2013 Low-Income Program Impact and Process Evaluation Report

Prepared for FirstEnergy Ohio Companies:

The Cleveland Electric Illuminating Company

Ohio Edison Company

The Toledo Edison Company

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1. Executive Summary

During 2013, 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 3,727 low-income households received energy efficiency services through the Low-Income Program in 2013. The numbers of participants in each service territory were as follows[1]:

- CEI 1,187
- OE 1,981
- TE 559

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.

Table 1 Impact Evaluation Results

Utility	***Ex Ante Expected Gross Savings***		***Ex Post Verified Gross Savings***	
	Gross kWh	**Gross kW**	**Gross kWh**	**Gross kW**
CEI	1,783,163	248	1,661,025	248
OE	2,800,640	436	2,699,152	375
TE	653,834	201	582,277	110
Total	**5,237,637**	**885**	**4,942,454**	**734**

[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.

The gross ex post kWh savings total shown in Table 1 reflect a realization rate of 94.4% percent, as determined by the ratio of verified gross kWh savings to expected gross kWh savings. The replacement of refrigerators and freezers with ENERGY STAR® models and the installation of energy efficient lighting accounted for 83 percent of the verified gross kWh savings.

Results of the process evaluation indicate that overall, the Low-Income program appears to be running smoothly. The Low-Income program has been effectively integrated into a successful weatherization portfolio of programs implemented through OPAE. Customers appreciate the services provided by the Companies, and agencies appreciate the support they have received from the Companies and OPAE.

Interviewees report that the Companies' program staff is well trained, knowledgeable, and responsive. Likewise, OPAE and local agency staff have many years of experience administering and implementing low-income weatherization and energy efficiency programs. The program does face some challenges moving forward, most involving outside funding uncertainties which have and may continue to affect resources available to implement the program in Ohio. However, the program has already taken steps to address some of these issues, such as encouraging the use of utility funds on non-base-load measures and directing program focus to multifamily buildings.

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 2013. 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 2013. 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?

ADM administered a telephone survey to 263 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 2013 Low-Income Program. The survey measured satisfaction on a scale of zero to five for each of the services that customers received through the 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.

Finally, in-depth interviews were carried out with a sample of Low-Income Program staff and with staff from OPAE, the implementation contractor. Additionally, a sample of contractors from the local community agencies that implemented the program was also interviewed. The objective of these interviews was to gather feedback from program staff and the implementer agencies to determine how the program was operating and to obtain suggestions for program improvements.

3. Description of Program

The Low-Income Program provides weatherization measures, energy efficient solutions and client education to low income customers that receive electric services from the Companies.

The Low-Income Program for 2013 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:

- 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 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 – some agencies have customers waiting months, some up to a year, before receiving weatherization and energy efficient products and services.

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 refrigerator to monitor the electrical use 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 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 and refrigerators and/or freezers are replaced if the meter reads a certain kWh per hour based on unit size and type (i.e. chest, upright, etc.). 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 2012-2014 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). Measures can include roof repairs or electrical wiring work. The Companies also recently 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 tables below detail the ex-ante savings per measure for program year 2013.

Table 2 Ex-Ante Estimates of per unit Annual kWh & kW Values for Non-Lighting Measures Installed through the 2013 Low-Income Program

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	1,131	0.175	Ohio TRM
Install 20-22 cu. ft. refrigerator w/top freezer	1,131	0.175	Ohio TRM
Install 20-23 cu. ft. side by side refrigerator	1,131	0.175	Ohio TRM
Install 24-26 cu. ft. side by side refrigerator	1,131	0.175	Ohio TRM
Install 5-10 cu. ft. chest freezer	1,251	0.192	Ohio TRM
Install 9-15 cu. ft. upright freezer	1,251	0.192	Ohio TRM
Install faucet aerator w/o shut- off valve	24.5	0.003	Ohio TRM
Install faucet aerator w/shut-off valve	24.5	0.003	Ohio TRM
Install low flow showerhead	212.28	0.024	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

Table 3 Ex-Ante Estimates of per unit Annual kWh & kw Values for Lighting Measures Installed through the 2013 Low-Income Program

Energy Efficiency Measures: Lighting	**kWh**	**kW**	**Source**
Install .03 nightlight	0.10	0.000	Ohio TRM
Install .5 watt nightlight	1.61	0.000	Ohio TRM
Install 15 watt dimmable CFL	48.26	0.005	Ohio TRM
Install 15 watt globe CFL	48.26	0.005	Ohio TRM
Install 15 watt or less outdoor CFL	41.83	0.005	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	25.74	0.003	Ohio TRM
Install 9 watt globe CFL	28.96	0.003	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 2013 Low-Income program.

Impact Evaluation Methods

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 Number of Measures Installed

Quantities of measures installed through the Low-Income Program were verified through a telephone survey of a randomly-selected sample of program participants. The sample design used for selecting program projects allows estimates of savings to be determined with ±10% precision at a 90% confidence interval for the program.

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 cost-effectively 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.

Table 4 Results from Ex-Post Stratified Sampling Plan

Utility	CV	Sample Size	Precision
CEI	1.02	86	0.02
OE	0.98	89	0.03
TE	2.15	88	0.09

Nineteen site visits were also conducted for each of the random sample points within each strata identified by the above sampling plan.

Methods Used to Calculate Savings for Lighting Measures

As discussed in Chapter 1, the lighting measures are CFLs of different wattages that are directly installed. For each CFL measure, total kWh savings and total peak demand savings for that measure are 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 are described in this section.

Calculation of kWh Savings per Lighting Measure

For each lighting measure, annual and lifetime kWh savings will be calculated through the following procedures.

Calculation of Annual kWh Savings per Lighting Measure

The lighting measures that are installed through the Low-Income Program are CFLs of different wattages that are directly installed. For these measures, kWh savings per measure are calculated per procedures set out in the Draft Technical Reference Manual (TRM).[2] As set out in the TRM,

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

where:

ΔWatts = CFL watts * delta watts multiplier:

CFL watts = wattage of installed CFL, as verified

Delta watts multiplier = factor to adjust for change in baseline conditions resulting from Energy Independence and Security Act of 2007.

ISR = In Service Rate (i.e., TRM specifies a value of 0.81)

Hours = Average hours of use per year; (TRM specifies a value of 1,040 hours).

WHFe = Waste Heat Factor for energy (to account for cooling savings from efficient lighting).

[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.

TRM-specified values were used in the calculation of kWh savings, with Hours = 1,040 and WHFe = 1.07.

Delta-Watts ratios were applied using the guidelines set forth in the Ohio TRM, adjusted based on results of the customer survey and ADM's baseline lighting shelving study (see Appendix D). The values used in this year's evaluation are as follows:

For general purpose lighting:

- 15 watts or less = 3.25;
- 16-20 watts = 2.45;
- 21 watts or more = 2.06;
- For all Specialty bulbs = 3.25 (from TRM)

Specialty bulbs are defined as all bulb types that are exempt from federal code changes, such as; globe, candelabra, reflector, etc.

Calculation of Lifetime kWh Savings per Lighting Measure

Lifetime kWh savings for a measure were calculated by multiplying annual kWh savings by the deemed life for the measure, as determined in the TRM.

Calculation of Summer Coincident Peak Demand Savings per Lighting Measure

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

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

where:

ΔWatts = CFL watts * delta watts multiplier:

CFL watts = wattage of installed CFL, as verified

Delta watts multiplier = factor to adjust for change in baseline conditions resulting from Energy Independence and Security Act of 2007.

ISR = In Service Rate (TRM specifies a value of 0.81);

WHFd = Waste Heat Factor for Demand (to account for cooling savings from efficient lighting);

CF = Summer Peak Demand Coincidence Factor

TRM-specified values for WHFd and CF were used in the calculation of summer coincident peak demand savings, with WHFd = 1.21 and CF = 0.11.

Delta-Watts ratios were applied using the guidelines set forth in the Ohio TRM, adjusted based on results of the customer survey and ADM's baseline lighting shelving study (see Appendix C). The values used in this year's evaluation are as follows:

For general purpose lighting:

- 15 watts or less = 3.25;
- 16-20 watts = 2.45;
- 21 watts or more = 2.06;
- For all Specialty bulbs = 3.25 (from TRM)

Specialty bulbs are defined as all bulb types that are exempt from federal code changes, such as; globe, candelabra, reflector, etc.

Calculation of Savings for Non-Lighting Measures

The following types of non-lighting measures were installed through the Low-Income Program in 2013:

- Refrigerator replacement
- Freezer replacement
- Central air conditioning replacement
- Attic Insulation
- Water Heater Wraps
- Low Flow Showerhead
- Faucet Aerators

For each such non-lighting measure installed in 2013, total kWh savings and total peak demand savings for that measure will be 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 this section.

Calculation of Energy & Peak Demand Savings for Refrigerator Replacements

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 2013, 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 2013 evaluation are reported in Table 5.

Table 5 Modified Values for kWh and Peak Demand Savings to Evaluate Savings for Early Replacement of Refrigerators through the Low-Income Program

	Modified Savings Value Used for Evaluation
Average Annual kWh Savings per Unit Remaining life of existing unit (8 years)	1,251 kWh
Average Summer Coincident Peak kW Savings per Unit Remaining life of existing unit (8 years)	0.192 kW

Calculation of Energy & Peak Demand Savings for 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 2013 evaluation are reported in Table 6.

[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

Table 6 Values for kWh and Peak Demand Savings to Evaluate Savings for Early Replacement of Freezers through the Low-Income Program

	Savings Value Used for Evaluation
Average Annual kWh Savings per Unit Remaining life of existing unit (8 years)	1,131 kWh
Average Summer Coincident Peak kW Savings per Unit Remaining life of existing unit (8 years)	0.175 kW

Calculation of Energy & Peak Demand Savings for 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.

Calculation of Energy & Peak Demand Savings for 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 approved TRM. A value of 173 kWh saved per gallons per minute was used in 2013 for the calculation of energy savings. Per the values given in the TRM,[6] 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 220 per showerhead, and the summer coincident peak demand savings used was 0.0281 kW.

Calculation of Energy & Peak Demand Savings for 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.[7] Values calculated in the TRM for a 1.5 gpm installation were used in 2013. The annual energy savings value used was 24.5 kWh per unit, and the deemed summer coincident peak demand savings used was 0.0031 kW.

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

[6] VEIC, State of Ohio Energy Efficiency Technical Reference Manual, Draft of August 6, 2010, pp. 93-96.

[7] VEIC, State of Ohio Energy Efficiency Technical Reference Manual, Draft of August 6, 2010, pp. 89-92.

Calculation of Energy & Peak Demand Savings for Wall Insulation

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

ΔkWh = ((1/Rexist – 1/Rnew) * CDH * DUA * Area) / 1000 / ηCool

Where:
Rexist = existing effective whole-assembly thermal resistance value or R-value.
Rnew = new total effective whole-assembly thermal resistance value or R-value.
CDH = Cooling Degree Hours
DUA = Discretionary Use Adjustment to account for the fact that people do not always operate their air conditioning system when the outside temperature is greater than 75°F.
Area = Square footage of insulated area
ηCool = Efficiency of Air Conditioning equipment

Calculation of Energy & Peak Demand Savings for Central AC Replacement

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

ΔkWh for remaining life of existing unit (1st 5 years)
= (FLHcool * BtuH * (1/SEERexist - 1/SEERee))/1000

ΔkWh for remaining measure life (next 13 years)
= (FLHcool * BtuH * (1/SEERbase - 1/SEERee))/1000

Where:
FLHcool = Full load cooling hours
BtuH = Size of equipment in Btuh (note 1 ton = 12,000Btuh)
SEERexist = SEER Efficiency of existing unit
SEERee = SEER Efficiency of ENERGY STAR unit
SEERbase = SEER Efficiency of baseline unit

Calculation of Energy & Peak Demand Savings for Air Infiltration Reduction

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

ΔkWh = (((CFM50Exist – CFM50New) / N-factor) *60 * CDH * DUA * 0.018) / 1000 / ηCool

Where:
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

Calculation of Energy & Peak Demand Savings for Hot Water Pipe Insulation

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

$\Delta kWh = ((1/Rexist - 1/Rnew) * (L * C) * \Delta T * 8{,}760)/ \eta DHW / 3413$
Where:
Rexist = Pipe heat loss coefficient of uninsulated pipe (existing) (Btu/hr-°F-ft)
Rnew = Pipe heat loss coefficient of insulated pipe (new) (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
ηDHW = Recovery efficiency of electric hot water heater
3413 = Conversion from Btu to kWh

Process Evaluation Methods

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 2014. Tetra Tech completed interviews with three of the Companies' staff and two OPAE staff. In addition, Tetra Tech completed seven interviews with participating community action agencies. In total, Tetra Tech conducted ten in-depth interviews with 13 interviewees for this qualitative assessment.

Customer Telephone Survey and Site Visits

Quantitative surveys were completed with participating customers by Research America, a professional survey firm. These surveys were completed via telephone survey in February 2014. A total of 263 surveys were completed across all three operating companies.

Table 7 below details the number of completes per EDC.

Table 7 Number of Completed Surveys By EDC

	CEI	OE	TE
Number of completed surveys	86	89	88

All analysis on participant data in this report is unweighted. In addition, all questions in the telephone survey were optional; therefore, respondents could choose not to respond. Respondents could also choose "don't know" or "refused" as options. Total reported n's for each question exclude any blank, "don't know," or "refused" response. To add an extra level of rigor to the analysis, approximately 20 site visits were also conducted by ADM field technicians.

Participating Contractor Surveys

Qualitative interviews were completed with six contractors who had completed a project(s) with the Low-Income program. ADM completed these interviews in March 2014.

5. Evaluation Results

The numbers of low-income households that received energy efficiency services through the Low-Income Program in 2013 in the service territories of the Companies are shown in the table below.

Table 8 Number of Participants in Low-Income Program during 2013

Utility	Number of Participants
CEI	1,187
OE	1,981
TE	559
Total Companies	3,727

Impact Evaluation Results

Table 9 shows the quantities of energy efficient lighting measures that were installed for these participants through the Low-Income Program and Table 10 shows the quantities of energy efficient non-lighting measures that were installed for the participants in 2013. Table 11 shows the number of health and safety measures and the number of energy education consultations that were conducted under the Low-Income Program in 2013.

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

Table 9 Quantities of Energy Efficient Lighting Measures Installed per Operating Company

CFL Category	CEI	OE	TE	Total
Install .03 nightlight	0	17	0	17
Install .5 watt nightlight	11	297	1	309
Install 15 watt dimmable CFL	133	244	4	381
Install 15 watt globe CFL	332	869	35	1,236
Install 15 watt or less outdoor CFL	0	306	0	306
Install 16-20 watt floodlight	0	215	0	215
Install 16-20 watt outdoor CFL	1	554	0	555
Install 16-20 watt spiral CFL	2,654	2,382	955	5,991
Install 21 watt or above floodlight	0	96	0	96
Install 21 watt or above outdoor CFL	49	16	0	65
Install 21 watt or above sprial CFL	2,570	2,040	1,034	5,644
Install 3-way circle line CFL	6	39	1	46
Install 3-way dimmable torchiere CFL	0	26	0	26
Install 3-way spiral CFL	154	804	160	1,118
Install 7-9 watt candelabra	812	1,191	73	2,076
Install 9 watt globe CFL	208	265	0	473
Install 9-15 watt spiral CFL	6,347	14,676	4,439	25,462
Total	13,277	24,037	6,702	44,016

Table 10 Quantities of Non-Lighting Efficiency Measures Installed per Operating Company

	CEI	OE	TE	Total Companies
Central AC replacement	0	23	13	36
Hot water pipe insulation	0	41	4	45
HVAC Tune Up	0	2	12	14
Install 11-15 cu. ft. chest freezer	26	22	6	54
Install 14-16 cu. ft. refrigerator w/top freezer	58	454	68	580
Install 16-18 cu. ft. upright freezer	43	61	4	108
Install 16-20 cu. ft. chest freezer	6	8	0	14
Install 17-19 cu. ft. refrigerator w/top freezer	341	366	68	775
Install 19-21 cu. ft. upright freezer	21	18	2	41
Install 19-22 cu. ft. refrigerator w/bottom freezer	8	23	1	32
Install 20-22 cu. ft. refrigerator w/top freezer	224	150	22	396
Install 20-23 cu. ft. side by side refrigerator	115	77	12	204
Install 24-26 cu. ft. side by side refrigerator	72	90	11	173
Install 5-10 cu. ft. chest freezer	57	42	0	99
Install 9-15 cu. ft. upright freezer	5	27	1	33
Install faucet aerator w/o shut- off valve	16	314	0	330
Install faucet aerator w/shut-off valve	22	26	2	50
Install low flow showerhead	19	117	0	136
Install R-10 attic insulation (average)	0	2	0	2
Install R-10 attic insulation (difficult)	0	1	0	1
Install R-11 foundation wall insulation (average)	0	0	3	3
Install R-11 foundation wall insulation (difficult)	0	1	0	1
Install R-11 sidewall insulation - brick veneer (average)	0	5	0	5
Install R-11 sidewall insulation - framed siding (average)	0	3	1	4
Install R-11 sidewall insulation - framed siding (difficult)	0	30	0	30
Install R-19 attic insulation (average)	0	5	3	8
Install R-19 attic insulation (difficult)	0	4	0	4
Install R-27 attic insulation (average)	0	5	4	9
Install R-27 attic insulation (difficult)	0	14	0	14
Insulate <52 gallon water heater	0	46	5	51
Insulate > or = 52 gallon water heater	0	3	0	3
Insulate band joist to R-11 (average)	0	0	3	3
Retirement of additional freezer	0	2	0	2
Retirement of additional refrigerator	0	1	0	1
Seal air leakage by 100 CFM50	0	29	21	50
Total Non-Lighting Measures	1,033	2,012	2,66	3,311

Table 11 Quantities of Health & Safety and Education Measures

per Operating Company

	CEI	OE	TE	Total Companies
Electrical Repairs	229	104	36	369
Roof Repairs	3	11	0	14
Replace Electric Stove	0	0	0	0
Replace Well-Pump	0	1	0	1
Energy Education Consultations	237	1,009	466	1,712
Total Health & Safety and Education Measures	469	1,125	502	2,096

Tables 12 through 15 below detail the ex-post savings values and realization rates calculated per measure during program year 2013.

Table 12 Estimates of Annual kWh Savings by Measure (Non-Lighting)

Measure	Ex-Ante kWh	Ex-Post kWh	Realization Rate
Central AC replacement	1	5,031	N/A
Hot water pipe insulation	49,375	74,159	150%
HVAC Tune Up	213	213	100%
Install 11-15 cu. ft. chest freezer	61,074	63,995	105%
Install 14-16 cu. ft. refrigerator w/top freezer	725,580	696,057	96%
Install 16-18 cu. ft. upright freezer	122,148	128,415	105%
Install 16-20 cu. ft. chest freezer	15,834	16,709	106%
Install 17-19 cu. ft. refrigerator w/top freezer	969,525	925,483	95%
Install 19-21 cu. ft. upright freezer	46,371	49,132	106%
Install 19-22 cu. ft. refrigerator w/bottom freezer	40,032	38,147	95%
Install 20-22 cu. ft. refrigerator w/top freezer	495,396	473,122	96%
Install 20-23 cu. ft. side by side refrigerator	255,204	242,644	95%
Install 24-26 cu. ft. side by side refrigerator	216,423	206,981	96%
Install 5-10 cu. ft. chest freezer	111,969	117,004	104%
Install 9-15 cu. ft. upright freezer	37,323	39,462	106%
Install faucet aerator w/o shut- off valve	8,085	10,193	126%
Install faucet aerator w/shut-off valve	1,225	1,544	126%
Install low flow showerhead	28,870	29,881	104%
Install R-10 attic insulation (average)	448	448	100%
Install R-10 attic insulation (difficult)	0	0	N/A
Install R-11 foundation wall insulation (average)	20,991	5,337	25%
Install R-11 foundation wall insulation (difficult)	0	2,634	N/A
Install R-11 sidewall insulation - brick veneer (average)	0	115	N/A
Install R-11 sidewall insulation - framed siding (average)	14,972	2,728	18%
Install R-11 sidewall insulation - framed siding (difficult)	0	6,391	N/A
Install R-19 attic insulation (average)	25,547	25,547	100%
Install R-19 attic insulation (difficult)	15,756	15,756	100%
Install R-27 attic insulation (average)	48,731	48,731	100%
Install R-27 attic insulation (difficult)	24,503	24,503	100%
Insulate <52 gallon water heater	4,029	4,010	100%
Insulate > or = 52 gallon water heater	237	236	100%
Insulate band joist to R-11 (average)	20,991	20,991	100%
Retirement of additional freezer	2,488	2,417	97%
Retirement of additional refrigerator	1,376	1,209	88%
Seal air leakage by 100 CFM50	2,931	2,184	75%
Grand Total	3,367,648	3,281,409	97%

Table 13 Estimates of Annual kWh Savings by Measure (Lighting)

Measure	Ex-Ante kWh Savings	Ex-Post kWh Savings	Realization Rate
Install .03 nightlight	2	14	867%
Install .5 watt nightlight	497	431	87%
Install 15 watt dimmable CFL	18,388	15,925	87%
Install 15 watt globe CFL	59,653	51,662	87%
Install 15 watt or less outdoor CFL	12,800	12,790	100%
Install 16-20 watt floodlight	7,707	11,383	148%
Install 16-20 watt outdoor CFL	22,028	27,837	126%
Install 16-20 watt spiral CFL	216,148	226,523	105%
Install 21 watt or above floodlight	4,895	5,618	115%
Install 21 watt or above outdoor CFL	3,049	3,804	125%
Install 21 watt or above sprial CFL	342,240	229,275	67%
Install 3-way circle line CFL	3,096	4,230	137%
Install 3-way dimmable torchiere CFL	2,916	2,594	89%
Install 3-way spiral CFL	44,421	88,474	199%
Install 7-9 watt candelabra	53,436	46,278	87%
Install 9 watt globe CFL	13,697	11,862	87%
Install 9-15 watt spiral CFL	1,065,015	922,345	87%
Grand Total	1,869,988	1,661,045	89%

Table 14 Estimates of Peak Demand kW Reductions by Measure (Non-Lighting)

Measure	Ex-Ante kW	Ex-Post kW	Realization Rate
Central AC replacement	0.00	6.62	N/A
Hot water pipe insulation	5.65	8.47	150%
HVAC Tune Up	0.11	0.11	100%
Install 11-15 cu. ft. chest freezer	9.45	9.85	104%
Install 14-16 cu. ft. refrigerator w/top freezer	111.36	107.09	96%
Install 16-18 cu. ft. upright freezer	18.90	19.77	105%
Install 16-20 cu. ft. chest freezer	2.45	2.57	105%
Install 17-19 cu. ft. refrigerator w/top freezer	148.80	142.43	96%
Install 19-21 cu. ft. upright freezer	7.18	7.56	105%
Install 19-22 cu. ft. refrigerator w/bottom freezer	6.14	5.87	96%
Install 20-22 cu. ft. refrigerator w/top freezer	76.03	72.81	96%
Install 20-23 cu. ft. side by side refrigerator	39.17	37.35	95%
Install 24-26 cu. ft. side by side refrigerator	33.22	31.85	96%
Install 5-10 cu. ft. chest freezer	17.33	18.02	104%
Install 9-15 cu. ft. upright freezer	5.78	6.07	105%
Install faucet aerator w/o shut- off valve	0.99	2.37	240%
Install faucet aerator w/shut-off valve	0.15	0.27	180%
Install low flow showerhead	3.26	4.05	124%
Install R-10 attic insulation (average)	0.48	0.48	100%
Install R-10 attic insulation (difficult)	0.00	0.00	N/A
Install R-11 foundation wall insulation (average)	22.99	0.10	0%
Install R-11 foundation wall insulation (difficult)	0.00	0.04	N/A
Install R-11 sidewall insulation - brick veneer (average)	0.00	0.14	N/A
Install R-11 sidewall insulation - framed siding (average)	17.27	0.12	1%
Install R-11 sidewall insulation - framed siding (difficult)	0.00	0.80	N/A
Install R-19 attic insulation (average)	27.51	27.51	100%
Install R-19 attic insulation (difficult)	21.35	21.35	100%
Install R-27 attic insulation (average)	54.90	54.90	100%
Install R-27 attic insulation (difficult)	24.45	24.45	100%
Insulate <52 gallon water heater	0.46	0.46	100%
Insulate > or = 52 gallon water heater	0.03	0.03	100%
Insulate band joist to R-11 (average)	22.99	22.99	100%
Retirement of additional freezer	0.40	0.37	93%
Retirement of additional refrigerator	0.22	0.19	84%
Seal air leakage by 100 CFM50	2.22	1.63	73%
Grand Total	681.24	638.69	94%

Table 15 Estimates of Peak Demand kW Reductions by Measure (Lighting)

Measure	Ex-Ante kW Savings	Ex-Post kW Savings	Realization Rate
Install .03 nightlight	0.00	0.00	N/A
Install .5 watt nightlight	0.01	0.05	759%
Install 15 watt dimmable CFL	2.02	1.68	83%
Install 15 watt globe CFL	6.52	5.46	84%
Install 15 watt or less outdoor CFL	1.42	1.35	95%
Install 16-20 watt floodlight	0.85	1.20	141%
Install 16-20 watt outdoor CFL	2.39	2.94	123%
Install 16-20 watt spiral CFL	23.72	23.96	101%
Install 21 watt or above floodlight	0.53	0.59	112%
Install 21 watt or above outdoor CFL	0.33	0.40	123%
Install 21 watt or above sprial CFL	37.30	24.25	65%
Install 3-way circle line CFL	0.33	0.45	134%
Install 3-way dimmable torchiere CFL	0.32	0.27	87%
Install 3-way spiral CFL	4.83	9.36	194%
Install 7-9 watt candelabra	5.82	4.89	84%
Install 9 watt globe CFL	1.48	1.25	85%
Install 9-15 watt spiral CFL	116.29	97.56	84%
Grand Total	204.16	175.66	86%

Process Evaluation Results

The following section provides the key findings associated with the 2013 Process Evaluation of the Low-Income program.

Funding Uncertainties/Concerns

Funding uncertainties, including the expiration of federal stimulus funds (ARRA) and shifts in HWAP funding, have resulted in further reliance on utility program weatherization funds to serve customers. For the 2013 program year, agency staff reported that the amount of American Recovery and Reinvestment Act of 2009 (ARRA) funds presented a challenge to agencies in the sense that many of them needed to ramp up resources and production to meet the budget they needed to spend when funds were initially allocated. However, when these funds expired in 2012, many agencies faced the additional challenge of then ramping down, yet maintaining enough staff and resources to sustain their remaining utility and state programs. Staff reported that this ramp-down continued to have a lasting effect on agencies in 2013. In addition, the method by which the state weatherization program (HWAP) funds were distributed changed to a "compete" or RFP process. While staff reported that there were limited changes in terms of funding distributions among agencies, several agencies noted concerns with the level of HWAP funding this year.

Agency staff report concerns with funding levels for seasonal measures (using the Seasonal Allowance spreadsheet), and as a result several agencies reported focusing program funds on base-load measures such as CFLs and refrigerators. A relatively new addition to the Community Connections program is the Seasonal Allowance spreadsheet, also referred to by agencies as "Exhibit 7a," which was added in 2013. This spreadsheet calculates the amount of funding available for shell and heating and cooling measures based on a customer's electric consumption. Several agencies brought up concerns with the amount of recommended funding by this spreadsheet. One agency that only offers utility weatherization programs stated that the funding levels were often too low to perform any improvements without bundling, while another stated that they tend to focus on mostly base-load measures, such as CFLs and refrigerators for the Low-Income program for this same reason. OPAE and Company staff reported that they are looking into revising this spreadsheet.

Multifamily Buildings

Local agencies report providing limited services to multifamily buildings through the Low-Income program. In the 2013 evaluation, the multifamily sector was identified as a potential focus of the program by implementation staff. When asked whether they have ever served or plan to serve multifamily units through the program, all agencies replied that they tend to focus mainly on single-family homes or duplexes. This was confirmed in findings from the participant surveys, as only 11 percent of participants interviewed

lived in multifamily (4+ unit) buildings. However, all seven of the agencies interviewed said that they had done at least one large multifamily complex in the past two or three years, and therefore had at least some limited experience working in that market. When asked what challenges they saw working with multifamily buildings, several topics came up, including administrative challenges and the split incentive barrier.

However, one agency noted that they have started looking at working with multifamily buildings more frequently, as given funding changes in the HWAP program they felt it was a way for them to serve a larger number of customers with mainly utility funds.

Health and Safety Funding

Because of the inability to claim savings for health and safety projects, over the past several years, the Companies have reduced the amount of the overall budget allocable for health and safety funding, such as new roofs or electrical wiring improvements, from 30 percent down to 15 percent of the overall program budget to be more in line with other low income programs across the country. This is a nationwide problem where home rehabilitation funds are less available in state and federal programs as well.

While agencies have generally adapted to the downshift in available health and safety funds from the Low-Income program, many still have concerns about a reduction in health and safety funding for low-income homes in Ohio, and report that many homes are not served with comprehensive air sealing and insulation measures as a result. Note that in these cases, Community Connections provides baseload and water heat measures. In general, several agencies raised concerns about the larger issue of health and safety problems in the low-income housing stock in Ohio.

All of the seven community action agencies that were interviewed stated that they deal with some level of health and safety issues in the homes that they work with, and five of the seven stated that they have needed to walk away from homes due to limitations on health and safety funding. This was supported by findings from interviews with participating subcontractors hired by the community action agencies; three stated that at least 60 percent of the homes they work in have some sort of health and safety issue. Additionally, a majority of participants live in older housing stock (70 percent lived in homes built before 1960), which are likely more susceptible to health and safety issues than newer homes.

Additionally, there is confusion as to how these funds are calculated—per allocated budget or budget spent. However, the Companies issued a health and safety spending clarification email to OPAE on 8/22/13; OPAE in turn forwarded it to the agencies.

The Companies and OPAE discussed on 8-27-13 that the agencies did not need to follow the ASHRAE 62.2 guidelines for the Community Connections program; OPAE advised that Ohio operated under a waiver last year and didn't have to follow it; this guideline was a DOE mandate. Agency and implementation staff report that the new

ASHRAE 62.2 ventilation requirement has taken up a portion of the already-limited Low-Income health and safety funding. A change that occurred in the current program year is a new federal guideline being implemented requiring compliance with ASHRAE 62.2, which is a ventilation standard. Program implementation staff reported that this standard is an unfunded mandate, meaning that no additional money is provided to comply with it; if a ventilation issue is detected, agency staff must install a ventilation fan to correct the issue. Program staff noted that agencies are able to use health and safety funding to address this mandate. However, implementation staff expressed concern that this mandate was putting additional strain on the health and safety funds available.

Several agencies brought up concerns or issues surrounding its implementation; a few noted that the fans are expensive—one estimating it at around $800 to install. Three agencies also noted that nearly every home they visit needs one.

Energy Education

Participants report changing their behaviors as a result of the energy saving information they received through the program. A majority of respondents (93 percent) said they know more about how to save energy in their home as a result of the information received during the inspection. In addition, 83 percent stated that they have changed how they use energy as a result of the inspection they received.

Audit Experience

Overall, approximately two-thirds (68 percent) of program participants recalled receiving an audit or inspection as part of their participation in the Low-Income program.[8]; One-third (32 percent) did not recall receiving an inspection or audit. Nearly all respondents (98 percent) said the visit was scheduled at a convenient time.

Table 16 Home Visit/Inspection Scheduled at Convenient Time

	TE		OE		CEI		Overall	
	n	Percent	n	Percent	n	Percent	n	Percent
Yes	54	96%	28	97%	44	100%	126	98%
No	2	4%	1	3%	0	0%	3	2%
Respondents (n)	56	100%	29	100%	44	100%	129	100%

Nearly all respondents who remembered the audit (98 percent) also stated that their inspector arrived on time.

[8] This question was added to the survey mid-field. Therefore, 73 people were not asked this question. Those not asked this question were asked other questions pertaining to the audit/inspection.

Respondents were asked if they recalled their inspector asking for information on their energy bills (providing a recent energy bill is a requirement of participation in the program). Overall, a little more than half of respondents did not recall their inspector requesting information on energy bills (56 percent).

As part of the program, inspectors provide information and education on energy efficiency as part of their home visit. Overall, most respondents said that their inspector gave them information on how to save energy in their home (92 percent). When asked what types of recommendations the inspector made, a majority of respondents said they received “general information” on energy efficiency (65 percent). Some respondents were able to remember specific recommendations; these included using CFLs instead of incandescent (37 percent), turning off lights and electronics (31 and 24 percent respectively), and setting back thermostats (16 percent). The table below details all responses given by respondents.

Table 17 Recommendations Made by Auditor/Inspector

	TE		OE		CEI		Overall	
	n	**Percent**	**n**	**Percent**	**n**	**Percent**	**n**	**Percent**
General information	36	72%	29	69%	27	54%	92	65%
Benefit of using CFLs instead of incandescent bulbs	14	28%	16	38%	22	44%	52	37%
Turning off lights when not in room	14	28%	11	26%	19	38%	44	31%
Turning off TV and other electronics when not in use	12	24%	6	14%	16	32%	34	24%
Change thermostat setting for A/C during the day/evening	11	22%	5	12%	7	14%	23	16%
Benefits of using cold wash cycle/layering clothes	8	16%	3	7%	11	22%	22	15%
Cleaning furnace filters	10	20%	4	10%	8	16%	22	15%
Removing unnecessary appliances	8	16%	3	7%	9	18%	20	14%
Benefit of using smart power strips instead of power strips	6	12%	5	12%	7	14%	18	13%
Costs associated with use of appliances	7	14%	1	2%	8	16%	16	11%
High cost of electric space heater	6	12%	3	7%	5	10%	14	10%
Changing other behaviors	6	12%	5	12%	1	2%	12	8%
Gaming systems— efficient use	3	6%	2	5%	4	8%	9	6%
Something else	3	6%	0	0%	3	6%	6	4%
Respondents (n)	50	100%	42	100%	50	100%	142	100%

Sixty-nine percent of respondents said that their inspector provided this information via energy education materials (such as literature), and 68 percent said that the inspector provided the information by discussing it with them in person. A majority of respondents (93 percent) said they know more about how to save energy in their home as a result of this information. In addition, 83 percent stated that they have changed how they use energy as a result of the audit they received.

Another step performed by inspectors as part of the Low-Income audit is to meter appliances, such as refrigerators, to see how much energy they are using. This determines if they are eligible to be replaced. Most respondents (80 percent) said that the inspector looked at their appliance(s) during the audit they received. Respondents most frequently stated that the inspector looked at their refrigerator (86 percent) or

freezer (44 percent). Other appliances mentioned include electric water heater (21 percent), furnace or boiler (20 percent), and central and wall air conditioners (8 and 6 percent, respectively). The table below shows all appliances mentioned by respondents.

Table 18 Appliances Inspector Looked at During Inspection

	TE		OE		CEI		Overall	
	n	Percent	n	Percent	n	Percent	n	Percent
Refrigerator	37	84%	38	90%	37	82%	112	85%
Freezer	14	32%	22	52%	22	49%	58	44%
Electric water heater	15	34%	6	14%	6	13%	27	21%
Furnace/boiler	14	32%	4	10%	8	18%	26	20%
Stove	15	34%	7	17%	4	9%	26	20%
Dryer	5	11%	2	5%	5	11%	12	9%
Central air conditioner	2	5%	4	10%	4	9%	10	8%
Wall air conditioner	3	7%	2	5%	3	7%	8	6%
Washer	3	7%	2	5%	3	7%	8	6%
Other	3	7%	2	5%	1	2%	6	5%
Microwave	1	2%	1	2%	2	4%	4	3%
CO detector	0	0%	1	2%	1	2%	2	2%
Respondents (n)	44	100%	42	100%	45	100%	131	100%

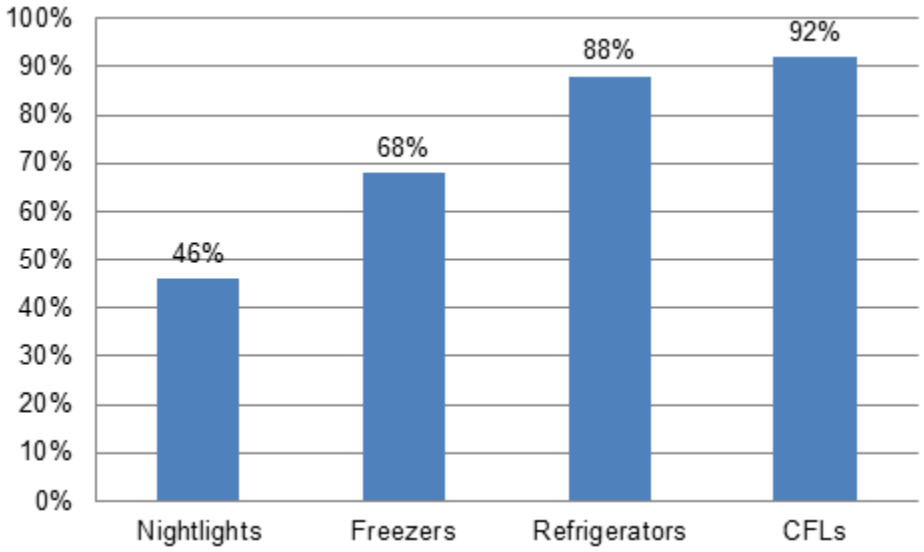
Respondents were asked if they had noticed any changes in their energy bills after the inspection and equipment installation. A little over half had (56 percent); 30 percent had not, and 14 percent were not sure. Of those that had noticed energy savings, most were very satisfied with the savings they had seen (83 percent); 17 percent were somewhat satisfied.

Most respondents (90 percent) did not have any additional recommendations they thought the inspector should have made in their home. Of the 10 percent who did, responses varied. In general, respondents wanted additional services that were not provided, such as blown-in insulation, windows, stoves, and central air conditioners.

Satisfaction with Program

Respondents were asked how satisfied they were with the equipment they received through the program, including CFLs, nightlights, refrigerators, and freezers. In general, respondents were satisfied with the equipment they received, with the percentage of respondents saying they were somewhat or very satisfied ranging from 46 percent (nightlights) to 92 percent (CFLs).

Figure 1 Somewhat or Very Satisfied with Equipment Received



Respondents were also asked to rate their satisfaction with program components. Ninety-five percent of respondents were satisfied (either somewhat or very) with the scheduling of their initial inspection. About one-third (34 percent) of respondents contacted program staff regarding their participation in the Low-Income program, most often over the phone (94 percent). A majority of these respondents (86 percent) were satisfied (somewhat or very) their communications with program staff.

When asked to rate their satisfaction with the Low-Income program overall, 93 percent of respondents said they were somewhat or very satisfied with it. Respondents gave open-ended reasons for their satisfaction with the program, which included:

- *"Because I would not have been able to do that on my own. I appreciate it."*
- *"Because they show you how to save on your bill and help people who are less fortunate."*
- *"Everything is working better and we save money on the bill."*

When asked if they had any suggestions to improve the program, most respondents did not (85 percent). Those who did offered a variety of suggestions to improve the program, some of which included additional services as discussed above (windows, stoves, etc.) and offering better quality equipment (both CFLs and refrigerators were mentioned).

Demographics

Eighty-six percent of respondents lived in a single-family home, a duplex or triplex, or manufactured or mobile home. Only 11 percent said they lived in a multifamily home that had four or more apartments. The table below details the housing types reported by respondents.

Table 19 Housing Type

	TE		OE		CEI		Overall	
	n	Percent	n	Percent	n	Percent	n	Percent
Single-family home, detached construction	66	81%	45	59%	50	62%	161	68%
Apartment with 4+ families	6	7%	13	17%	7	9%	26	11%
Two or Three family attached residence	1	1%	4	5%	15	19%	20	8%
Mobile house	4	5%	4	5%	5	6%	13	5%
Single-family home, factory manufactured/ modular	2	2%	7	9%	1	1%	10	4%
Other	2	2%	1	1%	0	0%	3	1%
Condominium	0	0%	0	0%	3	4%	3	1%
Row house	0	0%	2	3%	0	0%	2	1%
Respondents (n)	81	100%	76	100%	81	100%	238	100%

In addition, 69 percent of respondents owned their home, while 31 percent rented. Many homes were older, with a majority built before 1960 (70 percent). Only 3 percent of respondents had a home that was newer than 2000. Above-ground square footage of homes ranged widely; most homes (73 percent) fell between 1000 and 2500 square feet.

Overall

The program operates smoothly, with all program implementers and participants reporting positive interactions with others involved in the program. The Companies continued to report very positive working relationships with OPAE, and vice-versa. Contractors involved with the program also expressed positive feedback on working with other staff involved in the program.

Findings from participant surveys echoed this sentiment, with 93 percent of respondents reporting that they were somewhat or very satisfied with the program overall, and 86 percent somewhat or very satisfied with their interactions with program staff.

6. Conclusions and Recommendations

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

Conclusions

A total of 3,727 low-income households received energy efficiency services through the Low-Income Program in 2013. The numbers of participants in each service territory were as follows:

- CEI 1,187
- OE 1,981
- TE 559

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 20 below.

Table 20 Impact Evaluation Results

Utility	***Ex Ante Expected Gross Savings***		***Ex Post Verified Gross Savings***	
	Gross kWh	**Gross kW**	**Gross kWh**	**Gross kW**
CEI	1,783,163	248	1,661,025	248
OE	2,800,640	436	2,699,152	375
TE	653,834	201	582,277	110
Total	5,237,637	885	4,942,454	734

The gross kWh savings total shown in Table 20 reflect a realization rate of 94.4 percent, as determined by the ratio of verified gross kWh savings to expected gross kWh savings. The variation between the ex-ante and ex-post values can primarily be attributed to the slightly less than 100% verification rates for CFLs, refrigerators and freezers. To the best of ADM's present knowledge, an overall difference in analytic methods does not appear to account for the observed differences in savings estimates

since the Companies and ADM used the same deemed savings values for calculating kWh savings. The replacement of refrigerators and freezers with ENERGY STAR® models and the installation of energy efficient lighting accounted for 99 percent of the verified gross kWh savings.

Recommendations

Overall, the program continues to run smoothly, with agencies continuing to adapt to funding shifts and uncertainties. OPAE and local agency staff have many years of experience administering and implementing low-income weatherization and energy efficiency programs. There are, however, a few recommendations offered for consideration.

Continue offering the Low-Income program and maintain the current eligibility requirements, as agencies rely on these funds to fill a key need within the community. With recent uncertainties surrounding state and federal funding, such as the expiration of ARRA and the new bid requirement for HWAP funding distribution, agencies have looked to utility programs such as the Low-Income program to offer weatherization and energy efficiency services to their customers. Agencies expressed appreciation and gratitude for the program and report that it fills a key need in the low-income community, as many other funding sources have more restrictive income requirements.

Continue with the current plan to review and possibly revise the Seasonal Allowance spreadsheet in order to encourage the implementation of non-base-load measures. Several agencies expressed concerns that the funding amounts stemming from the seasonal allowance spreadsheet were too low to perform any significant amount of seasonal-type measures, and as a result tended to focus Low-Income funding on base-load measures.

Clarify whether health and safety funding is calculated based on budget allocated or budget used with agencies. As there was some confusion among agencies again this year about whether the 15 percent of the budget available for health and safety measures applied to the budget allocated or the budget used, it may be worthwhile to circulate an email or memo clarifying how agencies should be calculating the amount of health and safety funding available to them per year. However, the Companies issued a health and safety spending clarification email to OPAE on 8/22/13; OPAE in turn, forwarded it to the agencies.

Continue to explore options for claiming additional savings resulting from the Companies' participation in the whole-house approach taken by the portfolio of low-income state and utility programs in Ohio, as this continues to be a considerable concern raised by agencies. While it is acknowledged that is it not necessarily the Companies' sole responsibility to provide these types of funds to the

community, reduced health and safety funding continues to be a significant concern for agencies that serve low-income customers, resulting in the program providing only baseload and water heat measures. Comprehensive air sealing and insulation cannot be provided when health and safety issues exist. For low-income homes across Ohio, the Low-Income program often works in conjunction with other utility and state programs to provide whole-house, synergistic benefits and more effective energy savings. In addition, the decrease in health and safety funding, while seen as necessary, has resulted in less comprehensive services and only baseload and/or water heat measures. If possible, continue to explore options to account for the synergistic energy savings provided by this collaboration, including the energy-efficiency benefits achieved by health and safety funding.

Explore potential savings associated with Energy Education Consultations. Eighty-three percent of survey respondents indicated that they have made behavioral changes as a result of energy education consultations indicating that a TRM savings for energy education may be appropriate. An exploration of past low income program bill impact analyses that may provide insight into an avenue by which savings associated with Energy Education Consultations can be quantified. Particularly, the NJ Comfort Partners evaluation (expected August 2014) may include a robust billing analysis of a very similar Energy Education measure.

7. Appendix A: Required Savings Table

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

Table 21 Ex Post Lifetime Energy Savings (kWh)

Utility	***Annual kWh Savings***	***Annual kW Savings***	***Lifetime kWh Savings***
CEI	1,661,025	248	8,305,124
OE	2,699,152	375	13,495,759
TE	582,277	110	2,911,385
Total	**4,942,454**	**734**	**24,712,268**

8. Appendix B: Surveys and Interview Guides

2013 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)?*

Yes	01	
No	02	[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 households that participated in the (name of EDC's) Low-Income Program. You will receive a $10 gift card 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 electrical wiring or roof repairs. Do you recall participating in this program?

Yes	01	[SKIP TO A6]
No	02	
Don't Know	98	
Refused	99	[THANK AND TERMINATE]

A3 *You may have received these services through a subcontractor from another company. It is possible you worked with an energy auditor or inspector from the Ohio Home Weatherization Assistance Program (HWAP), or the Electric Partnership Program (EPP), or the Warm Choice or House Warming Program, or the Home Energy Assistance Program (HEAP). Do you recall participating in Low-Income through any of these other programs?*

Yes	01	[SKIP TO A6]
No	02	

Don't Know	98	
Refused	99	[THANK AND TERMINATE]

A4 *Is it possible that someone else in your household would be familiar with the items you received through this program?*

Yes	01	
No	02	[THANK AND TERMINATE]
Don't Know	98	[THANK AND TERMINATE]
Refused	99	[THANK AND TERMINATE]

A5 *May I speak with that person?*

Yes	01	[RECYCLE THROUGH A2 & A3 WITH NEW RESPONDENT]
No	02	[THANK AND TERMINATE]
Don't Know	98	[THANK AND TERMINATE]
Refused	99	[THANK AND TERMINATE]

A6 *Great, thank you. First I want to assure you that I'm not selling anything. I just want to ask your opinion 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 and how that has worked out for you?*

Yes	01	[PROCEED WITH INTERVIEW]
No	02	[THANK TERMINATE]
Refused	99	[THANK AND TERMINATE]

A7. Would you be interested in scheduling a follow-up home visit with ADM associates as an additional step of verification of the measures installed at your home? You will receive an additional 10.00 gift card for your courtesy at the time of the appointment.

Yes	01	[SCHEDULE INTERVIEW]
No	02	[PROCEED WITH INTERVIEW]
Refused	99	[PROCEED WITH INTERVIEW]

Appointment Date _____

Appointment Time _____

Confirmed Address _____
_____
_____

THE INTERVIEW

Name of Respondent: _____

Premise ID Number: _____ 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 Low-Income.* ***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	01	02	98	99
b. Energy Star Refrigerator	01	02	98	99
c. Energy Star Freezer	01	02	98	99
d. Energy Saving Showerheads	01	02	98	99
e. Faucet Aerators	01	02	98	99
f. Electrical Repairs	01	02	98	99
g. Roof Repairs	01	02	98	99
h. Energy Education	01	02	98	99
i. Water heater pipe insulation	01	02	98	99
j. Seal Air Leakage / Duct Sealing	01	02	98	99
k. Water Heater	01	02	98	99
l. Attic Insulation	01	02	98	99
m. Side Wall Insulation	01	02	98	99
n. Night Lights	01	02	98	99
o. Central AC Replacement	01	02	98	99
p. Torchiere	01	02	98	99

CFLS

[ASK Q2-Q9 IF Q1A = 1 OR Q1P=1]

2. *You indicated that you received CFLs from the program.*
   a. *Our records indicate you received _____ CFLS* (**INSERT # FROM RECORDS**)
   b. *As best as you can recall, is that number correct or did you receive a different number of CFLs?*

Number of CFLs in record is correct	01	[GO TO Q4]
Received a different number of CFLs	02	
Don't know	98	[GO TO Q8]
Refused	99	[GO TO Q8]

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

Number of CFLs received: _____

4. *Of the _____ 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)*

CFL broke or burned out	01
CFL not working as needed (e.g., lights too dim)	02
Using them in another home or at work	03
Storing them for later use	04
Gave them away	05
Returned them to the program	06
Other (specify)	07

   a) Other reason: _____

[ASK Q6 *IF Q4C > 0]*

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

7. *As best you can recall, 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]

An auditor or inspector installed all of the CFLs	01
An auditor or inspector installed some of the CFLs	02
An auditor or inspector did not install any of the CFLs	03
Don't know	98
Refused	99

Comments: _____

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

Standard incandescent light bulbs	01
Other CFLs	02
Both incandescent light bulbs and CFLs	03
Other (specify)	04
Don't Know	98
Refused	99

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]

Top-freezer refrigerator model	01	
Bottom-freezer refrigerator model	02	
Side-by-Side refrigerator model	03	
Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

11. Our records indicate that your new refrigerator was installed _____. Is this correct?

Yes	01	
No	02	Record Month _____
Don't recall	98	[GO TO Q12]
Refused	99	[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 an… [READ RESPONSE OPTIONS]

Upright freezer model	01	
Chest freezer model	02	
Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

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

Month of installation: _____

Don't recall	98	[GO TO Q14]
Refused	99	[GO TO Q14]

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?

Yes	01	
No	02	SKIP TO Q19
Don't recall	98	SKIP TO Q19
Refused	99	SKIP TO Q19

15. How was this information provided to you? [DO NOT READ; SELECT ALL THAT APPLY]

Auditor discussed ways to save energy with customer	01
Auditor provided customer energy education materials	02
Other (specify)	03

Specify Other: _____

16. 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]

Yes, know more now	01
No, about the same as before	02

Don't know	98
Refused	99

17. *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 01 TO 05]

[ASK Q18 IF Q17]

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

HOME IMPROVEMENT RETROFITS

[ASK Q20-Q22 IF Q1L=01]

Attic Insulation

19. *Please rank-order **the top three factors** in your decision to have additional attic insulation installed in your home. 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			
b.	Wanted to improve home comfort	1	2	3
c.	Impact of attic insulation on reducing my electric bill	1	2	3
d.	Other (Specify: _____)	1	2	3

20. *Using the satisfaction scale below, please indicate how satisfied you are with the following aspects of the attic insulation that was installed:*

	VD	D	N	S	VS	DK
a. Insulation performance after installation						
b. Home Comfort level after installation						
c. Savings on electric bill						

[ASK Q22 IF Q21 = VD or D]

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

[ASK Q23-Q25 IF Q1M=01]

Wall Insulation

22. *Please rank-order **the top three factors** in your decision to have additional wall insulation installed in your home. 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 wall insulation on reducing my electric bill	1	2	3
d.	Other (Specify: _____)	1	2	3

23. *Using the satisfaction scale below, please indicate how satisfied you are with the following aspects of the wall insulation that was installed:*

	VD	D	N	S	VS	DK
a. Insulation performance after installation						
b. Home comfort level after installation						
c. Savings on electric bill						

[ASK Q25 IF Q24 = VD or D]

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

[ASK Q26-Q28 IF Q1J=01]

Duct Sealing

25. *Please rank-order **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

26. *Using the satisfaction scale below, please indicate how satisfied you are with the following aspects of the duct sealing job that was performed:*

	VD	D	N	S	VS	DK
a. Home comfort level after installation						
b. Duct performance after installation						

c. Savings on electric bill

[ASK Q28 IF Q27 = VD or D]

27. 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	01
Somewhat dissatisfied	02
Neither satisfied nor dissatisfied	03
Somewhat satisfied	04
Very satisfied	05

please tell me how satisfied you are with:

[ASK Q29 IF Q1A = 1]

28. …the CFLs you received through the program?

_____ [ENTER 01 TO 05]

[ASK Q30 IF Q1B = 1]

29. …the Energy Star refrigerator you received through the program?

_____ [ENTER 01 TO 05]

[ASK Q31 IF Q1C = 1]

30. …the Energy Star freezer you received through the program?

_____ [ENTER 01 TO 05]

[ASK Q32 IF Q1F = 1]

31. …the electrical repairs you received through the program?

_____ [ENTER 01 TO 05]

[ASK Q33 IF Q1G = 1]

32. *…the roof repairs you received through the program?*

_____ [ENTER 01 TO 05]

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

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

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

34. *In the course of participating in the <UTILITY> program, how often did you contact <UTILITY> or program staff with questions?*

Never	01	[ASK Q37]
Once	02	
2 or 3 times	03	
4 times or more	04	
Refused	98	
Don't know	99	

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

Phone	01
Email or Fax	02
Letter	03
In person	04
Refused	98
Don't know	99

36. *And how satisfied were you with your communications with <UTILITY> and program staff? Would you say you were:*

Very dissatisfied	01	[ASK Q38]
Somewhat dissatisfied	02	[ASK Q38]
Neither satisfied nor dissatisfied	03	[ASK Q38]
Somewhat satisfied	04	[ASK Q39]
Very satisfied	05	[ASK Q39]
Refused	98	[ASK Q38]
Don't know	99	[ASK Q38]

37. ***Why were you dissatisfied?***

38. *Have you noticed any savings on your electric bill since installing your new [MEASURE_GENERIC]/removing your old [APPLIANCE]?*

Yes	01	[ASK Q40]
No	02	[ASK Q41]
Not sure	03	[ASK Q41]
Refused	98	[ASK Q41]
Don't know	99	[ASK Q41]

39. *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 were:*

Very dissatisfied	01
Somewhat dissatisfied	02
Neither satisfied nor dissatisfied	03
Somewhat satisfied	04
Very satisfied	05
Refused	98
Don't know	99

39. *Using a scale of 01 to 05 where 01 is very dissatisfied and 05 is very satisfied, Using a scale of 1 to 5 where:*

Very dissatisfied	01
Somewhat dissatisfied	02
Neither satisfied nor dissatisfied	03
Somewhat satisfied	04
Very satisfied	05

please tell me how satisfied you are overall with the (name of EDC) Low-Income Program?

_____ [ENTER 01 TO 05]

40. *Why do you give it that rating? [RECORD VERBATIM RESPONSE]*

41. Do you have any suggestions for improving the program?

Yes	01	
No	02	SKIP TO Q45

42. 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.

43. Which of the following best describes your home? [READ LIST: OPTIONS 01-07]

Single-family home, detached construction	01
Single-family home, factory manufactured/modular	02
Mobile home	03
Row house	04
Two or Three family attached residence	05
Apartment with 4+ families	06
Condominium	07
Other	08
Don't Know	98
Refused	99

Specify Other: _____

44. Do you own or rent this residence?

Own	01
Rent	02
Don't Know	98
Refused	99

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

Before 1960	01
1960-1969	02
1970-1979	03
1980-1989	04

1990-1999	05
2000-2005	06
2006 or Later	07
Don't know	98
Refused	99

46. 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]

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

Less than 1,000 square feet	01
1000-2000 square feet	02
2000-3000 square feet	03
3000-4000 square feet	04
4000-5000 square feet	05
Greater than 5000 square feet	06
Don't know	98
Refused	99

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

Square Feet: _____

Does not apply	88
Don't know	98
Refused	99

[ASK Q51 IF Q50 = 98 0R 99]

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

Less than 1,000 square feet	01
1000-2000 square feet	02
2000-3000 square feet	03
3000-4000 square feet	04
4000-5000 square feet	05
Greater than 5000 square feet	06
Don't know	98
Refused	99

That's all the questions I have. Thank you for your time.

You will receive your gift card within the next 30 days. Do you have any questions?

OK. Good bye

2013 Community Action Agency Interview Guide

The Companies OH

Community Action Agency Guide

Interview Guide Format

This interview guide is for Community Action Agencies who work with The Companies customers to provide services.

First, the guide summarizes the key researchable issues that the interviews will explore. This is followed by the specific questions that will be asked of the agencies.

Because senior staff will be conducting interviews, interviews will be semi-structured. Therefore, the following interview protocol is only a guide to ensure certain topics are covered, but evaluators will follow the flow of the interview and modify questions as needed to fit the interviewee's circumstance.

Overarching Key Researchable ISSUES

- How effective is the collaboration between The Companies and your agency?
- How effective is the interaction between OPAE and your agency?
- How well is the Low-Income program working? How could it be improved?
- Does the agency have any concerns about program implementation and its role in the program?
- What are the needs of the participants that could be further met through the Low-Income program? Should additional measures be considered?
- Do community action agencies feel they have sufficient staffing resources to deliver the program?
- Is the training to agencies sufficient? If not, what training and education support can be provided?
- Are there any groups not reached by the Low-Income program that also have financial and weatherization needs?

Introduction

My name is _____, with Tetra Tech. We are working with ADM Associates to evaluate the Low-Income program sponsored by The Companies.

The study will provide recommendations on how the utilities can improve the program for you and your customers. I would like to ask you some questions about your experience with the program. Your feedback on the program is extremely valuable as The Companies wants to improve your experience and satisfaction with the program as well as your customers. This interview should take approximately 15 minutes of your time. May we take some time now to do the interview? (If no, when would be a convenient time?)

(IF NECESSARY) I want to assure you that all of your responses and information about your company will be kept confidential and will not be reported individually by your name or businesses' name.

NAME: _____
COMPANY: _____
TITLE: _____
PHONE: _____
INTERVIEWER: _____
DATE COMPLETED: _____ LENGTH: _____

Introduction and background

A1) How many of your agency's staff members are currently working on the Community Connection Program? On average, what percentage of staff members' time is spent working on the program?

A2) What is the primary service that your agency provides to the community?

Role in Low-Income Implementation

B1) What services has your agency provided in the Low-Income program so far? (Probe for providing audits, installing measures, etc.) What is the process for getting clients through the program?

B2) What concerns do you or your staff have about the kinds of jobs that The Companies has asked you to do in the Low-Income program? (Be specific about CFL installations, refrigerator and freezer replacements, air sealing jobs, providing customers with energy education, and providing roof and electrical repairs.) What could be done to alleviate these concerns?

B3) What impact has the program had on your operations? (probe for impact on staff, resources, and time to process applications)

B4) What training have you received? Who provided this training? Was it sufficient? If no, what was missing?

B5) Did you receive communications regarding the measures and requirements for the program? Who provided this information? Was this communication adequate? [IF NO], What could have been done to communicate the requirements to you more effectively?

B6) How is the agency interacting with the OPAE? Are interactions running smoothly? Do you have suggestions for improvement?

B7) How do you communicate completed jobs? What is the system used for invoicing and tracking of progress toward job completion? How are completed jobs documented? How does this system compare to other systems you currently use?

B8) Did your agency have to change its tracking procedures when you started working with the The Companies program? (IF YES), How so?

B9) What impact does The Companies paperwork requirements have on your organization? [IF THERE IS ANY LEVEL OF DISSATISFACTION, ASK: Is there anything The Companies can do to improve the process?]

B10) Do your staff report experiencing any difficulties in installing any of the measures required by the Low-Income program? If so, what difficulties do they experience and how does it affect the installation rate?

B11) Are you working with any other Ohio utilities? (IF YES) Which ones? How do their programs compare to The Companies's program? (PROBE FOR PROS AND CONS OF THESE OTHER PROGRAMS)

B12) What other measures or services do you think would be useful to consider for the Community Connection's program? (Probe for additional types of measures, deeper education, etc.)

B13) Are there any groups not reached by the Low-Income program that also have financial and weatherization needs? Do you have ideas on how best to reach these groups?

Customer Feedback

C1) What feedback have you received from customers (positive and negative)? Do they have any suggestions for improving the program? [Probe for measure specific feedback]

Wrap-up

W1) Those are all the questions I have for you. Do you have anything else you want to mention to me in regards to the program?

Thank you for your time. This completes our interview.

2013 Low-Income Program
Contractor 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)?*

Yes	01	
No	02	[IF *NOT AVAILABLE, ASK FOR ANOTHER EMPLOYEE FAMILIAR WITH COMPANY'S PARTICIPATION IN COMMUNITY CONNECTIONS PROGRAM]*

A2 *I'm with ADM Associates, an independent research firm. We are speaking with contractors that participated in the (name of EDC's) Low-Income Program.*

Through this program you would have installed energy efficient light bulbs called compact fluorescent lights or CFLs for short; or you might have replaced a refrigerator or freezer with an energy efficient Energy Star refrigerator or freezer; or you might have completed electrical wiring or roof repairs. Do you recall participating in this program?

Yes	01	[SKIP TO A6]
No	02	
Don't Know	98	
Refused	99	[THANK AND TERMINATE]

THE INTERVIEW

Name of Contractor: _____

Name of Respondent: _____

Phone Number: _____

1. *What factors influenced your decision to participate in the program?*

   a.

   b.

   c.

   d.

2. *Of these factors which one would you consider to be the most influential?*

   a.

3. *What types of retrofit jobs did you complete with Program customers in 2012?*

   a.

   b.

   c.

4. *Were there any additional job types that were started but not completed during 2012?*

Yes	01
No	02
Don't Know	98
Refused	99

5. *What type of jobs were started but not completed in 2012?*

   a.

   b.

   c.

   d.

a.

6. *Was it necessary to increase your company's work force to perform measure installs created by the Low-Income t Program?*
   a. *Yes*
   b. *No*

7. *If so, by what percentage would you say your work force increased?*
   a. *1-25 Percent*
   b. *26-50 Percent*
   c. *51-75 Percent*
   d. *76-100 Percent*

8. *Please describe your agencies interaction with program participants. [RECORD VERBATIM RESPONSE]*

9. *If any, what type of energy education did your agency provide to program participants. [RECORD VERBATIM RESPONSE]*

Using a scale of 1 to 5 where:

Very dissatisfied	01
Somewhat dissatisfied	02
Neither satisfied nor dissatisfied	03
Somewhat satisfied	04
Very satisfied	05

please tell me how satisfied you are with the Low-Income Program.

_____ [ENTER 0 TO 5]

10. *Do you have any issues or concerns with your role in the Low-Income Program? [RECORD VERBATIM RESPONSE]*

11. *Do you believe OPAE provided sufficient training to your agency? [RECORD VERBATIM RESPONSE]*

12. *Please describe your experience communicating with _____(EDC). [RECORD VERBATIM RESPONSE]*

13. *Please describe your experience communicating with OPAE. [RECORD VERBATIM RESPONSE]*

14. *If any, what areas are in need of program improvement? [RECORD VERBATIM RESPONSE]*

That's all the questions I have. Thank you for your time. Good bye.

2013 Program Staff Interview Guide

Program Staff and Implementation Staff Interview Guide
The Companies Ohio staff, OPAE Staff, JACO Environmental Staff

Interview Objectives:

- How effective have the marketing efforts worked for the program? Which marketing methods have proven to be the most effective?
- How effectively have managers been able to monitor and administer the program?
- What were the issues and concerns about implementing the program in 2011? What issues remain unresolved?
- What were the lessons learned in implementing the program in 2011?
- How well has the team (i.e., The Companies staff and Implementation staff) worked together? Characterize internal program management and operations including communications, staffing and marketing.
- What changes, with regard to programs design or delivery, should the program implement in order to improve effectiveness? Understand program design process, program launch and programs' key challenges. Understand the programs service offerings, the types of customers participating and not participating, and role of trade allies and implementation contractors.

A. Describe your role with the programs in Ohio.

a. What are your responsibilities and roles in this/these programs?

b. When became involved in the program

c. (If The Companies Staff) Responsibilities and roles within The Companies and, specifically, for energy efficiency

d. (If The Companies Staff) Any previous experience with energy efficiency

e. (If OPAE staff) Responsibilities and roles within the program

f. (If JACO staff) Responsibilities and roles within the program

B. Who do you interact with directly as part of this program? (Examples listed below)

a. Trade allies?

b. Program manager/implementation contractor?

c. Customers?

d. Public Utilities Commission and advocacy groups?

e. Statewide Evaluator?

f. Others?

C. Program Planning and Design

a. How were you involved in the program planning and design, if at all? How does the Ohio iteration of the program differ from the Pennsylvania program offering?

b. How were the program's goals set? How are these goals communicated both internally and externally? Are the goals set by territory?

c. How will program progress toward goals be monitored and reported to the utility? How is the program doing in meeting these goals?

d. What are the implications for the program of not meeting goals? What are the implications for oversubscribing?

D. Program Design

a. Could you please provide an update on the progress of the program? What barriers have you encountered since the programs' launch? What are key successes from the programs' launch?

b. Please provide an overview of the program, including measures recycled and incentive strategy.

c. What are the target markets for the program? Any specific residential/commercial sectors?

d. [if Appliance Turn-in program] Do the incentive levels seem appropriate? If not, why do you think that? What, if any, changes in the incentive levels do you think may be needed?

E. Program Operations

a. What are the participation steps from the customer's perspective?

   [if Appliance Turn-in program] How long does it take before the customer's appliance is picked up? How long does it take before the customer receives the rebate check?

   [if Low-Income program] How long does it take for customers to get program services?

b. What parties are involved in administering and/or serving customers through the

program? (Probe for trade allies, implementation contractors, etc.) What do they do?

c. Describe your communications and working relationship with trade allies/action agencies. (If not revealed above, distinguish between the different trade ally groups involved.)

d. What support is provided through the program to trade allies/action agencies? In what areas could this be improved?

e. Have you received compliments or criticisms from participants? What are the typical topics brought up?

f. What type of quality control measures are in place for the program or are planned? What percentage of projects will receive QC? What types of problems are most common (if any QC has been performed yet)?

g. What do you see as future challenges to the program?

F. Program Operations and Management

a. Do you feel there are sufficient resources to effectively operate and manage the programs? If no, what additional resources are needed overall (by program)?

b. How is program information communicated internally (or planned to be communicated) within The Companies? Do you feel the correct mechanisms are in place for internal program information dissemination? Probe about any improvements needed or plans in place.

c. How often are progress reports generated on program performance? Who is responsible for this?

d. What additional reporting is required (type and dates)?

e. (If The Companies Staff) How effectively have program managers been able to monitor and administer the program? Are you confident in the information and data reported to you by the program administrator/implementer? Are additional QA/QC controls required to improve confidence (if applicable)? What additional information or data would be useful?

f. (If OPAE Staff) How effectively have program managers been able to monitor and administer the program? Are you confident in the information and data reported to you by the program administrator/implementer? Are additional QA/QC monitoring controls required to improve confidence (if applicable)? What additional information or data would be useful?

g. What aspects of the program operations and management are working well or are expected to work well? Which are not working well or may be a concern?

h. What do you see as challenges to the programs' operations and management?

i. What implementation issues in 2011 remain unresolved and why?

j. What were the lessons learned in implementing the program in 2011?

G. Program Marketing and Outreach

a. What overall marketing activities are being or will be used to reach the different target markets? Who conducts these? Have you noticed changes in participation levels relative to the release of each marketing effort? Do you feel that a specific type of effort works better than others?

b. How effective do you feel each of these methods has been in identifying and enrolling potential participants? Why?

c. How are the programs using or will the programs use the trade ally infrastructure (e.g., retailers of new appliances)? Do trade allies opt in and 'participate' in the program? How do you define a participating trade ally? Probe about any specific needs such as training, cooperative advertising, sales tools, etc.

d. How will program information be communicated to trade allies and other external stakeholders? Probe about any improvements needed.

e. What are major barriers to participation (both customers and trade allies)?

f. Why do you think some choose to participate or not participate?

g. Are there any specific types of customers/trade allies/stakeholders that face more barriers than others (e.g., retailers or low income customers)?

H. Conclusion

a. Is there anything we haven't covered today that we should be aware of when evaluating the program?

b. If I have any additional questions, can I call you or email you my questions? (Confirm contact information)

9. Appendix C: Ohio Energy Independence and Security Act Lighting Stocking Survey

Purpose of Stocking Survey

To calculate energy savings for a compact fluorescent lamp (CFL) installed in Ohio as the result of The Cleveland Electric Illuminating Company ("CEI"), Ohio Edison Company ("OE"), and The Toledo Edison Company ("TE") (collectively "Companies") conservation programs, the Ohio Technical Reference Manual (TRM) provides an algorithm which utilizes a factor known as the delta-watts multiplier. The delta-watts multiplier is the ratio of CFL wattage reduction (i.e., wattage of baseline bulb minus CFL wattage) to the CFL wattage.

The Ohio TRM specifies that the baseline bulb is an incandescent bulb that provides equivalent lumens, except for general purpose lighting that requires compliance with efficiency standards set forth by the Energy Independence and Security Act of 2007 (EISA). For EISA regulated general purpose lighting, the TRM assumes that the baseline bulb is an EISA compliant halogen or other high efficiency incandescent bulb.

The purpose of this stocking survey is to determine the post-EISA availability of 100W and 75W general purpose incandescent bulbs in the Companies' service territories during the 2013 program year, and to employ this data to develop a specific recommendation for the delta-watts multiplier that should be used in the Companies' calculations of *ex ante* estimated energy savings for CFLs that received incentives during 2013.

Background Information

EISA created new energy efficiency standards for general purpose lighting. The new standards are applicable to any incandescent lamp that is intended for general service applications, has a medium screw base, has a lumen range of 310 to 2,600 lumens, and is capable of being operated in a voltage range of 110 to 130 volts. Average lumens by wattage for general purpose lamps are:

- 40 watts = 450 lumens
- 60 watts = 800 lumens
- 75 watts = 1,100 lumens
- 100 watts = 1,600 lumens

The EISA standards are provided in the following table.

GENERAL SERVICE INCANDESCENT LAMPS			
Rated Lumen Ranges	Maximum Wattage	Minimum Lifetime	Effective Date
1490 – 2600	72	1,000 hrs	1/1/2012
1050 – 1489	53	1,000 hrs	1/1/2013
750 – 1049	43	1,000 hrs	1/1/2014
310 – 749	29	1,000 hrs	1/1/2014

EISA standards became effective January 1, 2012 for the 100W incandescent bulb and January 1, 2013 for the 75W incandescent bulb. EISA standards also extend to 60W and 40W lamps in 2014.

EISA standards apply to the production of general purpose incandescent bulbs. EISA does not necessarily cause the distribution of non-compliant incandescent bulbs to cease. In fact, as we describe in the remainder of this memo, 100W and 75W general purpose incandescent bulbs can still be found in Ohio retail outlets at the end of the 2013 calendar year. Therefore, to enable ADM to determine the actual baseline wattage for the 100W and 75W equivalent CFLs currently being distributed through the Companies programs, we conducted this study to assess availability of non-compliant incandescent lamps in retail stores throughout the Companies' service territory.

Data Collection and Analysis Approach

To determine availability of non-compliant incandescent lamps, ADM sampled a total of 120 retail stores throughout the Companies' service territory during the period of July 2013 through November 2013. The map below shows the sampled stores.

Figure 1: Map of Sampled Stores

During in-store visits ADM documented the following data: brand name or trade name of each 100W and 75W incandescent lamp that was available to be purchased; quantity of 100W and 75W incandescent packages and units per brand.

After collecting the data described above, ADM performed quantitative and qualitative analyses to determine the following criteria.

- Percent of retail outlets at which 100W and 75W incandescent lamps can be purchased.
- Delta watts multiplier to be used for *ex ante* estimated savings calculations for the 2013 program year.

Results

Many stores still have the non-compliant bulbs available to be purchased by the Companies' customers. However, 100W incandescent bulbs were less available than 75W incandescent bulbs. Only 21 of 120 stores (18%) had 100W bulbs in stock, while 50 of 120 stores (42%) had 75W bulbs in stock. The following table details the stores visited and stores that still had bulbs at the time of the survey.

Table 1: Breakdown of Surveyed Stores

Retail Chain	Stores Visited	75W Incandescent Bulbs		100W Incandescent Bulbs	
		Count of stores with 75W bulbs	Percent of stores with 75W bulbs	Count of stores with 100W bulbs	Percent of stores with 100W bulbs
Ace Hardware	7	5	71%	2	29%
Apples Grocery	1	0	0%	0	0%
Bassett's Hardware	2	0	0%	0	0%
Big Lots	3	0	0%	0	0%
Cardinal Grocery	1	1	100%	0	0%
CVS	5	4	80%	0	0%
Discount Drug Mart	1	1	100%	0	0%
Dollar General	8	7	88%	0	0%
Dollar Tree	2	0	0%	0	0%
Drug Mart	6	5	83%	0	0%
Family Dollar	4	0	0%	0	0%
Giant Eagle	9	3	33%	0	0%
Good Cents Grocery	1	0	0%	0	0%
Heinen's	1	0	0%	0	0%
Home Depot	8	0	0%	2	25%
Kmart	3	0	0%	0	0%
Kroger	2	0	0%	0	0%
Lakewood Hardware	1	1	100%	0	0%
Lowe's	12	6	50%	6	50%
Marcs	10	10	100%	10	100%
Rite Aid	6	2	33%	0	0%

Sam's	1	0	0%	0	0%
Save A lot	1	1	100%	0	0%
Target	3	0	0%	0	0%
True Value Hardware	1	1	100%	1	100%
Walgreens	9	1	11%	0	0%
Walmart	12	2	17%	0	0%
Total	**120**	**50**	**42%**	**21**	**18%**

Delta-Watts Multiplier for Ex Ante Estimated Savings for Program Year 2013

ADM employed the following formula to determine the recommended delta-watts multiplier for ex ante estimated savings:

Delta-watts multiplier = (Wbaseline - Wefficient) / Wefficient

Note that the Ohio TRM specifies a delta-watts multiplier of 3.25 for pre-EISA and 2.00 for post-EISA for 75W equivalent bulbs. When 75W bulbs are completely phased out as a consequence of EISA, the baseline for CFL's in the 16-20 watt range will be the 53W halogen.

The actual baseline for 75W equivalent CFLs in 2013 can be determined simply by weighting the 75W and 53W values by the respective fractions of stores that represent each of those two possible baseline values. In other words, given that 50 of 120 stores offer 75W bulbs, the 75W value receives a weight of 50 ÷ 120; whereas given that 70 of 120 stores do not offer 75W bulbs, the default baseline value of 53W receives a weight of 70 ÷ 120. Therefore the sum of (75W x 50 / 120 stores visited) and (53W x 70 / 120 stores visited) is 62.17W. The resulting delta-watts multiplier is calculated as follows:

Ex ante delta-watts multiplier75W equiv. CFLs, 2013 = (62.17 - 18) / 18 = 2.45

Where 62.17 is the average baseline wattage for calculating ex ante estimated savings and 18 is the average wattage of CFLs that can provide equivalent lumen output relative to 75W incandescent lamps.

Note that this 2.45 delta-watts multiplier for calculating *ex ante* estimated savings for 75W equivalent CFLs for program year 2013 is comparable to the 2.23 delta-watts multiplier used to calculate *ex post* verified savings for 100W equivalent CFLs during the evaluation of the 2012 Residential Lighting program. The 2012 calculation is shown here:

Ex post delta-watts multiplier$_{100W\ equiv.\ CFLs,\ 2012}$ = (74.27 - 23) / 23 = 2.23

Where 74.27 is the average baseline wattage for calculating ex post estimated savings and 23 is the average wattage of CFLs that can provide equivalent lumen output relative to 100W incandescent lamps.

As one would expect for the aforementioned delta-watts multipliers, their values are between the TRM specified values for pre-EISA (3.25) and post-EISA (2.06 for 100W equivalent CFLs; 2.00 for 75W equivalent CFLs).

Conclusions

At the end of calendar year 2013, 75W and 100W incandescent bulbs continue to be available in the Companies' Ohio service area. Ohio consumers can easily find 75W incandescent bulbs – of the 120 retail outlets we sampled, 75W incandescent bulbs were available at 50, including select locations of big box retail chains Lowes and Walmart. Ohio consumers cannot as easily find 100W incandescent bulbs – of the 120 retail outlets we sampled, 100W incandescent bulbs were available at 21, the majority of which (16 sites) are Lowes or Marcs locations. In other words, Ohio consumers who do not frequently shop at Lowes or Marcs chains will have difficulty finding 100W incandescent bulbs.

ADM cannot predict the future date at which non-compliant incandescent bulbs will be completely unavailable in Ohio. However, our shelving studies across 2012 and 2013 provide a clear indication that incandescent bulbs are widely available for approximately one year past the EISA implementation date. For example, the EISA implementation date was 1/1/2012 for 100W incandescent bulbs, but those bulbs were generally available for all of 2012 – and can still be found in Ohio if an Ohio consumer is determined to locate and purchase them. Similarly, the EISA implementation date was 1/1/2013 for 75W incandescent bulbs, but those bulbs were generally available for all of 2013, given that it would not require significant effort for an Ohio consumer to locate and purchase them.

Therefore ADM recommends the following delta-watts multipliers for the Companies' ex ante estimated savings for "time of sale" CFLs:

- 2.06 for 100W equivalent bulbs, the post-EISA TRM specified value; this value is recommended due to the relatively limited availability of 100W incandescent bulbs during the 2013 calendar year
- 2.45 for 75W equivalent bulbs, as described in the previous section of this memo

The M&V survey for the 2013 program year will capture data regarding what bulbs customers were using before they purchased new efficient lighting products. That 2013 survey data will be used to determine the delta-watts multiplier which ADM will use to calculate ex post verified energy savings for program year 2013.