Low-Income Program
Evaluation, Measurement and Verification Report
2017

Prepared for the FirstEnergy Ohio Companies:

Ohio Edison Company

The Cleveland Electric Illuminating Company

The Toledo Edison Company

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1. Executive Summary

During 2017, the Ohio operating companies, The Cleveland Electric Illuminating Company ("CEI"), Ohio Edison Company ("OE"), and The Toledo Edison Company ("TE") (collectively "Companies") continued the Low-Income Program (also known as the "Community Connections program"). The program was targeted to low-income residential customers, either directly or through landlords of such customers. The program was administered by Ohio Partners for Affordable Energy ("OPAE"), which worked with subcontractors to deliver weatherization services, energy efficient solutions, and customer education to participating low-income customers. For each participating customer, a walk-through audit of the residence was conducted to determine whether it was feasible and appropriate to install one or more weatherization or energy efficiency measures.

A total of 4,138 low-income households received energy efficiency services through the Low-Income Program in 2017. The numbers of participants in each service territory are shown in Table 1-1[1]:

Table 1-1 Program Participation by Utility

Utility	Number of Participants
CEI	1,908
OE	1,425
TE	805
Total	**4,138**

Estimates of the gross energy savings (kWh) and peak demand reductions (kW) for the program in the three service territories are reported in Table 1-2.

Table 1-2 Impact Evaluation Results[2]

Utility	Ex Ante kWh Savings	Ex Ante Peak kW Savings	Ex Post kWh Savings	Ex Post Peak kW Savings	kWh Realization Rate	kW Realization Rate
CEI	3,341,716	482.81	3,343,092	479.10	100%	99%
OE	2,694,984	373.66	2,685,669	366.68	100%	98%
TE	1,231,765	175.77	1,248,880	175.89	101%	100%
Total	**7,268,466**	**1,032.24**	**7,277,640**	**1,021.67**	**100%**	**99%**

[1] Unique project numbers were used to tally participant count. Some projects may span calendar years, in which case the Companies' tracking and reporting system only counts the participant in the year savings first appear for the project.

[2] All savings in this report are calculated at the retail level and do not include line losses.

The gross ex post kWh savings total shown in Table 1-2 reflects a realization rate of 100 percent, as determined by the ratio of verified total kWh savings to expected gross kWh savings. The gross ex post kW savings total shown in Table 1-2 reflect a realization rate of 99 percent. The replacement of refrigerators and freezers with ENERGY STAR® models and the installation of energy efficient lighting accounted for 68 percent of the verified total kWh savings.

1.1 Program Operations Conclusions

The following section summarizes the conclusions from program staff interviews[3] and community agency surveys.

- Communication between the Companies, OPAE and participating community agencies remains strong. All program staff ADM spoke with agreed that OPAE's new hires have contributed greatly to enhancing the program's delivery and better supporting agencies in the field. Also, frequent, ad-hoc communication over the phone and via email ensures staff is sharing information and providing agencies with the support and guidance they need. The majority of agencies we spoke with were either "satisfied" or "very satisfied" with how thoroughly Company and OPAE staff address their questions and how timely they are to respond. Both the Companies and OPAE staff indicated that they have the resources necessary to effectively administer the Community Connections Program.
- Increased site monitoring with community agencies in 2017. One of the key responsibilities of the new OPAE staff is to meet with agency staff, in-person. The Companies' staff agree that the agency monitoring was a success in 2017, with the key benefits being relationship building and creating opportunities to discuss diversifying the mix of measures installed at residences.
- Agencies continue to primarily utilize program funds for baseload measures. Agencies use funding from the Community Connections Program, in combination with other statewide weatherization programs, to complete energy efficiency projects in the homes of low-income customers. The funds from Community Connections are most often used to replace inefficient appliances, light bulbs and health and safety concerns that precede the completion of weatherization work, such as electrical panel upgrades and roof repairs.

[3] ADM interviewed the Companies' program manager and two OPAE staff members. Program staff at the individual EDC's were not interviewed during 2017. Company program staff (or representatives) coordinate program administration, tracking and reporting with OPAE. OPAE staff oversees delivery and Agency performance. Agency staff (or representatives) manage enrollment, coordination of delivery, tracking/reporting data entry, and follow-up with customers. Auditors perform and deliver audits, education and delivery of basic measures.

- The most widely discussed change from 2017 was the switch from CFL to LED light bulbs. During the transition, the program allowed agencies to install their remaining stocks of CFLs, before switching to LEDs. All agencies, but one, exclusively used LEDs by the end of August 2017. Agencies indicated that the new measure type is more cost effective in terms of energy use and maintenance costs. Agencies also conveyed that their clients were enthusiastic about the change indicating that the LED bulbs are much brighter (have greater lumen output.)
- The Community Connections Program increased health and safety spending approval limits from $2,000 per household to $2,500 per household. The program added mini-split ductless HVAC units to the list of eligible program measures, with one being installed in December.
- In 2017, the program placed more emphasis on energy savings tips and customer education, as compared to 2016. The Companies' staff added energy savings tips and topics of discussion to the quarterly agency newsletters. The Companies' staff also increased the materials for energy education; including a coloring book for children that addresses energy conservation. OPAE field monitors also reinforced energy education with agencies.
- The annual Weatherize Ohio Conference continues to be the primary event where program information is disseminated. According to OPAE program staff, the primary audience at the conference is agency operations and administrative staff. Agency feedback suggests there is a need to enhance training opportunities for agency field staff in the realm of appliance testing, home auditing, and health and safety measures. Agencies suggested this training may come in the form of additional workshops at the Weatherize Ohio Conference, additional program webinars, or training events which are more local to the agencies offices.
- The majority of participants learned about the Community Connections Program through word of mouth from a friend or family member, or through another program or community agency.

1.2 Participant Survey Conclusions

The following section summarizes the key findings from the survey of program participants.

- The majority (93%) of program participant surveyed reported high levels of satisfaction with the Community Connections Program. About half of the participants indicated they never spoke with agency staff, however, the majority (90%) that did, were either "satisfied" or "very satisfied" with their experience. Approximately 6% indicated lower levels of satisfaction with their communication. Sources of dissatisfaction include the instances where agency staff did not follow up on reported equipment issues, questions or concerns. Participants indicated

they were generally very satisfied with the audit experience. The time of the audit was convenient and the auditor showed up on time or within 15 minutes of the scheduled appointment time.

- The participant survey represents program participants who had agencies install mostly baseload measures in their homes such as CFLs or LEDs, ENERGYSTAR refrigerators, and freezers, as well as some health and safety measures. Overall, the majority of participants were very satisfied with the measures installed. Sources of dissatisfaction include the time it took to receive the freezer or that it had a dent. Several participants reported issues with the refrigerators they received, stating they were much smaller than what they expected, made noises, or were not cosmetically appealing.
- There are opportunities for auditors and program representatives to provide energy education to program participants. Eighty-four percent indicated they spoke with the auditor about ways to save energy in their home, however approximately 12% did not and 4% were unable to answer. After the auditor's visit took place, most respondents indicated they knew more about how to save energy in their home and found the information very useful.

1.3 Recommendations

ADM offers the following recommendations for continued improvement of the Community Connections Program.

- The Companies and OPAE should continue conducting annual in-person, site visits to agency offices. Feedback suggests the increased communication was well-received by agencies and considered to be a 2017 program success by OPAE and Company program staff. From our experience evaluating other low-income programs around the country, we can attest to the importance of strong relationships with program partners, such as community agencies and advocacy groups that work with low-income customers.
- Provide additional training opportunities and resources for agency staff as they continue their efforts to diversify the measure types installed. Feedback suggests agencies benefit from attending the Weatherize Ohio Conference and enjoyed last year's session conducted by the Company, with agency assistance, on smart power strips. The program should consider additional sessions on energy efficiency technologies that are either not frequently installed or are new to the program.
- Provide additional training for agency *field staff* to enhance their professional acumen related to home audits, appliance testing, and health and safety measures. Although they might not ultimately be responsible for the installation of

the measures, they could benefit from better understanding how to identify energy savings opportunities that may result from measures they are less familiar with. If the weatherize Ohio Conference is not the appropriate venue, the program could provide regional training workshops or coordinate with resources that are in close proximity to agency offices.

2. Introduction and Purpose of Study

Under contract with the Companies, ADM performed measurement and verification (M&V) activities to confirm the energy savings and demand reduction realized through the energy efficiency programs that the Companies implemented in Ohio in 2017. The purpose of this report is to present the results of the impact evaluation effort undertaken by ADM to verify the energy savings and peak demand reductions that resulted from the program during 2017. Additionally, this report presents the results of the process evaluation of the program focusing on participant and program staff perspectives.

The impact evaluation component of this report estimates annual gross energy savings and peak demand reduction as framed by the following three research questions:

- How many energy efficient measures were installed through the program?
- What is the average annual kWh savings per installed measure?
- What is the average kW reduction per installed measure?

The process evaluation is designed to research, and document, the program delivery mechanisms and collective experiences of program participants, partners and staff. ADM uses such information to assess if implementation strategies and/or program design could improve to better serve residential low-income customers. Table 2-1 provides a summary of the research questions and corresponding data collection activities.

Table 2-1: Community Connections Program Research Questions

Researchable Questions	Activity to Support the Question
Were there any significant program design changes? If so, what influenced the change(s) how did the change(s) impact the program?	Program staff interviews Agency survey
Is the program being administered effectively in terms of program oversight, communication, staffing, training and/or reporting?	Program staff interview Agency survey
Is the program being implemented effectively in terms of the participation processes, application tools and marketing and outreach?	Agency survey Participant survey
Were the program participants satisfied with their experiences?	Participant survey
What changes can be made to the program's design or delivery to improve its effectiveness in future program years?	Program staff interview Agency survey Participant survey

3. Description of Program

The Low-Income Program provides weatherization measures, energy efficient products, and services, as well as client education to low-income customers who receive electric service from the Companies.

The Low-Income Program for 2017 was a continuation of the program that began in 2003. In the state of Ohio there is a collaborative effort that leverages federal, state, utility, and other funding sources to provide weatherization and energy saving products and services to low-income customers. OPAE, a trade association that also does low-income advocacy work, administers the Low-Income Program and serves as the coordinator between utilities and the local agencies that perform the work. The program targets residential customers at or below 200% of Federal Poverty Guidelines and/or landlords of residents eligible for one of the following:

- Low Income Home Energy Assistance Program (LIHEAP), a federally-funded energy payment assistance program known in Ohio as HEAP
- Percentage Income Payment Program (PIPP), an energy payment assistance program
- Home Weatherization Assistance Program (HWAP), a federally-funded energy assistance program designed to increase the energy efficiency of dwellings owned or occupied by income-eligible Ohioans

OPAE allocates weatherization and energy efficient products and services funding to counties based upon the number of LIHEAP applications received.

In general, OPAE and local agencies do not market the program in the traditional sense. Rather, prioritized customers are identified and offered the services. Many agencies operate with a substantial on-going backlog of eligible customers.

Participation in the program is straightforward for customers. Most local agencies interviewed had on-staff inspectors who visit the customer's home. Auditors meter the customer's refrigerators and separate freezers to monitor the electrical use and they are replaced if the meter reads a certain kWh per hour based on unit size and type (i.e. chest, upright, etc.). The auditor talks with the client to understand energy use in the home and to provide energy conservation education. As part of the discussion, the auditor identifies which lights in the home are used more than 1 hour per day. Light bulbs are replaced with CFLs or LEDs for the fixtures that meet the minimum use criteria. The local agencies determine how best to leverage all funds (federal, state, utility, and other) available to the customer by taking into account what improvement and replacement equipment the customer needs. Other non-lighting measures that are administered through the program include installation of insulation, air infiltration reduction (blower door test), and water heater measures (water heater pipe wraps, low flow shower heads, and faucet aerators). Health and safety measures include roof repairs/replacement, electric wiring repairs and upgrades, stove replacement, and well pump replacement.

In addition, the cost to provide health & safety measures is not to exceed 15% of the Eligible Measures billed to the Companies during the 2017-2019 Program Years as part of the Community Connections Program. OPAE further distributes this allotment at 15 percent of the agency's total job spending per year. The Companies also added a seasonal allowance spreadsheet to the program, which allows agencies to determine what shell or electric heating/cooling reducing measures the customer is eligible for based on their electric consumption.

Table 3-1 and Table 3-2 below detail the ex-ante savings per measure for the program year 2017.

Table 3-1 Annual kWh & kW ex ante Estimates per Unit, Non-lighting

Energy Efficiency Measures: Non-Lighting	kWh	kW	Source
Air Sealing - CFM Reduction	Varies by Project	Varies by Project	Ohio TRM
Central AC replacement	Varies by Project	Varies by Project	Ohio TRM
Ductless Mini-Split	Varies by Project	Varies by Project	PA TRM
Hot water pipe insulation	Varies by Project	Varies by Project	Ohio TRM
Install 11-15 cu. ft. chest freezer	1,131	0.192	Ohio TRM
Install 14-16 cu. ft. refrigerator w/top freezer	1,251	0.192	Ohio TRM
Install 16-18 cu. ft. upright freezer	1,131	0.175	Ohio TRM
Install 16-20 cu. ft. chest freezer	1,131	0.192	Ohio TRM
Install 17-19 cu. ft. refrigerator w/top freezer	1,251	0.192	Ohio TRM
Install 19-21 cu. ft. upright freezer	1,131	0.192	Ohio TRM
Install 19-22 cu. ft. refrigerator w/bottom freezer	1,251	0.192	Ohio TRM
Install 20-22 cu. ft. refrigerator w/top freezer	1,251	0.192	Ohio TRM
Install 20-23 cu. ft. side by side refrigerator	1,251	0.192	Ohio TRM
Install 24-26 cu. ft. side by side refrigerator	1,251	0.192	Ohio TRM
Install 5-10 cu. ft. chest freezer	1,131	0.175	Ohio TRM
Install 9-15 cu. ft. upright freezer	1,131	0.175	Ohio TRM
Install faucet aerator w/o shut- off valve	30.9	0.004	Ohio TRM
Install faucet aerator w/shut-off valve	30.9	0.004	Ohio TRM
Install low flow showerhead	220	0.028	Ohio TRM
Install R-10 attic insulation (difficult)	Varies by Project	Varies by Project	Ohio TRM
Install R-11 blown cellulose-sloped ceiling	Varies by Project	Varies by Project	Ohio TRM
Install R-11 foundation wall insulation (difficult)	Varies by Project	Varies by Project	Ohio TRM
Install R-11 sidewall insulation - framed siding (difficult)	Varies by Project	Varies by Project	Ohio TRM
Install R-19 attic insulation (difficult)	Varies by Project	Varies by Project	Ohio TRM
Install R-19 blown cellulose-floored attic	Varies by Project	Varies by Project	Ohio TRM
Install R-19 fiberglass batt insulation	Varies by Project	Varies by Project	Ohio TRM
Install R-27 attic insulation (difficult)	Varies by Project	Varies by Project	Ohio TRM
Install R-27 blown cellulose-floored attic	Varies by Project	Varies by Project	Ohio TRM
Install R-38 attic insulation	Varies by Project	Varies by Project	Ohio TRM
Install R-38 blown cellulose-sloped ceiling	Varies by Project	Varies by Project	Ohio TRM
Insulate <52-gallon water heater	79	0.009	Ohio TRM
Insulate > or = 52-gallon water heater	79	0.009	Ohio TRM
Insulate band joist to R-11 (difficult)	Varies by Project	Varies by Project	Ohio TRM
Lower DHW tank temperature	123	0.010	PA TRM
The retirement of additional freezer	1,244	0.200	Ohio TRM
The retirement of additional refrigerator	1,376	0.220	Ohio TRM
Seal ducts with tape, mastic	0	0.000	Ohio TRM
Smart Strip Power Strip - 6 outlet	103	0.012	Ohio TRM
Smart Strip Power Strip - 7 outlet	103	0.012	Ohio TRM

Table 3-2 Annual kWh & kW ex Ante Estimates per Unit, Lighting

Energy Efficiency Measures: Lighting	kWh	kW	Source
Install 0.03 nightlight	11.40	0.0000	PA TRM
Install 0.5 Watt nightlight	11.40	0.0000	PA TRM
Install 10-12 Watt Flood LED	53.84	0.0064	PA TRM
Install 11–13 Watt LED	35.40	0.0042	PA TRM
Install 14-16 Watt LED	44.01	0.0053	PA TRM
Install 15 Watt dimmable CFL	43.92	0.0053	Ohio TRM
Install 15 Watt globe CFL	43.95	0.0053	Ohio TRM
Install 15 Watt or less outdoor CFL	38.07	0.0046	Ohio TRM
Install 16-20 Watt floodlight	52.71	0.0063	Ohio TRM
Install 16-20 Watt outdoor CFL	58.57	0.0070	Ohio TRM
Install 16-20 Watt spiral CFL	52.71	0.0063	Ohio TRM
Install 21 Watt or above floodlight	73.21	0.0088	Ohio TRM
Install 21 Watt or above outdoor CFL	67.35	0.0081	Ohio TRM
Install 21 Watt or above spiral CFL	73.26	0.0088	Ohio TRM
Install 3-way circle line CFL	96.63	0.0116	Ohio TRM
Install 3-way dimmable torchiere CFL	161.05	0.0193	Ohio TRM
Install 3-Way LED	84.97	0.0102	PA TRM
Install 3-way spiral CFL	58.60	0.0070	Ohio TRM
Install 4-6 Watt Mini-Candelabra LED	39.97	0.0048	PA TRM
Install 5-7 Watt Candelabra LED	49.11	0.0059	PA TRM
Install 5-7 Watt Globe LED	35.89	0.0043	PA TRM
Install 7-10 Watt LED	34.77	0.0042	PA TRM
Install 7-9 Watt candelabra	23.43	0.0028	Ohio TRM
Install 8-10 Watt Flood LED	55.21	0.0066	PA TRM
Install 9 Watt globe CFL	26.35	0.0032	Ohio TRM
Install 9-15 Watt spiral CFL	38.08	0.0046	Ohio TRM

The following Health and Safety measures were also installed through the program:

- Electric repair/upgrade
- Roof repair/replacement
- Energy Education Consultations
- Well-Pump Replacement

4. Methodology

This chapter provides a description of the methodology applied by ADM in the evaluation of the 2017 Low Income Program. The chapter is divided into two sections: impact evaluation methodology and process evaluation methodology.

4.1 Impact Evaluation Methodology

The primary deemed savings and/or engineering algorithm source for determining program impacts was the 2010 Ohio TRM[4] ("OHIO TRM"). The Pennsylvania TRM version 5[5] ("PA TRM") was used as a secondary calculation source for all measures not listed in the Ohio TRM.

Per the Companies' interpretation of Ohio RC §4928.662, for all measure types listed in the Ohio TRM; all installation rates, deemed savings, and hours of use were calculated per the Ohio TRM ("Deemed"). In addition, ADM calculated gross savings for measures in the program with "as found" baseline conditions, hours of use, and installation rates. The values reported for both *ex ante* and *ex post* energy savings (kWh) and peak demand reduction (kW) represent the higher calculated value obtained from both methodologies.

The impact evaluation component of this report estimates annual gross energy savings (kWh) and peak demand reduction (kW) as framed by the following five research questions:

- How many customers participated in the program?
- How many and which measure types were installed through the program?
- What percentage of each measure type can be verified as installed?
- What are the kWh savings achieved by the program?
- What was the kW reduction achieved by the program?

The methodology used to address each of these questions is detailed in the following sections.

4.2 Verification of quantity of Measures Installed

A first aspect of conducting measurements of program activity is to verify the number of program participants and measures installed in the home. ADM completed the following steps in the verification effort:

[4] Vermont Energy Investment Corporation (VEIC), *State of Ohio Energy Efficiency Technical Reference Manual*, Prepared for Public Utilities Commission of Ohio, Draft of August 6, 2010.

[5] PA 2016 Technical Reference Manual. http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/technical_reference_manual.aspx

- Validating program tracking data provided in the Vision DSM SSRS reporting system by checking for duplicate or erroneous entries;
- Conducting verification telephone surveys with a statistically valid sample of program participants. The focus of these surveys was to verify that customers listed in the program tracking database participated and the reported measure installations were accurate. The survey was also used to describe CFL and LED installation practices among lighting customers as well as to describe customer experiences with the contractors who performed the measure installations and the health and safety repairs; and,
- Completing on-site verification visits for a sample of customer homes. During these visits, ADM performed a visual verification and recorded the installation rates for all reported measures.

4.3 Sampling Strategy

For the evaluation surveying effort, a random sample was selected to ensure that 90 percent confidence with ±10 percent relative precision or better would be achieved for each utility.

For the calculation of sample size, a coefficient of variation of 0.5 was assumed.[6] With this assumption, a minimum sample size of 68 participants per utility was required, as shown in the following formula:

Minimum Sample Size Formula for 90 Percent Confidence Level

$$n_0 = \left(\frac{Z * CV}{RP}\right)^2 = \left(\frac{1.645 * 0.5}{0.10}\right)^2 = 68$$

Where:

n_0	=	minimum sample size
Z	=	Z-statistic value (1.645 for the 90% confidence level)
CV	=	Coefficient of Variation (assumed to be 0.5)
RP	=	Relative Precision (0.10)

ADM conducted phone surveys with 225 participants across the three service territories. Specifically, 75 surveys were completed with customers from each of the three operating companies. The instrument for the survey is provided in Appendix B.

For the evaluation's site verification visits, ADM utilized the Dalenius-Hodges' stratification methodology to achieve the required sampling precision. ADM's stratified

[6] The coefficient of variation, cv(y), is a measure of variation for the variable to be estimated. Its value depends on the mean and standard deviation of the distribution of values for the variable (i.e., cv(y) = sd(y)/mean(y)). Essentially, cv is a metric of how wide the distribution of values for the variable of interest is. Using a cv = 0.5 is recommend by the Uniform Methods Project Evaluation Protocol for Refrigerator Recycling Programs.

sampling plan utilized five strata per Operating Company. Strata boundaries per Operating Company were designed to minimize the coefficient of variance (CV) for all strata. The sample design used for selecting program projects allows estimates of savings to be determined with ±10% precision at a 90% confidence interval for the program. Forty-eight homes were visited, and precision goals were accomplished for each EDC.

Table 4-1 Ex Post Stratified Sampling Plan

Utility	Strata	Count of Gross kWh	Avg. of Gross kWh	Std. Dev of Gross kWh	Sum of Gross kWh	CV	Sample	Utility Precision
CEI	5	191	3,202	218	611,653	0.07	2	5.75%
	4	340	2,682	238	912,023	0.09	2	
	3	689	1,835	173	1,263,983	0.09	2	
	2	338	1,198	170	404,894	0.14	2	
	1	350	426	180	149,163	0.42	5	
OE	5	55	4,938	2,119	271,610	0.43	4	7.52%
	4	121	3,306	203	400,059	0.06	4	
	3	218	2,569	221	560,121	0.09	4	
	2	573	1,872	202	1,072,661	0.11	4	
	1	458	853	481	390,533	0.56	6	
TE	5	49	3,403	440	166,754	0.13	2	7.11%
	4	106	2,597	234	275,273	0.09	2	
	3	227	1,793	200	406,950	0.11	2	
	2	265	1,237	179	327,790	0.14	2	
	1	158	348	189	54,997	0.54	5	
Total					7,268,466		48	

4.4 Calculating Gross Annual kWh and kW Savings

Engineering and Deemed savings calculations were performed for a census of program measures. Detailed methodology descriptions are outlined in the sections below.

The following measures were installed through the Low-Income Program in 2017:

- CFLs
- LEDs
- Refrigerator replacement
- Freezer replacement
- Central air conditioning replacement

- Attic and Wall Insulation
- Water Heater Pipe Wraps
- Low Flow Showerhead
- Faucet Aerators
- Smart Power Strips
- Ductless Mini-Split Heat Pump

CFLs

The kWh savings per measure were calculated using Equation 4-1 and the corresponding values from Table 4-2 (taken from the 2010 Ohio TRM).

Equation 4-1: CFL Calculations for kWh Savings

$$kWh\ Savings = \Delta kWh = \left(\frac{\Delta Watts}{1000}\right) * ISR * Hours * WHFe$$

Table 4-2: Values Used to Calculate kWh Savings per CFL Measure

Variable	Description	Value	Source
CFL watts	Wattage of installed CFL	Varies	Participant Data
Delta watts multiplier	Factor to adjust for the change in baseline conditions	3.25[7]	OH TRM
ISR	In-Service-Rate [8]	86%	OH TRM
		79%	2017 survey and site verification results.
Hours	Average hours of use per year	1,040	OH TRM
WHFe	Waste Heat Factor to account for cooling savings from efficient lighting	1.07	OH TRM

The kW savings per measure were calculated using Equation 4-2 and the corresponding values from Table 4-3Table 4-2 (taken from the 2010 Ohio TRM).

[7] Ohio RC §4928.662 allows the use of the deemed 3.25 delta watts multiplier.
[8] Ohio RC §4928.662 allows the use of the higher of deemed or "as found" ISR. The final savings calculation for CFLs ISR used an 86% ISR.

Equation 4-2: CFL Calculations for Summer Peak Demand Reduction

$$Summer\ Peak\ Demand\ Reduction = \Delta kW = \left(\frac{\Delta Watts}{1000}\right) * ISR * WHFd * CF$$

Table 4-3: Values Used to Calculate kW Reduction per CFL Measure

Variable	Description	Value	Source
CFL watts	Wattage of installed CFL	Varies	Participant Data
Delta watts multiplier	A factor to adjust for the change in baseline conditions	3.25[9]	OH TRM
ISR	In-Service-Rate [10]	86%	OH TRM
		79%	2017 survey and site verification results.
WHFd	Waste Heat Factor. To account for cooling savings from efficient lighting	1.21	OH TRM
CF	Summer Peak Demand Coincidence Factor	0.11	OH TRM

LEDs

The kWh savings per measure were calculated per procedures set out in the PA TRM with applicable inputs utilized from the Ohio TRM. The calculations and inputs are shown respectively in Equation 4-3 and Table 4-4.

Equation 4-3: LED Calculations for kWh Savings

$$\Delta kWh = \frac{Watts_{base} - Watts_{EE}}{1000\ \frac{W}{kW}} \times Hours \times WHFe \times ISR$$

[9] Ohio RC §4928.662 allows the use of the deemed 3.25 delta watts multiplier.

[10] Ohio RC §4928.662 allows the use of the higher of deemed or "as found" ISR. The final savings calculation for CFLs ISR used an 86% ISR.

Table 4-4: Values Used to Calculate kWh Savings per LED Measure

Variable	Description	Value	Source
Watts base	The deemed wattage of existing bulb	Varies	FE OH EE Products Upstream Data
Watts EE	The wattage of the new bulb	Varies	FE OH EE Products Upstream Data
ISR	In-Service-Rate (i.e., the percentage of units provided by the program that are actually installed as estimated by the lighting verification survey)	83%	Participant surveys and site visits
Hours	Average hours of use per year	1,040	OH TRM
WHFe	Waste Heat Factor for energy - to account for cooling savings from efficient lighting	1.07	OH TRM

The installed wattages for the LED measures are reported by rated lamp wattage range as shown in Table 4-5. To calculate the energy savings, a specific efficient wattage is needed. ADM used the reported efficient wattages from the 2017 Ohio EE Products Lighting program to calculate an ex post weighted average wattage for each lamp category. Because 2017 EE Products data was not available when ex ante estimates were developed, the 2016 Pennsylvania EE Products upstream lighting data was used to calculate the ex ante weighted average wattage. Table 4-5 shows the ex post lamp wattage for the energy efficient installed lamps and the baseline wattage mapped utilizing the PA TRM lamp categories.

Table 4-5: Baseline and Efficient Wattages for LEDs

Lamp Category	Energy Efficient Lamp Wattage	Baseline Lamp Wattage
Install 3-Way LED	18.00	100.00
Install 14-16 Watt LED	15.09	67.35
Install 7-10 Watt LED	9.17	43.00
Install 10-12Watt Flood LED	11.29	64.75
Install 8-10Watt Flood LED	9.05	60.89
Install 4-6 Watt Mini-Candelabra LED	4.48	40.15
Install 5-7 Watt Candelabra LED	6.56	58.42
Install 5-7 Watt Globe LED	5.47	42.82
Install 11-13 Watt LED	11.41	53.00

The kW savings were calculated per procedures set out in the PA TRM with applicable inputs utilized from the Ohio TRM. The calculations and inputs are shown, respectively, in Equation 4-4 and Table 4-6.

Equation 4-4: LED Calculations for Summer Peak Demand Reduction

$$\Delta kW = \frac{Watts_{base} - Watts_{EE}}{1000\ \frac{W}{kW}} \times CF \times WHFd \times ISR$$

Table 4-6: Values Used to Calculate kW Reduction per LED Measure

Variable	Description	Value	Source
Watts base	Deemed wattage of existing bulb	Varies	PA TRM
Watts EE	Wattage of new bulb	Varies	Participant Data
ISR	In-Service Rate (i.e., the percentage of units provided by the program that are actually installed)	83%	Participant surveys and site visits
WHF_d	Waste Heat Factor for Demand (to account for cooling savings from efficient lighting)	1.21	OH TRM
CF	Summer Peak Demand Coincidence Factor	0.11	OH TRM

LED Nightlights kWh was calculated using Equation 4-5 from the PA TRM algorithm as follows:

Equation 4-5: LED Nightlights Calculation of kWh Savings

$$\Delta kWh = \frac{Watts_{base} - Watts_{EE}}{1000\ \frac{W}{kW}} \times NL_{hours} * 365 \times ISR$$

Where:

Wattsbase = Wattage of baseline nightlight

WattsEE = Wattage of LED nightlight

NLhours = Average hours of use per day per nightlight

ISR = In-service rate

According to the PA TRM, there is no measurable peak kW reduction attributed to LED night lights.

Refrigerator Replacement

The procedures for calculating annual kWh savings and peak demand savings for replacement of a refrigerator for a low-income household are reported in the Ohio TRM. The deemed values for kWh and kW are shown in Table 4-7 below.

Table 4-7: TRM Deemed Values for kWh & kW

	Per Unit Savings
kWh Savings per Unit *Remaining life of existing unit (8 years)*	1,251 kWh
Average Summer Coincident Peak **kW Savings** per Unit. *Remaining life of existing unit (8 years)*	0.192 kW

Freezer Replacements

The Ohio TRM does not include procedures for calculating annual kWh or kW savings for early replacement freezers installed in low-income households. However, procedures are presented to calculate savings for freezer replacement in households that are not low-income. ADM calculated ratios between the "time of sale" deemed kWh and kW savings values for refrigerators and the "time of sale" deemed kWh and kW saving values for freezers. These calculated ratios were applied to the early replacement refrigerator deemed savings to estimate early replacement savings for freezers installed in low-income households.[11] The resulting savings values are reported in Table 4-8.

Table 4-8: TRM Deemed Values for kWh & kW

	Per Unit Savings
kWh Savings per Unit *Remaining life of existing unit (8 years)*	1,131 kWh
Average Summer Coincident Peak **kW Savings** per Unit. *Remaining life of existing unit (8 years)*	0.175 kW

Smart Power Strips

Energy and demand savings are deemed based on the plug size (5-plug or 7-plug) of the smart power strip purchased. Table 4-9 shows the deemed savings values specified in the OHIO TRM for the installation of Smart Strips.

Table 4-9: Deemed Savings Values for Smart Power Strips

Plug Size	Annual kWh Savings per Unit	Peak Demand kW Reduction per Unit
5-Plug	56.5	0.0063
7-Plug	102.8	0.012

The deemed savings values for 7-plug smart power strips were applied to determine *ex post* savings.

[11] For freezer kWh savings, calculation is (1,244/1,376)*1,251 = 1,131 kWh. For freezer kW savings, calculation is (0.20/0.22)*0.192 = 0.175 kW

Water Heater Wraps

Program-level energy (kWh) and peak demand (kW) savings from installing water heater wraps were calculated using the deemed savings values for this measure in the TRM. Table 4-10 shows the deemed savings values specified in the TRM for Water Heater Wraps.

Table 4-10: Deemed Savings Values for Water Heater Wraps

	Per Unit kWh/kW
Average Annual **kWh Savings** per Unit	79 kWh
Average Summer Coincident Peak **kW Savings** per Unit	0.009 kW

Low-Flow Showerheads

For low-flow showerheads, kWh and kW savings per measure were calculated per procedures set out in the Ohio TRM:

Equation 4-6: Low-Flow Showerhead Calculations for kWh Savings

$$\Delta kWh = ISR * (GPM_{base} - GPM_{low}) * kwh/GPM_{reduced}$$

Equation 4-7: Low-Flow Showerhead Calculations for Summer Peak Demand Savings

$$\Delta kW = \frac{\Delta kWh}{hours} * CF$$

Table 4-11: Values used to Calculate kWh and kW savings for Low-Flow Showerheads

Variable	Description	Value	Source
ISR	In-Service-Rate	100%	OH TRM – Direct Install
GPMbase	Gallons per minute of baseline showerhead	2.87	OH TRM
GPMlow	Gallons per minute of low flow showerhead	1.6	The assumption of average flow
kWh/GPMreduced	Assumed kWh savings per GPM reduction	173	OH TRM
Hours	Average number of hours per year spent using shower	29	OH TRM
CF	Summer Peak Coincidence Factor	0.00371	OH TRM

The inputs in the table above produced annual energy savings of 219.7 kWh and summer coincident peak demand savings of 0.0281 kW per showerhead.

Faucet Aerators

For faucet aerators, kWh and kW savings per measure were calculated per procedures set out in the OH TRM:

Equation 4-8: Faucet Aerator Calculations for kWh Savings

$$\Delta kWh = ISR * ((((GPM_{base} - GPM_{low}) * 77$$[12]

Equation 4-9: Faucet Aerator Calculations for Summer Peak Demand Savings

$$\Delta kW = \frac{\Delta kWh}{hours} * CF$$

Table 4-12: Values used to Calculate kWh and kW savings for Low-Flow Showerheads

Variable	Description	Value	Source
ISR	In-Service-Rate	100%	OH TRM – Direct Install
GPMbase	Gallons per minute of baseline faucet aerator	2.2	OH TRM
GPMlow	Gallons per minute faucet aerator	1.6	Assumption of average flow
CF	Summer Peak Coincidence Factor	0.0026	OH TRM

From the equations and variables above, the annual energy savings values are 24.5 kWh per unit, and the summer coincident peak demand savings are 0.0031 kW per unit.

Attic/Wall Insulation

For attic/wall insulation measures kWh & kW savings per measure were calculated per procedures set out in the OH TRM:

Equation 4-10: Attic/Wall Insulation Calculations for Cooling kWh Savings

$$\Delta kWh\ (Cooling) = \frac{\left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) * CDH * DUA * Area}{\frac{1{,}000}{Eff_{Cool}}}$$

Equation 4-11: Attic/Wall Insulation Calculations for Heating kWh Savings

$$\Delta kWh\ (Electric\ Heating) = \frac{\left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) * HDD * 24 * Area}{\frac{1{,}000{,}000}{Eff_{Heat}}} * 293.1$$

Equation 4-12: Attic/Wall Insulation Calculations for Summer Peak Demand Reduction

$$\Delta kW\ (Cooling) = \frac{kWh\ Savings\ (Cooling)}{FLH_{Cool} * CF}$$

[12] The OH TRM (page 89 and 90) provides deemed values in the equation below which results in 77.

((#people*gals/day*days/year*DR/(F/home))*8.3*(Tft-Tmains)/1,000,000)/DHW Recovery Efficiency/0.003412

Table 4-13: Values Used to Calculate kWh Savings and kW Reduction for Attic and Wall Insulation

Variable	Description	Value	Source
Rexist	R-value existing	Varies	Community Connections (CC) System[13]
Rnew	R-value new	Varies	CC System
CDH	Cooling Degree Hours	Varies	OH TRM: Location Dependent
HDD	Heating Degree Days	Varies	OH TRM: Location Dependent
DUA	Discretionary Use Adjustment[14]	0.75	OH TRM
Area	Square footage of insulated area	Varies	CC System
Eff Cool	Efficiency of Air Conditioning equipment	Varies	CC System
Eff Heat	Efficiency of heating equipment	Varies	CC System
FLH Cool	Full Load Cooling Hours	Varies	OH TRM: Location Dependent
CF	Summer Peak Coincidence Factor	0.5	OH TRM
COP	Coefficient of Performance	2.26	OH TRM

Central AC Replacement

For Central AC Replacement, kWh & kW savings per measure were calculated per procedures set out in the OH TRM,[15]

Equation 4-13: Central AC Replacement Calculations for kWh Savings

$$\Delta kWh = \frac{\left(\frac{1}{SEER_{exist}} - \frac{1}{SEER_{new}}\right) * FLH_{cool} * BtuH}{1{,}000}$$

Equation 4-14: Central AC Replacement Calculations for Summer Peak Demand Reduction

$$\Delta kW = \frac{\left(\frac{1}{EER_{exist}} - \frac{1}{EER_{new}}\right) * BtuH}{1{,}000} * CF$$

[13] The Community Connections System is a data management system operated by the Company and its partners; the system tracks completed energy improvement activities and contains site-specific information, equipment specification details, as well as other supporting documentation about energy improvement projects implemented in low-income residences.

[14] To account for the fact that people do not always operate their air conditioning system when the outside temperature is greater than 75°F.

[15] The TRM calculation for lifetime savings for this measure uses existing equipment to calculate savings for the first five years and baseline (or code) equipment for the next 13 years. Since a conservative measure life of 8 years is being applied to most measures in the low-income program, only existing equipment baseline calculation was used.

Table 4-14: Values Used to Calculate kWh Savings and kW Reduction for Central Air Conditioners

Variable	Description	Value	Source
FLHcool	Full load cooling hours	Varies	OH TRM, Location Dependent
Btuh	Size of equipment in Btuh (1 ton = 12,000 Btuh)	Varies	CC System
SEERexist	SEER efficiency of existing unit	10	OH TRM
SEERee	SEER efficiency of ENERGY STAR unit	Varies	tCC System
EERexist	EER efficiency of existing unit (if unknown, SEER exist * 0.9)	9	OH TRM
EERee	EER efficiency of ENERGY STAR unit	Varies	Captured in the CC System
CF	Summer Peak Coincidence Factor	0.5	OH TRM

Air Infiltration Reduction

For Air Filtration Reduction kWh and kW cooling savings per measure were calculated per procedures set out in the OH TRM:

Equation 4-15: Air Infiltration Reduction Calculations for Cooling kWh Savings

$$\Delta kWh\ (Cooling) = \frac{\left(\frac{CFM50_{exist} - CFM50_{new}}{Nfactor_{cool}}\right) * 60 * CDH * 0.0135}{\frac{1{,}000}{Eff_{Cool}}}$$

Equation 4-16: Air Infiltration Reduction Calculations for Heating kWh Savings

$$\Delta kWh\ (Electric\ Heating) = \frac{\left(\frac{CFM50_{exist} - CFM50_{new}}{Nfactor_{heat}}\right) * 60 * 24 * HDD * 0.018}{\frac{1{,}000{,}000}{Eff_{heat}}} * 293.1$$

Equation 4-17: Air Infiltration Reduction Calculations for Summer Peak Demand Reduction

$$\Delta kW\ (Cooling) = \frac{kWh\ Savings\ (Cooling)}{FLH_{Cool} * CF}$$

Table 4-15: Values Used to Calculate kWh Savings and kW Reduction from Reduction of Air Infiltration

Variable	Description	Value	Source/Description
CFM50exist	Existing Cubic Feet per Minute at 50 Pascal pressure differential - measured by the blower door before air sealing	Varies	Captured in the CC System
CFM50new	New Cubic Feet per Minute at 50 Pascal pressure differential – measured by the blower door after air sealing	Varies	Captured in the CC System
N-factorCool	Conversion factor – convert 50-Pascal air flows to natural airflow	29.4	OH TRM
N-factorHeat	Conversion factor - convert 50-Pascal air flows to natural airflow	17.8	OH TRM
CDH	Cooling Degree Hours	Varies	OH TRM, Dependent on Location
HDD	Heating Degree Days	Varies	OH TRM, Dependent on Location
DUA	Discretionary Use Adjustment – to account for the fact that people do not always operate their air conditioning system when the outside temperature is greater than 75°F	0.75	OH TRM
EffCool	Efficiency of Air Conditioning equipment	Varies	Captured in the CC System
EffHeat	Efficiency of Heating equipment	Varies	Captured in the CC System
FLHCool	Full Load Hours - Cooling	Varies	OH TRM, Dependent on Location
CF	Summer Peak Coincidence Factor	0.5	OH TRM
COP	Coefficient of Performance	2.26	OH TRM

Hot Water Pipe Insulation

For Domestic Hot Water Pipe Insulation kWh and kW savings per measure were calculated per procedures set out in the OH TRM,

Equation 4-18: Hot Water Pipe Insulation Calculations for kWh Savings

$$\Delta kWh = \frac{\left(\frac{1}{R_{exist}} - \frac{1}{R_{new}}\right) * L * C * \Delta T * 8{,}760}{\frac{\eta DHW}{3{,}413}}$$

Equation 4-19: Hot Water Pipe Insulation Calculations for Summer Peak Demand Reduction

$$\Delta kW = \frac{kWh\ Savings}{8{,}760}$$

Table 4-16: Values Used to Calculate kWh Savings and kW Reduction for Hot Water Pipe Insulation

Variable	Description	Value	Source
Rexist	R-value existing – existing effective whole-assembly thermal resistance value	Varies	Captured in the CC System
Rnew	R-value new – new total effective whole-assembly thermal resistance value	Varies	Captured in the CC System
L	Length of pipe from water heating source covered by pipe wrap (ft)	Varies	Captured in the CC System
C	Circumference of pipe (ft) (Diameter (in) * π * 0.083)	Varies	Captured in the CC System
ΔT	Average temperature difference between supplied water and outside air temperature (°F)	65	OH TRM
ηDHW	Recovery efficiency of electric hot water heater	0.98	OH TRM

4.5 Calculation of Lifetime kWh Savings per Measure

Lifetime kWh savings were calculated by multiplying annual kWh savings for each measure by a deemed effective useful life. The useful life for each measure is detailed in Table 4-17 and Table 4-18.

Table 4-17: Effective Useful Life Non-Lighting Measures

Energy Efficiency Measures: Non-Lighting	**EUL**
Air Sealing - CFM Reduction	15
Central AC replacement	18
Ductless Mini-Split	18
Hot water pipe insulation	15
Install 11-15 cu. ft. chest freezer	17
Install 14-16 cu. ft. refrigerator w/top freezer	17
Install 16-18 cu. ft. upright freezer	17
Install 16-20 cu. ft. chest freezer	17
Install 17-19 cu. ft. refrigerator w/top freezer	17
Install 19-21 cu. ft. upright freezer	17
Install 19-22 cu. ft. refrigerator w/bottom freezer	17
Install 20-22 cu. ft. refrigerator w/top freezer	17
Install 20-23 cu. ft. side by side refrigerator	17
Install 24-26 cu. ft. side by side refrigerator	17
Install 5-10 cu. ft. chest freezer	17
Install 9-15 cu. ft. upright freezer	17
Install faucet aerator w/o shut- off valve	5
Install faucet aerator w/shut-off valve	5
Install low flow showerhead	5
Install R-10 attic insulation (difficult)	25
Install R-11 blown cellulose-sloped ceiling	25
Install R-11 foundation wall insulation (difficult)	25
Install R-11 sidewall insulation - framed siding (difficult)	25
Install R-19 attic insulation (difficult)	25
Install R-19 blown cellulose-floored attic	25
Install R-19 fiberglass batt insulation	25
Install R-27 attic insulation (difficult)	25
Install R-27 blown cellulose-floored attic	25
Install R-38 attic insulation	25
Install R-38 blown cellulose-sloped ceiling	25
Insulate <52 gallon water heater	5
Insulate > or = 52 gallon water heater	5
Insulate band joist to R-11 (difficult)	25
Lower DHW tank temperature	2
Retirement of additional freezer	8
Retirement of additional refrigerator	8
Seal ducts with tape, mastic	20
Smart Strip Power Strip - 6 Outlet	4
Smart Strip Power Strip - 7 outlet	4

Table 4-18: Effective Useful Life Lighting Measures

Energy Efficiency Measures: Lighting	**EUL**
Install 0.3 Watt nightlight	8.00
Install 0.5 Watt nightlight	8.00
Install 10-12 Watt Flood LED	13.60
Install 11–13 Watt LED	13.60
Install 14-16 Watt LED	13.60
Install 15 Watt dimmable CFL	9.18
Install 15 Watt globe CFL	9.18
Install 15 Watt or less outdoor CFL	9.18
Install 16-20 Watt floodlight	9.18
Install 16-20 Watt outdoor CFL	9.18
Install 16-20 Watt spiral CFL	9.18
Install 21 Watt or above floodlight	9.18
Install 21 Watt or above outdoor CFL	9.18
Install 21 Watt or above spiral CFL	9.18
Install 3-way circle line CFL	9.18
Install 3-way dimmable torchiere CFL	9.18
Install 3-way LED	13.60
Install 3-way spiral CFL	9.18
Install 4-6 Watt Mini-Candelabra LED	13.60
Install 5-7 Watt Candelabra LED	13.60
Install 5-7 Watt Globe LED	13.60
Install 7-10 Watt LED	13.60
Install 7-9 Watt candelabra	9.18
Install 8-10 Watt Flood LED	13.60
Install 9 Watt globe CFL	9.18
Install 9-15 Watt spiral CFL	9.18

4.6 Process Evaluation Methodology

The process evaluation is designed to research, and document, the program delivery mechanisms and collective experiences of program participants, partners and staff. ADM uses such information to assess if implementation strategies and/or program design could improve to better serve residential low-income customers. Table 4-19 provides a summary of the research questions and corresponding data collection activities.

Table 4-19: Community Connections Program Research Questions

Researchable Questions	Activity to Support the Question
Were there any significant program design changes? If so, what influenced the change(s) how did the change(s) impact the program?	Program staff interviews Agency survey
Is the program being administered effectively in terms of program oversight, communication, staffing, training and/or reporting?	Program staff interview Agency survey
Is the program being implemented effectively in terms of the participation processes, application tools and marketing and outreach?	Agency survey Participant survey
Were the program participants satisfied with their experiences?	Participant survey
What changes can be made to the program's design or delivery to improve its effectiveness in future program years?	Program staff interview Agency survey Participant survey

To address these researchable issues, ADM reviewed program documentation, administered participant surveys and completed in-depth interviews with the Companies' program staff and implementation partners. ADM began the process evaluation in August 2017 with the development of data collection instruments and a review of program documentation. Process evaluation data collection and analysis occurred September through December 2017.

- **Program Documentation Review:** Program materials are an important data source for the process evaluation. We began by requesting all available documentation from the Companies and OPAE program staff. This list included any operating or process manuals, implementation contracts, resident and agency outreach and education materials, agency newsletters and the current price sheet.
- **Program Staff In-Depth Interviews:** ADM researchers conducted in-depth interviews with three key program staff at the Companies and OPAE. The objective of these interviews is to check-in with staff to elicit feedback and suggestions for program improvements.
- **Agency Survey**: ADM administered an online survey to participating community agencies; thirteen of the 22 agencies (59%) responded. The respondents accounted for 40% of total program activity.[16] The survey addressed issues related to program design, operations, and opportunities for improvements.

[16] Program activity through the end of November 2017.

- **Participant Survey:** ADM contracted with VuPoint Research to administer phone surveys to residents who received measures or services from the program. In total, 225 customers completed the survey; 75 from each EDC. Survey topics covered measure installation rates as well as customer experiences with the program, installation crew, and agency staff.

5. Detailed Impact Evaluation Findings

The number of low-income households that received energy efficiency services through the Low-Income Program in 2017 in the service territories of the Companies are shown in Table 5-1 below.

Table 5-1: Number of Participants

Utility	Number of Participants
CEI	1,908
OE	1,425
TE	805
Total	**4,138**

5.1 Impact Evaluation Results

Table 5-2 shows the quantities of energy efficient lighting measures that were installed for these participants through the Low-Income Program and Table 5-3 shows the quantities of energy efficient non-lighting measures that were installed for the participants in 2017.

Table 5-4 shows the number of health and safety measures and the number of energy education consultations that were conducted under the Low-Income Program in 2017.

Table 5-2: Quantities of Lighting Measures

Lighting Measure	CEI	OE	TE	Total
Install 0.3 Watt nightlight	0	11	0	11
Install 0.5 Watt nightlight	0	329	3	332
Install 10-12 Watt Flood LED	64	246	12	322
Install 11-13 Watt LED	4	60	11	75
Install 14-16 Watt LED	1,811	1,160	1,445	4,416
Install 15 Watt dimmable CFL	38	90	1	129
Install 15 Watt globe CFL	281	753	25	1,059
Install 15 Watt or less outdoor CFL	14	110	0	124
Install 16-20 Watt floodlight	0	115	0	115
Install 16-20 Watt outdoor CFL	15	136	0	151
Install 16-20 Watt spiral CFL	2,290	1,046	1,515	4,851
Install 21 Watt or above floodlight	8	105	0	113
Install 21 Watt or above outdoor CFL	50	26	0	76
Install 21 Watt or above sprial CFL	5,047	1,030	515	6,592
Install 3-way circle line CFL	16	3	0	19
Install 3-way dimmable torchiere CFL	0	3	1	4
Install 3-Way LED	51	329	10	390
Install 3-way spiral CFL	56	372	15	443
Install 4-6 Watt Mini-Candelabra LED	221	568	0	789
Install 5-7 Watt Candelabra LED	220	598	43	861
Install 5-7 Watt Globe LED	164	827	2	993
Install 7-10 Watt LED	3,038	5,635	1,018	9,691
Install 7-9 Watt candelabra	118	677	52	847
Install 8-10 Watt Flood LED	17	50	0	67
Install 9 Watt globe CFL	18	16	108	142
Install 9-15 Watt spiral CFL	4,437	6,730	3,843	15,010
Total	**9,689**	**5,552**	**3,538**	**18,779**

Table 5-3: Quantities of Non - Lighting Measures

Measure Category	CEI	OE	TE	Total
Air Sealing - CFM Reduction	0	4	0	4
Central AC replacement	0	4	0	4
Ductless Mini-Split	0	1	0	1
Hot water pipe insulation	0	10	2	12
Install 11-15 cu. ft. chest freezer	4	21	25	50
Install 14-16 cu. ft. refrigerator w/top freezer	160	133	42	335
Install 16-18 cu. ft. upright freezer	198	77	65	340
Install 16-20 cu. ft. chest freezer	0	3	1	4
Install 17-19 cu. ft. refrigerator w/top freezer	625	441	171	1,237
Install 19-21 cu. ft. upright freezer	4	26	13	43
Install 19-22 cu. ft. refrigerator w/bottom freezer	6	38	49	93
Install 20-22 cu. ft. refrigerator w/top freezer	308	292	94	694
Install 20-23 cu. ft. side by side refrigerator	143	84	77	304
Install 24-26 cu. ft. side by side refrigerator	172	128	123	423
Install 5-10 cu. ft. chest freezer	170	123	33	326
Install 9-15 cu. ft. upright freezer	197	33	1	231
Install faucet aerator w/o shut- off valve	8	113	7	128
Install faucet aerator w/shut-off valve	12	67	0	79
Install low flow showerhead	11	89	4	104
Install R-10 attic insulation (difficult)	0	1	1	2
Install R-11 blown cellulose-sloped ceiling	0	0	1	1
Install R-11 foundation wall insulation (difficult)	0	1	0	1
Install R-11 sidewall insulation - framed siding (difficult)	0	8	0	8
Install R-19 attic insulation (difficult)	0	2	1	3
Install R-19 blown cellulose-floored attic	0	3	1	4
Install R-19 fiberglass batt insulation	0	3	2	5
Install R-27 attic insulation (difficult)	0	6	1	7
Install R-27 blown cellulose-floored attic	0	1	0	1
Install R-38 attic insulation	0	9	2	11
Install R-38 blown cellulose-sloped ceiling	0	1	0	1
Insulate <52 gallon water heater	0	13	0	13
Insulate > or = 52 gallon water heater	1	1	0	2
Insulate band joist to R-11 (difficult)	0	1	0	1
Lower DHW tank temperature	1	0	1	2
Retirement of additional freezer	0	2	0	2
Retirement of additional refrigerator	3	2	0	5
Seal ducts with tape, mastic	0	5	0	5
Smart Strip Power Strip - 6 outlet	48	6	0	54
Smart Strip Power Strip - 7 outlet	27	75	0	102
Total Non-Lighting Measures	**2,098**	**1,827**	**717**	**4,642**

Table 5-4: Quantities Health & Safety and Education Measures

Measure Category	CEI	OE	TE	Total Companies
Carbon Monoxide Detector	9	280	783	1,072
Electrical Repairs	876	5,677	155	6,708
Roof Repairs	40	5,056	43	5,139
Replace Electric Stove	2	208	9	219
Replace Well-Pump	1	12	6	19
Total Health & Safety and Education Measures	**928**	**11,233**	**996**	**13,157**

Table 5-5 through Table 5-8 below detail the ex-post savings values and realization rates calculated per measure during program year 2017.

Table 5-5: Annual kWh Savings by Measure (Non-Lighting)

Measure	Ex-Ante kWh	Ex Post Savings kWh	Realization Rate
Air Sealing - CFM Reduction	402	387	96%
Ductless Mini-Split	8,051	8,051	100%
Hot water pipe insulation	1,825	1,825	100%
Install 11-15 cu. ft. chest freezer	56,550	56,550	100%
Install 14-16 cu. ft. refrigerator w/top freezer	419,085	419,085	100%
Install 16-18 cu. ft. upright freezer	384,540	384,537	100%
Install 16-20 cu. ft. chest freezer	4,524	4,524	100%
Install 17-19 cu. ft. refrigerator w/top freezer	1,547,487	1,547,487	100%
Install 19-21 cu. ft. upright freezer	48,633	48,633	100%
Install 19-22 cu. ft. refrigerator w/bottom freezer	116,343	116,343	100%
Install 20-22 cu. ft. refrigerator w/top freezer	868,194	868,194	100%
Install 20-23 cu. ft. side by side refrigerator	380,304	380,304	100%
Install 24-26 cu. ft. side by side refrigerator	529,173	529,173	100%
Install 5-10 cu. ft. chest freezer	368,706	368,703	100%
Install 9-15 cu. ft. upright freezer	261,261	261,259	100%
Install faucet aerator w/o shut- off valve	3,955	3,954	100%
Install faucet aerator w/shut-off valve	2,441	2,440	100%
Install low flow showerhead	22,849	22,850	100%
Install R-10 attic insulation (difficult)	450	450	100%
Install R-11 foundation wall insulation (difficult)	559	554	99%
Install R-11 sidewall insulation - framed siding (difficult)	12,587	12,029	96%
Install R-19 attic insulation (difficult)	2	2	100%
Install R-19 blown cellulose-floored attic	290	264	91%
Install R-19 fiberglass batt insulation	7,860	8,007	102%
Install R-27 attic insulation (difficult)	4,863	4,789	98%
Install R-27 blown cellulose-floored attic	3,310	3,277	99%
Install R-38 attic insulation	27,048	23,643	87%
Install R-38 blown cellulose-sloped ceiling	6,722	6,655	99%
Insulate <52 gallon water heater	1,027	1,022	100%
Insulate > or = 52 gallon water heater	158	157	100%
Insulate band joist to R-11 (difficult)	420	208	50%
Lower DHW tank temperature	246	332	135%
Retirement of additional freezer	2,488	2,262	91%
Retirement of additional refrigerator	6,880	6,255	91%
Smart Strip Power Strip - 6 Outlet	5,551	5,551	100%
Smart Strip Power Strip - 7 outlet	10,486	10,486	100%
Total	**5,115,268**	**5,110,241**	**100%**

Table 5-6: Annual kWh Savings by Measure (Lighting)

Measure	Ex-Ante Savings kWh	Ex Post Savings kWh	Realization Rate
Install 0.3 Watt nightlight	125	134.32584	107%
Install 0.5 Watt nightlight	3,785	3780.816	100%
Install 10-12 Watt Flood LED	16,075	15,906	99%
Install 11-13 Watt LED	2,655	2,882	109%
Install 14-16 Watt LED	191,069	213,248	112%
Install 15 Watt dimmable CFL	5,666	6,018	106%
Install 15 Watt globe CFL	46,533	49,407	106%
Install 15 Watt or less outdoor CFL	4,720	5,785	123%
Install 16-20 Watt floodlight	6,061	6,796	112%
Install 16-20 Watt outdoor CFL	8,843	8,923	101%
Install 16-20 Watt spiral CFL	255,689	271,583	106%
Install 21 Watt or above floodlight	8,272	7,381	89%
Install 21 Watt or above outdoor CFL	5,119	4,964	97%
Install 21 Watt or above spiral CFL	482,626	471,568	98%
Install 3-way circle line CFL	1,836	1,950	106%
Install 3-way dimmable torchiere CFL	644	445	69%
Install 3-Way LED	33,139	29,548	89%
Install 3-way spiral CFL	25,956	26,179	101%
Install 4-6 Watt Mini-Candelabra LED	27,409	26,005	95%
Install 5-7 Watt Candelabra LED	37,481	41,257	110%
Install 5-7 Watt Globe LED	32,965	34,275	104%
Install 7-10 Watt LED	358,328	302,885	85%
Install 7-9 Watt candelabra	19,844	23,710	119%
Install 8-10 Watt Flood LED	3,094	3,209	104%
Install 9 Watt globe CFL	3,742	3,975	106%
Install 9-15 Watt spiral CFL	571,521	606,908	106%
Grand Total	**2,153,197**	**2,168,722**	**101%**

Table 5-7: Peak Demand kW Reductions by Measure (Non-Lighting)

Measure	Ex-Ante kW	Ex Post Savings kW	Realization Rate
Air Sealing - CFM Reduction	0.15	0.17	109%
Ductless Mini-Split	0.13	0.13	100%
Hot water pipe insulation	0.21	0.21	100%
Install 11-15 cu. ft. chest freezer	8.75	8.74	100%
Install 14-16 cu. ft. refrigerator w/top freezer	64.32	64.45	100%
Install 16-18 cu. ft. upright freezer	59.50	59.47	100%
Install 16-20 cu. ft. chest freezer	0.70	0.70	100%
Install 17-19 cu. ft. refrigerator w/top freezer	237.50	237.98	100%
Install 19-21 cu. ft. upright freezer	7.53	7.52	100%
Install 19-22 cu. ft. refrigerator w/bottom freezer	17.86	17.89	100%
Install 20-22 cu. ft. refrigerator w/top freezer	133.25	133.52	100%
Install 20-23 cu. ft. side by side refrigerator	58.37	58.49	100%
Install 24-26 cu. ft. side by side refrigerator	81.22	81.38	100%
Install 5-10 cu. ft. chest freezer	57.05	57.02	100%
Install 9-15 cu. ft. upright freezer	40.43	40.40	100%
Install faucet aerator w/o shut- off valve	0.50	0.49	99%
Install faucet aerator w/shut-off valve	0.31	0.30	99%
Install low flow showerhead	2.92	2.92	100%
Install R-10 attic insulation (difficult)	0.01	0.01	111%
Install R-11 sidewall insulation - framed siding (difficult)	0.16	0.16	100%
Install R-19 attic insulation (difficult)	0.00	0.00	100%
Install R-19 blown cellulose-floored attic	0.03	0.03	100%
Install R-27 attic insulation (difficult)	0.05	0.05	100%
Install R-38 attic insulation	0.13	0.15	118%
Insulate <52 gallon water heater	0.12	0.12	100%
Insulate > or = 52 gallon water heater	0.02	0.02	100%
Lower DHW tank temperature	0.02	0.03	135%
Retirement of additional freezer	0.40	0.35	87%
Retirement of additional refrigerator	1.10	0.96	87%
Smart Strip Power Strip - 6 Outlet	0.65	0.62	96%
Smart Strip Power Strip - 7 outlet	1.22	1.18	96%
Grand Total	**774.60**	**775.44**	**100%**

Table 5-8: Peak Demand kW Reductions by Measure (Lighting)

Measure	Ex-Ante kW Savings	Ex Post Savings kW	Realization Rate
Install 10-12 Watt Flood LED	1.92	1.60	84%
Install 11-13 Watt LED	0.32	0.29	92%
Install 14-16 Watt LED	22.94	21.50	94%
Install 15 Watt dimmable CFL	0.68	0.72	106%
Install 15 Watt globe CFL	5.58	5.91	106%
Install 15 Watt or less outdoor CFL	0.57	0.69	122%
Install 16-20 Watt floodlight	0.73	0.81	112%
Install 16-20 Watt outdoor CFL	1.06	1.07	101%
Install 16-20 Watt spiral CFL	30.65	32.48	106%
Install 21 Watt or above floodlight	0.99	0.88	89%
Install 21 Watt or above outdoor CFL	0.61	0.59	97%
Install 21 Watt or above sprial CFL	57.84	56.40	98%
Install 3-way circle line CFL	0.22	0.23	106%
Install 3-way dimmable torchiere CFL	0.08	0.05	69%
Install 3-Way LED	3.97	2.98	75%
Install 3-way spiral CFL	3.11	3.13	101%
Install 4-6 Watt Mini-Candelabra LED	3.28	2.62	80%
Install 5-7 Watt Candelabra LED	4.49	4.16	93%
Install 5-7 Watt Globe LED	3.94	3.46	88%
Install 7-10 Watt LED	42.99	30.54	71%
Install 7-9 Watt candelabra	2.38	2.84	119%
Install 8-10 Watt Flood LED	0.37	0.32	88%
Install 9 Watt globe CFL	0.45	0.48	106%
Install 9-15 Watt spiral CFL	68.49	72.59	106%
Grand Total	**257.64**	**246.36**	**96%**

Overall the ex ante and ex post kWh and kW savings calculation resulted in very similar savings.

For the LED measures, ex post savings are, on average, lower than what was claimed in the ex ante estimates. The variance in savings was attributed to the average installed LED wattages and the difference in installation rate.

Ex Ante wattages for LEDs were calculated from the 2016 FirstEnergy PA Upstream Lighting Program data. Ex Post wattages were calculated from the 2017 FirstEnergy OH Upstream Lighting Program data. The calculation is described in detail in Section 4.

The evaluation survey efforts and on-site verification visits determined that the installation rate of LEDs to be 83%. The PA TRM installation rate used in the ex ante calculation

was 92%. These differences in the calculations lead to 95% kWh realization rate and 80% kW realization rate.

CFL calculations used deemed values from the OH TRM for determining: a delta Watt multiplier, hours of use, waste heat factor, ISR, and Coincidence Factor. Ex Ante calculations used different ISRs for each lamp type. Overall, CFLs have a realization rate of 103% for kWh and kW. CFL savings make up 21% of total program ex Post savings.

The attic insulation measure ex post savings are, on average, lower than what was claimed. The factor primarily affecting the realization rate was the misclassification of the heating type. ADM used program tracking data to apply the heating type to the energy savings calculation.

6. Detailed Process Evaluation Findings

The following section provides detailed findings from the process evaluation of the Community Connections Program.

6.1 Program Operations Perspective

The following section provides an overview of the Community Connections Program's operations constructed through in-depth discussions with three key program staff with the Companies and OPAE, and a survey of 13 participating community agencies. The interviews and survey covered topics such as; staff roles and responsibilities, 2017 program operations and changes, satisfaction, and suggestions for improving program delivery.

Staff interviews

Staff Roles and Responsibilities

Primary responsibilities of the Companies' program manager include daily oversight and communication with the program implementation contractor, OPAE. The Companies' program manager also reviews system data and approves invoices, assists with guideline interpretation and agency questions. This year the program manager began conducting on-site monitoring visits to participating community agencies for purposes of general oversight and relationship building. The program manager receives support from additional staff as needed, however, the program manager is the primary, full-time staff member responsible for the day-to-day program oversight.

In 2017, OPAE continued its role as the Community Connections Program implementation contractor. OPAE added two program monitors to the implementation team, whose roles are to provide direct support to participating community agencies. ADM spoke with one of the monitors, who also serves as the assistant program director. The interviewee explained that program monitors are responsible for visiting each participating community agency in the service territory and reporting findings to OPAE management. Additional details regarding agency site visits can be found in the following section.

ADM also interviewed OPAE's director of finance. The director of finance primarily reviews and approves invoices from the agencies, ensures the various agencies adhere to their budgets and provides oversight to the monitors. All OPAE staff we spoke with agreed that the new staff members have contributed greatly to enhancing the program's delivery and better supporting agencies in the field. Both the Companies' and OPAE staff indicated that they have the resources necessary to effectively administer the Community Connections Program.

2017 Program Changes and Highlights

The Companies and OPAE Staff discussed several program highlights and changes that occurred in 2017. Both the Companies' staff and OPAE program staff were actively involved in fieldwork observation. At the time of the interviews, the Companies' program manager had accompanied OPAE staff on eight different agency visits.

The Companies' program manager indicated that prior to each agency visit, invoices are reviewed to identify what measures the agency is installing. If there are measure types underutilized, the program manager will talk with agency staff during the in-person visit and see if there are barriers to installing additional measures types. If there are barriers to installing certain measures, OPAE staff will explore how the program could help reduce those barriers so residents can benefit from the full range of measures eligible through the Community Connections Program. The Companies' program manager has increased efforts to talk with agencies about diversifying the measures installed, beyond baseload measures. According to the program manager, agencies have been receptive.

During these visits, OPAE staff will also review agency paperwork and spot check program documents for accuracy. OPAE staff takes the time to talk with agency staff to better understand:

- if agencies have what they need to deliver the program offerings;
- how the program can better support their needs; and
- if there are ways the program could be improved.

After the agency visit, the OPAE staff member summarizes their findings; detailing recommendations and required actions. The Companies and OPAE Staff agrees that the agency visits were a success in 2017, with the key benefits being relationship building and creating an opportunity to discuss program measures agencies may be underutilizing.

OPAE staff also reported performing more home inspections in 2017. A home inspection involves verifying that the invoiced measures are installed and meet program installation guidelines. Home inspections also provide an opportunity for OPAE staff to look for missed opportunities, ask about customer satisfaction, and if they would recommend the program to others. OPAE staff indicated they report all findings to their supervisor.

ADM also conducts on-sight verification visits at participants' residences. In preparation for the site-visit, ADM develops a measurement and verification plan (M&V Plan) based on the installed measures identified in the CC system. ADM reviews all available documentation, which typically includes the C4 form and invoices. When on-site ADM identifies and takes pictures of the installed measures. ADM field staff document missing measures.

In addition to measure verification, ADM field staff also documents missed opportunities. For example, ADM staff document fixtures that have less efficient bulbs or if the customer

has electric water heating but did not receive faucet aerators or low flow showerheads. ADM provides the Companies' program staff with a summary of site visit findings. OPAE staff work with the community agencies to resolve issues related to missing measures and/or missed opportunities. ADM uploads all on-site notes and findings to the community connections systems (CC System). In addition to increased agency visits and home inspections, the program also made several changes to the price list. According to the Companies and OPAE program staff, the most impactful and well-received change made during the 2017 program year was the addition of LED bulbs. The Companies' and OPAE program staff indicated that this change has been discussed over the past several years and due to the phase-out of many of the previously qualifying CFLs, they started accepting LED's into the program. During the early part of the 2017 program year, agencies had varying levels of CFLs in stock; the program instructed agencies to utilize their remaining CFL stocks then switch to LEDs. OPAE staff indicated that all but one agency was installing strictly LEDs by the end of August 2017. According to OPAE staff, agencies and residents are both pleased with the change.

The Community Connections Program also increased health and safety spending approval limits. Previously, any health and safety measure to be implemented with a cost of more than $2,000 must be in conjunction with a minimum of $500 worth of energy savings, and must be approved by the Companies'. In 2017, the approval limit was increased to $2,500, but still required $500 worth of energy savings measures.

According to Company staff, the program also added mini split ductless HVAC units in 2017, with one being installed in December. They have also added new measure codes to the Companies' Vision SSRS database; one which allows for the program to capture energy savings that result from the installation of air sealing measures.

The Community Connections Program continued its efforts to provide energy education to residents. OPAE staff said they are not only discussing more of these topics with agencies, but more information is provided in print. Companies' staff added energy education information to the quarterly newsletter regarding ways to engage the customers about their air conditioner, fans, refrigerators and/or freezers.

The program also provides an order form for agencies to order additional energy education material including:

- How To Read Your Meter
- Understanding Electricity Usage And Costs
- Save Money…Use Electricity Wisely (available in English and Spanish)
- More than 100 Ways to Improve Your Electric Bill
- How Families Save Energy Coloring Book

Program Administration and Outreach

The Companies' and OPAE staff indicated that they are still utilizing the same data systems for tracking program activity; the Companies' Vision system SSRS and the CC System. These systems track measure level activity and agency reporting, respectively.

In addition to the tracking systems, OPAE provides the Companies' with monthly reports that outline spending by agency. The Companies' program manager said that between the tracking systems and OPAE reporting, she believes there is sufficient transparency and sharing of information related to program activity, spending levels, and progress towards goals.

All staff interviewed agree that communication remains strong between the Companies and OPAE. Weekly, sometimes daily, communication over the phone and via email ensures staff is sharing information and providing agencies with the support they need. New staff and more frequent in-person meetings strengthened communication in 2017.

OPAE and Company program staff provided feedback on the annual Weatherize Ohio conference. They indicated that it was well-attended by participating agencies. During the conference this year, an OPAE agency, along with Company staff, conducted a presentation on smart power strips with the goal being to spark interest in the measure type. OPAE staff indicated that they received positive feedback from agencies interested in emphasizing the measure in the future. OPAE staff noted that the primary audience for the conference is operations and administrative-type staff members and that there may be more opportunities to engage agency field staff in the future.

Agency survey

ADM administered an online survey to participating community agencies in November 2017. The survey was designed to elicit feedback from agency staff about their experience and overall satisfaction with the Community Connections Program. The following sections discuss findings from the analysis of survey responses.

Respondent's Roles

In total, 13 agencies responded to the online survey. The majority of the respondents were either a program coordinator or program manager (42% and 33%). Table 6-1 provides a summary of the respondents' roles.

Table 6-1: Respondents' Roles

	Response	N=13	Percent of Respondents
What is your role with regards to the Community Connections Program?	Program Coordinator	5	42%
	Program Manager	4	33%
	Technician	0	0%
	Office Administrator	1	8%
	Other	2	17%

Training and Events

Each year OPAE hosts Weatherize Ohio, a conference that brings together various stakeholders responsible for administering and implementing energy efficiency programs, to low-income residents, throughout the state of Ohio. Agency staff is invited to attend the

conference to learn about new technologies and program offerings for their clients. Of the thirteen agencies that responded to our survey, 9 (69%) indicated they attended the conference, the other 4 (31%) did not.

We also asked agencies if they felt that their staff is well-trained in several program areas, Figure 6-1 displays the results. The majority of respondents (92%) indicated their staff is well-trained in the steps necessary to participate in the Community Connections Program. Far fewer (46%) felt their staff was well-trained in electrical and roof repairs, however, 31% indicated they typically hire a 3rd party for that work. Sixty-nine percent indicated their staff is well-trained in-home audits and installing shell measures.

Similarly, 69% of agencies indicated they are well-trained internally for testing and installing appliances, while 31% said they hire a 3rd party for testing and installing appliances. Feedback suggests that there may be more opportunities for training agency staff in auditing and installing shell measures, as well as electrical and roof repairs.

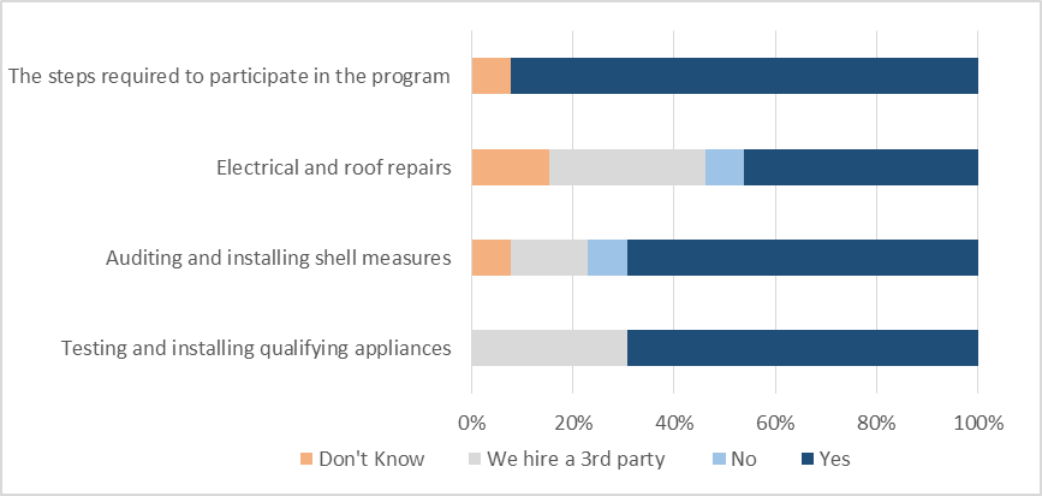

Figure 6-1: Feedback on Agency Staffs' Competencies to Deliver Program Offerings

Respondents offered feedback regarding ways the program could better support the training needs of their organizations. Three of the seven agencies that responded indicated they did not need additional training and reiterated their satisfaction with the current level of support they receive. Four of the agencies offered suggestions for additional training that would be helpful for their organization such as; a certification or training course for new auditors, more training opportunities that are local to the agencies, increased use of program webinars.

Communication with Program Staff

Eleven survey respondents (85%) indicated that they have had direct communication with OPAE staff. All eleven respondents characterized OPAE staff either "very knowledgeable" (82%) or "fairly knowledgeable" (18%) about the issues they discuss with them.

The eleven respondents went on to rate their overall satisfaction with how long it takes for OPAE staff to address their questions or concerns and how thoroughly they are addressed, as displayed in Figure 6-2. The majority of respondents were either “very satisfied” or “satisfied” only one respondent was “very dissatisfied.”

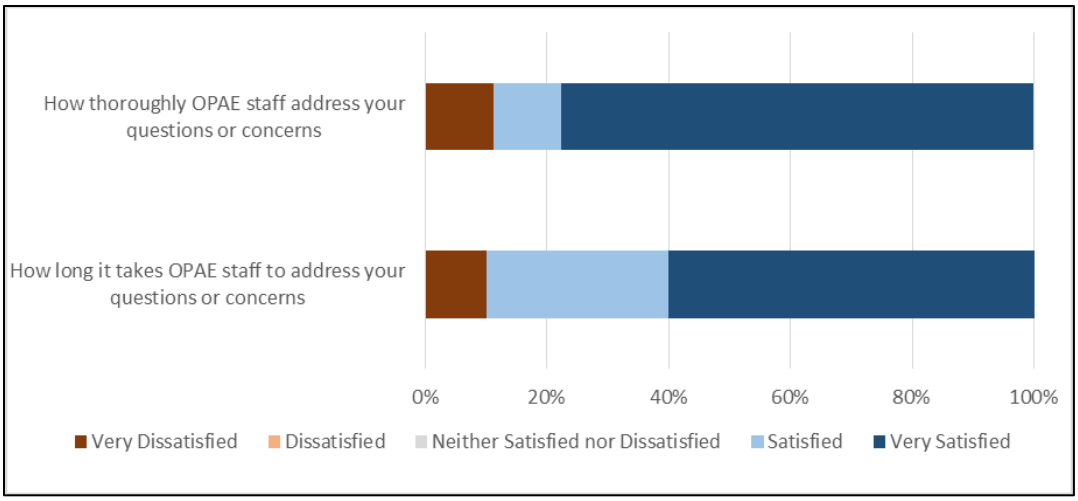

Figure 6-2: Satisfaction with OPAE Communication

Agencies also provided feedback about their communication with the Companies’ staff. Ten survey respondents (77%) indicated they had direct communication with the Companies’ staff. Nine respondents characterized the Companies’ staff either “very knowledgeable” (80%) or “fairly knowledgeable” (10%) about the issues they discuss with them. Only one respondent described the Companies’ staff as “somewhat knowledgeable”.

The respondents went on to rate their overall satisfaction with how long it takes for the Companies’ staff to address their questions or concerns and how thoroughly they are addressed. The results are displayed in Figure 6-3. The majority of respondents were either “very satisfied” or “satisfied”. Only one respondent expressed their dissatisfaction. None of the respondents provided details as to why they would be dissatisfied.

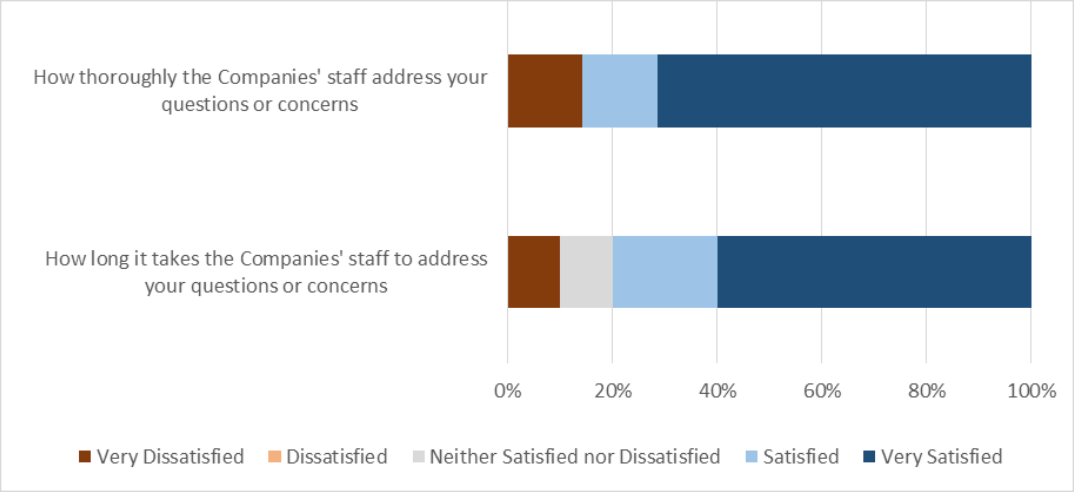

Figure 6-3: Satisfaction with the Companies' Communication

Program Satisfaction

Agency staff also rated their level of satisfaction with various aspects of the Community Connections Program, as displayed in Figure 6-4. Feedback reflects relative high levels of satisfaction with the program overall. Some agencies were less enthusiastic about the range of equipment available for incentives and two respondents were "very dissatisfied" overall.

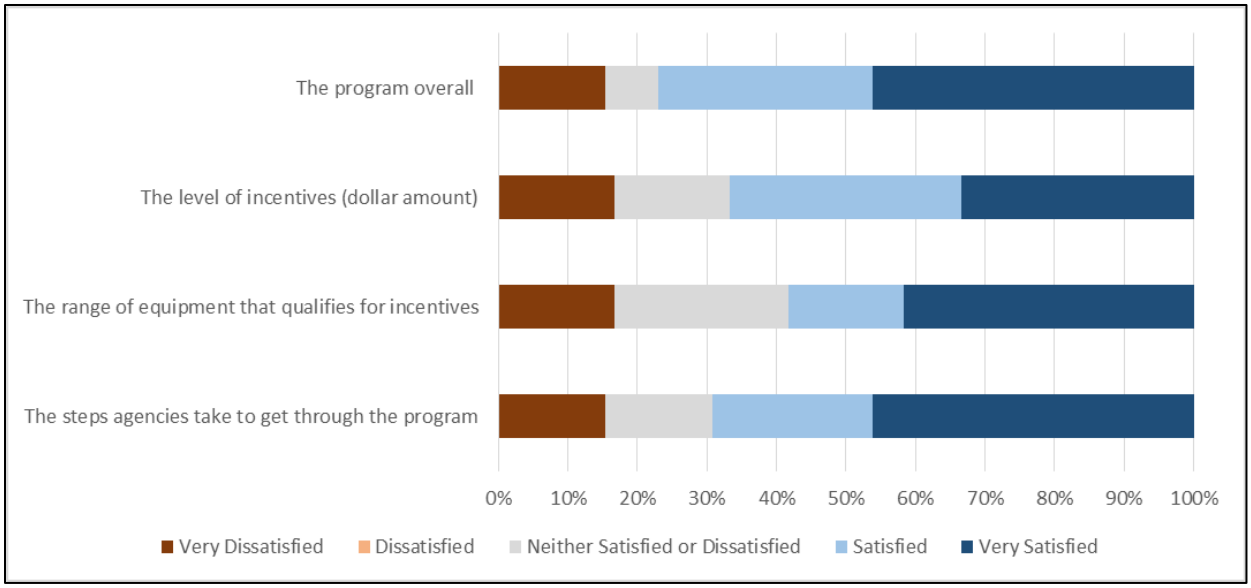

Figure 6-4: Program Satisfaction

Participant Survey Results

This section summarizes feedback received from a sample (225 responses, 75 from each EDC) of Community Connections Program participants. The survey collected data on program awareness, customer decision making, satisfaction, experiences with the program, and installed equipment.

Program Awareness

Program participants learned about the Community Connections Program from a variety of sources in 2017. Table 6-2 summarizes the various sources of program awareness identified by survey respondents. Most frequently mentioned, by 42% of respondents, was word of mouth from a friend or family member. Other common sources include community agencies (20%) other energy assistance programs they participated in, such as HWAP, LIHEAP or PIP.

Table 6-2: Sources of Program Awareness

Program Awareness	CEI		OE		TE		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
From a friend/neighbor	36	48%	27	36%	32	43%	95	42%
Other	15	20%	20	27%	23	31%	58	26%
Community agency	12	16%	22	29%	10	13%	44	20%
Received an information brochure	5	7%	4	5%	6	8%	15	7%
Property owner/landlord	1	1%	2	3%	3	4%	6	3%
Internet	5	7%	0	0%	1	1%	6	3%
Contractor	1	1%	0	0%	0	0%	1	0%

Measures Installed

A range of energy saving equipment and services were available to program participants. Historically, the majority of program funds were spent installing baseload equipment, such as appliances and lighting, as well as health and safety measures. In 2017, participant survey feedback indicated a similar distribution of baseload equipment, such as appliances and lighting, as well as health and safety measures installed. Approximately 66% of respondents reported receiving Compact Florescent Lamps (CFLs), 65% received refrigerators and 19% received freezers. Other measures received include LED light bulbs, hot water measures such as energy saving showerheads, faucet aerators, pipe insulation, electrical repairs, insulation, and LED night lights. Table 6-3 displays the results.

Table 6-3: Measures Installed

Measures Installed	CEI		OE		TE		Total	
	n	Percent	N	Percent	n	Percent	n	Percent
CFLs	48	65%	48	65%	51	69%	147	66%
Energy Star Refrigerator	50	68%	53	72%	41	55%	144	65%
Energy Star Freezer	16	22%	14	19%	12	16%	42	19%
LED light bulbs	4	5%	23	31%	3	4%	30	14%
Energy Saving Showerheads	1	1%	4	5%	1	1%	6	3%
Faucet Aerators	1	1%	2	3%	0	0%	3	1%
Water heater pipe insulation	0	0%	1	1%	1	1%	2	1%
LED Night Lights	0	0%	2	3%	0	0%	2	1%

Respondents provided feedback on their levels of satisfaction with the various equipment types. Figure 6-5 summarizes the responses. Only one survey respondent indicated they received home improvement measures, such as air sealing, attic and/or wall insulation. That one customer was “very satisfied” with the upgrade, therefore it appears as if satisfaction was highest for home improvements measures, however, it must be noted that the figure below represents only one survey response for home improvement measure types. Seventy-nine percent of respondents that received an ENERGYSTAR freezer indicated they were “very satisfied” with their appliances. Sources of dissatisfaction noted by participants for the ENERGYSTAR freezer received include the freezer having a dent from the factory or with the time it took to receive the freezer.

Participants were also generally satisfied with the ENERGYSTAR Refrigerators. Dissatisfaction for the ENERGYSTAR Refrigerators noted by participants involved the appliance being broken, smaller than their previous refrigerator, made noises, or not cosmetically appealing.

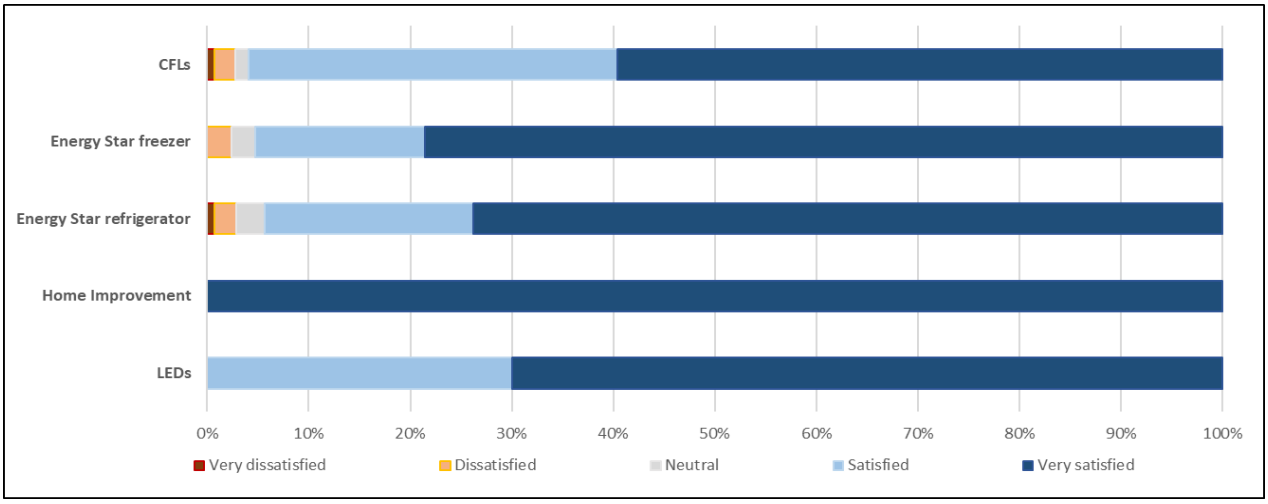

Figure 6-5: Satisfaction with Energy Savings Measures

Audit Experience

Each home that receives energy-saving equipment or services through the program first receives a home energy audit, typically performed by an agency staff member or contractor hired by the community agency. The majority of participants surveyed reported satisfaction with the logistics of scheduling the audit; 97% noted the time was convenient while 95% said the auditor was on time or within 15 minutes. The collective feedback is summarized in Table 6-4 below.

Table 6-4: Audit Experience

Audit Experience	CEI		OE		TE		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
Convenient Time								
Yes	72	96%	74	99%	72	96%	218	97%
No	2	3%	1	1%	2	3%	5	2%
Don't know	1	1%	0	0%	1	1%	2	1%
Was the auditor on time (or within 15 min)?								
Yes	71	95%	72	96%	70	93%	213	95%
No	3	4%	1	1%	1	1%	5	2%
Don't know	1	1%	2	3%	4	5%	7	3%

As part of the program participation process, the auditor is required to perform diagnostic testing on energy-using appliances in the home. Most of the survey respondents (83%) verified appliance testing occurred. The most common appliance tested were refrigerators and freezers, as reported by 85% and 31% of respondents respectively. Participants also reported having their furnace/heat pumps tested, as well as their water heater and air conditioner. Approximately 24% of respondents could not recall if their appliances were tested. Table 6-5 summarizes the responses.

Table 6-5: Appliance Testing

Appliance Testing	CEI		OE		TE		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
Appliances Tested								
Yes	61	81%	64	85%	61	81%	186	83%
No	6	8%	5	7%	4	5%	15	7%
Don't know	8	11%	6	8%	10	13%	24	11%
Which appliances								
Refrigerator	49	80%	57	88%	53	87%	159	85%
Freezer	21	34%	17	26%	20	33%	58	31%
Wall air conditioner	3	5%	2	3%	2	3%	7	4%
Central air conditioner	4	7%	1	2%	2	3%	7	4%
Electric water heater	10	16%	4	6%	16	26%	30	16%
Electric heat pump /Furnace	7	11%	8	12%	17	28%	32	17%
Other (Specify)	13	21%	9	14%	13	21%	35	19%
Don’t know/recall	17	28%	14	22%	13	21%	44	24%
Refused	2	3%	0	0%	1	2%	3	2%

In addition to testing the appliances, the auditor provides each resident with information and tips regarding home energy use and conservation. Eighty-four percent of respondents indicated they spoke with the auditor about ways to save energy in their home. Table 6-6 summarizes the various energy savings topics auditors discussed with participants.

Table 6-6: Energy-Savings Topics Discussed with Residents

Energy-savings topics discussed with residents	CEI		OE		TE		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
The benefit of using CFLs or LEDs	59	95%	58	88%	58	94%	175	92%
The benefit of using smart power strips	30	48%	37	56%	35	56%	102	54%
Costs associated with appliances	46	74%	46	70%	53	85%	145	76%
Benefits of using cold wash cycle	37	60%	46	70%	45	73%	128	67%
Removing unnecessary appliances	39	63%	45	68%	40	65%	124	65%
Turning off lights when not in the room	53	85%	59	89%	56	90%	168	88%
Adjusting the thermostat	37	60%	40	61%	48	77%	125	66%
Cleaning furnace filters	49	79%	52	79%	51	82%	152	80%
Changing behaviors to save energy	11	18%	15	23%	16	26%	42	22%
Turning off electronics when not in use	47	76%	50	76%	54	87%	151	79%
High cost of electric space heater use	29	47%	37	56%	27	44%	93	49%
Don’t know	0	0%	1	2%	1	2%	2	1%
Refused	0	0%	1	2%	0	0%	1	1%

The most common energy savings topics discussed with residents were the benefits of using CFLs or LEDs, the cost savings associated with turning off lights and electronics when not in use, as well as the benefits of cleaning furnace filters. After the auditor’s visit

took place, 93% of survey respondents indicated they knew more about how to save energy in their home, while 72% actually changed their habits to use less energy. The survey asked participants to provide a rating on a scale of 1 – 5, where 1 was not at all useful and 5 is extremely useful, stating how useful the information they received from their auditor was. Overall, 88% of survey respondents who received information on home energy savings rated its usefulness as a 4 or 5; Figure 6-6 displays the results.

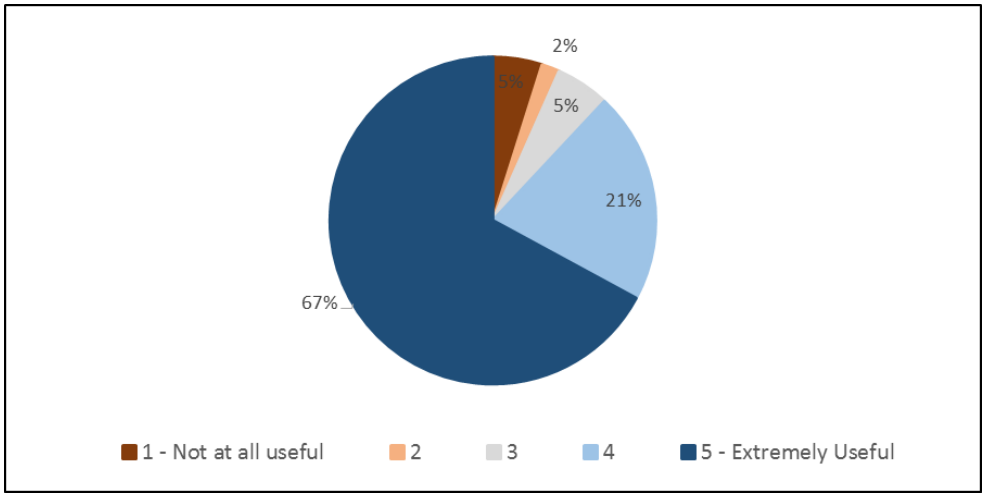

Figure 6-6: Usefulness of Energy Savings Tips and Information

Respondents also rated their overall satisfaction with the energy savings tips and information they received as well as the scheduling of the auditor's visit. Figure 6-7 below displays the results. Overall, survey respondents were very satisfied with the audit experience and energy savings tip and information they received through the Community Connections Program.

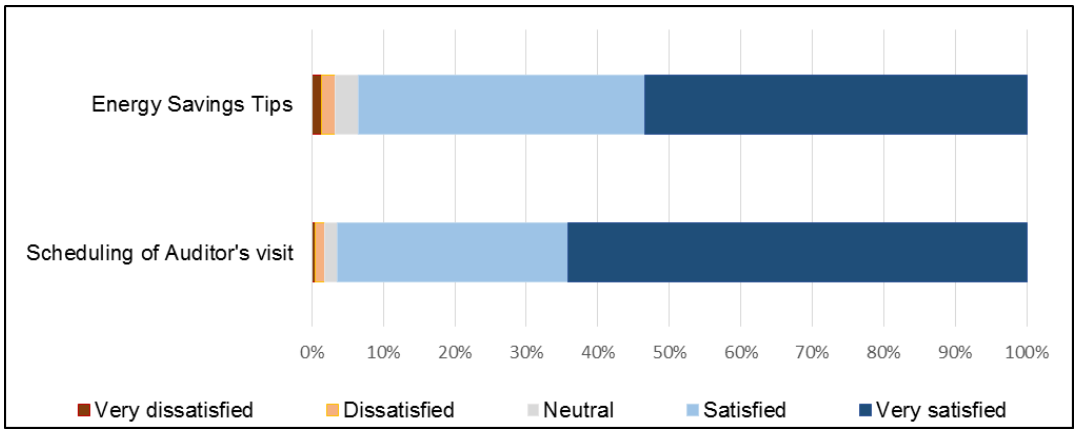

Figure 6-7: Satisfaction with Audit Experience

Agency Staff Communication

Participants have several reasons to communicate with agency staff including program enrollment, scheduling of the audit and follow up regarding the resolution of any issues

that occurred during or after insulation. Approximately half (45%) of survey respondents indicated they never spoke to agency staff, 52% did speak with staff. Of those that did speak with staff, 90% were either “very satisfied” or “satisfied” with their communication. Nine percent of respondents were either “neutral,” “dissatisfied,” or “very dissatisfied.” Sources of dissatisfaction include the instances where staff did not follow up on reported equipment issues, customer questions and/or concerns.

Program Satisfaction

Respondents commented on whether they have noticed savings on their electric bill. Fifty-seven percent said that they have noticed savings, while the remaining 43% of respondents stated that either they have not noticed savings (25%) or they were unable to answer (17%). When asked to rate their overall satisfaction with the Community Connections Program, the majority of participants (66%) were very satisfied with the program overall, 3% were neither satisfied nor dissatisfied and 1% were very dissatisfied. Figure 6-8 displays the results.

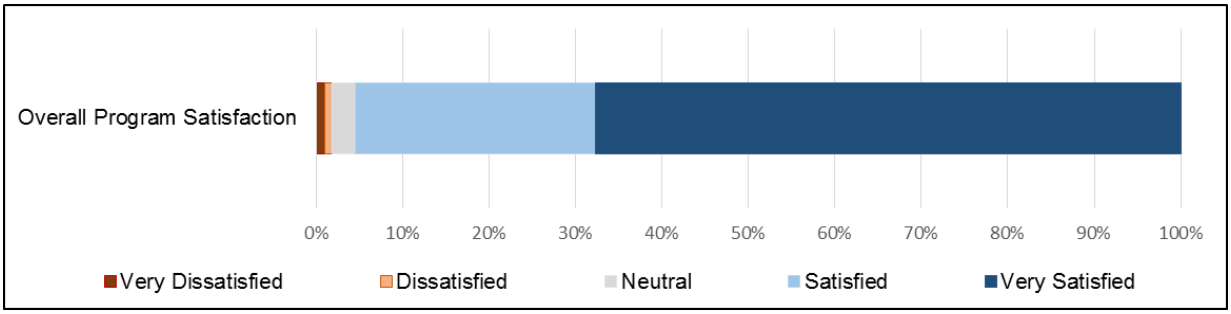

Figure 6-8: Overall Program Satisfaction

7. Conclusions and Recommendations

7.1 Program Operations Conclusions

The following section summarizes the conclusions from program staff interviews and community agency surveys.

- Communication between the Companies', OPAE and participating community agencies remains strong. All program staff ADM spoke with agreed that OPAE's new hires have contributed greatly to enhancing the program's delivery and better supporting agencies in the field. Also, frequent, ad-hoc communication over the phone and via email ensures staff is sharing information and providing agencies with the support and guidance they need. The majority of agencies we spoke with were either "satisfied" or "very satisfied" with how thoroughly OPAE and Company program staff addresses their questions and how timely they are to respond. Both the Companies and OPAE staff indicated that they have the resources necessary to effectively administer the Community Connections Program.
- Increased site visits with community agencies in 2017. One of the key responsibilities of the new OPAE staff is to meet with agency staff, in-person. Company and OPAE staff agree that the agency visits were a success in 2017, with the key benefits being relationship building and creating opportunities to discuss diversifying the mix of measures installed at residences. ADM is also responsible for conducting on-site visits for the purposes of measure verification and identifying missed opportunities. Results are communicated to program staff who resolve issues with agencies as necessary.
- Agencies continue to primarily utilize program funds for baseload measures. Agencies use funding from the Community Connections Program, in combination with other statewide weatherization programs, to complete energy efficiency projects in the homes of low-income customers. The funds from Community Connections are most often used to replace inefficient appliances and concerns that precede the completion of weatherization work, such as electrical panel upgrades and roof repairs
- The most widely discussed change from 2017 was the switch from CFL to LED light bulbs. During the transition, the program allowed agencies to install their remaining stocks of CFLs, before switching to LEDs. All agencies, but one, exclusively used LEDs by the end of August 2017. Agencies indicated that the new measure type is more cost effective in terms of energy use and maintenance costs. Agencies also conveyed that their clients were enthusiastic about the change indicating that the LED bulbs are much brighter (have greater lumen output.)

- The Community Connections Program increased health and safety spending approval limits from $2,000 per household to $2,500 per household. The program added mini-split ductless HVAC units to the list of eligible program measures, with one being installed in December.
- In 2017, the program placed more emphasis on energy savings tips and customer education, as compared to 2016. Program staff added energy savings tips and topics of discussion to the quarterly agency newsletter. The Companies' staff also increased the materials for energy education; including a coloring book for children that addresses energy conservation. OPAE field monitors also reinforced energy education with agencies.
- The annual Weatherize Ohio Conference continues to be the primary event where program information is disseminated. According to OPAE program staff, the primary audience at the conference is agency operations and administrative staff. Agency feedback suggests there is a need to enhance training opportunities for agency field staff in the realm of appliance testing, home auditing, and health and safety measures. Agencies suggested this training may come in the form of additional workshops at the Weatherize Ohio Conference, additional program webinars, or training events which are more local to the agencies offices.
- The majority of participants learned about the Community Connections Program through word of mouth from a friend or family member, or through another program or community agency.

7.2 Participant Survey Conclusions

The following section summarizes the key findings from the survey of program participants.

- The vast majority (93%) of program participant surveyed reported high levels of satisfaction with the Community Connections Program. About half of the participants indicated they never spoke with staff, however, the majority (90%) that did, were either "satisfied" or "very satisfied" with their experience. Approximately 6% indicated lower levels of satisfaction with their communication. Sources of dissatisfaction include the instances where staff did not follow up on reported equipment issues, questions or concerns. Participants indicated they were generally very satisfied with the audit experience. The time of the audit was convenient and the auditor showed up on time or within 15 minutes of the scheduled appointment time.
- The participant survey represents program participants who received mostly installed baseload measures such as CFLs or LEDs, ENERGYSTAR refrigerators and freezers, as well as some health and safety measures. Overall, the majority of

participants were very satisfied with the measures installed. Sources of dissatisfaction include the time it took to receive the freezer or that it had a dent. Several participants reported issues with the refrigerators they received stating they were much smaller than what they expected, made noises, or was not cosmetically appealing.

- There are more opportunities for auditors and program representatives to provide energy education to program participants. Eighty-four percent indicated they spoke with the auditor about ways to save energy in their home, however approximately 12% did not and 4% were unable to answer. After the auditor's visit took place, most respondents indicated they knew more about how to save energy in their home and found the information very useful.

7.3 Recommendations

ADM offers the following recommendations for continued improvement of the Community Connections program.

- The Companies and OPAE should continue conducting annual in-person, site visits to agency offices. Feedback suggests the increased communication was well-received by agencies and considered to be a 2017 program success by OPAE and Company program staff. From our experience evaluating other low-income programs around the country, we can attest to the importance of strong relationships with program partners, such as community agencies and advocacy groups that work with low-income customers.
- Provide additional training opportunities and resources for agency staff as they continue their efforts to diversify the measure types installed. Feedback suggests agencies benefit from attending the Weatherize Ohio Conference and enjoyed last year's session on smart power strips. The program should consider additional sessions on energy efficiency technologies that are either not frequently installed or are new to the program.
- Provide additional training for agency *field staff* to enhance their professional acumen related to home audits, appliance testing, and health and safety measures. Although they might not ultimately be responsible for the installation of the measures, they could benefit from better understanding how to identify energy savings opportunities that may result from measures they are less familiar with. If the Weatherize Ohio Conference is not the appropriate venue, the program could provide regional training workshops or coordinate with resources that are in closer proximity to agency offices.

Appendix A: Required Savings Table

This appendix provides a summary of all the relevant savings associated with the program.

Table A-1: Impact Evaluation Results (kWh)

Utility	Ex Ante kWh	Ex Post kWh	Realization Rate
CEI	3,341,716	3,343,092	100%
OE	2,694,984	2,685,669	100%
TE	1,231,765	1,248,880	101%
Total	**7,268,466**	**7,277,640**	**100%**

Table A-2: Impact Evaluation Results (kW)

Utility	Ex Ante kW	Ex Post kW	Realization Rate
CEI	482.81	479.10	99%
OE	373.66	366.68	98%
TE	175.77	175.89	100%
Total	**1,032.24**	**1,021.67**	**99%**

Table A-3: Ex Post Lifetime Energy Savings (kWh)

Utility	Annual kWh Savings	Annual kW Savings	Lifetime kWh Savings
CEI	3,343,092	479.10	48,871,675
OE	2,685,669	366.68	39,853,327
TE	1,248,880	175.89	18,372,098
Total	**7,277,640**	**1,021.67**	**107,097,100**

Appendix B: Surveys and Interview Guides

2017 Community Connections Program

Participant Telephone Survey

Introduction for phone administration

Hello, my name is _____. I am calling on behalf of [UTILITY]. We are speaking with homeowners and tenants who participated in the (name of EDU's) Community Connections "Weatherization" Program. The survey will take approximately 15 minutes and you will receive a $10 gift card for Target Stores for participating in this survey. Are you the person most familiar with this program?

1. Yes
2. No [IF NOT AVAILABLE, ASK FOR ANOTHER ADULT FAMILIAR WITH HOUSEHOLD'S PARTICIPATION IN COMMUNITY CONNECTIONS PROGRAM]

1. Through this program you would have received energy-efficient light bulbs or you might have had your refrigerator or freezer replaced with an Energy Star refrigerator or freezer; or you might have received insulation, air sealing, blower door test, or water heater measures (such as water heater wraps, low flow shower heads, and faucet aerators). Do you recall participating in this program?

   1. Yes [SKIP TO Q1]
   2. No
   98. Don't know
   99. Refused [THANK AND TERMINATE]

2. You may have received some of these services as part of another program. It is possible you worked with an energy auditor or inspector from the Ohio Home Weatherization Assistance Program (HWAP), the Electric Partnership Program (EPP), the Warm Choice or House Warming Program, the Home Energy Assistance Program (HEAP), or another Program. Do you recall participating in Community Connections or any of these other programs?

   1. Yes [SKIP TO Q1]
   2. No
   98. Don't know
   99. Refused [THANK AND TERMINATE]

[ASK Q3 IF Q2 = 2]

3. Is it possible that someone else in your household would be familiar with the items you received through this program?

   1. Yes
   2. No [THANK AND TERMINATE]
   98. Don't know [THANK AND TERMINATE]
   99. Refused [THANK AND TERMINATE]

[ASK Q4 IF Q3 = 1]

4. May I speak with that person?

   1. Yes [RECYCLE THROUGH 2 & 3 WITH NEW RESPONDENT]

2. No [THANK AND TERMINATE]
98. Don't know [THANK AND TERMINATE]
99. Refused [THANK AND TERMINATE]

1. I would like to start by asking you about how you first learned about the Community Connections Program?

i. Received an information brochure
ii. From a friend/neighbor
iii. Property owner/landlord
iv. Community agency
v. Contractor
vi. Internet
vii. Other: _____

2. Our records indicate that you received the following items from the Community Connections Program. Please tell me if you received these items or not.

[READ ITEMS THAT WERE RECEIVED ACCORDING TO RECORDS
RECORD ANSWER INDICATED BY RESPONDENT]

		Yes	No	DK	NA
a.	Compact fluorescent light bulbs, called CFLs	1	2	98	99
b.	LED light bulbs	1	2	98	99
c.	Energy Star Refrigerator	1	2	98	99
d.	Energy Star Freezer	1	2	98	99
e.	Energy Saving Showerheads	1	2	98	99
f.	Faucet Aerators	1	2	98	99
g.	Electrical Repairs	1	2	98	99
h.	Roof Repairs	1	2	98	99
i.	Water heater pipe insulation	1	2	98	99
j.	Seal Air Leakage / Duct Sealing	1	2	98	99
k.	Water Heater	1	2	98	99
l.	Attic Insulation	1	2	98	99
m.	Side Wall Insulation	1	2	98	99
n.	Night Lights	1	2	98	99
o.	Central AC Replacement	1	2	98	99
p.	Smart Power Strips	1	2	98	99

[ASK Q3-Q5 IF Q2a = 1 or Q2b = 1]

3. I'd like to ask you a few questions about your awareness of different types of light bulbs. Before this call today, had you ever heard of compact fluorescent light bulbs, or CFLs?

i. Yes
ii. No
98. Don't know
99. Refused

[Prompt if necessary: Here is a quick description: The most common type of CFL is made with a glass tube bent into a spiral. It generally looks like a corkscrew and uses less energy than a typical incandescent light bulb.]

4. Before this call today, had you ever heard of light emitting diode light bulbs, or LEDs?

i.	Yes	01
ii.	No	02 [READ E2]
98.	Don't know	98 [READ E2]
99.	Refused	99 [READ E2]

[Prompt if necessary: Here is a quick description: LED light bulbs are a newer light bulb technology that fit in regular light bulb sockets, but have various different appearances. LED bulbs are typically a lot heavier than incandescent bulbs. They use less energy and last much longer than typical incandescent light bulbs.]

5. Do you believe you could correctly identify a typical CFL light bulb and LED light bulb if they were placed in front of you?

i. Yes
ii. No
98. Don't know
99. Refused

CFLS

[ASK Q6-Q12 IF Q2a = 1]

6. You indicated that you received CFLs from the program. Our records indicate you received [# OF CFLS]. To the best of your knowledge, is that number correct or did you receive a different number of CFLs?

i. Number of CFLs in record is
ii. Received a different number of CFLs [GO TO Q7]
98. Don't know
99. Refused

[ASK Q7 IF Q6 = 2]

7. What is the correct number of CFLs that you received?

_____Number of CFLs received

8. Of the [# OF CFLS] CFL bulbs you received, how many [READ LIST; ENTER NUMBER FOR EACH]

a. Are currently installed?
b. Were installed and removed?
c. Were never installed?

[ASK Q9 IF Q8b > 0]

9. Why were some CFLs removed? (SELECT ALL THAT APPLY)

1. CFL broke or burned out
2. CFL not working as needed (e.g., lights too dim)
3. Using them in another home or at work
4. Storing them for later use
5. Gave them away
6. Returned them to the program
7. Other (specify)

[ASK Q10 IF Q8c > 0]

10. Why were some of the CFLs never installed? [RECORD VERBATIM RESPONSE]

11. To the best of your recollection, how many of the CFLs received through the program -- that are currently installed -- are installed in each of the following room locations?

Room Location	Code	# CFLs Installed
Bedrooms	1	
Bathrooms	2	
Living Room	3	
Kitchen	4	
Entry Way	5	
Dining Room	6	
Garage	7	
Basement	8	
Den	9	
Stairway	10	
Office	11	
Other (specify)	12	

Note: Total should not exceed number in Q8a

a) Specify other room location:

12. What type of lighting equipment did the CFLs replace? [SELECT ONE]

1. Standard incandescent light bulbs
2. Other CFLs
3. Both incandescent light bulbs and CFLs
4. Other (specify)

98. Don't Know
99. Refused

Specify if other_____

LEDs

[ASK Q13-Q19 IF Q2b= 1]

13. You indicated that you received LEDs from the program. Our records indicate you received [# OF LEDs]. To the best of your knowledge, is that number correct or did you receive a different number of LEDs?

i. Number of LEDs in record is
ii. Received a different number of LEDs [GO TO Q14]

98. Don't know
99. Refused

[ASK Q14 IF Q13 = 2]

14. What is the correct number of LEDs that you received?

_____Number of LEDs received

15. Of the [# OF LEDs] LED bulbs you received, how many [READ LIST; ENTER NUMBER FOR EACH]

a. Are currently installed?

b. Were installed and removed?
c. Were never installed?

[ASK Q16 IF Q15b > 0]

16. Why were some LEDs removed? (SELECT ALL THAT APPLY)

1. LED broke or burned out
2. LED not working as needed (e.g., lights too dim)
3. Using them in another home or at work
4. Storing them for later use
5. Gave them away
6. Returned them to the program
7. Other (specify)

[ASK Q17 IF Q15c > 0]

17. Why were some of the LEDs never installed? [RECORD VERBATIM RESPONSE]

18. To the best of your recollection, how many of the LEDs received through the program -- that are currently installed -- are installed in each of the following room locations?

Room Location	Code	# LEDs Installed
Bedrooms	1	
Bathrooms	2	
Living Room	3	
Kitchen	4	
Entry Way	5	
Dining Room	6	
Garage	7	
Basement	8	
Den	9	
Stairway	10	
Office	11	
Other (specify)	12	

Note: Total should not exceed number in Q13

b) Specify other room location:

19. What type of lighting equipment did the LEDs replace? [SELECT ONE]

1. Regular incandescent
2. CLF
3. Other LEDs
4. Both incandescent light bulbs and CFLs
5. Other (specify)

98. Don't Know
99. Refused
Specify if other_____

REFRIGERATOR REPLACEMENT

[ASK Q20 IF Q2c = 1]

20. You indicated that your refrigerator was replaced. Can you tell me the door style configuration of the new refrigerator that was installed? Is it a… [READ RESPONSE OPTIONS]

1. Top-freezer refrigerator model
2. Bottom-freezer refrigerator model
3. Side-by-Side refrigerator model

98. Don't know [PROMPT TO LOOK AT THE UNIT]
99. Refused

FREEZER REPLACEMENT

[ASK Q21 IF Q2d = 1]

21. You indicated that your freezer was replaced. Can you tell me the type of new freezer that was installed? Is it an… [READ RESPONSE OPTIONS]

1. Upright freezer model
2. Chest freezer model

98. Don't know [PROMPT TO LOOK AT THE UNIT]
99. Refused

HOME IMPROVEMENT RETROFITS

[ASK Q22-Q24 IF Q2j,l,m = 1]

22. Our records show that you had some home energy improvements such as insulation, or air sealing (such as caulking and foaming) installed by a participating agency or contractor. Is that correct?

	Yes	No	DK
a. Attic Insulation			
b. Wall Insulation (Side wall insulation)			
c. Duct Sealing / Seal Air Leakage /			

23. I am going to read a list of three factors that may have been important to your decision to receive the home energy improvements. After I read the list, I will read the reasons again and would like you to rank them by importance, where 1 is the most important reason and 2 is the second most important reason and 3 is the least important reason.

a. Wanted to improve home comfort	1	2	3
b. The improvements were free	1	2	3
c. Possibly reduce my electric bill	1	2	3

24. Were there any other reasons that were also important to your decision to receive the home energy improvements?[RECORD ANSWER VERBATIUM]

AUDIT EXPERIENCE

I'd like to discuss your experience with the home audit

25. Was the home visit scheduled at a time convenient for you? (Select one)

1. Yes
2. No
98. Don't Know
99. Refused

26. Did the home energy auditor or inspector arrive at your home on-time, or at least within 15 minutes of the scheduled appointment? (Select one)

1. Yes
2. No
98. Don't Know
99. Refused

27. Did the home energy auditor or inspector test, meter or evaluate appliances in your household to see how much energy they use? (Select one)

1. Yes
2. No
98. Don't know
99. Refused

[ASK Q28 IF Q27 = 1]

28. Which appliances were tested, metered or evaluated? (DO NOT READ; Select all that apply)

1. Refrigerator
2. Freezer
3. Wall air conditioner
4. Central air conditioner
5. Electric water heater
6. Electric heat pump / Furnace
7. Other (Specify)
98. Don't know/recall
99. Refused

ENERGY EDUCATION

29. Did an auditor or inspector visit your home and talk with you about ways to use less electricity in your home or leave materials with you that described how you could save electricity?

1. Yes
2. No
98. Don't Know
99. Refused

[ASK Q30, 31, 33, & 34 IF Q29 = 1]

30. I'm going to read a list of electricity-saving topics. For each one, please tell me if this is something the auditor or inspector talked about with you… (mark topics 1-12 that receives a yes response)

1. The benefit of using CFLs or LEDs instead of incandescent bulbs
2. The benefit of using smart power strips instead of power strips
3. Costs associated with the use of appliances
4. Benefits of using cold wash cycle / layering clothes
5. Removing unnecessary appliances (e.g. a second refrigerator, room air conditioner)
6. Turning off lights when not in the room
7. Change thermostat setting for A/C during the day/eve (note: excludes heat pumps)
8. Cleaning furnace filters
9. Changing other behaviors to save energy (SPECIFY BEHAVIORS)
10. Turning off TV and other electronics when not in use
11. High cost of electric space heater use
98. Don't know (Don't read this)
99. Refused (don't read this)

31. Did the auditor or inspector talk with you about any other ways to save electricity in your home? [SELECT ONE]

1. Yes
2. No

[Ask Q32 IF Q31=1]

32. What other ways were mentioned? [RECORD VERBATIM RESPONSE]

33. Because of the information you received from the auditor or inspector, do you feel you now know more about how to save electricity in your home? [SELECT ONE]

1. Yes, know more now
2. No, about the same as before
98. Don't know
99. Refused

34. Because of the information you received from the auditor or inspector, have you done anything in your home or changed any habits to use less electricity? (Select one)

1. Yes
2. No
98. Don't know
99. Refused

[IF Q35 IF Q34 = 1]

35. What are the most important things you have done to use less electricity? [RECORD VERBATIM RESPONSE]

36. On a scale of 1 to 5 where 1 is not at all useful and 5 is extremely useful, how useful was the energy education about saving electricity that you received from the auditor or inspector?

_____ [ENTER 1 TO 5]

37. Could the auditor or inspector have provided you with additional information about your bill, energy saving tips, or referrals to other agencies?

1. Yes, more information would have been helpful
2. No, what was provided was enough
98. Don't know
99. Refused

SATISFACTION

The final set of questions is about your satisfaction with the home improvements or items you received and other aspects of the program. For each, please tell me if you are very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied, or very satisfied.

[ASK Q38 IF Q2a = 1]
38. …the CFLs you received through the program?

_____ [ENTER VD D N S VS DK]

[ASK Q39 IF Q2b = 1]
39. …the LEDs you received through the program?

_____ [ENTER VD D N S VS DK]

[ASK Q40 IF Q2c = 1]
40. …the Energy Star refrigerator you received through the program?

_____ [ENTER VD D N S VS DK]

[ASK Q41 IF Q2d = 1]
41. …the Energy Star freezer you received through the program?

_____ [ENTER VD D N S VS DK]

[ASK Q42 IF Q2j,l,m = 1]
42. …the home improvement items installed through the program? (which includes attic insulation, wall insulation, and/or duct sealing)

_____ [ENTER VD D N S VS DK]

[ASK Q43 IF Q2g = 1]
43. …the electrical repairs you received through the program?

_____ [ENTER VD D N S VS DK]

[ASK Q44 IF Q2h = 1]

44. …the roof repairs you received through the program?

_____ [ENTER VD D N S VS DK]

45. …the scheduling of the visit?

_____ [ENTER VD D N S VS DK]

46. …the information about ways to use less electricity that you received through the audit visit?

_____ [ENTER VD D N S VS DK]

[ASK Q47 IF Q38 OR Q39 OR Q40 OR Q41 OR Q43 OR Q44 OR Q45 OR Q46 = VD or D]

47. Why weren't you satisfied with (type of product or service)?
[RECORD VERBATIM RESPONSE AND IDENTIFY ITEM(S) CUSTOMER IS DISSATISFIED WITH]

48. In the course of participating in the program, how often did you contact agency staff with questions about the items or services you could receive through this program?

1. Never
2. Once
3. 2 or 3 times
4. 4 times or more

98. Don't know
99. Refused

[ASK Q49 IF Q48 = 2,3,4]

49. And how satisfied were you with your communications with agency staff? Would you say you were?

_____ [ENTER VD D N S VS DK]

[ASK Q50 IF Q49 = VD or D]

50. Why were you dissatisfied?

51. Have you noticed any usage reduction or savings on your electric bill since the home improvements were completed or items installed?

1. Yes
2. No
3. Not sure

98. Don't know
99. Refused

[ASK Q52 IFQ51 = 1]

52. How satisfied are you with any usage reductions or savings you noticed on your electric bill? Would you say you are?

_____ [ENTER VD D N S VS DK]

53. How satisfied were you overall with the Community Connections Program? Would you say you are?

_____ [ENTER VDD N S VS DK]

54. Do you have any suggestions for improving the Program?

1. Yes
2. No

[ASK Q55 IF Q54 = 1]

55. What suggestions do you have for improving the Program? [RECORD VERBATIM RESPONSE]

56. Could you please confirm if this is the address to where the gift card should be sent? [HOME ADDRESS]

That's all the questions for this survey. Thank you for your time.

You will receive your gift card within the next 30 days. If you do not receive your gift card within the next 30 days, please contact ADM Associates, Inc. directly at 916-889-7634, or email john.vazquez@admenergy.com to check the status of your gift card. Do you have any questions?

OK. Thank you. Good bye.

Appendix C: Agency Survey

2017 FirstEnergy Ohio
Community Connections Agency Survey

Email Introduction
Good Day [Contact Name],

We are collecting feedback from agencies that participated in FirstEnergy Ohio's Community Connection Program. Please take a few minutes to complete this survey; we will use your response, in combination with other agencies' responses, to make recommendations on how the Community Connections Program could improve to better meet the needs of the low income community.

If you are not the person most knowledge about your agency's involvement with the program, please forward this email to the appropriate person or reply directly to this email and let us know who to reach out to.
We really value your input!
Thank you in advance for your time
Kind Regards,

[ADM Contact] ADM Associates \ Contractor to FirstEnergy Ohio

Roles and Responsibilities [Do not display]

1. What is your role in regards to the Community Connections program?
    1. Program Coordinator
    2. Program Manager
    3. Technician
    4. Office Administrator
    5. Other: _____

Program Changes

2. In 2017, the program added LED bulbs. Can you provide feedback on this change?
3. Do you have suggestions regarding other lighting technologies, or other LED bulbs, that should be added to the program?
4. In the last two years, has your organization changed the way you are allocating funds for residents?
    1. Yes
    2. No
    98. Don't Know

[DISPLAY Q5 IF Q4 = 1]

5. Could you please describe what changes were made and why?

6. In the last two years, has your organization implemented any changes in the way you are testing and installing appliances for residents?
    1. Yes
    2. No
    98. Don't Know

[DISPLAY Q7 IF Q6 = 1]

7. Could you please describe what changes were made and why?

8. In recent years the program has discussed ways to encourage deeper savings through implementing more shell measures. Do you think this is achievable with the current program structure and funding levels?
    1. Yes
    2. No
    98. Don't Know

[DISPLAY Q9 IF Q8 = 2]

9. Please explain

10. Do you use the seasonal allowance worksheet?
    1. Yes
    2. No
    98. Don't Know

[DISPLAY Q11 IF Q10 = 1]

11. Do you have any suggestions for improving the tool or how it's used to make decisions regarding funding levels?

12. Are there any planned changes for 2018?

Marketing and Outreach

13. Does your agency market the program to residents?
    1. Yes
    2. No
    99. Don't Know

[DISPLAY Q14 IF Q13 = 1]

14. What outreach methods and/or marketing channels are used?

15. Do you have any suggestions regarding ways the program could better support your outreach efforts?

Staff Communication

16. Currently OPAE is responsible for implementing the Community Connections Program. Have you had direct communication with OPAE staff regarding this program?
    1. Yes
    2. No
    98. Don't Know

[DISPLAY Q17 IF Q16 = 1]

17. On the scale provided, please indicate how knowledgeable OPAE staff are about the issues you discuss with them?

Not at all knowledgeable	Slightly knowledgeable	Somewhat knowledgeable	Fairly knowledgeable	5 – Very knowledgeable	Not sure
1	2	3	4	5	98

18. On the scale provided, please indicate how satisfied or dissatisfied you are with the following:

	Very Dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied	Not sure
a. how long it takes OPAE staff to address your questions or concerns	1	2	3	4	5	98
b. how thoroughly OPAE staff address your question or concern	1	2	3	4	5	98

[DISPLAY Q19 IF Q18a or b = 1 or 2]

19. Please describe the ways in which you were not satisfied with OPAE staff:

20. Have you had direct communication with FirstEnergy staff regarding the Community Connections Program?
    1. Yes
    2. No
    98. Don't Know

[DISPLAY Q21 IF Q20 = 1]

21. On the scale provided, please indicate how knowledgeable FirstEnergy staff are about the issues you discuss with them?

Not at all knowledgeable	Slightly knowledgeable	Somewhat knowledgeable	Fairly knowledgeable	5 – Very knowledgeable	Not sure
1	2	3	4	5	98

[DISPLAY Q22 IF Q20 = 1]

22. On the scale provided, please indicate how satisfied or dissatisfied you were with the following:

	Very Dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied	Not sure
a. how long it took FirstEnergy staff to address your questions or concerns	1	2	3	4	5	98
b. how thoroughly FirstEnergy staff addressed your question or concern	1	2	3	4	5	98

[DISPLAY Q23 IF Q22a or b = 1 or 2]

23. Please describe the ways in which you were not satisfied with FirstEnergy staff:

24. On the scale provided, please indicate how satisfied or dissatisfied you were with the following:

	Very Dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very Satisfied	Not sure
a. the steps agencies take to get through the program	1	2	3	4	5	98

b. the range of equipment that qualifies for incentives	1	2	3	4	5	98
c. the level of incentives (dollar amount)	1	2	3	4	5	98
d. the program, overall	1	2	3	4	5	98

25. Do you have any issues with regards to interpreting the program guidelines or determining what qualifies as an eligible measure?
    1. Yes
    2. No
    98. Don't Know

[DISPLAY Q26 IF Q25 = 1]

26. Please explain what issues you have interpreting the program guidelines or determining what qualifies as an eligible measure:

27. Does your organization feel comfortable with the documentation requirements for all measure types including non-standard measures?
    1. Yes
    2. No
    98. Don't Know

Training/Events

28. What events have you participated in 2017?
    3. Weatherize Ohio Conference
    4. Program webinar
    5. Other: _____
29. Do you have any suggestions for improving the format of the events or what information is presented?

30. Do you feel your agency staff are well-trained on the following:

	Yes	No	We hire a 3rd party for that	Don't Know
testing and installing qualifying appliances	1	2	3	98
auditing and installing shell measures	1	2	3	98
electrical and roof repairs	1	2	3	98
the steps required to participate in the program	1	2	3	98

31. Could you provide feedback on the way the program could better support the training needs of your agency?

32. Does your agency plan to make any changes regarding how it's utilizing Community Connections dollars, how it's reaching out to customers, how energy savings opportunities are being identified, or how measures are being installed in 2018?

33. Do you have any suggestions for improving the community connections program or feedback you'd like to share with OPAE or FirstEnergy?

Thank you for taking the survey. Your response, in combination with other agencies' responses, will be used to improve the program in the future. Have a nice day.