ComEd Nonprofit Retrofits Impact Evaluation Report

Energy Efficiency / Demand Response Plan: Program Year 2019 (CY2019) (1/1/2019-12/31/2019)

Presented to
ComEd

FINAL

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ComEd Nonprofit Retrofits Impact Evaluation Report

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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 CY2019 Nonprofits Retrofit Program ("Non-Profits" or "NP). It includes a summary of the energy and demand impacts for the total program broken out by relevant measure and program structure details. The appendix provides the impact analysis methodology and details of the Total Resource Cost inputs. CY2019 covers January 1, 2019 through December 31, 2019.

2. Program Description

The ComEd Nonprofit Retrofits Program aims to cost-effectively generate and capture savings from energy efficiency projects undertaken by ComEd's nonprofit customers under 400 kW. The Nonprofit Retrofits Program aims to provide a single point of contact for

- Energy assessments
- Energy efficiency measure installation
- Construction oversight
- 'Handholding' and long term relationship building.

The program approach to incentive levels and customer outreach closely mirrors the Small Business Program. The target population for the program includes churches, childcare centers, transitional housing, community-based organizations, and healthcare clinics.

To participate in the program, the ComEd customer must be a 501(c)3, located within ComEd's service territory, with an account at least sixty days old. Elevate Energy (Elevate) is responsible for implementation of the program. Elevate engineers complete a free assessment of the customer facility and identify savings opportunities from the program measure list. Elevate then helps the participant identify installers and provides construction management oversight and inspection to ensure the measures are installed and generating savings as expected.

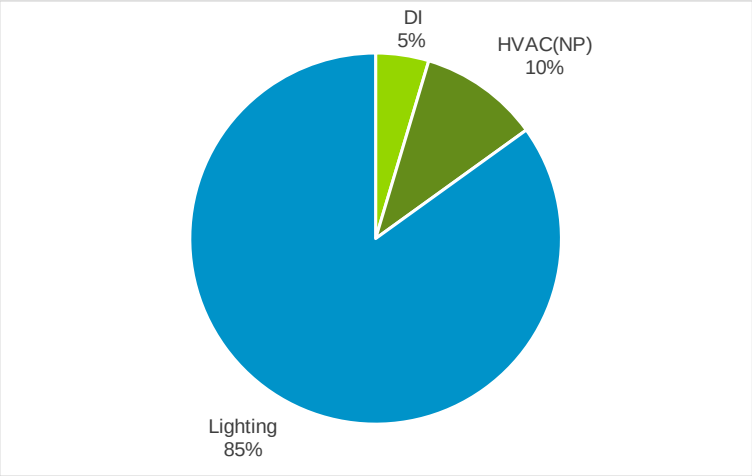
The program had 69 unique participants in CY2019 and distributed 678 measures as shown in the following table and graph. The measures included in the Nonprofit Retrofits Program are prescriptive measures. Further below, Figure 2-1 shows gross ex ante kWh installed by type.

Table 2-1. CY2019 Volumetric Findings Detail

Participation	
Participants	69
Total Measures	678
Number of Units/Projects	8.7
Installed Projects	78

Source: ComEd tracking data and evaluation team analysis

Figure 2-1. Gross Ex Ante kWh Installed by Type



Source: ComEd tracking data and evaluation team analysis

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the Nonprofits Retrofit Program achieved in CY2019.

Table 3-1. CY2019 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Non-Coincident Demand Savings (kW)	Summer Peak* Demand Savings (kW)
Electricity			
Ex Ante Gross Savings	3,459,320	NR	671
Program Gross Realization Rate	0.99	NA	1.00
Verified Gross Savings	3,430,859	NA	671
Program Net-to-Gross Ratio (NTG)	0.92	NA	0.92
Verified Net Savings	3,156,390	NA	618
Converted from Gas			
Ex Ante Gross Savings	NA	NA	NA
Program Gross Realization Rate	NA	NA	NA
Verified Gross Savings	NA	NA	NA
Program Net-to-Gross Ratio (NTG)	NA	NA	NA
Verified Net Savings	NA	NA	NA
Total Electric Plus Gas			
Ex Ante Gross Savings	3,459,320	NR	671
Program Gross Realization Rate	0.99	NA	1.00
Verified Gross Savings	3,430,859	NA	671
Program Net-to-Gross Ratio (NTG)	0.92	NA	0.92
Verified Net Savings	3,156,390	NA	618

NR = Not reported (refers a piece of data that was not reported, i.e., non-coincident demand savings)
NA = Not applicable (refers a piece of data cannot be produced or does not apply)
* The coincident summer peak period is defined as 1:00-5:00 p.m. Central Prevailing Time on non-holiday weekdays, June thr. August.
Source: ComEd tracking data and evaluation team analysis

4. Cumulative Persisting Annual Savings

Table 4-1 to Table 4-2 and Figure 4-1 show the measure-specific and total verified gross savings for the Nonprofit Retrofits Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2019. The electric CPAS across all measures installed in 2019 is 3,156,390 kWh net (Table 4-1). The total is 3,156,390 kWh net of total CY2019 contribution to CPAS (Table 4-2). The "historic" rows in each table are the CPAS contribution back to CY2018. The "Program Total Electric CPAS" and the "Program Total Gas CPAS" are the sum of the CY2019 contribution and the historic contribution. As this is the first year for the Nonprofit Retrofits Program, there is no historic contribution. Guidehouse did not evaluate gas savings for this program and as such electric CPAS is equivalent to total CPAS.

Table 4-1. Cumulative Persisting Annual Savings (CPAS) – Electric

End Use Type	Research Category	EUL	CY2019 Verified Gross Savings (kWh)	NTG*	Lifetime Net Savings (kWh)†	Verified Net kWh Savings 2018	2019	2020	2021	2022	2023	2024	2025	2026
Lighting	Lighting	9.0	2,910,090	0.92	24,095,546		2,677,283	2,677,283	2,677,283	2,677,283	2,677,283	2,677,283	2,677,283	2,677,283
HVAC(NP)	HVAC(NP)	11.0	360,935	0.92	3,652,663		332,060	332,060	332,060	332,060	332,060	332,060	332,060	332,060
DI	DI	5.0	159,834	0.92	735,236		147,047	147,047	147,047	147,047	147,047			
CY2019 Program Total Electric Contribution to C			3,430,859		28,483,445		3,156,390	3,156,390	3,156,390	3,156,390	3,156,390	3,009,343	3,009,343	3,009,343
Historic Program Total Electric Contribution to CPAS‡						-								
Program Total Electric CPAS						-	3,156,390	3,156,390	3,156,390	3,156,390	3,156,390	3,009,343	3,009,343	3,009,343
CY2019 Program Incremental Expiring Electric Savings§								-	-	-	-	147,047	-	-
Historic Program Incremental Expiring Electric Savings‡§							-	-	-	-	-	-	-	-
Program Total Incremental Expiring Electric Savings§							-	-	-	-	-	147,047	-	-

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Lighting	2,677,283											
HVAC(NP)	HVAC(NP)	332,060	332,060	332,060									
DI	DI												
CY2019 Program Total Electric Contribut		3,009,343	332,060	332,060	-	-	-	-	-	-	-	-	-
Historic Program Total Electric Contribution to CPAS‡													
Program Total Electric CPAS		3,009,343	332,060	332,060	-	-	-	-	-	-	-	-	-
CY2019 Program Incremental Expiring El		-	2,677,283	-	332,060	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring E		-	-	-	-	-	-	-	-	-	-	-	-
Program Total Incremental Expiring Elec		-	2,677,283	-	332,060	-	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first year electric savings. The gray cells are blank, indicating values irrelevant to the CY2019 contribution to CPAS.
* A deemed value. Source: is to be found on the Illinois SAG web site here: https://www.ilsag.info/ntg_2019.
† Lifetime savings are the sum of CPAS savings through the EUL.
‡ Historical savings go back to CY2018
§ Incremental expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n
Source: Evaluation team analysis

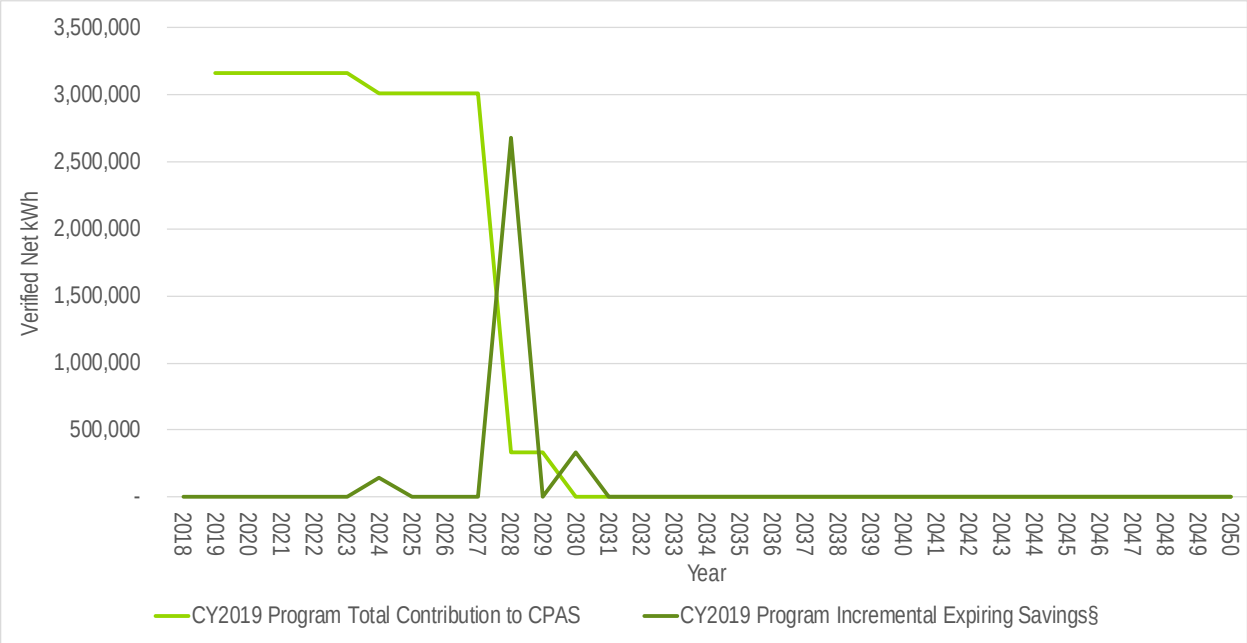
Table 4-2. Cumulative Persisting Annual Savings (CPAS) – Total

End Use Type	Research Category	EUL	CY2019 Verified Gross Savings (kWh)	NTG*	Lifetime Net Savings (kWh)†	Verified Net kWh Savings (Including Those Converted from Gas Savings) 2018	2019	2020	2021	2022	2023	2024	2025	2026
Lighting	Lighting	9.0	2,910,090	0.92	24,095,546		2,677,283	2,677,283	2,677,283	2,677,283	2,677,283	2,677,283	2,677,283	2,677,283
HVAC(NP)	HVAC(NP)	11.0	360,935	0.92	3,652,663		332,060	332,060	332,060	332,060	332,060	332,060	332,060	332,060
DI	DI	5.0	159,834	0.92	735,236		147,047	147,047	147,047	147,047	147,047			
CY2019 Program Total Contribution to CPAS			3,430,859		28,483,445		3,156,390	3,156,390	3,156,390	3,156,390	3,156,390	3,009,343	3,009,343	3,009,343
Historic Program Total Contribution to CPAS‡						-	-	-	-	-	-	-	-	-
Program Total CPAS						-	3,156,390	3,156,390	3,156,390	3,156,390	3,156,390	3,009,343	3,009,343	3,009,343
CY2019 Program Incremental Expiring Savings§								-	-	-	-	147,047	-	-
Historic Program Incremental Expiring Savings‡§							-	-	-	-	-	-	-	-
Program Total Incremental Expiring Savings§							-	-	-	-	-	147,047	-	-

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Lighting	2,677,283											
HVAC(NP)	HVAC(NP)	332,060	332,060	332,060									
DI	DI												
CY2019 Program Total Contribution to CPAS		3,009,343	332,060	332,060	-	-	-	-	-	-	-	-	-
Historic Program Total Contribution to CPAS‡		-	-	-	-	-	-	-	-	-	-	-	-
Program Total CPAS		3,009,343	332,060	332,060	-	-	-	-	-	-	-	-	-
CY2019 Program Incremental Expiring Savings§		-	2,677,283	-	332,060	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Savings‡§		-	-	-	-	-	-	-	-	-	-	-	-
Program Total Incremental Expiring Savings§		-	2,677,283	-	332,060	-	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first year electric savings (including direct electric savings and those converted from gas). The gray cells are blank, indicating no values or do not contribute to calculating CPAS in CY2019.
* A deemed value. Source: is to be found on the Illinois SAG web site here: https://www.ilsag.info/ntg_2019.
† Lifetime savings are the sum of CPAS savings through the EUL.
‡ Historic savings go back to CY2018.
§ Incremental expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n
Source: Evaluation team analysis

Figure 4-1. Cumulative Persisting Annual Savings

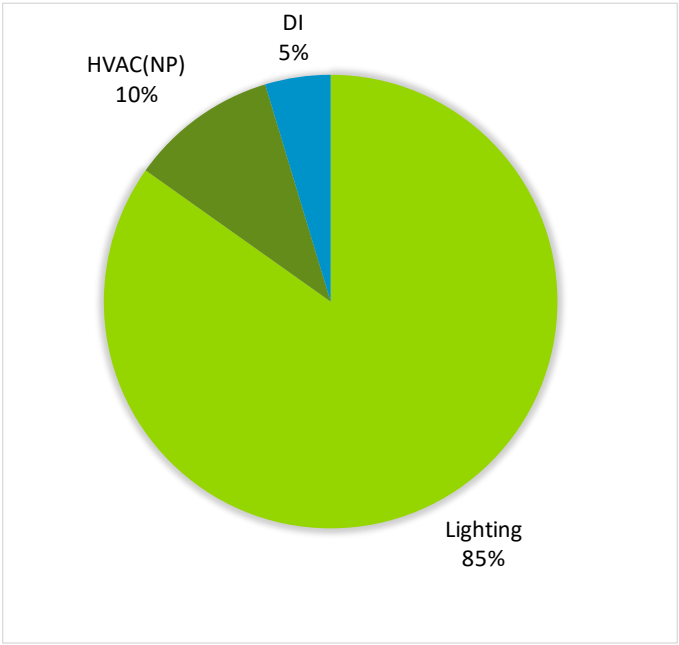


* Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n
Source: Evaluation team analysis

5. Program Savings by Measure

The program includes three measure types as shown in the following tables and figure. The lighting measures contributed the most savings (see Figure 5-1).

Figure 5-1. Verified Net Savings by Measure Type – Electric



Source: Evaluation team analysis

Table 5-1. CY2019 Energy Savings by Measure Type – Electric

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)	EUL (years)
Lighting	Lighting	2,938,552	0.99	2,910,090	0.92	2,677,283	9.0
HVAC(NP)	HVAC(NP)	360,935	1.00	360,935	0.92	332,060	11.0
DI	DI	159,834	1.00	159,834	0.92	147,047	5.0
	Total	3,459,320	0.99	3,430,859	NA	3,156,390	NA

NA = Not Applicable
* A deemed value. Source: is to be found on the Illinois SAG web site here: https://www.ilsag.info/ntg_2019.
Source: ComEd tracking data and evaluation team analysis

Table 5-2. CY2019 Summer Peak Demand Savings by Measure Type

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net Peak Demand Reduction (kW)
Lighting	Lighting	621.00	1.00	621.00	0.92	571.32
DI	DI	39.69	1.00	39.69	0.92	36.52
HVAC(NP)	HVAC(NP)	10.57	1.00	10.57	0.92	9.72
	Total	671.26	1.00	671.26	NA	617.56

NA = Not applicable
* A deemed value. Source: is to be found on the Illinois SAG web site here: https://www.ilsag.info/ntg_2019.
Source: ComEd tracking data and evaluation team analysis

6. Impact Analysis Findings and Recommendations

6.1 Impact Parameter Estimates

The Nonprofit Retrofits Program does not have relevant impact parameters.

6.2 Other Impact Findings and Recommendations

The evaluation team developed several recommendations based on findings from the CY2019 evaluation.

Finding 1. The ex ante inputs for key variables such as lighting wattages, waste heat factors, coincidence factors, and hours of use used by the implementer matched Illinois TRM (TRM) v.8 in most cases. In some cases, the implementer used conservative values for hours of use based on the building type table from section 4.5 Lighting End Use in TRM v.8. This may result in underestimating savings when it is not necessary to do so.

Recommendation 1. Guidehouse recommends per TRM v.8 "Note where a measure installation is within a building or application that does not fit with any of the defined building types below, the user should apply custom assumptions where it is reasonable to estimate them, else the building of best fit should be utilized."

Finding 2. The end of year tracking data contained some values inconsistent with space type, however, the ex ante calculated savings appeared correct. For example, the coincidence factors (CF) for project 10004647 were listed incorrectly for the "Lighting Fixture Commercial" measures; however, the demand savings in column "Total_Measure_Gross_kW" of tab "NPO EOY Data" were correct.

Recommendation 2. Guidehouse recommends the implementer ensure that the variables reported out in the program tracking data reflect the variables used to calculate the final savings.

Recommendation 3. Guidehouse additionally recommends the implementer thoroughly check their electronic data collection instruments for vestigial unused variables that may be getting confused with newer variables being used in the calculations. This will eliminate the possibility of apparent inconsistencies or calculation errors in the future.

Finding 3. The implementer's calculations included energy and demand waste heat factors, however, did not include heating penalties for efficient lighting and lighting controls measures in spaces with electric heating in the winter.

Recommendation 4. Guidehouse recommends the implementer implement heating penalty calculations for efficient lighting and lighting controls measures in spaces with electric heating per the TRM v.8.

7. Appendix 1. Impact Analysis Methodology

The evaluation team conducted an engineering review to verify the ex ante gross savings. This included a detailed review of the tracking data and a review of a random sample of measures using TRM v.8.

8. Appendix 2. Impact Analysis Detail

Table 8-1 shows detailed measure level counts and energy savings for the CY2019 Nonprofit Retrofits Program. The largest saving measures were Lighting Fixture Commercial and Programmable Thermostats.

Table 8-1. CY2019 Nonprofit Retrofits Program Measure Level Detail

Measure Type	Measure Description	Measure Count	Ex Ante Gross kWh	Heating Penalty kWh	Ex Post Gross kWh
Lighting	Lighting Fixture Commercial	422	2,536,118	(28,439)	2,507,678
Lighting	Std Interior 2ft by 4ft LED troffer (3L 4ft T8/T12) Commercial	3	99,718		99,718
Lighting	Exterior/Garage LED (250-400W HID) Commercial	8	81,027		81,027
Lighting	Interior 2L 4ft Type C TLED (T12) Commercial	5	71,247		71,247
Lighting	Std Interior 2ft by 4ft LED troffer (4L 4ft T8/T12) Commercial	3	35,568		35,568
Lighting	Occupancy Sensor Commercial	119	31,669	(22)	31,647
Lighting	Interior Delamp to 2L 4ft Type C TLED (4L 4ft T12) Commercial	4	28,264		28,264
Lighting	Occupancy Sensor	3	15,837		15,837
Lighting	Std Interior 2ft by 2ft LED troffer (2L 2ft T8/T12U) Commercial	3	11,602		11,602
Lighting	Exterior/Garage LED (176-250W HID) Commercial	2	8,531		8,531
Lighting	Interior 2L 4ft Type C TLED (T8) Commercial	5	4,776		4,776
Lighting	Interior Delamp to 2L 4ft Type C TLED (2L 8ft T12) Commercial	3	4,353		4,353
Lighting	Exterior/Garage LED (<=175W HID) Commercial	5	3,134		3,134
Lighting	Interior 1L 4ft Type C TLED (T12) Commercial	3	2,116		2,116
Lighting	Interior Delamp to 2L 4ft Type C TLED (2L 8ft T8) Commercial	1	1,920		1,920
Lighting	Interior Delamp to 2L 4ft Type C TLED (4L 4ft T8) Commercial	2	1,403		1,403
Lighting	Interior Delamp to 2L 2ft Type C TLED (2L 2ft T12U) Commercial	1	1,136		1,136
Lighting	Interior 3L 4ft Type C TLED (T8) Commercial	1	133		133
HVAC(NP)	Programmable Thermostats	13	315,855		315,855
HVAC(NP)	Economizer Repair	4	28,545		28,545
HVAC(NP)	VSD on Cooling Tower Fan	1	15,404		15,404
HVAC(NP)	Split/Unitary AC Replacement	2	1,131		1,131
DI	Interior LED - 5W Candelabra (40W) DI	3	37,040		37,040
DI	Interior LED - 15W DI	18	36,600		36,600
DI	Interior LED - 9W (60W) DI	19	36,426		36,426
DI	Interior LED - 11W DI	12	24,582		24,582
DI	Interior LED - 6W (40W) DI	5	10,689		10,689
DI	Interior LED - 8W Flood (65W) DI	2	6,677		6,677
DI	CA Vending Miser MV170 DI	2	3,226		3,226
DI	Interior LED - 6W Globe (40/60W) DI	2	2,438		2,438
DI	Interior LED - 7W Track Light (50W) DI	2	2,157		2,157
	TOTALS:	678	3,459,320	-28,461	3,430,859

9. Appendix 3. Total Resource Cost Detail

Table 9-1 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of finalizing this 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 the evaluation team later.

Table 9-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Verified Gross Electric Energy Savings (kWh)	Verified Gross Peak Demand Reduction (kW)	Verified Gross Gas Savings (Therms)	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG (kWh)	NTG (kW)	NTG (Therms)	Verified Net Electric Energy Savings (kWh)	Verified Net Peak Demand Reduction (kW)	Verified Net Gas Savings (Therms)	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
Lighting	Lighting	Measure	593	9.0	No	2,910,090	621.00	NA	-28,461	NA	0.92	0.92	NA	2,677,283	571.32	NA	-26,184	NA
HVAC(NP)	HVAC(NP)	Measure	20	11.0	No	360,935	10.57	NA	0	NA	0.92	0.92	NA	332,060	9.72	NA	0	NA
DI	DI	Measure	65	5.0	No	159,834	39.69	NA	0	NA	0.92	0.92	NA	147,047	36.52	NA	0	NA
	Total			NA		3,430,859	671	0	-28,461	0	NA	NA	NA	3,156,390	618	0	-26,184	0

NA = Not applicable

* The total of the EUL column is the weighted average measure life (WAML), and is calculated as the sum product of EUL and measure savings divided by total program savings.

† Early Replacement (ER) measures are flagged as YES, otherwise a NO is indicated in the column.

Source: ComEd tracking data and evaluation team analysis