Evaluation of
Low Income Residential Retrofit Program

June 2012 through May 2013

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 five and natural gas program year two (EPY5/GPY2) of the Low Income Residential Retrofit Program offered by the Illinois Department of Commerce and Economic Opportunity (DCEO). EPY5/GPY2 is defined as the period June 2012 through May 2013.

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 net energy savings of the Residential Retrofit Program during the period June 2012 through May 2013 are summarized by program component in Table ES-1 and by utility in Table ES-2. During this period, realized net energy savings were 4,025,972 kWh, and net peak demand reductions were 2,464.25 kW.

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

Program Component	*Electric Utility*	*Realized Net kWh Savings**	*Realized Net kW Savings**
Weatherization	Ameren	787,645	82.01
	ComEd	802,351	82.98
CDAP	Ameren	34,693	10.26
CNT	ComEd	1,342,883	1,425.45
HCBA	ComEd	681,831	730.19
LCRDC	ComEd	6,462	1.31
Mercy Housing	ComEd	22,429	3.37
TCB	ComEd	50,496	15.40
Hispanic Housing	Ameren	80,343	67.21
	ComEd	216,841	46.06
Total		4,025,972	2,464.25

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

Table ES-2 Summary of kWh Savings for Residential Retrofit Program by Utility

Electric Utility	*Realized Net kWh Savings**	*Realized Net kW Savings**
Ameren	902,680	159.49
ComEd	3,123,292	2,304.76
Total	4,025,972	2,464.25

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

The realized net natural gas savings of the Residential Retrofit Program during the period June 2012 through May 2013 are summarized by program component in Table ES-3 and by utility in Table ES-4. During this period, realized net natural gas savings were 672,618 therms.

Table ES-3 Summary of Therm Savings for Residential Retrofit Program by Program Component

Program Component	*Gas Utility*	*Realized Net Therms Savings**
Weatherization	Ameren	86,986
	Nicor	57,175
	North Shore	3,179
	Peoples	31,794
CDAP	Ameren	9,488
CNT	Nicor	172,480
	North Shore	24,887
	Peoples	286,628
Total		672,618

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

Table ES-4 Summary of Therm Savings for Residential Retrofit Program by Utility

Gas Utility	*Realized Net Therms Savings**
Ameren	96,474
Nicor	229,655
North Shore	28,067
Peoples	318,421
Total	672,618

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

Interviews were conducted with grant recipients and residents to better understand the effectiveness of program delivery. From the participant perspective, the program is generally 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 EPY5/GPY2:

- **High Program Satisfaction Among Grantees and Residents:** In general, both grantees and residents were satisfied with the program. Grantees indicated that the program process was streamlined and that the documentation and reporting requirements were transparent. The reimbursement process was prompt and the payment arrived in a timely manner. Grantees were also pleased with the DCEO staff who they described as communicative and knowledgeable. Residents of the housing where the efficiency measures were implemented were also satisfied with the efficiency improvements and the implementation process. They were most satisfied with the level of professionalism and service provided by the program staff, the quality of installation work, and the level of professionalism and service provided by the contractor. The residents were also very satisfied with the equipment itself. Respondents reported that the energy efficiency improvements resulted in financial, comfort, and safety benefits.

- **Grant Agreements Allow for Flexibility in Measures Installed:** When grantees apply for a Residential Retrofit Program grant, they estimate the scope of work that they will accomplish at the targeted properties. In most cases the number and type of measures implemented through the program differs from what was initially planned in the grant agreement. These differences occur for several reasons including inadequate time to implement all of the planned measures or because obstacles encountered at a site prevent the cost effective installation of the planned measures. Additionally, some respondents reported that they received outside funds for specific measures so they did not pursue these measures with DCEO funding.

  Once the final project is complete, grant recipients submit final reports of the measures installed through the program to receive the grant payment. Program staff calculates the grant payment based on the final submissions.

- **Grantees Typically Utilize Internal Verification Procedures to Ensure Proper Installation:** Grant recipients typically utilize internal verification procedures to confirm the installation of the energy efficient efficiency measures funded by the Residential Retrofit Program. The procedures are used to ensure that the contractors have completed the required work properly. Additionally, other funding organizations, such as banks, typically require an independent verification of the work performed. Examples of such verification include inspections and site walk-throughs.

- **Reporting Requirements Not Adequate to Support Illinois Statewide TRM Savings Calculations:** EPY5/GPY2 was the first year that required the calculation of savings for all applicable measures using the procedures outlined in the TRM. The calculation procedures

outlined in the TRM require measure specific information that is currently inconsistently reported by grant recipients. The supporting documentation submitted by program participants includes invoicing and contractor certifications that in many cases do not document the measure specifications needed to perform savings calculations, such as equipment make and model, operating efficiencies, wattages, and insulation R values. The evaluators obtained supporting documentation from grant recipients; the process of obtaining this information added to the evaluation cost.

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.

- **Improve Reporting Requirements:** Improving the reporting requirements for external grant recipients that receive program grants will improve the efficiency and effectiveness of the program administration. By providing reporting templates that outline what measure specification information is needed, grant recipients will have a better understanding of what to provide and program staff will be able to ensure that they are receiving the information they need to verify that equipment meets the program requirements and to calculate energy savings. Furthermore, the program guidelines should provide a clear description of what constitutes proof of purchase for the rebated measures.

- **Improve Program Database to Track Residential Retrofit Program Projects:** Program staff indicated that the current project database is not being used to track Residential Retrofit Program projects because it is not suited to the administration of the program. Staff should consider altering the program database so that project information is adequately captured. This revision to the database should occur in conjunction with the development of new project reporting templates to insure that the information reported corresponds with the data fields in the database. An improved database for tracking program activity will facilitate the management of the program by providing staff with an overall sense of the current program activity.

- **Different Program Design Requirements for Non-Standard Incentives:** One of the participants in the residential retrofit program is currently receiving grant funds based on achieved energy savings rather than for the installation of specific equipment. This type of calculated incentive requires a different administrative structure than what is required to administer the prescriptive incentives that are paid on a per unit basis, which typifies most of the program activity. To address this lack of fit with the Residential Retrofit Program, the DCEO has proposed a new program targeting low income participants that will pay calculated incentives on the basis of energy saved. The administration of this proposed program should require applicants to submit documentation of how savings were estimated including all calculations. Program staff should review proposed equipment and the estimated savings to verify that the savings expected by the participant are reasonable.

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 five and natural gas program year two (EPY5/GPY2). EPY5/GPY2 is defined as the period June 2012 through May 2013.

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 EPY5/GPY2, 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, program grants were awarded to the following external organizations:

- CNT Energy;
- Mercy Housing;
- Lake County Residential Development Corporation;
- The Community Builders, Inc.;
- Historic Chicago Bungalow Association; and
- Hispanic Housing.

Grant funds for most participants 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. One grant recipient, CNT Energy received grant funds based on electric and natural gas savings.

Total grant funds cannot exceed $750,000 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.

1.2 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 EPY5/GPY2.

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

- Available project documentation (e.g., invoices, savings calculations, 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;
- Interviews with grant recipients to gather information on their organization and their experience with the program;
- Interviews with program staff members discussing program operations, successes, challenges, and future plans; and
- Surveys of residents that received the energy efficiency improvements to assess satisfaction with the improvements and their perception of non-energy benefits.

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 residents.
- Appendix B 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 and natural gas savings, as well as peak demand (kW) reductions resulting from program projects during the period June 2012 through May 2013. 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 and natural gas savings, as well as peak demand (kW) reductions resulting from projects completed during EPY5/GPY2. When applicable, the measure-level algorithms from the Illinois Statewide Technical Reference Manual (TRM) for Energy Efficiency Version 2.0 (Illinois TRM) were used to estimate savings, see Table 2-1.

Table 2-1 Illinois TRM Sections by Measure Type

Measure	*Section in Illinois TRM*	*Other Resources*
Air Sealing	5.6.1	-
Attic / Wall Insulation	5.6.4	-
Bathroom Exhaust Fan	5.3.9	-
Ceiling Fan	N/A	ES Calculator
Central AC w/ PT	5.3.3	ES Calculator
CFLs / Lighting	5.5.1	-
Dishwasher	5.1.4	-
Furnace - Gas	5.3.7	-
Refrigerator	5.1.6	-
Room AC	5.1.7	-
Water Heater – Electric	N/A	PA TRM
Water Heater – Gas	5.4.2	-

2.1.1.1. Air Sealing

To develop ex post savings for air sealing, ADM applied the following savings algorithm from section 5.6.1 of the Illinois TRM:

$$\Delta kWh = \Delta kWh\_cooling + \Delta kWh\_heating$$

$$\Delta Therms = (((CFM50\_existing - CFM50\_new)/N\_heat) * 60 * 24 * HDD * 0.018) / (\eta Heat * 100{,}000)$$

Where,

ΔkWh_cooling = If central cooling, reduction in annual cooling requirement due to air sealing:

*[(((CFM50_existing - CFM50_new)/N_cool) * 60 * 24 * CDD * DUA * 0.018) / (1000 * ηCool)] * LM*

ΔkWh_heating = If electric heat (resistance or heat pump), reduction in annual electric heating due to air sealing:

*(((CFM50_existing - CFM50_new)/N_heat) * 60 * 24 * HDD * 0.018) / (ηHeat * 3,412)*

If gas furnace heat, kWh savings for reduction in fan run time:

*ΔTherms * Fe * 29.3*

CFM50_existing = Infiltration at 50 Pascals as measured by blower door before air sealing.

CFM50_new = Infiltration at 50 Pascals as measured by blower door after air sealing.

N_cool = Conversion factor from leakage at 50 Pascal to leakage at natural conditions

N_heat = Conversion factor from leakage at 50 Pascal to leakage at natural conditions

CDD = Cooling Degree Days

HDD = Heating Degree Days

DUA = Discretionary Use Adjustment (reflects the fact that people do not always operate their AC when conditions may call for it).

ηCool = Efficiency (SEER) of Air Conditioning equipment (kBtu/kWh)

ηHeat = Efficiency of heating system

LM = Latent multiplier to account for latent cooling demand

Fe = Furnace Fan energy consumption as a percentage of annual fuel consumption

2.1.1.2. Attic/Wall Insulation

To develop ex post savings for attic and wall insulation, ADM applied the following savings algorithm from section 5.6.4 of the Illinois TRM:

ΔkWh = *(ΔkWh_cooling + ΔkWh_heating) * ADJ*

ΔTherms = *(((1/R_old - 1/R_wall) * A_wall * (1-Framing_factor) + (1/R_old - 1/R_attic) * A_attic * (1-Framing_factor/2)) * 24 * HDD) / (ηHeat * 100,067 Btu/therm) * ADJ*

Where,

ΔkWh_cooling = If central cooling, reduction in annual cooling requirement due to insulation:

[((1/R_old - 1/R_wall) * A_wall * (1-Framing_factor) + (1/R_old - 1/R_attic) * A_attic * (1-Framing_factor/2)) * 24 * CDD * DUA] / (1000 * ηCool)

ΔkWh_heating = If electric heat (resistance or heat pump), reduction in annual electric heating due to insulation:

*[(1/R_old - 1/R_wall) * A_wall * (1-Framing_factor) + (1/R_old - 1/R_attic) * A_attic * (1-Framing_factor/2)) * 24 * HDD] / (ηHeat * 3412)*

If gas furnace heat, kWh savings for reduction in fan run time:

*ΔTherms * Fe * 29.3*

ADJ = Adjustment to account for prescriptive engineering algorithms overclaiming savings; TBD.

R_wall = R-value of new wall assembly (including all layers between inside air and outside air).

R_attic = R-value of new attic assembly (including all layers between inside air and outside air).

R_old = R-value value of existing assemble and any existing insulation. (Minimum of R-5 for uninsulated assemblies).

A_wall = Total area of insulated wall (ft^2)

A_attic = Total area of insulated ceiling/attic (ft^2)

Framing_factor = Adjustment to account for area of framing

CDD = Cooling Degree Days

HDD = Heating Degree Days

DUA = Discretionary Use Adjustment (reflects the fact that people do not always operate their AC when conditions may call for it).

ηCool = Seasonal Energy Efficiency Ratio of cooling system (kBtu/kWh)

ηHeat = Efficiency of heating system

Fe = Furnace Fan energy consumption as a percentage of annual fuel consumption

2.1.1.3. Bathroom Exhaust Fan

To develop ex post savings for bathroom exhaust fans, ADM applied the following savings algorithm from section 5.3.9 of the Illinois TRM:

$$\Delta kWh = (CFM * (1/\eta,Baseline - 1/\eta Efficient)/1,000) * Hours$$

Where,

CFM = Nominal capacity of exhaust fan.

$\eta,Baseline$ = The efficiency of the baseline unit.

$\eta,Efficient$ = The efficiency of the baseline unit.

Hours = Annual hours of operation.

2.1.1.4. Ceiling Fan

To develop ex post savings for ceiling fans, ADM referenced the most recent ENERGY STAR® savings calculator, which recommends annual savings of 115 kWh for the replacement of a ceiling fan with lighting. This value assumes that conventional ceiling fan have 120 watt bulbs, while ENERGY STAR® rated ceiling fan have 25 watt bulbs.

2.1.1.1. Central Air Conditioner: SEER 14 with Programmable Thermostat

To develop ex post savings for central air conditioning, ADM applied the following savings algorithm from section 5.3.3 of the Illinois TRM:

$$\Delta kWH \text{ for remaining life of existing unit (1st 6 years)} = ((FLHcool * Capacity * (1/SEERexist - 1/SEERee))/1000)$$

Where,

ΔkWh = $\%ElectricHeat * Elec\_Heating\_Consumption * Heating\_Reduction * HF * Eff\_ISR + (\Delta Therms * Fe * 29.3)$

$\Delta Therms$ = $\%FossilHeat * Gas\_Heating\_Consumption * Heating\_Reduction * HF * Eff\_ISR$

Where,

%ElectricHeat = Percentage of heating savings assumed to be electric.

%FossilHeat = Percentage of heating savings assumed to be Natural Gas.

Elec_Heating_ Consumption = Estimate of annual household heating consumption for electrically heated single-family homes.

Gas_Heating_Consumption = Estimate of annual household heating consumption for gas heated single-family homes. If location is unknown, assume the average below.

Heating_Reduction = Assumed percentage reduction in heating energy consumption due to programmable thermostat.

HF = Household factor, to adjust heating consumption for non-single-family households.

Eff_ISR = Effective In-Service Rate, the percentage of thermostats installed and programmed effectively.

Fe = Furnace Fan energy consumption as a percentage of annual fuel consumption.

2.1.1.2. Compact Fluorescent Lamp / Lighting

To develop ex post savings for compact fluorescent lamps CFLs, ADM applied the following savings algorithm from section 5.4.2 of the Illinois TRM:

$$\Delta kWh = ((WattsBase - WattsEE) / 1000) * ISR * Hours * WHFe$$

Where,

WattsBase = Watts for baseline fixture.

WattsEE = Watts for energy efficient fixture.

ISR = In-service rate.

Hours = Annual hours of operation.

WHFe = Waste heat factor.

For lighting other than CFLs, the above algorithm was used, less the in-service rate.

2.1.1.3. Dishwasher

To develop ex post savings for ENERGY STAR® dishwashers, ADM applied the following savings algorithm from section 5.1.4 of the Illinois TRM:

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

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.

2.1.1.4. Refrigerator

To develop ex post savings for ENERGY STAR® Refrigerators, ADM applied the following savings algorithm from section 5.1.6 of the Illinois TRM:

$$\Delta kWh = UEC_{BASE} - UEC_{EE}$$

Where,

UEC_{BASE} = Annual Unit Energy Consumption of baseline unit as calculated in algorithm provided in table above.

UEC_{EE} = Annual Unit Energy Consumption of ENERGY STAR unit as calculated in algorithm provided in table above.

Unit energy consumption can be determined by using the algorithms specified in the following table:

Table 2-2 Unit Energy Consumption of Refrigerators

Product Category	NAECA as of July 1, 2001 Maximum Energy Usage in kWh/year	Current ENERGY STAR level Maximum Energy Usage in kWh/year
1. Refrigerators and Refrigerator-freezers with manual defrost	8.82*AV+248.4	7.056*AV+198.72
2. Refrigerator-Freezer--partial automatic defrost	8.82*AV+248.4	7.056*AV+198.72
3. Refrigerator-Freezers--automatic defrost with top-mounted freezer without through-the-door ice service and all-refrigerators--automatic defrost	9.80*AV+276	7.84*AV+220.8
4. Refrigerator-Freezers--automatic defrost with side-mounted freezer without through-the-door ice service	4.91*AV+507.5	3.928*AV+406
5. Refrigerator-Freezers--automatic defrost with bottom-mounted freezer without through-the-door ice service	4.60*AV+459	3.68*AV+367.2
6. Refrigerator-Freezers--automatic defrost with top-mounted freezer with through-the-door ice service	10.20*AV+356	8.16*AV+284.8
7. Refrigerator-Freezers--automatic defrost with side-mounted freezer with through-the-door ice service	10.10*AV+406	8.08*AV+324.8

Where,

$$AV = Adjusted\_volume = Fresh\_volume + (1.63 * Freezer\_volume)$$

2.1.1.5. Room Air Conditioner

To develop ex post savings for room air conditioner, ADM applied the following savings algorithm from section 5.1.7 of the Illinois TRM:

$$\Delta kWh = ((FLH_{RoomAC} * BtuH * (1/EER_{base} - 1/EER_{ee}))/1000)$$

Where,

FLH_{RoomAC} = Full Load Hours of room air conditioning unit

Btu/H = Size of retired unit

EER_{base} = Efficiency of baseline unit

EER_{ee} = Efficiency of CEE Tier 1 (or ENERGY STAR Version 3.0) unit

2.1.1.1. Water Heater - Electric

To develop ex post savings for electric water heaters, ADM referenced the following table of prescriptive savings values from the Pennsylvania TRM:

Table 2-3 Prescriptive Savings Values for Electric Water Heaters

Measure Name	Efficient Electric Water Heaters
Target Sector	Residential Establishments
Measure Unit	Water Heater
Unit Energy Savings	115 kWh for 0.93 Energy Factor 157 kWh for 0.94 Energy Factor 199 kWh for 0.95 Energy Factor
Unit Peak Demand Reduction	0.0105 kW for 0.93 Energy Factor 0.0144 kW for 0.94 Energy Factor 0.0182 kW for 0.95 Energy Factor
Measure Life	14 years

2.1.1.2. Water Heater - Gas

To develop ex post savings for gas water heaters, ADM applied the following savings algorithm from section 5.4.2 of the Illinois 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.

$\gamma Water$ = Specific weight of water.

Tout = Tank temperature.

Tin = Temperature of the incoming supply water.

2.1.1.3. Furnace - Gas

To develop ex post savings for gas furnaces, ADM applied the following savings algorithm from section 5.3.7 of the Illinois TRM:

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

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

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 2012 through May 2013.

2.2.1 Program-Level Savings Results

This subsection presents the gross and net savings for the Residential Retrofit Program. A net-to-gross factor of 100% was used because the Residential Retrofit Program targets low income residents. Since gross savings are equal to net savings, all savings values will be reported as net savings to avoid duplication.

The realized net energy savings for the Residential Retrofit Program during the period June 2012 through May 2013 are summarized by program component in Table 2-4, by utility in

Table 2-5, and by measure in Table 2-6. During this period, realized net energy savings were 4,025,972 kWh, and net peak demand reductions were 2,464.25 kW.

Table 2-4 Summary of Net Energy Savings by Program Component

Program Component	*Electric Utility*	*Realized Net kWh Savings**	*Realized Net kW Savings**
Weatherization	Ameren	787,645	82.01
	ComEd	802,351	82.98
CDAP	Ameren	34,693	10.26
CNT	ComEd	1,342,883	1,425.45
HCBA	ComEd	681,831	730.19
LCRDC	ComEd	6,462	1.31
Mercy Housing	ComEd	22,429	3.37
TCB	ComEd	50,496	15.40
Hispanic Housing	Ameren	80,343	67.21
	ComEd	216,841	46.06
Total		4,025,972	2,464.25

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

Table 2-5 Summary of Net Energy Savings by Utility

Electric Utility	*Realized Net kWh Savings**	*Realized Net kW Savings**
Ameren	902,680	159.49
ComEd	3,123,292	2,304.76
Total	4,025,972	2,464.25

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

Table 2-6 Summary of kWh Savings by Measure

Measure	*Units*	*Realized Net kWh Savings**
Air Sealing	999	1,080,852
Attic Insulation**	342	873,786
Bathroom Exhaust Fan	837	74,141
Ceiling Fan	112	12,902
Central AC w/ PT	89	19,349
CFL	34,917	1,414,769
Dishwasher	169	10,140
Electric Water Heater	79	13,159
Lighting Fixtures	1,048	228,009
Refrigerator	1,695	174,438
Room AC	222	4,422
Wall Insulation**	186	120,005
Total	40,695	4,025,972

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

*** The savings algorithm for attic and wall insulation includes an adjustment factor to correct for an overestimation of savings. However, this factor has yet to be determined. As a result, the savings presented above for attic and wall insulation assumed an adjustment factor of 1 and are an overestimation of savings.*

The realized net natural gas savings of the Residential Retrofit Program during the period June 2012 through May 2013 are summarized by program component in Table 2-7, by utility in Table 2-7, and by measure in Table 2-8. During this period, realized net natural gas savings were 672,618 therms.

Table 2-7 Summary of Net Natural Gas Savings by Program Component

Program Component	*Gas Utility*	*Realized Net Therms Savings**
Weatherization	Ameren	86,986
	Nicor	57,175
	North Shore	3,179
	Peoples	31,794
CDAP	Ameren	9,488
CNT	Nicor	172,480
	North Shore	24,887
	Peoples	286,628
Total		672,618

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

Table 2-8 Summary of Net Natural Gas Savings by Utility

Gas Utility	*Realized Net Therms Savings**
Ameren	96,474
Nicor	229,655
North Shore	28,067
Peoples	318,421
Total	672,618

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

Table 2-9 Summary of Therm Savings by Measure

Measure	*Units*	*Realized Net Therms Savings**
Air Sealing	673	109,739
Attic Insulation**	31	324,449
Central AC w/ PT	43	3,407
Gas Water Heater	181	3,733
Wall Insulation**	1	49,807
Gas Furnace	1,217	181,483
Total	2,146	672,618

**To avoid duplication, gross savings are not presented because they are equal to net savings.*

*** The savings algorithm for attic and wall insulation includes an adjustment factor to correct for an overestimation of savings. However, this factor has yet to be determined. As a result, the savings presented above for attic and wall insulation assumed an adjustment factor of 1 and are an overestimation of savings.*

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, interviews with program staff, interviews with staff from participating organizations, and a survey of residents who received low energy efficiency improvements.

The chapter begins with a discussion of the overall progress 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 Residential Retrofit Program during electric program year 5 and natural gas program year 2 (EPY5/GPY2).

Key research questions to be addressed by this evaluation of EPY5/GPY2:

- 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 were analyzed to achieve the stated research objectives. Insight into the participant experience with the Residential Retrofit Program was developed through in-depth interviews with program participants and a survey administered by mail 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 Interviews:** Participant interviews are a key data source for many components of this process evaluation, and serve as the foundation for understanding the grant recipients' perspective. The participant interviews provide grant recipient feedback and insight regarding their experiences with the Residential Retrofit Program. Respondents reported on their satisfaction with the program, discussed their organizations and their motivations for making the efficiency improvements, and provided recommendations related to improving the program.

- **Resident Surveys:** Surveys with residents provide information to 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 aspects of the improvements that the participants do not like. 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 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. Both agree that from the participant perspective, the program is effective and operating well. 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 program 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 EPY5/GPY2:

- **High Program Satisfaction among Grantees and Residents:** In general, both grantees and residents were satisfied with the program. Grantees indicated that the program process was streamlined and that the documentation and reporting requirements were transparent. The reimbursement process was prompt and the payment arrived in a timely manner. Grantees were also pleased with the DCEO staff who they described as communicative and knowledgeable. Residents of the housing where the efficiency measures were implemented were also satisfied with the efficiency improvements and the implementation process. They were most satisfied with the level of professionalism and service provided by the program staff, the quality of installation work, and the level of professionalism and service provided by the contractor. The residents were also very satisfied with the equipment itself.

Respondents reported that the energy efficiency improvements resulted in financial, comfort, and safety benefits.

- **Grant Agreements Allow for Flexibility in Measures Installed:** When grantees apply for a Residential Retrofit Program grant, they estimate the scope of work that they will accomplish at the targeted properties. In most cases the number and type of measures implemented through the program differs from what was initially planned in the grant agreement. These differences occur for several reasons including inadequate time to implement all of the planned measures or because obstacles encountered at a site prevent the cost effective installation of the planned measures. Additionally, some respondents reported that they received outside funds for specific measures so they did not pursue these measures with DCEO funding.

  Once the final project is complete, grant recipients submit final reports of the measures installed through the program to receive the grant payment. Program staff calculates the grant payment based on the final submissions.

- **Grantees Typically Utilize Internal Verification Procedures to Ensure Proper Installation:** Grant recipients typically utilize internal verification procedures to confirm the installation of the energy efficient efficiency measures funded by the Residential Retrofit Program. The procedures are used to ensure that the contractors have completed the required work properly. Additionally, other funding organizations, such as banks, typically require an independent verification of the work performed. Examples of such verification include inspections and site walk-throughs.

- **Reporting Requirements Not Adequate to Support Illinois Statewide TRM Savings Calculations:** EPY5/GPY2 was the first year that required the calculation of savings for all applicable measures using the procedures outlined in the TRM. The calculation procedures outlined in the TRM require measure specific information that is currently inconsistently reported by grant recipients. The supporting documentation submitted by program participants includes invoicing and contractor certifications that in many cases do not document the measure specifications needed to perform savings calculations, such as equipment make and model, operating efficiencies, wattages, and insulation R values. The evaluators obtained supporting documentation from grant recipients; the process of obtaining this information added to the evaluation cost.

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.

- **Improve Reporting Requirements:** Improving the reporting requirements for external grant recipients that receive program grants will improve the efficiency and effectiveness of the program administration. By providing reporting templates that outline what measure specification information is needed, grant recipients will have a better understanding of what

to provide and program staff will be able to ensure that they are receiving the information they need to verify that equipment meets the program requirements and to calculate energy savings. Furthermore, the program guidelines should provide a clear description of what constitutes proof of purchase for the rebated measures.

- **Improve Program Database to Track Residential Retrofit Program Projects:** Program staff indicated that the current project database is not being used to track Residential Retrofit Program projects because it is not suited to the administration of the program. Staff should consider altering the program database so that project information is adequately captured. This revision to the database should occur in conjunction with the development of new project reporting templates to insure that the information reported corresponds with the data fields in the database. An improved database for tracking program activity will facilitate the management of the program by providing staff with an overall sense of the current program activity.

- **Different Program Design Requirements for Non-Standard Incentives:** One of the participants in the residential retrofit program is currently receiving grant funds based on achieved energy savings rather than for the installation of specific equipment. This type of calculated incentive requires a different administrative structure than what is required to administer the prescriptive incentives that are paid on a per unit basis, which typifies most of the program activity. To address this lack of fit with the Residential Retrofit Program, the DCEO has proposed a new program targeting low income participants that will pay calculated incentives on the basis of energy saved. The administration of this proposed program should require applicants to submit documentation of how savings were estimated including all calculations. Program staff should review proposed equipment and the estimated savings to verify that the savings expected by the participant are reasonable.

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 EPY5/GPY2, 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 housing 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 the 200% of 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 14.5 central air conditioner w/ programmable thermostat	$3,100
ENERGY STAR rated ceiling fan	$250
ENERGY STAR rated room air conditioner (per window AC unit)	$400
ENERGY STAR rated heat pump	$2,500
Replace existing PSC motor with electronically commutated motor or equivalent advanced air handler	$600
Attic insulation and bypass air sealing	$1,200
Wall insulation	$1,300
Air leakage reduction of 30% with blower door guided sealing work	$400
New electric water heater (minimum EFF 0.93), if all electric	$600
ENERGY STAR rated natural gas water heater	$600
High efficiency furnace with 92% AFUE or greater with electronically commutated motor or equivalent advanced air handler	$1,500
Boiler controls (for multi-family housing)	*
Steam system balancing (for multi-family housing)	*
Steam/hot water pipe insulation (for multi-family housing)	$250
Reflective Roof Coating (for multi-family housing)	$150
ENERGY STAR Clothes Washers (for multi-family housing)	$550

Total grant funds cannot exceed $750,000. However, the DCEO Director reserves the right to waive funding limitations and other program parameters.

In addition to the incentive amounts described above, some participants reach alternative arrangements with the program staff. Specifically, one of the participants received incentives

paid on an energy-saved basis. Specifically, the participant received the incentives shown in Table 3-2.

Table 3-2 Incentives for Energy Saved

	Less than 10,000 therms or 25,000 kWh	*More than 10,000 therms or 25,000 kWh*
Natural Gas Rate (Per Therm Saved)	$1.30	$0.90
Electric Rate (Per kWh Saved)	$0.25	$0.20

3.4.3 Program Participation Process

The participation process for the Residential Retrofit Program differs for program grants awarded to external organizations and for intra-agency grants. These processes are described below.

3.4.3.1. Program Grants

The process for completing a program grant project is illustrated in Figure 3-1. Participation is initiated when the participant applies to the program and the application is reviewed and accepted by DCEO. DCEO reviews the grant and estimates the expected electric and natural gas savings. Once an acceptable agreement between DCEO and the applicant is reached, the grant is reviewed by the legal department and executed.

During project implementation the grantee submits quarterly reports of the project status and financial information. A final report is submitted upon project completion.

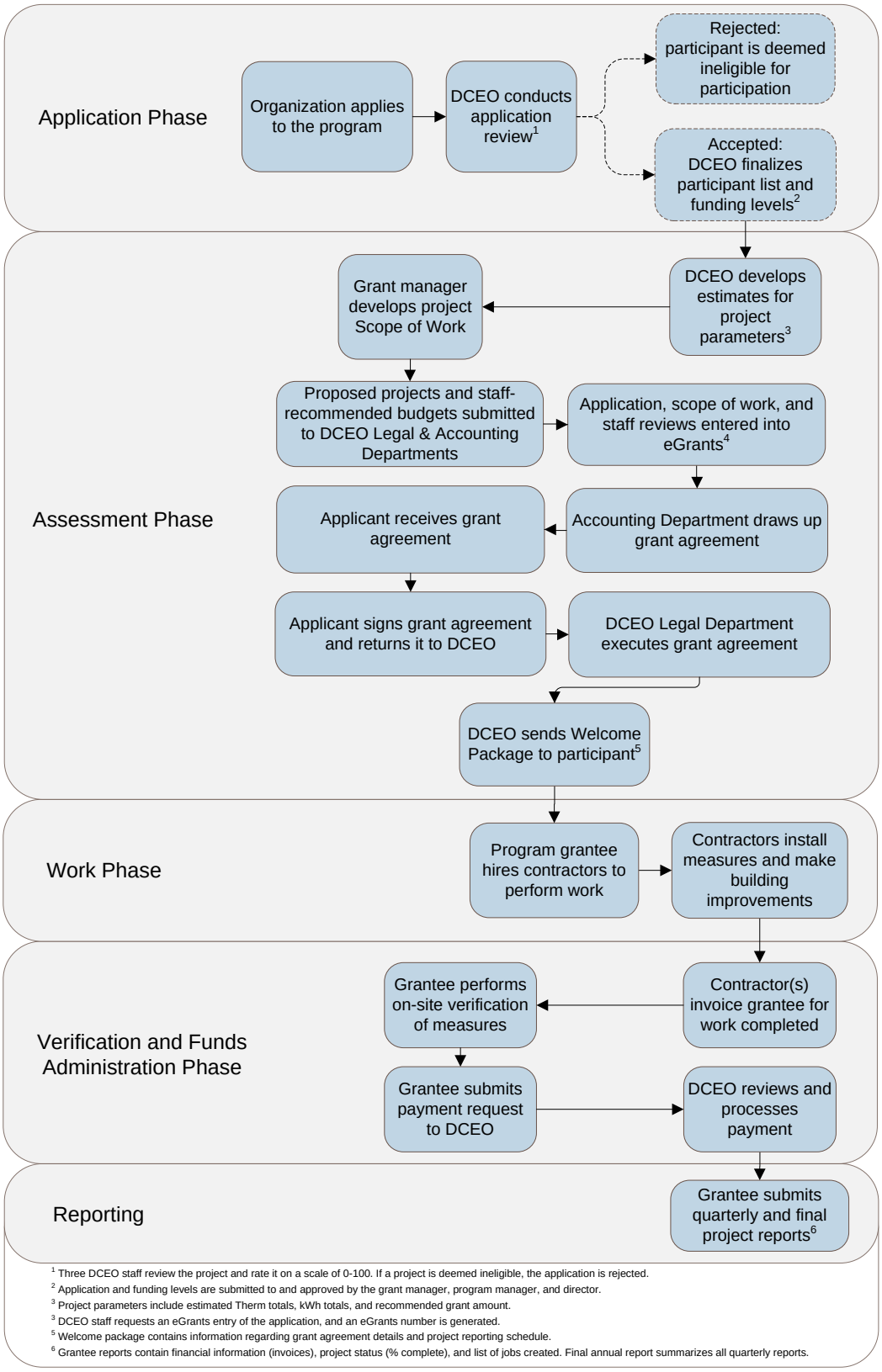

Figure 3-1 Program Grant Process

3.4.3.2. Bureau of Community Development Community Development Assistance Program

A portion of the Residential Retrofit Program funds are awarded to the Community Development Assistance Program (CDAP) to encourage participants to install energy efficient equipment in low income residences. CDAP is administered through the Bureau of Community Development, an office internal to DCEO. Figure 3-2 displays how the program is administered by the Bureau of Community Development.

CDAP staff work directly with grant administrators to deliver the program offerings, track project activity, and fulfill the reporting and verification requirements to DCEO. Grant administrators are local community action agencies or regional planning commissions that provide ancillary project management and administrative services to the participating municipal entity, township, or city office. Most of the Grant Administrators have a long-standing relationship with DCEO and have been receiving CDAP funds for years, sometimes decades.

The program is designed to aid in the economic development of Illinois communities; assisting local governments with public works projects and housing rehabilitation.[1] When a city decides to apply for the CDAP funds, the grant administrator will work with the city to identify potential target areas with eligible households. Eligibility is limited to low-income or very low-income housings. Low-income families are defined as families whose incomes do not exceed 80 percent of the median family income for the area. Very low-income families are defined as families whose incomes do not exceed 50 percent of the median family income for the area.

The grant administrator completes the application and wait for notification of award. Once the grant amount is determined, the grant administrator hosts a meeting with the homeowners and interested parties apply to the program. The applications are reviewed and ranked according to need. A SOW is developed and the grant administrator releases a Request for Bid. The lowest bidder will usually win the job. Total redevelopment expenditures on a single house are limited to $40,000.

Interviews were conducted with three of the eight grant administrators that participated in PY5. ADM staff elicited feedback on their overall satisfaction with the program and any areas that could be improved upon. Overall, there is a high level of satisfaction with the program and participating communities are grateful for the assistance. One issue that was raised was the timing of the award letters was the biggest complaint. Grant administrators indicated that the uncertainties associated with the timing of funds results in difficulties with budgeting, planning, and coordination.

[1] http://www.illinoisbiz.biz/dceo/Bureaus/Community_Development/Grants/CDAP.htm

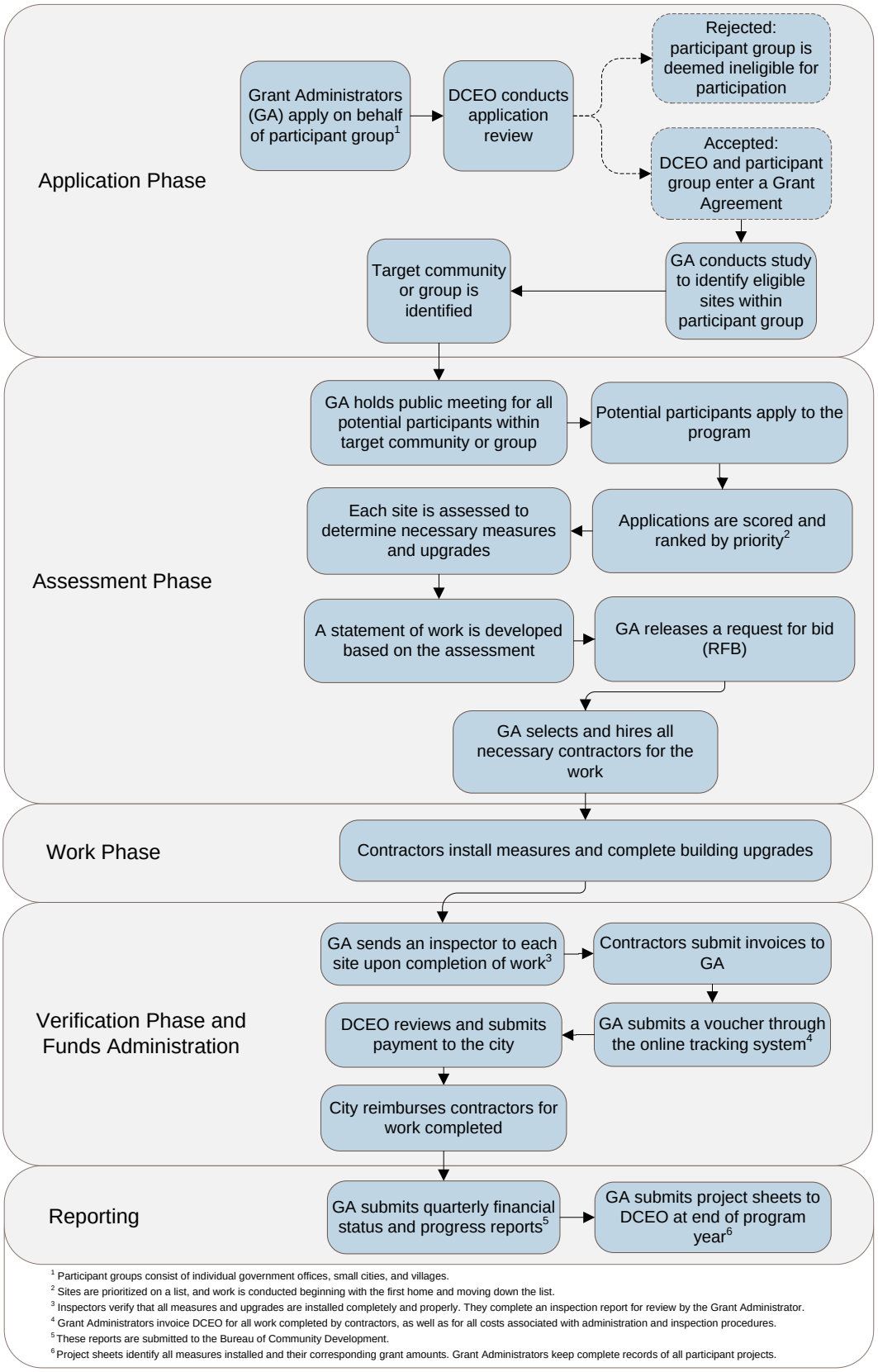

Figure 3-2 Community Development Assistance Program Process

3.4.3.3. Bureau of Energy Assistance Illinois Home Weatherization Assistance Program

Residential Retrofit Program funds are also used to fund a portion of the Illinois Home Weatherization Assistance Program (IHWAP) activity. IHWAP is administered through the Bureau of Energy Assistance, an office internal to DCEO. Like CDAP, IHWAP works with Local Action Agencies (LAA) to deliver the program offerings and track activity. While the measures are similar to those of CDAP, the guidelines are different. A maximum of $7,500 is allotted to each household. Additionally income requirements are slightly different as well, depending on the participant's family size and if the household's annual income is at or below 150% of the federal poverty level, the participant is eligible to receive IHWAP assistance.

EEPS funds are allocated to the agencies based on a formula that includes poverty level, population, index of need, and utility prices. Because the Bureau of Energy Assistance receives funding from a variety of sources, the Energy Efficiency Portfolio Standard (EEPS) dollars are pooled with other funds and are distributed once the work is completed. All projects are tracked and managed using a software tool called Weather Works. The Weather Works program develops an energy model of the building and proposes measures; those measures with a savings-to-investment ration (SIR) of one or greater become part of the work order. Then the agency then generates a work order from the list of recommended measures for measures within a specific budget. Once measures are completed, they are invoiced, inspected by the agency and approved. The agency must use a final inspector that goes through the work order to verify that the work was installed.

The LAAs hire contractors approximately 90% of the time, while some have crews that complete the work. The community action agencies maintain invoices and supporting documentation in customer files after the project specific documentation is uploaded to Weather Works. They also are responsible for vouchering the state office to request payments for work that has been completed.

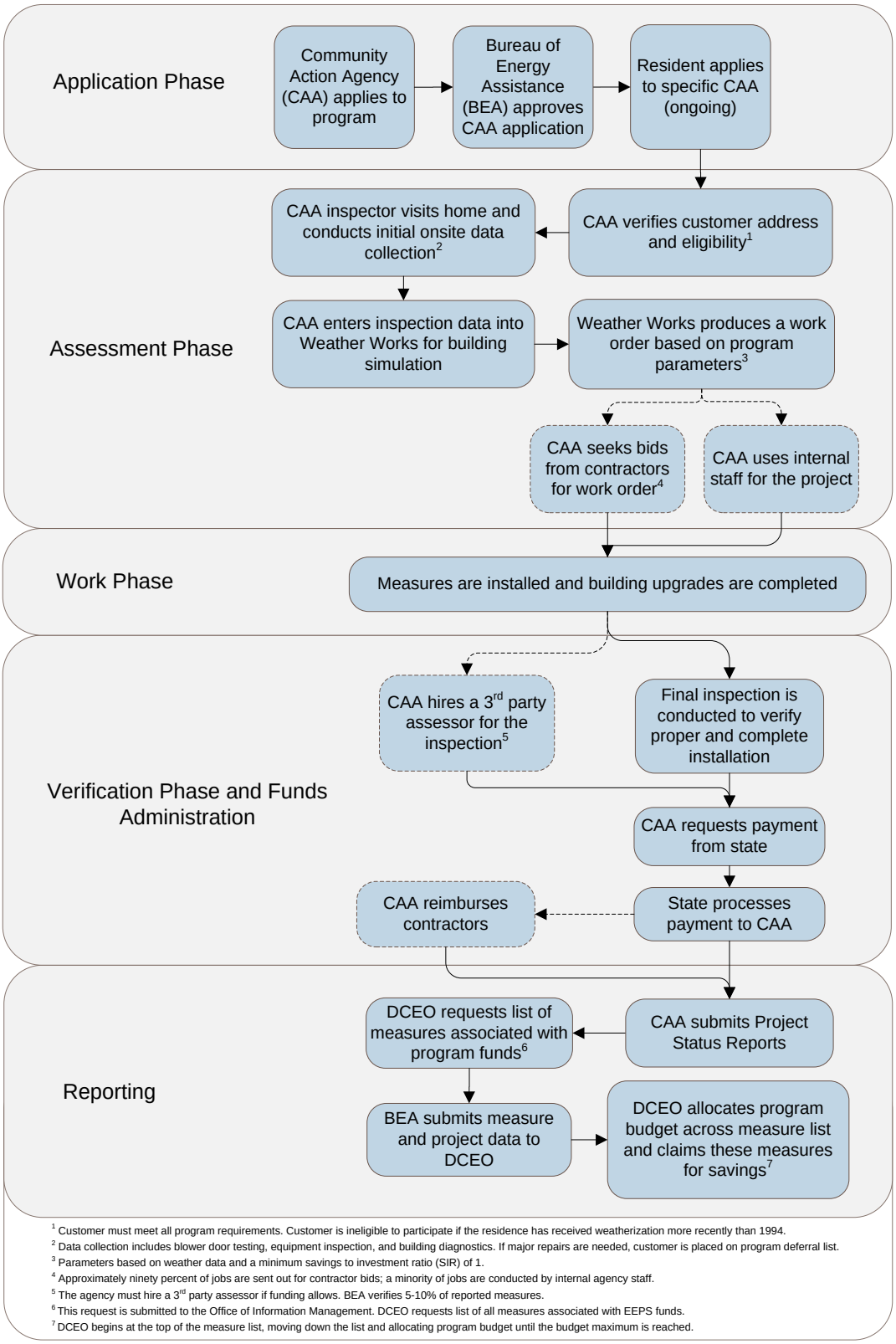

Figure 3-3 Illinois Home Weatherization Assistance Program Process

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 tracked through DCEO's EEPS database.

3.5 Residential Retrofit Energy Efficiency Program Grant Recipient Profile

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

Table 3-3 Grants Distributed through Residential Retrofit Program during EPY5/GPY2

Participant	*Total Grant Dollars*	*Electric Grant*	*Natural Gas Grant*
Program Grants			
CNT Energy	$1,250,000	$575,000	$675,000
Mercy Housing	$509,850	$509,850	-
Lake County Residential Development Corporation	$95,386	$95,386	-
The Community Builders, Inc.	$416,719	$416,719	-
Historic Chicago Bungalow Association	$750,000	$750,000	-
Hispanic Housing	$748,055	$748,055	-
Intra-Agency Grants			
Bureau of Community Development	$398,484	-	-
Bureau of Energy Assistance	$4,889,447	$3,314,372	$1,575,075
Total	$9,057,941	$6,409,382	$2,250,075

3.6 Grant Recipient Perspectives

Telephone interviews were performed with participants in the Residential Retrofit Program. In total, five of the program grant recipients were interviewed. Additionally, interviews were completed with representatives of the Weatherization and CDAP programs.

The interviews provided insight into the participants experience with the program, the implementation of the projects, and the organizations that received the grants. Key findings from the interviews are summarized below, followed by a description of the participating organizations.

3.6.1 Summary of Findings

- **Scopes of Work Change for Various Reasons:** A review of program documentation and discussions with grant recipients indicated that most grant recipients do not perform the work outlined in the initial grant agreement. Grant recipients reported a variety of reasons for the discrepancy between the work outlined in the agreement and the work performed. These

reasons include insufficient time to complete the work before the end of the grant period, decisions to claim funding from DCEO for only the most cost effective measures implemented, conditions at the site that prevented cost effective installation, and decisions to pay for some planned measures with non-DCEO funds.

Grant recipients are paid based on final reporting of measures implemented.

- **Some Grant Recipients have Alternative Arrangements:** The Residential Retrofit Program application process requires grant recipients to identify a location and the measures to be implemented for project approval. However, one grant recipient reported that they have an agreement to achieve energy savings without specifying where and how these savings will occur in advance. The grant recipient stated that this was an effective arrangement because it encouraged them to develop projects with high savings. Additionally, the organization has expertise in energy efficiency that should enable them to competently assess savings potential.

- **Many Grant Recipients Bundle Multiple Sources of Funding for Projects:** Projects completed by the grant recipients are often funded through multiples funding sources. These other funding sources include funding from government programs, bank financing, philanthropic donations, and state and federal tax credit programs. These additional funds are used for funding other property improvements as well as some energy efficiency improvements not covered by DCEO funding.

- **Grant Recipients have Verification Procedures in Place:** Several of the survey respondents reported that they have procedures to verify the installation of the energy efficiency measures. In some cases, these verification procedures are self-imposed to ensure that contractors are completing work as required. In other cases, third parties providing funding for projects require inspections of the work performed.

- **CNT Energy Provides Support to Grant Recipients:** One of the Residential Retrofit Grant Recipients, CNT Energy, also provides services that help support projects completed by other grant recipients. For other grant recipients, CNT Energy provides estimation of energy savings associated with projects, identification of potential measures, construction management expertise, and project verification services.

- **Additional Oversight and Clarification on Reporting Requirements is Needed:** Some of the grant recipients stated that the program needs additional project oversight and clarification on reporting requirements from DCEO. One grant recipient noted that DCEO was more heavily involved in the early stages of the grant agreement process but was notably less involved in later stages. Specifically, the grant recipient stated that it would be helpful if DCEO would become more involved at various points of the process to assist with problems that develop, see if there are difficulties meeting program requirements, and determine if requested funding needs to be modified. The grantee also suggested that DCEO schedule

meetings with contractors to clarify what information they will be required to report. Another grantee also stated that it was not clear what reporting DCEO required from them.

- **Consistency in when Grant Funds will be Approved and Disbursed:** Most of the recipients raised concerns about various aspects related to the timing of the programs and program deadlines. Some grant recipients noted that it often took a long time after the submission of the application to find out whether and when funds would be awarded. Other grant recipients stated a preference for having greater consistency in when funds are awarded in order to aid their planning process. Having a set date for the announcement will prevent grant recipients from making repeated contacts with DCEO. Lastly, one respondent requested greater flexibility in terms of the deadline.

  It should be noted that some of the aspects of how the program functions in regards to timelines may be impeding savings. Grant recipients noted that they typically did not receive grant funds until several months into the year. The late disbursement and the firm deadlines restrict the work that can be accomplished with a given grant, as was noted by some participants.

- **Some Measures Beyond Rehab Scope:** It was noted that some of the measures require significant rehabilitation that exceeds a typical retrofit project. In particular, wall insulation requires significant work and can be cost prohibitive if the walls are not being removed for other purposes in addition to installing insulation. According to one respondent, the incentive levels for insulation installation suggests that the program presumes that the work being done is of much greater scope than a moderate rehabilitation that does not involve the removal of walls. The participant indicated that current incentive levels are too low to justify installing insulation unless a removal of the walls for other purposes is planned.

- **High Satisfaction with the Program:** Grant recipients were generally satisfied with the program. Interviewed participants described DCEO as communicative, knowledgeable, and responsive to inquiries. Additionally, the application process was described as streamlined. Other positive aspects noted were that program staff is receptive to ideas about additional measures to fund and that grant awards are promptly paid.

3.6.2 Profiles of Program Grant Recipients

3.6.2.1. CNT Energy

CNT Energy, a division of the Center for Neighborhood Technology, is a non-profit think-and-do tank whose main mission is to promote urban sustainability. Specifically, the organization seeks to promote effective use of existing resources and community assets to improve the health of natural systems and the wealth of people, today and in the future. The organization, with its 70 employees, helps consumers and communities obtain the information and services they need to control energy costs and become energy efficient.

Awareness of the DCEO's Residential Retrofit program arose from CNT Energy's long-standing relationship with DCEO. They have participated in the program for over four years and have

continued to receive funding annually. CNT Energy felt that their goals align nicely with what DCEO is trying to achieve. DCEO is dedicated to economic development in lower income neighborhoods, the same neighborhoods that CNT Energy serves. CNT Energy believes that they are efficient in cost-effectively allocating DCEO funds for projects that are aligned with both organizations' goals.

CNT Energy offers a variety of services for multi-family building owners free of charge. They conduct upfront energy audits composed of onsite inspection and utility bill analysis and provide reports of the results to their customers. CNT Energy will also help to solicit and review bids for the work if the customer requests such services. The organization maintains a network of certified contractors. In fact, they are very active in the contractor certification process. CNT also has its own construction team that works alongside contractors to verify completion of the work. In terms of long-term oversight, CNT Energy conducts ongoing utility bill and savings analysis at one and two years after completion of the project.

3.6.2.2. The Community Builders

The Community Builders is a non-profit development organization with approximately 800 employees. The main mission of the organization is to build and sustain strong communities where people of all incomes can achieve their full potential. They partake in various activities to achieve this mission including: (1) planning, financing, developing and operating high-quality affordable housing, (2) coordinating access to support services and asset-building activities, (3) collaborating with neighborhood groups, residents, public and private agencies, and philanthropic interests to shape community and economic initiatives, (4) transforming large-scale distressed housing projects into anchors for revitalization efforts, (5) serving as a long-term stakeholder in the neighborhoods they help transform, and (6) creating local implementation teams that combine neighborhoods' understanding, technical skills, and managerial ability.

The EPY5/GPY2 program year was the first time that the Community Builders participated in the Residential Retrofit Program.

The role of the Community Builders is to serve as a liaison and essentially manage the funds transferred from DCEO to the building owners (i.e., the Community Builders subsidiaries and/or limited partners). In addition, the Community Builders work with general contractors and their own construction management team to watch changes as they happen. In addition, they conduct on-site inspections using their own inspection team, who are typically on site at least three days a week. The Community Builders also have their own legal staff that assist in delivering the program.

In terms of the program process, a project manager handles the initial application. To participate in the Residential Retrofit Program, the process requires that the Community Builders report to DCEO quarterly. They typically receive funds within 18 to 20 months of the initial application.

Outside of DCEO funds, the Community Builders seeks funds from various sources. They look for soft funds from municipalities, the state, tax credit programs and an array of smaller funding sources. Other funding sources include: the U.S. Department of the Treasury's 1603 Program,

Federal Home Loan Bank loans, and they often receive rental subsidies from the Public Housing Authority.

3.6.2.3. Historic Chicago Bungalow Association

The primary mission of the Historic Chicago Bungalow Association (HCBA) is to aid in the preservation of one and one-half story homes in the Chicago area. The organization assists homeowners who are looking to modernize, repair and adapt their bungalows to fit their needs and lifestyles. Collaborating with other non-profit groups and neighborhood organizations, HCBA strives to help bungalow owners make their homes more energy efficient and sustainable. They provide: seminars and workshops, design guidelines, local expos, awards and recognition, and more to their members.

To carry out the delivery of the Residential Retrofit program, HCBA works in tandem with several organizations. DNR Construction, Inc. handles the highest volume of work; they are HCBA's primary contractor. However, they have also worked closely with J. L. Contractor Services. HCBA also partners frequently with Franklin Energy and People's Gas for available rebates.

CNT Energy is one of HCBA's primary partners. HCBA is a heavily customer service-oriented organization. They partner with CNT Energy to ensure that bungalow owners are getting the best possible service. Since HCBA does not conduct in-house savings calculations, they rely on CNT Energy for this service. CNT Energy calculates savings for measures, which entail examining pre- and post- utility bill analysis. Recently, CNT Energy has received Energy Impact Illinois funding, which enables them to conduct post-work energy audits for HCBA.

3.6.2.4. Hispanic Housing Development Corporation

Hispanic Housing Development Corporation (HHDC) is a non-profit organization, established in 1975, whose primary mission is to help create affordable housing in Latino communities throughout a 250 mile radius of Chicago. In addition to housing, they aim to revitalize neighborhoods and become a catalyst for economic prosperity. To foster socio-economic growth, they provide employment and business opportunities.

In addition, the organization has a sub-sector, the Affordable Community Energy (ACE) division. ACE's mission is to deliver energy efficient and renewable energy solutions to underserved low-income populations. They focus on energy efficient retrofit measures and renewable power.

The organization has one corporate office, several satellite offices and offices at approximately 40 properties. There are 200 employees on staff to manage approximately 5000 buildings in the greater Chicago area. In addition to what they own and operate, they also provide property management and development services to third party properties. In the future, they hope to provide energy services to other affordable housing developers in the area.

HHDC has worked with the Illinois Department of Commerce & Economic Opportunity (DCEO) on various projects for over a decade. However, they are only in their third year of

participation in the Residential Retrofit Program. HHDC begins mobilizing to implement the measures shortly after signing the grant agreement with DCEO. They had not incurred any costs prior to securing the DCEO funding. Unlike previous years in which they applied in October, they applied early in June for EPY5/GPY2. Doing so allowed them to get an early start on the process.

After the installation of measures, HHDC conducts internal verification. The verification process is specific to the type of measure. The value of savings and installation typically drives the verification process. In other words, more verification is required for measures that are more costly or those that are predicted to have more savings.

HHDC works with various partners throughout the program process. They seek out assistance from auditors and engineering firms for feasibility and design commissioning. They also partner with CNT Energy through CNT Energy's Energy Savings Program. CNT provides various services to HHDC including the identification of potential measures, construction management expertise (particularly with air ceiling and insulation), and inspection of all properties to verify the scope of work being installed from a third party standpoint.

3.6.2.5. Mercy Housing

Mercy Housing is a non-profit organization with approximately 3,500 employees nationwide. Their mission is to create stable, vibrant and healthy communities by developing, financing, and operating affordable, program-enriched housing for families, seniors and people with special needs that lack the economic resources to access quality, safe housing.

The organization is primarily focused on helping those in need to find affordable housing (e.g., senior homes, family housing). They also offer access to on-site services such as: affordable housing development, property management, financing affordable housing, and portfolio services. Of those in need, approximately 71 percent are low-income residents, 20 percent are senior citizens, and about 9 percent are individuals with special needs.

A secondary mission is to achieve sustainability in affordable housing. For several years, the organization has been working on a national platform that prescribes guidelines and national standards pertaining to energy efficiency.

Mercy Housing's participation in the DCEO Residential Retrofit Program has had a positive impact on the organization. Without the DCEO funds, Mercy Housing often cannot close the deal on projects or get additional forms of capital. Additional forms of capital sought by Mercy Housing include: soft loans from state housing agencies (e.g., Illinois Housing Development Association), charitable institutions (e.g., MacArthur Foundation), zero or low interest loans, private first mortgage funds, bonds, and other sources (e.g., Chicago Housing Authority).

Mercy Housing staff believe that their mission and goals are closely aligned with those of the DCEO. Mercy Housing is very appreciative of DCEO and indicated that the staff is positive, helpful, and great to work with.

The primary role of Mercy Housing is to apply for funds. For each site, they have one general contractor. With certain projects, a master developer may designate tasks to a number of subcontractors. However, Mercy Housing only contracts directly with the general contractor.

3.7 Resident Outcomes

ADM mailed a survey to 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. These residents were given the option of responding to the survey by mail or completing it online. In total, 138 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 made. Residents were most satisfied with the level of professionalism and service provided by program staff, followed by the quality of installation work and the level of professionalism and service provided by the contractor. Comparatively fewer participants were satisfied or very satisfied with the savings on their monthly bill (72%), largely because 14% reported not knowing how satisfied they were. Residents may not know how satisfied they were 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	85%	10%	1%	1%	2%	1%	136
The performance of the equipment installed	80%	9%	3%	2%	2%	4%	127
The savings on your monthly utility bills	55%	17%	10%	1%	2%	14%	134
The level of professionalism and service provided by the contractor	85%	7%	1%	1%	4%	1%	136
The level of professionalism and service provided by the program staff	88%	7%	2%	-	3%	-	134
Overall satisfaction with the energy efficiency improvements	75%	17%	2%	4%	-	1%	134

Two of the residents stated that they had removed some of the energy efficiency improvements. One of the respondents elaborated that he or she removed the insulation around a door because the door would not open with it. However, 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.

All of the survey respondents stated that they pay the utility bills for their household. The 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, approximately two-thirds of the respondents (61%) reported that the improvements made their bills more affordable.

Table 3-5 Effect of Improvements on Utility Bill Affordability

	Response	*Percent of Respondents (n=137)*
Would you say that the energy efficiency improvements made to your home have made your utility bills:	More affordable	61%
	About the same	30%
	Less affordable	1%
	Don't know	7%

Respondents were asked if the energy efficiency improvements increased the value of their homes. Table 3-6 displays their responses. Seventy percent of survey respondents thought the improvements had increased the value of their home and 20% thought the improvements did not change their home value.

Table 3-6 Perceptions of Improvements on Home Value

	Response	*Percent of Respondents (n=130)*
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	70%
	Value has decreased	1%
	No change	20%
	Don't know	9%

Energy efficiency improvements can produce benefits to the health and well-being of the residents through improving the comfort of the home. As shown in Table 3-7, 80% 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=134)*
Would you say that the energy efficiency improvements made to your home have made it:	More comfortable to live in	80%
	Just as comfortable as before the improvements were made	16%
	Less comfortable to live in	1%
	Don't know	3%

Energy efficient upgrades can often lead to feelings of increased safety. Efficiency improvements can affect perceptions of improved safety in a variety of ways including improved lighting or the reduction of unsafe means of heating the home. Respondents were asked whether or not they believe the energy efficiency improvements made to their homes made it safer to live in. Table 3-8 displays their responses. Approximately 54% of participants stated that they felt their home was safer to live in following the installation of the energy efficiency upgrades. Forty-one percent felt that it was equally as safe as before the improvements were made.

Table 3-8 Perceptions of Improvements on Home Safety

	Response	*Percent of Respondents (n=131)*
Would you say that the energy efficiency improvements made to your home have made it:	More safe to live in	54%
	Just as safe as before the improvements were made	41%
	Less safe to live in	-
	Don't know	5%

Improved health oftentimes goes hand-in-hand with improved safety and recipients of energy efficiency improvements may perceive that their health is improved as well. Participants were asked if they had noticed an improvement in health since having the energy efficiency improvements made to their homes. As noted in Table 3-9, 28% of the residents cited improvements in health as a result of the upgrades.

Table 3-9 Improvements on Health

	Response	*Percent of Respondents (n=130)*
Since the energy efficiency improvements have been made to your home, have you noticed:	An improvement in health	28%
	No changes in health	65%
	A worsening in health	1%
	Don't know	7%

In addition to personal benefits, energy efficiency improvements can also improve the home itself. For example, the equipment can impact the noise levels and aesthetics of a residence. Respondents were asked if the energy efficiency upgrades made their home more or less noisy. As seen in Table 3-10, 44% of respondents claimed that the upgrades made their homes less noisy, while 46% noted that there was no change in noise levels. Only 4% of respondents stated that the energy efficient upgrades made their homes noisier.

Table 3-10 Improvements on Noise Levels

	Response	*Percent of Respondents (n=133)*
Since the energy efficiency improvements have been made to your home, have you noticed that your home:	Is more noisy	4%
	Has no change is noise level	46%
	Is less noisy	44%
	Don't know	7%

Participants were also asked whether or not the new energy efficient equipment improved the looks of their homes. Forty-three percent of respondents noted that the energy efficient improvements improved the looks of their home while 54% stated that it did not change the look of their homes. None of the respondents felt that the upgrades worsened the aesthetics of their homes.

Table 3-11 Improvements on Aesthetics

	Response	*Percent of Respondents (n=133)*
Since the energy efficiency improvements have been made to your home, have you noticed:	Improved looks	43%
	No changed looks	54%
	Worsening looks	-
	Don't know	3%

Respondents were asked several questions that involved comparing their old equipment to the new energy efficient equipment. They were first asked how the new equipment performed in comparison to their old equipment. Seventy-five percent of residents noted that the new energy efficient equipment works better than their old equipment while 18% stated that the new equipment was about the same in terms of performance. Only 1% of the residents felt that the new equipment works worse than what they previously had.

Table 3-12 Improvements on Performance

	Response	*Percent of Respondents (n=125)*
Does the new energy efficient equipment work better, worse, or about the same as what you had before?	Works better	75%
	About the same	18%
	Works worse	1%
	Don’t know	6%

Participants were also asked to compare their old equipment to the new energy efficient equipment in terms of reliability. Seventy percent of the respondents felt that their new energy efficient equipment is more reliable than their old equipment. Approximately 19% felt that the old and new equipment are about the same in terms of reliability. Only 2% of the residents stated that the new energy efficient upgrades are less reliable than their previous equipment.

Table 3-13 Improvements on Reliability

	Response	*Percent of Respondents (n=128)*
Is the new energy efficient equipment more reliable, less reliable, or about the same as what you had before?	More reliable	70%
	About the same	19%
	Less reliable	2%
	Don’t know	9%

Another survey item asked residents to compare their old equipment to the new energy efficient equipment in terms of maintenance needed. As seen in Table 3-14, approximately 44% of the residents said that they have less maintenance with the new energy efficient equipment whereas 34% said they have the same amount of maintenance as before. Only 4% felt that the new equipment increased the amount of maintenance required.

Table 3-14 Improvements on Reliability

	Response	*Percent of Respondents (n=128)*
Does the new energy efficient equipment need more maintenance, less maintenance, or about the same as what you had before?	More maintenance	4%
	About the same	34%
	Less maintenance	44%
	Don't know	17%

A number of residents (41%) noted that their new energy efficient equipment had new features compared to the old equipment. Some of the new features on air conditioning units, ceiling fans, and thermostats that were mentioned included: remote controls, timers, advanced settings, digital control for temperature, power save functionality, and variable speed controls.

Residents were also asked if there was anything they did not like about the improvements that were made. Ten percent (13 residents) mentioned that there was some aspect of the improvements that they did not like. Several of these comments were focused on asking for additional energy efficiency improvements, primarily new windows and stoves. Additionally, several participants reported that the insulation or air sealing work performed was insufficient.

Another issue mentioned by a few residents was that they disliked the equipment that was installed. The reasons for disliking the equipment raised by participants included refrigerators and air conditioners that were too loud, refrigerators that did not get as cold as previous ones, and water running too slowly. Other respondents also felt that the contractors left their homes rather messy during installation and did not clean up after themselves.

Overall, the residents experienced multiple benefits from the energy efficiency improvements made through the program. The majority of respondents reported that the energy efficiency improvements resulted in financial benefits, namely lower utility costs and increased home values. Approximately 80% reported that the program improved the comfort of the home and various respondents noted 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 3-15 and Table 3-16 display the responses to these questions. When asked about their awareness of the advantages of energy efficiency, approximately 80% of respondents stated that they were more aware of the advantages of the benefits of energy efficiency since the improvements were made. Additionally, 76% of respondents said they had discussed their experience with the improvements with others and all respondents stated that they had shared a positive experience with others. Because all respondents related a positive experience of the program, it may suggest that the program may be increasing awareness of energy efficiency benefits among non-participants as well.

Table 3-15 Awareness of Advantages of Energy Efficiency Improvements

	Response	*Percent of Respondents (n=126)*
How would you rate your level of awareness about the advantages of energy efficiency since the improvements were made to your home?	More aware	82%
	About the same	14%
	Less aware	1%
	Don't know	3%

Table 3-16 Discussions of Improvements with Others

	Response	*Percent of Respondents (n=95)*
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	100%
	I shared that I had a negative experience	-
	Don't know	-

3.7.4 Resident Recommendations and Overall Impressions

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

A few respondents raised concerns about the work performed. A number of these responses referred to measures being installed poorly. The most common complaint was that despite having insulation, air still escaped through the windows. The statements below highlight this:

> *They insulated this house and the air in still coming in through them.*
>
> *[There is still] air around windows.*

Three respondents reported that the contractors made a mess in their residence in which they were responsible for.

> *The installers left all of the debris that fell outside on the ground in my backyard. I cleaned it all up.*
>
> *The contractor did not clean up their mess. Therefore, I have been replacing the air filters.*

Many 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. Other recommendations for areas of assistance through program included: electrical wiring, roofing, concrete, ovens, foundation restoral, washers, dryers, showerheads, faucets, and furnaces.

Overall, most residents were positive about their experience the program. Residents expressed gratitude for the measures installed, the improvement they made to the comfort and warmth of their home, and the professionalism of the staff. Some residents also noted that the efficiency improvements reduced their utility costs although many felt that it was too early to tell. Some examples of these types of comments include:

> *We are grateful for your service and your program. Kudos to your staff and workers.*
>
> *We shared the program with several friends who took advantage of the program. All are very happy and satisfied.*
>
> *Thank you. The insulation was much needed and the appliances a great enhancement.*
>
> *The program is a very worthwhile energy saver and should continue.*
>
> *Thank you very much for the improvements, it makes life easier.*
>
> *Everything is very good. I'm happy with my house. They did a very very good job.*
>
> *I really appreciated the insulation and weatherization that was installed, it is warmer and I save about $7.00 a month on my bill.*

3.8 Program Operations Perspective

This section summarizes the core findings that resulted from primary data collection activities including interviews with the Residential Retrofit Program staff and a review of available tracking data and program documentation. Because the IHWAP, CDAP, and external grants are administered differently, findings that are specific to each participation path are grouped together, while general findings that apply to all three participations paths are summarized in the beginning.

In order to gather information regarding the operational efficiency and program delivery process for the Residential Retrofit Program, semi-structured interviews and workgroup sessions took place at the DCEO offices and over the phone in August, September, and October of 2013. Discussion areas focused on program administration, delivery, and oversight.

Summary of Findings:

- **New Program Staff Added:** At the end of the program year, a new staff member was added to assist with the administration of the program. The new program staff member was moved from another DCEO department but did not have previous experience administering energy efficiency programs. Because of their prior experience in the department, the staff member was familiar with DCEO's internal processes, even though a learning period has been required to understand the details of administering the program.
- **Reporting Requirements Meet Fiscal Tracking Needs but Are Not Adequate to Estimate Energy Savings:** After discussions with program staff and an in-depth review of the application and reporting templates, it appears that grant reporting requirements are bound by fiscal tracking needs and are less appropriate for tracking the project level data necessary to perform energy savings calculations as outlined in the Illinois Statewide TRM. Program grant recipients are required to submit quarterly reports that detail both the project status and financial status of the proposed work. With these reports participants are required to include supporting documentation that details the work performed. The documentation submitted varies in terms of the format and the level of granularity.
- **Program Activity is Tracked Outside of EEPS Database:** Program staff indicated that the Energy Efficiency Portfolio Standard (EEPS) Database does not adequately meet the needs of the Residential Retrofit Program. Because the database does not meet their needs, program activity is not systematically tracked by program staff. Not having an adequate tracking system makes it difficult to effectively manage the program and for staff to have a comprehensive sense of the activity.

4. Conclusions and Recommendations

Interviews and surveys were conducted with grant recipients and residents to better understand the effectiveness of program delivery. In general, grantees and residents indicated that 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 changed to improve effectiveness and delivery.

4.1 Key Conclusions

The following presents a selection of key conclusions from EPY5/GPY2:

- **High Program Satisfaction among Grantees and Residents:** In general, both grantees and residents were satisfied with the program. Grantees indicated that the program process was streamlined and that the documentation and reporting requirements were transparent. The reimbursement process was prompt and the payment arrived in a timely manner. Grantees were also pleased with the DCEO staff who they described as communicative and knowledgeable. Residents of the housing where the efficiency measures were implemented were also satisfied with the efficiency improvements and the implementation process. They were most satisfied with the level of professionalism and service provided by the program staff, the quality of installation work, and the level of professionalism and service provided by the contractor. The residents were also very satisfied with the equipment itself. Respondents reported that the energy efficiency improvements resulted in financial, comfort, and safety benefits.

- **Grant Agreements Allow for Flexibility in Measures Installed:** When grantees apply for a Residential Retrofit Program grant, they estimate the scope of work that they will accomplish at the targeted properties. In most cases the number and type of measures implemented through the program differs from what was initially planned in the grant agreement. These differences occur for several reasons including inadequate time to implement all of the planned measures or because obstacles encountered at a site prevent the cost effective installation of the planned measures. Additionally, some respondents reported that they received outside funds for specific measures so they did not pursue these measures with DCEO funding.

  Once the final project is complete, grant recipients submit final reports of the measures installed through the program to receive the grant payment. Program staff calculates the grant payment based on the final submissions.

- **Grantees Typically Utilize Internal Verification Procedures to Ensure Proper Installation:** Grant recipients typically utilize internal verification procedures to confirm the installation of the energy efficient efficiency measures funded by the Residential Retrofit Program. The procedures are used to ensure that the contractors have completed the required work properly. Additionally, other funding organizations, such as banks, typically require an

independent verification of the work performed. Examples of such verification include inspections and site walk-throughs.

- **Reporting Requirements Not Adequate to Support Illinois Statewide TRM Savings Calculations:** EPY5/GPY2 was the first year that required the calculation of savings for all applicable measures using the procedures outlined in the TRM. The calculation procedures outlined in the TRM require measure specific information that is currently inconsistently reported by grant recipients. The supporting documentation submitted by program participants includes invoicing and contractor certifications that in many cases do not document the measure specifications needed to perform savings calculations, such as equipment make and model, operating efficiencies, wattages, and insulation R values. The evaluators obtained supporting documentation from grant recipients; the process of obtaining this information added to the evaluation cost.

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.

- **Improve Reporting Requirements:** Improving the reporting requirements for external grant recipients that receive program grants will improve the efficiency and effectiveness of the program administration. By providing reporting templates that outline what measure specification information is needed, grant recipients will have a better understanding of what to provide and program staff will be able to ensure that they are receiving the information they need to verify that equipment meets the program requirements and to calculate energy savings. Furthermore, the program guidelines should provide a clear description of what constitutes proof of purchase for the rebated measures.

- **Improve Program Database to Track Residential Retrofit Program Projects:** Program staff indicated that the current project database is not being used to track Residential Retrofit Program projects because it is not suited to the administration of the program. Staff should consider altering the program database so that project information is adequately captured. This revision to the database should occur in conjunction with the development of new project reporting templates to insure that the information reported corresponds with the data fields in the database. An improved database for tracking program activity will facilitate the management of the program by providing staff with an overall sense of the current program activity.

- **Different Program Design Requirements for Non-Standard Incentives:** One of the participants in the residential retrofit program is currently receiving grant funds based on achieved energy savings rather than for the installation of specific equipment. This type of calculated incentive requires a different administrative structure than what is required to administer the prescriptive incentives that are paid on a per unit basis, which typifies most of

the program activity. To address this lack of fit with the Residential Retrofit Program, the DCEO has proposed a new program targeting low income participants that will pay calculated incentives on the basis of energy saved. The administration of this proposed program should require applicants to submit documentation of how savings were estimated including all calculations. Program staff should review proposed equipment and the estimated savings to verify that the savings expected by the participant are reasonable.

Appendix A: Questionnaire for Residents

1. Have the energy efficiency improvements made to your home made it more comfortable to live in, less comfortable to live in, or about the same as before the improvements were made?
   ( ) More comfortable
   ( ) Less comfortable
   ( ) About the same
   ( ) Don't know

2. Do you pay the utility bill or a portion of the utility bill for your home?
   ( ) Yes (Go to question 2a)
   ( ) No (Go to question 3)
   ( ) Don't know (Go to question 3)

2a. Have the energy efficiency improvements made to your home made your utility bills more affordable, less affordable, or about the same as before the improvements were made?
   ( ) More affordable (Go to question 2a1)
   ( ) Less affordable (Go to question 3)
   ( ) About the same (Go to question 3)
   ( ) Don't know (Go to question 3)

2a1. Since the energy efficiency improvements have made your utility bills more affordable, are you better able to pay other household bills?
   ( ) Yes
   ( ) No
   ( ) Don't know

2a2. Have the energy savings from the utility bills allowed you to have more money left over for other things?
   ( ) Yes
   ( ) No
   ( ) Don't know

3. Would you say that the energy efficiency improvements made to your home have made it feel safer, less safe, or about the same as before improvements were made?
   ( ) Safer
   ( ) Less safe
   ( ) About the same
   ( ) Don't know

4. Since the energy efficiency improvements have been made to your home, have you noticed an improvement in health, a worsening in health, or no change in the health of you and/or your family members?
   ( ) Improvement in health

( ) Worsening in health
( ) No change
( ) Don't know

5. Do you own this home?
   ( ) Yes (Go to question 5a)
   ( ) No (Go to question 6)
   ( ) Don't know (Go to question 6)

5a. Do you think that the energy efficiency improvements made to your home have made it more valuable, less valuable or not changed the value of your home?
   ( ) More valuable
   ( ) Less valuable
   ( ) No change
   ( ) Don't know

6. Have the energy efficiency improvements made to your home made it more noisy, less noisy, or not changed the level of noise inside your home?
   ( ) More noisy
   ( ) Less noisy
   ( ) No change
   ( ) Don't know

7. Have the energy efficiency improvements made to your home improved, worsened, or not changed the looks of your home?
   ( ) Improved looks
   ( ) Worsened looks
   ( ) Not changed looks
   ( ) Don't know

8. Is the new energy efficient equipment is more reliable, less reliable, or about the same as what you had before?
   ( ) More reliable
   ( ) Less reliable
   ( ) About the same
   ( ) Don't know

9. Does the new energy efficient equipment work better, worse, or about the same as what you had before?
   ( ) Works better
   ( ) Works worse
   ( ) About the same
   ( ) Don't know

10. Does the new energy efficient equipment need more maintenance, less maintenance, or about the same as what you had before?

( ) More maintenance
( ) Less maintenance
( ) About the same
( ) Don't know

11. Do the energy efficient appliances have any new features that your previous appliances didn't have?
( ) Yes (Go to question 11a)
( ) No (Go to question 12)
( ) Don't now (Go to question 12)

11a. What are the new features?

11b. Do you like the new features?

12. Has the program made you more aware of energy efficiency and/or more conscious of energy use?
( ) More aware
( ) Less aware
( ) About the same
( ) Don't know

13. Is there anything that you don't like about the energy efficiency improvements?
( ) Yes (Go to 13a)
( ) No (Go to 14)
( ) Don't know (Go to 14)

13a. What don't you like about the energy efficiency improvements?

14. Have you had problems with the functioning of the equipment?
( ) Yes (Go to question 14a)
( ) No (Go to question 15)
( ) Don't know (Go to question 15)

14a. What problems have you had?

14b. How have you handled these problems?

14c. Have any of these problems caused an interruption of gas or electric service or a complete shutoff of the equipment?
( ) Yes
( ) No
( ) Don't know

14d. Have any of these problems caused you to miss work and/or lose wages?
( ) Yes

( ) No
( ) Don't know

15. Have you removed any of the new energy efficient equipment that was installed in your home?
( ) Yes (Go to 15a)
( ) No (Go to 16)
( ) Don't know (Go to 16)

15a. What did you remove?

15b. Why did you remove this?

16. Have you shared your experience with energy efficient equipment with anyone?
( ) Yes (Go to 16a)
( ) No (Go to 17)
( ) Don't know (Go to 17)

16a. Was it a positive or negative experience that you shared?
( ) Shared positive experience
( ) Shared negative experience
( ) Don't know

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

18. For each of the following, please indicate if you are *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

19. Do you have any other comments about the energy efficiency improvements that we have not covered?

This completes the survey. Your input is greatly appreciated and will be used to help improve the Illinois Department of Commerce and Economic Opportunity's energy efficiency in the future. Thank you very much for your time!

Appendix B: Resident Survey Responses

1. Have the energy efficiency improvements made to your home made it more comfortable to live in, less comfortable to live in, or about the same as before the improvements were made?	*Response*	*(n=134)*	*Percent of Respondents*
	More comfortable	107	80%
	Less comfortable	1	1%
	About the same	22	16%
	Don't know	4	3%

2. Do you pay the utility bill or a portion of the utility bill for your home?	*Response*	*(n=138)*	*Percent of Respondents*
	Yes	138	100%
	No	0	0%
	Don't know	0	0%

2a. Have the energy efficiency improvements made to your home made your utility bills more affordable, less affordable, or about the same as before the improvements were made?	*Response*	*(n=137)*	*Percent of Respondents*
	More affordable	83	61%
	Less affordable	2	1%
	About the same	41	30%
	Don't know	10	7%

2A1. Since the energy efficiency improvements have made your utility bills more affordable, are you better able to pay other household bills?	*Response*	*(n=82)*	*Percent of Respondents*
	Yes	74	90%
	No	4	5%
	Don't know	4	5%

2A2. Have the energy savings from the utility bills allowed you to have more money left over for other things?	*Response*	*(n=61)*	*Percent of Respondents*
	Yes	48	79%
	No	7	11%
	Don't know	6	10%

3. Would you say that the energy efficiency improvements made to your home have made it feel more safe, less safe, or about the same as before improvements were made?	*Response*	*(n=131)*	*Percent of Respondents*
	More safe	71	54%
	Less safe	0	0%
	About the same	54	41%
	Don't know	6	5%

4. Since the energy efficiency improvements have been made to your home, have you noticed an improvement in health, a worsening in health, or no change in the health of you and/or your family members?	*Response*	*(n=130)*	*Percent of Respondents*
	Improvement in health	36	28%
	Worsening in health	1	1%
	No change	84	65%
	Don't know	9	7%

5. Do you own this home?	*Response*	*(n=133)*	*Percent of Respondents*
	Yes	132	99%
	No	0	0%
	Don't know	1	1%

5A. Do you think that the energy efficiency improvements made to your home have made it more valuable, less valuable or not changed the value of your home?	*Response*	*(n=130)*	*Percent of Respondents*
	More valuable	91	70%
	Less valuable	1	1%
	No change	26	20%
	Don't know	12	9%

6. Have the energy efficiency improvements made to your home made it more noisy, less noisy, or not changed the level of noise inside your home?	*Response*	*(n=133)*	*Percent of Respondents*
	More noisy	5	4%
	Less noisy	58	44%
	No change	61	46%
	Don't know	9	7%

7. Have the energy efficiency improvements made to your home improved, worsened, or not changed the looks of your home?	*Response*	*(n=133)*	*Percent of Respondents*
	Improved looks	57	43%
	Worsened looks	0	0%
	No changed looks	72	54%
	Don't know	4	3%

8. Is the new energy efficient equipment is more reliable, less reliable, or about the same as what you had before?	*Response*	*(n=128)*	*Percent of Respondents*
	More reliable	90	70%
	Less reliable	2	2%
	About the same	24	19%
	Don't know	12	9%

9. Does the new energy efficient equipment work better, worse, or about the same as what you had before?	*Response*	*(n=125)*	*Percent of Respondents*
	Works better	94	75%
	Works worse	1	1%
	About the same	23	18%
	Don't know	7	6%

10. Does the new energy efficient equipment need more maintenance, less maintenance, or about the same as what you had before?	*Response*	*(n=128)*	*Percent of Respondents*
	More maintenance	5	4%
	Less maintenance	56	44%
	About the same	44	34%
	Don't know	22	17%

11. Do the energy efficient appliances have any new features that your previous appliances didn't have?	*Response*	*(n=124)*	*Percent of Respondents*
	Yes	51	41%
	No	51	41%
	Don't know	21	17%

12. Has the program made you more aware of energy efficiency and/or more conscious of energy use?	*Response*	*(n=126)*	*Percent of Respondents*
	More aware	103	82%
	Less aware	1	1%
	About the same	18	14%
	Don't know	4	3%

13. Is there anything that you don't like about the energy efficiency improvements?	*Response*	*(n=125)*	*Percent of Respondents*
	Yes	13	10%
	No	106	85%
	Don't know	6	5%

14. Have you had problems with the functioning of the equipment?	*Response*	*(n=105)*	*Percent of Respondents*
	Yes	5	5%
	No	96	91%
	Don't know	4	4%

14A. Have any of these problems caused an interruption of gas or electric service or a complete shutoff of the equipment?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	0%
	No	0	0%
	Don't know	0	0%

14B. Have any of these problems caused you to miss work and/or lose wages?	*Response*	*(n=0)*	*Percent of Respondents*
	Yes	0	0%
	No	0	0%
	Don't know	0	0%

15. Have you removed any of the new energy efficient equipment that was installed in your home?	*Response*	*(n=131)*	*Percent of Respondents*
	Yes	2	2%
	No	127	97%
	Don't know	2	2%

16. Have you shared your experience with energy efficient equipment with anyone?	*Response*	*(n=130)*	*Percent of Respondents*
	Yes	99	76%
	No	28	22%
	Don't know	3	2%

16A. Was it a positive or negative experience that you shared?	*Response*	*(n=95)*	*Percent of Respondents*
	Shared positive experience	95	100%
	Share negative experience	0	0%
	Don't know	0	0%

17. Overall, how satisfied are you with the energy efficiency improvements made to your home?	*Response*	*(n=134)*	*Percent of Respondents*
	Very satisfied	101	75%
	Somewhat satisfied	23	17%
	Neither satisfied nor dissatisfied	3	2%
	Somewhat dissatisfied	5	4%
	Very dissatisfied	0	0%
	Don't know	2	1%

18a. How satisfied are you with the quality of installation work?	*Response*	*(n=136)*	*Percent of Respondents*
	Very satisfied	115	85%
	Somewhat satisfied	13	10%
	Neither satisfied nor dissatisfied	2	1%
	Somewhat dissatisfied	2	1%
	Very dissatisfied	3	2%
	Don't know	1	1%

18b. How satisfied are you with the performance of the equipment installed?	*Response*	*(n=127)*	*Percent of Respondents*
	Very satisfied	101	80%
	Somewhat satisfied	11	9%
	Neither satisfied nor dissatisfied	4	3%
	Somewhat dissatisfied	3	2%
	Very dissatisfied	3	2%
	Don't know	5	4%

	Response	*(n=134)*	*Percent of Respondents*
18c. How satisfied are you with the savings on your monthly utility bills?	Very satisfied	74	55%
	Somewhat satisfied	23	17%
	Neither satisfied nor dissatisfied	13	10%
	Somewhat dissatisfied	2	1%
	Very dissatisfied	3	2%
	Don't know	19	14%

	Response	*(n=136)*	*Percent of Respondents*
18d. How satisfied are you with the level of professionalism and service provided by the contractor?	Very satisfied	115	85%
	Somewhat satisfied	10	7%
	Neither satisfied nor dissatisfied	2	1%
	Somewhat dissatisfied	2	1%
	Very dissatisfied	6	4%
	Don't know	1	1%

	Response	*(n=134)*	*Percent of Respondents*
18e. How satisfied are you with the level of professionalism and service provided by the program staff?	Very satisfied	118	88%
	Somewhat satisfied	9	7%
	Neither satisfied nor dissatisfied	3	2%
	Somewhat dissatisfied	0	0%
	Very dissatisfied	4	3%
	Don't know	0	0%