

Low-Income Program Evaluation, Measurement and Verification Report 2015

Prepared for FirstEnergy Ohio Companies:

*Ohio Edison Company
The Cleveland Electric Illuminating Company
The Toledo Edison Company*

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1. Executive Summary

During 2015, 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 4,425 low-income households received energy efficiency services through the Low-Income Program in 2015. The numbers of participants in each service territory are shown in Table 1-1¹:

Table 1-1: Program Participation by Utility

<i>Utility</i>	<i>Number of Participants</i>
CEI	1,913
OE	1,326
TE	1,186
All Companies	4,425

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.

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.

Table 1-2 Impact Evaluation Results

Utility	Ex Ante Expected Gross Savings		Ex Post Verified Gross Savings		kWh Realization Rate	kW Realization Rate
	kWh	kW	kWh	kW		
CEI	2,942,226	426	3,038,813	438	103%	103%
OE	2,399,344	338	2,486,769	350	104%	103%
TE	1,958,053	275	2,047,419	286	105%	104%
Total	7,299,623	1,039	7,573,000	1,073	104%	103%

The gross ex post kWh savings total shown in Table 1-2 reflect a realization rate of 104 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 103 percent. The replacement of refrigerators and freezers with ENERGY STAR® models and the installation of energy efficient lighting accounted for 99 percent of the verified total kWh savings.

Key findings from the process evaluation of the 2015 Low Income program include:

- The program operates smoothly, with all program managers, administrators, and agencies reporting positive interactions with others involved in the program.** The Companies continued to report very positive working relationships with OPAE, and vice-versa. Agencies receive timely and helpful response from OPAE and from the Companies on questions, appreciate the newsletters and periodic updates, value the opportunity to interact at the annual conference, and generally find communications open and constructive. The Companies sought to have more direct interaction with agencies in 2015, and agencies that did communicate with the Companies spoke positively of the experience and feedback.

Findings from participant surveys echoed positive sentiments about the program. Three-quarters of respondents were very satisfied with the program overall, and as many as nine of every ten survey respondents were very satisfied with the specific equipment or services they received. Further, one-half had noticed savings on their electric bill and 70 percent of these customers were very satisfied with the energy savings.

- Agencies reacted positively to the changes in the price list and allowable measures that were made in 2015.** All of the agencies interviewed spoke positively and enthusiastically about the adjustments in the price list. Recovering the cost of time to meter appliances, even if not replaced, was mentioned most often, along with adjustments in the cost of refrigerators and inclusion of carbon monoxide detectors. Contractor prices, however, remain low relative to their costs, and the interviews detected that few agencies are taking advantage of additional air sealing measures or the unbundling of these measures. At the

same time, it was not possible to interview all agencies, and OP&E said agencies are still learning how to use these elements of the program.

- **The Seasonal Allowance worksheet is used more consistently than in previous years, and some agencies have found ways to use these funds regularly in combination with other programs.** Interviews revealed general agreement on the typical amount of funds indicated by the Seasonal Allowance worksheet—\$500 to \$1,500, with the maximum amounts observed ranging from a little more than \$1,500 to several thousand dollars. Some agencies have learned how to use these funds to deliver additional benefit to customers, while others report not using the funds at all and see them as insufficient or competing with dollars from other programs. Agencies agreed that the worksheet rarely indicates sufficient funds to complete standalone projects, even for all-electric homes.
- **Most agencies interviewed have continued to adapt to the decreased health and safety funds.** The opportunity to use health and safety funding from Community Connections is appreciated by the agencies interviewed. Several report using these funds to perform minor electrical repairs, cost-share the installation of ASHRAE-compliant ventilation, and install carbon monoxide detectors, noting that these measures help them maximize the benefit to customers receiving services through multiple programs.

2. Introduction and Purpose of Study

Under contract with the Companies, ADM is performing measurement and verification (M&V) activities to confirm the energy savings and demand reduction being realized through the energy efficiency programs that the Companies are implementing in Ohio in 2015. 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 2015. 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 goal of the process evaluation component was to determine how effective the program is in terms of customer satisfaction, customer awareness, and stakeholder interaction. The process evaluation was framed, therefore, by the following four research questions.

- How effective were the marketing efforts for the program? Which marketing methods were most effective?
- How well did the Companies' staff and the implementation team work together?
- Were the program participants satisfied with their experience?
- What changes can be made to the program's design or delivery to improve its effectiveness in future program years?

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 2015 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. Homes are prioritized using a point system with households with elderly, disabled, and young children receiving priority points. If the utility is offering funding for the job, there are additional priority points given to the applicant.

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. Inspectors 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 inspector talks with the client to understand energy use in the home and to provide energy conservation education. As part of the discussion, the inspector identifies which lights in the home are used more than 2.5 or 3 hours per day. Light bulbs are replaced with compact fluorescent lamps (CFLs) for the fixtures that meet the minimum use criteria. The local agencies determine how best to leverage all of the 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 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 are not to exceed 15% of the Eligible Measures billed to the Companies during the 2012-2015 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.

The table below details the ex-ante savings per measure for program year 2015.

Table 3-1: Annual kWh & kW ex ante Estimates per Unit

Energy Efficiency Measures: Non-Lighting	kWh	kW	Source
Central AC replacement	Varies by Project	Varies by Project	Ohio TRM
Hot water pipe insulation	Varies by Project	Varies by Project	Ohio TRM
HVAC Tune Up	Varies by Project	Varies by Project	Ohio TRM
Install 11-15 cu. ft. chest freezer	1,131	0.175	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	0.175	Ohio TRM
Install 17-19 cu. ft. refrigerator w/top freezer	1,251	0.192	Ohio TRM
Install 19-21 cu. ft. upright freezer	1,251	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	219.7	0.028	Ohio TRM
Install R-10 attic insulation (average)	Varies by Project	Varies by Project	Ohio TRM
Install R-10 attic insulation (difficult)	Varies by Project	Varies by Project	Ohio TRM
Install R-11 foundation wall insulation (average)	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 - brick veneer (average)	Varies by Project	Varies by Project	Ohio TRM
Install R-11 sidewall insulation - framed siding (average)	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 (average)	Varies by Project	Varies by Project	Ohio TRM
Install R-19 attic insulation (difficult)	Varies by Project	Varies by Project	Ohio TRM
Install R-27 attic insulation (average)	Varies by Project	Varies by Project	Ohio TRM
Install R-27 attic insulation (difficult)	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 (average)	Varies by Project	Varies by Project	Ohio TRM
Retirement of additional freezer	1,244	0.2	Ohio TRM
Retirement of additional refrigerator	1,376	0.22	Ohio TRM
Seal air leakage by 100 CFM50	Varies by Project	Varies by Project	Ohio TRM

<i>Energy Efficiency Measures: Lighting</i>	kWh	kW	Source
Install .03 nightlight	0.12	0.000	Ohio TRM
Install .5 watt nightlight	1.01	0.000	Ohio TRM
Install 15 watt dimmable CFL	30.44	0.003	Ohio TRM
Install 15 watt globe CFL	30.44	0.003	Ohio TRM
Install 15 watt or less outdoor CFL	26.38	0.003	Ohio TRM
Install 16-20 watt floodlight	35.64	0.004	Ohio TRM
Install 16-20 watt outdoor CFL	39.6	0.004	Ohio TRM
Install 16-20 watt spiral CFL	35.64	0.004	Ohio TRM
Install 21 watt or above floodlight	50.99	0.006	Ohio TRM
Install 21 watt or above outdoor CFL	46.91	0.005	Ohio TRM
Install 21 watt or above spiral CFL	60.64	0.007	Ohio TRM
Install 3-way circle line CFL	67.3	0.007	Ohio TRM
Install 3-way dimmable torchiere CFL	112.17	0.012	Ohio TRM
Install 3-way spiral CFL	39.6	0.004	Ohio TRM
Install 7-9 watt candelabra	16.24	0.002	Ohio TRM
Install 9 watt globe CFL	18.26	0.002	Ohio TRM
Install 9-15 watt spiral CFL	41.83	0.005	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

The following sections provide a detailed explanation of all methods used to evaluate the impacts and processes associated with the 2015 Low-Income program.

The methods used to calculate kWh savings and kW reductions for measures installed through the Low-Income Program are presented in this chapter. The methods used depended on whether or not a measure was a lighting measure. The methods used to calculate savings for lighting and non-lighting measures are therefore described separately in the following sections.

Verification of quantity of Measures Installed

ADM administered a telephone survey to 120 program participants to verify receipt of energy efficiency measures and services claimed in the Low-Income Program records and to estimate customer satisfaction with the 2015 Low-Income Program. The survey was also used to describe CFL installation practices among customers who received CFLs as well as to describe customer experiences with the contractors who performed the measure installations and the health and safety repairs.

Out of the initial sample of surveyed customers ADM randomly selected a subset of forty-eight additional sample points. Site visits, or over the phone verifications, were conducted for this population of customers.

4.1 Sampling Strategy

ADM developed a sampling plan enabling us to accomplish an unbiased review of a sample of participant records to determine the level of correlation between job-level savings reported by the program (i.e., *ex ante* expected savings as reported by the implementer through the AEG/Vision Database) and actual savings (i.e., *ex post* verified savings that were verified using the evaluation methodologies described in this EM&V Report).

ADM utilized the Dalenius-Hodges' stratification methodology to achieve the required sampling precision. ADM's stratified sampling plan utilized a four to 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 $\pm 10\%$ precision at a 90% confidence interval for the program.

Table 4-1: Ex Post Stratified Sampling Plan

Utility	CV	Sample Size	Precision @ 90% Confidence	Additional Field Visits Performed
CEI	0.81	40	0.08	8
OE	2.52	40	0.097	21
TE	0.68	40	0.097	19
Total		120		48

4.2 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 for each subprogram in the sections below.

For Ohio compliance requirements in previous years, baseline assumptions were applied directly from the Ohio Technical Reference Manual and represent minimum efficiencies as defined by either code requirements or market standards.

Senate Bill 310 (SB 310), passed in 2014, states that the following is countable toward compliance requirements:

Energy efficiency savings and peak demand reduction achieved on and after the effective date of S.B. 310 of the 130th general assembly shall be measured on the higher of an as found or deemed basis, except that, solely at the option of the electric distribution utility, such savings and reduction achieved since 2006 may also be measured using this method.

The incremental savings resulting from using the existing equipment as the baseline were calculated for the 2015 program year. The existing equipment baselines were taken from the Ohio TRM. Measures for which the 310 legislation affected the baseline calculation are listed with the applicable baselines in the sections below.

4.3 Analysis of Savings – Lighting Measures

The lighting measures installed through the Low-Income Program are direct install CFLs of varying wattages. kWh savings per measure are calculated per procedures set out in the Ohio Technical Reference Manual (TRM).²

² 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.

The following formula was used to calculate annual kWh *ex post* savings in accordance with the formula specified in the TRM. As set out in the TRM,

$$\text{kWh Savings} = \Delta\text{kWh} = \left(\frac{\Delta\text{Watts}}{1,000} \right) * \text{ISR} * \text{Hours} * \text{WHFe}$$

$\Delta\text{Watts} = \text{CFL watts} * \text{delta watts multiplier}$

CFL watts = wattage of installed CFL, as verified

Delta watts multiplier = factor to account for baseline conditions = 3.25 (from TRM)

ISR = In Service Rate (0.81)

Hours = Average hours of use per year; (1,040 hours).

WHFe = Waste Heat Factor for energy (1.07)

Per the TRM, summer coincident peak demand savings (kW) per lighting measure are calculated according to the following formula.

$$\text{Summer Coincident Peak Demand Savings} = \left(\frac{\Delta\text{Watts}}{1,000} \right) * \text{ISR} * \text{WHFd} * \text{CF}$$

$\Delta\text{Watts} = \text{CFL watts} * \text{delta watts multiplier}$:

CFL watts = wattage of installed CFL, as verified

Delta watts multiplier = factor to account for baseline conditions = 3.25 (from TRM)

ISR = In Service Rate (0.81);

WHFd = Waste Heat Factor for Demand (1.21)

CF = Summer Peak Demand Coincidence Factor (0.11)

4.4 Analysis of Savings – Non-Lighting Measures

The following types of non-lighting measures were installed through the Low-Income Program in 2015:

- Refrigerator replacement
- Freezer replacement
- Central air conditioning replacement
- Attic and Wall Insulation
- Water Heater Wraps
- Low Flow Showerhead
- Faucet Aerators
- Smart Power Strip
- HVAC Tune Up

For each non-lighting measure installed in 2015, total kWh savings and total peak demand savings for that measure were determined as a product of the number of measures verified as being installed and the savings per measure. The methods used to determine per-unit kWh and peak demand savings for the non-lighting measures are described in sections below.

Refrigerator Replacement

The procedures for calculating annual kWh savings and peak demand savings for replacement of a refrigerator for a low-income household are set out in the TRM. These procedures were used to calculate savings for the refrigerators replaced through the Low-Income Program. In 2015, modified values for UECexisting, UECES, and UECbase were used in the evaluation calculations, based on the information in the approved TRM. The modified savings values used for the 2015 evaluation are reported in Table 4-2.

Table 4-2: TRM Deemed Values for kWh & kW

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

Freezer Replacements

The TRM does not have procedures for calculating annual kWh savings and peak demand savings for replacement of a freezer for a low-income household. However, procedures are presented to calculate savings for freezers that are replaced in households that are not low-income.³ The deemed savings values for kWh and kW savings for refrigerators and freezers reported in the TRM were used to calculate ratios between the freezer and refrigerator savings values. These calculated ratios were applied to the modified savings values for replacement of refrigerators for low-income households to estimate the savings for replacement of freezers for such households.⁴ The resulting savings values that were used in the 2015 evaluation are reported in Table 4-3.

Table 4-3: TRM Deemed Values for kWh & kW

	Per Unit kWh/kW
Average Annual kWh Savings per Unit <i>Remaining life of existing unit (8 years)</i>	1,131 kWh
Average Summer Coincident Peak kW Savings per Unit. <i>Remaining life of existing unit (8 years)</i>	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 4-4 shows the deemed savings values specified in the TRM (p. 76) for the purchase of Smart Strip.

Table 4-4. 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

ADM used the deemed savings values for 7-plug smart power strips to determine *ex post* savings.

³ 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, pp. 23-24.

⁴ For freezer kWh savings, calculation is $(1244/1376)*1251 = 1,131$ 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 was calculated using the deemed savings values for this measure in the TRM.⁵ The deemed annual energy savings value is 79 kWh per unit, and the deemed summer coincident peak demand savings is 0.009 kW.

Low-Flow Showerheads

Program-level energy (kWh) and peak demand (kW) savings from installing low-flow showerheads was calculated using savings values based on information submitted in the TRM. A value of 173 kWh saved per gallons per minute (gpm) was used in 2015 for the calculation of energy savings. Per the values given in the TRM, it is assumed that installation of a low-flow showerhead would change the water flow from 2.87 gpm to 1.6 gpm. Thus, the annual energy savings value used was 219.7 per showerhead, and the summer coincident peak demand savings used was 0.0281 kW.

Faucet Aerators

Program-level energy (kWh) and peak demand (kW) savings from installing faucet aerators were calculated using savings values for this measure calculated in the TRM. Values calculated in the TRM for a 1.5 gpm installation were used in 2015. The annual energy savings value used was 30.9 kWh per unit, and the deemed summer coincident peak demand savings used was 0.0039 kW.

Attic Insulation

For attic insulation measures, kWh cooling savings per measure were calculated per procedures set out in the TRM:

$$\Delta\text{kWh} = ((1/R_{\text{exist}} - 1/R_{\text{new}}) * \text{CDH} * \text{DUA} * \text{Area}) / 1000 / \eta_{\text{Cool}}$$

R_{exist} = existing effective whole-assembly R-value.

R_{new} = new total effective whole-assembly R-value.

CDH = Cooling Degree Hours

DUA = Discretionary Use Adjustment⁶

Area = Square footage of insulated area

η_{Cool} = Efficiency of Air Conditioning equipment

⁵ VEIC, State of Ohio Energy Efficiency Technical Reference Manual, Draft of August 6, 2010, pp. 131-132.

⁶ Accounts for the fact that people do not always operate their air conditioning system when the outside temperature is greater than 75°F.

For attic insulation measures, kWh heating savings per measure were calculated per procedures set out in the TRM:

$$\Delta kWh = ((1/R_{exist} - 1/R_{new}) * HDD * 24 * Area) / 1000000 / \eta_{Heat}$$

R_{exist} = existing effective whole-assembly R-value.

R_{new} = new total effective whole-assembly R-value.

HDD = Heating Degree Days for location

Area = Square footage of insulated area

η_{Heat} = Average Net Heating System Efficiency (Equipment Efficiency * Distribution Efficiency)

For attic insulation measures, kW savings per measure were calculated per procedures set out in the TRM:

$$\Delta kW = \Delta kWh / FLH_{cool} * CF$$

ΔkWh = Cooling Savings

FLH_{cool} = Full load cooling hours

CF = Summer Peak Coincidence Factor for measure

Wall Insulation

For wall insulation measures, kWh savings per measure were calculated per procedures set out in the TRM:

$$\Delta kWh = ((1/R_{exist} - 1/R_{new}) * CDH * DUA * Area) / 1000 / \eta_{Cool}$$

R_{exist} = existing effective whole-assembly R-value.

R_{new} = new total effective whole-assembly R-value.

CDH = Cooling Degree Hours

DUA = Discretionary Use Adjustment⁷

Area = Square footage of insulated area

η_{Cool} = Efficiency of Air Conditioning equipment

⁷ Accounts for the fact that people do not always operate their air conditioning system when the outside temperature is greater than 75°F.

For wall insulation measures, kW savings per measure were calculated per procedures set out in the TRM:

$$\Delta kW = \Delta kWh / FLH_{cool} * CF$$

ΔkWh = Cooling Savings

FLH_{cool} = Full load cooling hours

CF = Summer Peak Coincidence Factor for measure

Central AC Replacement

For Central AC Replacement, kWh savings per measure were calculated per procedures set out in the TRM,⁸

$$\begin{aligned} &\Delta kWh \text{ for remaining life of existing unit} \\ &= (FLH_{cool} * BtuH * (1/SEER_{exist} - 1/SEER_{ee}))/1000 \end{aligned}$$

FLH_{cool} = Full load cooling hours

BtuH = Size of equipment in Btuh (note 1 ton = 12,000Btuh)

SEER_{exist} = SEER Efficiency of existing unit

SEER_{ee} = SEER Efficiency of ENERGY STAR unit

SEER_{base} = SEER Efficiency of baseline unit

For Central AC Replacement measures, kW savings per measure were calculated per procedures set out in the TRM:

$$\Delta kW = ((BtuH * ((1/EER_{exist}) - (1/EER_{ee}))) / 1000) * CF$$

BtuH = Size of equipment in Btuh (note 1 ton = 12,000Btuh)

EER_{exist} = EER Efficiency of existing unit

EER_{ee} = EER Efficiency of ENERGY STAR unit

CF = Summer Peak Coincidence Factor for measure

⁸ 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 all measures in the low income program, the only existing equipment baseline calculation was used.

Air Infiltration Reduction

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

$$\Delta kWh = (((CFM50Exist - CFM50New) / N-factor) * 60 * CDH * DUA * 0.018) / 1000 / \eta_{Cool}$$

CFM50Exist = Existing Cubic Feet per Minute at 50 Pascal pressure differential as measured by the blower door before air sealing.

CFM50New = New Cubic Feet per Minute at 50 Pascal pressure differential as measured by the blower door after air sealing.

N-Factor = Conversion factor to convert 50-pascal air flows to natural airflow.

60 = Constant to convert cubic feet per minute to cubic feet per hour

CDH = Cooling Degree Hours

For Air Filtration Reduction, kWh heating savings per measure were calculated per procedures set out in the TRM:

$$\Delta kWh = (((CFM50Exist - CFM50New) / N-factor) * 60 * 24 * HDD * 0.018) / 1000000 / \eta_{Heat} * 293.1$$

CFM50Exist = Existing Cubic Feet per Minute at 50 Pascal pressure differential as measured by the blower door before air sealing.

CFM50New = New Cubic Feet per Minute at 50 Pascal pressure differential as measured by the blower door after air sealing.

N-Factor = Conversion factor to convert 50-pascal air flows to natural airflow.

60 = Constant to convert cubic feet per minute to cubic feet per hour

HDD = Heating Degree Days (60° base temperature) for location

293.1 = Constant to convert MMBTU to kWh

For Air Infiltration Reduction measures, kW savings per measure were calculated per procedures set out in the TRM:

$$\Delta kW = \Delta kWh / FLH_{cool} * CF$$

ΔkWh = Cooling Energy Savings

FLH_{cool} = Full load cooling hours

CF = Summer Peak Coincidence Factor for measure

Residential HVAC Maintenance/Tune Ups

ADM performed an engineering desk review of available data to determine if the savings claims for tune-ups were rational. It was determined that the savings claimed for tune-ups was reasonable and conservative.

Hot Water Pipe Insulation

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

$$\Delta kWh = ((1/R_{exist} - 1/R_{new}) * (L * C) * \Delta T * 8,760) / \eta_{DHW} / 3413$$

R_{exist} = Pipe heat loss coefficient of *uninsulated* pipe (Btu/hr-°F-ft)

R_{new} = Pipe heat loss coefficient of *insulated* pipe (Btu/hr-°F-ft)

L = Length of pipe from water heating source covered by pipe wrap (ft)

C = Circumference of pipe (ft) (Diameter (in) * π * 0.083)

ΔT = Average temperature difference between supplied water and outside air temperature (°F)

8,760 = Hours per year

η_{DHW} = Recovery efficiency of electric hot water heater

3,413 = Conversion from Btu to kWh

For Hot Water Pipe Insulation measures, kW savings per measure were calculated per procedures set out in the TRM:

$$\Delta kW = \Delta kWh / 8,760$$

ΔkWh = Energy Savings

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 of 8 years.

4.6 Process Evaluation Methodology

The process evaluation component of this report was designed to answer the following research questions:

Customers

- How satisfied are participants with the products/services provided through the program?
- How did the participants hear about the program?
- What factors influenced the participants to participate in the program?
- Do the participants notice a change in their energy usage as a result of the new product?

Contractors and Agencies

- How satisfied are they with the program in general?
- Do they feel that there was enough programmatic support?
- How satisfied are the Agencies with the administrator's (OPAE) monitoring of the program?
- How satisfied are the Agencies with the administrators of the program?
- Do they think that there was enough effective marketing to encourage customers to participate in the program?
- Do they have any recommendations for improvements in the design and/or delivery of the program?

Program Managers and Administrators

- How satisfied are they with the program in general?
- How satisfied are the administrators with the Companies monitoring of the program?
- How satisfied are the Companies with the administrator's administering the program?
- Do they think that there was enough effective marketing to encourage customers to participate in the program?
- Do they feel that there was enough programmatic support?
- Do they have any recommendations for improvements in the design and/or delivery of the program?

- Were previous issues and/or concerns resolved in 2015? Were there any lessons learned in resolving previous issues?

Program, Implementation, and Action Agency Interviews

Tetra Tech, working in conjunction with ADM, conducted in-depth interviews with staff from the Companies, OPAE, and local agencies. Interviews were conducted in February 2016. Tetra Tech completed interviews with three Company staff, three OPAE staff, and seven community action agencies. The agencies interviewed ranged from small organizations of a few staff to large entities that employ several dozen field staff and deliver multiple conservation programs. Agencies represented by this report were located in each of the Companies’ service areas.

Participating Customer Survey

Quantitative surveys were completed with participating customers by VuPoint Research, a professional survey firm, during February 2016. A total of 120 surveys were completed across all three operating companies. Table 4-5 shows the number of completed surveys by electric distribution company (EDC).

Table 4-5: Number of Completed Process Surveys

	CEI	OE	TE	Total
Quantity	40	40	40	120

Analysis of survey data in this report is unweighted. All questions in the telephone survey were optional and respondents could choose not to respond (i.e., answers recorded as “don’t know” or “refused”). Unless otherwise reported, the reported number of observations for each question exclude blank or not applicable, “don’t know,” and “refused” responses.

5. Detailed Impact Evaluation Findings

The numbers of low-income households that received energy efficiency services through the Low-Income Program in 2015 in the service territories of the Companies are shown in the table below.

Table 5-1: Number of Participants

Utility	Number of Participants
CEI	1,913
OE	1,326
TE	1,186
Total Companies	4,425

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 2015. 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 2015.

Applying the methods described in Chapter 4 produced estimates of savings per unit on a measure-by-measure basis.

Table 5-2: Quantities of Lighting Measures

CFL Category	CEI	OE	TE	Total
Install .03 nightlight	0	14	0	14
Install .5 watt nightlight	7	58	4	69
Install 15 watt dimmable CFL	30	316	29	375
Install 15 watt globe CFL	299	996	338	1,633
Install 15 watt or less outdoor CFL	12	197		209
Install 16-20 watt floodlight	0	135	2	137
Install 16-20 watt outdoor CFL	1	229	0	230
Install 16-20 watt spiral CFL	3,022	1,240	3940	8,202
Install 21 watt or above floodlight	3	92	0	95
Install 21 watt or above outdoor CFL	3	45	0	48
Install 21 watt or above spiral CFL	3,364	1,774	1,302	6,440
Install 3-way circle line CFL	6	1	3	10
Install 3-way dimmable torchiere CFL	0	14	0	14
Install 3-way spiral CFL	77	370	26	473
Install 7-9 watt candelabra	257	902	516	1675
Install 9 watt globe CFL	77	86	14	177
Install 9-15 watt spiral CFL	8,965	11,331	10,700	30,996
Total	16,123	17,800	16,874	50,797

Table 5-3: Quantities of Non - Lighting Measures

Measure Category	CEI	OE	TE	Total Companies
Central AC replacement	0	2	4	6
Hot water pipe insulation	0	1	0	1
HVAC Tune Up	0	3	1	4
Install 11-15 cu. ft. chest freezer	2	17	10	29
Install 14-16 cu. ft. refrigerator w/top freezer	270	184	135	589
Install 16-18 cu. ft. upright freezer	116	82	57	255
Install 16-20 cu. ft. chest freezer	62	34	9	105
Install 17-19 cu. ft. refrigerator w/top freezer	526	392	275	1,193
Install 19-21 cu. ft. upright freezer	1	13	10	24
Install 19-22 cu. ft. refrigerator w/bottom freezer	4	42	29	75
Install 20-22 cu. ft. refrigerator w/top freezer	334	201	144	679
Install 20-23 cu. ft. side by side refrigerator	299	111	77	487
Install 24-26 cu. ft. side by side refrigerator	19	116	141	276
Install 5-10 cu. ft. chest freezer	120	55	84	259
Install 9-15 cu. ft. upright freezer	10	28	6	44
Install faucet aerator w/o shut- off valve	0	8	4	12
Install faucet aerator w/shut-off valve	1	7	2	10
Install low flow showerhead	1	17	1	19
Install R-10 attic insulation (difficult)	0	1	0	1
Install R-11 blown cellulose-sloped ceiling	0	1	0	1
Install R-11 foundation wall insulation (difficult)	0		1	1
Install R-11 sidewall insulation - brick veneer (average)	0	2	0	2
Install R-11 sidewall insulation - brick veneer (difficult)	0	4	0	4
Install R-11 sidewall insulation - framed siding (difficult)	0	26	0	26
Install R-19 attic insulation (difficult)	0	5	1	6
Install R-19 blown cellulose-floored attic	0	1	0	1
Install R-19 fiberglass batt insulation	0	2	0	2
Install R-27 attic insulation (average)	0	1	0	1
Install R-27 attic insulation (difficult)	0	16	6	22
Install R-27 blown cellulose-floored attic	0	1	0	1
Install R-38 attic insulation	0	4	0	4
Install R-49 attic insulation	0	1	0	1
Insulate <52 gallon water heater	0	11	1	12
Retirement of additional freezer	0	6	0	6
Retirement of additional refrigerator	1	5	0	6
Seal air leakage by 100 CFM50	0	2	0	2
Smart Strip Power Strip - 10 outlet	0	2	0	2
Total	1766	1,404	998	4,168

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

Measure Category	CEI	OE	TE	Total Companies
Electrical Repairs	543	1,750	147	2,440
Roof Repairs	23	38	0	61
Replace Electric Stove	0	0	0	0
Replace Well-Pump	0	0	0	0
Energy Education Consultations	5	6	6	17
Total Health & Safety and Education Measures	571	1,794	153	2,518

Tables 5-5 through 5-8 below detail the ex-post savings values and realization rates calculated per measure during program year 2015.

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

Measure	Ex-Ante kWh	Ex Post Savings kWh	Realization Rate
Central AC replacement	1,339	1,339	100%
Hot water pipe insulation	681	681	100%
HVAC Tune Up	208	208	100%
Install 11-15 cu. ft. chest freezer	32,799	32,799	100%
Install 14-16 cu. ft. refrigerator w/top freezer	736,839	736,839	100%
Install 16-18 cu. ft. upright freezer	288,405	288,403	100%
Install 16-20 cu. ft. chest freezer	118,755	118,754	100%
Install 17-19 cu. ft. refrigerator w/top freezer	1,492,443	1,492,443	100%
Install 19-21 cu. ft. upright freezer	27,144	27,144	100%
Install 19-22 cu. ft. refrigerator w/bottom freezer	93,825	93,825	100%
Install 20-22 cu. ft. refrigerator w/top freezer	849,429	849,429	100%
Install 20-23 cu. ft. side by side refrigerator	609,237	609,237	100%
Install 24-26 cu. ft. side by side refrigerator	345,276	345,276	100%
Install 5-10 cu. ft. chest freezer	292,929	292,927	100%
Install 9-15 cu. ft. upright freezer	49,764	49,764	100%
Install faucet aerator w/o shut- off valve	371	371	100%
Install faucet aerator w/shut-off valve	309	309	100%
Install low flow showerhead	4,174	4,174	100%
Install R-10 attic insulation (difficult)	2,411	2,387	99%
Install R-11 blown cellulose-sloped ceiling	2,558	2,532	99%
Install R-11 foundation wall insulation (difficult)	46	46	100%
Install R-11 sidewall insulation - brick (average)	42	42	100%
Install R-11 sidewall insulation - brick (difficult)	32	32	100%
Install R-11 sidewall insulation - siding (difficult)	10,368	9,703	94%
Install R-19 attic insulation (difficult)	2,484	2,243	90%
Install R-19 blown cellulose-floored attic	16	16	100%
Install R-19 fiberglass batt insulation	5,234	5,182	99%
Install R-27 attic insulation (average)	-	19	0%
Install R-27 attic insulation (difficult)	26,550	22,399	84%
Install R-27 blown cellulose-floored attic	4	4	100%
Install R-38 attic insulation	7,292	3,368	46%
Install R-49 attic insulation	2,568	2,542	99%
Insulate <52 gallon water heater	948	944	100%
Retirement of additional freezer	7,464	6,786	91%
Retirement of additional refrigerator	8,256	7,506	91%
Seal air leakage by 100 CFM50	415	415	100%
Smart Strip Power Strip - 10 outlet	206	206	100%
Total	5,020,820	5,010,293	100%

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

Measure	Ex-Ante Savings kWh	Ex Post Savings kWh	Realization Rate
Install .03 nightlight	160	346	217%
Install .5 watt nightlight	787	1,591	202%
Install 15 watt dimmable CFL	16,471	18,460	112%
Install 15 watt globe CFL	71,444	80,387	113%
Install 15 watt or less outdoor CFL	7,956	8,917	112%
Install 16-20 watt floodlight	7,221	8,093	112%
Install 16-20 watt outdoor CFL	13,413	15,096	113%
Install 16-20 watt spiral CFL	430,874	484,509	112%
Install 21 watt or above floodlight	6,955	7,794	112%
Install 21 watt or above outdoor CFL	3,212	3,623	113%
Install 21 watt or above spiral CFL	469,990	528,367	112%
Install 3-way circle line CFL	966	1,083	112%
Install 3-way dimmable torchiere CFL	2,255	1,805	80%
Install 3-way spiral CFL	27,656	31,046	112%
Install 7-9 watt candelabra	39,159	43,976	112%
Install 9 watt globe CFL	4,657	5,228	112%
Install 9-15 watt spiral CFL	1,175,626	1,322,387	112%
Total	2,278,803	2,562,707	112%

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

Measure	Ex-Ante kW	Ex Post Savings kW	Realization Rate
Central AC replacement	1.51	1.47	97%
Hot water pipe insulation	0.08	0.08	100%
HVAC Tune Up	0.08	0.08	100%
Install 11-15 cu. ft. chest freezer	5.08	5.07	100%
Install 14-16 cu. ft. refrigerator w/top freezer	113.09	113.32	100%
Install 16-18 cu. ft. upright freezer	44.62	44.60	100%
Install 16-20 cu. ft. chest freezer	18.38	18.36	100%
Install 17-19 cu. ft. refrigerator w/top freezer	229.06	229.52	100%
Install 19-21 cu. ft. upright freezer	4.20	4.20	100%
Install 19-22 cu. ft. refrigerator w/bottom freezer	14.40	14.43	100%
Install 20-22 cu. ft. refrigerator w/top freezer	130.37	130.63	100%
Install 20-23 cu. ft. side by side refrigerator	93.50	93.69	100%
Install 24-26 cu. ft. side by side refrigerator	52.99	53.10	100%
Install 5-10 cu. ft. chest freezer	45.32	45.30	100%
Install 9-15 cu. ft. upright freezer	7.70	7.70	100%
Install faucet aerator w/o shut-off valve	0.05	0.05	99%
Install faucet aerator w/shut-off valve	0.04	0.04	99%
Install low flow showerhead	0.53	0.53	100%
Install R-10 attic insulation (difficult)	0.00	0.00	0%
Install R-11 blown cellulose-sloped ceiling	0.00	0.00	0%
Install R-11 foundation wall insulation (difficult)	0.05	0.05	100%
Install R-11 sidewall insulation - brick (average)	0.06	0.06	100%
Install R-11 sidewall insulation - brick (difficult)	0.04	0.04	100%
Install R-11 sidewall insulation - siding (difficult)	0.75	1.17	157%
Install R-19 attic insulation (difficult)	0.03	0.03	127%
Install R-19 blown cellulose-floored attic	0.02	0.02	111%
Install R-19 fiberglass batt insulation	0.07	0.07	105%
Install R-27 attic insulation (average)	0.00	0.02	0%
Install R-27 attic insulation (difficult)	0.43	0.52	120%
Install R-27 blown cellulose-floored attic	0.00	0.00	111%
Install R-38 attic insulation	0.12	0.14	121%
Install R-49 attic insulation	0.00	0.00	0%
Insulate <52 gallon water heater	0.11	0.11	100%
Retirement of additional freezer	1.20	1.05	87%
Retirement of additional refrigerator	1.32	1.15	87%
Seal air leakage by 100 CFM50	0.55	0.55	100%
Smart Strip Power Strip - 10 outlet	0.02	0.02	96%
Total	765.76	767.18	100%

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

Measure	Ex-Ante kW Savings	Ex Post Savings kW	Realization Rate
Install .03 nightlight	0.00	0.00	0%
Install .5 watt nightlight	0.01	0.00	0%
Install 15 watt dimmable CFL	1.97	2.21	112%
Install 15 watt globe CFL	8.56	9.61	112%
Install 15 watt or less outdoor CFL	0.95	1.07	112%
Install 16-20 watt floodlight	0.87	0.97	112%
Install 16-20 watt outdoor CFL	1.61	1.81	112%
Install 16-20 watt spiral CFL	51.60	57.95	112%
Install 21 watt or above floodlight	0.83	0.93	112%
Install 21 watt or above outdoor CFL	0.38	0.43	113%
Install 21 watt or above spiral CFL	56.26	63.20	112%
Install 3-way circle line CFL	0.12	0.13	112%
Install 3-way dimmable torchiere CFL	0.27	0.20	76%
Install 3-way spiral CFL	3.31	3.71	112%
Install 7-9 watt candelabra	4.69	5.26	112%
Install 9 watt globe CFL	0.56	0.63	112%
Install 9-15 watt spiral CFL	140.79	158.17	112%
Total	272.79	306.28	112%

Overall the ex ante and ex post kWh and kW savings calculation resulted in similar savings. The difference in saving values are explained by measure below.

Attic Insulation

The low realization rate for the attic insulation measure is mainly due to the ex ante estimates use of a lower average net heating system efficiency (η_{Heat}) for participants with an electric resistance heating type in their home.

Lighting

For the lighting measures the ex post savings are, on average, higher than what was claimed in the ex ante estimates. Through on-site verifications, over the phone verifications, and over the phone surveys, a higher in-service rate was found than the TRM value used to calculate the ex ante estimates. Incorrect ex ante savings values were also applied to the nightlight measure resulting in an unusually high realization rate.

6. Detailed Process Evaluation Findings

The following section provides the key findings associated with the 2015 Process Evaluation of the Low-Income program.

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 Community Connections program and serves as the coordinator between EDCs and the local agencies that perform the work. OPAE and its member agencies also deliver the following energy assistance programs:

- *The Low Income Home Energy Assistance Program (LIHEAP), a federally funded energy payment assistance program known in Ohio as HEAP*
- *The Percentage Income Payment Program (PIPP), an energy payment assistance program*
- *The 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 residents of Ohio.*

OPAE and local agencies do not market the program in the traditional sense. The state's electronic tracking system provides a way for agencies to identify customers who are eligible for, and prioritized to receive, services. Agencies are well-established in their communities, administer other programs targeting low-income families, and have close ties to social service organizations. Agencies may also advertise their weatherization and energy conservation services in public service announcements or local publications. All agencies interviewed experience great demand for weatherization and conservation services and operate with a backlog of eligible customers. The waiting list reported by participating agencies was shorter than in previous years—all agencies have a wait list of at least a month but most customers are not waiting more than 90 days for service. Further, the waitlist is associated with delivery of comprehensive weatherization services and not necessarily delivery of equipment or services available through Community Connections. When waitlists for weatherization reach several months, agencies provide energy efficient products (CFLs, refrigerators, freezers, as eligible) earlier to help meet customers' energy conservation needs.

Participation in the program is straightforward for customers. All of the local agencies interviewed had on-staff inspectors who visit the customer's home. Inspectors place a meter on the customer's refrigerator to monitor the electrical current and, if applicable, the freezer to log usage. The inspector talks with the client to understand energy use in the home and to provide energy conservation education. As part of the discussion, the inspector identifies which lights in the home are used more than two hours per day.

Light bulbs are replaced with compact fluorescent lamps (CFLs) for the fixtures that meet the minimum use criteria, and refrigerators are replaced if the meter reads greater kWh usage than the prescribed threshold guidelines for the unit's size. The local agencies determine how best to leverage all of the funds (federal, state, utility, and other sources) available to the customer and the type of equipment or services needed to improve the energy efficiency and comfort of their home.

A proportion of funds (15 percent of the agency's expended budget) can be used for health and safety measures, such as electrical wiring, roof repairs, mechanical ventilation, and carbon monoxide detectors. The seasonal allowance worksheet allows agencies to determine what shell or electric heating/cooling reducing measures the customer is eligible for based on their electric consumption. Agencies use of the seasonal allowance worksheet is discussed in a later section of this report.

6.1 Program Manager, Program Administrator, and Community Agency Staff Detailed Findings

The Companies Program Staff Administration and Oversight

The Companies contract with OPAE to administer the Community Connections program. This arrangement is mandated by the Public Utilities Commission of Ohio. The Companies' program staff reports that the working relationship with OPAE remains very good.

The Companies' program staff use the Community Connections (CC) database system for tracking, reporting, and invoicing by the local agencies. The shared web-based system allows program managers to run and review reports on activity as needed. By seeing agencies' batch submissions even before approval by OPAE, they can check the data and identify inaccuracies that need attention. The system, and the Companies' staff careful review of the data, help to ensure that records and files sent to the third-party evaluator assessing energy-savings each month are correct. In addition, OPAE submits monthly reports on spending, health and safety, remaining balances, and program process. The CC system is discussed in more detail below.

Program Staffing and Training

Overall, there were no immediate concerns about the qualifications of program and implementation staff. Each group of interviewees (the Companies' staff, OPAE, and local agencies) expressed respect for the knowledge and expertise of all involved.

Staffing among community agencies has been stable. While any agency can experience temporary or short-term manpower constraints, none indicated serious problems finding or retaining qualified staff. Staffing levels have stabilized following the need to quickly ramp up with the influx of funds from the American Recovery and Reinvestment Act of 2009 and then downsize as this funding ended. Aside from the ongoing need to train

new staff, recertify, or acquire additional certifications for experienced staff, concerns about the supply and retention of staff summarized in previous reports have lessened.

Local agency contractors receive training through OPAE, primarily by attending the Weatherize Ohio Conference. OPAE and the Companies also circulate updates about the program and guidance on specific issues through e-newsletters. The 2015 program year included a webinar during which the Companies and OPAE reviewed changes in the price list and measures. In addition to these offerings, local agencies also provide training to their staff. All of the agencies interviewed had experience (often several decades of experience) with low-income and weatherization programs. They were well-versed in the rules and guidelines associated with each of the programs they deliver, how and when the programs could be combined to provide customers with maximum benefit while meeting sponsoring organizations' objectives, and how to marshal their crews and contractors to deliver services effectively.

Most agencies, when asked, feel the training for delivering Community Connections is sufficient. They find the courses valuable and technical assistance is available when needed. However, interviews revealed variability in agencies' expertise and experience with program tools, their ability to use funds effectively, and their knowledge of program details or policies that may enable them to deliver maximally beneficial services. This variability is revealed in the discussion of findings under each of the relevant subsections of this report. To summarize, they include the following:

- *Understanding the seasonal allowance worksheet and being able to use the available allocations to install measures that would benefit customers.*
- *Adjusting to the limit on health and safety measures and implementing measures with the available funds effectively, even if large projects, such as rewiring and roof replacements are seldom possible.*
- *Understanding the documentation requirements for non-standard measures and how the approval process can be managed to minimize reporting burden and delays for customers.*

In addition, the Companies' program managers would like the program to broaden energy conservation efforts beyond appliance replacement and lighting. Changes in the price list in 2015 reflect this desire to emphasize shell and deeper measures, yet program administrators note that *"we're still transitioning at the agency level to use these shell dollars more frequently."*

Communications among the Companies, OPAE, and local agencies

OPAE serves as the program administrator and directly interacts with the Companies' program staff, and the local agencies. Overall, both OPAE and the Companies report frequent communications with good rapport. Staff members noted: *"They're really, really good people to work with. They know programs [and] they've got a bunch of experience. They're just all real pleasures to work with."* The Companies' program staff and OPAE

hold regular, monthly conference calls, they coordinate on newsletters distributed to agencies, and training or update information. Staff from both organizations were quick to note that communication is not limited to scheduled meetings: “[I]f I have a question or if they don’t understand something or if I don’t understand what they’re saying, there is no hesitation on either of our parts to pick up the phone and talk about it.”

During the 2015 program year, the quality assurance inspector with the Companies’ third-party QA/QC contractor started participating in the monthly calls with program managers and program administrators. This step helped to share issues or findings from the field visits so that they could be understood among the entire team and addressed appropriately. OPAE and the Companies worked together on sessions held at the Weatherize Ohio Conference and the quality assurance staff also participated by speaking with agencies on program updates and answering questions.

Most communication with the Companies occurs between OPAE and program managers, but the Companies increased direct contact with local agencies. These communications, by email and telephone, give agencies an opportunity to ask questions they might be reluctant to ask in a group setting, such as a conference call or conference session. A one-on-one, verbal exchange also provides the Companies with “a much better feeling” and “understanding of what [a person] is saying” about the situation an agency is dealing with.

Most agencies also feel communications with OPAE and the Companies are good. The newsletters and updates are helpful and they feel well-informed. In turn, staff at each organization is available and responsive to questions.

Community Connections (CC) System

The CC System was developed by the Companies to track its low-income programs as well as for invoicing. Since contracting with OPAE, the CC system has been implemented across the state in June 2011. OPAE, local agencies, and two other electric utilities contracting with OPAE are now using the tracking system.⁹ The CC System has quality controls built in to assure required data are entered before invoices can be processed. The use of this system by OPAE, utilities, and agencies creates opportunities for statewide benchmarking of programs across utilities. The Companies’ program staff provides training and support of this system to all users.

Interviews with agencies this year indicate that they have become familiar with the system, appreciate the updates and efforts to automate whenever possible, and note the prompt and helpful assistance from the Companies or OPAE when it is needed. While agencies may still bemoan the need to enter information about the same housing unit into multiple systems when they leverage funding from multiple sources, they generally recognize the need for the duplication and the barriers to developing a one-

⁹ In interviews with agencies about the 2014 program year, they reported that one of the other participating utilities (AEP) would stop using the system in 2015. Interviews conducted this year suggest AEP is still in the process of creating its own system.

stop, coordinated database. Further, by comparison with the alternatives, agencies frequently prefer the CC system.

Funding

Similar to previous years, all agencies were able to spend their Community Connections funding in 2015. OPAE monitors agency's spending levels and number of projects throughout the year, and reallocates funds among agencies if they identify situations where an agency may not achieve its goals. In turn, agencies contact OPAE in advance if they anticipate not being able to use all their funding before the end of the program year to ensure funds are used effectively throughout the state. Discussions with agencies this year focused on adjustments in the price list and support for additional measures, health and safety funding, and the seasonal allowance worksheet, each of which is discussed below.

Price list and allowable measures

As discussed earlier, the Companies adjusted the price list and allowable measures for Community Connections in the 2015 program year. Prices were adjusted to better align with the cost of equipment. Allowable prices for ENERGY STAR® refrigerators increased, reflecting the higher cost of the newer, more energy efficient units that were introduced late in the 2014 program year. At the same time, the price of CFLs decreased, reflecting the lower cost of these bulbs in the market. Carbon monoxide detectors were added as a standard measure under health and safety, air-sealing measures were unbundled, and agencies could recover the cost of the time spent to audit a home, and meter the appliances (even if the appliance was not replaced).

Agencies uniformly praised several of these adjustments. Cost recovery for time spent metering was mentioned most often, but increasing the prices on refrigerators, including carbon monoxide detectors, and supporting additional air-sealing measures were also cited.

Several agencies reported that the prices for contractors are still problematic and generally lower than those allowed by other programs.

Health and safety measures and funding

Previous years' evaluation reports have discussed the changing levels of health and safety funding in Community Connections. Originally unlimited, the funds were restricted to 30 percent of total budget spent per agency in 2011; in 2012, it was reduced to 15 percent of total budget spent per agency. OPAE program administrators stated, in interviews for the 2014 and 2015 program years, that "*the agencies have adjusted*" to the restrictions. Discussions with agencies this year and last year indicate their adaptation to the cap on health and safety expenditures is varied and that the availability of other funding sources to fill the gap is limited.

Seasonal Allowance worksheet

The Seasonal Allowance worksheet calculates the amount of funding available for shell and heating/cooling measures based on a customer's electric consumption. All of the agencies we interviewed were familiar with the worksheet and use it. Similar to comments shared by agencies last year, they find the worksheet easy to work with, superior to systems they have to use for other programs, and appreciate updates by the Companies in recent years.

However, there is variability in agencies' experience with the worksheet and the extent to which they draw upon the funds indicated by the allowance calculations.

Quality assurance and quality control

The Companies contract with a third-party QA/QC contractor to conduct follow-up visits with customers, on-sites with agencies, and review files. The QA/QC contractor was brought on late in 2012 and the process and interaction with OPAE and the agencies, has developed over time. Interviews with agencies for 2015 indicate that the relationships are working fine for the most part. Most agencies do not find the QA/QC requests especially difficult or time-consuming, follow-up questions can be addressed easily and in a timely manner, and their customers have been comfortable with the process. The QA/QC task is more complex in areas where agencies deliver services under multiple funding sources and their work must meet the guidelines of all programs, not just Community Connections. This can lead to misunderstanding, such as a conclusion that appliances were metered unnecessarily or work was not done with the Companies' funding. Numerous follow-up questions or recommended corrections from the QA/QC contractor generated additional burden for agencies. Near the end of the program year, new processes were put into place to address this problem. Beginning in late 2015, communication on these issues are being channeled through OPAE to streamline the process and make it possible to identify and address the overlapping program issues.

Marketing

In general, the Community Connections program is not directly marketed to customers in Ohio. All but one of the agencies interviewed also delivers comprehensive weatherization services through HWAP and other utility programs. Eligible customers are identified by the HWAP prioritization and through their participation in other heating or income-qualified energy assistance programs. All agencies are well-connected with their communities and work to ensure that all segments of the population are aware of available assistance.

Smaller agencies, especially those that do not have HWAP contracts, do outreach through events, published announcements, and flyers in local stores and gathering places. They also coordinate with organizations that provide other services to low-income residents, such as local credit unions, home repair groups, social service organizations that serve the elderly, disabled, or vulnerable families. Word-of-mouth remains an effective way to reach clients.

The HWAP system prioritizes cases based on a point system that is not controlled by the agencies. The agencies that do not have HWAP contracts prioritize clients based on expressed need and assessment of the circumstances, with health and safety concerns moving a homeowner to the top of the queue. These agencies were generally working without a waitlist so, regardless of circumstance, homeowners rarely experience significant delay.

Program operations and implementation improvements

When asked about general program operations, most agencies did not have any complaints. As described in other sections, agencies find communications with the Companies and OPAE work well and their questions are answered promptly. Also as noted, most agency staff report extensive experience working with low-income populations and weatherization programs in Ohio, resulting in considerable experience at the helm of these programs.

The Companies program managers all agree that OPAE is very good to work with and willing to make changes. The managers expressed concerns about the length of time needed to incorporate desired program improvements such as price list and allowable measures updates, however OPAE plans to hire three additional staff in calendar year 2016, which may help address this problem. They plan to use these staff to perform operations management and field monitoring.

OPAE has been working with agencies over the past few years to seek out more multifamily units. Given the continuing challenges of combining Community Connections funding with HWAP and gas utility programs to weatherize homes, OPAE feels agencies could use Community Connections to deliver baseload measures to an underserved housing sector. The agencies available to be interviewed in 2014 and 2015 indicate that few can follow this guidance effectively. They deliver services to duplexes or smaller apartments (4- to 8-unit), but working with large apartment complexes of dozens, hundreds, or more units presents significant challenges to the agencies in both time and program dollars. For these agencies, experience had proven that the tasks of gaining cooperation, determining eligibility, coordinating with on-site maintenance staff, and gathering necessary documentation, among others, were excessive. To carve out a more productive path, OPAE contracted with two agencies in 2015 that focused solely on delivering baseload measures in multifamily units.¹⁰

Additional needs

In general, agencies felt the current program offerings were sufficient. As noted earlier, agencies expressed appreciation for the adjustment in the price list, the inclusion of carbon monoxide detectors, and coverage of time to meter appliances even if they are not replaced. There was no single item frequently requested by customers that would be appropriate for an electric utility program.

¹⁰ Neither agency was available to be interviewed for this evaluation.

Agencies expressed interest in expanding the program to include LED lighting. They recognize that LEDs may not offer considerable energy savings beyond the CFLs already provided by the program and there may be compatibility issues with lighting fixtures that prevent installation of LEDs.

More frequently than the previous year, agencies mentioned the spotty availability of CFLs, with 3-way and dimmable bulbs cited as being both most difficult to source and often requested by homeowners. “

Customer satisfaction

Although agencies can identify program rules or procedures they do not like, wish would change, or create paperwork for them, they are quick to recognize the importance of Community Connections for residents and for their ability to serve the community.

Agencies report that they receive positive feedback from the customers they serve through the Community Connections.

The telephone survey of participants included open-ended questions that explored homeowners' satisfaction with the program. These results are discussed below along with other results from the survey.

6.2 Program Participant Findings

Audit experience

Approximately eight out of every ten program participants (83 percent) reported having their appliances tested for efficiency as part of their participation in the Community Connections program. Refrigerators and freezers were the most common tested appliances. “Other” appliances were also tested, which included stoves, washers, and dryers. Table 6-1 reports the number of participants who recalled having an appliance tested and which appliances were tested, by each EDC.¹¹

¹¹ Although the number of observations is too small to support tests of statistical significance, we note differences that may be substantively meaningful.

Table 6-1. Auditor/Inspector Tested Appliances and Types of Appliances Tested

	Cleveland Electric Illuminating		Ohio Edison		Toledo Edison		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
Tested any appliance								
Yes	29	83%	30	83%	32	84%	91	83%
No	6	17%	6	17%	6	16%	18	17%
Appliances tested								
Refrigerator	27	68%	29	73%	28	70%	84	70%
Freezer	16	40%	12	30%	12	30%	40	33%
Wall A/C	1	3%	0	0%	0	0%	1	1%
Central A/C	2	5%	0	0%	1	3%	3	3%
Electric water heater	4	10%	4	10%	3	8%	11	9%
Electric heat pump / Furnace	1	3%	4	10%	4	10%	9	8%
Other	3	8%	6	15%	8	20%	17	14%

Source: Questions QAA16 QAA17.

Note: Totals may not sum to 100 percent due to rounding; for “Appliances tested,” may not total to 100% as respondents could select more than one answer.

Respondents were asked whether an auditor visited and discussed ways to use less energy in their home. As shown in Table 6-2, all but nine of the individuals surveyed remembered this visit and discussion. Almost two-thirds (63 percent) felt the information provided was enough and 82 percent felt the recommended energy saving improvements were sufficient. Among the 18 percent who sought further energy saving recommendations, help with windows, checking the furnace, providing more insulation, and evaluating washers, dryers, and stoves were mentioned most often. Two-thirds of surveyed customers were asked by the auditor to share a copy of their electric bill.

Table 6-2 Experience with Energy Audit

	Cleveland Electric Illuminating		Ohio Edison		Toledo Edison		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
Auditor visited home and talked about ways to save energy								
Yes	36	95%	36	95%	34	87%	106	92%
No	2	5%	2	5%	5	13%	9	8%
Wanted additional energy-saving information								
Yes, more information useful	13	37%	11	31%	15	45%	39	38%
No, information provided was enough	22	63%	25	69%	18	55%	65	63%
Wanted more energy saving improvements								
Yes	7	18%	9	27%	4	11%	20	18%
No	33	83%	24	73%	34	89%	91	82%
Auditor asked for copy of electric bill								
Yes	25	81%	16	50%	23	66%	64	65%
No	6	19%	16	50%	12	34%	34	35%

Source: Questions Q1B_1, QAA15, QAA21, QAA8.

Note: Totals may not sum to 100 percent due to rounding.

Respondents were asked if they had noticed any savings in their energy bills after having received weatherization services. Overall one-half had noticed energy savings, 32 percent had not and 18 percent were not sure.¹² The number of customers who noticed savings on their electric bill varied by each EDC (Table 6-3). More than 60 percent of the surveyed participants in the Cleveland Electric Illuminating territory reported noticeable energy savings compared with 40 percent of Toledo Edison customers. Overall, of those that had noticed energy savings, about 70 percent were very satisfied with the savings they had seen and 91 percent were at least “somewhat satisfied.”¹³

¹² In surveys of similar populations conducted by Tetra Tech, we have found that customers may not notice changes in their energy bill because they have a fixed payment plan that proportionally distributes their total annual energy costs in fixed amounts each month regardless of consumption. Customers that use automatic payment options, such as a checking account withdrawal, also may be less likely to notice changes in bill amounts.

¹³ Respondents were asked to rate whether they were “very dissatisfied,” “somewhat dissatisfied,” “neither satisfied nor dissatisfied,” “somewhat satisfied,” or “very satisfied.” The analysis reported in this table contrasts respondents who answered “very satisfied” and “somewhat satisfied” with other categories.

Table 6-3. Energy Savings After Weatherization Services

	Cleveland Electric Illuminating		Ohio Edison		Toledo Edison		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
Noticed savings on electric bill								
Yes	25	63%	19	49%	16	40%	60	50%
No	12	30%	11	28%	15	38%	38	32%
Not sure	3	8%	9	23%	9	23%	21	18%
Satisfaction with energy savings								
Very satisfied	20	80%	15	79%	6	40%	41	69%
Somewhat satisfied	2	8%	3	16%	8	53%	13	22%

Source: Questions Q41 Q42.

Note: Totals may not sum to 100 percent due to rounding.

Satisfaction with program

Respondents were asked to rate their satisfaction with various aspects of the program (Table 6-4). Satisfaction with the program overall and various elements of the program were similar: Three-quarters of surveyed customers were very satisfied with the program overall, over 80 percent were very satisfied with the scheduling of the visit, and 70 percent gave high marks to the information they received. Higher proportions of Cleveland Electric Illuminating and Ohio Edison customers were very satisfied with the program and these specific aspects of the program than Toledo Edison customers, where two-thirds were very satisfied with the program and just over one-half with the information they received.

Each of the energy efficient equipment installed for customers received high satisfaction ratings as well. More than 80 percent of customers were very satisfied with energy efficient lighting, and nine of every ten customers who received a freezer were very satisfied. The share of customers expressing high satisfaction with the refrigerator was lower but still two-thirds of those surveyed.

Table 6-4. Satisfaction with the Program and Utility

	Cleveland Electric Illuminating		Ohio Edison		Toledo Edison		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
Satisfaction with Community Connections								
Very satisfied with program overall	30	75%	31	82%	26	65%	87	74%
Very satisfied with scheduling of audit/visit	34	87%	33	87%	29	73%	96	82%
Very satisfied with information from the audit	32	80%	26	74%	22	55%	80	70%
Very satisfied with CFLs	21	84%	20	87%	17	74%	58	82%
Very satisfied with ENERGY STAR refrigerator	7	64%	4	50%	13	76%	24	67%
Contacted utility during participation								
Never	24	60%	25	66%	31	78%	80	68%
Once	6	15%	5	13%	2	5%	13	11%
Two or three times	9	23%	4	11%	5	13%	18	15%
Four or more times	1	3%	4	11%	2	5%	7	6%
Satisfaction with utility								
Very satisfied (all participants)	29	76%	24	73%	17	47%	70	65%
Very satisfied (participants who contacted utility)	11	69%	8	67%	1	11%	20	54%

Source: Questions Q34, Q35, Q37, Q39, Q43.

Note: Totals may not sum to 100 percent due to rounding.

Almost 70 percent of survey participants had never contacted their utility while they were participating in the program. (Table 6-4). In general, satisfaction with the utility is high; two-thirds of surveyed customers are very satisfied with communications with their EDC, and more than one-half of customers who contacted the utility were very satisfied. Rates of satisfaction are slightly lower among Toledo Edison customers (47 percent overall and 11 percent of those who contacted the utility), but the number of customers who contacted the utility is also much lower (23 percent) and the number of observations is limited (only 9 of the 40 customers surveyed).

Household characteristics

Table 6-5 shows rates of home ownership, type of residence, and year of construction. Two-thirds of the program participants who completed the survey owned their home, and the vast majority lived in a single-family home. Only 12 percent lived in a multifamily

home. Overall, most of the homes were older: over 85 percent were built before 1980 and 70 percent were at least 55 years old (built before 1960). The housing stock among customers of Cleveland Electric Illuminating and Toledo Edison is noticeably older: three-quarters of their homes were built before 1960 compared with slightly less than 60 percent for Ohio Edison.

Table 9-5. Household Characteristics

	Cleveland Electric Illuminating		Ohio Edison		Toledo Edison		Total	
	n	Percent	n	Percent	n	Percent	n	Percent
Home ownership								
Own	20	56%	29	76%	24	63%	73	65%
Rent	16	44%	9	24%	14	37%	39	35%
Type of home								
Single-family, detached construction	20	57%	27	69%	29	76%	76	68%
Single-family, manufactured or mobile home	4	11%	5	13%	7	18%	16	14%
Multi-family home	5	14%	7	18%	1	3%	13	12%
Year home built								
Before 1960	16	76%	13	57%	19	76%	48	70%
1960 to 1979	3	15%	6	26%	3	12%	12	17%
1980 or later	2	10%	4	17%	3	12%	9	13%

Source: Questions Q47, Q48, Q49.

Note: Totals may not sum to 100 percent due to rounding.

Conclusion

The Community Connections program has been effectively integrated into a successful weatherization portfolio of programs administered by OP&A and delivered by community action agencies throughout the state. Customers appreciate the services provided by the Companies, and agencies appreciate the support they have received from the Companies and OP&A. There are opportunities to improve the program operations and delivery by working with agencies to ensure measures and tools supported by the program are thoroughly understood and utilized. The inclusion of additional measures in 2015 and adjustments to the price list are also productive ways to provide energy conservation services and meet customers' needs. Further progress is likely in the coming year as the program and the agencies continue to focus attention on using Community Connections to deliver more shell measures while still addressing baseload needs and combining effectively with statewide weatherization and conservation programs from other utilities.

7. Conclusions and Recommendations

The following sections provide ADM conclusions and recommendations pertaining to program performance and improvement.

Conclusions

A total of 4,425 low-income households received energy efficiency services through the Low-Income Program in 2015. The numbers of participants in each service territory were as follows:

- CEI 1,913
- OE 1,326
- TE 1,186

The overall evaluation results for estimated gross energy savings (kWh) and peak demand reductions (kW) for the program in the three service territories are summarized in Table 7-1 below.

Table 7-1: Impact Evaluation Results

Utility	Ex Ante Expected Gross Savings		Ex Post Verified Gross Savings		kWh Realization Rate	kW Realization Rate
	kWh	kW	kWh	kW		
CEI	2,942,226	426	3,038,813	438	103%	103%
OE	2,399,344	338	2,486,769	350	104%	104%
TE	1,958,053	275	2,047,419	286	105%	104%
Total	7,299,623	1,039	7,573,000	1,073	104%	103%

The total gross kWh savings shown in Table 7-1 reflects a realization rate of 104 percent, as determined by the ratio of verified total gross kWh savings to expected gross kWh savings. The variation between the ex-ante and ex-post values can primarily be attributed to the lighting measures. The total gross kW savings reflect a realization rate of 103 percent.

Recommendations

Overall, the program continues to run smoothly. Local agencies and their staff have extensive experience with energy conservation programs and the low-income population they serve. Similarly, OPAE is an experienced administrator of these

programs and communicates effectively with the agencies and with the Companies. However, our evaluation uncovered opportunities for further improvements that we share for consideration.

Consider expanding training opportunities and communication strategies to achieve more consistent performance among participating agencies. Interviews revealed variability across the agencies in their familiarity with or experience using the Seasonal Allowance worksheet and their ability to use funds indicated by the Seasonal Allowance or the health and safety cap. In addition, the program is seeking to emphasize shell measures that will entail reorienting the focus of agencies that have used the program only for baseload measures. Aside from the annual weatherization conference, training and updates on program initiatives rely on individual channels of communication (telephone, email) that limit sharing lessons learned more broadly, engaging in dialogue about circumstances that may or may not allow installation of a measure, or achieving consistent messaging about program objectives. The webinar by the Companies' program managers and OPAE program administrators to share the price list and measure update with agencies in 2015 was well-received. It may be useful to explore broader or more frequent use of this format.

Review the price list, allowable measures, and seasonal allowance to identify additional opportunities to achieve energy savings and increase benefit to customers. Adjustments to the price list and inclusion of additional items in 2015 were positively received by agencies. At the same time, agencies must sometimes forgo some useful health and safety measures because contractor prices are too low and the seasonal allowance rarely yields sufficient funds to perform standalone projects. All parties (the Companies, OPAE, and agencies) acknowledge that all-electric homes are a fraction of the residential market, but it is important to find a way to serve these homes with Community Connections to realize the potential energy savings. It may be useful to revisit the seasonal allowance calculations and identify if they are adequate to cover these homes and, if not, how the calculation can be adjusted or if other approaches are warranted. Agencies have observed greater coverage of energy efficient lighting among eligible homeowners at the time of inspection. It may be useful to consider whether other lighting options should be included in Community Connections, such as LEDs. LEDs may not offer appreciable energy savings (beyond CFLs) but they may have other benefits, such as an additional conservation measure available to agencies, and being responsive to customers' concerns about CFLs and growing interest in LED lighting.

8. Appendix A: Required Savings Table

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

Table 8-1: Ex Post Lifetime Energy Savings (kWh)

Utility	Annual kWh Savings	Annual kW Savings	Lifetime kWh Savings
CEI	3,038,813	438	24,310,505
OE	2,486,769	350	19,894,149
TE	2,047,419	286	16,382,196
Total	7,573,000	1,073	60,586,850

9. Appendix B: Surveys and Interview Guides

2015 Low-Income Program Participant Telephone Survey

EDC	Code
Illuminating Company	1
Ohio Edison	2
Toledo Edison	3

A1. Hello, my name is (interviewer name), and I am calling on behalf of (name of EDC), your electric utility company. May I speak with (name of respondent)?

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

A2. I'm with ADM Associates, an independent research firm. We are speaking with homeowners and tenants who participated in the (EDC's) Community Connections "Weatherization" Program. You will receive a \$10 gift card for Target Stores for participating in this survey.

Through this program you would have received energy-efficient light bulbs called compact fluorescent lights or CFLs for short; or you might have had your refrigerator or freezer replaced with an energy-efficient Energy Star refrigerator or freezer; or you might have received insulation, air infiltration reduction (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 A6]
2. No
98. Don't know
99. Refused [THANK AND TERMINATE]

A3. You may have received 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, or the Home Energy Assistance Program (HEAP). Do you recall participating in Community Connections through any of these other programs?

1. Yes [SKIP TO A6]
2. No
98. Don't know
99. Refused [THANK AND TERMINATE]

A4. 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]

A5. May I speak with that person?

- 1. Yes [RECYCLE THROUGH A2 & A3 WITH NEW RESPONDENT]
- 2. No [THANK AND TERMINATE]
- 98. Don't know [THANK AND TERMINATE]
- 99. Refused [THANK AND TERMINATE]

A6. Great, thank you. First I want to assure you that I'm not selling anything. I just want to ask for your feedback about the program. Your responses will be kept confidential. For quality and training purposes, this call will be recorded. May I take a few minutes of your time to talk with you now about the equipment and services you received?

- 1. Yes [PROCEED WITH INTERVIEW]
- 2. No [THANK TERMINATE]
- 99. Refused [THANK AND TERMINATE]

Name of Respondent:

Phone Number:

1. I would like to start by asking you about the equipment and services you received through the program. Our records indicate that you received the following items from Community Connections. 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 99		1	2	98
b. Energy Star Refrigerator	1	2	98	99
c. Energy Star Freezer	1	2	98	99
d. Energy Saving Showerheads	1	2	98	99
e. Faucet Aerators 99		1	2	98
f. Electrical Repairs	1	2	98	99
g. Roof Repairs	1	2	98	99
h. Water heater pipe insulation	1	2	98	99
i. Seal Air Leakage / Duct Sealing 99		1	2	98
j. Water Heater	1	2	98	99
k. Attic Insulation	1	2	98	99
l. Side Wall Insulation	1	2	98	99
m. Night Lights	1	2	98	99
n. Central AC Replacement	1	2	98	99
o. Torchiere	1	2	98	99

New Question to replace Q1h”:

Q1B. Did an auditor or inspector visit your home and talk with you about ways to use less energy in your home or leave materials with you that described how you could save energy?

- 1 Yes
- 2 No
- D Don't Know
- R Refused

CFLS

[ASK Q2-Q9 IF Q1A = 1]

2. You indicated that you received CFLs from the program.

- a. Our records indicate you received [# OF CFLS].

- b. To the best of your recollection, is that number correct or did you receive a different number of CFLs?
 - i. Number of CFLs in record is correct [GO TO Q4]
 - ii. Received a different number of CFLs
 - 98. Don't know [GO TO Q3]
 - 99. Refused [GO TO Q3]

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

Number of CFLs received:

4. 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. Have never been installed?

[ASK Q5 IF Q4B > 0]

5. 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 Q6 IF Q4c > 0]

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

7. 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 Q4a

a) Specify other room location:

8. Please tell me which of the following statements is most correct.
[READ STATEMENTS; ALLOW ONE RESPONSE]

1. An auditor or inspector installed all of the CFLs
2. An auditor or inspector installed some of the CFLs
3. An auditor or inspector did not install any of the CFLs
98. Don't know [GO TO Q9]
99. Refused [GO TO Q9]

9. 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

a) Other lighting:

REFRIGERATOR REPLACEMENT

[ASK Q10-11 IF Q1B = 1]

10. 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

11. Our records indicate that your new refrigerator was installed [INSTALLATION DATE]. Is this correct?

- 1. Yes
- 2. No
- 98. Don't recall [GO TO Q12]
- 99. Refused [GO TO Q12]

FREEZER REPLACEMENT

[ASK Q12-13 IF Q1C = 1]

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

- 1. Upright freezer model
- 2. Chest freezer model
- 98. Don't know [PROMPT TO LOOK AT THE UNIT]
- 99. Refused

13. Can you tell me the month in which the new freezer was installed?

- 1. Month of installation:
- 98. Don't recall [GO TO Q14]
- 99. Refused [GO TO Q14]

Audit Experience

A2 Was the home visit scheduled at a time convenient for you? (Select one)

- 1 Yes
- 2 No
- D Don't know
- R Refused

A5 Did the home energy auditor or inspector arrive at your home on-time, which is within 15 minutes of the scheduled appointment? (Select one)

- 1 Yes [SKIP TO A8]
- 2 No
- D Don't know [SKIP TO A8]
- R Refused [SKIP TO A8]

A6 [If A5 = 2] Was the auditor or inspector more than 15 minutes early or more than 15 minutes late?

- 1 More than 15 minutes early

2 More than 15 minutes late

A8 During the home energy audit or inspection, did the auditor ask you to share copies of your electric bills?

- 1 Yes
- 2 No
- D Don't know
- R Refused

ENERGY EDUCATION

[ASK Q14-Q18 IF Q1H = 1]

14. You indicated that you received energy education from the program. Did the auditor or inspector provide you with information about ways you can save energy in your home?

- 1. Yes
- 2. No [SKIP TO Q19]
- 98. Don't recall [SKIP TO Q19]
- 99. Refused [SKIP TO Q19]

A10 I'm going to read a list of energy-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 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
- 12 Don't know (Don't read this)
- 13 Refused (don't read this)

A10a Did the auditor or inspector talk with you about any other ways to save energy in your home?
[SELECT ONE]

- 1 Yes
- 2 No [SKIP TO A15]

A10b [if Yes to A10a] What other ways were mentioned? RECORD VERBATIM RESPONSE

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

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

A12 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 energy? (Select one)

- 1 Yes
- 2 No [SKIP TO A17]
- D Don't know [SKIP TO A17]
- R Refused [SKIP TO A17]

A12a [IF YES to A12] What are the most important things you have done to use less energy? RECORD VERBATIM RESPONSE

16. 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 information you received from the auditor or inspector?

_____ [ENTER 1 TO 5]

[ASK Q18 IF Q17 <3]

17. What information could the auditor have provided that would have been more useful to you? RECORD VERBATIM RESPONSE

A15 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
- D Don't know
- R Refused

A16 Did the home energy auditor or inspector test appliances in your household to see how much energy they use? (Select one)

- 1 Yes
- 2 No [SKIP TO A21]
- D Don't know [SKIP TO A21]
- R Refused [SKIP TO A21]

A17 Which appliances were tested? (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)
- 8 Don't know/recall
- 9 Refused

A21 Are there additional energy saving improvements that you think should have been recommended?

- 1 Yes
- 2 No [SKIP TO Q19]
- D Don't know [SKIP TO Q19]
- R Refused [SKIP TO Q19]

A22 [If A21 = 1] What other energy saving improvements would you have liked?

[RECORD VERBATIM]

HOME IMPROVEMENT RETROFITS

- | | | | | |
|---|---|---|---|---|
| a. The retrofit recommendation seemed credible | | 1 | 2 | 3 |
| b. Wanted to improve home comfort | 1 | 2 | 3 | |
| c. Impact of wall insulation on reducing my electric bill | | 1 | 2 | 3 |
| d. Other (Specify:) | | 1 | 2 | 3 |

24. How satisfied are you with the following aspects of the wall insulation that was installed. Are you very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied, or very satisfied?

- | | | | | | | |
|--|----|---|---|---|----|----|
| | VD | D | N | S | VS | DK |
| a. Insulation performance after installation | | | | | | |
| b. Comfort level in your home after installation | | | | | | |
| c. Savings on electric bill | | | | | | |

[ASK Q25IF Q24 = VD or D]

25. Why weren't you satisfied with this aspect of your insulation performance after the installation?

DUCT SEALING

26. Please rank the top three factors in your decision to have the ducts in your home sealed. Select 1 for the most important factor; 2 for the second-most important factor; and 3 for the third-most important factor.

- | | | | | |
|--|---|---|---|---|
| a. The retrofit recommendation seemed credible | | 1 | 2 | 3 |
| b. Wanted to improve home comfort | 1 | 2 | 3 | |
| c. Impact of sealed ducts on reducing my electric bill | 1 | 2 | 3 | |
| d. Other (Specify:) | | 1 | 2 | 3 |

27. How satisfied are you with the following aspects of the duct sealing job that was performed? Are you very dissatisfied, somewhat dissatisfied, neither satisfied nor dissatisfied, somewhat satisfied, or very satisfied?

- | | | | | | | |
|--|----|---|---|---|----|----|
| | VD | D | N | S | VS | DK |
| a. Duct performance after installation | | | | | | |
| b. Comfort level in your home after installation | | | | | | |
| c. Savings on electric bill | | | | | | |

[ASK Q28 IF Q27 = VD or D]

28. Why weren't you satisfied with this aspect of your ducts after the duct sealing job?

SATISFACTION

The final set of questions is about your satisfaction with the equipment you received and other aspects of the program. Using a scale of 1 to 5 where:

Very dissatisfied	1	
Somewhat dissatisfied		2
Neither satisfied nor dissatisfied		3
Somewhat satisfied	4	
Very satisfied	5	

Please tell me how satisfied you are with:

[ASK Q29 IF Q1A = 1]

29. ...the CFLs you received through the program?

_____ [ENTER 1 TO 5]

[ASK Q30 IF Q1B = 1]

30. ...the Energy Star refrigerator you received through the program?

_____ [ENTER 1 TO 5]

[ASK Q31 IF Q1C = 1]

31. ...the Energy Star freezer you received through the program?

_____ [ENTER 1 TO 5]

[ASK Q32 IF Q1F = 1]

32. ...the electrical repairs you received through the program?

_____ [ENTER 1 TO 5]

[ASK Q33 IF Q1G = 1]

33. ...the roof repairs you received through the program?

_____ [ENTER 1 TO 5]

34. ...the scheduling of the visit?

_____ [ENTER 1 TO 5]

35. ...the information about ways to use less energy that you received through the audit visit?

_____ [ENTER 1 TO 5]

[ASK Q36 IF Q29 OR Q30 OR Q31 OR Q32 OR Q33 OR Q34 OR Q35 <3]

36. Why weren't you satisfied with (type of product or service)?

[RECORD VERBATIM RESPONSE AND IDENTIFY ITEM(S) CUSTOMER IS DISSATISFIED WITH]

37. In the course of participating in the [UTILITY] program, how often did you contact [UTILITY] or program staff with questions about the equipment or services you could receive through this program?

- 1. Never [ASK Q39]
- 2. Once
- 3. 2 or 3 times
- 4. 4 times or more
- 98. Don't know
- 99. Refused

38. How did you contact them? [CHECK ALL THAT APPLY]

- 1. Phone
- 2. Email or Fax
- 3. Letter
- 4. In person
- 98. Don't know
- 99. Refused

39. And how satisfied were you with your communications with [UTILITY] and program staff? Would you say you were:

- 1. Very dissatisfied [ASK Q40]
- 2. Somewhat dissatisfied [ASK Q40]
- 3. Neither satisfied nor dissatisfied [ASK Q41]
- 4. Somewhat satisfied [ASK Q41]
- 5. Very satisfied [ASK Q41]
- 98. Don't know [ASK Q41]
- 99. Refused [ASK Q41]

40. Why were you dissatisfied?

41. Have you noticed any savings on your electric bill since installing your new [MEASURE_GENERIC]/removing your old [APPLIANCE]?
1. Yes [ASK Q40]
 2. No [ASK Q41]
 3. Not sure [ASK Q41]
 98. Don't know [ASK Q41]
 99. Refused [ASK Q41]
42. How satisfied are you with any savings you noticed on your electric bill since installing your new [MEASURE_GENERIC]/removing your old [APPLIANCE]? Would you say you are:
1. Very dissatisfied
 2. Somewhat dissatisfied
 3. Neither satisfied nor dissatisfied
 4. Somewhat satisfied
 5. Very satisfied
 98. Don't know
 99. Refused
41. How satisfied were you with the overall [name of EDC] Community Connections "Weatherization" Program? Would you say you are:
1. Very dissatisfied
 2. Somewhat dissatisfied
 3. Neither satisfied nor dissatisfied
 4. Somewhat satisfied
 5. Very satisfied
 98. Don't know
 99. Refused
42. Why do you give it that rating? [RECORD VERBATIM RESPONSE]
43. Do you have any suggestions for improving the program?
1. Yes
 2. No [SKIP TO Q45]

44. What suggestions do you have for improving the program? [RECORD VERBATIM RESPONSE]

HOME DEMOGRAPHICS

I'd like to finish up by asking you some questions about your home.

45. Which of the following best describes your home? [READ LIST: OPTIONS 1-07]

1. Single-family home, detached construction
2. Single-family home, factory manufactured/modular
3. Mobile home
4. Row house
5. Two or Three family attached residence
6. Apartment with 4+ families
7. Condominium
8. Other
98. Don't Know
99. Refused

Specify Other:

46. Do you own or rent this residence?

1. Own
2. Rent
98. Don't Know
99. Refused

47. Approximately when was your home built? [DO NOT READ RESPONSE OPTIONS]

1. Before 1960
2. 1960-1969
3. 1970-1979
4. 1980-1989
5. 1990-1999
6. 2000-2005
7. 2006 or Later
98. Don't know
99. Refused

48. How many square feet is the above-ground living space?

Square Feet: _____
Don't know 98
Refused 99

[ASK Q49 IF Q48 = 98 OR 99]

49. Would you estimate the above-ground living space is about:

1. Less than 1,000 square feet
2. 1000-2000 square feet
3. 2000-3000 square feet
4. 3000-4000 square feet
5. 4000-5000 square feet
6. Greater than 5000 square feet
98. Don't know
99. Refused

50. How many square feet of below-ground living space is heated or air conditioned?

1. Square Feet:
2. Does not apply
98. Don't know
99. Refused

[ASK Q51 IF Q50 = 98 OR 99]

51. Would you estimate the below-ground living space is about:

1. Less than 1,000 square feet
2. 1000-2000 square feet
3. 2000-3000 square feet
4. 3000-4000 square feet
5. 4000-5000 square feet
6. Greater than 5000 square feet
98. Don't know
99. Refused

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 call (775) 229-4430 to check the status of your gift card. Do you have any questions?

OK. Good bye.

