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ComEd Public Sector Savings Through Efficient Products (STEP) Program Impact Evaluation Report

Energy Efficiency / Demand Response Plan: Plan Year 9 Bridge Period (PY9)

Presented to
Commonwealth Edison Company

DRAFT

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. Introduction

This report presents the results of the impact evaluation of ComEd's Savings Through Efficient Products (STEP) Program for the PY9 bridge period, June 2, 2017 through December 31, 2017. It presents a summary of the energy and demand impacts for the total program and broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology.

2. Program Description

The STEP program aims to effectuate energy savings by providing public facilities with free energy efficiency measures. The program provided LED exit signs, CFLs, vending machine controls, switch-mount occupancy sensors, screw-in LED bulbs for outdoor applications, low-flow faucet aerators, low-flow showerheads, and kitchen pre-rinse green nozzles. The program was implemented by the Midwest Energy Efficiency Alliance (MEEA). This program is an expansion of the pre-existing Department of Commerce & Economic Opportunity (DCEO) program.

3. Program Savings

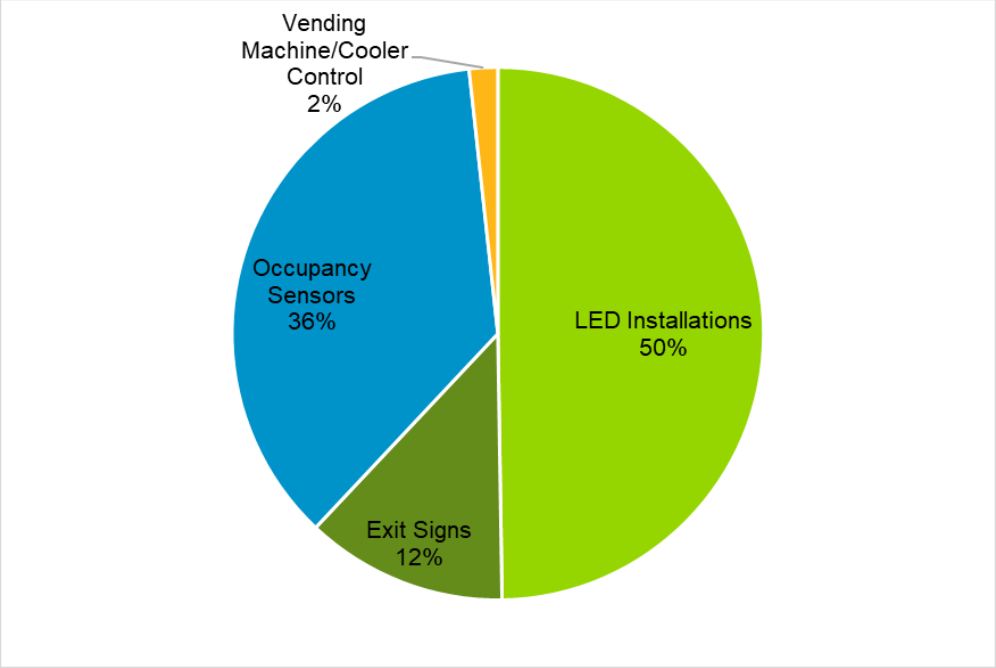
The PY9 participants and measures are shown in the following tables and graphs.

Table 3-1. PY9 STEP Volumetric Findings Detail

Participation	PY9 Bridge Total
Participants*	179
Projects†	208
Measures Installed	7,960
Units/Project	38.3
LED Installations	3,960
Exit Signs	977
Occupancy Sensors	2,885
Vending Machine/Cooler Control	138

Source: ComEd tracking data and Navigant team analysis.
* Participants are defined as unique Customer Names
† Unique projects are defined as unique Project IDs

Figure 3-1. STEP Distribution of Measures Installed by Type



Source: Evaluation Analysis

Table 3-2 summarizes the incremental energy and demand savings the STEP Program achieved in PY9 Bridge Period.

Table 3-2. STEP PY9 Bridge Total Annual Incremental Savings

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Peak Demand Savings (kW)
Ex Ante Gross Savings	1,856,407	NA	691
Program Gross Realization Rate	99%	NA	101%
Verified Gross Savings	1,836,504	1,442	695
Program Net-to-Gross Ratio (NTGR)	0.96	0.96	0.96
Verified Net Savings	1,763,043	1,384	667

Source: ComEd tracking data and Navigant team analysis.

4. Program Savings by Measure

The STEP program includes 4 measures as shown in the following table. Occupancy sensors and LED lighting make up the most savings at 42% and 38% of overall savings, respectively.

Table 4-1. STEP PY9 Bridge Energy Savings by Measure

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTGR*	Verified Net Savings (kWh)	Technical Measure Life	Persistence	Effective Useful Life (EUL)†
Lighting	LED Installations	722,352	97%	702,584	0.96	674,480	NA	NA	14
Lighting	Exit Signs	193,280	100%	193,145	0.96	185,420	NA	NA	16
Lighting	Occupancy Sensors	763,391	100%	763,391	0.96	732,855	NA	NA	8
Refrigeration	Vending Machine/Cooler Control	177,384	100%	177,384	0.96	170,288	NA	NA	5
	Total‡	**1,856,407**	**99%**	**1,836,504**	**0.96**	**1,763,043**	**NA**	**NA**	**11**

Source: ComEd tracking data and Navigant team analysis.
* A deemed value. Source: ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html.
† EUL is a combination of technical measure life and persistence.
‡ Values may not sum due to rounding.

Table 4-2. STEP PY9 Bridge Demand Savings by Measure

End Use Type	Research Category	Ex Ante Gross Demand Reduction (kW)*	Verified Gross Realization Rate	Verified Gross Demand Reduction (kW)	NTGR†	Verified Net Demand Reduction (kW)
Lighting	LED Installations	NA	NA	235	0.96	226
Lighting	Exit Signs	NA	NA	26	0.96	25
Lighting	Occupancy Sensors	NA	NA	1,180	0.96	1,133
Refrigeration	Vending Machine/Cooler Control	NA	NA	0	0.96	0
	Total†	**NA**	**NA**	**1,442**	**0.96**	**1,384**

Source: ComEd tracking data and Navigant team analysis.
* A deemed value. Source: ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html.
† Values may not sum due to rounding.

Table 4-3. STEP PY9 Bridge Peak Demand Savings by Measure

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (kW)	NTGR*	Verified Peak Net Demand Reduction (kW)
Lighting	LED Installations	118	103%	122	0.96	117
Lighting	Exit Signs	26	100%	26	0.96	25
Lighting	Occupancy Sensors	547	100%	547	0.96	525
Refrigeration	Vending Machine/Cooler Control	0	NA	0	0.96	0
	Total†	**691**	**101%**	**695**	**0.96**	**667**

Source: ComEd tracking data and Navigant team analysis.
* A deemed value. Source: ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html.
† Values may not sum due to rounding.

5. Program Impact Analysis Findings and Recommendations

Impact Parameter Estimates

Table 5-1summarizes the parameters and references used in verified gross and net savings calculation. Navigant calculated savings for each measure following algorithms defined by the Illinois TRM version 5.0.

Table 5-1. STEP Verified Gross Savings Parameters

Gross Savings Input Parameters	Value	Deemed or Evaluated?
Quantity (units)	Varies	Evaluated
NTGR	0.96	Deemed*
LED Installations (kWh/unit)	Varies	Deemed†
Exit Signs (kWh/unit)	Varies	Deemed†
Occupancy Sensors (kWh/unit)	Varies	Deemed†

* ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html
† State of Illinois Technical Reference Manual version 2.0 from http://www.ilsag.info/technical-reference-manual.html.

Other Impact Findings and Recommendations

Verified Gross Impacts and Realization Rate

Finding 1. The PY9 STEP program achieved 1,836,504 kWh of verified gross energy savings, 1,442 kW of verified gross demand reduction, and 695 kW of verified gross peak demand reduction. The overall verified gross program realization rate for energy savings was 99% and the verified gross program realization rate for peak demand savings was 101%. The realization rate for gross demand savings cannot be calculated as the implementer did not track gross demand reduction.

Verified Net Impacts and NTGR

Finding 2. The evaluation used a deemed net-to-gross (NTG) value of 0.96 for the STEP program in PY9 to calculate verified net savings of 1,763,043 kWh, verified net demand reduction of 1,384 kW and verified net peak demand reduction of 667 kW.

Impact Analysis

Finding 3. The realization rate for LED installations comes from LED PAR Bulbs. The implementer calculated savings for LED PAR bulbs as either installed in an unknown location or installed outside; however, 20% of PAR bulbs were installed in elementary schools, high schools, garages, or warehouses according to building type measure codes in the measure name. Navigant calculated savings for those bulbs using the specific building types, which changed the hour of use, waste heat factors, and coincidence factors for those measures.

Recommendation 1. Navigant recommends calculating savings for LED PAR bulbs using a specific building type where available to obtain accurate hours of use, waste heat factor, and coincidence factors.

Finding 4. Navigant noted that the implementer calculated savings for new LED exit signs replacing incandescent exit signs installed in a small office using inputs for a large office. Navigant calculated savings using inputs for a small office which changed the waste heat factors. This affected savings for less than 1% of exit sign measures.

Recommendation 2. Navigant recommends the implementer calculate savings for exit signs according to the listed building types to obtain accurate waste heat factors.

Program Participation

Finding 5. In PY9 Bridge, the program had 179 participants, distributed 7,960 measures, and completed 208 projects. Fire departments were the largest participant group with 55 participants followed by school districts and educational centers with 19 participants and libraries with seven participants.

6. Appendix 1. Impact Analysis Methodology

Verified Gross Program Savings Analysis Approach

Navigant determined verified gross savings for each program measure by reviewing the savings algorithm inputs in the measure workbook for agreement with the TRM v5.0. Navigant validated that savings algorithms were properly applied and cross-checked per unit savings values in the tracking data with the verified values in the measure workbook or in Navigant's calculations if the workbook did not agree with the TRM. Navigant multiplied the verified per-unit savings value by the quantity reported in the tracking data.

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 PY9, the NTGR estimates used to calculate the net verified savings were based on past evaluation research and defined by a consensus process through SAG, as documented in a spreadsheet.[1]

[1] Source ComEd_NTG_History_and_PY9_Recommendations_2016-02-26_Final.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html

7. APPENDIX 3. TRC DETAIL

The following sections show the TRC details by program.

STEP TRC Detail

Table 7-1 below shows the total resource cost savings summary for the STEP Program.

Table 7-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (kWh)	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)
Lighting	LED Installations	Each	3,960	14	722,352	118	702,584	122
Lighting	Exit Signs	Each	977	16	193,280	26	193,145	26
Lighting	Occupancy Sensors	Each	2,885	8	763,391	547	763,391	547
Refrigeration	Vending Machine/Cooler Control	Each	138	5	177,384	0	177,384	0

The Total Resource Cost (TRC) variable table only includes cost-effectiveness analysis inputs available at the time of finalizing this PY9 impact evaluation report. Additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in this table and will be provided to evaluation later. Further, detail in this table (e.g., EULs) other than final PY9 savings and program data are subject to change and are not final.