Evaluation of
Low Income Residential Retrofit Program

June 2011 through May 2012

Prepared for:
Illinois Department of Commerce and Economic Opportunity

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Executive Summary

This report presents the results of the impact and process evaluations for electric program year four and natural gas program year one (EPY4/GPY1) of the Low Income Residential Retrofit Program offered by the Illinois Department of Commerce and Economic Opportunity (DCEO). EPY4/GPY1 is defined as the period June 2011 through May 2012.

The main features of the approach used for the evaluation are as follows:

- Data for the study were collected through review of program materials interviews with DCEO staff members and participants.
- An engineering desk review was performed on program measures to verify gross savings estimates.

The realized gross and net electric energy savings of the Residential Retrofit Program during the period June 2011 through May 2012 are summarized in Table ES-1 Summary of kWh Savings for 1. For EPY4/GPY1, realized annual gross electric energy savings total 9,046,554 kWh. For electric energy savings, the gross realization rate for the program is 79%. The program net-to-gross ratio is 100% because the Residential Retrofit Program targets low income residents. The realized net electric energy savings for the period total 9,046,554 kWh. Natural gas energy savings are shown in Table ES-2. Gross realized natural gas savings total 328,862 therms annually. The gross realization rate for natural gas savings is 100%. Net therm savings total 328,862 annually.

Table ES-1 Summary of kWh Savings for Residential Retrofit Program

Program Component	*Utility*	*Units*	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Gross Realization Rate*	*Realized Net kWh Savings**
Weatherization	Ameren	42,059	3,783,813	2,913,301	77%	2,913,301
	ComEd	75,539	6,714,047	5,528,655	82%	5,528,655
Home Improvement	Ameren	1,386	416,055	290,253	70%	290,253
	ComEd	1,049	540,614	314,346	58%	314,346
Total		120,033	11,454,529	9,046,554	79%	9,046,554

**A net-to-gross ratio of 100% is applied because the Residential Retrofit Program targets low income residents who would not have funded new energy efficiency measures in the absence of the program.*

Table ES-2 Summary of Therm Savings for Residential Retrofit Program

Program Component	*Utility*	*Units*	*Expected Therm Savings*	*Realized Gross Therm Savings*	*Gross Realization Rate*	*Realized Net Therm Savings**
Weatherization	Ameren	886	65,986	96,337	146%	96,337
	Nicor Gas	369	40,846	39,558	97%	39,558
	Peoples Gas	275	30,419	29,483	97%	29,483
	North Shore Gas	22	2,366	2,363	100%	2,363
Home Improvement	Ameren	381	39,869	40,355	101%	40,355
	Nicor Gas	289	35,528	30,746	87%	30,746
	Peoples Gas	739	111,287	88,317	79%	88,317
	North Shore Gas	16	1,967	1,702	87%	1,702
Total		2,977	328,268	328,862	100%	328,862

**A net-to-gross ratio of 100% is applied because the Residential Retrofit Program targets low income residents who would not have funded new energy efficiency measures in the absence of the program.*

The realized gross and net peak kW reductions of the Residential Retrofit Program during the period June 2011 through May 2012 are summarized in Table ES-3. The achieved net peak demand savings are 1,279.62 kW.

Table ES-3 Summary of Peak kW Savings for Residential Retrofit Program

Program Component	*Utility*	*Units*	*Realized Gross kW Savings*	*Realized Net kW Savings**
Weatherization	Ameren	42,059	347	347
	ComEd	75,539	702	702
Home Improvement	Ameren	1,386.00	93.13	93.13
	ComEd	1,049.00	136.92	136.92
Total		120,033	1,279.62	1,279.62

**A net-to-gross ratio of 100% is applied because the Residential Retrofit Program targets low income residents who would not have funded new energy efficiency measures in the absence of the program.*

Interviews and surveys were conducted with grant recipients and residents to better understand the effectiveness of program delivery. From the participant perspective, the program is effective and operating smoothly. However, review of program documentation and in-depth interviews with program staff indicate that there are aspects of the program that could be improved in order to increase awareness, improve administration and project tracking, and better align reporting requirements with the informational needs for assessing savings. The following presents a selection of key conclusions from EPY4/GPY1:

- **High Program Satisfaction:** Grant recipients reported high levels of satisfaction with the program and no recipients indicated dissatisfaction with any aspect of the program. Grant recipient satisfaction is important for future program activity because many of the participants are organizations that participated during prior years. Overall, participants noted few problems with the participation process. However, one respondent indicated that it took longer than expected to receive the final grant agreement.

  Residents who received the energy efficiency measures reported high levels of satisfaction. Several residents reported that there were benefits to the energy efficiency

improvements such as increased ability to pay utility bills, increased value of their home, and improved home comfort. Although the majority of residents were satisfied with the improvements that were implemented, about one-quarter of the residents noted issues with some aspects of the improvements. Specifically, these respondents noted problems with the installation, dislike of the new equipment, and equipment malfunction. Despite these concerns, 86% of the respondents reported that they were satisfied with the energy efficiency improvements.

- **Program Staffing may be Insufficient:** The Residential Retrofit Program has faced challenges in maintaining sufficient staffing to administer the program. Despite these challenges, program participants were generally satisfied with the program. This suggests that even with limited resources, staff members are able to provide adequate assistance to participants. However, maintenance of documentation and program tracking data has suffered from limited administrative resources. To address the staffing limitation, two additional part-time employees were recently added to assist with the program's administration. Given the administrative requirements of the program, additional staffing may be necessary.

- **Project Tracking and Documentation in Need of Improvement:** Project information has not been systematically tracked and organized. Few of the grants provided through the program were entered into the DCEO project tracking database. Program staff maintained tracking of program activity in spreadsheets that provided high level summaries implemented measure quantities, but provided limited information on the technical aspects of the projects.

- **Limited Program Marketing:** The Low Income Residential Retrofit relies upon repeat participation by external organizations and other DCEO programs. Although few staff resources are spent on marketing and promotion, recent changes may help further promote the program. The program has expanded its partnership with the Illinois Housing Development Authority, a state financing agency, to provide an additional pipeline to the program for prospective participants.

- **Verification Procedures Limited to Grant Recipient Reporting:** Site visits to verify measure installation are not performed for the projects implemented by the external organizations. Verification of project implementation is limited to review of invoices and reports submitted by external organizations.

While the program has maintained participant satisfaction and delivered energy efficiency improvements to low income residents, there are aspects of the program that could be improved. The following recommendations are offered for consideration.

- **Track Additional Project Information:** The Low Income Residential Retrofit Program maintains limited tracking data. Ideally, comprehensive tracking data would provide the following: (1) the measures installed, including quantities and technical specifications

such as the wattage of bulbs, R-value of insulation, and size and Seasonal Energy Efficiency Ratio (SEER) ratings of air conditioners; (2) the date of implementation; (3) the location of the implementation; (4) the estimated measure energy savings; (5) resident contact information; (6) contractor information if utilized;(7) the baseline equipment or building conditions; and (8) the utility account numbers associated with the implementation address.

- **Provide a Report Template for Program Participants to Report Measure Specifications:** A review of project documentation found that information provided by program participants regarding the implemented measures was not consistently reported. In order to support reporting of this information, program staff should consider providing a reporting template for each measure type that collects the appropriate level of detail. The data captured by the reporting template should be included in DCEO's Energy Efficiency Portfolio Standard (EEPS) database.

- **Perform Verifications at Limited Number of Sites:** Currently the program is not performing site visits for projects completed through the program. Although program activity is limited, staff should consider performing verification inspections for a sample of sites in order to document the quality of the work performed and to verify measure installation.

- **Continue to Invest in Strong Partnerships:** Program staff indicated that marketing resources are limited at this time. Program partners such the University of Illinois School of Architecture, the Smart Energy Design Assistance Center, the Illinois Housing Authority, the Bureau of Community Development, and the Bureau of Energy Assistance possess established marketing channels that can continue to drive program demand. As the program matures, DCEO will be able to attract more participants and increase program savings.

1. Introduction

This report presents the results of the impact and process evaluations of the Illinois Department of Commerce and Economic Opportunity (DCEO) Low Income Residential Retrofit Program during electric program year four and natural gas program year one (EPY4/GPY1). EPY4/GPY1 is defined as the period June 2011 through May 2012.

1.1 Description of Program

The Residential Retrofit Program offers grants to state agencies, local governments, and other entities that administer low income home improvements. Funds used for weatherization must be targeted at households at or below 200% of the poverty level. Low income home improvements must be targeted at households at or below 80% of the Average Median Income (AMI).

During EPY4/GPY1, grants were awarded (1) to other programs that are operated by the Department of Commerce and Economic Opportunity, referred to as intra-agency grants; and (2) to external applicants engaged in low income construction projects.

Intra-agency grants were awarded to:

- The Community Development Assistance Program; and
- The Illinois Home Weatherization Assistance Program.

Additionally, external grants were awarded to:

- Delta Institute;
- Hispanic Housing;
- Historic Chicago Bungalow; and
- CNT Energy.

Grant funds are prescriptive and based on the measure. Applicants may propose additional measures provided that they include estimates of the energy savings from these measures. Decisions regarding funding proposed measures are based on staff reviews of the estimated savings.

Total grant funds cannot exceed $500,000 and may not exceed 100 percent of the installed cost. However, the DCEO Director reserves the right to waive funding limitations and other program parameters.

1.1.1 Expected kWh and Therm Savings

Expected kWh and therm savings by program component are shown in

Table 1-1 and in Table 1-2. During the period June 2011 through May 2012, the expected annual savings are 11,454,529 kWh and 328,268 therms.

Table 1-1 Expected kWh Savings for Residential Retrofit by Program Component

Program Component	*Utility*	*Units*	*Expected kWh Savings*
Weatherization	Ameren	42,059	3,783,813
	ComEd	75,539	6,714,047
Home Improvement	Ameren	1,386	416,055
	ComEd	1,049	540,614
Total		120,033	11,454,529

Table 1-2 Expected Therm Savings for Residential Retrofit by Program Component

Program Component	*Utility*	*Units*	*Expected Therm Savings*
Weatherization	Ameren	886	65,986
	Nicor Gas	369	40,846
	Peoples Gas	275	30,419
	North Shore Gas	22	2,366
Home Improvement	Ameren	381	39,869
	Nicor Gas	289	35,528
	Peoples Gas	739	111,287
	North Shore Gas	16	1,967
Total		2,977	328,268

1.2 Overview of Evaluation Approach

The overall objective for the impact evaluation of the Residential Retrofit Program was to determine the net electric and natural gas energy savings and peak demand (kW) reductions resulting from program projects implemented during EPY4/GPY1.

The approach for the impact evaluation included the following main features:

- Available project documentation (e.g., invoices, savings calculation work papers, etc.) was reviewed, with particular attention given to the calculation procedures and documentation for savings estimates.
- Gross savings were verified via analytical desk review.

The process evaluation approach involved the following:

- Review of program documentation and prior evaluation reports;
- A survey of a sample of program participants to gather information on their decision making and their likes and dislikes of the program; and
- Interviews with program staff members discussing program operations, successes, challenges, and future plans.

1.3 Organization of Report

The evaluation report for the Residential Retrofit Program is organized as follows:

- Chapter 2 presents and discusses the analytical methods and results of estimating program savings.
- Chapter 3 presents and discusses the analytical methods and results of the process evaluation of the program.
- Chapter 4 presents evaluation conclusions and recommendations resulting from the program evaluation.
- Appendix A provides a copy of the questionnaire used for the survey of grant recipient decision makers.
- Appendix B presents the results from the survey of grant recipient decision makers.
- Appendix C provides a copy of the questionnaire used for the survey of residents.
- Appendix D presents the results from the survey of residents.

2. Impact Evaluation

This chapter presents the results of the impact evaluation of the Low Income Residential Retrofit Program offered by the Illinois Department of Commerce and Economic Opportunity (DCEO). The overall objective of the impact evaluation was to determine the net electric energy and natural gas energy savings, as well as peak demand (kW) reductions resulting from program projects during the period June 2011 through May 2012. Section 2.1 describes the methodology used for estimating gross savings. Section 2.2 presents the results from the effort to estimate savings for the Residential Retrofit Program.

2.1 Methodology for Calculating Program Savings

The methodology used for calculating program savings is described in this section. The overall objective for the impact evaluation of the Residential Retrofit Program was to determine the net electric energy and natural gas energy savings, as well as peak demand (kW) reductions resulting from projects completed during EPY4/GPY1.

ADM performed a tracking system review and an engineering desk review to determine the appropriateness of the assumptions used to determine the ex ante savings estimates. In EPY4/GPY1, DCEO used stipulated savings values suggested in the PY3 evaluation to estimate ex ante savings.[1] The stipulated savings values used by DCEO to estimate ex ante electric savings are summarized in Table 2-1. The stipulated savings values used by DCEO to estimate ex ante natural gas savings are summarized in Table 2-2.

Table 2-1 Stipulated Savings Values Used to Estimate Ex Ante Electric Savings

Measure	*Ex Ante kWh / Unit*
ENERGY STAR® Refrigerators	1,405.00
ENERGY STAR® Fluorescent Lights	50.20
Compact Fluorescent Lamps	42.21
ENERGY STAR® Bathroom Exhaust Fans	89.00
ENERGY STAR® Dishwashers	62.00
Central AC	1,119.00
Room AC	176.00
Reduced Load:	216.00
Furnace (ECM)	400.00
ENERGY STAR® Ceiling Fans	88.00
Electric Water Heater	291.00
ENERGY STAR® Heat Pump	49,206.97

[1] Gas measures were not offered under the Low Income Residential Retrofit Program until EPY4/GPY1.

Table 2-2 Stipulated Savings Values Used to Estimate Ex Ante Natural Gas Savings

Measure	*Ex Ante Therms / Unit*
92% AFUE Furnace	104.02
Gas Water Heater	183.00
Air Sealing	72.00
Attic Insulation	61.00

The review of the ex ante savings estimates included reviewing the analyses and calculations that were used to develop stipulated savings values for program measures. ADM assessed the degree to which the savings calculations for each measure were reasonable and defensible, and whether documentation was adequate. A checklist was used to record (1) whether the methodology used for the calculation was appropriate, (2) whether assumptions used were reasonable and appropriate, and (3) whether savings calculations were done correctly.

The accuracy of a savings estimate developed through engineering calculations depends on the extent to which the analysis uses correct assumptions for factors such as usage patterns and operating hours. The as-used baseline conditions were assessed by reviewing program baseline assumptions and testing the validity of those assumptions.

Based on the evaluation of the savings calculations, measures were classified into one of three categories:

- Documentation is sufficient, and original savings estimate is reasonable.
- Documentation is sufficient, but original savings estimate is not reasonable.
- Both documentation and original savings estimate are inadequate.

ADM used several sources to verify the reasonableness of the DCEO stipulated savings values, including:

- Ameren Missouri Technical Resource Manual;
- Arkansas Public Service Commission's Technical Reference Manual;
- California Database for Energy Efficiency Resources (DEER) reports;
- ENERGY STAR® Calculators;
- Illinois's Draft Statewide Technical Reference Manual for Energy Efficiency;
- Ohio Public Utilities Commission's Technical Reference Manual;
- Pennsylvania Public Utility Commission's Technical Reference Manual; and
- ADM's previous low income residential retrofit evaluations.

Based on this work, recommendations were developed regarding changes to the stipulated values.

2.2 Results of Impact Evaluation

This section presents the results of the impact evaluation for the Residential Retrofit Program during the period of June 2011 through May 2012.

2.2.1 Review of Tracking System

Several data and project documentation issues were encountered over the course of the evaluation effort. The Energy Efficiency Portfolio Standard (EEPS) database, like any information system, must meet the diverse needs of its users. The EEPS portfolio is comprised of eleven programs, approximately seven of which rely on the database to track the status of projects, estimate savings, and aggregate the measures installed. An effective information system must have appropriate functionality adequate staff resources, and organizational protocols that guide how the system is used.

If there is a protocol for how the system is used and the necessary functionality is built into the system, then there is less risk of errors in expected savings and fewer gaps in the data. While the completeness of data varied among the DCEO programs, the Residential Retrofit Program specifically had less data available in the EEPS system. In the majority of instances, reports developed by the grant recipients served as the primary source of information regarding installed measures and claimed energy savings.

ADM makes the following recommendations:

- **Establish a standardized list of measures and corresponding measure descriptions.** Though such a list has been established for standard measures, it would be helpful to also develop measure lists for all of the low income programs.
- **Collect information from participants regarding age and specifications of pre-existing equipment.** This will facilitate more accurate estimation of the remaining useful life of the baseline equipment. ADM recommends creating reporting templates that inform participants about what information is required.
- **Accurately record the number of units (lamps, fixtures, etc.) contained within each line item, so that per unit comparisons are accurate.** Currently the descriptions are somewhat unclear as to the number of units installed and the composition of each unit. For lighting measures, the number and wattage of individual bulbs should be recorded. For insulation R values should be recorded. For HVAC measures, unit size and efficiency ratings should be recorded. This should be developed in conjunction with the establishment of a standardized list of measures to ensure that the appropriate data for each measure are being collected. The wattage/R value/etc. associated with each efficient measure should also be recorded.

A project will likely have various measures installed, but the program level listing should categorize each measure individually.. It may be challenging to develop a comprehensive and specific enough measure list that is able to capture all measures within the low income programs.

As the program involves a changing list of relevant measures, this list will have to be modified as new projects are accepted. Each measure description should be precise enough to account for all differences in expected useful life (EUL), but general enough that they can be aggregated at a higher level. There are certain instances where custom measures may not be easily categorized. Such measures may need to be assigned to a "Other" category and subcategory, although there should be few measures of this type. Ideally the tracking data would contain:

- **Measure Category:** Lighting, HVAC, building insulation, etc.
- **Measure Subcategory:** Linear Fluorescent, Lighting Occupancy Sensor, HVAC Packaged Unit, etc.
- **Measure:** 14W CFL, R-19 fiberglass insulation, 2 Ton SEER 14 central air conditioner, etc.
- **Notes:** For custom measures this field would provide the description for those measures that do not correspond to any established category in the fields described above. These measures would be given a value of "Other" for the preceding fields.

ADM also recommends that the tracking data present measure quantity and measure unit categories for each line item.

- **Measure Quantity:** Number of fixtures, lamps, linear feet, etc.
- **Measure Unit:** The unit of measure quantity.

Addressing these questions and adopting the recommended solutions should reduce the work hours required for savings evaluation.

2.2.2 Measure-Level Electric Energy Savings

This subsection presents the results of the evaluation's engineering desk review of the stipulated values used to estimate ex ante savings for each electric measure included in the Residential Retrofit Program. The stipulated savings values used to estimate ex ante and ex post electric savings are summarized in Table 2-3. For reference, this table also presents the savings value that would result from the application of the Illinois Statewide Technical Reference Manual (TRM).

Table 2-3 Stipulated Savings Values Used to Estimate Ex Ante and Ex Post Electric Savings

Measure	*Ex Ante kWh Savings / Unit*	*Illinois TRM kWh Savings / Unit*	*Ex Post kWh Savings / Unit*	*Ex Post Peak kW Savings / Unit*
ENERGY STAR® Refrigerators	1,405.00	105.70	976.00	0.156
ENERGY STAR® Fluorescent Lights	50.20	N/A	69.92	0.032
Compact Fluorescent Lamps	42.21	43.48	43.48	0.005
ENERGY STAR® Bathroom Exhaust Fans	89.00	88.58	88.58	0.010
ENERGY STAR® Dishwashers	62.00	62.00	62.00	0.007
Central AC	1,119.00	268.57	771.57	0.619
ENERGY STAR® Room AC	176.00	19.92	73.80	0.095
Reduced Load*	216.00	N/A	0.00	0.000
Furnace (ECM)	400.00	N/A	400.00	0.000
ENERGY STAR® Ceiling Fans	88.00	N/A	115.00	0.009
Electric Water Heater	291.00	N/A	115.00	0.011
ENERGY STAR® Heat Pump	49,206.97 (Chicago); 48,087.89 (Springfield)	12,264.30 (Chicago); 11,759.99 (Springfield)	12,264.30 (Chicago); 11,759.99 (Springfield)	0.026
**Ex post savings could not be developed for the reduced load measure (insulation and air sealing) because of insufficient information.*				

2.2.2.1. Refrigerator

Ex ante annual savings for the ENERGY STAR® rated Refrigerator measure were found to be 1,405 kWh per unit.

Ex post savings were developed using the Ohio TRM. Unlike the Illinois Statewide Technical Reference Manual (TRM), the Ohio TRM utilizes a dual-baseline for low income participants for the early replacement of an ENERGY STAR® rated refrigerators. According to the Ohio TRM, the baseline condition is the existing inefficient refrigerator for the remaining assumed useful life of the unit, and then for the remainder of the measure life the baseline becomes a new refrigerator meeting the minimum federal efficiency standard. For the first eight years, the Ohio TRM recommends using an annual per unit savings value of 976 kWh for ENERGY STAR® rated refrigerator replacement for low income participants.

ADM suggests using 976 kWh per unit to estimate annual savings for the ENERGY STAR® rated Refrigerator measure.

2.2.2.2. Compact Fluorescent Lamp

Ex ante annual savings were 42.21 kWh per unit for their CFL installation measure.

This value was suggested in the PY3 evaluation, which made the following assumptions:

- In-service rate = 100%;
- Hours of use = 2.57 hours / day; and
- Saved watts per bulb = 45 Watts.

ADM applied the following savings algorithm from the Illinois Statewide Technical Reference Manual (TRM), to determine ex post savings.

*ΔkWh = ((WattsBase - WattsEE) / 1000) * ISR * Hours * WHFe*

Where,

WattsBase	=	Watts for baseline fixture.
WattsEE	=	Watts for energy efficient fixture.
ISR	=	In-service rate.
WHFe	=	Waste heat factor.
Hours	=	Annual hours of operation.

For the direct install of compact fluorescent lamps in a multi-family facility, the Illinois TRM provides the following assumptions:

- The in-service rate is 96.9%.
- The annual hours of use are 938.
- For CFLs with lumen range of 750-1,049 and installation date before June 2014 the Watts saved per bulb are 46.
- The waste heat factor is 1.04.

The ex post annual savings are 43.48 kWh per unit for the CFL installation measure.

2.2.2.3. Fluorescent Lighting

Ex ante annual savings were 50.20 kWh per unit for their ENERGY STAR® rated fluorescent light fixtures.

This value was suggested in the PY3 evaluation, which made the following assumptions:

- Two outdoor and eight indoor fixtures were installed at each dwelling;
- In-service rate = 100%;
- Indoor Hours of Use = 2.57 hours / day;
- Outdoor Hours of Use = 5 hours; and
- Saved Watts per Bulb = 45 Watts.

ADM applied the following algorithm from the Illinois Statewide Technical Reference Manual (TRM), to determine ex post savings.

*ΔkWh = ((WattsBase - WattsEE) / 1000) * ISR * Hours * WHFe*

Where,

WattsBase	=	Watts for baseline fixture.

WattsEE	=	Watts for energy efficient fixture.
ISR	=	In-service rate.
WHFe	=	Waste heat factor.
Hours	=	Annual hours of operation.

For the direct install of the CFL installation measure, the Illinois TRM assumes an in-service rate of 96.9%, instead of 100%. Similarly, for the evaluation of this measure, ENERGY STAR® rated fluorescent light fixtures, ADM will utilize an in-service rate of 96.9%. The average indoor and outdoor hours of use are reasonable. For example, the current Savings Calculator for ENERGY STAR® Qualified Light Fixtures suggests the average daily use is 3 hours for indoor fixtures and 5 hours for outdoor fixtures. Finally, the expected reduction in connected load was assumed to be 45 watts, which appears to be carried over from the CFL Installation measure. However, according the ENERGY STAR® savings calculator, the reduction in connected load is more likely to be 66 watts for indoor fixtures and 62 watts for outdoor fixtures. If these values are used as the reduction in connected load coupled with the assumptions made in the PY3 evaluation, the annual savings would be 69.92 kWh per unit for this measure.

ADM suggests using 69.92 kWh per unit to estimate annual savings for the ENERGY STAR® rated fluorescent light fixture measure.

2.2.2.4. Bathroom Exhaust Fan

Ex ante annual savings were 89 kWh per unit for their ENERGY STAR® rated bathroom exhaust fan measure.

ADM applied the following savings algorithm for bathroom exhaust fans from the Illinois Statewide Technical Reference Manual (TRM) to develop ex post savings:

$$\Delta kWh = (CFM * (1/\eta,Baseline - 1/\eta Efficient)/1000) * Hours$$

Where,

CFM	=	Nominal capacity of exhaust fan.
η,Baseline	=	The efficiency of the baseline unit.
η,Efficient	=	The efficiency of the efficient unit.
Hours	=	Annual hours of operation.

The Illinois Statewide TRM recommends using the following assumptions:

- The nominal capacity of exhaust fan is 50.
- The efficiency of the baseline fan is 8.3 CFM per Watt.
- The efficiency of the efficient fan is 3.1 CFM per Watt.
- The annual hours of use are 8,766.

Consistent with ex ante savings used by program staff, ex post calculations resulted in electric savings of 88.58 kWh per fan.

ADM suggests using 88.58 kWh per unit to estimate annual savings for the ENERGY STAR® rated bathroom exhaust fan measure.

2.2.2.5. Dishwasher

Ex ante annual savings were 62 kWh per unit for the ENERGY STAR® dishwasher measure.

This value was suggested in the PY2 evaluation and was accepted in the PY3 evaluation to calculate gross savings for this measure, which made the following assumptions:

- Baseline usage of a conventional dishwasher – 211 kWh per year; and
- ENERGY STAR® dishwashers usage – 149 kWh per year.

For the new construction ENERGY STAR® dishwasher measure, the annual kWh savings are based on the following Illinois Statewide TRM algorithm:

$$\Delta kWh = (kWh\_base - kWh\_estar) * [\%kWh\_op + (\%kWh\_heat * \%Electric\_DWH)]$$

Where,

kWh_base	=	Baseline kWh consumption per year.
kWh_estar	=	ENERGY STAR® kWh annual consumption.
%kWh_op	=	Percentage of dishwasher energy consumption used for unit *operation.*
%kWh_heat	=	Percentage of dishwasher energy consumptions used for water *heating.*
%Electric_DHW	=	Percentage of DHW Savings assumed to be electric.

The Illinois Statewide TRM recommends using the following assumptions:

- Baseline annual kWh consumption for a standard sized dishwasher is 355 kWh;
- ENERGY STAR® annual kWh consumption for a standard sized dishwasher is 295 kWh;
- 44% of the dishwasher energy consumption is used for unit operation;
- 56% of the dishwasher energy consumption is used for water heating; and
- 100% of the DWH savings will be assumed electric savings for an electric ENERGY STAR® dishwasher.

Using the aforementioned algorithm and assumptions, the average annual savings for the new construction of an ENERGY STAR® dishwasher is 60kWh per unit.

$$\Delta kWh = (355kWh - 295kWh) * [0.44 + (0.56 * 1.00)] = 60.0\ kWh$$

2.2.2.6. Central Air Conditioner: SEER 14 with Programmable Thermostat

Ex ante annual savings were 1,119 kWh per unit for the central air conditioner with programmable thermostat measure.

This value was suggested in the PY3 evaluation, which made the following assumptions:

- Existing Central AC with SEER rating of 9; and
- Existing Central AC with no programmable thermostat.

ADM applied the following savings algorithm, found in the Illinois Statewide Technical Reference Manual (TRM), to determine ex post savings.

*ΔkWH for remaining life of existing unit (1st 6 years) =((FLHcool * Capacity * (1/SEERexist - 1/SEERee))/1000)*

Where,

FLHcool	=	Full load cooling hours
Capacity	=	Size of new equipment in Btuh
SEERexist	=	Seasonal energy efficiency ratio of baseline unit
SEERee	=	Seasonal energy efficiency ratio of efficient unit

For the early replacement of a central air conditioner with programmable thermostat in a single-family facility, the Illinois TRM assumes 629 full load cooling hours. The use of a baseline SEER value of 9 for a unit without a programmable thermostat to develop ex ante savings is reasonable and used in ex post calculation. ADM assumed a capacity of 2 ton (i.e., 24,000 BTU/hr), which is typical for a single-family facility, and a SEER value of 14 for the energy efficient equipment. To account for savings from the programmable thermostat, the algorithm from the Illinois TRM was modified to the following:

ΔkWH for remaining life of existing unit (1st 6 years) =

*(FLHcool * Capacity * 1/SEERexist)/1000 – ((1 - PT_Discount) * FLHcool * Capacity * 1/SEERee)/1000*

Where,

PT_Discount	=	Programmable thermostat discount rate
FLHcool	=	Full load cooling hours
Capacity	=	Size of new equipment in Btuh
SEERexist	=	Seasonal energy efficiency ratio of baseline unit
SEERee	=	Seasonal energy efficiency ratio of efficient unit

The most recent Energy Star Calculator recommends a programmable thermostat discount rate of 16%.[2]

[2] LBNL 2007 (Based on minimum estimated savings)

The ex post annual savings are 771.57 kWh per unit for central air conditioner with programmable thermostat measure.

2.2.2.7. Room Air Conditioner

Ex ante annual savings were 176 kWh per unit for the ENERY STAR® rate room air conditioner measure.

This value was suggested in PY2 evaluation, which used the following assumptions:

- Existing AC unit with an EER rating of 8.8;
- ENERGY STAR® rated Room Air Conditioner with an EER of 11.5.

Ex post savings were developed using the Ohio TRM. Unlike the Illinois TRM, the Ohio TRM utilizes a dual-baseline for low income participants for the early replacement of an ENERGY STAR® rated room air conditioner. According to the Ohio TRM, the baseline condition is the existing inefficient room air conditioning unit for the remaining assumed useful life of the unit, and then for the remainder of the measure life the baseline becomes a new replacement unit meeting the minimum federal efficiency standard (i.e. with an efficiency rating greater than or equal to 9.8EER). For the first three years, the Ohio TRM recommends using an annual per unit savings value of 73.8 kWh for ENERGY STAR® rated room air conditioner replacement for low income participants.

ADM suggests using 73.8 kWh per unit for the ENERGY STAR® rated room air conditioner measure.

2.2.2.8. 90% AFUE Furnace with Efficient Air Handler

Ex ante annual savings were 400 kWh per unit for the 90% AFUE furnace with efficient air handler measure.

This value originated from the PY1 evaluation report and was accepted as reasonable in PY2 and PY3. The Gas Appliance Manufacturers Association ratings were used to calculate the gross ex ante electric savings from this measure. The typical furnace was assumed to be 90% AFUE without an Electronically Commutated Motor (ECM), which is estimated to use 625 kWh per year. The more efficient furnace had a 90% AFUE with an ECM, which is estimated to use 225 kWh per year.[3] This results in annual savings of 400 kWh per unit for this measure.

Upon review, the assumptions are reasonable and ADM suggests using 400 kWh per unit to estimate annual savings for the 90% AFUE furnace with efficient air handler measure.

2.2.2.9. 92%+ AFUE Furnace

Ex ante annual savings were 104.02 therms per unit for the 92% AFUE or better furnace measures.

[3] Additional detail on the origin of these savings assumptions can be found in Appendix B of the PY1 evaluation report.

The algorithm used to arrive at the aforementioned savings was provided, and the following assumptions were used:

- Average heating load of 638 therms;
- 80% AFUE of existing furnace; and
- 92% AFUE of energy efficient furnace.

ADM applied the following savings algorithm from Illinois Statewide Technical Reference Manual (TRM) to develop ex post savings:

$$\Delta Therms = Gas\_Furnace\_Heating\_Load * (1/AFUE(base) - 1/AFUE(eff))$$

Where,

Gas_Furnace_Heating_Load =		Estimate of annual household heating load for gas furnace heated single family home.
AFUE(base)	=	Baseline furnace annual fuel utilization rating
AFUE(eff)	=	Efficient furnace annual fuel utilization efficiency rating

The Illinois Statewide TRM recommends using the following assumptions:

- The estimated annual heating load is 766 therms.
- The AFUE for early replacement of baseline equipment is 90%.

ADM suggests using 124.89 therms per unit to estimate annual savings for the 92% AFUE or better furnace measures.

2.2.2.10. Reduced Load (Attic, Sidewall, and/or Foundation Insulation)

Ex ante annual savings were 216 kWh per unit when a new air conditioner is installed in a home that also received weatherization improvements, such as attic, sidewall, or foundation insulation.

The evaluation reports from the previous evaluation cycle recommended that DCEO provide more information on the measures installed to accurately assess the savings estimates. In particular, a detailed breakdown of the type of weatherization measures that were installed in each dwelling was requested.

However, the type of weatherization measures that were installed in each dwelling, as well as the inputs and algorithms used to inform the stipulated savings value were not provided for the current program year. As a result, a thorough review of the stipulated savings value for this measure could not be performed.

ADM recommends that DCEO track the type of weatherization measure installed, the baseline insulation type and R-value, the added insulation type and R-value for all participants, and any other relevant data inputs.

2.2.2.11. Air Sealing

Ex ante annual savings were 72 therms per unit in Chicago and 61 therms per unit in Springfield for the air sealing measure.

These values were estimated using the following assumption:

- Average of 3,577 CFM_{50} before retrofit (blower door test at 50 Pa);
- Average of 2,503 CFM_{50} after retrofit (blower door test at 50 Pa); and
- Average of 1.5 story house.

However, the algorithm used to calculate ex ante savings was not provided. Assuming an air leakage reduction of 1,000 cubic feet per minute at 50 pascals, and a conservative estimate of a 1 story house, the Illinois TRM stipulates an average savings of 105.73 therms.

ADM suggests 105.73 therms per unit to estimate annual savings for the air sealing measure.

2.2.2.12. Attic Insulation

Ex ante annual savings were 61 therms per units in Chicago and 52 therms per unit in Springfield for the attic insulation measure.

The algorithm used to arrive at the aforementioned savings was provided, and the following assumptions were used:

- Existing insulation – R-value of 3;
- Total insulation after retrofit – R-value of 49;
- Area of insulated space – 900 square feet;
- Framing factor of 0.15;
- AFUE of 0.85;
- HDD of 5,113 for Chicago; and
- HDD of 4,379 for Springfield.

From ADM's evaluation of a similar low income weatherization program in Arkansas, the average annual savings per dwelling was 95.41 therms.

ADM suggests 95.41 therms per unit to estimate annual savings for the attic insulation measure.

2.2.2.13. Heat Pump

Ex ante annual savings were 49,207 kWh for Chicago and 47,088 kWh for Springfield for ENERGY STAR® rated heat pumps.

These values were estimated using Illinois TRM and the following assumptions:

- 570 full load hours for cooling - Chicago;
- 1,840 full load hours for heating – Chicago;

- 730 full load hours for cooling - Springfield;
- 1,754 full load hours for heating – Springfield;
- Existing equipment with SEER 13;
- Existing equipment with heating season performance factor (HSPF) of 1.0;
- ENERGY STAR® rated Heat Pump with SEER 15; and
- ENERGY STAR® rated Heat Pump with HSPF of 9.0.

ADM applied the following savings algorithm, found in the Illinois Statewide Technical Reference Manual (TRM), to determine ex post savings for heat pumps.

$$\Delta kWh = \{ [FLH\_cooling * Capacity\_cooling * (1/SEER\_base - 1/\_SEER\_ee)] / 1000\} + \{[FLH\_heat * Capacity\_heating * (1/HSPF\_base - 1/HSPF\_ee)] / 1000\}$$

Where,

FLH_cooling	=	Full load hours for air conditioning.
Capacity_cooling	=	Cooling capacity of air source heat pump.
SEER_base	=	Seasonal Energy Efficiency Ratio of baseline equipment.
SEER_ee	=	Seasonal Energy Efficiency Ratio of new equipment.
FLH_heat	=	Full load hours for heating.
HSPF_base	=	Heating System Performance Factor of baseline equipment.
HSPF_ee	=	Heating System Performance Factor of new equipment

Upon review of the inputs provided by DCEO, ADM was able to reproduce the savings values. However, the HSPF_base was incorrectly assumed to be 1.0. The baseline equipment was an electrical resistance furnace with central air. The coefficient of performance (COP) is 1.0, but the HSPF_base is 3.412.

When using an HSPF_base value of 3.412, the per unit savings value is 12,264.30 kWh for installation of heat pumps in Chicago and 11,759.99 kWh for installation of heat pumps in Springfield.

To estimate annual savings for the replacement of an electrical resistance furnace and central air with a Heat Pump (15 SEER), ADM suggests using 12,264.30 kWh per unit in Chicago, and 11,759.99 kWh per unit in Springfield.

2.2.2.14. Ceiling Fan

Ex ante annual savings were 88 kWh per unit for ENERGY STAR® rated ceiling fans.

The assumptions and algorithms used to arrive at the aforementioned savings value were not provided; however, it was stated that an "Ameren spreadsheet" was used.

The most recent ENERGY STAR® calculator recommends annual savings of 115 kWh for the replacement of a ceiling fan with lighting. This value assumes that bulbs in a conventional ceiling fan are 120 watts, while bulbs in an ENERGY STAR® rated ceiling fan are 25 watts.

ADM suggests 115 kWh per unit to estimate annual savings for the ENERGY STAR® rated ceilings fan measure.

2.2.2.15. Water Heater

Ex ante annual savings were 291 kWh per unit for the electric water heater measure.

The assumptions and algorithms used to arrive at the aforementioned savings value were not provided. However, according to DCEO guidelines for the Low Income Residential Retrofit, the minimum energy factor is 0.93 or greater.

To develop ex post savings for electric water heaters, a prescriptive value from the Pennsylvania TRM was used. The annual savings value for the installation of an electric water heater (with a 0.93 energy factor) of 115 kWh.

ADM suggests 115 kWh per unit to estimate annual savings for the electric water heater measure.

Ex ante annual savings were 48.82 therms per unit for the natural gas water heater measure.

Therm savings for Natural Gas Water Heaters were calculated using the following algorithm provided by the Illinois Statewide TRM:

$$\Delta Therms = (1/ EFbase - 1/EFefficient) * (GPD * 365.25 * \gamma Water * (Tout – Tin) * 1.0)/100,000$$

Where,

EFbase	=	Efficiency of the baseline equipment.
EF efficient	=	Efficiency of the new equipment.
GPD	=	Gallons of water used per day.
γWater	=	Specific weight of water.
Tout	=	Tank temperature.
Tin	=	Temperature of the incoming supply water.

The Illinois Statewide TRM recommends using the following assumptions:

- The efficiency of baseline equipment if unknown is .59
- The efficiency for energy efficient unit was based on the efficiency for condensing gas storage units and is .80.
- The tank temperature is 125 °F.

- The incoming water temperature is 54 °F.
- The specific weight of water is 8.33 lb.
- The gallons of water used per day are 50.

ADM suggests 46.82 therms per unit to estimate annual savings for the natural gas water heater measure.

2.2.3 Program-Level Savings Results

This subsection presents the gross and net savings for the Residential Retrofit Program.

The realized gross and net energy savings of the Residential Retrofit Program during the period June 2011 through May 2012 are summarized by program component in Table 2-4 and by measure in Table 2-5. During this period, realized gross energy savings totaled 9,046,554 kWh. The gross realization rate for the program is 79%. A net-to-gross factor of 100% was used because the Residential Retrofit Program targets low income residents. The realized net savings for the period are 9,046,554 kWh. Therm savings are shown by program component in Table 2-6 and by measure in Table 2-7. Gross realized natural gas savings are 328,862 therms and the gross realization rate is 100%. Net therm savings were 328,862.

Table 2-4 Summary of kWh Savings by Program Component

Program Component	*Utility*	*Units*	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Gross Realization Rate*	*Realized Net kWh Savings**
Weatherization	Ameren	42,059	3,783,813	2,913,301	77%	2,913,301
	ComEd	75,539	6,714,047	5,528,655	82%	5,528,655
Home Improvement	Ameren	1,386	416,055	290,253	70%	290,253
	ComEd	1,049	540,614	314,346	58%	314,346
Total		120,033	11,454,529	9,046,554	79%	9,046,554

**A net-to-gross ratio of 100% is applied because the Residential Retrofit Program targets low income residents who would not have funded new energy efficiency measures in the absence of the program.*

Table 2-5 Summary of kWh Savings by Measure

Measure	*Units*	*Expected kWh Savings*	*Realized Gross kWh Savings*	*Gross Realization Rate*	*Realized Net kWh Savings**
ENERGY STAR® Refrigerators	3,637	5,109,985	3,549,712	69%	3,549,712
ENERGY STAR® Fluorescent Lights	399	20,030	27,899	139%	27,899
Compact Fluorescent Lamps	114,080	4,815,317	4,960,198	103%	4,960,198
ENERGY STAR® Bathroom Exhaust Fans	140	12,460	12,401	100%	12,401
ENERGY STAR® Dishwashers	56	3,472	3,472	100%	3,472
Central AC	259	286,464	199,837	70%	199,837
Room AC	234	41,184	17,269	42%	17,269
Reduced Load:	978	211,248	-	-	-
Furnace (ECM)	78	31,200	31,200	100%	31,200
ENERGY STAR® Ceiling Fans	152	13,376	17,480	131%	17,480
Electric Water Heater	1	291	115	40%	115
ENERGY STAR® Heat Pump	19	909,502	226,970	25%	226,970
Total	120,033	11,454,529	9,046,554	79%	9,046,554

**A net-to-gross ratio of 100% is applied because the Residential Retrofit Program targets low income residents who would not have funded new energy efficiency measures in the absence of the program.*

Table 2-6 Summary of Therm Savings by Program Component

Program Component	*Utility*	*Units*	*Expected Therm Savings*	*Realized Gross Therm Savings*	*Gross Realization Rate*	*Realized Net Therm Savings**
Weatherization	Ameren	886	65,986	96,337	146%	96,337
	Nicor Gas	369	40,846	39,558	97%	39,558
	Peoples Gas	275	30,419	29,483	97%	29,483
	North Shore Gas	22	2,366	2,363	100%	2,363
Home Improvement	Ameren	381	39,869	40,355	101%	40,355
	Nicor Gas	289	35,528	30,746	87%	30,746
	Peoples Gas	739	111,287	88,317	79%	88,317
	North Shore Gas	16	1,967	1,702	87%	1,702
Total		2,977	328,268	328,862	100%	328,862

**A net-to-gross ratio of 100% is applied because the Residential Retrofit Program targets low income residents who would not have funded new energy efficiency measures in the absence of the program.*

Table 2-7 Summary of Therm Savings by Measure

Measure	*Units*	*Expected Therm Savings*	*Realized Gross Therm Savings*	*Gross Realization Rate*	*Realized Net Therm Savings**
92% AFUE Furnace	1,752	201,916	186,393	92%	186,393
Gas Water Heater	3	549	140	26%	140
Air Sealing	873	106,948	109,030	102%	109,030
Attic Insulation	349	18,856	33,299	177%	33,299
Total	2,977	328,268	328,862	100%	328,862

**A net-to-gross ratio of 100% is applied because the Residential Retrofit Program targets low income residents who would not have funded new energy efficiency measures in the absence of the program.*

The realized gross and net peak kW reductions of the Residential Retrofit Program during the period June 2011 through May 2012 are summarized in Table 2-8. The achieved net peak demand savings for the program are 1,279.62 kW.

Table 2-8 Summary of Peak kW Savings for Residential Retrofit Program

Program Component	*Utility*	*Units*	*Realized Gross kW Savings*	*Realized Net kW Savings**
Weatherization	Ameren	42,059	347.22	347.22
	ComEd	75,539	702.35	702.35
Home Improvement	Ameren	1,386.00	93.13	93.13
	ComEd	1,049.00	136.92	136.92
Total		120,033	1,279.62	1,279.62

**A net-to-gross ratio of 100% is applied because the Residential Retrofit Program targets low income residents who would not have funded new energy efficiency measures in the absence of the program.*

3. Process Evaluation

This chapter presents the results of the process evaluation for the DCEO Low Income Residential Retrofit Program. The process evaluation focuses on the effectiveness of program policies and organization, as well as the program delivery framework. The purpose of the process evaluation is to assess the design and recent results of the program in order to determine how effectively it is achieving its intended outcomes. This evaluation is based upon analysis of program structure and interviews and surveys of participating organizations and residents who received energy efficiency improvements.

The chapter begins with a discussion of the overall background of the program. This is followed by an examination of certain issues that are critical to the future success of the program. This chapter also presents strategic planning and process recommendations, and highlights key findings from the interviews of grant recipients and residents. The information in this chapter provides insight into participant decision making behaviors, and identifies any key issues that may be addressed for future program years. Conclusions, recommendations, and other findings from the process evaluation may be useful in comparing program years over time, and in conducting planning efforts for future program years.

3.1 Evaluation Objectives

The purpose of the process evaluation is to examine program operations and results throughout the program operating year, and to identify potential program improvements that may prospectively increase program efficiency or effectiveness in terms of levels of participation and program satisfaction. This process evaluation was designed to document the operations and delivery of the Low Income Residential Retrofit Program during electric program year four and natural gas program year one (EPY4/GPY1).

Figure 3-1 provides an overview of the evaluation process, including the specific research activities performed.

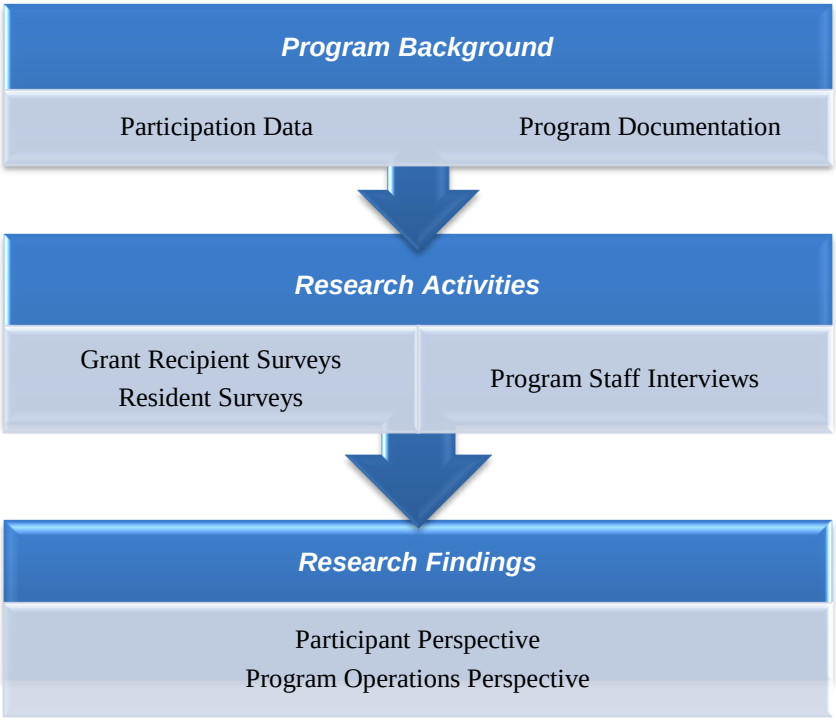

Figure 3-1 Process Evaluation Overview

Key research questions to be addressed by this evaluation of Program Year 4:

- Was the Residential Retrofit Program delivery effective and successful?
- Did the Residential Retrofit Program reduce barriers to increased energy efficiency project implementation?
- What non-energy benefits were realized by residents who received the energy efficiency improvements?

During the evaluation, data and information from numerous sources are analyzed to achieve the stated research objectives. Insight into the participant experience with the Residential Retrofit Program is developed from an online survey of program participants and a survey administered by mail and telephone to residents receiving the energy efficiency improvements. The program operations perspective is developed through in-depth interviews with program staff.

3.2 Summary of Primary Data Collection

The primary data collection activities completed for the program evaluation effort were as follows:

- **Participant Surveys:** Participant surveys are the primary data source for many components of this process evaluation, and serve as the foundation for understanding the grant recipients' perspective. The participant surveys provide grant recipient feedback

and insight regarding their experiences with the Residential Retrofit Program. Respondents report on their satisfaction with the program, detail their motivations and the factors affecting their decision making process, and provide recommendations related to improving the program.

- **Resident Surveys:** Surveys with residents provide information on measure recipient satisfaction. The objective of the survey is to gain insight into the non-energy benefits of the program, such as improved home comfort, and if there are aspects of the improvements that the participants were dissatisfied with. Residents report on their satisfaction with the measures installed, the effect on their utility bills, any improvements to the comfort of their homes, and any improvements in the awareness of the benefits of energy efficiency.

- **Program Staff Interviews:** At various times during the evaluation effort, program staff was interviewed about the program operations. Interviews with program staff covered topics such as program operations, motivations for grant recipients for participating, and how program activity is tracked and managed.

3.3 Summary of Conclusions and Recommendations

Interviews and surveys were conducted with grant recipients and residents to better understand the effectiveness of program delivery. From the participant perspective, the program is effective and operating smoothly. However, review of program documentation and in-depth interviews with program staff indicate that there are aspects of the program that could be improved in order to increase awareness, improve administration and project tracking, and better align reporting requirements with the informational needs for assessing savings. The following presents a selection of key conclusions from EPY4/GPY1:

- **High Program Satisfaction:** Grant recipients reported high levels of satisfaction with the program and no recipients indicated dissatisfaction with any aspect of the program. Grant recipient satisfaction is important for future program activity because many of the participants are organizations that participated during prior years. Overall, participants noted few problems with the participation process. However, one respondent indicated that it took longer than expected to receive the final grant agreement.

  Residents who received the energy efficiency measures reported high levels of satisfaction. Several residents reported that there were benefits to the energy efficiency improvements such as increased ability to pay utility bills, increased value of their home, and improved home comfort. Although the majority of residents were satisfied with the improvements that were implemented, about one-quarter of the residents noted issues with some aspects of the improvements. Specifically, these respondents noted problems with the installation, dislike of the new equipment, and equipment malfunction. Despite these concerns, 86% of the respondents reported that they were satisfied with the energy efficiency improvements.

- **Program Staffing may be Insufficient:** The Residential Retrofit Program has faced challenges in maintaining sufficient staffing to administer the program. Despite these challenges, program participants were generally satisfied with the program. This suggests that with limited resources, staff are able to provide adequate assistance to participants. However, maintenance of documentation and program tracking data has suffered from the limitation in administrative resources. To address the staffing limitation, two additional part-time employees were recently added to assist with the program's administration. Given the administrative requirements of the program, additional staffing may be needed.

- **Project Tracking and Documentation in Need of Improvement:** Project information has not been systematically tracked and organized. Few of the grants provided through the program were entered into the DCEO project tracking database. Program staff maintained tracking of program activity in spreadsheets that provided high level summaries implemented measure quantities, but provided limited information on the technical aspects of the projects.

- **Limited Program Marketing:** The Low Income Residential Retrofit relies upon repeat participation by external organizations and other DCEO programs. Although few staff resources are spent on marketing and promotion, recent changes may help further promote the program. The program has expanded its partnership with the Illinois Housing Development Authority, a state financing agency, to provide an additional pipeline to the program for prospective participants.

- **Verification Procedures Limited to Grant Recipient Reporting:** Site visits to verify measure installation are not performed for the projects implemented by the external organizations. Verification of project implementation is limited to review of invoices and reports submitted by external organizations.

While the program has maintained participant satisfaction and delivered energy efficiency improvements to low income residents, there are aspects of the program that could be improved. The following recommendations are offered for consideration.

- **Track Additional Project Information:** The Low Income Residential Retrofit Program maintains limited tracking data. Ideally, comprehensive tracking data would provide the following: (1) the measures installed, including quantities and technical specifications such as the wattage of bulbs, R-value of insulation, and size and Seasonal Energy Efficiency Ratio (SEER) ratings of air conditioners; (2) the date of implementation; (3) the location of the implementation; (4) the estimated measure energy savings; (5) resident contact information; (6) contractor information if utilized;(7) the baseline equipment or building conditions; and (8) the utility account numbers associated with the implementation address.

- **Provide a Report Template for Program Participants to Report Measure Specifications:** A review of project documentation found that information provided by program participants regarding the implemented measures was not consistently reported. In order to support reporting of this information, program staff should consider providing a reporting template for each measure type that collects the appropriate level of detail. The data captured by the reporting template should be included in DCEO's Energy Efficiency Portfolio Standard (EEPS) database.

- **Perform Verifications at Limited Number of Sites:** Currently the program is not performing site visits for projects completed through the program. Although program activity is limited, staff should consider performing verification inspections for a sample of sites in order to document the quality of the work performed and to verify measure installation.

- **Continue to Invest in Strong Partnerships:** Program staff indicated that marketing resources are limited at this time. Program partners such the University of Illinois School of Architecture, the Smart Energy Design Assistance Center, the Illinois Housing Authority, the Bureau of Community Development, and the Bureau of Energy Assistance possess established marketing channels that can continue to drive program demand. As the program matures, DCEO will be able to attract more participants and increase program savings.

3.4 Low Income Residential Retrofit Program Description

The Residential Retrofit Program offers grants to state agencies, local governments, and other entities that administer low income home improvements. During EPY4/GPY1, grants were awarded to other programs that are operated by the Department of Commerce and Economic Opportunity, referred to as intra-agency grants, and to external applicants engaged in low income construction projects. Intra-agency grants were awarded to the Community Development Assistance Program and the Illinois Home Weatherization Assistance Program. Additionally, four grants were awarded to external applicants.

3.4.1 Participant and Measure Eligibility Requirements

Projects funded through the Residential Retrofit Program must be targeted at households at or below 80% of the Average Median Income (AMI). Funds used for weatherization must be targeted at households at or below 200% of the poverty level. Furthermore, the projects cannot have applied or received funds for the same measures from other DCEO programs or programs operated by ComEd or Ameren.

The program includes a list of eligible measures that applicants select from including ENERGY STAR® appliances, compact fluorescent lamps, and energy efficient heating and cooling equipment. Applicants may also propose additional measures to be approved by program staff.

3.4.2 Program Incentives

The Residential Retrofit Program offers standard incentives for a list of prescribed measures. Table 3-1 displays the incentive amounts for the measures included in the program. The incentive amounts listed are the maximum funds available for the measures. The amount of the incentive cannot exceed the total installed cost of the measures.

Table 3-1 Measure Incentive Levels

Energy Saving Measure	*Maximum Amount*
ENERGY STAR® rated refrigerator	$700
ENERGY STAR® rated fluorescent light fixtures	$95/fixture
CFL Installation	$5/lamp
ENERGY STAR® rated bathroom exhaust fan	$450
ENERGY STAR® rated dishwasher	$550
SEER 14 central air conditioner w/ programmable thermostat	$3,100
ENERGY STAR® rated ceiling fan	$250
ENERGY STAR® rated room air conditioner3	$400
90% AFUE furnace with electronically commutated motor or equivalent advanced air handler	$600
Reduce required tonnage as a result of thermal envelope improvements4	$2,500
ENERGY STAR® rated heat pump	$2,500
New electric water heater (minimum EFF 0.93)	$600

Total grant funds cannot exceed $500,000. However, the DCEO Director reserves the right to waive funding limitations and other program parameters.

3.4.3 Program Participation Process

Interested parties apply to the program by submitting an application. The program suggests that the applicant meet with the program manager to discuss the proposed project before construction documents have been completed. Applications are reviewed by program staff for completeness and adherence to program requirements. This review process is followed by negotiations with the applicant regarding the technical aspects of the project. Projects are judged on multiple criteria including the likelihood that the project will be completed, the cost effectiveness of the energy saved, and the capability and previous experience of the applicant.

Upon approval, the grant agreement specifies the conditions of payment and the payment schedule.

3.4.4 Reporting and Verification

Grantees submit progress reports to the DCEO detailing status of the project. Furthermore, upon acceptance of the grant the recipient agrees to assist with an analysis of energy consumption for up to three years following the occupancy of the buildings. Currently, program activity is not entered into the DCEO project tracking database.

3.5 Residential Retrofit Energy Efficiency Program Grant Recipient Profile

Table 3-2 presents the grant amounts received by external organizations and the intra-agency grants distributed to the Bureau of Community Development and the Bureau of Energy Assistance.

Table 3-2 Grants Distributed through Residential Retrofit Program during EPY4/GPY1

	Electric Grant	*Natural gas Grant*	*Number of Units*
External Organization Grants			
CNT Energy	$900,000	$100,000	804
Delta Institute	$500,000		184
Hispanic Housing	$495,843		204
Historic Chicago Bungalow	$500,000		174
Intra-agency Grants			
Bureau of Community Development	$517,010	$50,000	111
Bureau of Energy Assistance	$4,090,826	$1,372,872	2311
Total	$7,003,679	$1,522,872	3,788

3.6 Participant Outcomes

An online survey was conducted to collect data about participant decision-making, preferences, and opinions of the Residential Retrofit Program. The program offered a variety of efficiency measures for low income housing. In total, three of the four external grant recipient decision makers responded to the survey.

Information in this section is intended to characterize participant decision making behaviors and identify notable trends within participant responses. Some of the comments and issues raised by participants are anecdotal in nature and reflect individual participant opinions. The Conclusions and Recommendations section of the Process Evaluation chapter provides an overall distillation of key findings from the process evaluation activities that were performed for the Residential Retrofit Program.

3.6.1 How Grantees Learn About the Program

The grant recipients were asked how they learned about the program. Participants heard of the program in several different ways, and all of the program participants were familiar with the program from prior experience with it. Two-thirds of participants stated that they learned of the program from a DCEO representative, while the DCEO website and friends or colleagues were each cited by one participant.

Two-thirds of the program participants heard about the Residential Retrofit Program prior to completing their projects and another one-third heard about the after the project began but before it was completed.

3.6.2 Factors Affecting Participation

The majority of survey respondents indicated that the residents of participating facilities pay either the natural gas bill, electric bill, or both. One of the respondents stated that the residents pay the natural gas bill and another respondent stated that residents pay both the natural gas and the electric bills. The other respondent stated that some residents pay the utility bills and others do not.

Participants were asked about their reasons for completing the grant funded energy efficiency projectsThe participant responses illustrate the multiple motivations involved in making the decision to make the energy efficiency improvements. All three respondents indicated that they undertook the projects to save residents money on their utility bills and because of environmental concerns. Two of the respondents stated that they undertook the project to improve the comfort of the building for its residents. Only one respondent undertook the improvements to save money on operational costs.

Participants were asked a series of questions about their prior plans for the energy efficiency projects and the influence of the program on their decision making. One of the participants stated that they had plans to complete the energy efficiency improvements prior to participating in the program. However this participant reported that they would not have completed the energy efficiency improvements had they not participated in the program. Furthermore, the participant's organization had the plans for one to two years prior to participating, suggesting that the availability of the incentive through the program was the impetus for completing the project.

To further understand how the Residential Retrofit Program may have influenced participant decision-making, survey respondents were asked whether the measure was recommended to them by a representative of the program or by a representative of the Smart Energy Design Assistance Center (SEDAC). One participant indicated that energy efficient equipment or design features were recommended by program staff, although the respondent did not know if they would have implemented the measures without the recommendation.

Residential Retrofit Program participants were asked about whether the information and incentives offered by the program influenced various factors related to the measure installation. These factors included the timing of the installation, discussed above, as well as the quantity of units installed, and the energy efficiency of the installed equipment. One participant, who stated that they had prior plans to implement the project, responded that the program increased the quantity and efficiency of the equipment, and that they completed the project earlier than they would have without the program.

3.6.3 Energy Efficiency Attitudes, Behaviors, and Decision Making

All of the respondents stated that the incentive or grant payments from DCEO and their past experience with energy efficient equipment was very important to their decision making about energy efficiency projects. Advice and recommendations from DCEO were cited as relatively less important, but still somewhat important to the decision making process.

Participants were asked what barriers their organizations faced to implementing energy efficient equipment. All of the respondents reported that the high initial cost of efficient equipment was a barrier to making energy efficiency improvements in low income housing. This finding highlights the importance of financial incentives for encouraging program participants to implement energy efficiency improvements. A lack of knowledge of energy efficiency measures and a lack of interest among prospective tenants in energy efficient housing were each mentioned as barriers by one respondent.

All three of the participants also indicated that there were other barriers to completing energy efficiency improvements in low income housing. The barriers identified were a lack of interest among home owners in financing energy efficiency improvements, a lack of funds among grant recipient organizations for making energy efficiency improvements, and structural deficits in low income homes that make them ineligible for program founds. While two of these comments reiterate the importance of financial incentives for encouraging energy efficiency improvements, the third comments reflects a common problem encountered in low-income energy efficiency program. A portion of the low income housing stock is in such poor state that it is not possible to achieve cost effective energy efficiency improvements.

The decision makers were asked what kinds of energy efficiency policies and activities their organizations have in place. All three decision makers reported having the same policies and procedures regarding energy efficiency improvements in low income housing. Each respondent reported that they had a staff member responsible for energy and energy efficiency, policies that incorporate energy efficiency in operations and procurement, and active training of staff.

These responses suggest that the organizations that completed projects through the program have incorporated organizational policies and procedures to manage energy efficiency.

When asked about prior energy efficiency activities, none of the respondents were aware of their organizations having implemented energy efficiency improvements in low income residences without applying for an incentive. These findings further support that respondents are unlikely to make energy efficiency improvements without financial assistance.

3.6.4 Where Decision Makers Get Their Information

Respondents were asked what sources they rely on for information about energy efficient equipment, materials, and design features. Respondents were able to provide multiple responses to this item.

All of the respondents reported that they rely on friends and colleagues for information about energy efficient materials and design features. Other frequently used sources, each mentioned by two of the respondents, were the DCEO website, trade associations or business groups, architects, engineers, or energy consultants, equipment vendors, or building contractors, city or county planning departments, and the U.S. Department of Housing and Urban Development.

Although respondents use a wide variety of resources for information on energy efficiency, program and program affiliated resources are utilized by the respondents. All but two of the respondents utilized the DCEO website or DCEO program representatives for information on energy efficiency. Additionally, two organizations affiliated with DCEO energy efficiency programs, the Smart Energy Design Assistance Center and the Energy Resources Center, were each mentioned by one respondent as sources of information.

Financial Methods Used by Decision Makers**Error! Reference source not found.**Respondents provided information regarding the financial methods they use to review efficiency projects. Two respondents reported that they use simple payback to evaluate efficiency projects. One of these respondents clarified that they use simple payback even though they are not owners of the residential units. The other respondent stated that they typically look for payback periods of three to five years when evaluating projects. The initial cost and the life cycle costs were each used by one of the decision makers. One decision maker reported that they do not evaluate low income housing projects.

3.6.5 Participant Satisfaction with the Program

Respondents were asked to report their level of satisfaction with selected aspects of the program on a scale of 1 to 5 where 1 was very dissatisfied and 5 was very satisfied. Overall, satisfaction ratings were high, with few low scores reported by respondents.

Table 3-3 shows the results. Overall, participants reported that they were satisfied with the program. Participants were most satisfied with the performance of the equipment installed, the effort required for the application process, and the quality of work performed by contractors. The relatively high level of satisfaction with the effort for the application is atypical. It is more common that participants are least satisfied with this aspect of the program.

Participants were less satisfied with the grant amount and the time elapsed to receive the grant payment, although none of the respondents reported that they were dissatisfied.

Table 3-3 Decision Maker Satisfaction with Selected Aspects of Program Experience

Element of Program Experience	*Very Satisfied*	*Somewhat Satisfied*	*Neither Satisfied nor Dissatisfied*	*Somewhat Dissatisfied*	*Very Dissatisfied*	*Don't Know / Not Applicable*	*n*
Performance of the equipment installed	67%	33%	-	-	-	-	3
Savings on your monthly bill	33%	-	33%	-	-	33%	3
Grant amount	33%	33%	33%	-	-	-	3
The effort required for the application process	67%	33%	-	-	-	-	3
Quality of the work conducted by your contractor	67%	33%	-	-	-	-	3
Information provided by DCEO	33%	67%	-	-	-	-	3
The elapsed time until you received the grant payment	33%	33%	33%	-	-	-	3
Overall program experience	33%	67%	-	-	-	-	3

In addition to their satisfaction, respondents were also asked about whether or not the measures they implemented met their expectations. Two of the respondents reported that the measures met their expectations while the other indicated that their expectations were exceeded.

3.6.6 Installation and Incentives

When asked if they had any problems with the application process only one of the program participants reported experiencing problems during the application process. This participant stated that it took a long time to get the confirmation and the final contract.

Survey responses indicate that program participants did not have problems with the grant payments provided through the program. All participants reported that the grant payment met their expectations and none reported problems receiving the payments.

When asked whether project implementation had gone smoothly, none of the participants reported problems with the project implementation, equipment installation, or the grant agreement that they received.

Overall, the program participation process appears to be operating effectively from the participants' perspective.

3.6.7 Additional Energy Efficiency Projects

Some participants reported installing energy efficient equipment after participating in the program that they did not receive an incentive for. One participant indicated that they had implemented additional energy efficient equipment or design features similar to those implemented through the program. This participant reported that they did not know if the equipment or design features qualified for an incentive.

3.6.8 Participant Recommendations and Overall Impressions

At various points of the survey, grantees were provided the opportunity to respond to open-ended questions regarding their experiences with the program or suggestions for improvement. One of the grantees expressed their gratitude for the program:

> *We are very grateful for the opportunity to work with DCEO to implement the Residential Retrofit Program.*

3.7 Resident Outcomes

ADM surveyed residents who received energy efficiency measures through the Residential Retrofit Program. Residents were asked about their experiences with the energy efficiency improvements and their benefits. Although contact information was not available for most of the residents served by the program, the survey was administered by telephone to 98 residents who received energy efficiency improvements through the Illinois Home Weatherization Assistance Program and were partially funded with program grant funds. Additionally, one of the grantee organizations assisted with the administration of the survey by mail to residents who received energy efficiency improvements. These residents were given the option of responding to the survey by mail or completing it online. In total, 76 of these residents completed the survey.

3.7.1 Resident Satisfaction

Residents were asked how satisfied they were with the improvements and the process of having the improvements made. Their responses are displayed in Table 3-4. The majority of residents reported that they were very satisfied or somewhat satisfied with all aspects of the improvements. Residents were most satisfied with the level of professionalism and service provided by program staff, followed by the performance of the equipment installed. Comparatively fewer participants were satisfied or very satisfied with the savings on their monthly bill (65%), largely because 14% reported not knowing how satisfied they were. Residents may not be aware of this factor because they do not track their utility bills or because the effects of the energy improvements on consumption are obscured by other factors such as changes weather conditions.

Table 3-4 Resident Satisfaction with Energy Efficiency Improvements

Element of Program Experience	*Very Satisfied*	*Somewhat Satisfied*	*Neutral*	*Somewhat Dissatisfied*	*Very Dissatisfied*	*Don't Know*	*n*
The quality of installation work	63%	23%	3%	5%	4%	2%	172
The performance of the equipment installed	70%	16%	4%	3%	2%	5%	170
The savings on your monthly utility bills	43%	22%	9%	5%	6%	14%	171
The level of professionalism and service provided by the contractor	69%	14%	2%	8%	4%	3%	173
The level of professionalism and service provided by the program staff	75%	17%	1%	1%	1%	5%	168
Overall satisfaction with the energy efficiency improvements	65%	21%	2%	8%	3%	1%	174

A few of the residents stated that they had removed some of the energy efficiency improvements. However, based on their answers to a follow up question asking what equipment they removed, most of these responses seemed to refer to the equipment that was replaced with more efficient equipment. However, there were two cases where it was clear that participants had removed the energy efficiency measures. One resident removed door weather stripping because it made the door difficult to open and another replaced some of the efficient light bulbs. Another resident reported that the thermostat did not work and had to be replaced. Overall, most residents reported that they did not remove the equipment.

3.7.2 Benefits of Energy Efficiency Improvements

To understand the impact that the energy efficiency improvements had on the residents' lives, the survey respondents were asked a series of questions about potential benefits from the measures and whether or not there was anything they disliked about the improvements.

Ninety-eight percent of survey respondents stated that they pay the utility bills for their household. These residents were asked if they had noticed if energy efficiency improvements had affected the affordability of their utility bills. As shown in Table 3-5, one-half of the respondents (50%) reported that the improvements had improved the affordability of their utility bills.

Table 3-5 Effect of Improvements on Utility Bill Affordability

	Response	*Percent of Respondents (n=163)*
Would you say that the energy efficiency improvements made to your home have made your utility bills:	More affordable	50%
	About the same	42%
	Less affordable	4%
	Don't know	4%

The 89% of survey respondents who reported that they owned their home were asked if the energy efficiency improvements increased the value of their homes. Table 3-6 displays their responses. Forty-three percent of survey respondents thought the improvements had increased the value of their home and the same share thought the improvements did not change their home value.

Table 3-6 Perceptions of Improvements on Home Value

	Response	*Percent of Respondents (n=143)*
Do you think that the work that was done on your home has increased, decreased, or not changed the value of your home?	Value has increased	43%
	Value has decreased	1%
	No change	43%
	Don't know	13%

A potential benefit of energy efficiency improvements is increased home comfort. As shown in Table 3-8, more than two-thirds of the survey respondents reported that the energy efficiency improvements made their homes more comfortable to live in.

Table 3-7 Perceptions of Improvements on Home Comfort

	Response	*Percent of Respondents (n=173)*
Would you say that the energy efficiency improvements made to your home have made it:	More comfortable to live in	68%
	Just as comfortable as before the improvements were made	25%
	Less comfortable to live in	3%
	Don't know	2%

Respondents were also asked what the biggest benefits were to having the work performed, and. their responses are shown in Table 3-8. The most frequently mentioned benefit, cited by 49% of respondents, was that the improvements made the home feel more comfortable. A similar share of respondents, 45%, stated that their appliances and heating or cooling equipment were more reliable. Nearly a quarter of residents reported that the improvements had resulted in less exterior noise. Only 10% of the respondents reported that there were not any benefits.

Eighteen percent of the respondents made additional comments about the benefits caused by the energy efficiency improvements. Most of these comments referred to other benefits such as reduced drafts in the residence, less water use, lower utility bills or energy savings, and fewer insects inside the house. However, three of these respondents stated that there were not any benefits.

Table 3-8 Greatest Benefits of Energy Efficiency Improvements

	Response	*Percent of Respondents (n=164)*
What are the biggest benefits you have seen since the work was done on your home?	The home feels more comfortable	49%
	The appliances and heating or cooling equipment are more reliable	45%
	There is less noise from the outside	25%
	There is less noise from the appliances	16%
	The home is safer	16%
	No benefits	10%
	There have been health improvements	10%
	Other	18%
	Don't know	4%

Residents were also asked if there was anything they didn't like about the improvements that were made. Twenty-six percent (45 residents) mentioned that there was some aspect of the improvements that they did not like. Several of these comments (19) were focused on asking for additional energy efficiency improvements, primarily new windows or additional insulation or air sealing. Additionally, several participants reported that the insulation or air sealing work performed was insufficient.

Twelve residents stated that there was some aspect of the work that was performed poorly. These issues included problems with insulation installation, leaks in the roof or windows attributed to the work that was performed, and problems with how air sealing measures were completed. The residents who reported these problems received the energy efficiency improvements through both the weatherization program and the grantee organization that assisted with the survey.

Another issue mentioned by 10 residents was that they disliked the equipment that was installed. The reasons for disliking the equipment raised by participants included furnaces that were too loud or undersized, that a refrigerator did not contain an ice maker, and problems with door replacements or door weather stripping.

Other issues mentioned by one or two residents included equipment malfunctions and not perceiving any benefits from the improvements.

Overall, the residents experienced multiple benefits from the energy efficiency improvements made through the program. Nearly half of respondents reported that the energy efficiency

improvements resulted in financial benefits, namely lower utility costs and increased home values. However, more than two-thirds reported that the program improved the comfort of the home and nearly all respondents said there were other non-energy benefits to the program such as more reliable appliances and less exterior noise in the residence. These responses suggest that Residential Retrofit Program is having multiple beneficial impacts on the lives of the residents who receive the efficiency improvements.

A sizable share of respondents reported that there were aspects of the energy efficiency improvements that they did not like. While many of these responses expressed a desire for additional energy efficiency improvements, others noted additional concerns such as poor quality workmanship. Though relatively few of the respondents reported this type of problem, the responses emphasize the importance of verification procedures to ensure that the work that is being performed is properly completed.

3.7.3 Increased Awareness of Energy Efficiency Improvements

To assess the impact the program had on residents' awareness of the benefits of energy efficiency and efficient equipment, residents were asked whether the program increased their awareness of the advantages of energy efficiency and if they had discussed their experience with the improvements with others. Table 3-9 and Table 3-10 display the responses to these questions. When asked about their awareness of the advantages of energy efficiency, nearly two-thirds of residents (65%) stated that they were more aware of the advantages of the benefits of energy efficiency since the improvements were made. Additionally, 74% of respondents said they had discussed their experience with the improvements with others and most of these respondents (89%) stated that they had shared a positive experience with others, although 10% reported that they related a negative experience with the improvements. The majority of residents did relate a positive experience of the program, which suggests that the program may be increasing awareness of energy efficiency benefits among non-participants as well.

Table 3-9 Awareness of Advantages of Energy Efficiency Improvements

	Response	*Percent of Respondents (n=166)*
How would you rate your level of awareness about the advantages of energy efficiency since the improvements were made to your home?	More aware	66%
	About the same	31%
	Less aware	1%
	Don't know	1%

Table 3-10 Discussions of Improvements with Others

	Response	*Percent of Respondents (n=129)*
Have you shared your experience or informed someone else about your experience with the energy efficiency improvements?	I shared that I had a positive experience	89%
	I shared that I had a negative experience	10%
	Don't know	1%

3.7.4 Resident Recommendations and Overall Impressions

At various points in the survey, residents were asked to respond to open-ended questions and to provide suggestions and general feedback about their experience with the energy efficiency improvements. Several respondents took the opportunity to provide their feedback and their comments are summarized below.

Thirty of the respondents raised concerns about the work performed or made suggestions for improving the program. Several of these responses referred to measures being installed poorly or the contractors making a mess in the residence. Some of these respondents suggested that better oversight was needed of the work performed. Most of these comments came from residents who received improvements through the weatherization program, which does provide oversight through verifications of completed projects. However, one resident suggested that more supervision should occur while the work is being completed. Additionally, two residents recommended that a mechanism for reporting problems should be established.

Twenty-two of the residents stated that they would like additional equipment to be covered by the program. Most of these residents wanted windows to be installed through the program. However, it should be noted that windows are expensive to replace and would most likely not be an effective use of program resources.

A few residents suggested that the scope of the project, what the result will be, and the process of having the work completed should be better explained to the residents prior to starting the work.

Overall, the majority of residents provided positive remarks about their experience the program. Residents expressed gratitude for the measures installed, the improvement they made to the comfort of their home, and the professionalism of the staff. Some residents also noted that the efficiency improvements reduced their utility costs. Some examples of these types of comments include:

> *I want to thank you for everything you did for me with the weatherization of my home.*
>
> *No, just keep doing what you're doing, cause it works.*
>
> *Great Program- thanks, the appliances were very useful and needed. The insulation was okay only because I believe I needed new windows to help insulate. Thanks again*
>
> *This is a fantastic program. I had my doubts at first, but I'm very satisfied as to the comfort and the decrease overall in my bill.*

Everyone was extremely professional and walked us through the process. We are very satisfied and lucky to have had this done. Thank you!

The service I received to help keep my home comfortable has been very good and the help from [the grantee organization]. Being a senior and on fixed income I love my home and want to stay in it. P.S. It's a pleasure to fill out that survey.

3.8 Program Operations Perspective

This section summarizes the core findings of interviews that were conducted with the Residential Retrofit Program staff.

In order to gather information regarding the operational efficiency and program delivery process for the Residential Retrofit Program, in-depth interviews were conducted by telephone with key DCEO program staff to better understand how the program sets goals, administers program offerings, manages data, and facilitates partnerships.

Respondents discussed their perspective on program structure and operations, their individual roles, and program strengths and weaknesses.

- **The Residential Retrofit Program Leverages Existing Programs and Partnerships to Generate Energy Savings:** The Residential Retrofit Program awards grants to other agency programs, referred to as intra-agency grants, and to external organizations making improvements to low income housing. During EPY4/GPY1, four external organizations received grants through the Residential Retrofit Program: the Delta Institute, CNT Energy, Hispanic Housing, and The Historic Chicago Bungalow Association. These organizations currently work with and serve low income and public sector communities. The grant funds are used as a funding source to further their missions and to include energy efficiency measures in their program offerings.

  Intra-agency grants were awarded to the Bureau of Energy Assistance Weatherization Program and the Bureau of Community Development Community Development Assistance Program (CDAP). CDAP's primary mission is to address health and safety concerns, although when energy efficiency retrofit projects become part of that effort, the Bureau of Community Development relies upon DCEO Residential Retrofit Program grants to fund the improvements. Funds for these intra-agency grants are appropriated at the beginning of the year. Once these projects are complete the costs are reimbursed.

- **Program Goals:** Savings goals for the Residential Retrofit Program are set in the three year plan. Typically, 25% of the budget is allocated to the three low income programs, including the Residential Retrofit Program. While all grantees have to report on the number of jobs created, the program does not have specific goals for this outcome.

- **Program Administration Adjusts to Cyclical Activity:** DCEO management and Residential Retrofit Program staff meet on an ad hoc basis in response to program activity. The Residential Retrofit Program provides a relatively small number of grants to organizations implementing large projects. Therefore, as program activity fluctuates

between more and less active periods, DCEO program staff responds and creates internal work plans accordingly. Internal planning meetings consist of a status check on all active projects, current grant agreements, and projects in the pipeline. Program staff must ensure the grants and energy savings are distributed among the utility service territories. Six investor owned utilities exist in Illinois, therefore six separate budgets must be aligned and grant funds allocated accordingly to the Residential Retrofit Program.

- **Program Staffing Resources may be Insufficient:** The Residential Retrofit Program has struggled with insufficient staff resources but steps have been taken to remedy the issue. The staff administering the Residential Retrofit Program and the Energy Efficient Affordable Housing Construction Program consists of one program manager, an intern, and two ancillary consultants that provide technical support and assist with calculating energy savings when needed. Recently, two part time staff members that are shared with the DCEO recycling program have been brought into assist with program administration. Despite the inclusion of these additional staff members, interview responses suggest that the department may not have sufficient staff to meet the current demands for tracking grant reporting and maintaining the program tracking database.
- **Program Tracking Database is Underutilized:** Currently, the project tracking database for the Residential Retrofit Program is very limited in detail. Projects are not tracked because of the staffing constraints discussed above, as well as due to the limited functionality of the database. When Residential Retrofit Program projects are entered into the database, they are entered at the level of the grant recipient, which may include projects completed at multiple locations with differing measures. Moreover, the database contains fields that are arranged by class of measure, for example "Efficient Electric Water Heater." Staff can enter the quantity of units entered for this category but the database does not allow staff to enter the specifications for the measure. Because program participants may install measures that exceed the specifications in the program guidelines and measures may not meet the guidelines in special circumstances, the technical specifications of the measure cannot be inferred from the quantity. Although program staff are able to enter additional notes describing the measures implemented the level of detail provided varies by project.
- **Limited Marketing Activity:** Few resources are dedicated towards marketing the Residential Retrofit Program and the program primarily relies upon repeat participation to drive program activity. However, plans are in development to further promote the program. In particular, the Illinois Housing Development Authority (IHDA), a state financing agency that has previously partnered with DCEO, will have a greater role in the coming program years. While more closely aligned with the Affordable Housing New Construction Program, IHDA will also be a pipeline for upcoming Residential Retrofit Projects. Program staff indicated that the Governor's office is promoting more cooperation between the agencies because IHDA has an established channel of program partners who serve low income communities with the potential to benefit from the EEPS funds and contribute to further program energy savings.

4. Conclusions and Recommendations

Interviews and surveys were conducted with grant recipients and residents to better understand the effectiveness of program delivery. Both agree that from the participant perspective, the program is effective and operating smoothly. However, review of program documentation and in-depth interviews with program staff indicate that there are aspects of the program that could be improved to increase awareness, improve department administration and project tracking, and better align reporting requirements with the informational needs for assessing savings.

4.1 Key Conclusions

The following presents a selection of key conclusions from EPY4/GPY1:

- **High Program Satisfaction:** Grant recipients reported high levels of satisfaction with the program and no recipients indicated dissatisfaction with any aspect of the program. Grant recipient satisfaction is important for future program activity because many of the participants are organizations that participated during prior years. Overall, participants noted few problems with the participation process. However, one respondent indicated that it took longer than expected to receive the final grant agreement.

  Residents who received the energy efficiency measures reported high levels of satisfaction. Several residents reported that there were benefits to the energy efficiency improvements such as increased ability to pay utility bills, increased value of their home, and improved home comfort. Although the majority of residents were satisfied with the improvements that were implemented, about one-quarter of the residents noted issues with some aspects of the improvements. Specifically, these respondents noted problems with the installation, dislike of the new equipment, and equipment malfunction. Despite these concerns, 86% of the respondents reported that they were satisfied with the energy efficiency improvements.

- **Program Staffing may be Insufficient:** The Residential Retrofit Program has faced challenges in maintaining sufficient staffing to administer the program. Despite these challenges, program participants were generally satisfied with the program. This suggests that with limited resources, staff are able to provide adequate assistance to participants. However, maintenance of documentation and program tracking data has suffered from the limitation in administrative resources. To address the staffing limitation, two additional part-time employees were recently added to assist with the program's administration. Given the administrative requirements of the program, additional staffing may be needed.

- **Project Tracking and Documentation in Need of Improvement:** Project information has not been systematically tracked and organized. Few of the grants provided through the program were entered into the DCEO project tracking database. Program staff maintained tracking of program activity in spreadsheets that provided high level

summaries implemented measure quantities, but provided limited information on the technical aspects of the projects.

- **Limited Program Marketing:** The Low Income Residential Retrofit relies upon repeat participation by external organizations and other DCEO programs. Although few staff resources are spent on marketing and promotion, recent changes may help further promote the program. The program has expanded its partnership with the Illinois Housing Development Authority, a state financing agency, to provide an additional pipeline to the program for prospective participants.

- **Verification Procedures Limited to Grant Recipient Reporting:** Site visits to verify measure installation are not performed for the projects implemented by the external organizations. Verification of project implementation is limited to review of invoices and reports submitted by external organizations.

4.2 Program Recommendations

While the program has maintained participant satisfaction and delivered energy efficiency improvements to low income residents, there are aspects of the program that could be improved. The following recommendations are offered for consideration.

- **Track Additional Project Information:** The Low Income Residential Retrofit Program maintains limited tracking data. Ideally, comprehensive tracking data would provide the following: (1) the measures installed, including quantities and technical specifications such as the wattage of bulbs, R-value of insulation, and size and Seasonal Energy Efficiency Ratio (SEER) ratings of air conditioners; (2) the date of implementation; (3) the location of the implementation; (4) the estimated measure energy savings; (5) resident contact information; (6) contractor information if utilized;(7) the baseline equipment or building conditions; and (8) the utility account numbers associated with the implementation address.

- **Provide a Report Template for Program Participants to Report Measure Specifications:** A review of project documentation found that information provided by program participants regarding the implemented measures was not consistently reported. In order to support reporting of this information, program staff should consider providing a reporting template for each measure type that collects the appropriate level of detail. The data captured by the reporting template should be included in DCEO's Energy Efficiency Portfolio Standard (EEPS) database.

- **Perform Verifications at Limited Number of Sites:** Currently the program is not performing site visits for projects completed through the program. Although program activity is limited, staff should consider performing verification inspections for a sample of sites in order to document the quality of the work performed and to verify measure installation.

- **Continue to Invest in Strong Partnerships:** Program staff indicated that marketing resources are limited at this time. Program partners such the University of Illinois School of Architecture, the Smart Energy Design Assistance Center, the Illinois Housing Authority, the Bureau of Community Development, and the Bureau of Energy Assistance possess established marketing channels that can continue to drive program demand. As the program matures, DCEO will be able to attract more participants and increase program savings.

Appendix A: Questionnaire for Decision Maker Survey

1. Name of Participant's Organization

2. Your name (please correct if necessary)

3. What was your role in the decision implement the energy efficiency projects completed through the Residential Retrofit Program?

( ) Main decision maker
( ) Assisted with the decision to implement the measure
( ) Was not part of the decision process (If Checked, go to 3A)

3A. Who was the main decision maker?

3B. What is this person's telephone number?

3C. What is this person's email address?

4. What are the main sources your organization relies on for information about energy efficient equipment, materials, practices and design features? (Check all that apply)

( ) A DCEO Representative
( ) The DCEO Website
( ) Utility representatives
( ) Brochures or advertisements
( ) Trade associations or business groups you belong to
( ) Trade journals or magazines
( ) Friends and colleagues
( ) Representatives of the Smart Energy Design Assistance Center (SEDAC)
( ) Representatives of the Energy Resource Center (ERC)
( ) Architects, engineers or energy consultants
( ) Equipment vendors or building contractors
( ) City or county planning departments
( ) Illinois Housing Development Authority
( ) Illinois Habitat for Humanity
( ) US Department of Housing and Urban Development
( ) Other (please specify)

5. What barriers does your organization face in making energy efficiency improvements to low income housing? *(Select all that apply)*

( ) High initial cost of efficient equipment or design features
( ) Lack of knowledge of energy efficient equipment or design features
( ) Lack of interest among prospective residents in energy efficient housing
( ) Don't know
( ) Other (please describe)

6. Which of the following policies or procedures does your organization have in place regarding energy efficiency for low income housing? *(Check all that apply)*

( ) An energy management plan (If checked, go to 6A)
( ) A designated staff member responsible for energy tracking and energy efficiency
( ) Policies that incorporate energy efficiency in operations and procurement
( ) Active training of staff
( ) Other (please specify)
( ) None

6A. Does your energy management plan have energy efficiency goals?

( ) Yes
( ) No
( ) Don't know

6C. What are the goals of your energy management plan?

7. How important are grant payments to your decision making regarding energy efficiency improvements for low income housing?

( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not important at all
( ) Don't know

8. How important is past experience with energy efficient equipment or practices for your decision making regarding energy efficiency improvements low income housing?

( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not important at all
( ) Don't know

9. How important is advice and/or recommendations received from for your decision making regarding energy efficiency improvements low income housing?

( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not important at all
( ) Don't know

10. For the project(s) completed through the program, do the residents pay the utility bills?

( ) Residents pay electrical bills
( ) Residents pay gas bills
( ) Residents pay gas and electric bills
( ) Some residents pay their gas and electric bills, but some do not
( ) Don't know

( ) Other (please specify)

11. Why did you decide to undertake the energy efficiency project(s) completed through the program? (select all that apply)

( ) To save money on operational costs of the building
( ) To help residents save money on their utility bills
( ) To improve the comfort of the building for its residents
( ) To qualify for financing opportunities
( ) To help save energy because of environmental concerns
( ) Other (please specify)

12. Which financial methods does your organization typically use to evaluate energy efficiency investments in low income housing? (Select all that apply)

( ) Initial Cost
( ) Simple payback (If checked, go to 12A)
( ) Internal rate of return (If checked, go to 12B)
( ) Life cycle cost (If checked, go to 12C)
( ) None of these

12A. What payback length of time do you normally require in order to proceed with an energy efficiency project? Please provide either a specific value or an estimated range.

12B. What rate of return do you normally require in order to proceed with an energy efficiency project? Please provide either a specific value or an estimated range.

12C. What discount rate do you normally apply when determining life cycle costs? Please provide either a specific value or an estimated range.

13. Has your organization implemented any low income energy efficiency projects in the last three years for which you did not apply for a financial incentive or grant through an energy efficiency program?

( ) Yes, undertook energy efficiency projects but did not apply for an incentive or grant. (If checked, go to 13A)
( ) No efficiency projects were undertaken.
( ) No, an incentive or grant was applied for. (If checked, go to 13B)
( ) Don't know

13A. Why didn't you apply for a financial incentive or grant for the project(s)?

( ) Didn't know whether project qualified for financial incentives or grants
( ) Didn't know about financial incentives or grants until after project was completed
( ) Didn't have time to complete paperwork for financial incentive or grant application
( ) Too much paperwork for the financial incentive or grant application
( ) Financial incentive or grant was insufficient
( ) Other (please specify)

13B. Did you receive all of your incentives for these past energy efficiency projects?

( ) Yes
( ) No
( ) Don't know

14. How did you learn of the Residential Retrofit Program? (Select all that apply)
( ) From a representative of the Residential Retrofit Program
( ) A DCEO representative mentioned it
( ) The DCEO Website
( ) From a utility representative
( ) Brochures or advertisements
( ) Trade association or business group you belong to
( ) Trade journal or magazine
( ) Friend or colleague
( ) From a representative of Smart Energy Design Assistance Center (SEDAC) or a SEDAC Service Provider
( ) From a representative of the Energy Resource Center (ERC)
( ) An architect, engineer or energy consultant
( ) Equipment vendor or building contractor
( ) Attended a conference workshop or seminar
( ) Past experience with the program
( ) An energy service company
( ) US Department of Housing and Urban Development Authority
( ) Illinois Housing Development Authority
( ) Illinois Habitat for Humanity
( ) Other (please describe)

15. When did you learn of the Residential Retrofit Program?
( ) Before planning the project
( ) During the project planning and concept phase
( ) Once the project was begun but before it was finished
( ) After the project was finished
( ) Some other time (please describe)
( ) Don't know

16. Before participating in the Residential Retrofit Program, had your organization completed any low income energy efficiency projects?
( ) Yes
( ) No
( ) Don't know

17. For the energy efficiency project(s) completed through the Residential Retrofit Program, did you have plans for these projects prior to participating in the program?
( ) Yes (If checked, go to 17A)
( ) No
( ) Don't know

17A. For about how long did you have these plans prior to finding out about the Residential Retrofit Program?

( ) Less than 6 months before
( ) 6-12 months before
( ) 1-2 years before
( ) 3-5 years before
( ) More than 5 years before
( ) Don't know

17B. Did your plans specify which energy efficiency measures you were going to implement?

( ) Yes
( ) No

17C. Would you have gone ahead with the energy efficiency projects even if you had not participated in the program?

( ) Yes
( ) No

18. Did you have experience with DCEO energy efficiency programs prior to participating in the Residential Retrofit Program?

( ) Yes(If checked, go to 18A)
( ) No

18A. How important was previous experience with the DCEO programs in making your decision to install the energy efficiency measures?

( ) Very important
( ) Somewhat important
( ) Only slightly important
( ) Not at all important
( ) Don't know

19. Did a representative of the Residential Retrofit Program recommend that you implement the energy efficient equipment or design features?

( ) Yes (If checked, go to 20A)
( ) No
( ) Don't know

19A. If the Residential Retrofit Program representative had not recommended these energy efficiency measures, how likely is it that you would have installed them anyway?

( ) Definitely would have
( ) Probably would have
( ) Probably would not have
( ) Definitely would not have
( ) Don't know

20. Did a representative of the Smart Energy Design Assistance Center (SEDAC) or a SEDAC Service Provider recommend that you implement the energy efficient equipment or design features?

( ) Yes (If checked, go to 20A)
( ) No
( ) Don't know

20A. If the SEDAC representative had not recommended these energy efficiency measures, how likely is it that you would have installed them anyway?

( ) Definitely would have installed
( ) Probably would have installed
( ) Probably would not have installed
( ) Definitely would not have installed
( ) Don't know

21. Would your organization have been financially able to complete the energy efficiency project(s) without the grant from the Residential Retrofit Program?

( ) Yes
( ) No

22. If the grant from the Residential Retrofit Program had not been available, how likely is it that you would have made the energy efficiency improvements anyway?

( ) Definitely would have
( ) Probably would have
( ) Probably would not have
( ) Definitely would not have
( ) Don't know

23. How did the availability of information and grant payments through the Residential Retrofit Program affect the quantity (or number of units) of energy efficient equipment or design features that you implemented in the project(s)? Did you implement more energy efficient equipment or design features than you otherwise would have without the program?

( ) Yes (If checked, go to 23A)
( ) No, program did not affect quantity of improvements implemented.

23A. What additional equipment or design features did you implement?

24. How did the availability of information and grant payments through the Residential Retrofit Program affect the level of energy efficiency of the equipment or design features you implemented? Did you choose equipment or design features that were more energy efficient than you otherwise would have chosen because of the program?

24A. How much more efficient was the equipment or design features that you installed (i.e., "xx% more efficient")?

25. How did the availability of information and grant payments through the Residential Retrofit Program affect the timing of the energy efficiency project(s)? Did you complete the projects earlier than you otherwise would have without the program?

( ) Yes (If checked, go to 25A)
( ) No, program did not affect the timing of the project.

25A. When would you have otherwise completed the projects?

( ) Less than 6 months before
( ) 6-12 months before
( ) 1-2 years before
( ) 3-5 years before
( ) More than 5 years before
( ) Don't know

26. Did you have any problems with the application process?

( ) Yes
( ) No
( ) Don't know

26A. What problems did you have?

27. Did the implementation of the efficiency measures go smoothly?

( ) Yes
( ) For the most part (If checked, go to 27A)
( ) No (If checked, go to 27A)
( ) Don't know

27A. Please explain in what ways the implementation did not go smoothly.

28. Did the energy efficiency measures you adopted for this project meet your expectations?

( ) My expectations were exceeded
( ) My expectations were met
( ) My expectations were mostly met (If checked, go to 28A)
( ) My expectations were not met (If checked, go to 28A)
( ) Don't know

28A. Please explain in what ways the energy efficiency improvements did not meet your expectations.

29. Do you feel you got a quality installation of the energy efficiency measures?

( ) Yes
( ) For the most part (If checked, go to 29A)
( ) No (If checked, go to 29A)
( ) Don't know

29A. Please explain in what ways you do not feel the service provider did a good job.

30. Did the grant agreement that you received meet your expectations?
( ) Yes
( ) No
( ) Don't know

32A. Please explain in what ways the grant you received did not meet your expectations.

31. Did anyone from the program or other DCEO representative do a pre-inspection at the site?
( ) Yes
( ) No
( ) Don't know

33A. Who performed the inspection?

33B. What did the pre-inspection consist of?

33C. Did anything change in the project design as a result of the pre-inspection?
( ) Yes
( ) No
( ) Don't know

33D. Please explain the changes that were made to the project as a result of the pre-inspection.

32. Did anyone from the program or other DCEO representative do a post-inspection at the site?
( ) Yes
( ) No
( ) Don't know

34A. Who performed the inspection?

34B. What did the pre-inspection consist of?

34C. Did anything change in the grant amount as a result of the post-inspection?
( ) Yes
( ) No
( ) Don't know

34D. Please explain how the grant amount changed as a result of the post-inspection.

33. Were there any issues receiving the grant payments?
( ) Yes
( ) No

( ) Don’t know

35A. Please describe the issues you had receiving the grant payments.

34. Was the grant amount what you expected?
( ) Yes
( ) No
( ) Don’t know

35A. Please explain how the grant payment was different from what you expected.

35. Since participating in Residential Retrofit Program, have you implemented any additional energy efficient equipment or design features similar to those you implemented through the program that you did not apply or receive an incentive or grant for?
( ) Yes (If checked, go to 32A-32G)
( ) No
( ) Don't know

37A. Did the additional energy efficient equipment or design features result in the same or higher level of efficiency improvement as the measures implemented through the program?
( ) Yes
( ) No
( ) Don't know

37B. Was this additional equipment or design features implemented at the same site(s) as the project(s) completed through the program?
( ) Yes
( ) No; Where were the improvements made? (please specify)
( ) Don’t know

37C. Did a recommendation from a program staff member or contractor influence your decision to implement the additional equipment or design features?
( ) Yes (If checked, go to 37C.1
( ) No
( ) Don't know

37C.1. How important was this recommendation to your decision to implement the additional energy efficiency improvements?
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don’t know

37D. How important was your experience with the program or the efficiency measures to your decision to implement the additional equipment or design features?

( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don't know

37E. How important was any past experience with energy efficiency programs to your decision to implement the additional efficiency improvements?

( ) Did not participate in any other programs in the past
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don't know

37F. Why didn't you apply for or receive financial incentives or grants for the additional equipment or design features? (Check all that apply)

( ) Didn't know whether the improvements qualified for financial incentives
( ) Financial incentive was insufficient
( ) No financial incentive was offered
( ) Too much paperwork for the financial incentive application
( ) For some other reason (please specify)

36. Since participating in the program, have you implemented any other energy efficiency improvements that were not similar to what you implemented through the program and that you did not apply or receive an incentive or grant for?

( ) Yes (If checked, go to 33A-33G)
( ) No
( ) Don't know

38. What energy efficiency equipment or design features did you implement?

38B. Was this additional equipment or design features implemented at the same site(s) as the project that you completed through the program?

( ) Yes
( ) No; Where was the equipment installed? (please specify)
( ) Don't know

38C. Did a recommendation from a program staff member or contractor influence your decision to implement the additional measures?

( ) Yes (If checked, go to 33D.1)
( ) No

( ) Don't know

38D.1 How important was this recommendation to your decision to implement the additional equipment or design features?

( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant

38E. How important was your experience with the program or the efficiency measures to your decision to implement the additional equipment or design features?

( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don’t know

38F. How important was your participation in any past programs offered by the DCEO in your decision to implement the additional equipment or design features?

( ) Did not participate in any other programs in the past
( ) Very important
( ) Somewhat important
( ) Neither important or unimportant
( ) Somewhat unimportant
( ) Unimportant
( ) Don’t know

38G. Why didn't you apply for or receive financial incentives or a grant for the additional equipment or design features? (Select all that apply) (Check all that apply)

( ) Didn’t know about financial incentives
( ) Didn’t know whether the measures qualified for financial incentives
( ) Financial incentive was insufficient
( ) No financial incentive was offered
( ) Too much paperwork for the financial incentive application
( ) For some other reason (please specify)

37. How would you rate your satisfaction with the following - *Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied*? *(If dissatisfied, go to 34A)*

- Performance of the equipment installed
- Savings on your monthly bill
- Grant amount

- The effort required for the application process
- Quality of the work conducted by your contractor
- Information proved by DCEO
- The elapsed time until you received the grant payment
- Overall program experience

39A. Please describe in what ways you were not satisfied with the program.

38. Do you have any other comments that you would like to relay to DCEO about energy efficiency in public entities or about their programs?

Appendix B: Decision Maker Survey Responses

As part of the evaluation work effort, a survey was conducted for a sample of decision makers associated with projects implemented under the Low Income Residential Retrofit Program. Each participant was surveyed using the survey instrument provided in Appendix A.

The following tabulations summarize the survey responses. Two columns of data are presented. The first column presents the number of survey respondents *(n)*. The second column presents the percentage of survey respondents.

	Response	*(n=3)*	*Percent of Respondents*
3. What was your role in the decision making process to implement the energy efficiency project(s)?	Main decision maker	2	67%
	Assisted with the decision to implement the project(s)	1	33%
	Was not part of the decision process	0	0%

	Response	*(n=3)*	*Percent of Respondents**
4. What are the sources your organization relies on for information about energy efficient equipment, materials and design features? (Select all that apply)	DCEO Representatives	1	33%
	The DCEO Website	2	67%
	Utility representatives	1	33%
	Brochures or advertisements	0	0%
	Trade associations or business groups you belong to	2	67%
	Trade journals or magazines	1	33%
	Friends and colleagues	3	100%
	Representatives of the Smart Energy Design Assistance Center (SEDAC)	1	33%
	Representatives of the Energy Resource Center (ERC)	1	33%
	Architects, engineers or energy consultants	2	67%
	Equipment vendors or building contractors	2	67%
	City or county planning departments	2	67%
	Illinois Housing Development Authority	1	33%
	Illinois Habitat for Humanity	0	0%
	U.S. Department of Housing and Urban Development	2	67%
	Other (please describe)	2	67%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=3)*	*Percent of Respondents**
5. What barriers does your organization face in making energy efficiency improvements to low income housing?	High initial cost of efficient equipment or design features	3	100%
	Lack of knowledge of energy efficient equipment or design features	1	33%
	Lack of interest among prospective residents in energy efficient housing	1	33%
	Don't know	0	0%
	Other (please describe)	3	100%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=3)*	*Percent of Respondents**
6. Which of the following policies or procedures does your organization have in place regarding energy efficiency for low income housing?	An energy management plan	0	0%
	A staff member responsible for energy and energy efficiency	3	100%
	Policies that incorporate energy efficiency in operations and procurement	3	100%
	Active training of staff	3	100%
	Do not have policies or procedures for energy efficiency improvements	0	0%
	Other	0	0%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=0)*	*Percent of Respondents*
6a. Does your energy management plan have energy efficiency goals?	Yes	0	0%
	No	0	0%
	Don't Know	0	0%

	Response	*(n=3)*	*Percent of Respondents*
7. How important are incentive or grant payments from the DCEO for your decision making regarding energy efficiency improvements for low income housing?	Very Important	3	100%
	Somewhat Important	0	0%
	Only Slightly Important	0	0%
	Not Important At All	0	0%
	Don't Know	0	0%

	Response	*(n=3)*	*Percent of Respondents*
8. How important is past experience with energy efficient equipment or design features to your decision making regarding energy efficiency improvements for low income housing?	Very Important	3	100%
	Somewhat Important	0	0%
	Only Slightly Important	0	0%
	Not Important At All	0	0%
	Don't Know	0	0%

	Response	*(n=3)*	*Percent of Respondents*
9. How important is advice and/or recommendations received from the DCEO to your decision making regarding energy efficiency improvements for low income housing?	Very Important	0	0%
	Somewhat Important	3	100%
	Only Slightly Important	0	0%
	Not Important At All	0	0%
	Don't Know	0	0%

	Response	*(n=3)*	*Percent of Respondents*
10. For the project(s) completed through the Residential Retrofit Program, do the residents pay the utility bills?	Residents pay electrical bill	0	0%
	Residents pay gas bill	1	33%
	Residents pay gas and electric bill	1	33%
	Residents do not pay the gas and electric bills	0	0%
	Some residents pay their gas and electric bills, but some do not	1	33%
	Don't know	0	0%
	Other (please specify)	0	0%

	Response	*(n=3)*	*Percent of Respondents**
11. Why did you decide to undertake the energy efficiency project(s) completed through the Residential Retrofit Program? (Select all that apply)	To save money on operational costs of the building	1	33%
	To help residents save money on their utility bills	3	100%
	To improve the comfort of the building for its residents	2	67%
	To qualify for financing opportunities	2	67%
	To help save energy because of environmental concerns	3	100%
	Other (please specify)	2	67%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=3)*	*Percent of Respondents**
12. Which financial methods does your organization typically use to evaluate energy efficiency investments in low income housing? (Select all that apply)	Initial cost	1	33%
	Simple payback	2	67%
	Internal rate of return	0	0%
	Life cycle cost	1	33%
	We do not use financial methods to evaluate efficiency investments for low income housing	1	33%
	Other (please specify)	1	33%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	(n=1)	
12a. What payback length of time do you require to proceed with an energy efficiency project? Please provide either a specific value or an estimated range.	Average (Years)	4.0

	(n=0)	
12b. What rate of return do you require to proceed with an energy efficiency project? Please provide either a specific value or an estimated range.	Average (return on investment)	0%

12c. What discount rate do you apply when determining life cycle costs? Please provide either a specific value or an estimated range.	*(n=0)*	
	Average (discount rate)	0%

13. Has your organization implemented any low income energy efficiency projects in the last three years for which you did not apply for a financial incentive or grant through an energy efficiency program?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes, undertook energy efficiency projects but did not apply for incentive	0	0%
	No energy efficiency projects were undertaken	0	0%
	No, an incentive was applied for	2	67%
	Don't know	1	33%

13a. Why didn't you apply for a financial incentive or grant for the project(s)?	*Response*	*(n=0)*	*Percent of Respondents*
	Didn't know whether project qualified for financial incentives or grants	0	0%
	Didn't know about financial incentives or grants until after project was completed	0	0%
	Didn't have time to complete paperwork for financial incentive or grant application	0	0%
	Too much paperwork for the financial incentive or grant application	0	0%
	Financial incentive or grant was insufficient	0	0%
	Other (please specify)	0	0%

13b. Did you receive all of your incentives or grant payments for these past energy efficient projects?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	1	50%
	Don't know	0	0%

	Response	*(n=3)*	*Percent of Respondents**
14. How did you learn of the Residential Retrofit Program?	From a representative of the Residential Retrofit Program	0	0%
	A DCEO representative mentioned it	2	67%
	The DCEO website	1	33%
	From a utility representative	0	0%
	Brochures or advertisements	0	0%
	Trade association or business group you belong to	0	0%
	Trade journal or magazine	0	0%
	Friend or colleague	1	33%
	From a representative of the Smart Energy Design Assistance Center (SEDAC)	0	0%
	From a representative of the Energy Resource Center (ERC)	0	0%
	An architect, engineer or energy consultant	0	0%
	Equipment vendor or building contractor	0	0%
	Attended a conference workshop or seminar	0	0%
	Past experience with the program	3	100%
	An energy service company	0	0%
	U.S. Department of Housing and Urban Development	0	0%
	Illinois Housing Development Authority	0	0%
	Illinois Habitat for Humanity	0	0%
	Other	0	0%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=3)*	*Percent of Respondents*
15. When did you learn of the Residential Retrofit Program?	Before planning the project	2	67%
	During the project planning and concept phase	0	0%
	Once the project was begun but before it was finished	1	33%
	After the project was finished	0	0%
	Some other time (please explain)	0	0%
	Don't know	0	0%

16. Before participating in the Residential Retrofit Program, had your organization completed any low income energy efficiency projects?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	3	100%
	No	0	0%

17. For the energy efficiency project(s) completed through the Residential Retrofit Program, did you have plans for these projects prior to participating in the program?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%
	Don't know	0	0%

17a. For about how long did you have these plans prior to finding out about the Residential Retrofit Program?	*Response*	*(n=1)*	*Percent of Respondents*
	Less than 6 months	0	0%
	6-12 months	0	0%
	1-2 years	1	100%
	3-5 years	0	0%
	More than 5 years	0	0%
	Don't know	0	0%

17b. Did your plans specify which energy efficiency measures you were going to implement?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%

17c. Would you have gone ahead with the energy efficiency project(s) if you had not participated in the program?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	1	100%

18. Did you have experience with DCEO energy efficiency programs prior to participating in the Residential Retrofit Program?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%

18a. How important was your previous experience with the DCEO energy efficiency programs to your decision to install the energy efficiency measures?	*Response*	*(n=1)*	*Percent of Respondents*
	Very important	1	100%
	Somewhat important	0	0%
	Only slightly important	0	0%
	Not at all important	0	0%
	Don't know	0	0%

19. Did a representative of the Residential Retrofit Program recommend that you implement the energy efficient equipment or design features?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%
	Don't know	0	0%

19a. If the Residential Retrofit Program representative had not recommended these energy efficiency measures, how likely is it that you would have installed them anyway?	*Response*	*(n=1)*	*Percent of Respondents*
	Definitely would have	0	0%
	Probably would have	0	0%
	Probably would not have	0	0%
	Definitely would not have	0	0%
	Don't know	1	100%

20. Did a representative of the Smart Energy Design Assistance Center (SEDAC) recommend that you implement the energy efficient equipment or design features?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	0	0%
	No	3	100%
	Don't know	0	0%

20a. If the SEDAC representative had not recommended these energy efficiency measures, how likely is it that you would have installed them anyway?	*Response*	*(n=0)*	*Percent of Respondents*
	Definitely would have installed	0	0%
	Probably would have installed	0	0%
	Probably would not have installed	0	0%
	Definitely would not have installed	0	0%
	Don't know	0	0%

21. Would your organization have been financially able to complete the energy efficiency project(s) without the grant from the Residential Retrofit Program?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%

	Response	*(n=3)*	*Percent of Respondents*
22. If the grant from the Residential Retrofit Program had not been available, how likely is it that you would have made the energy efficiency improvements anyway?	Definitely would have made the same improvements	0	0%
	Probably would have made the same improvements	1	33%
	Probably would not have made the same improvements	0	0%
	Definitely would not have made the same improvements	2	67%
	Don't know	0	0%

	Response	*(n=3)*	*Percent of Respondents*
23. How did the availability of information and grant payments through the Residential Retrofit Program affect the quantity (or number of units) of energy efficient equipment or design features that you implemented in the project(s)? Did you implement more energy efficient equipment or design features than you otherwise would have without the program?	Yes	3	100%
	No, program did not affect the quantity implemented	0	0%

	Response	*(n=2)*	*Percent of Respondents*
24. How did the availability of information and grant payments through the Residential Retrofit Program affect the level of energy efficiency of the equipment or design features you implemented? Did you choose equipment or design features that were more energy efficient than you otherwise would have chosen because of the program?	Yes	1	50%
	No, program did not affect level of efficiency	1	50%

	Response	*(n=3)*	*Percent of Respondents*
25. How did the availability of information and grant payments through the Residential Retrofit Program affect the timing of the energy efficiency project(s)? Did you complete the projects earlier than you otherwise would have without the program?	Yes	3	100%
	No, program did not affect the timing of the project.	0	0%

	Response	*(n=3)*	*Percent of Respondents*
25a. When would you otherwise have completed the project(s)?	Less than 6 months later	1	33%
	6-12 months later	0	0%
	1-2 years later	1	33%
	3-5 years later	0	0%
	More than 5 years later	1	33%

26. Did you have any problems with the application process?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	1	33%
	No	2	67%
	Don't know	0	0%

27. Did the implementation of the efficiency measures go smoothly?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	3	100%
	For the most part	0	0%
	No	0	0%
	Don't know	0	0%

28. Did the energy efficiency measures you adopted for this project meet your expectations?	*Response*	*(n=3)*	*Percent of Respondents*
	My expectations were exceeded	1	33%
	My expectations were met	2	67%
	My expectations were mostly met	0	0%
	My expectations were not met	0	0%
	Don't know	0	0%

29. Do you feel you got a quality installation of the energy efficiency measures?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	3	100%
	For the most part	0	0%
	No	0	0%
	Don't know	0	0%

30. Did the grant agreement that you received meet your expectations?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	3	100%
	No	0	0%
	Don't know	0	0%

31. Did anyone from the Residential Retrofit Program or other DCEO representative do a pre-inspection at the site(s)?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	0	0%
	No	2	67%
	Don't know	1	33%

31c. Did anything change in the project design as a result of the pre-inspection?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	0%
	No	0	0%
	Don't know	0	0%

32. Did anyone from the Residential Retrofit Program or other DCEO representative do a post-inspection at the site(s)?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	0	0%
	No	2	67%
	Don't know	1	33%

32c. Did anything change in the grant amount as a result of the post-inspection?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	0%
	No	0	0%
	Don't know	0	0%

33. Were there any issues with receiving the grant payments?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	0	0%
	No	3	100%
	Don't know	0	0%

34. Was the grant payment amount what you expected?	*Response*	*(n=3)*	*Percent of Respondents*
	Yes	3	100%
	No	0	0%
	Don't know	0	0%

35. Since participating in the Residential Retrofit Program, have you implemented any additional energy efficient equipment or design features similar to those you implemented through the program that you did not apply or receive an incentive or grant for?	*Response*	*(n=2)*	*Percent of Respondents*
	Yes	1	50%
	No	1	50%
	Don't know	0	0%

36a. Did the additional energy efficient equipment or design features result in the same or higher level of efficiency improvement as the measures implemented through the program?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No	0	0%
	Don't know	0	0%

36b. Was this additional equipment or design features implemented at the same site(s) as the project(s) completed through the program?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	1	100%
	No (where was the equipment or design feature installed?)	0	0%
	Don't know	0	0%

36c. Did a recommendation from a program staff member or contractor influence your decision to implement the additional equipment or design features?	*Response*	*(n=1)*	*Percent of Respondents*
	Yes	0	0%
	No	1	100%
	Don't know	0	0%

36c1. How important was the recommendation to your decision to implement the additional equipment or design features?	*Response*	*(n=0)*	*Percent of Respondents*
	Important	0	0%
	Somewhat Important	0	0%
	Neither Important nor Unimportant	0	0%
	Somewhat Unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

36d. How important was your experience with the program or the efficiency measures to your decision to implement the additional equipment or design features?	*Response*	*(n=1)*	*Percent of Respondents*
	Important	0	0%
	Somewhat Important	1	100%
	Neither Important nor Unimportant	0	0%
	Somewhat Unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

36e. How important was your participation in any past programs offered by the DCEO to your decision to implement the additional equipment or design features?	*Response*	*(n=1)*	*Percent of Respondents*
	Important	1	100%
	Somewhat Important	0	0%
	Neither Important nor Unimportant	0	0%
	Somewhat Unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

	Response	*(n=0)*	*Percent of Respondents*
37e. How important was your experience with the program or the efficiency measures to your decision to implement the additional equipment or design features?	Important	0	0%
	Somewhat Important	0	0%
	Neither Important nor Unimportant	0	0%
	Somewhat Unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

	Response	*(n=0)*	*Percent of Respondents*
37f. How important was your participation in any past programs offered by the DCEO in your decision to implement the additional equipment or design features?	Important	0	0%
	Somewhat Important	0	0%
	Neither Important nor Unimportant	0	0%
	Somewhat Unimportant	0	0%
	Unimportant	0	0%
	Don't know	0	0%

	Response	*(n=0)*	** Percent of Respondents*
37g. Why didn't you apply for or receive financial incentives or a grant for the additional equipment or design features? (Select all that apply)	Didn't know about financial incentives or grants	0	0%
	Didn't know whether the measures qualified for financial incentives or grants	0	0%
	Financial incentive or grant was insufficient	0	0%
	No financial incentive or grant was offered	0	0%
	Too much paperwork for the financial incentive or grant application	0	0%
	For some other reason (please describe)	0	0%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=3)*	*Percent of Respondents**
38a. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the performance of the equipment installed?	5	2	67%
	4	1	33%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		*4.7*

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=3)*	*Percent of Respondents**
38b. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the savings on your monthly bill?	5	1	33%
	4	0	0%
	3	1	33%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	1	33%
	Average		*4.0*

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=3)*	*Percent of Respondents**
38c. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the grant amount?	5	1	33%
	4	1	33%
	3	1	33%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		*4.0*

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=3)*	*Percent of Respondents**
38d. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the effort required for the application process?	5	2	67%
	4	1	33%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		*4.7*

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=3)*	*Percent of Respondents**
38e. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the quality of the work conducted by your contractor?	5	2	67%
	4	1	33%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		*4.7*

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=3)*	*Percent of Respondents**
38f. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the information provided by DCEO?	5	1	33%
	4	2	67%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		*4.3*

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=3)*	*Percent of Respondents**
38g. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the elapsed time until you received the grant payment?	5	1	33%
	4	1	33%
	3	1	33%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		*4.0*

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=3)*	*Percent of Respondents**
38h. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the overall program experience?	5	1	33%
	4	2	67%
	3	0	0%
	2	0	0%
	1	0	0%
	Don't know / Not applicable	0	0%
	Average		*4.3*

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

Appendix C: Questionnaire for Residents

1. Overall, how satisfied were you with the energy efficiency improvements made to your residence?
   ( ) Very satisfied
   ( ) Somewhat satisfied
   ( ) Neither satisfied nor dissatisfied
   ( ) Somewhat unsatisfied
   ( ) Very unsatisfied
   ( ) Don't know

2. Have you removed or replaced any of the energy efficiency improvements that were installed in your home?
   ( ) Yes
   ( ) No (If Checked, go to 2A)
   ( ) Don't know

2A. What did you remove?

3. Would you say that the energy efficiency improvements made to your home have made it:
   ( ) More comfortable to live in
   ( ) Just as comfortable as before the improvements were made
   ( ) Less comfortable to live in
   ( ) Don't know

4. Do you pay the utility bill or a portion of the utility bill for your home?
   ( ) Yes (If Checked, go to 4A)
   ( ) No
   ( ) Don't know

4A. Would you say that the energy efficiency improvements made to your home have made your utility bills:
   ( ) More affordable
   ( ) About the same
   ( ) Less affordable
   ( ) Don't know

5. What are the biggest benefits you have seen since the work was done on your home? (Please mark as many as apply)
   ( ) The home feels more comfortable
   ( ) There is less noise from the outside
   ( ) There is less noise from the appliances
   ( ) There have been health improvements
   ( ) The home is safer
   ( ) The appliances and heating or cooling equipment are more reliable

( ) No benefits
( ) Other (Please describe)_____
( ) Don't know

6. Is there anything that you don't like about the energy efficiency improvements?

7. Do you own your home?
( ) Yes (If Checked, go to 7A)
( ) No
( ) Don't know

7A. Do you think that the work that was done on your home has increased, decreased, or not changed the value of your home?
( ) Value has increased
( ) Value has decreased
( ) No change
( ) Don't know

8. How would you rate your level of awareness about the advantages of energy efficiency since the improvements were made to your home?
( ) More aware
( ) About the same
( ) Less aware
( ) Don't know

9. Have you shared your experience or informed someone else about your experience with the energy efficiency improvements?
( ) Yes (If Checked, go to 9A)
( ) No
( ) Don't know

9A. Was it a positive or negative experience that you shared?
( ) I shared that I had a positive experience
( ) I shared that I had a negative experience
( ) Don't know

10. For each of the following, please indicate if you were *Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied*.

- The quality of installation work
- The performance of the equipment installed
- The savings on your monthly utility bills
- The level of professionalism & service provided by the contractor
- The level of professionalism & service provided by the program staff

11. Do you have any other comments that you would like to relay to the program staff about energy efficiency in residences or about these programs in general?

Appendix D: Resident Survey Responses

	Response	*(n=173)*	*Percent of Respondents*
1. Overall, how satisfied were you with the energy efficiency improvements made to your residence?	Very satisfied	112	65%
	Somewhat satisfied	37	21%
	Neither satisfied nor dissatisfied	3	2%
	Somewhat unsatisfied	14	8%
	Very unsatisfied	5	3%
	Don't know	2	1%

	Response	*(n=172)*	*Percent of Respondents*
2. Have you removed or replaced any of the energy efficiency improvements that were installed in your home?	Yes	12	7%
	No	158	92%
	Don't know	2	1%

	Response	*(n=173)*	*Percent of Respondents*
3. Would you say that the energy efficiency improvements made to your home have made it:	More comfortable to live in	118	68%
	Just as comfortable as before the improvements were made	44	25%
	Less comfortable to live in	5	3%
	Don't know	6	3%

	Response	*(n=171)*	*Percent of Respondents*
4. Do you pay the utility bill or a portion of the utility bill for your home?	Yes	168	98%
	No	3	2%
	Don't know	0	0%

	Response	*(n=163)*	*Percent of Respondents*
4a. Would you say that the energy efficiency improvements made to your home have made your utility bills:	More affordable	81	50%
	About the same	69	42%
	Less affordable	6	4%
	Don't know	7	4%

	Response	*(n=164)*	*Percent of Respondents**
5. What are the biggest benefits you have seen since the work was done on your home?	The home feels more comfortable	80	49%
	There is less noise from the outside	41	25%
	There is less noise from the appliances	26	16%
	There have been health improvements	16	10%
	The home is safer	26	16%
	The appliances and heating or cooling equipment are more reliable	74	45%
	No benefits	17	10%
	Other (please describe)	29	18%
	Don't know	7	4%

**Since respondents were able to select more than one response, the sum of the percentages in the table above can exceed 100%.*

	Response	*(n=171)*	*Percent of Respondents*
7. Do you own your home?	Yes	152	89%
	No	15	9%
	Don't know	4	2%

	Response	*(n=143)*	*Percent of Respondents*
7a. Do you think that the work that was done on your home has increased, decreased, or not changed the value of your home?	Value has increased	61	43%
	Value has decreased	2	1%
	No change	61	43%
	Don't know	19	13%

	Response	*(n=166)*	*Percent of Respondents*
8. How would you rate your level of awareness about the advantages of energy efficiency since the improvements were made to your home?	More aware	110	66%
	About the same	51	31%
	Less aware	1	1%
	Don't know	4	2%

9. Have you shared your experience or informed someone else about your experience with the energy efficiency improvements?	*Response*	*(n=171)*	*Percent of Respondents*
	Yes	129	75%
	No	42	25%
	Don't know	0	0%

9a. Was it a positive or negative experience that you shared?	*Response*	*(n=129)*	*Percent of Respondents*
	I shared that I had a positive experience	115	89%
	I shared that I had a negative experience	13	10%
	Don't know	1	1%

10a. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the quality of installation work?	*Response*	*(n=171)*	*Percent of Respondents**
	5	108	63%
	4	40	23%
	3	5	3%
	2	8	5%
	1	6	4%
	Don't know	4	2%
	Average		4.4

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

10b. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the performance of the equipment installed?	*Response*	*(n=169)*	*Percent of Respondents**
	5	119	70%
	4	27	16%
	3	7	4%
	2	5	3%
	1	3	2%
	Don't know	8	5%
	Average		4.6

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=170)*	*Percent of Respondents**
10c. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the savings on your monthly utility bills?	5	73	43%
	4	38	22%
	3	16	9%
	2	9	5%
	1	11	6%
	Don't know	23	14%
	Average		4.0

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=172)*	*Percent of Respondents**
10d. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the level of professionalism & service provided by the contractor?	5	119	69%
	4	24	14%
	3	3	2%
	2	13	8%
	1	7	4%
	Don't know	6	3%
	Average		4.4

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*

	Response	*(n=167)*	*Percent of Respondents**
10e. On a scale of 1 to 5, where "5" is very satisfied and "1" is very unsatisfied, how satisfied are you with the level of professionalism & service provided by the program staff?	5	126	75%
	4	28	17%
	3	2	1%
	2	1	1%
	1	2	1%
	Don't know	8	5%
	Average		4.7

**Each response was assigned a numerical value from one to five (5=Very Satisfied, 4=Satisfied, 3=Neither Satisfied nor Dissatisfied, 2=Dissatisfied, 1=Very Dissatisfied)*