

Evaluation of Low Income Residential Retrofit Program

June 2015 through May 2016

Prepared for:
Illinois Department of Commerce and Economic Opportunity

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Executive Summary

This report presents the results of the impact evaluation for electric program year eight and natural gas program year five (EPY8/GPY5) of the Low Income Residential Retrofit Program offered by the Illinois Department of Commerce and Economic Opportunity (hereinafter referred to as the “Department of Commerce”). EPY8/GPY5 is defined as the period June 2015 through May 2016.

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

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

The gross and net ex post kWh savings of the Residential Retrofit Program during the period June 2015 through May 2016 are summarized by program component in Table ES-1 and by utility in Table ES-2. Because the Residential Retrofit Program targets energy efficiency improvements in low income resident housing, the net ex post savings are assumed to equal the gross ex post savings. Net ex post electricity savings total 3,040,685 kWh for the period. The program net-to-gross ratio is 100% because the program targets low income residents.

Table ES-1 Summary of Gross and Net Ex Post kWh Savings by Program Component

Program Component	Utility	TRM-Calculated		ADM-Calculated		Net-to-Gross Ratio
		Gross Ex Post kWh Savings	Net Ex Post kWh Savings	Gross Ex Post kWh Savings	Net Ex Post kWh Savings	
Weatherization	Ameren	1,977,373	1,977,373	1,977,373	1,977,373	100%
	ComEd	853,586	853,586	853,586	853,586	100%
	Subtotal	2,830,959	2,830,959	2,830,959	2,830,959	100%
Program Grantees	Ameren	144,502	144,502	144,502	144,502	100%
	ComEd	35,167	35,167	35,167	35,167	100%
	Subtotal	179,669	179,669	179,669	179,669	100%
Energy Savers Multifamily	ComEd	29,851	29,851	30,057	30,057	100%
	Subtotal	29,851	29,851	30,057	30,057	100%
Total		3,040,479	3,040,479	3,040,685	3,040,685	100%

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

<i>Electric Utility</i>	<i>Net Ex Post kWh Savings*</i>
Ameren	2,121,875
ComEd	918,810
Total	3,040,685

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

The gross and net ex post natural gas savings of the Residential Retrofit Program during the period June 2015 through May 2016 are summarized by program component in Table ES-3 and by utility in Table ES-4. Net natural gas savings total 317,158 therms for the period.

Table ES-3 Summary of Gross and Net Ex Post Therm Savings by Program Component

<i>Program Component</i>	<i>Utility</i>	<i>TRM-Calculated</i>		<i>ADM-Calculated</i>		<i>Net-to-Gross Ratio</i>
		<i>Gross Ex Post Therm Savings</i>	<i>Net Ex Post Therm Savings</i>	<i>Gross Ex Post Therm Savings</i>	<i>Net Ex Post Therm Savings</i>	
Weatherization	Ameren	79,383	79,383	79,383	79,383	100%
	Nicor	95,655	95,655	95,655	95,655	100%
	North Shore	10,992	10,992	10,992	10,992	100%
	Peoples	16,802	16,802	16,802	16,802	100%
	Subtotal	202,833	202,833	202,833	202,833	100%
Program Grantees	Peoples	40,133	40,133	40,133	40,133	100%
	Subtotal	40,133	40,133	40,133	40,133	100%
Energy Savers Multifamily	Nicor	5,850	5,850	6,858	6,858	100%
	Peoples	59,096	59,096	67,334	67,334	100%
	Subtotal	64,946	64,946	74,192	74,192	100%
Total		307,912	307,912	317,158	317,158	100%

Table ES-4 Summary of Net Ex Post Therm Savings by Utility

<i>Gas Utility</i>	<i>Net Ex Post Therm Savings*</i>
Ameren	79,383
Nicor	102,514
North Shore	10,992
Peoples	124,269
Total	317,158

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

The gross and net ex post peak kW reductions of the Residential Retrofit Program during the period June 2015 through May 2016 are summarized by program component in Table ES-5 and by utility in Table ES-6. Net ex post peak kW reductions total 1,807.80 kW for the period.

Table ES-5 Summary of Gross and Net Ex Post Peak kW Reductions by Program Component

<i>Program Component</i>	<i>Utility</i>	<i>TRM-Calculated</i>		<i>ADM-Calculated</i>		<i>Net-to-Gross Ratio</i>
		<i>Gross Ex Post Peak kW Reductions</i>	<i>Net Ex Post Peak kW Reductions</i>	<i>Gross Ex Post Peak kW Reductions</i>	<i>Net Ex Post Peak kW Reductions</i>	
Weatherization	Ameren	933.76	933.76	933.76	933.76	100%
	ComEd	794.86	794.86	794.86	794.86	100%
	Subtotal	1,728.62	1,728.62	1,728.62	1,728.62	100%
Program Grantees	Ameren	8.14	8.14	8.14	8.14	100%
	ComEd	53.96	53.96	53.96	53.96	100%
	Subtotal	62.10	62.10	62.10	62.10	100%
Energy Savers Multifamily	ComEd	17.08	17.08	17.08	17.08	100%
	Subtotal	17.08	17.08	17.08	17.08	100%
Total		1,807.80	1,807.80	1,807.80	1,807.80	100%

Table ES-6 Summary of Net Ex Post Peak kW Reductions by Utility

<i>Electric Utility</i>	<i>Net Ex Post Peak kW Reductions *</i>
Ameren	941.91
ComEd	865.90
Total	1,807.80

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

The program kWh savings for EPY8/GPY5 were 3,040,685 which is a decrease from 5,536,153 kWh savings in the last program year. The program therm savings for EPY8/GPY5 were 317,158 which is a decrease from 735,045 therm savings in the last program year.

1. Introduction

This report presents the results of the impact and process evaluations of the Department of Commerce Low Income Residential Retrofit Program during EPY8/GPY5, defined as the period June 2015 through May 2016.

1.1 Description of Program

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

During EPY8/GPY5, grants were awarded to (1) other programs that are operated by the Department of Commerce, referred to as intra-agency grants; and (2) to external applicants engaged in low income construction projects.

As in prior years, intra-agency grants were awarded to the Illinois Home Weatherization Assistance Program.

During EPY8/GPY5, the grants awarded to Elevate Energy were treated as a separate program component referred to as the Energy Savers Multifamily. Through this component, Elevate Energy provides a package of services and measure incentives to multifamily building owners and operators to encourage the adoption of energy efficiency improvements to existing buildings.

Additionally, program grants were awarded to the following external organizations:

- Affordable Housing Continuum;
- Historic Chicago Bungalow Association;

Grant funds for most participants are prescriptive and based on the measures that are outlined in the program application. Applicants may propose additional measures provided that they include estimates of the energy savings from these measures. Decisions regarding the funding of proposed measures are based on staff reviews of estimated savings. Grantees receive funds for expected electric and gas energy savings.

Total grant funds cannot exceed \$750,000 and may not exceed 100 percent of the installed cost. However, the Department of Commerce Director reserves the right to waive funding limitations and other program parameters.

1.2 Overview of Evaluation Approach

The overall objective for the impact evaluation of the Residential Retrofit Program was to determine the net electric and natural gas energy savings and peak demand (kW) reductions resulting from program projects implemented during EPY8/GPY5.

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

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

1.3 Organization of Report

Chapter 2 presents and discusses the analytical methods and results of estimating program savings.

2. Estimation of Net Savings

This chapter presents the results of the impact evaluation of the Low Income Residential Retrofit Program offered by the Department of Commerce. The overall objective of the impact evaluation was to determine the net electric and natural gas savings, as well as peak demand (kW) reductions resulting from program projects during the period June 2015 through May 2016. Section 2.1 describes the methodology used for estimating gross savings. Section 0 presents the results from the effort to estimate savings for the Residential Retrofit Program.

2.1 Methodology for Calculating Program Savings

The methodology used for calculating program savings is described in this section. The overall objective for the impact evaluation of the Residential Retrofit Program was to determine the net electric and natural gas savings, as well as peak demand (kW) reductions resulting from projects completed during EPY8/GPY5. When applicable, the measure-level algorithms from the Illinois Statewide Technical Reference Manual (TRM) Version 4.0 (Illinois TRM) were used to estimate savings (see Table 2-1).

Depending on the measure type, savings were calculated using up to two different approaches. These approaches were as follows:

- TRM-Calculated: Savings calculated as per Illinois' Statewide TRM Version 4.0.
- ADM-Calculated: Savings calculated using a non-TRM methodology. ADM-Calculated savings were performed when the measure was not in the TRM or when the methodology in the TRM was not applicable because the assumptions provided were not appropriate for that particular measure.

Table 2-1 Illinois TRM Sections by Measure Type

Measure	Section in Illinois TRM	Other Resources	TRM	ADM
Air Leakage Reduction	5.6.1	-	●	
Attic Insulation	5.6.4	-	●	
Boiler Controls for Multi-Family Housing	4.4.4	-	●	
Energy Star-Rated Compact Fluorescent Lamp	5.5.1	-	●	
Energy Star-Rated Refrigerator	5.1.6	-	●	
High Efficiency Furnace 92% AFUE or Greater with ECM	5.3.7	-	●	
LED Linear Replacement Lamps	4.5.4	-	●	□
LED Specialty Lamps	5.5.6	-	●	
Low Flow Faucet Aerators for Kitchen and Bathroom	5.5.4	-	●	
Low Flow Shower Heads	5.4.5	-	●	
Multi-Family Central Domestic Hot Water Plants	4.3.7	-	●	
Multi-Family High Efficiency Boiler	4.4.10	-	●	
Non-Standard Measure	N/A.	TRM V5		●
Programmable Thermostat	5.3.11	-	●	
SEER 14.5 Central Air Systems with Programmable Thermostat	5.3.3	-	●	
Sidewall Insulation	5.6.4	-	●	
Energy Star-Rated Room AC	5.1.7	-	●	
ENERGY STAR Rated Heat Pump	5.3.1	-	●	

2.2 Results of Net Savings Evaluation

This section presents the results of the impact evaluation for the Residential Retrofit Program during the period of June 2015 through May 2016.

2.2.1 Program-Level Savings Results

This subsection presents the gross and net savings for the Residential Retrofit Program. A net-to-gross factor of 100% was used because the Residential Retrofit Program targets low income residents.

The gross and net ex post kWh and kW savings for the Residential Retrofit Program during the period June 2015 through May 2016 are summarized by program component in Table 2-2 and Table 2-4, by utility in Table 2-3 and Table 2-5. Gross and net ex post kWh savings are summarized by measure for the Weatherization component in Table 2-6 for the Program Grantees component in Table 2-7, and for the Energy Savers Multifamily component in Table 2-8. Net ex post electricity savings energy savings total 3,040,685 kWh and net peak demand reductions total 1,807.80 kW for the period.

Table 2-2 Summary of Gross and Net Ex Post kWh Savings by Program Component

Program Component	Utility	TRM-Calculated		ADM-Calculated		Net-to-Gross Ratio
		Gross Ex Post kWh Savings	Net Ex Post kWh Savings	Gross Ex Post kWh Savings	Net Ex Post kWh Savings	
Weatherization	Ameren	1,977,373	1,977,373	1,977,373	1,977,373	100%
	ComEd	853,586	853,586	853,586	853,586	100%
	Subtotal	2,830,959	2,830,959	2,830,959	2,830,959	100%
Program Grantees	Ameren	144,502	144,502	144,502	144,502	100%
	ComEd	35,167	35,167	35,167	35,167	100%
	Subtotal	179,669	179,669	179,669	179,669	100%
Energy Savers Multifamily	ComEd	29,851	29,851	30,057	30,057	100%
	Subtotal	29,851	29,851	30,057	30,057	100%
Total		3,040,479	3,040,479	3,040,685	3,040,685	100%

Table 2-3 Summary of Net Ex Post kWh Savings by Utility

Electric Utility	Net Ex Post kWh Savings*
Ameren	2,121,875
ComEd	918,810
Total	3,040,685

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

Table 2-4 Summary of Gross and Net Ex Post Peak kW Reductions by Program Component

Program Component	Utility	TRM-Calculated		ADM-Calculated		Net-to-Gross Ratio
		Gross Ex Post Peak kW Reductions	Net Ex Post Peak kW Reductions	Gross Ex Post Peak kW Reductions	Net Ex Post Peak kW Reductions	
Weatherization	Ameren	933.76	933.76	933.76	933.76	100%
	ComEd	794.86	794.86	794.86	794.86	100%
	Subtotal	1,728.62	1,728.62	1,728.62	1,728.62	100%
Program Grantees	Ameren	8.14	8.14	8.14	8.14	100%
	ComEd	53.96	53.96	53.96	53.96	100%
	Subtotal	62.10	62.10	62.10	62.10	100%
Energy Savers Multifamily	ComEd	17.08	17.08	17.08	17.08	100%
	Subtotal	17.08	17.08	17.08	17.08	100%
Total		1,807.80	1,807.80	1,807.80	1,807.80	100%

Table 2-5 Summary of Net Ex Post Peak kW Reductions by Utility

<i>Electric Utility</i>	<i>Net Ex Post Peak kW Reductions *</i>
Ameren	941.91
ComEd	865.90
Total	1,807.80

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

Table 2-6 Summary of Gross and Net Ex Post kWh Savings by Measure for Weatherization

<i>Measure</i>	<i>TRM-Calculated</i>		<i>ADM-Calculated</i>		<i>Net-to-Gross Ratio</i>
	<i>Gross Ex Post KWh Savings</i>	<i>Net Ex Post KWh Savings</i>	<i>Gross Ex Post KWh Savings</i>	<i>Net Ex Post KWh Savings</i>	
Air Leakage Reduction	1,058,182	1,058,182	1,058,182	1,058,182	100%
Attic Insulation	254,735	254,735	254,735	254,735	100%
Energy Star-Rated Compact Fluorescent Lamp	331,606	331,606	331,606	331,606	100%
Energy Star-Rated Refrigerator	158,880	158,880	158,880	158,880	100%
High Efficiency Furnace 92% AFUE or Greater with ECM	421,947	421,947	421,947	421,947	100%
Programmable Thermostat	5,083	5,083	5,083	5,083	100%
SEER 14.5 Central Air Systems with Programmable Thermostat	168,468	168,468	168,468	168,468	100%
Sidewall Insulation	129,974	129,974	129,974	129,974	100%
Energy Star-Rated Room AC	81,234	81,234	81,234	81,234	100%
Energy Star-Rated Heat Pump	220,851	220,851	220,851	220,851	100%
Total	2,830,959	2,830,959	2,830,959	2,830,959	100%

Table 2-7 Summary of Gross and Net Ex Post kWh Savings by Measure for Program Grantees

Measure	TRM-Calculated		ADM-Calculated		Net-to-Gross Ratio
	Gross Ex Post KWh Savings	Net Ex Post KWh Savings	Gross Ex Post KWh Savings	Net Ex Post KWh Savings	
Air Leakage Reduction	24,445	24,445	24,445	24,445	100%
Attic Insulation	10,723	10,723	10,723	10,723	100%
Energy Star-Rated Refrigerator	50,886	50,886	50,886	50,886	100%
LED Linear Replacement Lamps	3,109	3,109	3,109	3,109	100%
LED Specialty Lamps	569	569	569	569	100%
Low Flow Faucet Aerators for Kitchen and Bathroom	735	735	735	735	100%
Low Flow Shower Heads	5,827	5,827	5,827	5,827	100%
Programmable Thermostat	83,375	83,375	83,375	83,375	100%
Total	179,669	179,669	179,669	179,669	100%

Table 2-8 Summary of Gross and Net Ex Post kWh Savings by Measure for Energy Savers Multifamily

Measure	TRM-Calculated		ADM-Calculated		Net-to-Gross Ratio
	Gross Ex Post KWh Savings	Net Ex Post KWh Savings	Gross Ex Post KWh Savings	Net Ex Post KWh Savings	
Air Leakage Reduction	1,599	1,599	1,599	1,599	100%
Attic Insulation	12,360	12,360	12,360	12,360	100%
Energy Star-Rated Compact Fluorescent Lamp	1,516	1,516	1,516	1,516	100%
Energy Star-Rated Refrigerator	2,088	2,088	2,088	2,088	100%
High Efficiency Furnace 92% AFUE or Greater with ECM	7728	7728	7728	7728	100%
Non-Standard Measure	0	0	206	206	100%
Programmable Thermostat	37	37	37	37	100%
SEER 14.5 Central Air Systems with Programmable Thermostat	4,523	4,523	4,523	4,523	100%
Total	29,851	29,851	30,057	30,057	100%

The gross and net ex post natural gas savings of the Residential Retrofit Program during the period June 2015 through May 2016 are summarized by program component in Table 2-9 by utility in Table 2-10. Gross and net ex post kWh savings are summarized by measure for the Weatherization component in Table 2-11, for the Program Grantees component in Table 2-12, and for the Energy Savers Multifamily component in Table 2-13. Net ex post natural gas savings total 317,158 therms for the period.

Table 2-9 Summary of Gross and Net Ex Post Therm Savings by Program Component

Program Component	Utility	TRM-Calculated		ADM-Calculated		Net-to-Gross Ratio
		Gross Ex Post Therm Savings	Net Ex Post Therm Savings	Gross Ex Post Therm Savings	Net Ex Post Therm Savings	
Weatherization	Ameren	79,383	79,383	79,383	79,383	100%
	Nicor	95,655	95,655	95,655	95,655	100%
	North Shore	10,992	10,992	10,992	10,992	100%
	Peoples	16,802	16,802	16,802	16,802	100%
	Subtotal	202,833	202,833	202,833	202,833	100%
Program Grantees	Peoples	40,133	40,133	40,133	40,133	100%
	Subtotal	40,133	40,133	40,133	40,133	100%
Energy Savers Multifamily	Nicor	5,850	5,850	6,858	6,858	100%
	Peoples	59,096	59,096	67,334	67,334	100%
	Subtotal	64,946	64,946	74,192	74,192	100%
Total		307,912	307,912	317,158	317,158	100%

Table 2-10 Summary of Net Natural Gas Savings by Utility

Gas Utility	Net Ex Post Therm Savings*
Ameren	79,383
Nicor	102,514
North Shore	10,992
Peoples	124,269
Total	317,158

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

Table 2-11 Summary of Gross and Net Ex Post Therm Savings by Measure for Weatherization

<i>Measure</i>	<i>TRM-Calculated</i>		<i>ADM-Calculated</i>		<i>Net-to-Gross Ratio</i>
	<i>Gross Ex Post KWh Savings</i>	<i>Net Ex Post KWh Savings</i>	<i>Gross Ex Post KWh Savings</i>	<i>Net Ex Post KWh Savings</i>	
Air Leakage Reduction	68,774	68,774	68,774	68,774	100%
Attic Insulation	46,236	46,236	46,236	46,236	100%
High Efficiency Furnace 92% AFUE or Greater with ECM	77,691	77,691	77,691	77,691	100%
Programmable Thermostat	1,569	1,569	1,569	1,569	100%
Sidewall Insulation	8,563	8,563	8,563	8,563	100%
Total	202,833	202,833	202,833	202,833	100%

Table 2-12 Summary of Gross and Net Ex Post Therm Savings by Measure for Program Grantees

<i>Measure</i>	<i>TRM-Calculated</i>		<i>ADM-Calculated</i>		<i>Net-to-Gross Ratio</i>
	<i>Gross Ex Post KWh Savings</i>	<i>Net Ex Post KWh Savings</i>	<i>Gross Ex Post KWh Savings</i>	<i>Net Ex Post KWh Savings</i>	
Air Leakage Reduction	26,570	26,570	26,570	26,570	100%
Attic Insulation	13,563	13,563	13,563	13,563	100%
Total	40,133	40,133	40,133	40,133	100%

Table 2-13 Summary of Gross and Net Ex Post Therm Savings by Measure for Energy Savers Multifamily

<i>Measure</i>	<i>TRM-Calculated</i>		<i>ADM-Calculated</i>		<i>Net-to-Gross Ratio</i>
	<i>Gross Ex Post KWh Savings</i>	<i>Net Ex Post KWh Savings</i>	<i>Gross Ex Post KWh Savings</i>	<i>Net Ex Post KWh Savings</i>	
Air Leakage Reduction	1,738	1,738	1,738	1,738	100%
Attic Insulation	5,390	5,390	5,390	5,390	100%
Boiler Controls for Multi-Family Housing	985	985	985	985	100%
High Efficiency Furnace 92% AFUE or Greater with ECM	3,325	3,325	3,325	3,325	100%
Low Flow Faucet Aerators for Kitchen and Bathroom	441	441	441	441	100%
Low Flow Shower Heads	1,040	1,040	1,040	1,040	100%
Multi-Family Central Domestic Hot Water Plants	7,865	7,865	7,865	7,865	100%
Multi-Family High Efficiency Boiler	44,122	44,122	44,122	44,122	100%
Non-Standard Measure	0	0	9,246	9,246	100%
Programmable Thermostat	41	41	41	41	100%
Total	64,946	64,946	74,192	74,192	100%