



ComEd

Elevate Multi-Family Electric Energy Savings Program Evaluation Report

FINAL

**Energy Efficiency / Demand Response Plan:
Plan Year 8 (PY8)
(6/1/2015-5/31/2016)**

**Presented to
Commonwealth Edison Company**

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Elevate Multi-Family Electric Energy Savings Program Evaluation Report

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E. EXECUTIVE SUMMARY

This report presents a summary of the findings and results from the impact and process evaluation of the PY8¹ ComEd Elevate Multi-Family Electric Savings Program (Multi-Family Electric program or MFEP). The MFEP is a third-party energy efficiency (EE) program implemented under the Illinois Power Agency (IPA) funding mechanism.² The program delivers energy efficiency measures to multi-family property customers with less than 100 kW of demand that are not already served by the *ComEd Smart Ideas For Your Business (SIFYB)* portfolio. The program is not intended to compete with the Multi-Family Assessment program, a joint program currently offered in the ComEd *SIFYB*. Rather, the MFEP is intended to complement the existing program by focusing on the delivery of electric efficiency measures to the residential multi-family electric space heating market in the City of Chicago. Elevate Energy is the primary implementation contractor for the MFEP in a joint partnership with the City of Chicago.³

The PY8 MFEP did not change substantially from PY7 in terms of scope and measure types. The PY8 program continued to provide energy audits and free energy efficiency products in residential units. Through custom energy audit reports provided to each building owner (or representative), customers are provided with financing and incentive packages, as well as solicited bids from contractors for comprehensive electric efficiency upgrades. In addition, the program distributes free energy efficiency products to residential customers through a series of programs, initiatives, and events that the City of Chicago undertakes to engage its residents on issues of sustainability and energy efficiency.

Navigant's evaluation involved verifying the compliance of the PY8 program gross savings with the Illinois Technical Reference Manual version 4.0 (TRM v4.0)⁴ and applying research adjustments to non-deemed savings in the tracking database. Navigant calculated PY8 verified net impact savings using the approved net-to-gross ratio (NTGR) deemed through Illinois Stakeholder Advisory Group (SAG) consensus.⁵ In addition, Navigant coordinated with program staff to verify information about the tracking database.

E.1. Program Savings

Table E-1 summarizes the gross and net electricity savings from the Multi-Family Electric program. As this table shows, the total verified net energy savings is 1,784 megawatt-hours (MWh), and verified net summer peak demand savings is 0.11 megawatts (MW).

¹ The program year 8 (PY8) began June 1, 2015 and ended May 31, 2016.

² Created by Illinois Public Acts 97-0616 ("PA 97-0616") and 97-0824 ("PA 97-0824").

³ IPA All Electric Scope of Work_Final.docx (received 7/18/2014)

⁴ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 4.0, available at: <http://www.ilsag.info/technical-reference-manual.html>

⁵ <http://ilsag.info/net-to-gross-framework.html>

Table E-1. PY8 Total Program Electric Savings

Savings Category	Energy Savings (MWh)	Demand Savings (MW)	Peak Demand Savings (MW)
Ex-Ante Gross Savings	2,069	2.36	0.14 ⁶
Verified Gross Savings	1,991	1.82	0.13
Verified Net Savings	1,784	1.69	0.11

Source: ComEd tracking data and Navigant team analysis

E.2. Program Savings by Measure

Table E-2 summarizes the breakdown of electricity savings by measure type. By comparison, smart power strips account for 55 percent of the PY8 verified net savings, followed by programmable thermostats with percent, and the remaining one percent of savings is shared among the other measures.

Table E-2. PY8 Program Results by Measure

Measure	Ex Ante Gross Savings (MWh)	Ex ante Gross Peak Demand Reduction (MW)	Verified Gross Savings (MWh)	Verified Gross Peak Demand Reduction (MW)	Verified Gross kWh Realization Rate	NTGR †	Verified Net Savings (MWh)	Verified Net Peak Demand Reduction (MW)
Distributed 13W CFL, 1 st Year Install	19	<0.01	12	<0.01	66%	0.62	8	<0.01
7-plug Smart Strip Distributed	1,150	0.13	1,150	0.13	100%	0.86	989	0.11
Programmable Thermostat	890	-	819	-	92%	0.95	778	-
Low-Flow Showerheads	2	<0.01	2	<0.01	72%	0.93	2	<0.01
1-Lamp F40T12 (Mag) to 1-Lamp Relamp/Reballast HPT8	6	<0.01	6	<0.01	100%	0.95	6	<0.01
LED Wall-Mounted Lights, 30W - 75W	2	-	3	-	110%	0.95	2	-
PY8 Total	2,069	0.14§	1,991	0.13	96%		1,784§	0.11

Source: ComEd tracking data and Navigant team analysis.

† A deemed value. Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, available on the IL SAG website: <http://ilsag.info/net-to-gross-framework.html>

§ Numbers do not sum exactly due to rounding.

⁶ Estimates of ex ante demand and summer peak demand savings are not reported in the tracking database provided to the evaluation team. Evaluation derived the ex ante demand estimates based on reported energy savings.

E.3. Impact Estimate Parameters for Future Use

The evaluation did not conduct any specific research on parameters for deeming in future versions of the Illinois TRM.

E.4. Program Volumetric Detail

The PY8 Multi-Family Electric program completed 40 property assessments in PY8, involving 3,014 tenant units (see Table E-4). The program distributed efficient measures at 208 community events across Chicago. The program implemented 13,866 measures in the tenant spaces and at community events in Chicago. The tenants received 3,409 measures, mainly 7-plug smart power strips, which were distributed, and programmable thermostats and showerheads, which were installed. One property had additional lighting improvements and received rebates from ComEd. The Chicago events distributed 10,457 measures, most of which were 7-plug power strips and some 13W CFLs.

Table E-3. PY8 Volumetric Findings Detail

Participation	Direct Install	Contractor Installed	Distributed Products	Total
Completed Building Assessments (Participants)	14	1	25	40
Completed Events	-	-	208	208
Tenant Units in Assessed Buildings	989	74	2,357	3,014†
PY8 Measures Installed in Tenant Units	986	52	2,371	3,409
PY8 Measures Distributed at Events	-	-	10,457‡	10,457
Total PY8 Measures	986	52	12,828	13,866

Source: ComEd tracking data and Navigant team analysis.

† Unique tenants list excludes 406 duplicate tenant units with direct install programmable thermostats who also received distributed 7-plug smart power strips.

‡ Includes 1,663 distributed CFLs, the rest are 7-plug smart power strips.

E.5. Results Summary

The following table summarizes the key metrics from PY8.

Table E-4. PY8 Results Summary

Participation	Units	PY8
Net Savings	MWh	1,784
Net Demand Reduction	MW	1.69
Net Peak Demand Reduction	MW	0.11
Gross Savings	MWh	1,991
Gross Demand Reduction	MW	2.36
Gross Peak Demand Reduction	MW	0.13
Program Realization Rate	%	96%
Program NTG Ratio†	#	CFL Public Event =0.62 Thermostats=0.95 Power Strip Public Event =0.86 Showerhead =0.93 Comprehensive Non-CFL=0.95
Total Measures Evaluated	#	13,866
13W CFLs Distributed	#	1,663
Tenant Units	#	3,014
Events Completed	#	208
Customers Touched (Properties exclude event attendees)	#	40

Source: ComEd tracking data and Navigant team analysis.

† A deemed value. Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-

26_Final_EMV_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

E.6. Findings and Recommendations

The following describes key program findings and recommendations.

Verified Gross Impacts and Realization Rate

Finding 1. The PY8 Multi-Family Electric program achieved 1,991 MWh of verified gross energy savings, and 0.13 MW of verified gross peak demand savings. The total verified gross energy savings is 78 MWh lower than the ex ante gross savings of 2,069 MWh, which means that the verified gross savings realization rate for the program was 96 percent. With the exception of the smart power strips and one-lamp HPT8 measures which had 100 percent gross realization rate (RR) on energy savings, the remaining program measures including programmable thermostats (92 percent RR), showerheads (72 percent RR), LEDs (110 percent RR) and CFLs (66 percent RR) had their savings adjusted to reflect the applicable Illinois TRM version (v4.0).

Recommendation 1. The default savings values for programmable thermostats, LEDs, CFL and low flow showerheads required adjustments. The program implementer (Elevate Energy) should update their tracking database default savings assumptions to comply with the current and applicable version of the TRM (Version 5, Volumes 2 and 3 for PY9).⁷

⁷ IL-TRM_Effective_060116_v5.0_Vol_2_C_and_I_021116_Final.pdf;

Verified Net Impacts & NTGR

Finding 2. The evaluation used deemed NTG values to calculate verified net savings of 1,784 MWh, verified net demand reduction of 1.69 MW and verified net summer coincidence peak demand reduction of 0.11 MW. Overall, the PY8 program achieved 118 percent of its net energy savings target of 1,518 MWh⁸ through direct installation activities, distribution of products at events in Chicago and contractor installations of incented measures.

Finding 3. The verified net 1,784 MWh is 72 MWh less than the reported ex ante net 1,856 MWh, mainly due to adjustment of the measures default savings. The PY8 net MWh savings is 197 percent year-over-year compared to PY7, mainly due to more measures installed or distributed in PY8, an increment of 136 percent more measures from the previous year.

Tracking System Review

Finding 4. Navigant reviewed the program tracking database and found that although the tracking database captured vital program information on impact savings and participation, the database did not provide full records for the program's participants as they were tracked in the monthly scorecard (spreadsheet). The implementation contractor provided records (pdf file format) of individual tenants that received program measures and those that received distributed products at community events, but this information was not transferred into the monthly scorecard spreadsheet database. Navigant also found that the tracking database savings input did not include program demand reduction.

Recommendation 2. As a follow up recommendation from PY7, Elevate Energy should consider including additional information in the tracking system, such as: unique numeric property or unit identification numbers that could be used for referencing the property. The tenants' or event attendees' handwritten contact information on the Distribution Products Log Sheets should be transferred into the tracking spreadsheet database for easy accessibility. This could be used for post installation inspection or for future research to gauge participation and satisfaction.

Program Participation

Finding 5. The PY8 Multi-Family Electric program completed 40 property assessments, involving 3,014 tenant units. The program also distributed efficient measures at 208 community events across Chicago. The PY8 program implemented 13,866 measures in the tenant spaces and at community events in Chicago. The tenants received 3,409 measures, mainly 7-plug smart power strips, which were distributed, and programmable thermostats and showerheads, which were directly installed. One property was identified with additional lighting improvements and received rebates from ComEd. The Chicago events distributed 10,457 measures, most of which were 7-plug power strips and some 13W CFLs.

Finding 6. Measures installed in tenant spaces constituted approximately 23 percent of the PY8 measure volume, and the distributed measures at events constituted 77 percent of the PY8 measure volume. Overall, 93 percent of program volume was distributed smart power strips and CFLs. Direct install measures constituted approximately seven percent of measure volume, and less than one percent of volume were contractor installed common area HPT8 lamps and wall mounted exterior LEDs.

IL-TRM_Effective_060116_v5.0_Vol_3_Res_021116_Final.pdf
⁸ IPA All Electric Scope of Work_Final.docx (received 7/18/2014)

Finding 7. The PY8 program distributed more smart power strips and CFLs at events compared to PY7 when only CFLs were distributed at events. The PY8 total measure volume increased more than 136 percent from PY7, dominated by smart power strips (constituting 75 percent of the overall measure mix in PY8). Participation in the contractor installed measures decreased, dropping eight percent by volume from PY7.

Recommendation 3. Although the Multi-Family Electric program achieved successes in some areas of participation (particularly the distribution products channel) and exceeded savings and participation targets, the program could do more to increase program savings. As a follow up to a PY7 recommendation, the program should consider increasing the measure mix and focus more on the high-impact contractor installed measures. The program should emphasize the high-impact upgrades and the various incentive levels offered by the program in its marketing and outreach campaign.

Process Findings

Finding 8. Navigant's assessment shows that the program eligibility criteria are followed for the direct install and contractor install activities, and for the most part for the event activities. Navigant's review suggests that the program has improved their screening process to ensure distribution product recipients provide their contact details and addresses to prove they are ComEd customers. Although several recipients committed they will install the products within 30 days as the log sheet required, there were several others who did not check the box to commit, although they signed the log sheet. It appears also that many recipients do not have a full understanding of the "Bulb Wattage" check box in the log sheet. Some wrote 13W, 60W or even 100W when the valid value would have been the existing bulb wattage (60W or the 750-1049 lumens equivalent).

Recommendation 4. ComEd should consider reviewing the distribution products log sheet and clarify whether recipients are supposed to indicate the type of bulbs to be installed (13W CFL) or their existing bulb wattages at home. In addition, it is important that Elevate Energy ensures product recipients commit to install the measures within 30 days as required by the program. However, Navigant acknowledges that late installation or bulb storage is factored into the impact savings estimation.

1. INTRODUCTION

1.1 Program Description

The Elevate Multi-Family Electric Savings Program (Multi-Family Electric program or MFEP) is a third party energy efficient (EE) program implemented under the Illinois Power Agency (IPA) funding mechanism.⁹ The program delivers energy efficiency measures to multi-family property customers with less than 100 kW of demand who are not already served by the *ComEd Smart Ideas For Your Business (SIFYB)* portfolio. The program does not directly compete with the Multi-Family Assessment program, a joint program currently offered in the ComEd *SIFYB*. Rather, the MFEP complements the existing program by focusing on the delivery of electric efficiency resources to the residential multi-family electric space heating market in the City of Chicago. Elevate Energy is the primary implementation contractor for the MFEP in a joint partnership with the City of Chicago (“Chicago”).¹⁰

The PY8 MFEP did not change substantially from PY7 in terms of scope and measure types. The PY8 program continued to provide energy audits and free energy efficiency products in residential units. Through custom energy audit reports provided to each building owner (or representative), customers are provided with financing and incentive packages, as well as solicited bids from contractors for comprehensive electric efficiency upgrades. In addition, the program distributes free energy efficiency products to residential customers through a series of programs, initiatives, and events that the City of Chicago undertakes to engage its residents on issues of sustainability and energy efficiency.

1.2 Evaluation Objectives

Navigant’s evaluation involved verifying the compliance of the PY8 program gross savings with the Illinois Technical Reference Manual version 4.0 (TRM v4.0)¹¹ and applying research adjustments to non-deemed savings in the tracking database. Navigant calculated PY8 verified net impact savings using the net-to-gross ratio (NTGR) deemed through Illinois Stakeholder Advisory Group (SAG) consensus.¹² In addition, Navigant coordinated with program staff to verify information about the tracking database.

The evaluation team identified the following key researchable questions for PY8.

1.2.1 Impact Questions

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

1.2.2 Process Questions

The PY8 process evaluation activities were limited to interviews with program staff to verify information about the tracking database and data requirements for the evaluation.

⁹ Created by Illinois Public Acts 97-0616 (“PA 97-0616”) and 97-0824 (“PA 97-0824”).

¹⁰ IPA All Electric Scope of Work_Final.docx (received 7/18/2014)

¹¹ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 4.0, available at: <http://www.ilsag.info/technical-reference-manual.html>

¹²<http://ilsag.info/net-to-gross-framework.html>

2. EVALUATION APPROACH

This evaluation of the Multi-Family Electric program covers the second full-scale year of operation as an IPA program (June 1, 2015 through May 31, 2016). To determine verified gross savings, the evaluation team verified per unit savings for each program measure by (1) reviewing the tracking database, (2) comparing the use of measure algorithms in the tracking database to their use in the Illinois TRM v4.0 to ensure that they are appropriately applied or through secondary research of custom inputs, and (3) cross-checking totals. Navigant multiplied measure quantities reported in the program tracking database by the verified per unit savings values. The verified net savings were calculated using a net-to-gross ratio (NTGR) that was deemed for PY8. Navigant interviewed program staff to verify information about the monthly scorecards and tracking database.

2.1 Overview of Data Collection Activities

The core data collection activities included review of the program’s tracking data and verification of direct install measures, contractor install and distributed products quantity and savings against the TRM v4.0. The full set of data collection activities is shown in the following table.

Table 2-1. Primary Data Collection Activities

What	Who	Target Completes	Completes Achieved	When
Review program materials, invoices, monthly scorecard	Program Documents, Participants Completed Projects	All	All	June-September 2016
Tracking System & Desk Review	Participants Completed Projects	All	All	August- October 2016
In Depth Interviews	Program Management	2	2	April-August 2016

2.2 Verified Savings Parameters

Navigant calculated the verified gross and net savings (energy and coincident peak demand) using deemed impact algorithm sources found in the TRM v4.0. Table 2-2 presents the parameters that were used in the verified gross and net savings calculations, indicating which were examined through evaluation activities and which were deemed.

Table 2-2. Verified Savings Parameter Data Sources

Savings Input Parameters	Data Source	Deemed † or Evaluated?
NTGR	SAG Agreement†	Deemed
Gross Realization Rate ¹³	Tracking data and evaluation research	Evaluated
Program Bulbs	PY8 Program Tracking Data	Evaluated
Delta Watts	Illinois TRM v4.0 and secondary research	Partially Deemed
Lighting In-Service Rate	Illinois TRM v4.0‡	Deemed
Leakage	Illinois TRM v4.0‡	Deemed
Power Strip In-Service Rate	Illinois TRM v4.0‡	Deemed
Heating Penalty for Electric Heating	Illinois TRM v4.0‡	Deemed
Hours of Use (HOU)	Illinois TRM v4.0‡	Deemed
Summer Peak Coincidence Factor (CF)	Illinois TRM v4.0‡	Deemed
Energy Interactive Effects	Illinois TRM v4.0‡	Deemed
Demand Interactive Effects	Illinois TRM v4.0‡	Deemed
Programmable Thermostats & Showerhead Inputs	Illinois TRM v4.0‡	Deemed

Source: Navigant analysis

† Deemed values. Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

‡ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 4.0, available at: <http://www.ilsag.info/technical-reference-manual.html>

2.2.1 Verified Gross Program Savings Analysis Approach

Navigant used the TRM v4.0 methodology to calculate verified gross savings for measures with deemed savings. Navigant estimated verified unit savings values for each program measure and made adjustments to ex ante unit savings values based on the measure savings input assumptions found in the TRM v4.0. Navigant reviewed the program tracking system and procedures to verify that the program accurately reported measure counts. The verified gross savings are the product of verified unit savings values (energy and demand savings) and verified measure quantities.

Navigant reviewed a sample of project documentation data to determine the level of impacts of CFL bulbs and smart power strips distributed at tenant units and Chicago community events. Navigant used the assumptions in the TRM to determine the in-service rates and verified savings from the distributed products.

¹³ The verified gross realization rate is the ratio of verified gross savings to ex ante gross savings from the program tracking database.

2.2.2 Verified Net Program Savings Analysis Approach

Navigant calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a net-to-gross ratio (NTGR). In PY8, the NTGR estimates used to calculate the net verified savings were based on past evaluation research and defined through a consensus process through SAG as documented in a spreadsheet.¹⁴

2.3 Process Evaluation

The PY8 process evaluation activities were limited to interviews with program staff to verify information about the tracking database and data requirements for the evaluation. We also reviewed program materials to determine if any of the process recommendations from PY7 evaluation were implemented or impacted customer participation.

¹⁴ Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>

3. GROSS IMPACT EVALUATION

Navigant reviewed the tracking database of the Multi-Family Electric program to examine the values used to calculate program savings from measures installed through the program. The total ex ante gross savings estimate derived from the tracking database is 2,069 MWh. This is 78 MWh more than the verified gross savings of 1,991 MWh, mainly due to evaluation adjustments of the gross per unit savings from distributed CFLs, programmable thermostats, low-flow showerheads, high performance T8 lamps, and wall mounted LED lights. The verified gross realization rate for energy savings is 96 percent.

3.1 Tracking System Review

Navigant downloaded the final tracking data (final monthly scorecard) for the Multi-Family Electric PY8 impact evaluation from the ComEd Evaluation Sharefile site.¹⁵ Navigant reviewed the tracking data to verify the completeness and accuracy of the tracking system data and to identify any issues that would affect the impact evaluation of the program. The tracking database captures the most vital information that enables accurate tracking of the claimed savings. Navigant found that with the exception of the smart power strips and 1-Lamp HPT8 measures, which had default savings comparable to the TRM estimates, the evaluation adjusted the remaining program measures including programmable thermostats, showerheads, LEDs and CFLs to reflect the applicable Illinois TRM version (v4.0).

Although the tracking database captures vital program information, Navigant observed that the database does not provide full records for program's participants as they are tracked in the monthly scorecard (spreadsheet). The implementation contractor provides records (pdf file format) of individual tenants that received program measures and those that received distributed products at community events, but they are not transferred into the monthly scorecard spreadsheet, which is the program database. Navigant also found that the tracking database did not include program demand reduction.

Other key findings from the tracking data review include the following:

- **Programmable Thermostats – Resistant Heat: 92 Percent Realization Rate (RR), 44 Percent of Program Net Savings.** The tracking database shows a total of 978 programmable thermostats installed in PY8. Navigant found that the ex ante calculation used TRM v4.0 to calculate a savings of 837 kWh per unit for 548 of the thermostats and then used a previous version of the TRM to calculate a savings of 1,002 kWh per unit for 430 thermostats. Since the 430 programmable thermostats were installed in June-July 2015, close to the beginning of PY8 and that savings were claimed in PY8, the TRM v4.0 is the appropriate reference for the estimated savings, which should be 837 kWh per unit gross savings.
- **Distributed CFLs (43W to 13W): 66 Percent Realization Rate (RR), 0.4 Percent of Program Net Savings.** The ex ante savings appear to use the direct install value of an installation rate of 96.9 percent instead of the first-year installation rate for distributed CFLs (59 percent) as provided in TRM v4.0. Navigant adjusted the installation rate accordingly and also used a delta watts of 30W and hours of use value similar to efficiency kits instead of direct install values. Navigant estimated 7.39 kWh as the verified gross unit savings compare to 11.17 kWh from the tracking database.
- **Low-Flow Showerheads: 72 Percent Realization Rate (RR), 0.1 Percent of Program Net Savings.** ComEd confirmed¹⁶ that the approved low-flow showerhead installed through the

¹⁵ Tracking system data received on July 21, 2016. File: "Elevate Energy Multi-Family Electric Heat Program Scorecard 6_3_16.xlsx" and clarification email sent by ComEd on September 30, 2016.

¹⁶ Email correspondence with ComEd Program Manager (2016-09-26)

program has a flow rate of 2 gallons per unit (gpm). Using the TRM, Navigant estimated approximately 206 kWh for the verified savings. The tracking database did not list the type of showerhead and flow rate used in the ex ante calculation, which is estimated to save 287 kWh.

- LED Wall-Mounted Area Lights (30W - 75W): 110 Percent Realization Rate (RR), 0.1 Percent of Program Net Savings.** This measure was described in PY7 documentation to have a delta watts of 130.4W.¹⁷ Using this assumption and installation rate of 100 percent, Navigant estimated 639 kWh for the verified gross savings for exterior space. The ex ante estimate 582 kWh appears to be based on 91 percent installation rate from a previous version of the TRM.
- HPT8 and Distributed 7-Plug Smart Strips: 100 Percent Realization Rate (RR), 55 Percent of Program Net Savings.** Deemed assumptions were verified to be reasonable. No changes to claimed savings.

3.2 Program Volumetric Findings

The Multi-Family Electric program completed 40 property assessments in PY8, involving 3,014 tenant units (see Table 3-1). The program also completed distribution of efficient measures at 208 community events across Chicago. The PY8 program distributed 13,866 measures in the tenant spaces and at community events in Chicago. The tenants received 3,409 measures, mainly distributed 7-plug smart power strips, direct install programmable thermostats and showerheads. One property had additional lighting improvements and received rebates from ComEd. The Chicago events distributed 10,457 measures, most of which were 7-plug power strips and some 13W CFLs.

Table 3-1. PY8 Volumetric Findings Detail

Participation	Direct Install	Contractor Installed	Distributed Products	Total
Completed Building Assessments (Participants)	14	1	25	40
Completed Events	-	-	208	208
Tenant Units in Assessed Buildings	989	74	2,357	3,014†
PY8 Measures Installed in Tenant Units	986	52	2,371	3,409
PY8 Measures Distributed at Events	-	-	10,457‡	10,457
Total PY8 Measures	986	52	12,828	13,866

Source: ComEd tracking data and Navigant team analysis.

†Unique tenants list excludes 406 duplicate tenant units with direct install programmable thermostats who also received distributed 7-plug smart power strips.

‡Includes 1,663 distributed CFLs, and the rest are 7-plug smart plugs.

Navigant’s verified measure counts equaled the ex ante measure counts, after a careful review of the monthly scorecards and invoice records. Table 3-2 provides additional measure details by count.

¹⁷ Elevate Energy Multi-Family Electric Heat Program T12 and LED measures v_Navigant comments.xlsx (received 2015-01-22)

Table 3-2. PY8 Volumetric Findings by Measure Count

Measure	Unit	Install Type	Ex ante Measure Count	Verified Measure Count
Distributed 13W CFL	Each	In-unit	1,663	1,663
7-plug Smart Strip Distributed	Each	In-unit	11,165	11,165
Programmable Thermostat - Resistance Heat	Each	In-unit	978	978
Low-Flow Showerheads	Each	In-unit	8	8
1-Lamp F40T12 (Mag) to 1-Lamp Relamp/Reballast HPT8	Each	In-unit	48	48
LED Wall-Mounted Area Lights, 30W - 75W	Each	In-unit	4	4
PY8 Total			13,866	13,866

Source: ComEd tracking data and Navigant team analysis.

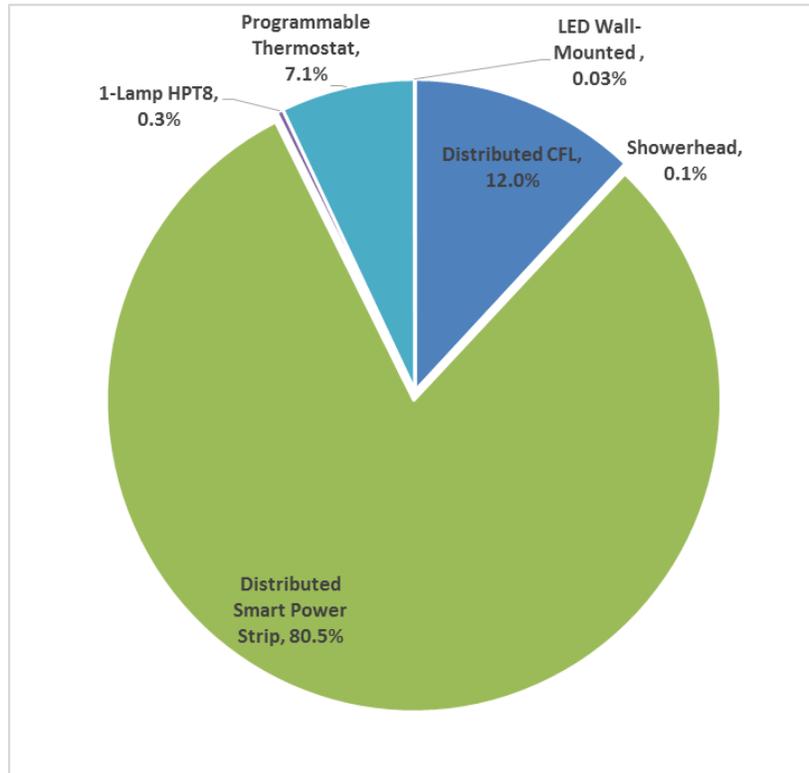
Key findings from the volumetric details include:

1. A total of 3,014 tenant units participated in the PY8 program and received 3,409 measures including 2,371 smart power strips distributed at tenant spaces, and direct installation of 978 programmable thermostats and eight low flow showerheads. Others were 52 HPT8 lamps and wall-mounted exterior LEDs installed by contractors, which received rebates from ComEd. ¹⁸Measures installed in tenant spaces constituted approximately 25 percent of the PY8 measure volume.
2. A total of 10,457 measures were distributed at 208 community events. This includes 1,663 CFLs and 8,794 smart power strips. The 10,457 overall distributed measures at events constituted approximately 75 percent of the PY8 measure volume.
3. Overall, approximately 93 percent of program volume were distributed CFLs and smart power strips. Direct install measures constituted approximately seven percent of measure volume, and less than one percent of volume were contractor installed common area HPT8 lamps and wall-mounted exterior LEDs.
4. In comparison to PY7 when only CFLs were distributed at events and smart power strips and other measures were distributed at tenants' space, the PY8 program had the majority of smart power strips distributed at events. Smart power strips distributed at events constituted approximately 81 percent of the overall measure mix in PY8. Figure 3-1 disaggregates the measure mix by percentage of program measures.
5. The PY8 total measure volume increased more than 136 percent from PY7 level, dominated by smart power strips. Participation in the contractor installed measures decreased, dropping eight percent by volume from PY7. The program should consider encouraging participation in other program measure mixes with higher savings potential in addition to the current participation level.
6. Navigant estimated each tenant unit received at least one program measure, mostly smart power strips or programmable thermostats. Navigant did not estimate the number of measures received per event attendee from all the 208 events. We reviewed a sample of the Distributed Products

¹⁸ The evaluation team checked that no HPT8s were incented in the PY8 Small Business program implemented by Nexant, hence no double-counting of savings.

Log Sheets but did not aggregate the total number of event participants from the Log Sheets. The tracking database spreadsheet we received was missing the attendee's information.

Figure 3-1. Number of Measures Installed by Type



Source: Navigant analysis

3.3 Gross Program Impact Parameter Estimates

Navigant estimated verified unit savings for each program measure using impact algorithm sources found in the TRM v4.0. Table 3-3 presents the key parameters and the references used in the verified gross and net savings calculations (energy and coincident peak demand).

Table 3-3. Verified Gross Savings Parameters

Measure	Ex Ante Gross Value (kWh/unit)	Verified Gross Value, (kWh/unit)	Verified Gross Value (kW/unit)	Deemed† or Evaluated?	Source (TRM V4.0)
Distributed 13W CFL, 1 st Year Install	11.17	7.39	0.001	Deemed	Section 5.5.1
7-plug Smart Strip Distributed	103.00	103.00	0.012	Deemed	Section 5.2.1
Programmable Thermostat - Resistance Heat	837 or 1,002.46	837.07	-	Deemed	Section 5.3.11
Low-Flow Showerheads	287.10	205.63	0.023	Deemed	Section 5.4.5
1-Lamp F40T12 (Mag) to 1-Lamp Relamp/Reballast HPT8	122.81	122.81	0.036	Deemed	Section 4.5.3
LED Wall-Mounted Area Lights, 30W - 75W	581.81	639.35	-	Partially Deemed	Section 4.5.4 and secondary research delta watts

Source: Navigant Analysis

† Deemed values are from Illinois TRM v4.0, available at <http://www.ilsag.info/technical-reference-manual.html>.

3.4 Verified Gross Program Impact Results

The total verified gross savings was 1,991 MWh, and the total verified gross peak demand reduction was 0.13 MW as shown in Table 3-4. The table presents savings at the measure group level including groups where the estimate is not statistically significant at the 90/10 level. The program achieved a 96 percent gross realization rate on energy savings.

Regarding delivery channels, the community events channel involving smart power strips and CFLs constituted 918 MWh of the verified gross savings, which represented 46 percent of total savings. The tenant space delivery channel constituted 1,073 MWh, which was 54 percent of the verified gross savings. The tenant space measures included the direct install and contractor installed measures and 2,371 smart power strips distributed by the program at certain tenant addresses through coordination with the property managers.

At the measure level, the overall distributed smart power strips accounted for 58 percent of the PY8 verified gross savings and programmable thermostats accounts for 41 percent of the verified gross savings, and the remaining one percent of savings was shared among the other measures.

Table 3-4. PY8 Verified Gross Impact Savings Estimates by Measure and Delivery

Program Delivery	Measure	Ex Ante Gross Savings (MWh)	Ex ante Gross Peak Demand Reduction (MW)	Verified Gross kWh RR	Verified Gross Savings (MWh)	Verified Gross Peak Demand Reduction (MW)
Event Distributions	Distributed 13W CFL, 1 st Year Install	19	<0.01	66%	12	<0.01
	7-plug Smart Strip Distributed	906	0.10	100%	906	0.10
<i>Subtotal</i>		<i>925</i>	<i>0.11</i>	<i>99%</i>	<i>918</i>	<i>0.10</i>
Tenant Space	7-plug Smart Strip Distributed	244	0.03	100%	244	0.03
	Programmable Thermostat	890	-	92%	819	-
	Low-Flow Showerheads	2.30	<0.01	72%	1.65	<0.01
	1-Lamp F40T12 (Mag) to 1-Lamp Relamp/Reballast HPT8	5.89	<0.01	100%	5.89	<0.01
	LED Wall-Mounted Lights, 30W - 75W	2.33	-	110%	2.56	-
<i>Subtotal</i>		<i>1,144</i>	<i>0.03</i>	<i>94%</i>	<i>1,073</i>	<i>0.03</i>
PY8 Total		2,069§	0.14§	96%	1,991	0.13

Source: Evaluation Team analysis.

† NA when the TRM determines the gross savings.

§ Numbers do not sum exactly due to rounding.

4. NET IMPACT EVALUATION

Verified net energy and demand (coincident peak and overall) savings were calculated by multiplying the verified gross savings estimates by a NTG ratio. This section presents the estimated PY8 net savings..

4.1 PY8 Program Savings Estimate

The table below shows the deemed NTG values for PY8.

Table 4-1. PY8 Verified Net Impact Parameters

Measure	Net to Gross Ratio (NTGR) †
CFL Public Event	0.62
Thermostats	0.95
Power Strip Public Event	0.86
Showerhead	0.93
Comprehensive Non-CFL	0.95

† A deemed value. Source: ComEd_NTG_History_and_PY8_Recommendation_2016-02-26_Final_EMV_Recommendations.xlsx, available on the IL SAG website: <http://ilsag.info/net-to-gross-framework.html>

Table 4-2 presents the program net savings at the measure group level. The evaluation calculated verified net savings of 1,784 MWh and verified net peak demand reduction of 0.11 MW. The verified net 1,784 MWh is 72 MWh less than the reported ex ante net 1,856 MWh. Overall, the PY8 program achieved 118 percent of its net energy savings target of 1,518 MWh.¹⁹

Table 4-2. PY8 Verified Net Impact Savings Estimates by Delivery

Research Category	Ex-Ante Net MWh Savings ²⁰	Verified Net Realization Rate	Verified Net MWh Savings	Verified Net Peak MW Savings
Event Distribution	790	100%	787	0.09
Tenant Space	1,066	94%	997	0.02
Total	1,856	96%	1,784	0.11

Source: Evaluation team analysis

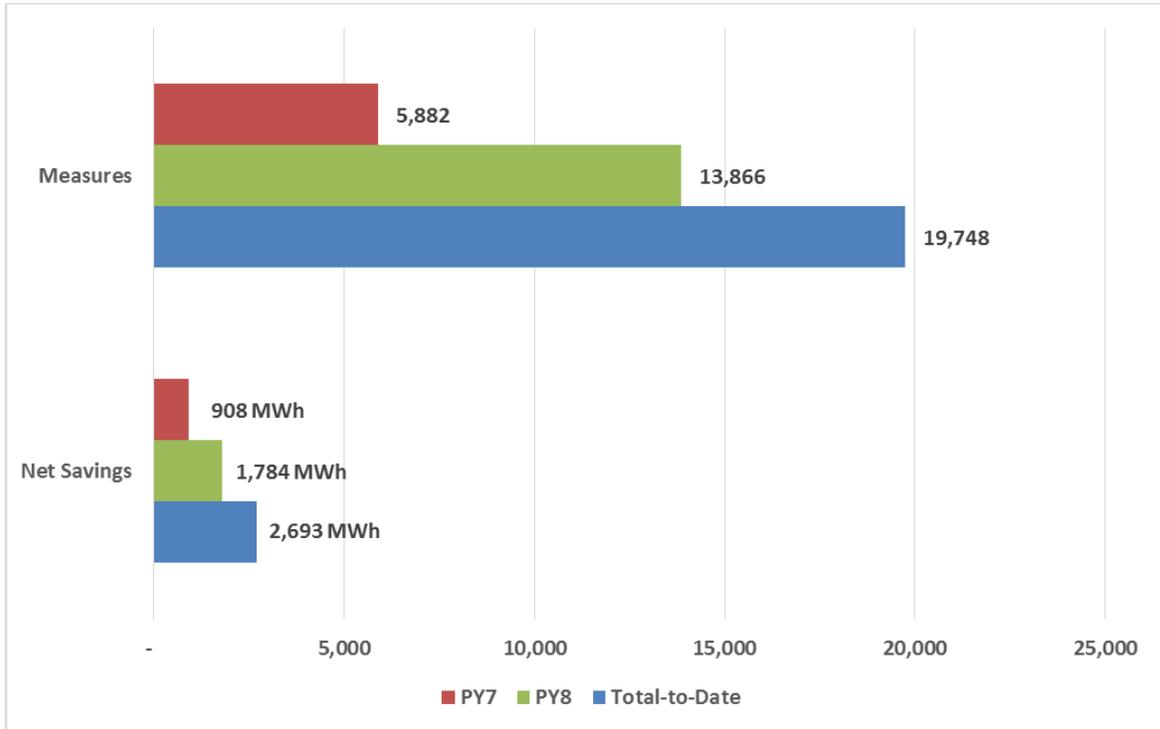
The measures distributed at community events contributed 44 percent of the verified net savings, and the tenant space measures contributed 56 percent of the net savings. At the measure level, smart power strips contributed 55 percent and programmable thermostats contributed 44 percent of the verified gross savings. The remaining one percent of net savings was shared among the other measures.

Figure 4-1 provides a comparison of the year-over-year performance of the Multi-Family Electric program. The PY8 net MWh savings is 197 percent year-over-year compare to PY7, mainly due to more measures installed or distributed in PY8, an increment of 136 percent more measures.

¹⁹ IPA All Electric Scope of Work_Final.docx (received 7/18/2014)

²⁰ ComEd provide the evaluation team with the ex-ante net savings in the tracking database.

Figure 4-1. PY7-PY8 Yearly Comparison



Source: ComEd tracking data and Navigant team analysis.

5. PROCESS EVALUATION

Navigant conducted a limited process review in PY8. Process research was through interviews with program staff and a review of program materials to verify information about program measures and the program tracking system. Navigant conducted interviews with the program staff in April 2016. We also had periodic discussions with program staff over the program year to discuss program forecasts and strategies for future program cycles.

Navigant reviewed the program documentation and monthly scorecards, invoices and Distribution Product Log Sheets. The purpose was to verify how the program operation or processes improved if any of the due diligence recommendations from PY7 evaluation were adhered to.

Navigant's review indicated that the program has improved the screening process to ensure distribution product recipients provided their contact details and addresses to prove they are ComEd customers. Our recommendation is that this handwritten information should be transferred into the tracking database for easy accessibility. This information could be used for post installation inspection, in-service research, or for future research to gauge participation and satisfaction.

Although several recipients committed they will install the distributed products within 30 days as the log sheet required, there were several others who did not check the box to commit, although they signed the log sheet. It appears also that many recipients did not have a full understanding of the "Bulb Wattage" check box in the log sheet. Some recipients wrote 13W, 60W or 100W when it should have been the existing bulb wattage (60W or the 750-1049 lumens equivalent). ComEd should consider reviewing the log sheet and clarify whether recipients are supposed to indicate the type of bulbs to be installed (13W CFL) or their existing bulb wattages at home.

6. FINDINGS AND RECOMMENDATIONS

The following describes key program findings and recommendations.

Verified Gross Impacts and Realization Rate

Finding 1. The PY8 Multi-Family Electric program achieved 1,991 MWh of verified gross energy savings, and 0.13 MW of verified gross peak demand savings. The total verified gross energy savings is 78 MWh lower than the ex ante gross savings of 2,069 MWh, which means that the verified gross savings realization rate for the program was 96 percent. With the exception of the smart power strips and one-lamp HPT8 measures which had 100 percent gross realization rate (RR) on energy savings, the remaining program measures including programmable thermostats (92 percent RR), showerheads (72 percent RR), LEDs (110 percent RR) and CFLs (66 percent RR) had their savings adjusted to reflect the applicable Illinois TRM version (v4.0).

Recommendation 1. The default savings values for programmable thermostats, LEDs, CFL and low flow showerheads required adjustments. The program implementer (Elevate Energy) should update their tracking database default savings assumptions to comply with the current and applicable version of the TRM (Version 5.0, Volumes 2 and 3 for PY9).

Verified Net Impacts & NTGR

Finding 2. The evaluation used deemed NTG values to calculate verified net savings of 1,784 MWh, verified net demand reduction of 1.69 MW and verified net summer coincidence peak demand reduction of 0.11 MW. Overall, the PY8 program achieved 118 percent of its net energy savings target of 1,518 MWh²¹ through direct installation activities, distribution of products at events in Chicago and contractor installations of incented measures.

Finding 3. The verified net 1,785 MWh is 72 MWh less than the reported ex ante net 1,856 MWh, mainly due to adjustment of the measures default savings. The PY8 net MWh savings is 197 percent year-over-year compared to PY7, mainly due to more measures installed or distributed in PY8, an increment of 136 percent more measures from the previous year.

Tracking System Review

Finding 4. Navigant reviewed the program tracking database and found that although the tracking database captured vital program information on impact savings and participation, the database did not provide full records for the program's participants as they were tracked in the monthly scorecard (spreadsheet). The implementation contractor provided records (pdf file format) of individual tenants that received program measures and those that received distributed products at community events, but this information was not transferred into the monthly scorecard spreadsheet database. Navigant also found that the tracking database savings input did not include program demand reduction.

Recommendation 2. As a follow up recommendation from PY7, Elevate Energy should consider including additional information in the tracking system, such as: unique numeric property or unit identification numbers that could be used for referencing the property. The tenants' or event attendees' handwritten contact information on the Distribution Products Log Sheets should be transferred into the tracking spreadsheet database for easy accessibility. This could be used for post installation inspection or for future research to gauge participation and satisfaction.

²¹ IPA All Electric Scope of Work_Final.docx (received 7/18/2014)

Program Participation

Finding 5. The PY8 Multi-Family Electric program completed 40 property assessments, involving 3,014 tenant units. The program also distributed efficient measures at 208 community events across Chicago. The PY8 program implemented 13,866 measures in the tenant spaces and at community events in Chicago. The tenants received 3,409 measures, mainly 7-plug smart power strips, which were distributed, and programmable thermostats and showerheads, which were directly installed. One property was identified with additional lighting improvements and received rebates from ComEd. The Chicago events distributed 10,457 measures, most of which were 7-plug power strips and some 13W CFLs.

Finding 6. Measures installed in tenant spaces constituted approximately 25 percent of the PY8 measure volume, and the distributed measures at events constituted 75 percent of the PY8 measure volume. Overall, 93 percent of program volume was distributed smart power strips and CFLs. Direct install measures constituted approximately seven percent of measure volume, and less than one percent of volume were contractor installed common area HPT8 lamps and wall mounted exterior LEDs.

Finding 7. The PY8 program distributed more smart power strips and CFLs at events compared to PY7 when only CFLs were distributed at events. The PY8 total measure volume increased more than 136 percent from PY7, dominated by smart power strips (constituting 81 percent of the overall measure mix in PY8). Participation in the contractor installed measures decreased, dropping eight percent by volume from PY7.

Recommendation 3. Although the Multi-Family Electric program achieved successes in some areas of participation (particularly the distribution products channel) and exceeded savings and participation targets, the program could do more to increase program savings. As a follow up to a PY7 recommendation, the program should consider increasing the measure mix and focus more on the high-impact contractor installed measures. The program should emphasize the high-impact upgrades and the various incentive levels offered by the program in its marketing and outreach campaign.

Process Findings

Finding 8. Navigant's assessment shows that the program eligibility criteria are followed for the direct install and contractor install activities, and for the most part for the event activities. Navigant's review suggests that the program has improved their screening process to ensure distribution product recipients provide their contact details and addresses to prove they are ComEd customers. Although several recipients committed they will install the products within 30 days as the log sheet required, there were several others who did not check the box to commit, although they signed the log sheet. It appears also that many recipients do not have a full understanding of the "Bulb Wattage" check box in the log sheet. Some wrote 13W, 60W or even 100W when the valid value would have been the existing bulb wattage (60W or the 750-1049 lumens equivalent).

Recommendation 4. ComEd should consider reviewing the Distribution Products Log Sheet and clarify whether recipients are supposed to indicate the type of bulbs to be installed (13W CFL) or their existing bulb wattages at home. In addition, it is important that Elevate Energy ensures product recipients commit to install the measures within 30 days as required by the program. However, Navigant acknowledges that late installation or bulb storage is factored into the impact savings estimation.