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ComEd Public Small Facilities Impact Evaluation Report

Energy Efficiency / Demand Response Plan: Program Year 2018 (CY2018) (1/1/2018-12/31/2018)

Presented to
ComEd

FINAL

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1. INTRODUCTION

This report presents the results of the impact evaluation of ComEd's CY2018 Public Small Facilities (PSF) Program. 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. CY2018 covers January 1, 2018 through December 31, 2018.

2. PROGRAM DESCRIPTION

The PSF Program is designed to assist qualified ComEd public sector non-residential customers[1] to achieve electric energy savings by educating them about energy efficiency opportunities through no-cost on-site energy assessments conducted by vetted and trained Energy Efficiency Service Providers (EESP). Further savings are available to participating customers for implementing select contractor-installed measures identified during the assessment. Incentives are available for these measures which can cover up to 75 percent of the project costs.[2] EESPs are the primary means of promoting the PSF Program and obtaining participants. Willdan, Inc is the implementation contractor for the PSF Program throughout ComEd's service territory.

The PSF Program had 167 participants in CY2018 and distributed 21,932 measures, as shown in Table 2-1 and Figure 2-1. Some participants participated in multiple projects resulting in a total of 218 unique projects. The CY2018 program installed exclusively lighting-based measures where most measures replaced interior LED fixtures.

Table 2-1. CY2018 Volumetric Findings Detail

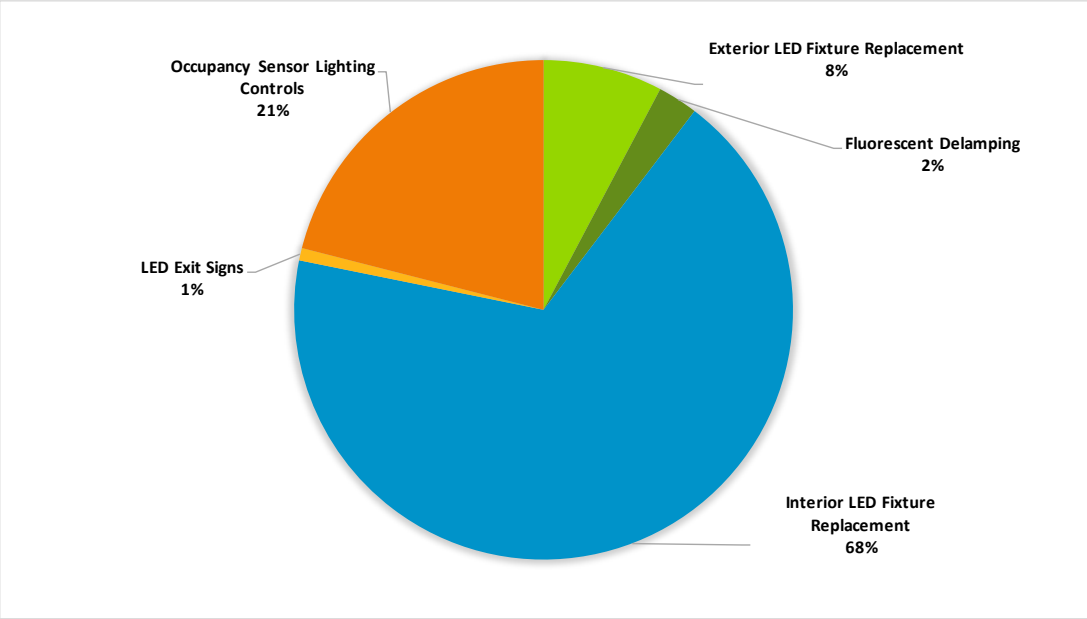
Participation	PSF
Participants	167
Total Measures	21,932
Installed Projects	218

Source: ComEd tracking data and Navigant team analysis.

[1] To qualify, participants must be ComEd public sector non-residential customers with monthly peak demand levels up to 100 KW.

[2] Incented measures may include upgrades to T8/T5 lighting, LED retrofits and fixtures, high bay fluorescents, lighting controls, HVAC system components, electric water heaters, refrigeration system components, commercial kitchen equipment, compressed air system measures, smart thermostats, and building envelope measures.

Figure 2-1. Number of Measures Installed by Type



Source: ComEd tracking data and Navigant team analysis.

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the PSF Program achieved in CY2018. The program verified net savings for CY2018 are 8,053,484 kWh. The PSF Program did not have any gas savings to convert to electricity.

Table 3-1. CY2018 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Summer Peak Demand Savings (kW)
Electricity			
Ex Ante Gross Savings	8,488,967	NR	980
Program Gross Realization Rate	1.04	NA	1.15
Verified Gross Savings	8,816,014	2,139	1,120
Program Net-to-Gross Ratio (NTG)	0.91	0.91	0.91
Verified Net Savings	8,022,573	1,947	1,019
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	8,488,967	NR	980
Program Gross Realization Rate	1.04	NA	1.15
Verified Gross Savings	8,816,014	2139	1,120
Program Net-to-Gross Ratio (NTG)	0.91	0.91	0.91
Verified Net Savings	8,022,573	1,947	1,019

NR = Not reported
NA = Not applicable
* There are no gas savings associated with the Public Small Facilities Program.
Note: The demand savings are equivalent to the reduction in kW of bulbs installed in 2018.
The coincident Summer Peak period is defined as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, June through August.
Source: ComEd tracking data and Navigant team analysis.

4. Cumulative Persisting Annual Savings

The measure-specific and total ex ante gross savings for the PSF Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 are shown in the following tables and figure. The total CPAS across all measures is 8,053,484 kWh. Table 4-1 below shows the total CPAS for the program.

The IL TRM Effective Useful Life (EUL) for LED lamp and fixtures is a function of hours of operation of the building type (lamp life in hours divided by operating hours per year, capped at 15 years). This approach resulted in 11 unique EUL values for the LED interior fixture replacement measure, ranging from 6.4 years to 15 years. For readability, this measure has been aggregated to one line item in the CPAS table in Section 4. The 9.3 years EUL value for LED interior fixture replacement reflects a weighted average by energy savings, while the distribution of savings extends much longer (15 years), reflecting a year-by-year savings sum of all 11 LED interior fixture replacement line items.

Table 4-1 accounts for changes in the T12 baseline in 2019 to T8 lamps and fixtures. The evaluation team adjusted the CPAS starting in 2019, by mapping the appropriate TRM (v6.0) standard T8 fixture wattage to replace T12 fixtures. This resulted in an estimated 8 percent drop in net savings from 2018 to 2019. LED (omni-directional) lamps have a reduction in net savings following the implementation of the Energy Independence and Security Act (EISA) standards change after 2020.

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

End Use Type	Research Category	EUL*	CY2018 Verified Gross Savings	NTG†	Lifetime Net Savings‡	Verified Net kWh Savings 2018	2019	2020	2021	2022	2023	2024	2025	2026
Lighting	Exterior LED Fixture Replacement	10.2	2,150,814	0.91	19,901,812	1,957,240	1,955,160	1,955,160	1,949,787	1,949,787	1,949,787	1,949,787	1,949,787	1,949,787
Lighting	Fluorescent Delamping	11.0	316,578	0.91	3,005,108	288,086	272,703	272,703	271,452	271,452	271,452	271,452	271,452	271,452
Lighting	Interior LED Fixture Replacement	9.3	5,884,278	0.91	44,772,278	5,354,693	4,748,890	4,748,890	4,718,040	4,718,040	4,718,040	3,363,291	1,662,706	1,662,706
Lighting	LED Exit Signs	16.0	87,984	0.91	1,281,047	80,065	80,065	80,065	80,065	80,065	80,065	80,065	80,065	80,065
Lighting	Occupancy Sensor Lighting Controls	8.0	376,361	0.91	2,739,905	342,488	342,488	342,488	342,488	342,488	342,488	342,488	342,488	
CY2018 Program Total Electric CPAS			8,816,014		71,700,150	8,022,573	7,399,306	7,399,306	7,361,833	7,361,833	7,361,833	6,007,084	4,306,498	3,964,010
CY2018 Program Expiring Electric Savings§							623,267	623,267	660,740	660,740	660,740	2,015,489	3,716,075	4,058,563

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034
Lighting	Exterior LED Fixture Replacement	1,949,787	385,742						
Lighting	Fluorescent Delamping	271,452	271,452						
Lighting	Interior LED Fixture Replacement	1,637,676	1,608,489	1,608,489	1,586,390	1,457,673	1,178,263		
Lighting	LED Exit Signs	80,065	80,065	80,065	80,065	80,065	80,065	80,065	
Lighting	Occupancy Sensor Lighting Controls								
CY2018 Program Total Electric CPAS		3,938,981	2,345,749	1,688,555	1,666,456	1,537,739	1,258,329	80,065	-
CY2018 Program Expiring Electric Savings§		4,083,592	5,676,824	6,334,018	6,356,117	6,484,834	6,764,244	7,942,508	8,022,573

* The EUL values represent an average, weighted by electric energy savings, of all measures in the identified research category

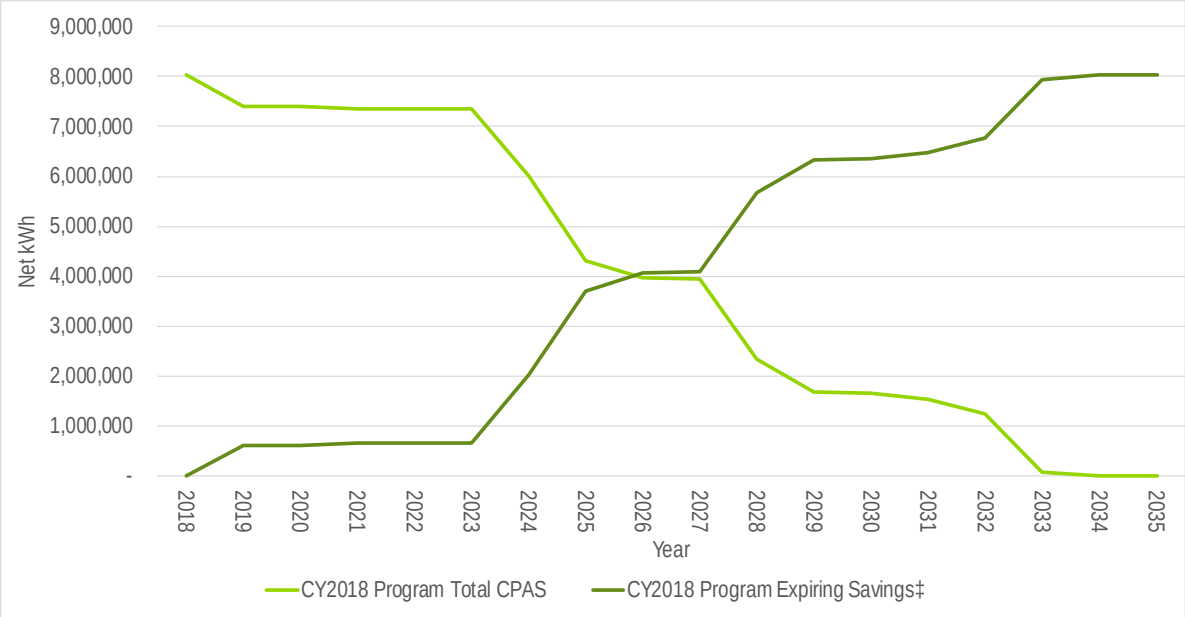
† A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html.

‡ Lifetime savings are the sum of CPAS savings through the EUL.

§ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.

Source: Navigant analysis

Figure 4-1. Cumulative Persisting Annual Savings



‡ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.
Source: Navigant analysis

5. Program Savings by Measure

The program includes five measures as shown in the following tables. The Interior LED Fixture Replacement and Exterior LED Fixture Replacement measures contributed the most savings.

Table 5-1. CY2018 Energy Savings by Measure

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)	Effective Useful Life
Lighting	Exterior LED Fixture Replacement	2,155,918	1.00	2,150,814	0.91	1,957,240	10.2†
Lighting	Fluorescent Delamping	317,667	1.00	316,578	0.91	288,086	11.0
Lighting	Interior LED Fixture Replacement	5,891,181	1.00	5,884,278	0.91	5,354,693	9.3†
Lighting	LED Exit Signs	87,984	1.00	87,984	0.91	80,065	16.0
Lighting	Occupancy Sensor Lighting Controls	36,217	10.39	376,361	0.91	342,488	8.0
	Total	8,488,967	1.04	8,816,014	0.91	8,022,573	

* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html.
† The EUL values represent an average, weighted by electric energy savings, of all measures in the identified research category
Source: ComEd tracking data and Navigant team analysis.

Table 5-2. CY2018 Demand Savings by Measure

End Use Type	Research Category	Ex Ante Gross Demand Reduction (kW)*	Verified Gross Realization Rate	Verified Gross Demand Reduction (kW)	NTG†	Verified Net Demand Reduction (kW)
Lighting	Exterior LED Fixture Replacement	NR	NA	439	0.91	399
Lighting	Fluorescent Delamping	NR	NA	71	0.91	65
Lighting	Interior LED Fixture Replacement	NR	NA	1,335	0.91	1,215
Lighting	LED Exit Signs	NR	NA	12	0.91	11
Lighting	Occupancy Sensor Lighting Controls	NR	NA	282	0.91	257
	Total	NR	NA	2,139	0.91	1,947

* Non-peak demand reduction not included in tracking data
† A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html.
NR = Not reported
NA = Not applicable
Source: ComEd tracking data and Navigant team analysis.

Table 5-3. CY2018 Summer 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)	NTG*	Verified Net Peak Demand Reduction (kW)
Lighting	Exterior LED Fixture Replacement	-	NA	-	0.91	-
Lighting	Fluorescent Delamping	44	1.00	44	0.91	40
Lighting	Interior LED Fixture Replacement	905	0.99	900	0.91	819
Lighting	LED Exit Signs	12	1.01	12	0.91	11
Lighting	Occupancy Sensor Lighting Controls	18	8.92	163	0.91	148
	Total	980	1.14	1,120	0.91	1,019

* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html
NA = Not applicable
Source: ComEd tracking data and Navigant team analysis.

6. Impact Analysis Findings and Recommendations

6.1 Impact Parameter Estimates

Verified gross and net savings (energy and coincident peak demand) resulting from the CY2018 PSF Program were calculated using algorithms defined by the Illinois TRM version 6.0. Table 6-1 presents the key parameters and the references used in the verified gross and net savings calculations and indicates which were examined through additional evaluation and which were deemed.

Energy and demand savings are estimated using the following formulas as specified in the TRM:

Equation 1. Standard Lighting Equations

$$\Delta kWh = ((WattsBase - WattsEE)/1000) * ISR * Hours * WHFe$$

$$\Delta kW = ((WattsBase - WattsEE)/1000) * ISR * WHFd * CF$$

Equation 2. Occupancy Sensor Lighting Controls

$$\Delta kWh = KWcontrolled * Hours * ESF * WHFe$$

$$\Delta kW = KWcontrolled * WHFd * (CFbaseline – CFos)$$

The standard lighting equations apply to the exterior and interior LED fixture replacements, fluorescent delamping, and LED exit sign measures. The inputs will change with each measure and are found in the relevant sections of the TRM detailed in the table below. The occupancy sensor lighting controls equations apply only to that measure. The inputs are from both the TRM and program tracking data.

Table 6-1. Savings Parameters

Gross Savings Input Parameters	Value	Units	Deemed * or Evaluated?	Source
Quantity	Varies	Varies	Evaluated	Program tracking data
NTG	Varies	NA	Deemed	IL SAG Consensus†
WattsBase, WattsEE	Varies	Watts	Evaluated	Program tracking data
ISR	Varies	%	Mixture	IL TRM v6.0 – Sections 4.5.2, 4.5.4, 4.5.5, 4.5.10, program tracking data
Hours	Varies	Hours	Deemed	IL TRM v6.0 – Sections 4.5, 4.5.5
WHFe, WHFd, CF, ESF, CFbaseline, CFos	Varies	NA	Deemed	IL TRM v6.0 – Section 4.5
KWcontrolled	Varies	kW	Evaluated	Program tracking data

* State of Illinois Technical Reference Manual version 6.0 from http://www.ilsag.info/technical-reference-manual.html.
† A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html.

6.2 Other Impact Findings and Recommendations

The evaluation team has developed several recommendations based on findings from the CY2018 evaluation, as follows:

Finding 1. The tracking data input field “Measure Unit” shows if measure savings is determined per sensor or fixture, but it does not describe measure savings per exit sign, “screw in” LED or exterior condition. The deemed hours of use for these measures were also not included in the database extract submitted to Navigant.

Recommendation 1. The program implementer (Willdan, Inc.) should provide details in the measure unit field for exit sign, “screw in” LED and exterior condition.

Finding 2. Project 1610573004-A had a measure which was described as both exterior LED lighting and exit sign. Upon evaluation of the baseline and efficient measure detail, we determined the measure was an exit sign, and the verified savings was consistent with the ex ante savings.

Recommendation 2. The program implementer should ensure the “Measure_ID and measure description fields are always consistent with the EE measure category field to avoid confusion, especially considering the difference in EUL values, which can introduce errors in the CPAS calculation.

Finding 3. During CY2018, the evaluation team and the PSF Program staff discussed and agreed on the TRM (v6.0) building of best fit that can be adopted for public buildings not deemed in the TRM. The evaluation team, however, found that while the ex ante savings

from the building type “Hospital - CAV no econ” were consistent with the recommended TRM assumptions, the tracking data extract was incorrectly mapped to the “Hospital - CAV econ” building type, which is a different building type with different savings assumptions.

Recommendation 3. The program implementer (Willdan) should populate the tracking data extract with the TRM defined building type and correct the error for “Hospital - CAV no econ” savings assumptions.

Finding 4. The evaluation team found that project (419077062-A) had 1.91 percent gross realization rate on energy but 100 percent realization for demand savings. The error stems from the hours of use other than the library or unknown building type in the tracking database.

Finding 5. The evaluation team found five projects that claimed savings from permanent removal of exterior fixtures, but the tracking data did not describe the exterior condition (e.g. projects (788347008-A and 959265000-A). We did not make any adjustment to savings.

Recommendation 4. The program implementer should update the input variable values to match the relevant table in the TRM .

Finding 6. The evaluation team found variations in the occupancy sensor savings calculations. Some projects showed total gross savings as the result of the unit savings multiplied by quantity (e.g. project 2194310008-A and 2213124024-A). While several other projects are only show unit savings (e.g. 103402008-A and 108508005-A) – this applied the algorithm to get total savings and divided by quantity of sensors to get a “per unit” value (backward). That resulted in a large discrepancy seen in the realization rates and savings calculations (realization rate of 1039 percent). The error is related to how the KW controlled and sensor quantity are applied. See the next section for details.

Recommendation 5. The program implementer should apply the TRM algorithms as “per unit” calculations and then multiply by the quantity to get the total, instead of applying the algorithms as the total and then dividing to get “per unit” values.

Recommendation 6. The evaluation team has noted that, upon discussion with the program implementer, future data extracts will provide the total fixtures controlled per sensor as an additional field or the program will rely on the deemed kWcontrolled from the TRM.

Finding 7. The evaluation team estimated that 16 percent of linear fixtures (quantity) in CY2018 were T12 baseline measures. We estimated 26 percent of savings from linear fixtures for which T12s were the baseline (1,209,444 kWh out of 4,599,232 kWh). Comparing the 1,209,444 first year net kWh from T12 baseline to 586,176 kWh when standard T8s were assumed as the baseline for linear fixtures, we estimated a 52 percent drop in total kWh net savings from the baseline shift in 2019 (after one year T12 EUL as in the current TRM). Overall, there was an 8 percent drop in the total program net savings from 2018 to 2019 CPAS due to the baseline shift.

Recommendation 7. The evaluation team recommends that the program implementer track the T8 baseline equivalent for linear fixtures with T12 baseline. The program should track and provide details of the savings drop that may result from baseline shift to standard T8s.

Finding 8. The evaluation team adjusted the ex ante savings for screw based omnidirectional LED bulbs with incandescent baseline to meet EISA requirement of higher efficiency baselines. We also adjusted for post 2020 baseline wattage reduction (see Table 8-4 for details of EISA baseline changes). The adjustment resulted in deduction of 327,048 kWh, although the overall program gross realization rate was determined as 104 percent.

Recommendation 8. The program implementer should apply adjustment to general-purpose lamps that require EISA adjustment and post 2020 baseline requirements, in accordance with the TRM.

7. Appendix 1. Impact Analysis Methodology

7.1 Building Type Mapping

The following were Navigant's recommended IL TRM hours of best fit for public sector buildings not found in the TRM (v6.0). All other CY2018 program building types were also sourced from the IL TRM. Navigant also brought this to the attention of the Illinois technical Advisory Committee (IL TAC) for deeming savings assumptions for all public sector buildings in the TRM.

Table 7-1. Building Type Mapping for Non-TRM Buildings

Building	IL TRM Building	IL Lighting HOU	Other Interestive Factors
Police / Fire Stations/ Miscellaneous (24 Hours)	Hospital - CAV no econ	7,616	
Fire Station (Unmanned)	Hotel/Motel-Guest	2,390	IL TRM (v6.0
Post Office/ Town Hall/ Library/ Others	Unknown	3,379	

Source: State of Illinois Technical Reference Manual version 6.0 from http://www.ilsag.info/technical-reference-manual.html.

7.2 Occupancy Sensor Lighting Control Algorithm Methodology

The KWcontrolled value is calculated as:

KWcontrolled = (fixtures quantity / sensor quantity) * Watts base * 1/1000

Where
Fixture_Quantity = # Fixtures controlled
Watts_base/1000 = kW per fixture

This agrees with the TRM (v6.0) which states that "*Savings is per control*."[3] This issue is addressed in Finding 5, above. When the "per sensor" quantity is applied to the TRM algorithm, the savings are interpreted as "per unit." To obtain total savings, Navigant multiplies this value by the quantity of sensors (as shown below). The ex ante calculations apply the algorithm to get total savings and then divide by quantity of sensors to get a "per unit" value.

This methodology should be applied:

ΔkWh / sensor = (KWcontrolled / sensor) * Hours * ESF * WHFe

ΔkWh total = (**ΔkWh / sensor**) * sensors

ΔkWh total = [(KWcontrolled / ~~sensor~~) * Hours * ESF * WHFe] * ~~sensors~~

ComEd's ex ante methodology should not be applied as noted in Finding 5, above:

ΔkWh total = (KWcontrolled / sensor) * Hours * ESF * WHFe

ΔkWh / sensor = (**ΔkWh total**) / sensors

ΔkWh / sensor = [(KWcontrolled / sensor) * Hours * ESF * WHFe] / sensors

[3] http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_2_C_and_I_020817_Final.pdf, section 4.5.10, page 403

8. Appendix 2. Impact Analysis Detail

8.1 Occupancy Sensor Example Calculations

Below are three example projects and the inputs needed for calculating savings. Energy Savings Factor (ESF) is defined by the TRM (v6.0) as 0.24 for this measure, operating hours and WHFe are based on TRM building type, and KWcontrolled is from the tracking data.

Table 8-1. Occupancy Sensor Calculation Variables

Project Number	Measure ID	Operating Hours	kW.Controlled	WHFe	ESF	Measure Quantity
103402008-A	EEM4 - Lighting Controls	7616	0.100	1.1	0.24	14
1297619027-A	EEM4 - Lighting Controls	3379	0.039	1	0.24	115
1317119002-A	EEM4 - Lighting Controls	7616	0.100	1.1	0.24	12

Source: Program tracking data and Navigant team analysis

Applying the algorithm with the TRM methodology give the following results

Table 8-2. Verified Calculation Results

Project Number	Ex Post kWh Per Unit	Ex Post kWh Total
103402008-A	193.751	2712.51
1297619027-A	34.474	3964.50
1317119002-A	193.751	2325.01

Source: Program tracking data

The tracking data has the following results.

Table 8-3. Ex Ante Calculation Results

Project Number	Ex Ante kWh Per Unit	Ex Ante kWh Total
103402008-A	14.492	202.89
1297619027-A	0.299	34.47
1317119002-A	16.907	202.89

Source: Program tracking data and Navigant team analysis

With the methodology used in the tracking data, Project 1297619027-A saves only 0.3 kWh per sensor for the year. This difference in methodology is what accounts for the irregular realization rates for the occupancy sensor measures, as shown in Table 5-1 and Table 5-3.

8.2 EISA Baseline Adjustment

Table 8-4 shows the EISA adjustment for general-purpose screw based omni-directional LEDs with incandescent baselines, ranging from 40W to 100W. The energy efficient (EE) wattage are averages across two or more bulb types.

Table 8-4. EISA Baseline Adjust for Omnidirectional Lamps

Baseline Measure Types	Watts Base	EISA_Watts	EE Watts	Delta Watts	Post-2020 Baseline	Post 2020 Delta Watts
A-LAMP: INCANDESCENT, (1) 100W LAMP	100	72.0	16.1	55.9	45.5	29.4
A-LAMP: INCANDESCENT, (1) 75W LAMP	75	53.0	10.0	43.0	28.2	18.2
A-LAMP: INCANDESCENT, (1) 60W LAMP	60	43.0	10.1	32.9	20.0	9.9
A-LAMP: INCANDESCENT, (1) 40W LAMP	40	29.0	12.6	16.4	11.8	(0.8)

Source: Program tracking data and Navigant team analysis

9. Appendix 3. Total Resource Cost Detail

Table 9-1, below, shows the Total Resource Cost (TRC) table. It includes only the 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 evaluation later.

Table 9-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	Effective Useful Life	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)	Verified Gross Savings Therms	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG Ratio (kWh)	NTG Ratio (kW)	NTG Ratio (Therms)	Verified Net Savings (kWh)	Verified Net Peak Demand Reduction (kW)	Verified Net Savings Therms	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
Lighting	Exterior LED Fixture Replacement	Fixtures	1,706	10.2	2,150,814	-	NA	NA	-	0.91	0.91	0.91	1,957,240	0.00	NA	NA	-
Lighting	Fluorescent Delamping	Fixtures	570	11.0	316,578	44	NA	NA	(5,303)	0.91	0.91	0.91	288,086	40	NA	NA	(4,825)
Lighting	Interior LED Fixture Replacement	Fixtures	14,876	9.3	5,884,278	900	NA	NA	(112,090)	0.91	0.91	0.91	5,354,693	819	NA	NA	(102,002)
Lighting	LED Exit Signs	Sign	170	16.0	87,984	12	NA	NA	(1,293)	0.91	0.91	0.91	80,065	11	NA	NA	(1,177)
Lighting	Occupancy Sensor Lighting Controls	Sensors	4,610	8.0	376,361	163	NA	NA	(30,419)	0.91	0.91	0.91	342,488	148	NA	NA	(27,681)

NA = Not applicable

Source: ComEd tracking data and Navigant team analysis.

End Use Type	Research Category	Units	Quantity	Effective Useful Life	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)	Verified Gross Savings Therms	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG Ratio (kWh)	NTG Ratio (kW)	NTG Ratio (Therms)	Verified Net Savings (kWh)	Verified Net Peak Demand Reduction (kW)	Verified Net Savings Therms	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
Lighting	Exterior LED Fixture Replacement	Fixtures	1,706	10.2	2,155,918	-	NA	NA	(30)	0.91	0.91	0.91	1,961,886	0.00	NA	NA	(27)
Lighting	Fluorescent Delamping	Fixtures	570	11.0	317,667	44	NA	NA	(5,313)	0.91	0.91	0.91	289,077	40	NA	NA	(4,835)
Lighting	Interior LED Fixture Replacement	Fixtures	14,876	9.3	5,912,053	905	NA	NA	(113,265)	0.91	0.91	0.91	5,379,968	824	NA	NA	(103,071)
Lighting	LED Exit Signs	Sign	170	16.0	87,984	12	NA	NA	(1,263)	0.91	0.91	0.91	80,065	11	NA	NA	(1,149)
Lighting	Occupancy Sensor Lighting Controls	Sensors	4,610	8.0	376,361	163	NA	NA	(30,419)	0.91	0.91	0.91	342,488	148	NA	NA	(27,681)