Guidehouse

ComEd Small Business - Public Impact Evaluation Report

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

Presented to
ComEd

FINAL

April 24, 2020

Prepared by:

Charles Ampong
Guidehouse

Paul Higgins
Guidehouse

Sagar Phalke
Guidehouse

www.guidehouse.com

ComEd Small Business - Public Impact Evaluation Report

Submitted to:

ComEd
2011 Swift Drive
Oak Brook, IL 60523

Submitted by:

Guidehouse (which acquired Navigant in 2019)
150 N. Riverside Plaza, Suite 2100
Chicago, IL 60606

Contact:

Randy Gunn, Partner	Jeff Erickson, Director	Rob Neumann, Associate Director
312.583.5714	608.616.4962	312.583.2176
randy.gunn@guidehouse.com	jeff.erickson@guidehouse.com	rob.neumann@guidehouse.com

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. Introduction

This report presents the results of the impact evaluation of ComEd's CY2019 Small Business – Public (also known as Public Small Facilities (PSF)) Program. 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 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 (EESPs). Further savings are available for implementing other measures identified during the assessment that required a customer copay. Incentives are available for these measures which can cover up to 75% 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 program had 262 participants in CY2019 and distributed 27,558 measures as shown in the following table. A total of 155 HVAC measure quantity were installed from 27 projects, and 27,403 lighting measure quantity were installed from 265 projects.

Table 2-1. CY2019 Volumetric Findings Detail

Participation	Total
Participants	262
Installed Projects	289
Total Measures	27,558
Lighting Measures	27,403
HVAC Measures	155

Source: ComEd tracking data and evaluation team analysis

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the PSF Program achieved in CY2019. The gas savings are only those that ComEd may be able to claim, which excludes savings the gas utilities claim, either via joint or non-joint programs.[3]

[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.
[3] The evaluation will determine which gas savings will be counted toward goal while producing the portfolio-wide Summary Report.

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	11,978,872	NR	1,364
Program Gross Realization Rate	0.97	NA	0.98
Verified Gross Savings	11,602,593	2,460	1,340
Program Net-to-Gross Ratio (NTG)	0.92	0.92	0.92
Verified Net Savings	10,674,385	2,263	1,233
Converted from Gas†			
Ex Ante Gross Savings	1,632,912	NA	NA
Program Gross Realization Rate	0.15	NA	NA
Verified Gross Savings	247,088	NA	NA
Program Net-to-Gross Ratio (NTG)	0.92	NA	NA
Verified Net Savings	227,321	NA	NA
Total Electric Plus Gas			
Ex Ante Gross Savings	13,611,784	NR	1,364
Program Gross Realization Rate	0.87	NA	0.98
Verified Gross Savings	11,849,681	2,460	1,340
Program Net-to-Gross Ratio (NTG)	0.92	0.92	0.92
Verified Net Savings	10,901,706	2,263	1,233

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 through August.
† Gas savings converted to kWh by multiplying therms * 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh). The evaluation will determine which gas savings will be converted to kWh and counted toward ComEd's electric savings goal while producing the portfolio-wide Summary Report. According to Section 8-103B(b-25) of the Illinois Public Utilities Act, "In no event shall more than 10% of each year's applicable annual incremental goal as defined in paragraph (7) of subsection (g) of this Section be met through savings of fuels other than electricity."
Source: ComEd tracking data and evaluation team analysis

4. Cumulative Persisting Annual Savings

Table 4-1 to Table 4-3 and Figure 4-1 show the measure-specific and total verified gross savings for the PSF Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2019. The electric CPAS across all measures installed in 2019 is 10,674,385 kWh (Table 4-1). The CY2019 gas contribution to CPAS (converted to equivalent electricity) is 227,321 kWh (Table 4-2). Adding the gas and electric contributions produces 10,901,706 kWh of total CY2019 contribution to CPAS (Table 4-3). 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.

The CPAS accounts for midlife savings adjustments to LED lighting measures with T12 baselines, screw based omnidirectional lamps, specialty decorative and directional lamps, as required by Illinois Technical

Reference Manual (TRM) v7.0 and the Energy Independence and Security Act (EISA 2007) baseline adjustment requirements. Another adjustment was the early replacement for air-cooled air conditioners.

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	Interior LED Fixture Replacement (with adjusted T12 baseline and EISA)	9.6	6,401,893	0.92	51,205,750		5,889,742	5,889,742	5,821,478	5,252,880	5,102,778	5,018,489	5,018,489	5,018,489
Lighting	Exterior LED Fixture Replacement (with adjusted T12 baseline)	11.6	3,684,579	0.92	39,319,842		3,389,813	3,389,813	3,386,009	3,385,560	3,382,466	3,381,700	3,381,700	3,381,700
Lighting	Occupancy Sensor Lighting Controls	8.0	684,702	0.92	5,039,408		629,926	629,926	629,926	629,926	629,926	629,926	629,926	629,926
Lighting	Fluorescent Delamping (with adjusted T12 baseline)	11.0	298,186	0.92	2,794,190		274,331	274,331	274,331	264,433	244,636	243,688	243,688	243,688
HVAC	Non-Programmable to Smart or Advanced Thermostat	11.0	155,339	0.92	1,572,035		142,912	142,912	142,912	142,912	142,912	142,912	142,912	142,912
HVAC	Air Conditioning Full Tune-Up	3.0	106,543	0.92	294,058		98,019	98,019	98,019					
Lighting	LED Exit Signs	5.0	90,143	0.92	414,660		82,932	82,932	82,932	82,932	82,932			
HVAC	Programmable to Smart or Advanced Thermostat	11.0	55,342	0.92	560,063		50,915	50,915	50,915	50,915	50,915	50,915	50,915	50,915
HVAC	Economizer with DCV (Gas Heating)	5.0	33,096	0.92	152,243		30,449	30,449	30,449	30,449	30,449			
HVAC	Advanced Rooftop Controls – DCV & VFD	10.0	24,001	0.92	220,811		22,081	22,081	22,081	22,081	22,081	22,081	22,081	22,081
HVAC	Thermostat Adjustment - Intermittent	2.0	18,340	0.92	33,746		16,873	16,873						
HVAC	Packaged RTU Sealing	5.0	18,025	0.92	82,917		16,583	16,583	16,583	16,583	16,583			
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	15.0	17,658	0.92	113,901		16,246	16,246	16,246	16,246	16,246	3,267	3,267	3,267
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	15.0	12,692	0.92	175,149		11,677	11,677	11,677	11,677	11,677	11,677	11,677	11,677
HVAC	Notched V-Belt	3.4	2,051	0.92	6,377		1,886	1,886	1,886	717				
CY2019 Program Total Electric Contribution to CPAS			11,602,593		101,985,150		10,674,385	10,674,385	10,585,445	9,907,310	9,733,600	9,504,655	9,504,655	9,504,655
Historic Program Total Electric Contribution to CPAS‡						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
Program Total Electric CPAS						8,022,573	18,073,691	18,073,691	17,947,278	17,269,143	17,095,433	15,511,739	13,811,154	13,468,665
CY2019 Program Incremental Expiring Electric Savings§								-	88,940	678,135	173,710	228,945	-	-
Historic Program Incremental Expiring Electric Savings‡§							623,267	-	37,473	-	-	1,354,749	1,700,586	342,488
Program Total Incremental Expiring Electric Savings§							623,267	-	126,413	678,135	173,710	1,583,693	1,700,586	342,488

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Interior LED Fixture Replacement (with adjusted T12 baseline and EISA)	5,018,489	3,175,175										
Lighting	Exterior LED Fixture Replacement (with adjusted T12 baseline)	3,381,700	3,381,700	3,381,700	2,095,978								
Lighting	Occupancy Sensor Lighting Controls												
Lighting	Fluorescent Delamping (with adjusted T12 baseline)	243,688	243,688	243,688									
HVAC	Non-Programmable to Smart or Advanced Thermostat	142,912	142,912	142,912									
HVAC	Air Conditioning Full Tune-Up												
Lighting	LED Exit Signs												
HVAC	Programmable to Smart or Advanced Thermostat	50,915	50,915	50,915									
HVAC	Economizer with DCV (Gas Heating)												
HVAC	Advanced Rooftop Controls – DCV & VFD	22,081	22,081										
HVAC	Thermostat Adjustment - Intermittent												
HVAC	Packaged RTU Sealing												
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	3,267	3,267	3,267	3,267	3,267	3,267	3,267					
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	11,677	11,677	11,677	11,677	11,677	11,677	11,677					
HVAC	Notched V-Belt												
CY2019 Program Total Electric Contribution to CPAS		8,874,729	7,031,416	3,834,159	2,110,922	14,944	14,944	14,944	-	-	-	-	-
Historic Program Total Electric Contribution to CPAS‡		3,938,981	2,345,749	1,688,555	1,666,456	1,537,739	1,258,329	80,065					
Program Total Electric CPAS		12,813,710	9,377,165	5,522,714	3,777,378	1,552,683	1,273,273	95,009	-	-	-	-	-
CY2019 Program Incremental Expiring Electric Savings§		629,926	1,843,313	3,197,256	1,723,237	2,095,978	-	-	14,944	-	-	-	-
Historic Program Incremental Expiring Electric Savings‡§		25,029	1,593,232	657,194	22,099	128,717	279,410	1,178,263	80,065	-	-	-	-
Program Total Incremental Expiring Electric Savings§		654,955	3,436,545	3,854,451	1,745,336	2,224,695	279,410	1,178,263	95,009	-	-	-	-

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) – Gas

End Use Type	Research Category	EUL	CY2019 Verified Gross Savings (Therms)	NTG*	Lifetime Net Savings (Therms)†	Verified Net Therms Savings								
						2018	2019	2020	2021	2022	2023	2024	2025	2026
Lighting	Interior LED Fixture Replacement (with adjusted T12 baseline and EISA)	9.6	-	0.92	-		-	-	-	-	-	-	-	-
Lighting	Exterior LED Fixture Replacement (with adjusted T12 baseline)	11.6	-	0.92	-		-	-	-	-	-	-	-	-
Lighting	Occupancy Sensor Lighting Controls	8.0	-	0.92	-		-	-	-	-	-	-	-	-
Lighting	Fluorescent Delamping (with adjusted T12 baseline)	11.0	-	0.92	-		-	-	-	-	-	-	-	-
HVAC	Non-Programmable to Smart or Advanced Thermostat	11.0	4,705	0.92	47,612		4,328	4,328	4,328	4,328	4,328	4,328	4,328	4,328
HVAC	Air Conditioning Full Tune-Up	3.0	-	0.92	-		-	-	-					
Lighting	LED Exit Signs	5.0	-	0.92	-		-	-	-	-	-			
HVAC	Programmable to Smart or Advanced Thermostat	11.0	-	0.92	-		-	-	-	-	-	-	-	-
HVAC	Economizer with DCV (Gas Heating)	5.0	2,329	0.92	10,712		2,142	2,142	2,142	2,142	2,142			
HVAC	Advanced Rooftop Controls – DCV & VFD	10.0	1,147	0.92	10,548		1,055	1,055	1,055	1,055	1,055	1,055	1,055	1,055
HVAC	Thermostat Adjustment - Intermittent	2.0	29	0.92	53		27	27						
HVAC	Packaged RTU Sealing	5.0	221	0.92	1,019		204	204	204	204	204			
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	15.0	-	0.92	-		-	-	-	-	-	-	-	-
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	15.0	-	0.92	-		-	-	-	-	-	-	-	-
HVAC	Notched V-Belt	3.4	-	0.92	-		-	-	-	-				
CY2019 Program Total Gas Contribution to CPAS (Therms)			8,430		69,943		7,756	7,756	7,729	7,729	7,729	5,383	5,383	5,383
CY2019 Program Total Gas Contribution to CPAS (kWh Equivalent)‡					2,050,041		227,321	227,321	226,544	226,544	226,544	157,780	157,780	157,780
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§						-	-	-	-	-	-	-	-	-
Program Total Gas CPAS (kWh Equivalent)‡						-	227,321	227,321	226,544	226,544	226,544	157,780	157,780	157,780
CY2019 Program Incremental Expiring Gas Savings (Therms)‖								-	27	-	-	2,346	-	-
CY2019 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖								-	777	-	-	68,763	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖							-	-	-	-	-	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖							-	-	777	-	-	68,763	-	-

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Interior LED Fixture Replacement (with adjusted T12 baseline and EISA)	-	-										
Lighting	Exterior LED Fixture Replacement (with adjusted T12 baseline)	-	-	-	-								
Lighting	Occupancy Sensor Lighting Controls												
Lighting	Fluorescent Delamping (with adjusted T12 baseline)	-	-	-									
HVAC	Non-Programmable to Smart or Advanced Thermostat	4,328	4,328	4,328									
HVAC	Air Conditioning Full Tune-Up												
Lighting	LED Exit Signs												
HVAC	Programmable to Smart or Advanced Thermostat	-	-	-									
HVAC	Economizer with DCV (Gas Heating)												
HVAC	Advanced Rooftop Controls – DCV & VFD	1,055	1,055										
HVAC	Thermostat Adjustment - Intermittent												
HVAC	Packaged RTU Sealing												
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	-	-	-	-	-	-	-					
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	-	-	-	-	-	-	-					
HVAC	Notched V-Belt												
CY2019 Program Total Gas Contribution to CPAS (Therms)		5,383	5,383	4,328	-	-	-	-	-	-	-	-	-
CY2019 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		157,780	157,780	126,865	-	-	-	-	-	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		-	-	-	-	-	-	-	-	-	-	-	-
Program Total Gas CPAS (kWh Equivalent)‡		157,780	157,780	126,865	-	-	-	-	-	-	-	-	-
CY2019 Program Incremental Expiring Gas Savings (Therms)‖		-	-	1,055	4,328	-	-	-	-	-	-	-	-
CY2019 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖		-	-	30,916	126,865	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖		-	-	-	-	-	-	-	-	-	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖		-	-	30,916	126,865	-	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first year gas savings in kWh equivalents. 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.
‡ kWh equivalent savings are calculated by multiplying therm savings by 29.31.
§ Historic savings go back to CY2018.
‖ Incremental expiring savings are equal to CPAS Yn-1 - CPAS Y_n.
Source: Evaluation team analysis

Table 4-3. 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	Interior LED Fixture Replacement (with adjusted T12 baseline and EISA)	9.6	6,401,893	0.92	51,205,750		5,889,742	5,889,742	5,821,478	5,252,880	5,102,778	5,018,489	5,018,489	5,018,489
Lighting	Exterior LED Fixture Replacement (with adjusted T12 baseline)	11.6	3,684,579	0.92	39,319,842		3,389,813	3,389,813	3,386,009	3,385,560	3,382,466	3,381,700	3,381,700	3,381,700
Lighting	Occupancy Sensor Lighting Controls	8.0	684,702	0.92	5,039,408		629,926	629,926	629,926	629,926	629,926	629,926	629,926	629,926
Lighting	Fluorescent Delamping (with adjusted T12 baseline)	11.0	298,186	0.92	2,794,190		274,331	274,331	274,331	264,433	244,636	243,688	243,688	243,688
HVAC	Non-Programmable to Smart or Advanced Thermostat	11.0	293,236	0.92	2,967,547		269,777	269,777	269,777	269,777	269,777	269,777	269,777	269,777
HVAC	Air Conditioning Full Tune-Up	3.0	106,543	0.92	294,058		98,019	98,019	98,019					
Lighting	LED Exit Signs	5.0	90,143	0.92	414,660		82,932	82,932	82,932	82,932	82,932			
HVAC	Programmable to Smart or Advanced Thermostat	11.0	55,342	0.92	560,063		50,915	50,915	50,915	50,915	50,915	50,915	50,915	50,915
HVAC	Economizer with DCV (Gas Heating)	5.0	101,348	0.92	466,199		93,240	93,240	93,240	93,240	93,240			
HVAC	Advanced Rooftop Controls – DCV & VFD	10.0	57,605	0.92	529,969		52,997	52,997	52,997	52,997	52,997	52,997	52,997	52,997
HVAC	Thermostat Adjustment - Intermittent	2.0	19,185	0.92	35,301		17,650	17,650						
HVAC	Packaged RTU Sealing	5.0	24,517	0.92	112,778		22,556	22,556	22,556	22,556	22,556			
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	15.0	17,658	0.92	100,832		16,246	16,246	16,246	16,246	16,246	3,267	3,267	3,267
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	15.0	12,692	0.92	128,443		11,677	11,677	11,677	11,677	11,677	11,677	11,677	11,677
HVAC	Notched V-Belt	3.4	2,051	0.92	6,377		1,886	1,886	1,886	717				
CY2019 Program Total Contribution to CPAS			11,849,681		103,975,415		10,901,706	10,901,706	10,811,989	10,133,854	9,960,144	9,662,436	9,662,436	9,662,436
Historic Program Total Contribution to CPAS‡						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
Program Total CPAS						8,022,573	18,301,012	18,301,012	18,173,822	17,495,687	17,321,977	15,669,520	13,968,934	13,626,446
CY2019 Program Incremental Expiring Savings§								-	89,718	678,135	173,710	297,708	-	-
Historic Program Incremental Expiring Savings‡§							623,267	-	37,473	-	-	1,354,749	1,700,586	342,488
Program Total Incremental Expiring Savings§							623,267	-	127,191	678,135	173,710	1,652,457	1,700,586	342,488

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Interior LED Fixture Replacement (with adjusted T12 baseline and EISA)	5,018,489	3,175,175										
Lighting	Exterior LED Fixture Replacement (with adjusted T12 baseline)	3,381,700	3,381,700	3,381,700	2,095,978								
Lighting	Occupancy Sensor Lighting Controls												
Lighting	Fluorescent Delamping (with adjusted T12 baseline)	243,688	243,688	243,688									
HVAC	Non-Programmable to Smart or Advanced Thermostat	269,777	269,777	269,777									
HVAC	Air Conditioning Full Tune-Up												
Lighting	LED Exit Signs												
HVAC	Programmable to Smart or Advanced Thermostat	50,915	50,915	50,915									
HVAC	Economizer with DCV (Gas Heating)												
HVAC	Advanced Rooftop Controls – DCV & VFD	52,997	52,997										
HVAC	Thermostat Adjustment - Intermittent												
HVAC	Packaged RTU Sealing												
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	3,267	3,267	3,267									
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	11,677	11,677	11,677									
HVAC	Notched V-Belt												
CY2019 Program Total Contribution to CPAS		9,032,510	7,189,196	3,961,024	2,095,978	-	-	-	-	-	-	-	-
Historic Program Total Contribution to CPAS‡		3,938,981	2,345,749	1,688,555	1,666,456	1,537,739	1,258,329	80,065	-	-	-	-	-
Program Total CPAS		12,971,491	9,534,945	5,649,579	3,762,434	1,537,739	1,258,329	80,065	-	-	-	-	-
CY2019 Program Incremental Expiring Savings§		629,926	1,843,313	3,228,172	1,865,046	2,095,978	-	-	-	-	-	-	-
Historic Program Incremental Expiring Savings‡§		25,029	1,593,232	657,194	22,099	128,717	279,410	1,178,263	80,065	-	-	-	-
Program Total Incremental Expiring Savings§		654,955	3,436,545	3,885,366	1,887,145	2,224,695	279,410	1,178,263	80,065	-	-	-	-

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.

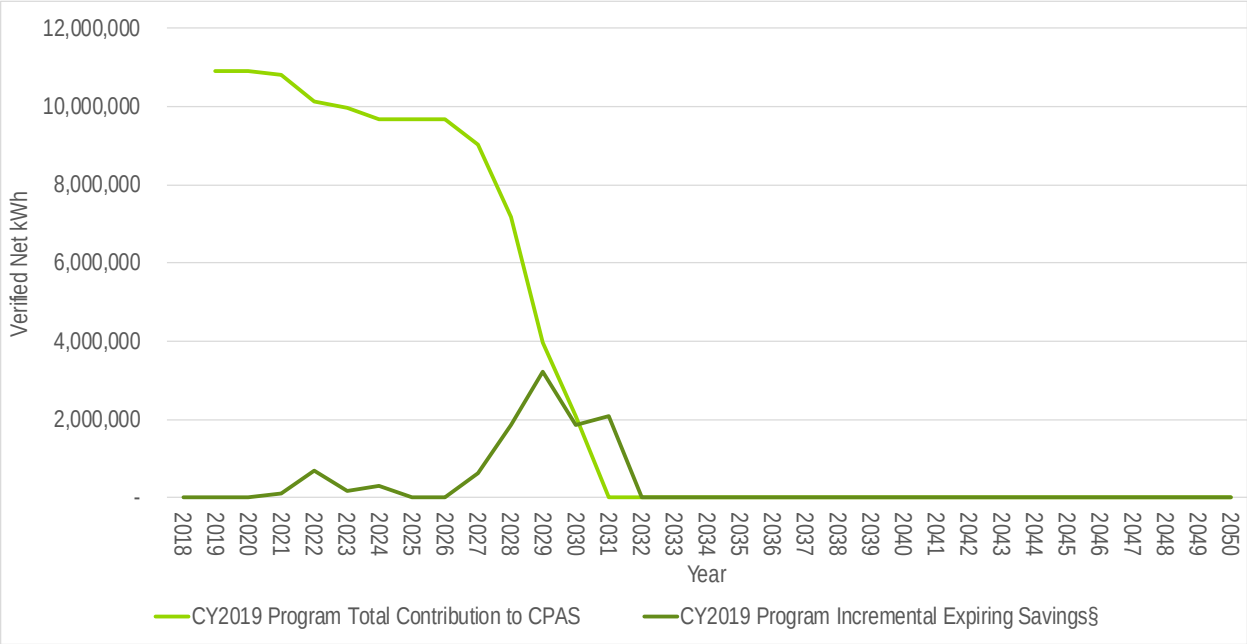
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ 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

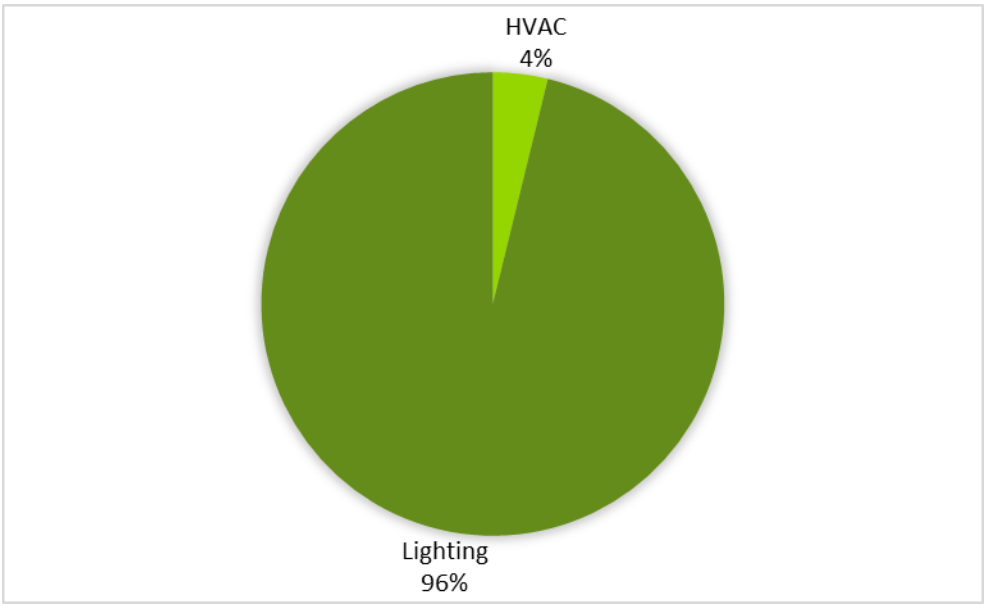


* Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n.
Source: Evaluation team analysis

5. Program Savings by Measure

The program includes 15 measures as shown in the following tables. The interior and exterior LED fixture replacements contributed the most savings. The lighting end use accounts for the majority of the program's verified energy savings (see Figure 5-1) with 96% of verified net savings, and 4% from HVAC measures. The program did not have water measures and did not claim secondary electric energy (kWh) savings from water supply and wastewater treatment plants. The overall electric gross realization rate was 97%.

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



Source: Evaluation team analysis

Table 5-1. CY2019 Energy Savings by Measure – 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	Interior LED Fixture Replacement	6,438,451	0.99	6,401,893	0.92	5,889,742	9.6
Lighting	Exterior LED Fixture Replacement	3,688,702	1.00	3,684,579	0.92	3,389,813	11.6
Lighting	Occupancy Sensor Lighting Controls	683,788	1.00	684,702	0.92	629,926	8.0
Lighting	Fluorescent Delamping	298,080	1.00	298,186	0.92	274,331	11.0
HVAC	Non-Programmable to Smart or Advanced Thermostat	145,537	1.07	155,339	0.92	142,912	11.0
HVAC	Air Conditioning Full Tune-Up	106,308	1.00	106,543	0.92	98,019	3.0
Lighting	LED Exit Signs	90,153	1.00	90,143	0.92	82,932	5.0
HVAC	Programmable to Smart or Advanced Thermostat	55,342	1.00	55,342	0.92	50,915	11.0
HVAC	Economizer with DCV (Gas Heating)	367,877	0.09	33,096	0.92	30,449	5.0
HVAC	Advanced Rooftop Controls – DCV & VFD	24,001	1.00	24,001	0.92	22,081	10.0
HVAC	Thermostat Adjustment - Intermittent	18,340	1.00	18,340	0.92	16,873	2.0
HVAC	Packaged RTU Sealing	18,005	1.00	18,025	0.92	16,583	5.0
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	18,836	0.94	17,658	0.92	16,246	15.0
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	23,403	0.54	12,692	0.92	11,677	15.0
HVAC	Notched V-Belt	2,051	1.00	2,051	0.92	1,886	3.4
	Total	11,978,872	0.97	11,602,593	0.92	10,674,385	10.1

* A deemed value. Source: is to be found on the Illinois SAG web site here: https://www.ilsag.info/ntg_2019.
Note: The savings in this table includes secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd.
Source: ComEd tracking data and evaluation team analysis

Table 5-2 and Table 5-3 show CY2019 non-coincident demand savings and summer peak demand savings by measure, respectively.

Table 5-2. CY2019 Non-Coincident Demand Savings by Measure

End Use Type	Research Category	Ex Ante Gross Non-Coincident Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Non-Coincident Demand Reduction (kW)	NTG*	Verified Net Non-Coincident Demand Reduction (kW)
Lighting	Interior LED Fixture Replacement	NR	NA	1,153.70	0.92	1,061.41
Lighting	Exterior LED Fixture Replacement	NR	NA	857.24	0.92	788.66
Lighting	Occupancy Sensor Lighting Controls	NR	NA	243.29	0.92	223.83
Lighting	Fluorescent Delamping	NR	NA	57.11	0.92	52.54
HVAC	Non-Programmable to Smart or Advanced Thermostat	NR	NA	0.00	0.92	0.00
HVAC	Air Conditioning Full Tune-Up	NR	NA	83.63	0.92	76.94
Lighting	LED Exit Signs	NR	NA	9.63	0.92	8.86
HVAC	Programmable to Smart or Advanced Thermostat	NR	NA	0.00	0.92	0.00
HVAC	Economizer with DCV (Gas Heating)	NR	NA	0.00	0.92	0.00
HVAC	Advanced Rooftop Controls – DCV & VFD	NR	NA	7.40	0.92	6.81
HVAC	Thermostat Adjustment - Intermittent	NR	NA	0.00	0.92	0.00
HVAC	Packaged RTU Sealing	NR	NA	19.41	0.92	17.85
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	NR	NA	13.05	0.92	12.01
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	NR	NA	14.83	0.92	13.65
HVAC	Notched V-Belt	NR	NA	0.29	0.92	0.27
	Total	NR	NA	2,459.57	0.92	2,262.81

NR = Not reported
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 5-3. CY2019 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	Interior LED Fixture Replacement	1,022.49	0.99	1,010.24	0.92	929.42
Lighting	Exterior LED Fixture Replacement	0.00	NA	0.00	0.92	0.00
Lighting	Occupancy Sensor Lighting Controls	215.79	1.00	215.79	0.92	198.52
Lighting	Fluorescent Delamping	34.70	1.00	34.70	0.92	31.92
HVAC	Non-Programmable to Smart or Advanced Thermostat	0.00	NA	0.00	0.92	0.00
HVAC	Air Conditioning Full Tune-Up	39.97	1.00	39.97	0.92	36.78
Lighting	LED Exit Signs	12.82	1.00	12.82	0.92	11.80
HVAC	Programmable to Smart or Advanced Thermostat	0.00	NA	0.00	0.92	0.00
HVAC	Economizer with DCV (Gas Heating)	0.00	NA	0.00	0.92	0.00
HVAC	Advanced Rooftop Controls – DCV & VFD	3.54	1.00	3.54	0.92	3.25
HVAC	Thermostat Adjustment - Intermittent	0.00	NA	0.00	0.92	0.00
HVAC	Packaged RTU Sealing	9.28	1.00	9.28	0.92	8.53
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	11.92	0.52	6.24	0.92	5.74
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	13.54	0.52	7.09	0.92	6.52
HVAC	Notched V-Belt	0.29	1.00	0.29	0.92	0.27
	Total	1,364.32	0.98	1,339.95	0.92	1,232.75

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 5-4 and Table 5-5 show CY2019 energy savings by measure for gas and total combined electricity and gas savings by measure, respectively.

Table 5-4. CY2019 Energy Savings by Measure – Gas

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)	EUL (years)
Lighting	Interior LED Fixture Replacement	0	NA	0	0.92	0	9.6
Lighting	Exterior LED Fixture Replacement	0	NA	0	0.92	0	11.6
Lighting	Occupancy Sensor Lighting Controls	0	NA	0	0.92	0	8.0
Lighting	Fluorescent Delamping	0	NA	0	0.92	0	11.0
HVAC	Non-Programmable to Smart or Advanced Thermostat	4,656	1.01	4,705	0.92	4,328	11.0
HVAC	Air Conditioning Full Tune-Up	0	NA	0	0.92	0	3.0
Lighting	LED Exit Signs	0	NA	0	0.92	0	5.0
HVAC	Programmable to Smart or Advanced Thermostat	-41	0.00	0	0.92	0	11.0
HVAC	Economizer with DCV (Gas Heating)	49,756	0.05	2,329	0.92	2,142	5.0
HVAC	Advanced Rooftop Controls – DCV & VFD	1,148	1.00	1,147	0.92	1,055	10.0
HVAC	Thermostat Adjustment - Intermittent	29	1.00	29	0.92	27	2.0
HVAC	Packaged RTU Sealing	164	1.35	221	0.92	204	5.0
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	0	NA	0	0.92	0	15.0
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	0	NA	0	0.92	0	15.0
HVAC	Notched V-Belt	0	NA	0	0.92	0	3.4
	Total Therms	55,712	0.15	8,430	0.92	7,756	NA
	Total kWh Converted From Therms†	1,632,912	0.15	247,088	0.92	227,321	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.
† Gas savings converted to kWh by multiplying therms * 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh).
Source: ComEd tracking data and evaluation team analysis

Table 5-5. CY2019 Energy Savings by Measure – Total Combining Electricity and Gas

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
Lighting	Interior LED Fixture Replacement	6,438,451	0.99	6,401,893	0.92	5,889,742
Lighting	Exterior LED Fixture Replacement	3,688,702	1.00	3,684,579	0.92	3,389,813
Lighting	Occupancy Sensor Lighting Controls	683,788	1.00	684,702	0.92	629,926
Lighting	Fluorescent Delamping	298,080	1.00	298,186	0.92	274,331
HVAC	Non-Programmable to Smart or Advanced Thermostat	281,991	1.04	293,236	0.92	269,777
HVAC	Air Conditioning Full Tune-Up	106,308	1.00	106,543	0.92	98,019
Lighting	LED Exit Signs	90,153	1.00	90,143	0.92	82,932
HVAC	Programmable to Smart or Advanced Thermostat	54,140	1.02	55,342	0.92	50,915
HVAC	Economizer with DCV (Gas Heating)	1,826,239	0.06	101,348	0.92	93,240
HVAC	Advanced Rooftop Controls – DCV & VFD	57,646	1.00	57,605	0.92	52,997
HVAC	Thermostat Adjustment - Intermittent	19,185	1.00	19,185	0.92	17,650
HVAC	Packaged RTU Sealing	22,814	1.07	24,517	0.92	22,556
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	18,836	0.94	17,658	0.92	16,246
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	23,403	0.54	12,692	0.92	11,677
HVAC	Notched V-Belt	2,051	1.00	2,051	0.92	1,886
	Total†	13,611,784	0.87	11,849,681	0.92	10,901,706

* A deemed value. Source: is to be found on the Illinois SAG web site here: https://www.ilsag.info/ntg_2019.
† The total includes the electric equivalent of the total therms.
Source: ComEd tracking data and evaluation team analysis

6. Impact Analysis Findings and Recommendations

6.1 Impact Parameter Estimates

The evaluation team calculated verified gross and net savings (energy and coincident peak demand) resulting from the CY2019 PSF Program using algorithms as defined by the TRM (v7.0) or ComEd CY2019 Workpapers. 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 CY2019 evaluation research and which were deemed.

Table 6-1. Savings Parameters

Gross Savings Input Parameters	Value	Units	Deemed or Evaluated?	Source
Quantity	Varies	Varies	Evaluated	CY2019 program tracking database
NTG	Varies	0.92	Deemed	Illinois SAG Consensus*
Deemed Lighting Measure Savings Parameters: Hours of Use (HOU), Coincidence Factor, Interactive Effects	Varies	NA	Deemed	TRM v7.0†
Lighting Measure Watts (deemed by TRM), KW Controlled, ISR	Varies	Watts	Deemed	TRM v7.0, Program Measure Workpapers
T12 Baseline Adjustment, EISA Midlife Adjustment (LED omnidirectional, decorative, and directional lamps)	Varies	Watts	Evaluated	TRM v7.0, TRM v7.0 Errata Memo, Program Measure Workpapers, and Evaluation M&V
Deemed HVAC, Thermostats, Advanced Rooftop Controls – DCV & VFD, Early Replacement for Air Cooled AC, Packaged RTU Sealing, Notched V-Belt	Varies	kWh	Evaluated	TRM v7.0, TRM v7.0 Errata Memo, Program Measure Workpapers, and Evaluation M&V
Verified Realization Rate on Ex Ante Gross Savings	Varies	NA	Evaluated	CY2019 Evaluation
Effective Useful Life (EUL)	Varies	Years	Mixture	TRM v7.0

* The NTG values can be found on the Illinois SAG web site here: https://www.ilsag.info/ntg_2019.
† TRM is the State of Illinois Technical Reference Manual version 7.0 from http://www.ilsag.info/technical-reference-manual.html.

6.2 Other Impact Findings and Recommendations

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

6.2.1 Tracking System Review

Finding 1. In the course of CY2019, the evaluation team and ComEd worked to streamline the data tracking and extraction process for the PSF Program. We experienced some delays in receiving the final tracking data due to certain data fields not meeting the evaluation request. This delayed the evaluation planning schedule for completing the initial draft of the report.

Recommendation 1. We acknowledge that the issue regarding tracking data fields has been resolved to the extent that we were able to complete the CY2019 final evaluation. We recommend that the evaluation team and ComEd work out any differences on data needs during the mid-year review to avoid delays during the year end evaluation.

Finding 2. The evaluation team found that the tracking data savings assumptions for project 699337007-A were not consistent with the ex ante savings. The program implementer clarified that the savings considered the negative heat penalty reduction for the heating system being electric resistance heating. The heating system type was not recorded in the tracking data submitted for evaluation, which could have introduced errors in the verified savings approach if unknown. The evaluation team accordingly applied the necessary waste heat interactive factors and accounted for heating penalties in the verified savings.

Recommendation 2. The tracking data should include additional fields to track the facility heating system. Also, considering that the evaluation process is now reporting heating penalties, we recommend that the program tracks heating penalties for affected measures.

6.2.2 Packaged RTU Sealing, AC Tune-Up

Finding 3. The tracking data classified the Fire Station buildings as the "Hospital – CAV econ" building type for the RTU Sealing and AC Tune-up measures. However, the ex ante savings were based on the equivalent full load hours for cooling (EFLH_Cooling) and heating (EFLH_Heating) values corresponding to the "Hospital – CAV no econ" building type. Guidehouse verified that savings for these measures are calculated using the EFLH values corresponding to the "Hospital – CAV no econ" building type. We verified a gross realization rate of 100%.

Recommendation 3. Guidehouse recommends updating the classification of the Fire Station buildings in the tracking data to the "Hospital – CAV non econ" building type and ensuring the EFLH used in the calculations corresponds to the building type.

Finding 4. Guidehouse agreed with the ex ante approach for the Packeged RTU Sealing measure, of calculating the EFLH for Unknown building type as an average of the EFLH for the buildings in the TRM (v7.0) Section 4.4.43 while the EFLH for the "Elementary School, High School, and Hospital – CAV Econ" building types were based on Section 4.4 of the TRM. Guidehouse calculated 100% gross realization rate for the electric savings. In the case for the therms savings for the Elementary School, Hospital – CAV econ, and High School building types, the ex ante used EFLH_Cooling from the HVAC Section 4.4 of the Illinois TRM v7.0. The verified therms savings for these building types were calculated using the EFLH_Heating from the HVAC Section 4.4 of the TRM. Guidehouse adjusted the therms savings with 135% gross realization rate.

Recommendation 4. Guidehouse recommends using the EFLH_Heating corresponding to the building type when calculating therms savings for this measure

6.2.3 Economizer with DCV

Finding 5. The per unit ex ante savings for demand controlled ventilation (DCV) for this measure are calculated using the savings factor (cooling savings factor and heating gas savings factor) values from the Section 4.4.19 of the TRM v6.0 while the per unit ex ante savings for economizer for this measure are consistent with the savings in the Small Business Measure Workbook (ex ante calculator which the PSF implementer referenced)[4] for the corresponding building types. The verified savings for economizer for this measure are also consistent with the savings in the Small Business Measure Workbook while the verified savings for DCV for this measure are calculated using the savings factor values from the Section 4.4.19 of the TRM v7.0.

[4] SBO 2019 Measure Workbook_Master_10022019_v21.xlsx

Recommendation 5. Guidehouse recommends calculating savings for demand controlled ventilation (DCV) for this measure using the savings factor values from the current and applicable version of the Illinois TRM for future program impacts.

Finding 6. The program implementer calculated total ex ante savings for this measure by multiplying the sum of the per unit Economizer savings (kWh/Ton) and the total DCV savings (kWh) by the capacity of the unit (Ton). The total DCV savings was erroneously multipled twice by the tonnage capacity which inflated the claimed savings. Guidehouse updated the total savings algorithm to multiply the sum of the per unit Economizer savings (kWh/Ton) and the per unit DCV savings (kWh/Ton) by the capacity of the unit (Ton). The changes resulted in electric savings with gross realization rate of 9% and the gas savings with gross realization rate of 5%. Details of the algorithm adjustment is provided in Section 8.2.

Recommendation 6. Guidehouse recommends correcting the error of double counting the DCV tonnage capacity in the total savings calculation and update the total savings algorithm to use the per unit savings for both the Economizer and DCV components of this measure then multiply by the capacity of the unit.

6.2.4 Early Replacement Air Cooled AC

Finding 7. Based on the supplemental information provided for this measure, Guidehouse found that the ex ante savings for the following Time of Sale (TOS) projects 198138000-B, 619147027-C (6 Ton, 7.5 Ton, and 25 Ton Units) are calculated using baseline efficiencies corresponding to the 2012 IECC minimum efficiency requirements. Guidehouse calculated the verified savings for these projects using baseline efficiency values corresponding to the 2018 IECC minimum efficiency requirements. A comparison of the efficiency values used in the ex ante and verified savings is shown in Table 6-3.

Table 6-2. Comparing Early Replacement Air Cooled AC Savings

Project ID	Cooling Capacity (Tons)	SEER EE / IEER EE	SEER Exist / IEER Exist	Ex Ante SEER Base / IEER Base	Ex Post SEER Base / IEER Base	kWh RR	kW RR
1668057011-A	12.5	12.5	9.2	NA	12.2	100%	52%
198138000-B	30	16	NA	9.9	11.4	65%	52%
619147027-C	3	15	NA	13	13	100%	52%
619147027-C	6, 7.5	12	NA	11.2	12.6	0%	52%
619147027-C	25	12	NA	9.9	11.4	25%	52%
7507166026-C	5	16	8.1	NA	13	100%	52%

Note: TD refers to Tracking Data
Source: ComEd tracking data and evaluation team analysis

Recommendation 7. Guidehouse recommends updating the baseline efficiency values for these projects to be consistent with the 2018 IECC minimum efficiency requirements.

Finding 8. The ex ante peak demand savings for this measure are calculated using the Summer System Peak (SSP) coincidence factor (91.3%). The verified peak demand savings are calculated using the PJM coincidence factor (47.8%).

Recommendation 8. Guidehouse recommends using the PJM coincidence factor to calculate peak demand savings for this measure.

Finding 9. The ex ante savings for this measure for units with capacity less than 65,000 Btu/h are calculated using a baseline efficiency value of SEER 13, which corresponds to both split system and single package subcategories in the 2012 IECC standard. However, 2015 IECC standard onwards the minimum efficiency requirements for split system and single package subcategories are SEER 13 and SEER 14 respectively.

Recommendation 9. Guidehouse recommends including the subcategory information for all units with capacity less than 65,000 Btu/h. This will facilitate the selection of the appropriate baseline efficiency value for these units.

6.2.5 Lighting

Finding 10. The ex ante savings for the "Hospital – CAV econ" building type were calculated using the TRM v7.0 inputs corresponding to the "Hospital – CAV no econ" building type. Guidehouse calculated the verified savings for these measures using the operating parameters corresponding to the "Hospital – CAV no econ" building type.

Recommendation 10. Guidehouse recommends updating the "Hospital – CAV econ" building type in the tracking data to "Hospital – CAV no econ" and ensuring that the values used in the calculations correspond to the building type.

Finding 11. The ex ante baseline wattages for screw based omnidirectional LED bulbs with incandescent baselines were adjusted to meet the EISA requirements for higher efficiency (both first year and lifetime) and midlife adjustment.

Recommendation 11. Guidehouse recommends tracking and adjusting the baseline wattages for general-purpose light bulbs that require EISA adjustment per TRM (v7.0).

6.2.6 Non-Programmable to Advanced Thermostat

Finding 12. The ex ante kWh savings for the unknown building type are currently calculated as an average of the kWh savings for all building types, while the verified kWh savings for the unknown building type are calculated as the difference between the baseline energy use (calculated as an average of baseline energy use for all building types) and the proposed energy use (calculated as an average of proposed energy use for all building types).

Recommendation 12. Guidehouse currently does not have a recommendation for this measure since the algorithm used to calculate the ex ante savings has been retired. Guidehouse is working with ComEd and the implementation team to update the proposed TRM v9 to resolve this issue. Today, the implementer should use the algorithm that is included TRM v8.

6.2.7 Non-Programmable to Smart or Advanced Thermostat and Programmable to Smart or Advanced Thermostat

Finding 13. The program claimed negative therm savings for these measures in the ex ante calculator for the Office – Mid Rise building type. This was based on using the TRM v6.0 algorithm, which was found to generate erroneous gas savings values. The evaluation team determined that no verified therm savings for these measures for the Office – Mid Rise building type should be applied. We determined from the TRM that negatives savings is an error.

7. Appendix 1. Impact Analysis Methodology

7.1 Verified Gross Program Savings Analysis Approach

Guidehouse determined the verified gross savings for each program measure by:

1. Reviewing the savings algorithm inputs in the measure workbook for agreement with the TRM or secondary research.
2. Validating that the savings algorithms were applied correctly.
3. Cross-checking per-unit savings values in the tracking data with the verified values in the measure workbook or in Guidehouse's calculations if the workbook did not agree with the TRM.
4. Multiplying the verified per-unit savings value by the quantity reported in the tracking data.

The evaluation team downloaded the final tracking data and measure workbook for the CY2019 impact evaluation from the ComEd Evaluation ShareFile site. We relied on the following documents to verify the per-unit savings for each program measure:

- Final CY2019 tracking database file: "SBSB_EOY_Submission_2020-03-06".
- Nexant Measure Workbook of default savings: "SBO 2019 Measure Workbook_Master_10022019_v21".
- ComEd PSF Program Workpapers (lighting and HVAC workpapers)
- Illinois Technical Reference Manual (TRM v7.0 and v8.0) for deemed input parameters or secondary evaluation research to verify any custom inputs used in the ex ante calculations.
- T12 and EISA baseline and midlife analysis using the TRM

7.2 Verified Net Program Savings Analysis Approach

The evaluation team calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a net-to-gross (NTG) ratio. In CY2019, the NTG ratio estimates used to calculate the net verified savings was 0.92, based on past evaluation research and defined by a consensus process through SAG. This document is found on the SAG website.[5]

8. Appendix 2. Impact Analysis Detail

8.1 T12 Baseline and EISA Midlife Adjustments

The tracking data provided sufficient information to enable the evaluation team to determine the measures affected by T12 adjustment and EISA midlife adjustment. The evaluation team found that 16% of the savings from affected LED fixtures involved T12 baselines (indoor and outdoor LED fixtures, and fluorescence delamping), and 2% of LED lamps involved EISA midlife adjustment.

In CY2019, the remaining useful life (RUL) to the T12 midlife adjustment is calculated based on one-third the assumed rated hours instead of one year, as was in previous TRM (v6.0) for CY2018. To account for EISA backstop adjustment for screw in, standard and specialty lamps in CY2019, the TRM v7.0 (CY2019) specifies that the omni-directional and standard A-lamps will have a baseline adjustment starting

[5] https://www.ilsag.info/ntg_2019.

1/1/2021. While the specialty decorative and directional lamps will also become subject to the backstop provision resulting in a baseline adjustment starting January 1, 2024.

Using the TRM, we developed the EISA midlife adjustment baselines post 2020 and 2023. Combining the T12 and EISA adjustments, we calculated 10% lighting CPAS drop at the end of 2023.

8.2 Economizer with DCV Total Savings Algorithm

The total ex ante kWh savings for the Economizer with DCV measure were errornous which were corrected. The ex ante algorithm are shown below and example verified corrections are also shown.

$$Economizer\ Per\ Unit\ Savings = 202.281\frac{kWh}{Ton}$$

$$DCV\ Per\ Unit\ Savings = \frac{430.5\frac{kWh}{1000\ Square\ Feet} * 400\frac{SquareFeet}{Ton}}{1000} = 172.2\frac{kWh}{Ton}$$

$$DCV\ Total\ Savings = 172.2\frac{kWh}{Ton} * 12\ Tons = 2{,}066.4\ kWh$$

$$Ex\ Ante\ Total\ kWh\ Savings = \left(202.281\frac{kWh}{Ton} + 2{,}066.4\ kWh\right) * 12\ Tons = 27{,}224\ kWh$$

$$Verified\ Total\ kWh\ Savings = \left(202.281\frac{kWh}{Ton} + 172.2\frac{kWh}{Ton}\right) * 12\ Tons = 4{,}494\ kWh$$

The total ex ante therms savings for the Economizer with DCV measure are currently calculated using the following algorithm:

$$DCV\ Per\ Unit\ Savings = \frac{18.5\frac{Therms}{1000\ Square\ Feet} * 400\frac{SquareFeet}{Ton}}{1000} = 7.4\frac{Therms}{Ton}$$

$$DCV\ Total\ Savings = 7.4\frac{Therms}{Ton} * 12\ Tons = 88.8\ Therms$$

$$Ex\ Ante\ Total\ Therms\ Savings = 88.8\ Therms * 12\ Tons = 1{,}065.6\ Therms$$

$$Verified\ Total\ Therms\ Savings = 7.4\frac{Therms}{Ton} * 12\ Tons = 88.8\ Therms$$

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	Interior LED Fixture Replacement‡	Fixtures	18,260	9.6	NO	6,401,893	1,010.24	0	0	-116,512	0.92	0.92	0.92	5,889,742	929.42	0	0	-107,191
Lighting	Exterior LED Fixture Replacement‡	Fixtures	3,030	11.6	NO	3,684,579	0.00	0	0	0	0.92	0.92	0.92	3,389,813	0.00	0	0	0
Lighting	Occupancy Sensor Lighting Controls	Sensors	5,620	8.0	NO	684,702	215.79	0	0	-12,979	0.92	0.92	0.92	629,926	198.52	0	0	-11,941
Lighting	Fluorescent Delamping‡	Fixtures	344	11.0	NO	298,186	34.70	0	0	-3,548	0.92	0.92	0.92	274,331	31.92	0	0	-3,264
HVAC	Non-Programmable to Smart or Advanced Thermostat	Each	20	11.0	NO	155,339	0.00	4,705	0	0	0.92	0.92	0.92	142,912	0.00	4,328	0	0
HVAC	Air Conditioning Full Tune-Up	Each	58	3.0	NO	106,543	39.97	0	0	0	0.92	0.92	0.92	98,019	36.78	0	0	0
Lighting	LED Exit Signs	Each	149	5.0	NO	90,143	12.82	0	0	-1,744	0.92	0.92	0.92	82,932	11.80	0	0	-1,605
HVAC	Programmable to Smart or Advanced Thermostat	Signs	3	11.0	NO	55,342	0.00	0	0	0	0.92	0.92	0.92	50,915	0.00	0	0	0
HVAC	Economizer with DCV (Gas Heating)§	Each	7	5.0	NO	33,096	0.00	2,329	0	0	0.92	0.92	0.92	30,449	0.00	2,142	0	0
HVAC	Advanced Rooftop Controls – DCV & VFD§	Each	3	10.0	NO	24,001	3.54	1,147	0	0	0.92	0.92	0.92	22,081	3.25	1,055	0	0
HVAC	Thermostat Adjustment - Intermittent	Each	4	2.0	NO	18,340	0.00	29	0	0	0.92	0.92	0.92	16,873	0.00	27	0	0
HVAC	Packaged RTU Sealing	Each	43	5.0	NO	18,025	9.28	221	0	0	0.92	0.92	0.92	16,583	8.53	204	0	0
HVAC	Early Replacement for Air Cooled AC (< 20 ton)	Each	8	15.0	YES	17,658	6.24	0	0	0	0.92	0.92	0.92	16,246	5.74	0	0	0
HVAC	Early Replacement for Air Cooled AC (> 20 ton)	Each	2	15.0	NO	12,692	7.09	0	0	0	0.92	0.92	0.92	11,677	6.52	0	0	0
HVAC	Notched V-Belt	Each	7	3.4	NO	2,051	0.29	0	0	0	0.92	0.92	0.92	1,886	0.27	0	0	0
	Total			10.1		11,602,593	1,340	8,430	0	-134,783	0.92	0.92	0.92	10,674,385	1,233	7,756	0	-124,000

* 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.
‡ The EUL for this measure varies over time. See the CPAS tables (Table 4-1 to Table 4-3).
§ The therm savings from these measure may possibly also be claimed by the gas companies if overlap is found. Guidehouse confirmed there was no overlap.
Source: ComEd tracking data and evaluation team analysis