



Energy Efficiency / Demand Response Plan: Plan Year 3 (6/1/2010-5/31/2011)

Low Income Residential Retrofit Energy Efficiency Program Evaluation

Presented to

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Economic Opportunity

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Executive Summary

The Illinois Department of Commerce and Economic Opportunity (DCEO) provides grants to program partners to give funding to their participants for energy efficiency measures or for the direct installation of the energy efficiency measures in low income residences. DCEO provides these grants to partners that already administer low income weatherization programs or other low income home improvement programs in the Illinois electric service territories of Commonwealth Edison or Ameren. This program has been in existence since 2008, however many of the program partners have been running low-income programs for several years and this program provided them with additional funding.

The installation of weatherization measures and other home improvements are generally focused on gas savings, which are not part of this evaluation. However, this report does look at the energy savings achieved from the extra funding for electric efficiency measures that are installed in tandem with the weatherization and home improvement work.

E.1. Evaluation Objectives

The objective of this evaluation report is to provide verification of electric savings impacts during program year 3 (PY3), which covers June 1, 2010 through May 31, 2011.

For this report on PY3, we examined the program's impact calculations and tracking data to answer the impact evaluation questions:

1. What are the gross impacts from this program?
2. Did the program meet its energy goals? If not, why not?

The objectives of the process evaluation were to develop an understanding of the final program design and implementation strategies as well as document program processes and tracking efforts.

E.2. Evaluation Methods

The evaluation methods for this year included an algorithm review to verify that reasonable assumptions and methods were used for assigning ex-ante gross kWh and kW savings per measure.

In program year one (PY1) DCEO used the Energy Star Calculator for all of their measure savings estimates, except for the furnace measure. EPA and DOE data was the source of the information used by DCEO in the Energy Star calculators. The furnace information came from

the Gas Appliance Manufacturers Association. For PY2 and PY3 DCEO used the calculation methods suggested in the PY1 evaluation. There were no new measures in PY3.

Navigant used several sources to verify the reasonableness of the DCEO savings estimates including:

- Pennsylvania Public Utility Commission TRM
- The most current California Database for Energy Efficiency Resources (DEER) reports
- Efficiency Vermont's Technical Reference User Manual (TRM) 2010
- Navigant's own measure studies.

The primary data collection for the process evaluation was in-depth interviews with program implementation staff and program partners. The team also reviewed secondary data sources including the program implementation plan, the Residential Retrofit Energy Efficiency Program guidelines, and best practices for low income programs.¹

E.3. Key Findings and Recommendations

E.3.1. Impact Evaluation

The evaluation team recommends that saving estimates from refrigerators and lighting be adjusted due to ComEd evaluation studies that provide more accurate saving estimates. All other measure savings estimates remain the same as last year as the estimates continue to be reasonable when compared to other authoritative sources. Navigant adjusted the refrigerator energy and demand savings estimates. Navigant's evaluation of the ComEd Appliance Recycling program revealed that the refrigerator stock has a higher energy use than was estimated in the previous LI Retrofit evaluations. Navigant adjusted the lighting energy and demand savings estimates. Navigant's evaluation of the ComEd Residential Energy Star Lighting program determined that the hours of use and peak coincidence factor should be adjusted.

- **Recommendation. Improve ex ante and ex post estimates of measure savings per unit.** We recommend that both DCEO and the EM&V team continue to make efforts to find up-to-date measure savings data sources for areas closer to the Illinois region.

Table ES-1 presents the ex ante (DCEO reported) and ex post (evaluation verified) gross and net program impact results for the Weatherization program. The summary of final gross and net savings for the Home Improvement program can be found in Table ES-2.

¹ ACEEE, "Meeting Essential Needs: The Results of a National Search for Exemplary Utility Funded Low Income Energy Efficiency Programs", September 2005.

Table ES-3 and Table ES-4 present the net savings impact contributions of ComEd and Ameren for the Weatherization and Home Improvement programs.

Table ES-1. Summary of Gross and Net Savings for Low Income Weatherization

Low Income Weatherization Program PY3	MWh Savings		kW Savings	
	Ex Ante	Ex Post	Ex Ante	Ex Post
Gross Savings	5,777	8,157	660	1,173
Net-to-Gross Ratio	1	1	1	1
Net Savings	5,777	8,157	660	1,173

Table ES-2. Summary of Gross and Net Savings for Low Income Home Improvement

Low Income Home Improvement Program PY3	MWh Savings		kW Savings	
	Ex Ante	Ex Post	Ex Ante	Ex Post
Gross Savings	2,161	3,184	486	725
Net-to-Gross Ratio	1	1	1	1
Net Savings	2,161	3,184	486	725

Table ES-3. ComEd and Ameren Net Savings for Low Income Weatherization

Low Income Weatherization Program PY3	MWh Savings		kW Savings	
	Ex Ante	Ex Post	Ex Ante	Ex Post
ComEd	2,980	4,419	340	661
Ameren	2,797	3,738	320	512
Net Savings	5,777	8,157	660	1,173

Table ES-4. ComEd and Ameren Net Savings for Low Income Home Improvement

Low Income Weatherization Program PY3	MWh Savings		kW Savings	
	Ex Ante	Ex Post	Ex Ante	Ex Post
ComEd	2,040	3,019	412	643
Ameren	121	165	74	82
Net Savings	2,161	3,184	486	725

E.3.2. Process Evaluation

The process evaluation of the Residential Retrofit Energy Efficiency Program concluded that this program is effectively funneling funds to existing and established low-income programs (partners). The partners are very satisfied with the application process and interactions with the program staff. DCEO also made some advantageous changes to the PY3 program: DCEO has minimized the differences between weatherization and home improvement to avoid market confusion, and it increased the maximum grant amount for many of the eligible measures.

The program's implementation strategy meets many of the industry best practices for low-income programs. The program is smoothly providing incentives to partners, providing a program that is easily understood by its targets, providing timely responses to partner questions and is continuing to funnel program funds through pre-existing programs. By adding funding to existing programs, DCEO is able to achieve large energy savings with low administrative costs by leveraging existing infrastructure. The impact of these funds on partners allowed more homes to be upgraded with energy efficient measures than what would have happened without the program and the funding enabled these partners to bring the importance of energy efficiency into their existing activities and goals.

Communication. While partners were mostly satisfied with the level of communication with DCEO, this was not universally true. Some stated that communication with external partner organizations fell off sharply after the 2010 applications had been submitted. Towards the end of the calendar year, close to when the funding was announced, communication changed from being infrequent to almost daily. While partners appreciated communication during this critical period, they would prefer regular communications throughout the entire process. Consistent communication is especially important because partners often plan their financial strategies around what they understand from the written material and are only in close personal communication with DCEO later in the funding process. If there are miscommunications at the beginning, it may be too late to correct these later on. The primary sources of confusion were the details as to which administrative fees were eligible for grant funding, as well as caveats surrounding air conditioning eligibility.

- **Recommendation.** More frequent and consistent communication throughout the year.

Measure Choices. Many partners suggested that the program add more measures to their standard offering. Suggested measures for future grants include ENERGY STAR clothes washers, lighting lamp and ballast retrofits instead of full-fixture retrofits, and water pumps and boosters. We recommend that the DCEO consider whether additional measures fit the scope of the program and if they can be offered and still maintain the program's cost effectiveness.

- **Recommendation.** Examine the potential to add new standard eligible measures.

Grant Award Period. Some participants noted the long period of time between the application and the granting of funds. Partner organizations, are dependent on multiple funding sources. Each of these sources stipulates a different time period in which its funds must be used. A long period between the DCEO application and the granting of funds increases the difficulty of planning where and how partners can spend these various funding sources. This also can leave little time for the partner agency to effectively spend the grant money, which can make relationships with contractors difficult.

- **Recommendation.** Reexamine the grant award period.

E.4. Cost Effectiveness Review

Cost effectiveness is assessed through the use of the Illinois Total Resource Cost (TRC) test. Table ES-5 summarizes the unique inputs used to calculate the TRC ratio for the Low Income Residential Retrofit Energy Efficiency Program in PY3. Most of the unique inputs come directly from the evaluation results presented in this report. Measure life estimates were based on similar ComEd programs, third party sources including the California Public Utilities Commission (CPUC) developed Database of Energy Efficiency Resources (DEER) and previous Navigant evaluation experience with similar programs. Program costs data came directly from DCEO. Incremental costs were estimated from program, survey data and similar ComEd programs. Avoided cost data came from both ComEd and Ameren and are the same for all programs.

Table ES-5. Inputs to TRC Model for Low Income Residential Retrofit Energy Efficiency Program

Item	Value Used
Measure Life	12 years
Annual Gross Energy Savings	11,341 MWh
Gross Coincident Peak Savings	1.90 MW
Net-to-Gross Ratio	100%
DCEO Administration and Implementation Costs	\$650,201
DCEO Incentive Costs	\$7,066,634
Net Participant Costs	\$7,066,634

Based on these inputs, the Illinois societal TRC for this program is 0.75 and the program fails the Illinois TRC test. However the low income programs are not required to meet the TRC test.²

² ILCS 220 5/8-103(a) and 5/8-104(a), which states "The low income measures described in section (f)(4) of this Section shall not be required to meet the total resource cost test."

Section 1. Introduction to the Program

1.1 *Program Description*

The Low Income Residential Retrofit program is comprised of two separate programs a Low Income Weatherization program and a Low Income Home Improvement program. Each year DCEO administers a grant application and acceptance process that provides extra funding for electric energy efficiency measures installed in low income residential homes. DCEO awards grants to state agencies, local governments, lending institutions, affordable housing developers and other entities that administer low income weatherization programs or other low income home improvement programs in the Illinois electric service territories of Commonwealth Edison or Ameren. The objective of the grant process is to leverage existing energy efficiency programs to maximize electricity savings in low income residences.

Evaluation of the Low Income Weatherization and Low Income Home Improvement programs is combined into a single report because they both provide incentives for a similar set of retrofit measures that improve electric efficiency in existing homes.

When funding is provided to Low Income Weatherization programs, grants are more likely to cover 100% of the cost of the approved electric efficiency measures for each home but fewer measures are covered. When funding is provided to organizations with Home Improvement programs that promote home repair and rehab in low-income neighborhoods, grants are more likely to cover only the incremental costs for the electric efficiency measures but more measures are eligible for funding.

1.1.1 **Implementation Strategy**

The goal of the program is to leverage existing programs to maximize electricity savings in low income residences, and to capture electricity savings that would otherwise be missed due to insufficient funding. The overall implementation strategy for this program is to give additional funding to pre-existing home improvement and weatherization programs that target the low-income sector. The overall program is managed by DCEO, and DCEO works with program partners throughout the implementation of the program. The partners themselves can work with program administrators, homeowners, property owners (in the case of a multi-family building), contractors, and developers.

In order to be eligible to participate in the program, program partners need to meet the following requirements:

- They must administer a low income weatherization or low income home improvement program for residences that are located in Illinois and receive electricity from either ComEd or Ameren.

- The projects funded need to result in the installation of energy efficiency measures in existing residential buildings.
- If the partners’ program is a weatherization program, it must be targeted to households at or below 200% of the poverty level.
- If a partners’ program is a home improvement program, it must be targeted to households at or below 80% of the Area Median Income (AMI).

1.1.2 Measures and Incentives

Table 1-1 shows the electric efficiency measures and the associated incentive levels provided by the program. The measures and incentives no longer vary depending on whether the grantee’s pre-existing program is defined as a low income weatherization program or a low income home improvement program, as they did in the previous year.

Table 1-1. Energy Efficiency Measures and Incentives

	Measure	Incentive per Unit
1	Energy Star Refrigerator	\$700
2a	CFL Installation	\$5
2b	Energy Star Fixture	\$95
3	Energy Star rated bathroom exhaust fan	\$450
4	High SEER central air conditioner w/ programmable thermostat	\$3,100 (SEER 14)
5	Energy Star rated room air conditioner	\$400
6	90% AFUE furnace with efficient air handler	\$600
7	Energy Star Dishwasher	\$550
8	Reduce required AC tonnage as a result of thermal envelope improvements	\$2,500
9	Ceiling Fan	\$250

1.2 Evaluation Questions

The evaluation sought to answer the following key researchable questions.

Impact Questions:

1. What are the gross impacts from this program?
2. Did the program meet its energy goals? If not, why not?

The installation of weatherization measures is focused primarily on gas savings which are not part of this evaluation. However, this report does look at the energy savings achieved from the extra funding for electric efficiency measures that are installed in tandem with the weatherization work. It also looks at the energy savings achieved from the extra funding for electric efficiency measures given to organizations that run home improvement programs that are not part of the Low Income Weatherization program.

The objectives of the process evaluation were to develop an understanding of the final program design and implementation strategies and complete documentation of program processes and tracking efforts. Particular emphasis was placed on an assessment of processes for coordinating with other programs to identify potential missed opportunities and leverage funding to deliver program services. We identified best practices for similar low income program efforts and provide recommendations to improve program efficiency and effectiveness.

Specific focus of the process evaluation was to answer the following questions:

- Because the program funds are funneled through pre-existing programs, we will determine if the additional funding has changed how these programs are implemented.
- What are the characteristics of the customers and the program partners (which encompass contractors, other state agencies, and non-profit agencies) participating in the programs and is this the expected group for participation?
- Are the program processes effective for smoothly providing incentives to partners and motivating the program partners to participate?

Section 2. Evaluation Methods

2.1 *Analytical Methods*

2.1.1 **Impact Evaluation Methods**

The evaluation reviewed the energy savings algorithms to verify that the assumptions were reasonable assumptions and the algorithm was correct for assigning ex-ante gross kWh and kW savings per measure.

The first step was a verification of the mathematical soundness of the savings calculations for each measure. The measure algorithm's components were verified with the savings assumptions provided by DCEO. The calculations were checked to ensure that the reported results could be replicated.

Once the calculation methods were verified, the reasonableness of the calculation was assessed. The assessment of reasonableness of the savings estimates was based on reputable measure savings evaluations from other sources and Navigant's own engineering calculations for similar measures.

2.1.2 **Process Evaluation Methods**

The process evaluation was primarily based on in-depth interviews with program staff and program partners. DCEO program staff provided us with contact information for all seven partners that received program funding in PY3. We were able to conduct an in-depth interview with all seven partners in August 2011. We also reviewed program materials including implementation plans, application materials, and the actual applications submitted to the program.

2.2 *Data Sources*

2.2.1 **Impact Evaluation Sources**

Data used to prepare this evaluation came from several sources. DCEO provided program documentation, tracking information and energy savings calculation algorithms. The tracking information was at a summary level for each participating organization that receives a grant from DCEO. Savings were disaggregated by measure and by utility service territory.

DCEO accepted and implemented all the per-unit measure savings estimates recommended by Navigant's PY2 evaluation report.

The evaluation team referred to several additional sources to verify the reasonableness of the DCEO savings estimates including the following:

- Pennsylvania Public Utility Commission TRM
- The most current California Database for Energy Efficiency Resources (DEER) reports
- Efficiency Vermont's Technical Reference User Manual (TRM) 2010
- Navigant's own measure studies.

Section 3. Program Level Results

3.1 *Impact Evaluation Results*

The impact evaluation will cover verification and due diligence issues, program tracking system review, and verification of gross and net savings for the program.

3.1.1 **Verification and Due Diligence**

Both programs have significant verification requirements. Every site in the Weatherization program receives a follow-up on-site inspection. For the Home Improvement program, grantees have to provide receipts for all installations to collect their grant money.

Grantees are responsible for ensuring that funded measures meet program requirements and are properly installed. The DCEO program manager monitors Grantee compliance with the terms of the grant agreement.

The evaluation reviewed DCEO's procedures and documentation and concluded that their verification procedures were adequate.

3.1.2 **Tracking System Review**

The tracking system data reviewed for this program was summary-level data prepared by DCEO. Since DCEO administers the program by providing grants to specific agencies, the focus of their tracking system is energy savings achievements for each agency. The number of installations is recorded for each measure within each agency. Deemed savings per measure are used to estimate total program savings. Care is taken to identify which installations are in ComEd service territory and which are in Ameren since funding is tied back to these two different sources.

The summary data is based on quarterly reports from each grantee which provide addresses of all installations completed over the quarter, the number of occupants meeting the income qualifications, and documentation on the electric service provider (ComEd or Ameren).

DCEO's tracking system gathers and verifies the appropriate data to accurately provide the number of measures installed and the location of the measure installations.

3.1.3 **Gross Program Impact Parameter Estimates**

This section presents the results of the evaluation's technical review of the gross savings assumptions for each measure included in either the Weatherization program or the Home Improvement program.

Energy Star Refrigerator

DCEO assumes annual savings of 550 kWh per unit for their Energy Star Refrigerator measure.

Navigant suggests adjusting this savings to 1,405 kWh per year. This is a significant adjustment from the PY2 evaluation that estimated savings at 550 kWh per year. DCEO is using the 550 kWh savings based on Navigant's PY2 evaluation. The adjusted savings is based on new data on the refrigerator stock in ComEd's service territory. This data points to higher average usage for the replaced refrigerators. ComEd's Appliance Recycling program, targeted at the general population, recycled over 30,000 refrigerators and their data shows that 22% were the primary refrigerator in the home and 61% were over 20 years old. Refrigerators made before 1993 use significantly more energy than refrigerators those produced after 1993. The Appliance Recycling program evaluation calculated the average energy use of the recycled refrigerators at 1,855 kWh³ annually. It is reasonable to assume that the Low Income Retrofit population will on average have older refrigerators that use more energy than the average for the general population because their limited income reduces their ability to purchase newer, more efficient models. While it does not necessarily follow that the average ComEd **recycled** refrigerator is of the same vintage as the average replaced refrigerator in DCEO's program, it seems to be a reasonable assumption. Navigant confirmed that this savings estimate was reasonable for DCEO's program as it was consistent with Pennsylvania's TRM for refrigerator replacements that estimated the replaced stock of refrigerators used 1,659 kWh annually and replacement refrigerators use 454 kWh. Further evidence that the savings estimate is reasonable comes from Vermont's TRM that stated a range of savings from 800 to 2,500 kWh for refrigerator replacement in Low Income programs. Navigant's savings estimate is calculated by taking the conventional recycled refrigerator that uses 1,855 kWh annually and comparing it to the Energy Star replacement which uses 450 kWh annually. Total annual savings per unit from this calculation is 1,405 kWh.

The demand savings shifts to 0.281 kW using the updated 1,405 kWh in the demand savings calculation.

CFL Installation

DCEO assumes annual savings of 38.25 kWh and 0.00436 per 15-watt CFL for their CFL Installation measure.

Navigant suggests adjusting this savings to 42.21 kWh and 0.00459 per 15-watt CFL.

³ Evaluation Report: Residential Appliance Recycling. Energy Efficiency / Demand Response Plan: Plan Year 3 (6/1/2010-5/31/2011). Navigant Consulting. May 2012.

There are several key assumptions to the calculation of savings for CFLs.

In-service Rate. In this program the bulbs are installed for the customer while other energy efficiency work is being done on the home. This justifies the use of the 100% in-service rate for this program. If the bulbs were distributed to the customer but not installed for them a lower in-service rate would be appropriate.

Hours of Use. The DEER estimation of hours of use is 2.34 hours per day, taken from a California metering study. However, average hours of use depend on the number of bulbs per home and their room placement. Navigant’s evaluation of the Commonwealth Edison Company’s residential lighting program extensively explored hours of use with on-site verifications. The logger study revealed an increase in the HOU to 2.57 hours per day. This study is more representative of the HOU in the DCEO area than the California study.

Saved Watts per Bulb. DCEO assumed that the average replaced light bulb was a 60 Watt bulb and it was replaced with a 15 Watt CFL bulb. It is known that all of the installed bulbs were 15 watt bulbs for this program, however, this is only half of the equation. The wattage of the replaced light would be needed to improve the estimate of saved watts per bulb.

Peak Coincidence Factor (CF)

Navigant’s evaluation of the ComEd residential lighting program provided a peak coincidence factor that was more representative of the DCEO region than the California study. The peak coincidence factor adjustment caused the demand saving estimate to shift from .00436 kW to .00459 kW.

$$\text{kW} = \text{Delta Watts}/1000 * \text{Peak Coincidence Factor}$$

$$\text{kW} = 45/1000 * 0.102$$

$$\text{kW} = 0.00459$$

The EM&V team does not recommend any changes to the estimate of 45 watts saved per bulb.

Energy Star Fixtures

DCEO estimated annual savings of 54.8 kWh per unit for their Energy Star Fixture program. Two outdoor fixtures and eight indoor fixtures were installed at each dwelling.

Navigant suggests adjusting this savings to 50.19 kWh and 0.005337 per fixture.

DCEO total ex ante annual savings per household from this calculation is 54.8 kWh. Similar to our discussion of savings from CFL bulbs, all of these fixtures were installed for the customer so the in-service rate is 100%.

The eight indoor fixtures are calculated the same way as the CFL installation above. The two outdoor fixtures have different HOU and peak coincidence factors than the indoor fixtures. The outdoor fixtures are estimated to have an HOU of 5 and a peak coincidence factor of .00832. The reduction in the saving estimate is due to the change in HOU in the outdoor fixtures.

Energy Star rated Bathroom Exhaust Fan

DCEO assumes annual savings of 89 kWh per unit for their Energy Star rated Bathroom Exhaust Fan measure.

Energy Star bathroom exhaust fan ratings were used for the DCEO calculation. It was assumed that the fans would be run for two hours per day. The conventional fan was rated to use 150 watts an hour while the Energy Star fan was rated to use 28 watts an hour. This is a difference of 122 watts per hour. Total annual savings per unit from this calculation is 89 kWh (365 days x 2 hours/day x 122 watts/hour = 89 kWh).

The EM&V team examined the Home Ventilating Institute's (HVI) bathroom fan ratings and verified the reasonableness of the conventional and replacement bathroom fan wattages used by DCEO.

The EM&V team does not recommend any changes to the ex ante estimate of savings for Energy Star rated Bathroom Exhaust Fans.

SEER=14 Central Air Conditioner with Programmable Thermostat

In PY3, DCEO assumed annual savings of 1,119 kWh per unit for their SEER=14 Central Air Conditioner with Programmable Thermostat measure.

This measure is part of the Weatherization program which looks at savings from replacing an existing unit. The conventional existing central AC unit was assumed to have a SEER rating of 9 and no programmable thermostat. The low SEER value used for this savings estimation is appropriate given that this is for the Weatherization program where an older central air conditioning model is being replaced before its normal end of life, as opposed to the Home Improvement program that is installing a new central air conditioning unit in a home that does not have one.

The EM&V team continues to recommend using 1,119 kWh per unit for the estimation of verified gross savings.

SEER=14 new Central Air Conditioner with Programmable Thermostat

DCEO assumes annual savings of 240 kWh per unit for their SEER=14 Central Air Conditioner with Programmable Thermostat measure.

DCEO used the savings estimates from Navigant's PY2 evaluation to calculate the gross savings for this measure. This measure is part of the Home Improvement program which looks at incremental savings compared to installation of a baseline new unit with a lower SEER. The conventional baseline unit was assumed to have a SEER rating of 13 and no programmable thermostat. This conventional unit was estimated to use 1,662 kWh per year. The Energy Star central AC unit was assumed to have a SEER rating of 14 and have a programmable thermostat. The Energy Star central AC unit was estimated to use 1,296 kWh per year. Without additional adjustment, this would suggest savings of 366 kWh.

The EM&V team continues to recommend using 240 kWh per unit for the estimation of verified gross savings.

Energy Star rated Room Air Conditioner

DCEO assumes annual savings of 176 kWh per unit for their Energy Star rated Room Air Conditioner measure.

DCEO uses the Navigant PY2 estimates to calculate gross savings for this measure. As part of the Home Improvement program, it is assumed that the Energy Star rated room air conditioner would be installed instead of a conventional new room air conditioner. DCEO assumes the conventional room AC unit has an EER rating of 8.8, while the Energy Star room AC has an EER rating of 11.5. Based on these values, the Energy Star calculator estimates an annual kWh usage of 750 for the conventional unit and 574 for the efficient unit. The total annual savings per unit from this calculation is 176 kWh.

The EM&V explored Vermont's 2010 TRM and Pennsylvania's 2011 TRM and with the given EER rating parameters the 176 kWh is a reasonable estimate.

The EM&V team recommends using 176 kWh per unit.

90% AFUE Furnace with efficient air handler

DCEO assumes annual savings of 400 kWh per unit for their 90% AFUE Furnace with efficient air handler measure. Since these are electric savings, they come from the efficiency of the air handler (furnace fan) and are not directly related to the AFUE rating on the furnace.

DCEO used Navigant's PY2 saving estimates to calculate the gross electric savings from this measure. DCEO assumes the total annual savings per unit from this calculation is 400 kWh.

The EM&V team recommends using 400 kWh per unit as a reasonable estimate of savings from an efficient air handler on a furnace.

Energy Star Dishwasher

DCEO assumes annual savings of 62 kWh per unit for their Energy Star Dishwasher program.

DCEO used Navigant's PY2 saving estimates to calculate gross savings for this measure. Conventional dishwashers were rated as using 211 kWh per year. Energy Star dishwashers were rated as using 149 kWh per year. DCEO assumes total annual savings per unit from this calculation is 62 kWh.

The EM&V explored Vermont's 2010 TRM and Pennsylvania's 2011 TRM and with the given EER rating parameters the 62 kWh is a reasonable estimate.

The EM&V team recommends using 62 kWh per unit.

Reduce required AC tonnage as a result of weatherization improvements

DCEO assumes annual savings of 216 kWh per unit when a new air conditioner is installed in a home that also received weatherization improvements. This savings is attributed to the fact that the size (tonnage) of the unit can be reduced because the cooling requirements of the home have been lowered.

The DCEO estimate of savings for this measure is based on several assumptions. They assumed the weatherization improvements to the home were sidewall insulation, roof cavity insulation, and improved window thermal efficiency. They then made an engineering judgment that this would contribute to a ½ ton reduction in cooling requirements for the home. This judgment was based on their knowledge that homes being rehabbed under the Home Improvement program are old. DCEO assumes the participants had no or poor insulation in the sidewalls and attic, giving an overall low effective R-value. If windows were being replaced, it was assumed the old windows were single-pane or single-pane with storms. This situation was expected to create a cooling load reduction of ½ ton after the sidewalls and attics were insulated. This was considered a broad assumption given that homes in the program are spread across the state and vary in size. The ½ ton reduction in capacity led to an estimate of 216 kWh of savings per year.

The EM&V team believes that more information on the measures installed is needed before the EM&V team can accurately assess the savings estimates. For example, we would need a detailed breakdown of the type of weatherization measures that were installed in each dwelling. An initial examination of Oak Ridge National Laboratory and Green Builders databases on insulation and window improvement savings suggest that DCEO's savings estimates are within the likely ranges depending on the amount of weatherization measures installed.

The EM&V team recommends using 216 kWh per unit this year and that DCEO should explore the possibility of tracking more detailed weatherization information per home to facilitate more accurate savings estimates.

Ceiling Fan

DCEO assumes annual savings of 88 kWh per unit when a new ceiling fan is installed. DCEO used an Ameren spreadsheet to calculate gross savings for this measure.

The EM&V team compared this savings estimate to other sources. The Efficiency Vermont's Technical Reference User Manual (TRM) concluded that annual savings from the replacement of a ceiling fan is 180 kWh. The most recent Energy Star calculator lists the savings from a ceiling fan in the East North Central region to be 90 kWh. The discrepancy in the two saving estimates is a result of the assumptions of the replaced ceiling fan. The Vermont Manual assumed the ceiling fan had four bulbs and 1,241 annual hours of use. The Energy Star calculator assumed three bulbs and 1,022 hours of annual use. Based on this range of savings, the 88 kWh savings estimated by DCEO is a reasonable savings estimate.

The EM&V team recommends using 88 kWh per unit this year.

Summary of Energy Savings Assessment

Table 3-1 compares the original estimates of ex ante gross savings per unit to the final recommended verified values for each program measure. Most of the measure-specific ex ante gross savings estimates were reasonable when compared to other authoritative sources.

Table 3-1. Summary of PY3 Verified Gross Energy Savings per Unit

	Measure	Ex Ante kWh per unit	Verified kWh per unit	Difference
1	Energy Star Refrigerator	550	1,405	855
2a	CFL Installation	38.25	42.21	3.96
2b	Energy Star Fixture	54.8	50.2	-4.6
3	Energy Star rated bathroom exhaust fan	89	89	0
4a	SEER 14 replacement central air conditioner w/ programmable thermostat	1,119	1,119	0
4b	SEER 14 new central air conditioner w/ programmable thermostat	240	240	0
5	Energy Star rated room air conditioner	176	176	0
6	90% AFUE furnace with efficient air handler	400	400	0
7	Energy Star Dishwasher	62	62	0
8	Reduce required AC tonnage as a result of thermal envelope improvements	216	216	0
9	Ceiling Fan	88	88	0

Estimates of Peak Demand Savings

Peak demand savings were estimated for each measure in addition to annual energy savings. For this evaluation, the peak period is defined as 1:00 to 6:00 p.m. on the hottest summer weekday.

DCEO’s estimates of peak demand savings for most measure types in PY3 were based on the assumption of uniform use over all hours of the year. That is, annual energy savings estimates were divided by 8760 hours to get an estimate of peak demand savings for the measure. The EM&V team concurs that a uniform load shape based on 8760 hours is an appropriate assumption to use for peak contributions for most of the measure types until more detailed load shape data is available. The hours of use should for air-conditioning and furnace measures should be 600 hours to reflect their seasonal use.

Table 3-2. Calculation of Verified Gross Demand Savings

	Measure	Verified kWh per unit	Hours	Unadjusted kW per unit	Adjustment Factor	Verified kW per unit
1	Energy Star Refrigerator	1,405	8760	0.281	1	0.281
2a	CFL Installation	42.21	8760	0.0046	1	0.0046
2b	Energy Star Fixture	50.2	8760	0.0053	1	0.0053
3	Energy Star rated bathroom exhaust fan	89	8760	0.0102	1	0.0102
4a	SEER 14 replacement central air conditioner w/ programmable thermostat	1,119	600	2.1450	70%	1.5015
4b	SEER 14 new central air conditioner w/ programmable thermostat	240	600	0.4000	70%	0.2800
5	Energy Star rated room air conditioner	176	600	0.2933	70%	0.2053
6	90% AFUE furnace with efficient air handler	400	8760	0	0	0
7	Energy Star Dishwasher	62	8760	0.0071	1	0.0071
8	Reduce required AC tonnage as a result of thermal envelope improvements	216	600	0.3600	70%	0.2520
9	Ceiling Fan	88	8760	0.147	1	0.147

Table 3-3. Summary of Verified Gross Demand Savings

	Measure	Ex Ante kW per unit	Ex Post kW per unit	Difference
1	Energy Star Refrigerator	0.0628	0.281	0.2182
2a	CFL Installation	0.00436	0.00459	0.00023
2b	Energy Star Fixture	0.00626	0.00533	-0.00093
3	Energy Star rated bathroom exhaust fan	0.0102	0.0102	0
4a	SEER 14 replacement central air conditioner w/ programmable thermostat	1.5015	1.5015	0
4b	SEER 14 new central air conditioner w/ programmable thermostat	0.2800	0.2800	0
5	Energy Star rated room air conditioner	0.2053	0.2053	0
6	90% AFUE furnace with efficient air handler	0	0	0
7	Energy Star Dishwasher	0.0071	0.0071	0
8	Reduce required AC tonnage as a result of thermal envelope improvements	0.2520	0.2520	0
9	Ceiling Fan	0.147	0.147	0

3.1.4 Gross Program Impact Results

The verified gross savings per unit for energy and demand savings can be used with the actual number of installations for each measure to show the overall gross program impact results for PY3.

The evaluation team recommends that DCEO and the EM&V team continue to monitor measure saving estimate studies for more accurate saving estimates. There are continuous studies being conducted on measure savings. To obtain the most accurate saving estimates studies that are the most rebuttable and comparable to the Low Income Retrofit program are needed.

Weatherization Program

Table 3-4 presents the ex ante and ex post gross MWh savings for the Weatherization program. Table 3-5 presents the companion MW savings. For this program, the ex post energy and demand savings are higher than the ex ante savings.

Table 3-4. Weatherization Program Ex Ante and Ex Post Gross MWh Savings

Measure	Ex Ante			Ex Post		
	kWh/Unit	Units	Total MWh	kWh/Unit	Units	Total MWh
Energy Star Refrigerator	550	2,236	1,230	1,405	2,236	3,142
CFL	38.25	118,116	4,518	42.21	118,116	4,986
Energy Star Bathroom Exhaust Fan	89	323	29	89	323	29
Energy Star rated room air conditioner	176	3	0	176	3	0
TOTAL			5,777			8,157

Table 3-5. Weatherization Program Ex Ante and Ex Post Gross kW Savings

Measure	Ex Ante			Ex Post		
	kW/Unit	Units	Total kW	kW/Unit	Units	Total kW
Energy Star Refrigerator	0.0628	2,236	141	0.281	2,236	628
CFL	0.00436	118,116	516	0.00459	118,116	542
Energy Star Bathroom Exhaust Fan	0.0102	323	3	0.0102	323	3
Energy Star rated room air conditioner	0.2053	3	0	176	3	0
TOTAL			660			1,173

Note: These tables only include the electric efficiency measures actually installed through the Weatherization program in PY3.

Home Improvement Program

Table 3-6 presents the ex ante and ex post gross MWh savings for the Home Improvement program. Table 3-7 presents the companion kW savings. For this program, the ex post energy and demand savings are higher than the ex ante savings.

Table 3-6. Home Improvement Program Ex Ante and Ex Post Gross MWh Savings

Measure	Ex Ante			Ex Post		
	kWh/Unit	Units	Total MWh	kWh/Unit	Units	Total MWh
Energy Star Refrigerator	550	1,075	591	1,405	1,075	1,510
Energy Star Fixture	54.80	1,860	102	50.19	1,860	93
Energy Star Bathroom Exhaust Fan	89	233	21	89	233	21
Energy Star Dishwasher	62	131	8	62	131	8
SEER 14 Central AC with programmable thermostat (new installation)	240	74	18	240	74	18
Energy Star Room AC	176	245	43	176	245	43
Reduce required tonnage as a result of thermal envelope improvements	216	515	111	216	515	111
90% AFUE furnace with EE air handler	400	337	135	400	337	135
CFL Installation	38.25	28,348	1,084	42.21	28,348	1,197
Ceiling Fan	88	541	48	88	541	48
TOTAL			2,160			3,184

Table 3-7. Home Improvement Program Ex Ante and Ex Post Gross kW Savings

Measure	Ex Ante			Ex Post		
	kW/Unit	Units	Total kW	kW/Unit	Units	Total kW
Energy Star Refrigerator	0.0628	1,075	67	0.281	1,075	302
Energy Star Fixture	0.00626	1,860	12	0.00534	1,860	10
Energy Star Bathroom Exhaust Fan	0.0102	233	2	0.0102	233	2
Energy Star Dishwasher	0.0071	131	0.9	0.0071	131	0.9
SEER 14 Central AC with programmable thermostat (new installation)	0.2800	74	21	0.2800	74	21
Energy Star Room AC	0.2053	245	50	0.2053	245	50
Reduce required tonnage as a result of thermal envelope improvements	0.2520	515	130	0.2520	515	130
90% AFUE furnace with EE air handler	0	337	0	0	337	0
CFL Installation	0.00436	28,348	124	0.00459	28,348	130
Ceiling Fan	0.1467	541	79	0.1467	541	79
TOTAL			486			725

3.1.5 Net Program Impact Parameter Estimates

Since these programs specifically target customers of limited income it is likely that the customers would not have funded new energy efficiency measures on their own. As a result, the EM&V team believes the Net-to-Gross factor should be 100%, which is the value used by DCEO for PY2 and PY3. This is the practice in other jurisdictions, such as Wisconsin.⁴

⁴ Telephone conversation with Oscar Bloch, DSM Evaluation Supervisor, Public Service Commission of Wisconsin, 10-29-2009. Mr. Bloch verified that Wisconsin has always used a net-to-gross ratio of 1 for evaluation of programs targeted to limited income customers. However, there is no current documentation stating this. It can be seen by looking at program evaluation reports, such as “Focus on Energy Evaluation, Semiannual Report (First Half of 2009)”, PA Consulting Group, Revised Final October 19, 2009, p. 4-21, and noting that programs targeted at limited income customers are only required to report verified gross savings, not verified net savings.

3.1.6 Net Program Impact Results

Table 3-8 presents the final gross and net program impact results for the Weatherization program. The summary of final gross and net savings for the Home Improvement program can be found in Table 3-9.

Table 3-8. Summary of Gross and Net Savings for Low Income Weatherization

Low Income Weatherization Program PY3	MWh Savings		kW Savings	
	DCEO Claimed	Evaluation Verified	DCEO Claimed	Evaluation Verified
Gross Savings	5,777	8,157	660	1,173
Net-to-Gross Ratio	1	1	1	1
Net Savings	5,777	8,157	660	1,173

Table 3-9. Summary of Gross and Net Savings for Low Income Home Improvement

Low Income Weatherization Program PY3	MWh Savings		kW Savings	
	DCEO Claimed	Evaluation Verified	DCEO Claimed	Evaluation Verified
Gross Savings	2,161	3,184	486	725
Net-to-Gross Ratio	1	1	1	1
Net Savings	2,161	3,184	486	725

3.2 Process Evaluation Results

Below, we present the detailed findings from this process evaluation of DCEO’s Residential Retrofit Energy Efficiency Program.

3.2.1 Process Themes

Program Changes in PY3

This evaluation explored whether any changes were made to the program between PY2 and PY3, why they were made, and whether they were advantageous to the program. In PY2, the program was presented as two different programs (one for home improvements and one for weatherization). In the PY2 process evaluation, we found that this structure caused confusion in the marketplace, especially during the application process. The program staff acted upon the recommendation to streamline this program in PY3.

There are two key differences between the PY2 and PY3 programs. Partially in response to the PY2 evaluation, DCEO has minimized the differences between weatherization and home improvement to avoid market confusion. The second change is the increase in the maximum grant amount for many of the eligible measures. We describe these changes in more detail below.

The first key change in PY3 has been the consolidation of the dual-track grant award structure. In PY2, there were two grant structures, one focused on weatherization programs and the other dedicated to home improvement. The two-track structure in PY2 also stipulated differences between how the funds should be used depending on the emphasis of the program track: as either incremental or full-cost awards. The program removed these distinctions in PY3. As in PY2, the PY3 grant structure does make a distinction between weatherization and home improvement efforts with regard to participant income requirements. Weatherization programs must target households at or below 200% of the poverty level, while Home Improvement programs must target households at or below 80% of the Area Median Income (AMI). These requirements apply only to the distribution of funds by the partner agencies and not to the grant award process itself. This was an excellent improvement to the program in PY3.

Table 3-10 presents the different measures available in PY2 and PY3, as well as the combined nature of the PY3 award structure.

Table 3-10. Energy Efficiency Measures Offered: PY2 and PY3

Measure	PY2		PY3
	Home Improvement	Weatherization	Combined
1 ENERGY STAR Refrigerator	✓	✓	✓
2a CFL Installation	✓	✗	✓
2b ENERGY STAR Advanced Lighting Package	✗	✓	✓
3 ENERGY STAR-rated bathroom exhaust fan	✓	✓	✓
4 SEER 14 central air conditioner w/ programmable thermostat	✓	✓	✓
5 ENERGY STAR-rated room air conditioner	✓	✓	✓
6 90% AFUE furnace with efficient air handler	✓	✓	✓
7 ENERGY STAR Dishwasher	✗	✓	✓
8 Reduce required AC tonnage as a result of thermal envelope improvements	✗	✓	✓
9 ENERGY STAR rated ceiling fan	✗	✗	✓

The other key change between PY2 and PY3 is that the grant levels for many measures have increased significantly. Almost half of the measures saw an increase, and in each case this increase was at least 100% more than the maximum grant level available in PY2. Table 3-11 presents these increases by measure. The grant award amounts listed for PY2 are based on the maximum value allowed between the weatherization and the home improvement tracks.

Table 3-11. Energy Efficiency Incentives for PY2 and PY3

Measure	PY2*	PY3	Change: Percentage
1 ENERGY STAR Refrigerator	\$700	\$700	=
2a CFL Installation	\$45	\$5/lamp	N/A
2b ENERGY STAR Advanced Lighting Package	\$300	\$95/fixture	N/A
3 ENERGY STAR-rated bathroom exhaust fan	\$200	\$450	↑ 225%
4 SEER 14 central air conditioner w/ programmable thermostat	\$2,500	\$3,100	↑ 124%
5 ENERGY STAR-rated room air conditioner	\$400	\$400	=
6 90% AFUE furnace with efficient air handler	\$600	\$600	=
7 ENERGY STAR Dishwasher	\$425	\$550	↑ 129%
8 Reduce required AC tonnage as a result of thermal envelope improvements	\$2,500	\$2,500	=
9 ENERGY STAR-rated ceiling fan	-	\$250	↑ 100%

* Combined Weatherization and Home Improvement. The highest amount offered between the two programs is listed.

Marketing and Outreach Effectiveness

As described in the PY2 process evaluation, the DCEO channels money from external organizations that own or manage low-income properties or run low-income home improvement programs. The program has the same partners that apply for funding each year and therefore does not have to do much marketing to drive demand. DCEO has a pre-existing network of organizations and established relationships with partners. As such, marketing efforts were minimal for this program and the program primarily relied upon one-on-one conversations and word of mouth to promote the program. Additionally, program staff posted program information on the DCEO website. The partners we interviewed mentioned they initially heard about the program from the city of Chicago or from personal connections. The program’s marketing efforts appear to have been effective in recruiting qualified partners for the program.

Impact of DCEO Funding on Partnering Organizations

Much of the DCEO funding is allocated to organizations that run low-income programs and, therefore, the funding allows the programs to enhance what they offer. By funneling program funds through pre-existing programs, the DCEO is able to leverage existing infrastructure to increase the energy impact of these other programs. The funds allowed more sites to be upgraded, and enabled these programs to increase their focus on energy efficiency.

“Without the DCEO funds...there would be less homes weatherized, and we would do a significantly lower number of base load measures.” – PY3 Partner

While the goal of many DCEO partner organizations is not energy efficiency, the effect of the DCEO program does correspond with their missions. For example, two partners generally use

any extra funding to extend rehabilitation and community development efforts to more sites. However, since the DCEO funds are targeted, the partners now require the installation of energy efficient measures within all rehabilitation projects. This would not be the case without DCEO funds. Because the primary focus of these partners is housing rehabilitation, any extra funds required for energy efficient measures would instead be spent on further low-cost rehabilitation efforts rather than energy efficiency. The dedicated nature of the DCEO funds forces monies to be spent on energy efficient rehabilitation. In the long term, this coincides with their mission to provide decent housing to low-income families, since energy efficiency improvements lower the capital needed for each tenant to maintain their residence.

“We get quite a bit of positive feedback from homeowners who say that they have cut their utility bills in half, which really helps them to stay in their homes longer. It is a foreclosure prevention strategy.”- PY3 Partner

Two partners have used the DCEO funds to help focus their efforts on improvements to the thermal envelope of each site. Thermal envelope investments offer high-energy efficiency returns, but are less likely to be implemented by low-income residents without financial aid due to high upfront costs.

One partner is constrained by per-site funding limits imposed by the federal American Recovery and Reinvestment Act. This cap prevents some sites from having all possible measures installed, but the DCEO funds allow these additional measures to be completed when they otherwise could not be.

“We’ve been able to add this energy efficiency retrofit money, which has been wonderful. We are doing more than we were ever able to do before.” – PY3 Partner

An additional benefit of the DCEO funds for external organizations is stability. By receiving non-governmental funds, these organizations grow larger and more stable. This in turn increases the likelihood that they will be awarded government funding, as those funds tend to be awarded to organizations that have shown a record of effectiveness.

Program Implementation Effectiveness

As noted in the PY2 evaluation, the program’s implementation strategy met many of the industry best practices for low-income programs. Below, we summarize the partners’ satisfaction with the program in several key areas and identify some areas of improvement for the next program year.

Designing a program that is easily understood by its intended targets

Best practices suggest that a program should be designed in such a way that its intended targets easily understand it. Interviews with partners suggest that the program is in fact easily

understood by its targets, especially when compared to other sources of funding for which partners apply.

“... I’ve been with the [organization] for four years and applied for many different grants from many different funders. DCEO has been the most concise and clear.” – PY3 Partner

The previous dual-track program structure was the result of combining two programs that offered different incentive amounts for home improvement and weatherization programs. This double-track had caused confusion in the market among partners, potential partners, and evaluators. To further simplify the process, the program combined the home improvement and weatherization tracks in PY3.

This seems to have been effective as none of the interviewees mentioned these changes as a source of confusion. Most partners found the application process to be clear and compared the DCEO program application process favorably to other low-income grant programs. A few cited the DCEO web reporting resources as being particularly helpful.

Smoothly providing incentives to partners to encourage participation

Smoothly providing incentives to partners contributes to program satisfaction and motivates partners to participate. During partner interviews, many partners did note that there was a significant period of time between when the funds were requested and when they were received, but none thought it was unusual and seemed to think it was typical for both DCEO programs and other programs that they seek funding from. Paying out grant funding requires the approval of several offices within DCEO and takes time for each partner. Smaller organizations did mention that requiring the grantees to pay for the installations first and then receive reimbursement later was a significant financial burden.

Providing timely responses to partner questions

Providing timely responses to partner questions contributes to program satisfaction and motivates partners to participate. DCEO provided timely responses to partner questions. After contracts were signed, partners reported that questions were quickly answered and DCEO staff were easy to reach.

“During the implementation process, [DCEO communication] was quite good.” – PY3 Partner

In addition to the measures listed in Table 3-10, partners proposed other measures, which were considered on a case-by-case basis. Many of these non-standard measures were funded, including water pumps and boosters. Partners commended the DCEO staff for their assistance.

“We worked with DCEO staff and the consultant that helps them ... to figure out a way to fund one measure that was outside of what they had expected... replacing the lamp and the ballast instead of

ripping it all out and putting a new one in. They were very logical about it. It was a good process.” – PY3 Partner

DCEO has provided timely responses to partner’s questions. DECO’s cooperation with projects that would benefit from measures that were not on the standard measure list was an unexpected bonus to partners. Partners would like the case-by-case measure consideration to continue. Navigant recommends that DECO continue to consider non-standard measures on a case-by-case basis to encourage partners continued involvement in the program. The case-by-case consideration would have to conform to the availability of DCEO’s limited resources. Another benefit of case-by-case consideration is identifying frequently requested non-standard measures, which could be made standard in future years.

3.3 Cost Effectiveness

This section addresses the cost effectiveness of the Low Income Residential Retrofit Energy Efficiency Program. Cost effectiveness is assessed through the use of the Illinois Total Resource Cost (TRC) test. The Illinois TRC test is defined in the Illinois Power Agency Act SB1592 as follows:

‘Total resource cost test’ or ‘TRC test’ means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases.⁵

Navigant developed an Excel based TRC model that incorporates all relevant program level data including avoided costs, line losses, gross savings, free ridership, program costs and CO₂ reductions. It then calculates a TRC that meets the requirements of the Illinois Power Agency Act SB1592. The two electric distribution companies (EDCs) that pass funds to DCEO’s programs, ComEd and Ameren, utilize different avoided costs in calculating the benefits that accrue from energy efficiency programs; therefore Navigant employed each utility’s specific avoided costs to their corresponding energy and demand savings from each program.

⁵ Illinois Power Agency Act SB1592, pages 7-8.

Results

Table 3-12 summarizes the unique inputs used to calculate the TRC ratio for the Low Income Residential Retrofit Energy Efficiency Program in PY3. Most of the unique inputs come directly from the evaluation results presented previously in this report. Measure life estimates were based on similar ComEd programs, third party sources including the California Public Utilities Commission (CPUC) developed Database of Energy Efficiency Resources (DEER) and previous Navigant evaluation experience with similar programs. Program costs data came directly from DCEO. Incremental costs were estimated from program, survey data and similar ComEd programs. Avoided cost data came from both ComEd and Ameren and are the same for all programs.

Table 3-12. Inputs to TRC Model for Low Income Residential Retrofit Energy Efficiency Program

Item	Value Used
Measure Life	12 years
Annual Gross Energy Savings	11,341 MWh
Gross Coincident Peak Savings	1.90 MW
Net-to-Gross Ratio	100%
DCEO Administration and Implementation Costs	\$650,201
DCEO Incentive Costs	\$7,066,634
Net Participant Costs	\$7,066,634

Based on these inputs, the Illinois societal TRC for this program is 0.75 and the program fails the Illinois TRC test. However the low income programs are not required to meet the TRC test.⁶

⁶ ILCS 220 5/8-103(a) and 5/8-104(a), which states "The low income measures described in section (f)(4) of this Section shall not be required to meet the total resource cost test."

Section 4. Conclusions and Recommendations

This section highlights the conclusions and recommendations from the PY3 evaluation of the Weatherization and Home Improvement programs.

4.1 *Impact Conclusions and Recommendations*

Navigant recommends that a continued effort is made to improve ex ante and ex post estimates of measure savings per unit. We recommend that both DCEO and the EM&V team continue to make efforts to find measure savings data sources for areas closer to the Illinois region that are up-to-date.

Finding: Navigant’s evaluation of ComEd’s Appliance Recycling program conducted an extensive study of the recycled refrigerator stock in the ComEd territory. This study concluded the average annual energy use of recycled refrigerators is 1,855 kWh annually. ComEd’s Appliance Recycling program, targeted at the general population, recycled over 30,000 refrigerators and their data shows that 22% were the primary refrigerator in the home and 61% were over 20 years old. It is reasonable to assume that the Low Income Retrofit population will on average have older refrigerators that use more energy than the average for the general population because their limited income reduces their ability to purchase newer, more efficient models. While it does not necessarily follow that the average ComEd **recycled** refrigerator is of the same vintage as the average replaced refrigerator in DCEO’s program, it seems to be a reasonable assumption. Reputable resources confirmed that this annual energy use was reasonable for DCEO’s program as it was consistent with Pennsylvania’s TRM for refrigerator replacements estimated the replaced stock of refrigerators used 1,659 kWh annually and replacement refrigerators use 454 kWh. Further evidence that the savings estimate is reasonable comes from Vermont’s TRM that stated a range of savings from 800 to 2,500 kWh for refrigerator replacement in Low Income programs.

Recommendation: Refrigerator Saving: Navigant suggests adjusting this savings to 1,405 kWh per year. DCEO is using the 550 kWh savings based on Navigant’s PY2 evaluation. Navigant’s savings estimate is calculated by taking the conventional refrigerator that uses 1,855 kWh annually and comparing it to the Energy Star replacement which uses 450 kWh annually.

The demand savings shifts to 0.281 kW using the updated 1,405 kWh in the demand savings calculation.

Finding: Navigant conducted a lighting logger study for ComEd that provided adjustments to the hours of use (HOU) and peak coincidence factor for CFL installations. The logger study revealed an increase in the HOU to 2.57 hours per day. The HOU adjustment changes the kWh savings from 38.25 to 42.21. This study is more representative of the HOU in the DCEO area than the California study that was previously used for HOU. The ComEd lighting study also

suggested an adjustment of the peak coincident factor. The adjustment in the peak coincident factor changes the demand savings from 0.00436 kW to .00459 kW.

Recommendation: Navigant recommends adjusting the savings for CFL installations to 42.21 kWh and 0.00459 per CFL. DCEO is using 38.25 kWh and 0.00436 kW savings based on Navigant’s PY2 evaluation.

Finding: The Energy Star fixtures measure uses eight indoor fixtures and two outdoor fixtures. The indoor fixtures are 15 watt CFLs replacing 60 watt CFLs. The savings for the indoor fixtures is assumed to be the same as the CFL installation section. The two outdoor fixtures have different HOU and peak coincidence factors than the indoor fixtures. The outdoor fixtures are estimated to have an HOU of 5 and a peak coincidence factor of 0.185. The HOU adjustment changed the kWh savings from The reduction in the per fixture saving estimate is due to the change in HOU and peak coincidence factor in the outdoor fixtures.

Recommendation: Navigant suggests adjusting this savings to 50.19 kWh and 0.005337 kW per fixture. DCEO is using 54.80 kWh and 0.00626 kW savings based on Navigant’s PY2 evaluation.

Weatherization Program

Table 4-1 presents the ex ante and ex post gross MWh savings for the Weatherization program. Table 4-2 presents the companion kW savings. The ex post energy savings and demand savings for the Weatherization program are higher than the ex ante energy savings and demand savings due to the adjustment in the refrigerator and lighting savings estimates.

Table 4-1. Weatherization Program Ex Ante and Ex Post Gross MWh Savings

Measure	Ex Ante			Ex Post		
	kWh/Unit	Units	Total MWh	kWh/Unit	Units	Total MWh
Energy Star Refrigerator	550	2,236	1,230	1,405	2,236	3,142
CFL	38.25	118,116	4,518	42.21	118,116	4,986
Energy Star Bathroom Exhaust Fan	89	323	29	89	323	29
Energy Star rated room air conditioner	176	3	0	176	3	0
TOTAL			5,777			8,157

Table 4-2. Weatherization Program Ex Ante and Ex Post Gross kW Savings

Measure	Ex Ante			Ex Post		
	kW/Unit	Units	Total kW	kW/Unit	Units	Total kW
Energy Star Refrigerator	0.0628	2,236	141	0.230	2,236	628
CFL	0.00436	118,116	516	0.00459	118,116	542
Energy Star Bathroom Exhaust Fan	0.0102	323	3	0.0102	323	3
Energy Star rated room air conditioner	0.2053	3	0	176	3	0
TOTAL			660			1,173

Note: These tables only include the electric efficiency measures actually installed through the Weatherization program in PY3.

Home Improvement Program

The ex post energy savings and demand savings for the Home Improvement program are higher than the ex ante energy savings and demand savings due to the adjustment in the refrigerator and lighting savings estimates.

Table 4-3 presents the ex ante and ex post gross MWh savings for the Home Improvement program. Table 4-4 presents the companion MW savings. The ex post energy savings and demand savings for the Home Improvement program are higher than the ex ante energy savings and demand savings due to the adjustment in the refrigerator and lighting savings estimates.

Table 4-3. Home Improvement Program Ex Ante and Ex Post Gross MWh Savings

Measure	Ex Ante			Ex Post		
	kWh/Unit	Units	Total MWh	kWh/Unit	Units	Total MWh
Energy Star Refrigerator	550	1,075	591	1,405	1,075	1,510
Energy Star Fixture	54.80	1,860	102	50.19	1,860	93
Energy Star Bathroom Exhaust Fan	89	233	21	89	233	21
Energy Star Dishwasher	62	131	8	62	131	8
SEER 14 Central AC with programmable thermostat (new installation)	240	74	18	240	74	18
Energy Star Room AC	176	245	43	176	245	43
Reduce required tonnage as a result of thermal envelope improvements	216	515	111	216	515	111
90% AFUE furnace with EE air handler	400	337	135	400	337	135
CFL Installation	38.25	28,348	1,084	42.21	28,348	1,197
Ceiling Fan	88	541	48	88	541	48
TOTAL			2,160			3,184

Table 4-4. Home Improvement Program Ex Ante and Ex Post Gross kW Savings

Measure	Ex Ante			Ex Post		
	kW/Unit	Units	Total kW	kW/Unit	Units	Total kW
Energy Star Refrigerator	0.0628	1,075	67	0.281	1,075	302
Energy Star Fixture	0.00626	1,860	12	0.00534	1,860	10
Energy Star Bathroom Exhaust Fan	0.0102	233	2	0.0102	233	2
Energy Star Dishwasher	0.0071	131	0.9	0.0071	131	0.9
SEER 14 Central AC with programmable thermostat (new installation)	0.2800	74	21	0.2800	74	21
Energy Star Room AC	0.2053	245	50	0.2053	245	50
Reduce required tonnage as a result of thermal envelope improvements	0.2520	515	130	0.2520	515	130
90% AFUE furnace with EE air handler	0	337	0	0	337	0
CFL Installation	0.00436	28,348	124	0.0048	28,348	130
Ceiling Fan	0.1467	541	79	0.1467	541	79
TOTAL			486			725

Table 4-5 and Table 4-6 present the net savings impact contributions of ComEd and Ameren for the Weatherization and Home Improvement programs.

Table 4-5. ComEd and Ameren Net Savings for Low Income Weatherization

Low Income Weatherization Program PY3	MWh Savings		kW Savings	
	DCEO Claimed	Evaluation Verified	DCEO Claimed	Evaluation Verified
ComEd	2,980	4,419	340	661
Ameren	2,797	3,738	320	512
Total Savings	5,777	8,157	660	1,173

Table 4-6. ComEd and Ameren Net Savings for Low Income Home Improvement

Low Income Home Improvement Program PY3	MWh Savings		kW Savings	
	DCEO Claimed	Evaluation Verified	DCEO Claimed	Evaluation Verified
ComEd	2,040	3,019	412	643
Ameren	121	165	74	82
Total Savings	2,161	3,184	486	725

4.2 *Process Conclusions and Recommendations*

Findings: The process evaluation of the Residential Retrofit Energy Efficiency Program concluded that this program is effectively funneling funds to existing and established low-income programs (partners). The partners are very satisfied with the application process and interactions with the program staff. DCEO also made some advantageous changes to the PY3 program: the DCEO has minimized the differences between weatherization and home improvement to avoid market confusion and it increased the maximum grant amount for many of the eligible measures.

The program’s implementation strategy meets many of the industry best practices for low-income programs. The program is smoothly providing incentives to partners, providing a program that is easily understood by its targets, providing timely responses to partner questions and is continuing to funnel program funds through pre-existing programs. By adding funding to existing programs, DCEO is able to achieve large energy savings with low administrative costs by leveraging existing infrastructure. The impact of these funds on partners allowed more homes to be upgraded with energy efficient measures than what would have happened without the program and the funding enabled these partners to bring the importance of energy efficiency into their existing activities and goals.

Communication. While partners were satisfied with the level of communication offered by the DCEO, this was not universally true. Some stated that communication with external partner organizations fell off sharply after the 2010 applications had been submitted. Towards the end of the calendar year, close to when the funding was announced, communication changed from being infrequent to almost daily. While partners appreciated communication during this critical period, they would prefer regular communications throughout the entire process. Consistent communication is especially important because partners often plan their financial strategies around what they understand from the written material and are only in close personal communication with DCEO later in the funding process. If there are miscommunications at the beginning, it may be too late to correct these later on. The primary sources of confusion were

the details as to which administrative fees were eligible for grant funding, as well as caveats surrounding air conditioning eligibility.

- **Recommendation.** More frequent and consistent communication throughout the year

Measure Choices. Many partners suggested that the program add more measures to their standard offering. Suggested measures for future grants include ENERGY STAR clothes washers, lighting lamp and ballast retrofits instead of full-fixture retrofits, and water pumps and boosters. We recommend that the DCEO consider whether additional measures fit the scope of the program and if they can add additional measures to the standard offering and still maintain the program's cost effectiveness.

- **Recommendation.** Expand standard eligible measures

Grant Award Period. Some participants noted the long period of time between the application and the granting of funds. Partner organizations, are dependent on multiple funding sources. Each of these sources stipulates a different time period in which its funds must be used. A long period between the DCEO application and the granting of funds increases the difficulty of planning where and how partners can spend these various funding sources. This also can leave little time for the partner agency to effectively spend the grant money, which can make relationships with contractors difficult.

- **Recommendation.** Reexamine the grant award period

Section 5. Appendices

5.1 *Partner Profiles from Interviews*

The program dispensed grants to seven different partners in PY3. The partners were:

1. The Chicago Housing Authority
2. The Historic Chicago Bungalow Association
3. CNT Energy
4. The Delta Institute
5. Heartland Housing, Inc.
6. The Illinois Home Weatherization Assistance Program
7. The Illinois Community Development Assistance Program

This evaluation explored the seven different partners that received grant funding in PY3. For each partner, we created “partner profiles” that describe the organization in general as well as how the partner used the PY3 grant funding. We present the profiles below. All of the partners have been working with the DCEO as part of this program for several years. These partner profiles illuminate the varying nature of the organizations and properties that receive funding as well as how flexible the program must be to allow it to cater to the multiple ways in which partners use the funds.

Chicago Housing Authority

The Chicago Housing Authority (CHA) has jurisdiction for the administrative oversight of public and Section 8 housing for over 50,000 families and individuals within the city of Chicago. The agency's mission is guided by a Board of Commissioners appointed by the city's mayor, and has a budget independent from that of the city of Chicago. In 2000, the CHA began its Plan for Transformation. This plan called for the demolition of the city's entire gallery high-rise buildings, because they failed HUD's viability test, and proposed a renovated housing portfolio totaling 25,000 units. The project is partially completed.

To leverage the DCEO funds, the CHA identified properties that were solely owned or financed by the CHA. This allowed the CHA to be certain that the sites in question would comply with the DCEO grant fund requirements. The CHA regularly audits the status of these properties, allowing them to easily identify which sites are in need of measures whose installation costs can be offset by DCEO funds.

An on-site CHA construction manager is responsible for ordering all items at that site, while a construction company subcontractor is then hired for the work. These contractors are paid using CHA funds, which are augmented by DCEO grants for appropriate measures. For light

bulb replacement projects, funds are sent to property managers, who are then responsible for changing the bulbs.

The DCEO funding allowed the CHA to install energy efficient measures in 3,934 apartments in PY3.

Historic Chicago Bungalow Association

The Historic Chicago Bungalow Association (HCBA) is a nonprofit organization designed to foster an appreciation of the Chicago Bungalow as a distinctive housing type, encourage sympathetic rehabilitation of Chicago bungalows, and assist bungalow owners with adapting their homes to current needs, which in turn helps to strengthen Chicago bungalow neighborhoods.

The HCBA has 11,000 registered homeowners and markets programs to 80,000 Chicago style bungalow residents within Chicago. It has participated in the DCEO grant process for the past three years and has used these funds to augment the HCBA's Energy Savers Grant Program (ESGP).

Large swaths of Chicago consist of these bungalows, which were built between 1910 and 1940. The bungalows generally house low-income tenants and have few energy efficient measures installed. The ESGP, which the HCBA has offered for seven years, provides a variety of financial and technical resources from special permit assistance to "how-to" seminars. For the last three years, it has focused on improving the energy envelope of these homes, since these improvements offer the best opportunity to lower energy consumption for these sites. The DCEO funds have helped to make this focus possible.

To participate in HCBA's ESGP program, homeowners must submit an application, including financial and income information. Eighty percent of low-income homeowners who qualify for the ESGP also meet the DCEO program eligibility requirements.

The HCBA conducted energy audits of participating homes to determine which sites would benefit from the installation of measures covered by the DCEO grants. Once it had been determined that a site was eligible, the HCBA tasked a contractor with the installation, as well as a pre- and post "blower-door" reading, to determine the efficiency of the energy envelope. HCBA paid the contractors directly.

The DCEO funding allowed the HCBA to install energy efficient measures in 302 bungalows in PY3.

CNT Energy

The Center for Neighborhood Technology (CNT) is a nonprofit organization, headquartered in Chicago, Illinois, which is committed to sustainable development and livable urban communities. As an “innovations center for urban sustainability,” CNT researches, invents, and tests urban strategies that use resources more efficiently and equitably. CNT Energy manages a variety of energy saving programs statewide, but works primarily within the 7-county northern Illinois area. Services include low-income retrofit funding, dynamic electricity pricing programs, and energy planning.

CNT’s Energy Savers program focuses on maintaining the pool of low-income rental property available in Illinois, as well as increasing energy efficiency in low-income housing properties. Since the end of 2008, CNT has facilitated large-scale energy efficiency retrofit projects for over 6,000 units.

The Energy Savers program is designed as a “one-stop” tool for multi-family building owners. The service includes audits and contractor relations, multi-family low-income financing (facilitated by one of CNT’s partner organizations), and subsidized energy efficiency measures provided through the DCEO funds. CNT’s partner organization that focuses on low-income retrofit financing recently received funds from a competitive federal block grant. This, along with the DCEO funds, has allowed CNT to expand the Energy Savers program. DCEO funds generally focus on reducing natural gas demand, though they support electricity measures as well.

The program uses a variety of marketing strategies to contact multi-family building owners, who can apply to CNT’s program online. After CNT staff performs an energy efficiency walkthrough, CNT works with the owner to determine what measures the owner can afford. An emphasis is placed on financing to make the most efficient use of rebates and grant funds. CNT leverages its relationship with local pre-qualified contractors to find the best bid per job, though the decision is left to the owner.

CNT staff implements post installation on-site inspections for the vast majority of measures installed through its program. In addition, CNT requires detailed documentation for each project. CNT tracks energy savings on a site-by-site basis.

There are few funding sources for the Energy Savers program, of which DCEO is a major source. The energy audits are subsidized through efficiency portfolios, which are based on the energy savings of each site. The city of Chicago occasionally grants some moneys to supplement specific measures within Chicago, and CNT has access to low-interest loans. Besides these, the DCEO is the only other significant funding source for this program.

The DCEO funding allowed CNT to install energy efficient measures in 2,358 units in PY3.

Delta Institute

The Delta Institute manages a variety of environmentally focused programs within the Great Lakes region including Brownfield development, energy efficiency, renewable energy, urban agriculture, waste, and water. The pertinent program for the DCEO is the Delta Institute Appliance Program, which helps replace inefficient appliances with newer, more energy efficient ENERGY STAR appliances in eligible dwellings.

The Delta Institute Appliance Program primarily exists as an additional set of services offered to those who have participated in the Delta Weatherization Program. The Weatherization program, primarily funded by Chicago's Department of the Environment, provides for administration, energy audits, and weatherization improvements, while the DCEO funds are used to further improve the energy efficiency of applicable sites.

Low-to-moderate income homeowners apply for participation in the Chicago DOE-funded Weatherization program. Participants receive a free energy audit as well as rebates towards weatherization and thermal envelope work. Delta uses its pool of applicants for this program to estimate the type and number of appliances that would be eligible to be retrofitted through the DCEO. When these funds are approved, Delta hires local appliance vendors to install appliance replacements in conjunction with the Chicago DOE-funded weatherization work. Delta weatherizes 200-300 homes per year, most of which exercise the option to replace old appliances through the DCEO-funded Appliance program.

Each weatherization participant receives a pre-and post installation blower door test and, in the case of furnace replacement, a furnace test. The appliance installations are verified primarily through documentation provided by the local contractors. Additional verification is sometimes implemented during the post-weatherization energy audit, though the fact that the weatherization and appliance work often uses different contractors, and is funded through grants that follow different funding cycles, often prevents this.

The DCEO funding allowed the Delta Institute to install energy efficient measures in 158 units in PY3.

Heartland Housing, Inc.

Heartland Alliance is a human-rights-advocacy group providing housing, healthcare, economic security, and legal protection for low-income citizens. As Heartland Alliance's housing division, Heartland Housing (HH) has developed and managed more than 1,000 affordable homes in Chicago and Milwaukee since 1988. DCEO funds have allowed for retrofitting Chicago properties owned by HH.

Heartland Housing is responsible for the maintenance and upkeep of its facilities. Since the tenants do not pay utility bills, any energy efficiency improvements made to the properties

directly benefit HH by reducing overhead costs. As a low-income housing provider, HH requires income documentation from all of its tenants. These records, along with internal HH site audits, are sufficient for HH to identify sites that would qualify for and benefit from the installation of eligible measures. Heartland Housing works with local contractors to install approved measures, and then presents invoices from these contractors to the DCEO for reimbursement.

The DCEO funding allowed the HCBA to install energy efficient measures in 430 units in PY3.

Illinois Home Weatherization Assistance Program

The Illinois Home Weatherization Assistance Program (IHWAP) is designed to help reduce the energy costs for low-income households by making their homes more energy efficient. For Program Years 2010-2012, increased funding through the federal American Recovery and Reinvestment Act (ARRA) is augmenting this effort. Energy conservation actions that can be funded through IHWAP include air sealing, attic and wall insulation, furnace repair and replacement, electric base load reduction (lighting and refrigerator), and window and door weatherization.

Illinois Weatherization works within the state of Illinois to weatherize between 7,000 and 8,000 homes every year, though recent ARRA funding has increased this to 23,000 sites per year. IHWAP coordinates with a network of 35 local nonprofit organizations that consist of approximately 1,500 people, 1,100 of which were added directly due to the ARRA funding. The network includes private nonprofits as well as municipal and county government agencies.

These agencies perform energy audits in homes that have applied for the Low Income Home Energy Assistance Program (LIHEAP), which has income requirements that are similar to the DCEO program. These audits identify measures that would be beneficial for each site, and present the list to IHWAP for review. Funds are given to the local agency depending on what measures are eligible, and then the local agency hires contractors accordingly. Four of these 35 agencies have in-house work crews and do not have to hire outside contractors.

The DCEO funding allowed the HCBA to install energy efficient measures in 15,030 units in PY3.

Illinois Community Development Assistance Program

The Community Development Assistance Program (CDAP) is a grant program funded through the U.S. Department of Housing and Urban Development (HUD) that assists Illinois communities by providing grants to local governments to help them in financing economic development projects, and public facilities and housing rehabilitation. The program is targeted to assist low-to-moderate income persons by creating job opportunities and improving the quality of their living environment.

The CDAP oversees three primary programs: the Single Family Owner-Occupied Housing Rehab Program (SFO), the Mobility and Accessibility Rehabilitation Services (MARS) for the mobility impaired, and a Section 8 housing voucher program. The DCEO funds are allocated to the SFOOHRP, which services Illinois communities with populations less than 50,000, and counties with populations less than 500,000.

The Department of Housing and Urban Development (HUD) provides block grants to the state of Illinois for community development. There is an annual formula allocation from these HUD funds dedicated to Small Cities Community Development Block Grants (CDBGs). These block grants, along with the DCEO funds, comprise the entire funding base for the SFO program for non-entitlement communities and counties.

Qualified non-entitlement communities apply for CDAP rehabilitation funding on an annual basis through a competitive application process. They conduct intensive surveys to identify portions of the community that have a high concentration of low-to-moderate income residents whose sites have need of rehabilitation. If approved, the grantee then takes applications from individual site owners within their communities. The grantee communities also handle the competitive bidding process among qualified local contractors and are responsible for monitoring and complying with community development block grant regulations.

The amount that can be expected to fund energy efficiency measures within each grant application is identified and used to estimate what the CDAP expects to spend on qualifying measures in the coming year. This figure is passed on to the DCEO for planning purposes. The CDAP then fronts the money to pay for housing rehabilitation, including energy efficiency measures, through the general CDBG funds. Grantees are required to submit detailed reports to the CDAP outlining the actual work completed for each property, and at the end of every year, the actual amount spent on energy efficiency improvements is tallied. This result is given to the DCEO, which then reimburses the CDAP with appropriate funds.

The DCEO funding allowed the HCBA to install energy efficient measures in 119 units in PY3.

5.2 *Data Collection Instruments*

5.2.1 **ComEd Residential Low Income Retrofit Program Interview Guide**

Partner Organizations - Residential Low Income Retrofit Program

PY3 Evaluation Depth Interview Questions

Program Overview & Management

1. Could you briefly summarize your specific role in your organization?
 - a. What are your main responsibilities?
 - b. How are you involved in the DCEO Retrofit Program?
 - c. How long have you been involved with the DCEO program?
 - d. How long has your organization been receiving funding from the DCEO program?

2. What kind of communication do you have with the DCEO?
 - a. How often do you communicate with DCEO?
 - b. How do you typically communicate with them? [PROBE FOR: regular meetings, calls, email, informal communication between set meetings, etc.]
 - c. How well is the communication going?
 - d. What do you typically communicate about?
 - e. How responsive is the DCEO to your needs as they relate to the program?
 - f. Beyond dispensing funding to your organization, does the DCEO provide you with any support to help with your involvement with these programs? If so, please elaborate.
 - g. Are there areas where you could use more support from the DCEO?

3. Other than the DCEO, whom else does your organization interact with about these programs? [e.g. directly with homeowners, renters and/or contractors/developers? partner agencies?]

4. Has your organization collaborated with other ComEd and/or Ameren Residential Retrofit Energy Efficiency programs? If yes, how so?

Organizational Overview & Program Priority

5. In which geographic areas is your organization active?
 - a. What proportion of your organization's work is done within the ComEd and Ameren service areas?

6. Please describe the types of services your organization, as a whole, offers.

- a. What services does your specific department provide?
7. How much of a priority is the DCEO Residential Retrofit Energy Efficiency Program for your organization as a whole?
 - a. What about for your department?
8. Are the DCEO program funds funneled to pre-existing programs that your organization runs?
9. a. If yes, how has the additional funding changed the way these pre-existing programs are implemented?
 - a. Were these changes advantageous?
 - b. What were some of the challenges that occurred in the implementation of the additional funding? How were they handled?
10. If funds from the DCEO were not made available through this program, how would that impact the implementation of these energy efficient measures?
 - a. Are there other funding sources you could turn to? If so, who?
 - b. Would your organization seek additional funds elsewhere?

Participation Process for Partner Organizations

11. How did your organization find out about these programs?
12. What was the process to apply to participate in this program?
13. What are the requirements that you need to fulfill in order to participate in the program? Do you have any trouble meeting these requirements?
14. How were the process of how to participate and the program requirements explained to you?
 - a. Were participation process and program requirements easy to understand?
15. What is the process that you went through to receive these grant funds?
 - a. Did this process operate smoothly?

Program Operations

16. Once the funds from the DCEO Residential Retrofit Energy Efficiency Program are secured, how are they distributed? Can you walk me through this process?
 - a. How does the application process work?
 - b. Who generally receives the funds?

- c. Are there ever unused funds? If so why, and what is done with them?
17. What are the eligibility requirements for those to whom you distribute the funds?
- a. How do you verify income requirements?
 - b. How do you verify service area requirements?

QA/QC and Verification Procedures

As part of our evaluation, we'd like to report on the quality assurance and quality control procedures that are in place for the program.

18. The grant application states that "grantees are responsible for ensuring measures meet program requirements and are properly installed." Can you walk me through the way in which this is addressed?
- c. Are there on-site inspections?
 - a. Who implements them?
 - b. Is it done on every home?
 - c. When is it done?

Program Databases & Documents [Important; Navigant needs participant information for their impact evaluation]

19. What are your systems for tracking customers who participate in the Residential Retrofit Energy Efficiency Program?
- a. Is it electronic or paper-based?
20. What information do you track about customers? For example, do you have participant account numbers, meter numbers, and measures installed?
21. After the funds have been granted, what is your procedure for reporting to the DCEO?
- a. In what format do you send the quarterly reports?
 - b. Do you use the standardized report template provided by the DCEO?
22. Are you in a position to share electronic lists of participants for this program for potential use in an impact study?

Program Changes Between PY2 & PY3

According to our records, your organization participated in this program last year.

23. Have you noticed any changes in the program between this year and last?

- a. What changes did you notice? [Probe for increased funding per unit, combining Weatherization and Home Improvement programs, offering ceiling fans, etc]
- b. What is your impression of these changes? [Probe for: better, worse, why]

Program Strengths & Weaknesses

24. What do you see as the greatest strengths of the program?
25. What are some challenges to the program's success so far? [PROBE FOR: internal barriers such as application processes, management, implementation program design and external barriers in the marketplace]
 - a. How are the challenges being addressed?
26. How does your experience with this program compare to other similar low income programs that service Chicago?
 - a. [If applicable] What about programs outside of Chicago?
27. How would you sum up your experience with the program? Do you have any recommendations for improvement?
28. What is your overall level of satisfaction with the Residential Retrofit Energy Efficiency Program? Why do you say that?