Guidehouse

ComEd Small Business - Private Impact Evaluation Report

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

Presented to
ComEd

FINAL

April 29, 2020

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ComEd Small Business - Private Impact Evaluation Report

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1. Introduction

This report presents the results of the impact evaluation of ComEd's CY2019 Small Business - Private (SBP) 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 SBP Program is designed to assist qualified ComEd private 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) and the installation of no-cost direct install measures. Further savings are available for implementing other measures identified during the assessment that require a customer copay. Incentives are available for these measures which can cover up to 75 percent of the project costs. EESPs are the primary means of promoting the SBP Program and obtaining participants.

The CY2019 program offered comprehensive measures including lighting, refrigeration, HVAC and hot water, compressed air, commercial kitchen, and building envelope upgrades. Nexant, Inc. (Nexant) is the implementation contractor for the SBP Program throughout ComEd's service territory.

The program had 6,680 participants in CY2019 and incented 60,410 measures from 7,130 projects, as shown in Table 2-1 and Figure 2-1. Lighting contributed 62 percent of participation and non-lighting measures contributed 38 percent.

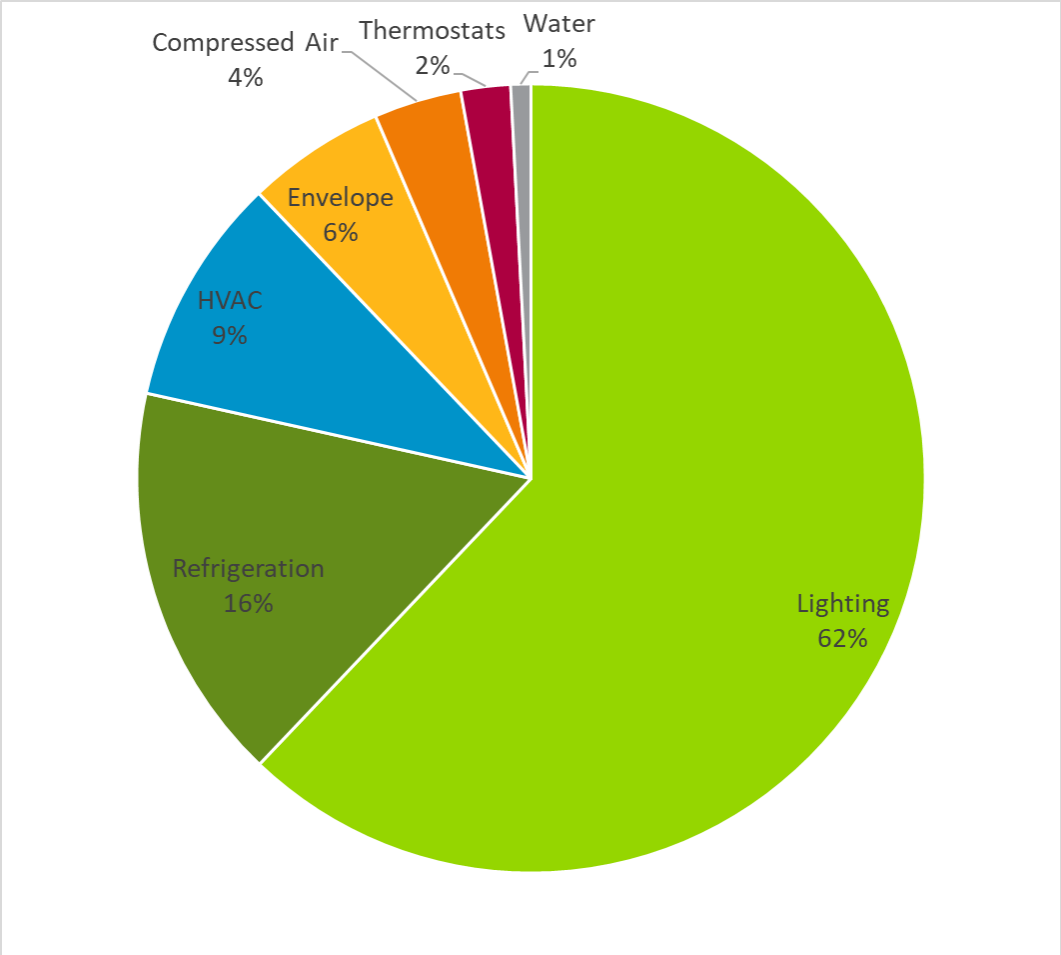
Table 2-1. CY2019 Volumetric Findings Detail

Participation	Total
Participants	6,680
Total Projects	7,130
Total Measures	60,410
Lighting Projects	6,056
Non-Lighting Projects	2,964
Mixed Projects (L+NL)	1,890
Lighting Measures	37,517
Non-Lighting Measures	22,893

Note: For purpose of this table, if a measure count is reported as for example, watts reduced or controlled, tons or square foot, Guidehouse counted each row as one measure. Other measures were counted as per units.
Source: ComEd tracking data and evaluation team analysis.

[1] Customers with a demand equal to or less than 100 kW.

Figure 2-1. Number of Measures Installed by End-Use



Source: ComEd tracking data and evaluation team analysis

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the SBP 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.[2] Total CY2019 verified net savings (without gas savings) are 164,972,218 kWh and the program gross realization rate is 1.00.

[2] 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	179,362,890	NR	27,385
Program Gross Realization Rate	1.00	NA	1.00
Verified Gross Savings	179,317,629	62,799	27,267
Program Net-to-Gross Ratio (NTG)	0.92	0.92	0.92
Verified Net Savings	164,972,218	57,775	25,086
Converted from Gas†			
Ex Ante Gross Savings	11,929,830	NA	NA
Program Gross Realization Rate	1.05	NA	NA
Verified Gross Savings	12,514,109	NA	NA
Program Net-to-Gross Ratio (NTG)	0.92	NA	NA
Verified Net Savings	11,512,980	NA	NA
Total Electric Plus Gas			
Ex Ante Gross Savings	191,292,720	NR	27,385
Program Gross Realization Rate	1.00	NA	1.00
Verified Gross Savings	191,831,738	62,799	27,267
Program Net-to-Gross Ratio (NTG)	0.92	0.92	0.92
Verified Net Savings	176,485,199	57,775	25,086

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 SBP program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2019. The electric CPAS across all measures installed in 2019 is 164,972,218 kWh (Table 4-1). The CY2019 gas contribution to CPAS (converted to equivalent electricity) is 11,512,980 kWh (Table 4-2). Adding the gas and electric contributions produces 176,485,199 kWh of total CY2019 contribution to CPAS (Table 4-3). The “historic” rows in each table are the CPAS contributions 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. The evaluation team estimated an 19 percent drop in total lighting electric CPAS after 2023 due to 2021 and 2024 baseline shifts. Another adjustment was the early replacement of

air-cooled air conditioners. Discussion on the T12 adjustment approach and EISA adjustments are detailed in Section and Table 8-4 below.

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	LED Lamps and Fixtures (with adjusted T12 baseline)	14.9	134,217,228	0.92	1,602,233,144		123,479,850	123,479,850	123,479,850	123,426,655	123,393,529	99,401,279	99,401,279	99,398,073
Refrigeration	EC Motor for Cooler or Freezer	15.0	8,151,570	0.92	112,491,666		7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444
Refrigeration	EC Motor with Evaporator Fan Controls for Cooler or Freezer	13.0	7,192,828	0.92	86,026,218		6,617,401	6,617,401	6,617,401	6,617,401	6,617,401	6,617,401	6,617,401	6,617,401
Thermostats	Advanced Thermostat	11.0	6,219,942	0.92	62,945,814		5,722,347	5,722,347	5,722,347	5,722,347	5,722,347	5,722,347	5,722,347	5,722,347
Lighting	Lighting Controls	8.0	5,505,931	0.92	40,523,653		5,065,457	5,065,457	5,065,457	5,065,457	5,065,457	5,065,457	5,065,457	5,065,457
Refrigeration	Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	10.0	5,297,251	0.92	48,734,711		4,873,471	4,873,471	4,873,471	4,873,471	4,873,471	4,873,471	4,873,471	4,873,471
HVAC	Economizer with DCV	10.0	1,972,562	0.92	18,147,572		1,814,757	1,814,757	1,814,757	1,814,757	1,814,757	1,814,757	1,814,757	1,814,757
Compressed Air	Air Compressors with Integrated VSD LTE 40 HP	13.0	1,443,012	0.92	17,258,418		1,327,571	1,327,571	1,327,571	1,327,571	1,327,571	1,327,571	1,327,571	1,327,571
Refrigeration	LED Refrigerated Display Case Lighting	10.0	1,118,430	0.92	10,289,554		1,028,955	1,028,955	1,028,955	1,028,955	1,028,955	1,028,955	1,028,955	1,028,955
Lighting	Decorative & Directional Lamps (adjusted for EISA)	13.2	1,036,665	0.92	5,799,369		953,732	953,732	953,732	953,732	953,732	125,696	125,696	125,696
HVAC	Early Replacement for Air Cooled AC	15.0	907,497	0.92	9,004,883		834,897	834,897	834,897	834,897	834,897	483,040	483,040	483,040
Compressed Air	No-Loss Condensate Drains	10.0	772,573	0.92	7,107,667		710,767	710,767	710,767	710,767	710,767	710,767	710,767	710,767
HVAC	Variable Speed Drive on HVAC - Pumps and Fans	15.0	668,239	0.92	9,221,705		614,780	614,780	614,780	614,780	614,780	614,780	614,780	614,780
Lighting	Omnidirectional Lamps (adjusted for EISA)	13.1	602,930	0.92	3,264,540		554,695	554,695	194,158	194,158	194,158	194,158	194,158	194,158
Compressed Air	Compressed Air Leak Repair	2.0	511,340	0.92	940,866		470,433	470,433						
Refrigeration	Strip Curtains for Cooler or Freezer	4.0	450,557	0.92	1,658,052		414,513	414,513	414,513	414,513				
Refrigeration	Auto Closer for Walk-in Cooler or Freezer	8.0	423,425	0.92	3,116,408		389,551	389,551	389,551	389,551	389,551	389,551	389,551	389,551
Thermostats	Thermostat Adjustment	2.0	373,934	0.92	688,039		344,020	344,020						
Compressed Air	High-Efficiency Air Nozzles	15.0	350,349	0.92	4,834,811		322,321	322,321	322,321	322,321	322,321	322,321	322,321	322,321
HVAC	Smart Strip - Tier 1	7.0	348,963	0.92	2,247,320		321,046	321,046	321,046	321,046	321,046	321,046	321,046	
Lighting	LED Lit Signage (with adjusted T12 baseline)	15.0	291,351	0.92	4,020,648		268,043	268,043	268,043	268,043	268,043	268,043	268,043	268,043
HVAC	Restroom Exhaust Fan Occupancy Sensor	8.0	282,152	0.92	2,076,642		259,580	259,580	259,580	259,580	259,580	259,580	259,580	259,580
Refrigeration	Beverage, Snack and Cooler Machine Controls	5.0	208,876	0.92	960,831		192,166	192,166	192,166	192,166	192,166			
Lighting	LED Exit Signs	5.0	161,964	0.92	745,033		149,007	149,007	149,007	149,007	149,007			
HVAC	Air Conditioner Tune-Up	3.0	93,697	0.92	258,604		86,201	86,201	86,201					
Water	Bathroom and Kitchen Faucet Aerators	10.0	89,509	0.92	823,483		82,348	82,348	82,348	82,348	82,348	82,348	82,348	82,348
Lighting	Advanced Lighting Controls	10.0	86,281	0.92	793,782		79,378	79,378	79,378	79,378	79,378	79,378	79,378	79,378
HVAC	Advanced Rooftop Controls	10.0	81,473	0.92	749,553		74,955	74,955	74,955	74,955	74,955	74,955	74,955	74,955
Thermostats	Programmable Thermostat	8.0	67,969	0.92	500,251		62,531	62,531	62,531	62,531	62,531	62,531	62,531	62,531
Water	High Efficiency Pre-Rinse Spray Valve	5.0	56,815	0.92	261,348		52,270	52,270	52,270	52,270	52,270			
Refrigeration	Q-Sync Motors for Reach-in Coolers/Freezers	10.0	54,398	0.92	500,462		50,046	50,046	50,046	50,046	50,046	50,046	50,046	50,046
Refrigeration	Night Covers	5.0	49,170	0.92	226,182		45,236	45,236	45,236	45,236	45,236			
Envelope	Weather Stripping	10.0	47,406	0.92	436,135		43,613	43,613	43,613	43,613	43,613	43,613	43,613	43,613
HVAC	Packaged RTU Sealing	5.0	40,788	0.92	187,625		37,525	37,525	37,525	37,525	37,525			
HVAC	Variable Speed Drive on HVAC - Supply and Return Fans	15.0	37,322	0.92	515,043		34,336	34,336	34,336	34,336	34,336	34,336	34,336	34,336
Lighting	LED Open & Channel Sign	15.0	24,853	0.92	342,974		22,865	22,865	22,865	22,865	22,865	22,865	22,865	22,865
HVAC	Economizer Repair and Optimization	5.0	19,345	0.92	88,987		17,797	17,797	17,797	17,797	17,797			
HVAC	End of life Replacement for Air Cooled AC	15.0	15,573	0.92	214,914		14,328	14,328	14,328	14,328	14,328	14,328	14,328	14,328
Envelope	Cool Roof	20.0	8,758	0.92	161,156		8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058
Water	Showerhead - Low Flow	10.0	8,608	0.92	79,195		7,919	7,919	7,919	7,919	7,919	7,919	7,919	7,919
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5 HP to 20 HP)	15.0	6,857	0.92	94,627		6,308	6,308	6,308	6,308	6,308	6,308	6,308	6,308
Envelope	Roof Insulation	20.0	6,329	0.92	116,459		5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823
Compressed Air	Efficient Refrigerated CA Dryer	13.0	6,001	0.92	71,770		5,521	5,521	5,521	5,521	5,521	5,521	5,521	5,521
Refrigeration	ENERGY STAR Solid or Glass Door Refrigerator or Freezer	12.0	3,090	0.92	34,114		2,843	2,843	2,843	2,843	2,843	2,843	2,843	2,843
Lighting	Induction and MH Fixtures	15.0	2,633	0.92	36,336		2,422	2,422	2,422	2,422	2,422	2,422	2,422	2,422
HVAC	Cogged V-Belt	3.0	1,183	0.92	3,264		1,088	1,088	1,088					
CY2019 Program Total Electric Contribution to CPAS			179,317,629		2,060,833,826		164,972,218	164,972,218	163,797,228	163,656,743	163,209,105	137,542,960	137,542,960	137,218,708
Historic Program Total Electric Contribution to CPAS‡						196,963,232	164,398,619	163,887,470	163,887,470	163,424,271	162,585,781	162,585,781	162,083,758	152,575,771
Program Total Electric CPAS						196,963,232	329,370,837	328,859,688	327,684,698	327,081,014	325,794,886	300,128,742	299,626,718	289,794,479
CY2019 Program Incremental Expiring Electric Savings§								-	1,174,990	140,485	447,638	25,666,145	-	324,252
Historic Program Incremental Expiring Electric Savings‡§							32,564,613	511,149	-	463,199	838,490	-	502,023	9,507,987
Program Total Incremental Expiring Electric Savings§							32,564,613	511,149	1,174,990	603,684	1,286,128	25,666,145	502,023	9,832,239

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Lighting	LED Lamps and Fixtures (with adjusted T12 baseline)	99,181,678	99,086,475	99,063,973	99,052,630	97,847,472	96,291,715	96,248,835							
Refrigeration	EC Motor for Cooler or Freezer	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444							
Refrigeration	EC Motor with Evaporator Fan Controls for Cooler or Freezer	6,617,401	6,617,401	6,617,401	6,617,401	6,617,401									
Thermostats	Advanced Thermostat	5,722,347	5,722,347	5,722,347											
Lighting	Lighting Controls														
Refrigeration	Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	4,873,471	4,873,471												
HVAC	Economizer with DCV	1,814,757	1,814,757												
Compressed Air	Air Compressors with Integrated VSD LTE 40 HP	1,327,571	1,327,571	1,327,571	1,327,571	1,327,571									
Refrigeration	LED Refrigerated Display Case Lighting	1,028,955	1,028,955												
Lighting	Decorative & Directional Lamps (adjusted for EISA)	125,696	125,696	125,696	125,696	125,696	25,139								
HVAC	Early Replacement for Air Cooled AC	483,040	483,040	483,040	483,040	483,040	483,040	483,040							
Compressed Air	No-Loss Condensate Drains	710,767	710,767												
HVAC	Variable Speed Drive on HVAC - Pumps and Fans	614,780	614,780	614,780	614,780	614,780	614,780	614,780							
Lighting	Omnidirectional Lamps (adjusted for EISA)	194,158	194,158	194,158	194,158	194,158	19,416								
Compressed Air	Compressed Air Leak Repair														
Refrigeration	Strip Curtains for Cooler or Freezer														
Refrigeration	Auto Closer for Walk-in Cooler or Freezer														
Thermostats	Thermostat Adjustment														
Compressed Air	High-Efficiency Air Nozzles	322,321	322,321	322,321	322,321	322,321	322,321	322,321							
HVAC	Smart Strip - Tier 1														
Lighting	LED Lit Signage (with adjusted T12 baseline)	268,043	268,043	268,043	268,043	268,043	268,043	268,043							
HVAC	Restroom Exhaust Fan Occupancy Sensor														
Refrigeration	Beverage, Snack and Cooler Machine Controls														
Lighting	LED Exit Signs														
HVAC	Air Conditioner Tune-Up														
Water	Bathroom and Kitchen Faucet Aerators	82,348	82,348												
Lighting	Advanced Lighting Controls	79,378	79,378												
HVAC	Advanced Rooftop Controls	74,955	74,955												
Thermostats	Programmable Thermostat														
Water	High Efficiency Pre-Rinse Spray Valve														
Refrigeration	Q-Sync Motors for Reach-in Coolers/Freezers	50,046	50,046												
Refrigeration	Night Covers														
Envelope	Weather Stripping	43,613	43,613												
HVAC	Packaged RTU Sealing														
HVAC	Variable Speed Drive on HVAC - Supply and Return Fans	34,336	34,336	34,336	34,336	34,336	34,336	34,336							
Lighting	LED Open & Channel Sign	22,865	22,865	22,865	22,865	22,865	22,865	22,865							
HVAC	Economizer Repair and Optimization														
HVAC	End of life Replacement for Air Cooled AC	14,328	14,328	14,328	14,328	14,328	14,328	14,328							
Envelope	Cool Roof	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058		
Water	Showerhead - Low Flow	7,919	7,919												
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5 HP to 20 HP)	6,308	6,308	6,308	6,308	6,308	6,308	6,308							
Envelope	Roof Insulation	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823		
Compressed Air	Efficient Refrigerated CA Dryer	5,521	5,521	5,521	5,521	5,521									
Refrigeration	ENERGY STAR Solid or Glass Door Refrigerator or Freezer	2,843	2,843	2,843	2,843										
Lighting	Induction and MH Fixtures	2,422	2,422	2,422	2,422	2,422	2,422	2,422							
HVAC	Cogged V-Belt														
CY2019 Program Total Electric Contribution to CPAS		131,225,194	131,129,991	122,341,278	116,607,588	115,399,587	105,618,038	105,530,604	13,881	13,881	13,881	13,881	13,881	-	-
Historic Program Total Electric Contribution to CPAS‡		152,494,058	146,605,424	146,605,424	35,121,246	8,661,447	8,661,447	282,274	10,846	10,846	10,846	10,846	-	-	-
Program Total Electric CPAS		283,719,251	277,735,415	268,946,702	151,728,835	124,061,034	114,279,486	105,812,878	24,727	24,727	24,727	24,727	13,881	-	-
CY2019 Program Incremental Expiring Electric Savings§		5,993,514	95,202	8,788,714	5,733,690	1,208,001	9,781,548	87,435	105,516,723	-	-	-	-	13,881	-
Historic Program Incremental Expiring Electric Savings‡§		81,713	5,888,634	-	111,484,178	26,459,799	-	8,379,174	271,428	-	-	-	10,846	-	-
Program Total Incremental Expiring Electric Savings§		6,075,228	5,983,836	8,788,714	117,217,867	27,667,801	9,781,548	8,466,608	105,788,151	-	-	-	10,846	13,881	-

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
Thermostats	Advanced Thermostat	11.0	90,794	0.92	918,832		83,530	83,530	83,530	83,530	83,530	83,530	83,530	83,530
HVAC	Economizer with DCV	10.0	138,693	0.92	1,275,972		127,597	127,597	127,597	127,597	127,597	127,597	127,597	127,597
Thermostats	Thermostat Adjustment	2.0	557	0.92	1,024		512	512						
HVAC	Advanced Rooftop Controls	10.0	2,479	0.92	22,805		2,281	2,281	2,281	2,281	2,281	2,281	2,281	2,281
Thermostats	Programmable Thermostat	8.0	7,856	0.92	57,817		7,227	7,227	7,227	7,227	7,227	7,227	7,227	7,227
Envelope	Weather Stripping	10.0	183,829	0.92	1,691,224		169,122	169,122	169,122	169,122	169,122	169,122	169,122	169,122
HVAC	Packaged RTU Sealing	5.0	2,751	0.92	12,654		2,531	2,531	2,531	2,531	2,531			
CY2019 Program Total Gas Contribution to CPAS (Therms)			426,957		3,980,329		392,800	392,800	392,288	392,288	392,288	389,757	389,757	389,757
CY2019 Program Total Gas Contribution to CPAS (kWh Equivalent)‡			12,514,109		9,703,896		11,512,980	11,512,980	11,497,969	11,497,969	11,497,969	11,423,790	11,423,790	11,423,790
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§						9,794,779	9,794,779	9,794,779	9,794,779	9,625,595	9,625,595	9,625,595	9,625,595	9,625,595
Program Total Gas CPAS (kWh Equivalent)‡						9,794,779	21,307,759	21,307,759	21,292,748	21,123,564	21,123,564	21,049,385	21,049,385	21,049,385
CY2019 Program Incremental Expiring Gas Savings (Therms)‖								-	512	-	-	2,531	-	-
CY2019 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖								-	15,012	-	-	74,179	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖							-	-	-	169,184	-	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖							-	-	15,012	169,184	-	74,179	-	-

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Thermostats	Advanced Thermostat	83,530	83,530	83,530										
HVAC	Economizer with DCV	127,597	127,597											
Thermostats	Thermostat Adjustment													
HVAC	Advanced Rooftop Controls	2,281	2,281											
Thermostats	Programmable Thermostat													
Envelope	Weather Stripping	169,122	169,122											
HVAC	Packaged RTU Sealing													
CY2019 Program Total Gas Contribution to CPAS (Therms)		382,530	382,530	83,530	-	-	-	-	-	-	-	-	-	-
CY2019 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		11,211,964	11,211,964	2,448,271	-	-	-	-	-	-	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		9,625,595	3,525,819	3,525,819	3,525,819	3,525,819	3,525,819	711,505	711,505	711,505	711,505	711,505	-	-
Program Total Gas CPAS (kWh Equivalent)‡		20,837,559	14,737,783	5,974,090	3,525,819	3,525,819	3,525,819	711,505	711,505	711,505	711,505	711,505	-	-
CY2019 Program Incremental Expiring Gas Savings (Therms)‖		7,227	-	299,000	83,530	-	-	-	-	-	-	-	-	-
CY2019 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖		211,827	-	8,763,693	2,448,271	-	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖		-	6,099,776	-	-	-	-	2,814,314	-	-	-	-	711,505	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖		211,827	6,099,776	8,763,693	2,448,271	-	-	2,814,314	-	-	-	-	711,505	-

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	LED Lamps and Fixtures (with adjusted T12 baseline)	14.9	134,217,228	0.92	1,602,233,144		123,479,850	123,479,850	123,479,850	123,426,655	123,393,529	99,401,279	99,401,279	99,398,073
Refrigeration	EC Motor for Cooler or Freezer	15.0	8,151,570	0.92	112,491,666		7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444
Refrigeration	EC Motor with Evaporator Fan Controls for Cooler or Freezer	13.0	7,192,828	0.92	86,026,218		6,617,401	6,617,401	6,617,401	6,617,401	6,617,401	6,617,401	6,617,401	6,617,401
Thermostats	Advanced Thermostat	11.0	8,881,106	0.92	89,876,793		8,170,618	8,170,618	8,170,618	8,170,618	8,170,618	8,170,618	8,170,618	8,170,618
Lighting	Lighting Controls	8.0	5,505,931	0.92	40,523,653		5,065,457	5,065,457	5,065,457	5,065,457	5,065,457	5,065,457	5,065,457	5,065,457
Refrigeration	Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	10.0	5,297,251	0.92	48,734,711		4,873,471	4,873,471	4,873,471	4,873,471	4,873,471	4,873,471	4,873,471	4,873,471
HVAC	Economizer with DCV	10.0	6,037,641	0.92	55,546,298		5,554,630	5,554,630	5,554,630	5,554,630	5,554,630	5,554,630	5,554,630	5,554,630
Compressed Air	Air Compressors with Integrated VSD LTE 40 HP	13.0	1,443,012	0.92	17,258,418		1,327,571	1,327,571	1,327,571	1,327,571	1,327,571	1,327,571	1,327,571	1,327,571
Refrigeration	LED Refrigerated Display Case Lighting	10.0	1,118,430	0.92	10,289,554		1,028,955	1,028,955	1,028,955	1,028,955	1,028,955	1,028,955	1,028,955	1,028,955
Lighting	Decorative & Directional Lamps (adjusted for EISA)	13.2	1,036,665	0.92	5,799,369		953,732	953,732	953,732	953,732	953,732	125,696	125,696	125,696
HVAC	Early Replacement for Air Cooled AC	15.0	907,497	0.92	9,004,883		834,897	834,897	834,897	834,897	834,897	483,040	483,040	483,040
Compressed Air	No-Loss Condensate Drains	10.0	772,573	0.92	7,107,667		710,767	710,767	710,767	710,767	710,767	710,767	710,767	710,767
HVAC	Variable Speed Drive on HVAC - Pumps and Fans	15.0	668,239	0.92	9,221,705		614,780	614,780	614,780	614,780	614,780	614,780	614,780	614,780
Lighting	Omnidirectional Lamps (adjusted for EISA)	13.1	602,930	0.92	3,264,540		554,695	554,695	194,158	194,158	194,158	194,158	194,158	194,158
Compressed Air	Compressed Air Leak Repair	2.0	511,340	0.92	940,866		470,433	470,433	-	-	-	-	-	-
Refrigeration	Strip Curtains for Cooler or Freezer	4.0	450,557	0.92	1,658,052		414,513	414,513	414,513	414,513	-	-	-	-
Refrigeration	Auto Closer for Walk-in Cooler or Freezer	8.0	423,425	0.92	3,116,408		389,551	389,551	389,551	389,551	389,551	389,551	389,551	389,551
Thermostats	Thermostat Adjustment	2.0	390,251	0.92	718,063		359,031	359,031	-	-	-	-	-	-
Compressed Air	High-Efficiency Air Nozzles	15.0	350,349	0.92	4,834,811		322,321	322,321	322,321	322,321	322,321	322,321	322,321	322,321
HVAC	Smart Strip - Tier 1	7.0	348,963	0.92	2,247,320		321,046	321,046	321,046	321,046	321,046	321,046	321,046	-
Lighting	LED Lit Signage (with adjusted T12 baseline)	15.0	291,351	0.92	4,020,648		268,043	268,043	268,043	268,043	268,043	268,043	268,043	268,043
HVAC	Restroom Exhaust Fan Occupancy Sensor	8.0	282,152	0.92	2,076,642		259,580	259,580	259,580	259,580	259,580	259,580	259,580	259,580
Refrigeration	Beverage, Snack and Cooler Machine Controls	5.0	208,876	0.92	960,831		192,166	192,166	192,166	192,166	192,166	-	-	-
Lighting	LED Exit Signs	5.0	161,964	0.92	745,033		149,007	149,007	149,007	149,007	149,007	-	-	-
HVAC	Air Conditioner Tune-Up	3.0	93,697	0.92	258,604		86,201	86,201	86,201	-	-	-	-	-
Water	Bathroom and Kitchen Faucet Aerators	10.0	89,509	0.92	823,483		82,348	82,348	82,348	82,348	82,348	82,348	82,348	82,348
Lighting	Advanced Lighting Controls	10.0	86,281	0.92	793,782		79,378	79,378	79,378	79,378	79,378	79,378	79,378	79,378
HVAC	Advanced Rooftop Controls	10.0	154,128	0.92	1,417,982		141,798	141,798	141,798	141,798	141,798	141,798	141,798	141,798
Thermostats	Programmable Thermostat	8.0	298,215	0.92	2,194,865		274,358	274,358	274,358	274,358	274,358	274,358	274,358	274,358
Water	High Efficiency Pre-Rinse Spray Valve	5.0	56,815	0.92	261,348		52,270	52,270	52,270	52,270	52,270	-	-	-
Refrigeration	Q-Sync Motors for Reach-in Coolers/Freezers	10.0	54,398	0.92	500,462		50,046	50,046	50,046	50,046	50,046	50,046	50,046	50,046
Refrigeration	Night Covers	5.0	49,170	0.92	226,182		45,236	45,236	45,236	45,236	45,236	-	-	-
Envelope	Weather Stripping	10.0	5,435,425	0.92	50,005,909		5,000,591	5,000,591	5,000,591	5,000,591	5,000,591	5,000,591	5,000,591	5,000,591
HVAC	Packaged RTU Sealing	5.0	121,417	0.92	558,517		111,703	111,703	111,703	111,703	111,703	-	-	-
HVAC	Variable Speed Drive on HVAC - Supply and Return Fans	15.0	37,322	0.92	515,043		34,336	34,336	34,336	34,336	34,336	34,336	34,336	34,336
Lighting	LED Open & Channel Sign	15.0	24,853	0.92	342,974		22,865	22,865	22,865	22,865	22,865	22,865	22,865	22,865
HVAC	Economizer Repair and Optimization	5.0	19,345	0.92	88,987		17,797	17,797	17,797	17,797	17,797	-	-	-
HVAC	End of life Replacement for Air Cooled AC	15.0	15,573	0.92	214,914		14,328	14,328	14,328	14,328	14,328	14,328	14,328	14,328
Envelope	Cool Roof	20.0	8,758	0.92	161,156		8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058
Water	Showerhead - Low Flow	10.0	8,608	0.92	79,195		7,919	7,919	7,919	7,919	7,919	7,919	7,919	7,919
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5 HP to 20 HP)	15.0	6,857	0.92	94,627		6,308	6,308	6,308	6,308	6,308	6,308	6,308	6,308
Envelope	Roof Insulation	20.0	6,329	0.92	116,459		5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823
Compressed Air	Efficient Refrigerated CA Dryer	13.0	6,001	0.92	71,770		5,521	5,521	5,521	5,521	5,521	5,521	5,521	5,521
Refrigeration	ENERGY STAR Solid or Glass Door Refrigerator or Freezer	12.0	3,090	0.92	34,114		2,843	2,843	2,843	2,843	2,843	2,843	2,843	2,843
Lighting	Induction and MH Fixtures	15.0	2,633	0.92	36,336		2,422	2,422	2,422	2,422	2,422	2,422	2,422	2,422
HVAC	Cogged V-Belt	3.0	1,183	0.92	3,264		1,088	1,088	1,088	-	-	-	-	-
CY2019 Program Total Contribution to CPAS			191,831,738		2,177,497,263		176,485,199	176,485,199	175,295,197	175,154,712	174,707,074	148,966,751	148,966,751	148,642,499
Historic Program Total Contribution to CPAS‡						206,758,011	174,193,397	173,682,249	173,682,249	173,049,866	172,211,376	172,211,376	171,709,353	162,201,366
Program Total CPAS						206,758,011	350,678,596	350,167,447	348,977,446	348,204,578	346,918,450	321,178,127	320,676,104	310,843,865
CY2019 Program Incremental Expiring Savings§								-	1,190,002	140,485	447,638	25,740,323	-	324,252
Historic Program Incremental Expiring Savings‡§							32,564,613	511,149	-	632,383	838,490	-	502,023	9,507,987
Program Total Incremental Expiring Savings§							32,564,613	511,149	1,190,002	772,868	1,286,128	25,740,323	502,023	9,832,239

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Lighting	LED Lamps and Fixtures (with adjusted T12 baseline)	99,181,678	99,086,475	99,063,973	99,052,630	97,847,472	96,291,715	96,248,835	-	-	-	-	-	-	-
Refrigeration	EC Motor for Cooler or Freezer	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	7,499,444	-	-	-	-	-	-	-
Refrigeration	EC Motor with Evaporator Fan Controls for Cooler or Freezer	6,617,401	6,617,401	6,617,401	6,617,401	6,617,401	-	-	-	-	-	-	-	-	-
Thermostats	Advanced Thermostat	8,170,618	8,170,618	8,170,618	-	-	-	-	-	-	-	-	-	-	-
Lighting	Lighting Controls	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	4,873,471	4,873,471	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Economizer with DCV	5,554,630	5,554,630	-	-	-	-	-	-	-	-	-	-	-	-
Compressed Air	Air Compressors with Integrated VSD LTE 40 HP	1,327,571	1,327,571	1,327,571	1,327,571	1,327,571	-	-	-	-	-	-	-	-	-
Refrigeration	LED Refrigerated Display Case Lighting	1,028,955	1,028,955	-	-	-	-	-	-	-	-	-	-	-	-
Lighting	Decorative & Directional Lamps (adjusted for EISA)	125,696	125,696	125,696	125,696	125,696	25,139	-	-	-	-	-	-	-	-
HVAC	Early Replacement for Air Cooled AC	483,040	483,040	483,040	483,040	483,040	483,040	483,040	-	-	-	-	-	-	-
Compressed Air	No-Loss Condensate Drains	710,767	710,767	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Variable Speed Drive on HVAC - Pumps and Fans	614,780	614,780	614,780	614,780	614,780	614,780	614,780	-	-	-	-	-	-	-
Lighting	Omnidirectional Lamps (adjusted for EISA)	194,158	194,158	194,158	194,158	194,158	19,416	-	-	-	-	-	-	-	-
Compressed Air	Compressed Air Leak Repair	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	Strip Curtains for Cooler or Freezer	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	Auto Closer for Walk-in Cooler or Freezer	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thermostats	Thermostat Adjustment	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Compressed Air	High-Efficiency Air Nozzles	322,321	322,321	322,321	322,321	322,321	322,321	322,321	-	-	-	-	-	-	-
HVAC	Smart Strip - Tier 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lighting	LED Lit Signage (with adjusted T12 baseline)	268,043	268,043	268,043	268,043	268,043	268,043	268,043	-	-	-	-	-	-	-
HVAC	Restroom Exhaust Fan Occupancy Sensor	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	Beverage, Snack and Cooler Machine Controls	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lighting	LED Exit Signs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Air Conditioner Tune-Up	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water	Bathroom and Kitchen Faucet Aerators	82,348	82,348	-	-	-	-	-	-	-	-	-	-	-	-
Lighting	Advanced Lighting Controls	79,378	79,378	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Advanced Rooftop Controls	141,798	141,798	-	-	-	-	-	-	-	-	-	-	-	-
Thermostats	Programmable Thermostat	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water	High Efficiency Pre-Rinse Spray Valve	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	Q-Sync Motors for Reach-in Coolers/Freezers	50,046	50,046	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	Night Covers	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Envelope	Weather Stripping	5,000,591	5,000,591	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Packaged RTU Sealing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Variable Speed Drive on HVAC - Supply and Return Fans	34,336	34,336	34,336	34,336	34,336	34,336	34,336	-	-	-	-	-	-	-
Lighting	LED Open & Channel Sign	22,865	22,865	22,865	22,865	22,865	22,865	22,865	-	-	-	-	-	-	-
HVAC	Economizer Repair and Optimization	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	End of life Replacement for Air Cooled AC	14,328	14,328	14,328	14,328	14,328	14,328	14,328	-	-	-	-	-	-	-
Envelope	Cool Roof	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	8,058	-	-
Water	Showerhead - Low Flow	7,919	7,919	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5 HP to 20 HP)	6,308	6,308	6,308	6,308	6,308	6,308	6,308	-	-	-	-	-	-	-
Envelope	Roof Insulation	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	5,823	-	-
Compressed Air	Efficient Refrigerated CA Dryer	5,521	5,521	5,521	5,521	5,521	-	-	-	-	-	-	-	-	-
Refrigeration	ENERGY STAR Solid or Glass Door Refrigerator or Freezer	2,843	2,843	2,843	2,843	-	-	-	-	-	-	-	-	-	-
Lighting	Induction and MH Fixtures	2,422	2,422	2,422	2,422	2,422	2,422	2,422	-	-	-	-	-	-	-
HVAC	Cogged V-Belt	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CY2019 Program Total Contribution to CPAS		142,437,157	142,341,955	124,789,549	116,607,588	115,399,587	105,618,038	105,530,604	13,881	13,881	13,881	13,881	13,881	-	-
Historic Program Total Contribution to CPAS‡		162,119,653	150,131,243	150,131,243	38,647,066	12,187,266	12,187,266	993,779	722,351	722,351	722,351	722,351	-	-	-
Program Total CPAS		304,556,810	292,473,198	274,920,792	155,254,654	127,586,853	117,805,305	106,524,383	736,232	736,232	736,232	736,232	13,881	-	-
CY2019 Program Incremental Expiring Savings§		6,205,341	95,202	17,552,406	8,181,960	1,208,001	9,781,548	87,435	105,516,723	-	-	-	-	13,881	-
Historic Program Incremental Expiring Savings‡§		81,713	11,988,410	-	111,484,178	26,459,799	-	11,193,488	271,428	-	-	-	722,351	-	-
Program Total Incremental Expiring Savings§		6,287,055	12,083,612	17,552,406	119,666,138	27,667,801	9,781,548	11,280,922	105,788,151	-	-	-	722,351	13,881	-

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.

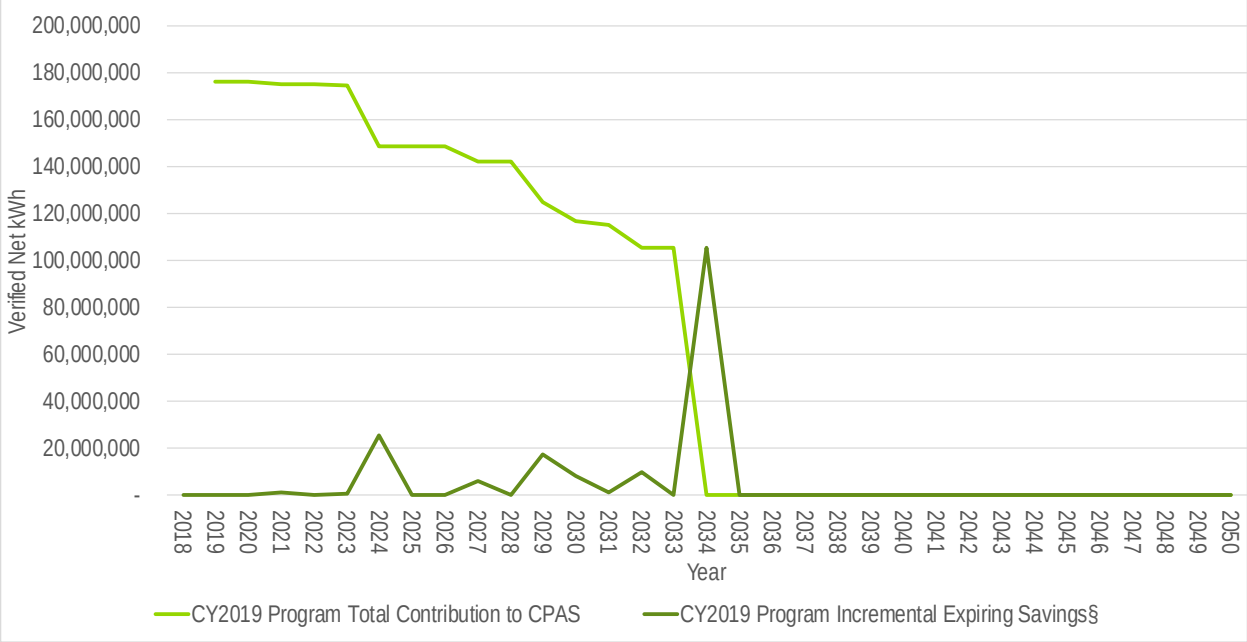
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ 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

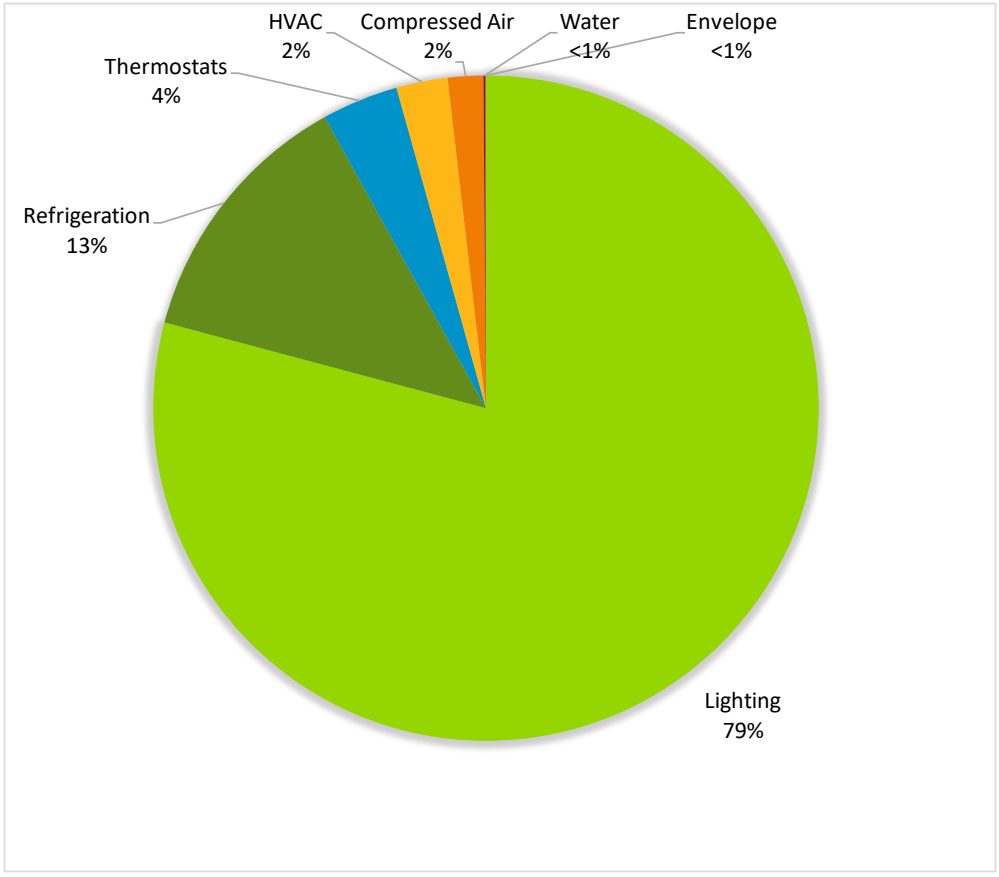


* Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n
Source: Evaluation team analysis

5. Program Savings by Measure

The CY2019 SBP Program included 46 measure groups as shown in the following tables. Lighting contributed 79 percent of net electric savings, refrigeration measures followed with 13 percent, and the remaining 8 percent of the net savings from other non-lighting measures.

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	LED Lamps and Fixtures	134,217,477	1.00	134,217,228	0.92	123,479,850	14.9
Refrigeration	EC Motor for Cooler or Freezer	8,151,570	1.00	8,151,570	0.92	7,499,444	15.0
Refrigeration	EC Motor with Evaporator Fan Controls for Cooler or Freezer	7,192,828	1.00	7,192,828	0.92	6,617,401	13.0
Thermostats	Advanced Thermostat	5,861,842	1.06	6,219,942	0.92	5,722,347	11.0
Lighting	Lighting Controls	5,505,934	1.00	5,505,931	0.92	5,065,457	8.0
Refrigeration	Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	5,297,257	1.00	5,297,251	0.92	4,873,471	10.0
HVAC	Economizer with DCV	1,971,510	1.00	1,972,562	0.92	1,814,757	10.0
Compressed Air	Air Compressors with Integrated VSD LTE 40 HP	1,443,012	1.00	1,443,012	0.92	1,327,571	13.0
Refrigeration	LED Refrigerated Display Case Lighting	1,118,430	1.00	1,118,430	0.92	1,028,955	10.0
Lighting	Decorative & Directional Lamps	1,036,661	1.00	1,036,665	0.92	953,732	13.2
HVAC	Early Replacement for Air Cooled AC	907,498	1.00	907,497	0.92	834,897	15.0
Compressed Air	No-Loss Condensate Drains	772,573	1.00	772,573	0.92	710,767	10.0
HVAC	Variable Speed Drive on HVAC - Pumps and Fans	668,239	1.00	668,239	0.92	614,780	15.0
Lighting	Omnidirectional Lamps	1,074,397	0.56	602,930	0.92	554,695	13.1
Compressed Air	Compressed Air Leak Repair	511,335	1.00	511,340	0.92	470,433	2.0
Refrigeration	Strip Curtains for Cooler or Freezer	450,534	1.00	450,557	0.92	414,513	4.0
Refrigeration	Auto Closer for Walk-in Cooler or Freezer	423,425	1.00	423,425	0.92	389,551	8.0
Thermostats	Thermostat Adjustment	373,668	1.00	373,934	0.92	344,020	2.0
Compressed Air	High-Efficiency Air Nozzles	351,495	1.00	350,349	0.92	322,321	15.0
HVAC	Smart Strip - Tier 1	348,963	1.00	348,963	0.92	321,046	7.0
Lighting	LED Lit Signage	291,351	1.00	291,351	0.92	268,043	15.0
HVAC	Restroom Exhaust Fan Occupancy Sensor	282,152	1.00	282,152	0.92	259,580	8.0
Refrigeration	Beverage, Snack and Cooler Machine Controls	208,876	1.00	208,876	0.92	192,166	5.0
Lighting	LED Exit Signs	161,929	1.00	161,964	0.92	149,007	5.0
HVAC	Air Conditioner Tune-Up	93,697	1.00	93,697	0.92	86,201	3.0
Water	Bathroom and Kitchen Faucet Aerators	66,795	1.34	89,509	0.92	82,348	10.0
Lighting	Advanced Lighting Controls	86,275	1.00	86,281	0.92	79,378	10.0
HVAC	Advanced Rooftop Controls	81,474	1.00	81,473	0.92	74,955	10.0
Thermostats	Programmable Thermostat	36,092	1.88	67,969	0.92	62,531	8.0
Water	High Efficiency Pre-Rinse Spray Valve	45,712	1.24	56,815	0.92	52,270	5.0
Refrigeration	Q-Sync Motors for Reach-in Coolers/Freezers	54,398	1.00	54,398	0.92	50,046	10.0
Refrigeration	Night Covers	49,170	1.00	49,170	0.92	45,236	5.0
Envelope	Weather Stripping	47,406	1.00	47,406	0.92	43,613	10.0
HVAC	Packaged RTU Sealing	40,795	1.00	40,788	0.92	37,525	5.0
HVAC	Variable Speed Drive on HVAC - Supply and Return Fans	37,323	1.00	37,322	0.92	34,336	15.0
Lighting	LED Open & Channel Sign	24,853	1.00	24,853	0.92	22,865	15.0
HVAC	Economizer Repair and Optimization	19,345	1.00	19,345	0.92	17,797	5.0
HVAC	End of life Replacement for Air Cooled AC	15,573	1.00	15,573	0.92	14,328	15.0
Envelope	Cool Roof	8,767	1.00	8,758	0.92	8,058	20.0
Water	Showerhead - Low Flow	6,163	1.40	8,608	0.92	7,919	10.0
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5 HP to 20 HF	6,857	1.00	6,857	0.92	6,308	15.0
Envelope	Roof Insulation	6,333	1.00	6,329	0.92	5,823	20.0
Compressed Air	Efficient Refrigerated CA Dryer	6,001	1.00	6,001	0.92	5,521	13.0
Refrigeration	ENERGY STAR Solid or Glass Door Refrigerator or Freezer	3,090	1.00	3,090	0.92	2,843	12.0
Lighting	Induction and MH Fixtures	2,633	1.00	2,633	0.92	2,422	15.0
HVAC	Cogged V-Belt	1,183	1.00	1,183	0.92	1,088	3.0
	Total	179,362,890	1.00	179,317,629	0.92	164,972,218	14.0

* 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. CY2019 Non-Coincident Demand Savings by Measure

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)
LED Lamps and Fixtures	NR	NA	41,155.7	0.92	37,863.2
Lighting Controls	NR	NA	7,644.4	0.92	7,032.9
Economizer with DCV	NR	NA	2,142.0	0.92	1,970.6
Smart Strip - Tier 1	NR	NA	2,077.2	0.92	1,911.0
Bathroom and Kitchen Faucet Aerators	NR	NA	1,671.6	0.92	1,537.8
Advanced Thermostat	NR	NA	1,207.5	0.92	1,110.9
Early Replacement for Air Cooled AC	NR	NA	953.0	0.92	876.7
EC Motor for Cooler or Freezer	NR	NA	930.5	0.92	856.1
EC Motor with Evaporator Fan Controls for Cooler or Freezer	NR	NA	830.3	0.92	763.9
LED Screw-ins	NR	NA	732.7	0.92	674.1
Variable Speed Drive on HVAC - Pumps and Fans	NR	NA	632.3	0.92	581.7
Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	NR	NA	604.7	0.92	556.3
LED Omnidirectional	NR	NA	474.5	0.92	436.5
Air Compressors with Integrated VSD LTE 40 HP	NR	NA	365.1	0.92	335.9
No-Loss Condensate Drains	NR	NA	195.5	0.92	179.8
LED Refrigerated Display Case Lighting	NR	NA	192.8	0.92	177.3
High Efficiency Pre-Rinse Spray Valve	NR	NA	182.1	0.92	167.5
Compressed Air Leak Repair	NR	NA	136.2	0.92	125.3
High-Efficiency Air Nozzles	NR	NA	88.7	0.92	81.6
Thermostat Adjustment	NR	NA	72.6	0.92	66.8
LED Lit Signage	NR	NA	67.9	0.92	62.4
Advanced Lighting Controls	NR	NA	67.1	0.92	61.7
Restroom Exhaust Fan Occupancy Sensor	NR	NA	63.2	0.92	58.1
Beverage, Snack and Cooler Machine Controls	NR	NA	61.7	0.92	56.8
Auto Closer for Walk-in Cooler or Freezer	NR	NA	59.8	0.92	55.0
Strip Curtains for Cooler or Freezer	NR	NA	51.4	0.92	47.3
Packaged RTU Sealing	NR	NA	40.5	0.92	37.3
LED Exit Signs	NR	NA	34.9	0.92	32.2
Showerhead - Low Flow	NR	NA	27.5	0.92	25.3
End of life Replacement for Air Cooled AC	NR	NA	15.5	0.92	14.3
Programmable Thermostat	NR	NA	13.2	0.92	12.1
LED Open & Channel Sign	NR	NA	3.5	0.92	3.2
Induction and MH Fixtures	NR	NA	1.9	0.92	1.7
Efficient Refrigerated CA Dryer	NR	NA	1.5	0.92	1.4
ENERGY STAR Solid or Glass Door Refrigerator or Freezer	NR	NA	0.4	0.92	0.3
Roof Insulation	NR	NA	0.0	0.92	0.0
Weather Stripping	NR	NA	0.0	0.92	0.0
Variable Speed Drive on HVAC - Supply and Return Fans	NR	NA	0.0	0.92	0.0
Cool Roof	NR	NA	0.0	0.92	0.0
Air Conditioner Tune-Up	NR	NA	0.0	0.92	0.0
Variable Speed Drives for HVAC Supply and Return Fans (5 HP to	NR	NA	0.0	0.92	0.0
Cogged V-Belt	NR	NA	0.0	0.92	0.0
Advanced Rooftop Controls	NR	NA	0.0	0.92	0.0
Economizer Repair and Optimization	NR	NA	0.0	0.92	0.0
Q-Sync Motors for Reach-in Coolers/Freezers	NR	NA	0.0	0.92	0.0
Night Covers	NR	NA	0.0	0.92	0.0
Total	NR	NA	62,799.2	0.92	57,775.3

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	LED Lamps and Fixtures	20,443.1	1.00	20,439.4	0.92	18,804.2
Lighting	Lighting Controls	2,817.6	1.00	2,817.6	0.92	2,592.2
Refrigeration	EC Motor for Cooler or Freezer	931.3	1.00	930.5	0.92	856.1
Refrigeration	EC Motor with Evaporator Fan Controls for Cooler or Freezer	830.3	1.00	830.3	0.92	763.9
HVAC	Early Replacement for Air Cooled AC	455.5	1.00	455.5	0.92	419.1
Compressed Air	Air Compressors with Integrated VSD LTE 40 HP	346.9	1.00	346.9	0.92	319.1
Lighting	Decorative & Directional Lamps	232.3	1.00	232.3	0.92	213.7
Refrigeration	LED Refrigerated Display Case Lighting	192.8	1.00	192.8	0.92	177.3
Compressed Air	No-Loss Condensate Drains	185.7	1.00	185.7	0.92	170.9
Lighting	Omnidirectional Lamps	257.4	0.56	144.4	0.92	132.9
HVAC	Variable Speed Drive on HVAC - Pumps and Fans	134.8	1.00	134.6	0.92	123.8
Compressed Air	Compressed Air Leak Repair	129.4	1.00	129.4	0.92	119.0
Compressed Air	High-Efficiency Air Nozzles	84.5	1.00	84.2	0.92	77.5
Refrigeration	Auto Closer for Walk-in Cooler or Freezer	59.8	1.00	59.8	0.92	55.0
Lighting	Advanced Lighting Controls	51.5	1.00	51.5	0.92	47.4
Refrigeration	Strip Curtains for Cooler or Freezer	51.4	1.00	51.4	0.92	47.3
HVAC	Air Conditioner Tune-Up	45.8	1.00	45.8	0.92	42.1
HVAC	Restroom Exhaust Fan Occupancy Sensor	39.5	1.00	39.5	0.92	36.4
Lighting	LED Exit Signs	21.6	1.00	21.6	0.92	19.8
HVAC	Packaged RTU Sealing	19.4	1.00	19.4	0.92	17.8
Envelope	Cool Roof	13.2	1.00	13.2	0.92	12.1
HVAC	Advanced Rooftop Controls	12.4	1.00	12.4	0.92	11.4
Water	Bathroom and Kitchen Faucet Aerators	9.1	1.00	9.1	0.92	8.4
HVAC	End of life Replacement for Air Cooled AC	7.4	1.00	7.4	0.92	6.8
Refrigeration	Q-Sync Motors for Reach-in Coolers/Freezers	6.3	1.00	6.3	0.92	5.8
HVAC	Variable Speed Drive on HVAC - Supply and Return Fans	2.0	1.00	2.0	0.92	1.8
Compressed Air	Efficient Refrigerated CA Dryer	1.4	1.00	1.4	0.92	1.3
Water	Showerhead - Low Flow	0.8	1.00	0.8	0.92	0.7
Lighting	Induction and MH Fixtures	0.7	1.00	0.7	0.92	0.7
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5 HP to 20 HP)	0.4	1.00	0.4	0.92	0.4
Refrigeration	ENERGY STAR Solid or Glass Door Refrigerator or Freezer	0.3	1.00	0.3	0.92	0.3
Lighting	LED Open & Channel Sign	0.3	1.00	0.3	0.92	0.3
Envelope	Roof Insulation	0.3	1.00	0.3	0.92	0.3
HVAC	Cogged V-Belt	0.2	1.00	0.2	0.92	0.2
Envelope	Weather Stripping	0.0	NA	0.0	0.92	0.0
HVAC	Smart Strip - Tier 1	0.0	NA	0.0	0.92	0.0
HVAC	Economizer with DCV	0.0	NA	0.0	0.92	0.0
HVAC	Economizer Repair and Optimization	0.0	NA	0.0	0.92	0.0
Lighting	LED Lit Signage	0.0	NA	0.0	0.92	0.0
Refrigeration	Beverage, Snack and Cooler Machine Controls	0.0	NA	0.0	0.92	0.0
Refrigeration	Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	0.0	NA	0.0	0.92	0.0
Refrigeration	Night Covers	0.0	NA	0.0	0.92	0.0
Thermostats	Thermostat (Advanced, Programmable, Adjustment)	0.0	NA	0.0	0.92	0.0
Water	High Efficiency Pre-Rinse Spray Valve	0.0	NA	0.0	0.92	0.0
	Total	27,385.3	1.00	27,267.4	0.92	25,086.0

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. 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)
Envelope	Weather Stripping	183,832	1.00	183,829	0.92	169,122	10.0
HVAC	Economizer with DCV	138,694	1.00	138,693	0.92	127,597	10.0
Thermostats	Advanced Thermostat	75,199	1.21	90,794	0.92	83,530	11.0
Thermostats	Programmable Thermostat	3,481	2.26	7,856	0.92	7,227	8.0
HVAC	Packaged RTU Sealing	2,750	1.00	2,751	0.92	2,531	5.0
HVAC	Advanced Rooftop Controls	2,479	1.00	2,479	0.92	2,281	10.0
Thermostats	Thermostat Adjustment	587	0.95	557	0.92	512	2.0
	Total Therms	407,023	1.05	426,957	0.92	392,800	10.1
	Total kWh Converted From Therms†	11,929,830	1.05	12,514,109	0.92	11,512,980	10.1

* 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	LED Lamps and Fixtures	134,217,477	1.02	134,217,228	0.92	123,479,850
Thermostats	Advanced Thermostat	8,065,927	1.12	9,009,330	0.92	8,288,584
Refrigeration	EC Motor for Cooler or Freezer	8,151,570	1.00	8,151,570	0.92	7,499,444
Refrigeration	EC Motor with Evaporator Fan Controls for Cooler or Freezer	7,192,828	1.00	7,192,828	0.92	6,617,401
HVAC	Economizer with DCV	6,036,630	1.00	6,037,641	0.92	5,554,630
Lighting	Lighting Controls	5,505,934	1.00	5,505,931	0.92	5,065,457
Envelope	Weather Stripping	5,435,525	1.00	5,435,425	0.92	5,000,591
Refrigeration	Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	5,297,257	1.00	5,297,251	0.92	4,873,471
Compressed Air	Air Compressors with Integrated VSD LTE 40 HP	1,443,012	1.00	1,443,012	0.92	1,327,571
Refrigeration	LED Refrigerated Display Case Lighting	1,118,430	1.00	1,118,430	0.92	1,028,955
Lighting	Decorative & Directional Lamps	1,036,661	1.00	1,036,665	0.92	953,732
HVAC	Early Replacement for Air Cooled AC	907,498	1.00	907,497	0.92	834,897
Compressed Air	No-Loss Condensate Drains	772,573	1.00	772,573	0.92	710,767
HVAC	Variable Speed Drive on HVAC - Pumps and Fans	668,239	1.00	668,239	0.92	614,780
Lighting	Omnidirectional Lamps	1,074,397	0.56	602,930	0.92	554,695
Compressed Air	Compressed Air Leak Repair	511,335	1.00	511,340	0.92	470,433
Refrigeration	Strip Curtains for Cooler or Freezer	450,534	1.00	450,557	0.92	414,513
Refrigeration	Auto Closer for Walk-in Cooler or Freezer	423,425	1.00	423,425	0.92	389,551
Thermostats	Thermostat Adjustment	390,884	1.00	390,251	0.92	359,031
Compressed Air	High-Efficiency Air Nozzles	351,495	1.00	350,349	0.92	322,321
HVAC	Smart Strip - Tier 1	348,963	1.00	348,963	0.92	321,046
Lighting	LED Lit Signage	291,351	1.00	291,351	0.92	268,043
HVAC	Restroom Exhaust Fan Occupancy Sensor	282,152	1.00	282,152	0.92	259,580
Refrigeration	Beverage, Snack and Cooler Machine Controls	208,876	1.00	208,876	0.92	192,166
Lighting	LED Exit Signs	161,929	1.00	161,964	0.92	149,007
HVAC	Advanced Rooftop Controls	154,129	1.00	154,128	0.92	141,798
HVAC	Packaged RTU Sealing	121,406	1.00	121,417	0.92	111,703
HVAC	Air Conditioner Tune-Up	93,697	1.00	93,697	0.92	86,201
Water	Bathroom and Kitchen Faucet Aerators	66,795	1.34	89,509	0.92	82,348
Lighting	Advanced Lighting Controls	86,275	1.00	86,281	0.92	79,378
Thermostats	Programmable Thermostat	138,114	1.23	169,991	0.92	156,392
Water	High Efficiency Pre-Rinse Spray Valve	45,712	1.24	56,815	0.92	52,270
Refrigeration	Q-Sync Motors for Reach-in Coolers/Freezers	54,398	1.00	54,398	0.92	50,046
Refrigeration	Night Covers	49,170	1.00	49,170	0.92	45,236
HVAC	Variable Speed Drive on HVAC - Supply and Return Fans	37,323	1.00	37,322	0.92	34,336
Lighting	LED Open & Channel Sign	24,853	1.00	24,853	0.92	22,865
HVAC	Economizer Repair and Optimization	19,345	1.00	19,345	0.92	17,797
HVAC	End of life Replacement for Air Cooled AC	15,573	1.00	15,573	0.92	14,328
Envelope	Cool Roof	8,767	1.00	8,758	0.92	8,058
Water	Showerhead - Low Flow	6,163	1.40	8,608	0.92	7,919
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5 HP to 20 HP)	6,857	1.00	6,857	0.92	6,308
Envelope	Roof Insulation	6,333	1.00	6,329	0.92	5,823
Compressed Air	Efficient Refrigerated CA Dryer	6,001	1.00	6,001	0.92	5,521
Refrigeration	ENERGY STAR Solid or Glass Door Refrigerator or Freezer	3,090	1.00	3,090	0.92	2,843
Lighting	Induction and MH Fixtures	2,633	1.00	2,633	0.92	2,422
HVAC	Cogged V-Belt	1,183	1.00	1,183	0.92	1,088
	Total†	191,292,720	1.00	191,831,738	0.92	176,485,199

* 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

The SBP Program includes measures that save water. That reduction in water produces secondary kWh savings from water supply and wastewater treatment. Table 5-6 shows the secondary measure level savings. The savings in this table are included within the electricity savings in the previous tables in this section.

Table 5-6. Secondary Energy Savings from Water Reduction by Measure – Electric

End Use Type	Research Category	Ex Ante Annual Water Savings (gallons)	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate (RR_{water})	Verified Gross Savings (kWh)*	NTG†	Verified Net Savings (kWh)
Water	Bathroom and Kitchen Faucet Aerators	811,362	NR	NA	22,714	0.92	20,897
Water	High Efficiency Pre-Rinse Spray Valve	259,459	NR	NA	11,186	0.92	10,291
Water	Showerhead - Low Flow	48,606	NR	NA	2,435	0.92	2,240
	Total	1,119,428	NR	NA	36,335	0.92	33,428

NA = Not applicable
NR = Not reported
Note: The savings in this table reflects only secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd, not those claimed by gas utilities.
* Water savings converted to kWh by water savings(gallons) / 1,000,000 * E_{water}, where E_{water} equals 5,010 (kWh/million gallons) or 2,937 (kWh/million gallons) for measures installed in Cook County. Illinois TRM v7.0, section 4.3.2, pg. 96
† 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 evaluation team calculated verified gross and net savings (energy and coincident peak demand) resulting from the CY2019 SBP 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.

The lifetime energy and demand savings are estimated by multiplying the verified savings by the effective useful life for each measure.

Table 6-1. Savings Parameters

Gross Savings Input Parameters	Value	Units	Deemed or Evaluated?	Source
Quantity	Varies	Varies	Evaluated	CY2019 program tracking database, sample file review
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 ΔWatts (deemed by TRM)	Varies	Watts	Deemed	TRM v7.0
Lighting Measure ΔWatts (not deemed by TRM), Photocells, Time Clock, Daylighting Controls	Varies	Watts	Evaluated	Program Measure Workbook and Evaluation M&V
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 Workbook and Evaluation M&V
Deemed HVAC, Food Service/Other, and Refrigeration Measures, principally: Electric Air-Cooled Chillers, Air Conditioners, PTAC/PTHP, HVAC s, Air Compressors, EC Motors, Anti-Sweat Heater Controls, Refrigerated Case Lighting, DCV	Varies	kWh	Deemed	TRM v7.0
Non-Deemed Non-Lighting Measures with TRM Adjustment principally: Compressed Air Measures, Weather Stripping, Cool Roof,	Varies	kWh	Evaluated	Program Measure Workbook and Evaluation M&V
Verified Realization Rate on Ex Ante Gross Savings	Varies	NA	Evaluated	CY2019 Evaluation
Verified Realization Rate on Ex Ante Gross Savings	Varies	NA	Evaluated	CY2019 Evaluation
Effective Useful Life (EUL)	Varies	Years	Mixture	TRM v7.0, Evaluated[3]

* 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 T12 Baseline and EISA Midlife Adjustments

ComEd provided supplemental tracking data that enabled the evaluation team to assess potential T12 baseline lighting measures. The evaluation team found that 39 percent of the savings from affected LED fixtures involved T12 baselines (indoor and outdoor LED fixtures and TLED (Type C)), and 75 percent of LED Lit Signage fixtures involved T12 baselines.

The evaluation team developed T12 adjustment factors based on guidance provided in the TRM (v7.0). The TRM approach was modified to account for LED fixture installation instead of high-performance T8 fixtures. The evaluation team estimated the modified adjustment factor to be 50 percent.[4] The evaluation team applied the savings adjustment factors to portions of savings from the affected measures identified above. 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. Details on the T12 adjustments are provided in Table 8-4.

[3] ComEd - Retrofit Add-On EUL Results - Memo 2019_12_05 DRAFT.docx
[4] IL-TRM_Effective_010119_v7.0_Vol_2_C&I 091318_Final (Page 421, C-1: T12 Baseline Adjustment). 39 percent reflects an average of the four lamp quantities and the 34W and 40W T12 lamps with EE magnetic ballasts. [5] SBO 2019 Measure Workbook_Master_10022019_v21.xslx

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

Using the TRM and the Nexant Measure Workbook (Calculator),[5] we developed the EISA midlife adjustment baselines post 2020 and 2023. Combining the T12 and EISA adjustments, we calculated 19 percent lighting CPAS drop at the end of 2023.

6.3 Other Impact Findings and Recommendations

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

6.3.1 Verified Gross Impacts and Realization Rate

Finding 1. Lighting contributed 79 percent of the verified gross electric savings, followed by refrigeration with 13 percent, and the remaining 8 percent spread among the other end-uses. The overall program gross realization rate was 100 percent. Lighting savings contribution dropped from 88 percent in CY2018 which suggests program improvement in diversifying the measure mix and potential contributions from other high impact end-uses.

Recommendation 1. The program should continue to look for opportunities in high impact measures with longer lives. Advanced lighting controls have EUL improved or deemed from 8 to 10 years. There are opportunities to improve on Q-Sync Motors for Reach-in Coolers and Freezers, ECMs and others.

6.3.2 Tracking Data

Finding 2. ComEd and the implementation contractor provided separate supplemental T12 data at the end of the program year to enable us to determine T12 baseline adjustment factors for CPAS. While the provision of this data at the latter part of the evaluation year is still relevant, we suggest that ComEd provide a complete data of all measures that may require CPAS adjustments during the midyear review process.

Recommendation 2. ComEd and the implementation contractor should provide readily access to T12 information or replaced wattage in eTrack or provided during the midyear review.

Finding 3. The tracking data does not provide the actual baseline of screw-in bulbs and specialty LEDs affected by EISA. In CY2019, the evaluation team reviewed documentation from a sample of 30 projects to ascertain information about the replaced wattage of the directional, decorative and omnidirectional screw in lamps. For the most part, there were no spec sheets available or details of the replaced wattages. For those found, we determined that the wattage ranges for the directional and decorative lamps were reasonable compare to the program lamp types and average wattages. For the omnidirectional lamps, we did not find lamp types with wattages as high as 150W, 200W and 300W. We determined that the 200W and 300W should be removed from the average wattage. The evaluation team changed the delta watts for omnidirectional lamps from 80.4W to 45.1W for CY2019 savings, which resulted in a 56 percent gross realization rate.

[5] SBO 2019 Measure Workbook_Master_10022019_v21.xslx

Recommendation 3. We recommend that the program improve on tracking the actual baseline or replaced wattages of measures affected by EISA. One advantage is that per TRM, lamps above 150W do not get adjusted for CPAS (persistence savings is higher). Using averages from all lamps leads to incorrect adjustment of the higher lamp types.

Recommendation 4. For planning purposes the program should consider tracking details of the savings drop that may result from baseline shift from T12s and EISA compliance.

Finding 4. During the midyear review, the implementation contractor clarified the use of the two exterior hours, 'Dusk to Dawn' which is 4303 hours/yr and 'Custom/Dusk to Business close' which is 3622 hours/yr. These hours are supposedly listed as 'Facility Type Code' in eTrack under code 30 – Dusk to Dawn and code 32 - Custom/Dusk to Business close. However, the final CY2019 tracking data did not populate the building type code 32. Evaluation assigned 100 percent gross realization rate for 904 project IDs found to have used 3622 operating hours.

Recommendation 5. Review the eTrack data extraction query for the Small Business program to ensure building type codes are matched appropriately during data extraction.

Finding 5. The tracking data provides the gallons of water saved but does not calculate the secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd. This additional savings are estimated in the Calculator but not included in the ex ante or provided separately to the evaluation team. The additional verified savings increased the gross savings realization rates for the faucet aerators, showerheads and pre-rinse sprayers.

Recommendation 6. The tracking data should produce the eligible secondary ex ante kWh savings from gallons of water reported in the tracking data using the TRM guidelines and algorithm and the conversion of gallons of water to kWh.

Recommendation 7. Also, considering that the evaluation process is now reporting heating penalties, we recommend that the program tracks heating penalties for affected measures.

6.3.3 Measure-Related Findings

Finding 6. The evaluation team found that for the programmable to smart or advanced thermostat measure, the "weekly hours thermostat is in occupied mode" (Ws) values in the Calculator do not match the values in the workpaper.

Finding 7. For the non-programmable to programmable thermostat measure, the workpaper states the setback for heating and cooling (Th and Tc) is 10 degrees, the Calculator uses a value of 5 for both. The workpaper uses a weighted average for climate zone coefficient, CZ (79/21 for zone 2/1 based on CLEAResult data from Air Care Plus), the calculator uses a straight average. The calculator does not use the Ws hours from the workpaper for non-programmable to programmable thermostat. In addition to the issues above, the calculator uses a capacity kBtu value of 115 in the calculator instead of the 137 in the workpaper.

Finding 8. For the thermostat adjustments – intermittent measure, the Calculator uses 151 kBtu and not the value of 137 from the workpaper. Since the TRM (v7.0) thermostat regression model is retired in version 8.0, we do not offer any specific recommendations for program update regarding the findings above. We acknowledge the collaboration Guidehouse, ComEd and the implementation contractor made to update the 2020 workpapers to the new inputs in TRM v 8.0, and the additional thermostat research Guidehouse conducted to support the TRM update of cooling and heating reduction factors.

Finding 9. The ex ante savings for weather stripping are based on a custom weather-dependent data analysis model. The evaluation team reviewed the model and found the inputs to be reasonable. The TRM (v8.0) provides deemed savings inputs for electric resistance and heat pump cooling or heating systems for commercial buildings.

Finding 10. The program also assumes a measure life of 20 years which was based on a previous evaluation research, and based on a residential air-sealing – weatherization measure.[6] This value has since been reviewed and updated through the Illinois Technical Assistant Committee (TAC) approval process to 10 years in the TRM (v8.0)[7] on the basis that commercia buildings weather stripping EUL is lower than residential due to likely significantly higher door usage. Evaluation used 10 years from the TRM (v8.0) as the best available source.

Recommendation 8. We recommend that the program consider using the deemed savings for weather stripping provided in the TRM (v8.0), and the measure life of 10 years.

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: "SBES_CY2019_EOY_Data_Rev2_01272020".
- Measure workbook of default savings: "SBO 2019 Measure Workbook_Master_10022019_v21".
- ComEd SBP Program Workpapers (lighting and HVAC workpapers)
- Illinois Technical Reference Manual (TRM v7.0 and Vv8.0) for deemed input parameters or secondary evaluation research to verify any custom inputs used in the ex ante calculations.
- T12 supplemental data and EISA projects file review

The ex ante kWh savings for directional, decorative, and omnidirectional LEDs were reduced by 50 percent due to the SBP overlap with the Instant Discounts Program. The measures also had relatively similar incentive levels across the two programs. The savings calculator already applied a 50 percent reduction factor to the ex ante kWh savings and peak demand savings for these measures. The evaluation team did not make any further adjustment due to the overlap.

[6] ComEd Effective Useful Life Research 2018-07-02.xlsx
[7] IL-TRM_Effective_010120_v8.0_Vol_2_C_and_I_101719_Final (section 4.8.16, page 643)

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 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.[8]

8. Appendix 2. Impact Analysis Detail

8.1 Program Savings by Channel and Project Type

Table 8-1 presents program net savings by program channel. The traditional (Basic) small business offers contributed 99 percent of the net savings, and the remaining one percent from other project types.

Table 8-1. Program Savings by Channel

Project Type	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net kWh Savings	Verified Net Peak Demand Reduction (kW)
Basic SBES	177,398,096	1.00	177,297,082	27,115	0.92	163,113,316	24,946
HVAC Optimization (Under 100kW)	1,527,604	1.04	1,582,516	93	0.92	1,455,914	86
AC Replacement	437,190	1.00	438,031	59	0.92	402,988	54
Total	179,362,890	1.00	179,317,629	27,267	0.92	164,972,218	25,086

* 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 Navigant team analysis.

In Table 8-2 we show the verified savings by program end-use from CY2019. The verified gross realization rate was 100 percent.

Table 8-2. Program Savings by End-Use

Project Type	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net kWh Savings	Verified Net Peak Demand Reduction (kW)
Envelope	62,506	1.00	62,494	13.5	0.92	57,494	12.4
Compressed Air	3,084,416	1.00	3,083,274	747.6	0.92	2,836,612	687.8
HVAC	4,474,609	1.00	4,475,653	717.1	0.92	4,117,600	659.8
Lighting	142,401,510	1.00	141,929,836	23707.8	0.92	130,575,449	21,811.2
Refrigeration	22,949,578	1.00	22,949,595	2071.4	0.92	21,113,628	1,905.7
Thermostats	6,271,602	1.06	6,661,846	0.0	0.92	6,128,898	0.0
Water	118,670	1.31	154,932	9.9	0.92	142,537	9.1
Total	179,362,890	1.00	179,317,629	27267.4	0.92	164,972,218	25,086.0

* 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 Navigant team analysis.

Table 8-3 shows the program savings disaggregated by direct install versus prescriptive paths. Direct install measures included showerheads, bathroom and kitchen faucet aerators, smart strips, high

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

efficiency nozzles, snack machines and pre-spray valves. The direct install projects contributed less than one percent of the net savings.

Table 8-3. Program Savings by Direct Install and Prescriptive Install

Project Type	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net kWh Savings	Verified Net Peak Demand Reduction (kW)
Direct Install	1,028,004	1.03	1,063,119	94	0.92	978,070	87
Prescriptive	178,334,886	1.00	178,254,509	27,173	0.92	163,994,149	24,999
Total	179,362,890	1.00	179,317,629	27,267	0.92	164,972,218	25,086

* 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 Navigant team analysis.

8.2 Midlife Adjustment T12 Baseline and EISA Compliance

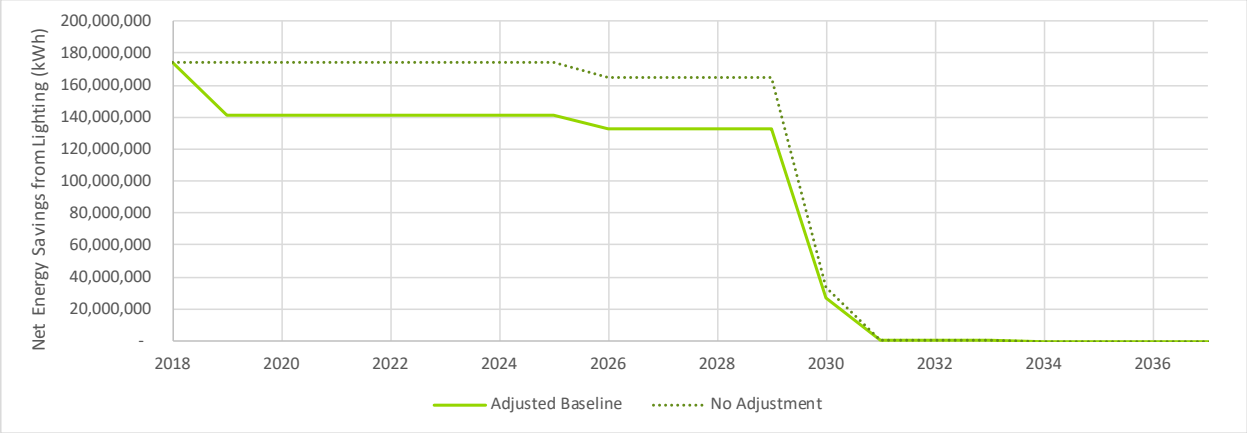
Table 8-4 and Figure 8-1 present the results from the evaluation team's analysis of supplemental tracking data that contained additional details about the baseline and installed equipment. This analysis was used to develop the T12 portion factors that were applied in tandem with the savings adjustment factors discussed in Section 6.2**.** For measures that did not have the additional data available, the evaluation team applied T12 portion factors for similar lighting measures. We estimated a reduction of 24,635,570 net kWh resulting from the T12 baseline adjustment and EISA degradation, which is a 19 percent drop in total lighting CPAS.

Table 8-4. T12 Adjustment Factor Details (kWh Gross -Electric only)

Measure Name	Verified Energy Savings From All Baselines (kWh)	Verified Energy Savings, T12 Baselines (kWh)	Verified Energy Savings From All Baselines (kWh)	T12 Portion of Sample	Verified Energy Savings, T12 Baselines (kWh)	Savings Adjustment Factor	Verified Second Year Energy Savings (kWh)
LED Lamps and Fixtures	137,368,421	53,592,019	134,217,228	39%	53,592,019	50%	108,650,605
LED Lit Signage	292,032	218,037	291,351	75%	218,037	56%	195,923
Total	137,660,454	53,810,056	134,508,580	39%	53,810,056	50%	108,846,528

Source: ComEd tracking data and Navigant team analysis.

Figure 8-1. Comparison of T12 Adjusted Baseline and CPAS Degradation



Source: ComEd tracking data and Navigant team analysis.

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	LED Lamps and Fixtures	Watt Reduced	35,020,444	14.9	Yes	134,217,228	20,439.4	-	-	1,365,892.20	0.92	0.92	0.92	123,479,850	18,804.2	-	-	1,256,620.82
Refrigeration	EC Motor for Cooler or Freezer	Motor	4,788	15.0	No	8,151,570	930.5	-	-	-	0.92	0.92	0.92	7,499,444	856.1	-	-	-
Refrigeration	EC Motor with Evaporator Fan Controls for Cooler or Freezer	Motor	3,258	13.0	No	7,192,828	830.3	-	-	-	0.92	0.92	0.92	6,617,401	763.9	-	-	-
Thermostats	Advanced Thermostat	Each	795	11.0	No	6,219,942	-	90,794	-	-	0.92	0.92	0.92	5,722,347	-	83,530	-	-
Lighting	Lighting Controls	Watt Controlled	1,132,462	8.0	No	5,505,931	2,817.6	-	-	705,461.46	0.92	0.92	0.92	5,065,457	2,592.2	-	-	649,024.55
Refrigeration	Anti-Sweat Heater Controls for Glass Door Cooler or Refrigerator	Linear Foot	12,919	10.0	No	5,297,251	-	-	-	-	0.92	0.92	0.92	4,873,471	-	-	-	-
HVAC	Economizer with DCV	Ton	5,690	10.0	No	1,972,562	-	138,693	-	-	0.92	0.92	0.92	1,814,757	-	127,597	-	-
Compressed Air	Air Compressors with Integrated VSD LTE 40 HP	Horsepower	2,193	13.0	No	1,443,012	346.9	-	-	-	0.92	0.92	0.92	1,327,571	319.1	-	-	-
Refrigeration	LED Refrigerated Display Case Lighting	Lamp	3,277	10.0	No	1,118,430	192.8	-	-	-	0.92	0.92	0.92	1,028,955	177.3	-	-	-
Lighting	Decorative & Directional Lamps	Each	13,521	13.2	Yes	1,036,665	232.3	-	-	21,136.57	0.92	0.92	0.92	953,732	213.7	-	-	19,445.64
HVAC	Early Replacement for Air Cooled AC	Ton	4,183	15.0	Yes	907,497	455.5	-	-	-	0.92	0.92	0.92	834,897	419.1	-	-	-
Compressed Air	No-Loss Condensate Drains	Each	609	10.0	No	772,573	185.7	-	-	-	0.92	0.92	0.92	710,767	170.9	-	-	-
HVAC	Variable Speed Drive on HVAC - Pumps and Fans	Horsepower	868	15.0	No	668,239	134.6	-	-	-	0.92	0.92	0.92	614,780	123.8	-	-	-
Lighting	Omnidirectional Lamps	Each	9,669	13.1	Yes	602,930	144.4	-	-	12,293.13	0.92	0.92	0.92	554,695	132.9	-	-	11,309.68
Compressed Air	Compressed Air Leak Repair	Horsepower	2,685	2.0	No	511,340	129.4	-	-	-	0.92	0.92	0.92	470,433	119.0	-	-	-
Refrigeration	Strip Curtains for Cooler or Freezer	Door	817	4.0	No	450,557	51.4	-	-	-	0.92	0.92	0.92	414,513	47.3	-	-	-
Refrigeration	Auto Closer for Walk-in Cooler or Freezer	Each	355	8.0	No	423,425	59.8	-	-	-	0.92	0.92	0.92	389,551	55.0	-	-	-
Thermostats	Thermostat Adjustment	Each	117	2.0	No	373,934	-	557	-	-	0.92	0.92	0.92	344,020	-	512	-	-
Compressed Air	High-Efficiency Air Nozzles	Each	1,289	15.0	No	350,349	84.2	-	-	-	0.92	0.92	0.92	322,321	77.5	-	-	-
HVAC	Smart Strip - Tier 1	Each	3,214	7.0	No	348,963	-	-	-	-	0.92	0.92	0.92	321,046	-	-	-	-
Lighting	LED Lit Signage	Watt Reduced	67,867	15.0	Yes	291,351	-	-	-	-	0.92	0.92	0.92	268,043	-	-	-	-
HVAC	Restroom Exhaust Fan Occupancy Sensor	Fan	1,690	8.0	No	282,152	39.5			-	0.92	0.92	0.92	259,580	36.4		-	-
Refrigeration	Beverage, Snack and Cooler Machine Controls	Each	145	5.0	No	208,876	-	-	-	-	0.92	0.92	0.92	192,166	-	-	-	-
Lighting	LED Exit Signs	Sign	2,123	5.0	No	161,964	21.6	-	-	2,347.10	0.92	0.92	0.92	149,007	19.8	-	-	2,159.33
HVAC	Air Conditioner Tune-Up	Ton	767	3.0	No	93,697	45.8	-	-	-	0.92	0.92	0.92	86,201	42.1	-	-	-
Water	Bathroom and Kitchen Faucet Aerators	Each	474	10.0	No	66,795	9.1	-	-	-	0.92	0.92	0.92	61,451	8.4	-	-	-
Lighting	Advanced Lighting Controls	Watt Controlled	71,968	10.0	No	86,281	51.5	-	-	10,814.64	0.92	0.92	0.92	79,378	47.4	-	-	9,949.47
HVAC	Advanced Rooftop Controls	Ton	125	10.0	No	81,473	12.4	2,479	-	-	0.92	0.92	0.92	74,955	11.4	2,281	-	-
Thermostats	Programmable Thermostat	Each	319	8.0	No	67,969	-	7,856	-	-	0.92	0.92	0.92	62,531	-	7,227	-	-
Water	High Efficiency Pre-Rinse Spray Valve	Each	9	5.0	No	45,629	-	-	-	-	0.92	0.92	0.92	41,979	-	-	-	-
Refrigeration	Q-Sync Motors for Reach-in Coolers/Freezers	Motor	118	10.0	No	54,398	6.3	-	-	-	0.92	0.92	0.92	50,046	5.8	-	-	-
Refrigeration	Night Covers	Linear Foot	324	5.0	No	49,170	-	-	-	-	0.92	0.92	0.92	45,236	-	-	-	-
Envelope	Weather Stripping	Door	3,429	10.0	No	47,406	-	183,829	-	-	0.92	0.92	0.92	43,613	-	169,122	-	-
HVAC	Packaged RTU Sealing	Ton	730	5.0	No	40,788	19.4	2,751	-	-	0.92	0.92	0.92	37,525	17.8	2,531	-	-
HVAC	Variable Speed Drive on HVAC - Supply and Return Fans	Horsepower	20	15.0	No	37,322	2.0	-	-	-	0.92	0.92	0.92	34,336	1.8	-	-	-
Lighting	LED Open & Channel Sign	Letter	103	15.0	No	24,853	0.3	-	-	27.60	0.92	0.92	0.92	22,865	0.3	-	-	25.39
HVAC	Economizer Repair and Optimization	Ton	849	5.0	No	19,345	-	-	-	-	0.92	0.92	0.92	17,797	-	-	-	-
HVAC	End of life Replacement for Air Cooled AC	Ton	129	15.0	No	15,573	7.4	-	-	-	0.92	0.92	0.92	14,328	6.8	-	-	-
Envelope	Cool Roof	Square Foot	29,320	20.0	No	8,758	13.2	-	-	-	0.92	0.92	0.92	8,058	12.1	-	-	-
Water	Showerhead - Low Flow	Each	18	10.0	No	6,173	0.8	-	-	-	0.92	0.92	0.92	5,679	0.7	-	-	-
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5 HP to 20 HP)	Horsepower	4	15.0	No	6,857	0.4	-	-	-	0.92	0.92	0.92	6,308	0.4	-	-	-
Envelope	Roof Insulation	Square Foot	29,320	20.0	No	6,329	0.3	-	-	-	0.92	0.92	0.92	5,823	0.3	-	-	-
Compressed Air	Efficient Refrigerated CA Dryer	CFM	870	13.0	No	6,001	1.4	-	-	-	0.92	0.92	0.92	5,521	1.3	-	-	-
Refrigeration	ENERGY STAR Solid or Glass Door Refrigerator or Freezer	Each	7	12.0	No	3,090	0.3	-	-	-	0.92	0.92	0.92	2,843	0.3	-	-	-
Lighting	Induction and MH Fixtures	Each	2	15.0	No	2,633	0.7	-	-	44.70	0.92	0.92	0.92	2,422	0.7	-		41.12
HVAC	Cogged V-Belt	Each	4	3.0	No	1,183	0.2	-	-	-	0.92	0.92	0.92	1,088	0.2	-	-	-
	Total			14.0		179,281,294	27,267.4	426,957	-	2,118,017	0.92	0.92	0.92	164,938,790	25,086.0	392,800	-	1,948,576

Note: To avoid double counting, the verified gross kWh and net kWh used in the TRC analysis excludes secondary energy savings from water reduction measures. Table 9-1 represents the kWh savings from Table 5-1 minus those shown in Table 5-6)

* 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) or midlife adjustment measures are flagged as YES, otherwise a NO is indicated in the column.

Source: ComEd tracking data and evaluation team analysis