Guidehouse

ComEd Small Business – Public Impact Evaluation Report

Energy Efficiency / Demand Response Plan:
Program Year 2020 (CY2020)
(1/1/2020-12/31/2020)

Prepared for:

ComEd

FINAL

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1. Introduction

This report presents results from the CY2020 impact evaluation of ComEd's Small Business – Public (SBP) Program. It summarizes the energy and demand impacts for the total program broken out by relevant measure and program structure details. The appendices provide the impact analysis methodology and details of the total resource cost (TRC) analysis inputs. CY2020 covers January 1, 2020 through December 31, 2020.

2. Program Description

The SBP Program is designed to assist qualified ComEd public sector nonresidential customers[1] to achieve electric energy savings by educating them about energy efficiency opportunities through no-cost, onsite energy assessments conducted by vetted and trained energy efficiency service providers (EESPs). Savings are realized by implementing the measures identified during the assessment. 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 SBP Program and recruiting participants. Willdan Group, Inc. was the implementation contractor for the SBP Program throughout ComEd's service territory in CY2020. This program is referred to as the Small Business Energy Savings program in the deemed NTG spreadsheet.

The program had 181 participants in CY2020 and distributed 1,919 measures, as Table 2-1 shows. A total of 30 HVAC measures were installed through seven projects, one compressed air measure or project was installed, and 1,888 lighting measures were installed through 187 projects.

Table 2-1. CY2020 Volumetric Findings Detail

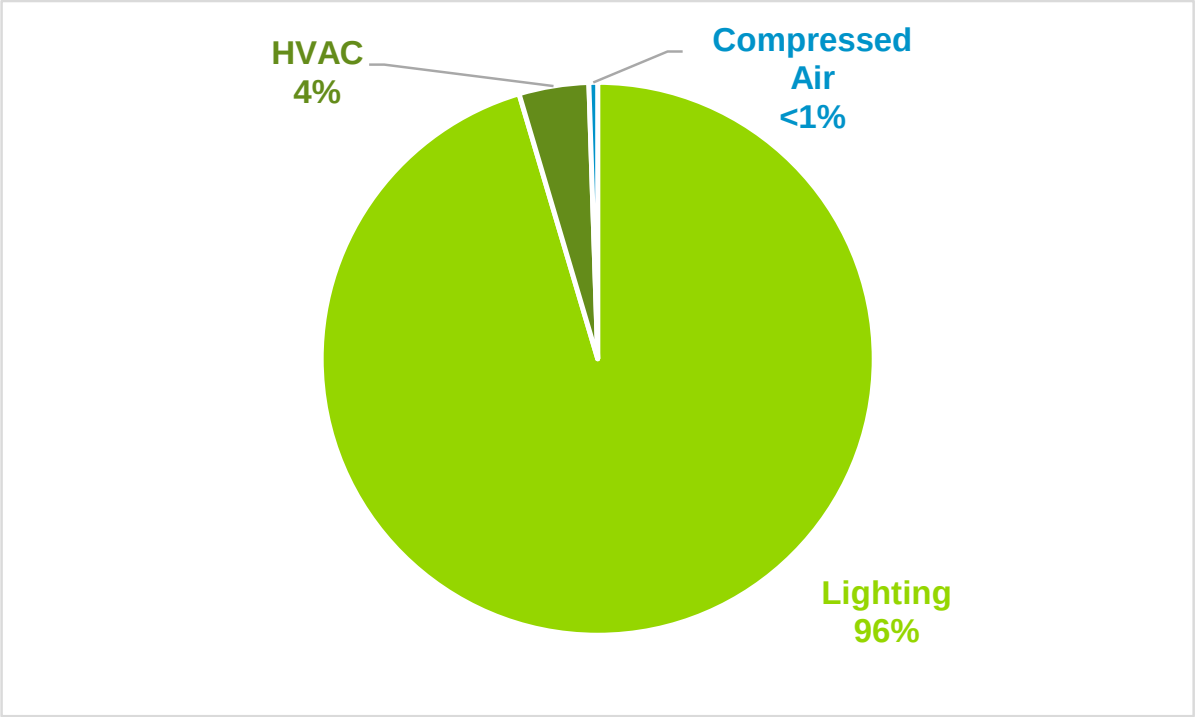
Participation	Total
Participants*	181
Installed Projects	195
Total Measures†	1,919
Lighting Measures	1,888
HVAC Measures	30
Compressed Air Measures	1

Note: *Participant count is by unique project addresses.
† Total measures represent the number of line items in the tracking data.
Source: ComEd tracking data and evaluation team analysis

[1] To qualify, participants must be ComEd public sector nonresidential 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, compressed air system measures, and smart thermostats.

Figure 2-1. Share of Projects Installed by Type



Source: ComEd tracking data and evaluation team analysis

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the SBP Program achieved in CY2020. The program had an overall realization rate of 1.00 and 0.99 for the energy savings and demand savings respectively. 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.

Table 3-1. CY2020 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Summer Peak* Demand Savings (kW)
Electricity		
Ex Ante Gross Savings	11,488,052	985
Program Gross Realization Rate	1.00	0.99
Verified Gross Savings	11,483,619	975
Program Net-to-Gross Ratio (NTG)	0.97	0.97
Verified Net Savings	11,139,110	946
Converted from Gas†		
Ex Ante Gross Savings	74,580	NA
Program Gross Realization Rate	1.14	NA
Verified Gross Savings	85,050	NA
Program Net-to-Gross Ratio (NTG)	0.97	NA
Verified Net Savings	82,499	NA
Total Electric Plus Gas		
Ex Ante Gross Savings	11,562,632	985
Program Gross Realization Rate	1.00	0.99
Verified Gross Savings	11,568,669	975
Program Net-to-Gross Ratio (NTG)	0.97	0.97
Verified Net Savings	11,221,609	946

NA = not applicable (refers to a piece of data that cannot be produced or does not apply)

*The coincident summer peak period is defined as 1:00 p.m.-5:00 p.m. Central Prevailing Time on non-holiday weekdays, June through August.

† Gas savings are converted to kilowatt-hours (kWh) by multiplying therms by 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh). The evaluation determines which gas savings are 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 CY2020. The electric CPAS across all measures installed in 2020 is 11,139,110 kWh (Table 4-1). Figure 4-1 shows the savings across the useful life of the measures. The CY2020 gas contribution to CPAS (converted to equivalent electricity) is 82,499 kWh (Table 4-2). Adding the gas and electric contributions produces 11,221,609 kWh of total CY2020 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 rows are the sum of the CY2020 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 the Illinois Statewide Technical Reference Manual (TRM v8.0) and the Energy Independence and Security Act (EISA 2007) baseline adjustment requirements. The early replacement for air cooled air conditioners (ACs) was another adjustment.

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

End Use Type	Research Category	EUL	CY2020 Verified Gross Savings (kWh)	NTG*	Lifetime Net Savings (kWh)†	Verified Net kWh Savings 2018	2019	2020	2021	2022	2023	2024	2025	2026
Lighting	Exterior Fixtures	11.6	4,769,919	0.97	53,605,256			4,626,821	4,626,821	4,626,821	4,626,821	4,622,148	4,611,423	4,602,370
Lighting	Interior Fixtures	8.8	4,407,877	0.97	37,434,478			4,275,641	4,275,641	4,260,524	4,235,215	4,235,076	4,212,634	2,850,960
Lighting	Interior Fixtures - T12	10.5	773,682	0.97	5,100,671			750,472	690,802	511,124	496,076	464,882	345,960	286,829
Lighting	Lighting Controls	8.0	513,957	0.97	3,988,309			498,539	498,539	498,539	498,539	498,539	498,539	498,539
Lighting	Permanent Fixture Removal	11.4	390,756	0.97	4,303,541			379,034	379,034	379,034	379,034	379,034	379,034	309,346
Lighting	Interior Fixtures - Omnidirectional and Specialty	8.6	192,650	0.97	1,145,863			186,871	186,871	186,871	186,871	84,155	78,981	50,446
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	15.0	113,889	0.97	1,657,084			110,472	110,472	110,472	110,472	110,472	110,472	110,472
Lighting	Exterior Fixtures - Omnidirectional and Specialty	8.9	70,221	0.97	436,556			68,114	68,114	68,114	68,114	31,839	26,983	18,734
HVAC	Early Replacement for Air Cooled AC	15.0	52,904	0.97	565,614			51,317	51,317	51,317	51,317	51,317	30,903	30,903
Lighting	Permanent Fixture Removal - T12	7.4	51,713	0.97	257,304			50,162	45,081	29,779	29,779	29,191	28,200	17,441
Lighting	Exit Signs	5.0	50,928	0.97	247,002			49,400	49,400	49,400	49,400	49,400		
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	15.0	49,837	0.97	725,122			48,341	48,341	48,341	48,341	48,341	48,341	48,341
HVAC	Economizer with DCV (Gas Heating)	5.0	10,995	0.97	53,326			10,665	10,665	10,665	10,665	10,665		
HVAC	Non-Programmable to Smart or Advanced Thermostat	11.0	8,620	0.97	91,974			8,361	8,361	8,361	8,361	8,361	8,361	8,361
HVAC	Packaged RTU Sealing	5.0	8,615	0.97	41,784			8,357	8,357	8,357	8,357	8,357		
Lighting	Exterior Fixtures - T12	11.6	7,263	0.97	64,773			7,046	7,046	7,046	5,237	5,039	5,039	5,039
HVAC	Advanced Rooftop Controls	10.0	4,318	0.97	41,889			4,189	4,189	4,189	4,189	4,189	4,189	4,189
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	8.9	2,354	0.97	15,028			2,283	2,283	2,283	2,283	1,191	1,191	1,086
Compressed Air	No-Loss Condensate Drains	10.0	1,970	0.97	19,106			1,911	1,911	1,911	1,911	1,911	1,911	1,911
HVAC	Programmable to Smart or Advanced Thermostat	11.0	1,150	0.97	12,272			1,116	1,116	1,116	1,116	1,116	1,116	1,116
CY2020 Program Total Electric Contribution to CPAS			11,483,619		109,806,950			11,139,110	11,074,359	10,864,263	10,822,098	10,645,222	10,393,277	8,846,082
Historic Program Total Electric Contribution to 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
Program Total Electric CPAS						8,022,573	18,073,691	29,212,801	29,021,637	28,133,406	27,917,531	26,156,961	24,204,431	22,314,748
CY2020 Program Incremental Expiring Electric Savings§									64,751	210,097	42,164	176,877	251,945	1,547,195
Historic Program Incremental Expiring Electric Savings‡§								-	126,413	678,135	173,710	1,583,693	1,700,586	342,488
Program Total Incremental Expiring Electric Savings§								-	191,164	888,231	215,875	1,760,570	1,952,530	1,889,683

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Exterior Fixtures	4,602,370	4,602,370	4,602,370	4,602,370	2,852,550							
Lighting	Interior Fixtures	1,150,060	1,148,794	1,148,716	1,148,704	1,148,704	1,143,049	1,110,111	1,090,650				
Lighting	Interior Fixtures - T12	209,988	209,988	209,988	209,988	209,243	200,062	153,652	151,621				
Lighting	Lighting Controls	498,539											
Lighting	Permanent Fixture Removal	218,785	218,785	218,785	218,785	215,429	209,957	209,957	209,508				
Lighting	Interior Fixtures - Omnidirectional and Specialty	33,930	23,833	22,599	22,469	22,469	21,929	18,785	18,785				
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	110,472	110,472	110,472	110,472	110,472	110,472	110,472	110,472				
Lighting	Exterior Fixtures - Omnidirectional and Specialty	18,734	18,734	18,734	18,734	11,611							
HVAC	Early Replacement for Air Cooled AC	30,903	30,903	30,903	30,903	30,903	30,903	30,903	30,903				
Lighting	Permanent Fixture Removal - T12	3,459	3,459	3,459	3,459	3,459	3,459	3,459	3,459				
Lighting	Exit Signs												
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	48,341	48,341	48,341	48,341	48,341	48,341	48,341	48,341				
HVAC	Economizer with DCV (Gas Heating)												
HVAC	Non-Programmable to Smart or Advanced Thermostat	8,361	8,361	8,361	8,361								
HVAC	Packaged RTU Sealing												
Lighting	Exterior Fixtures - T12	5,039	5,039	5,039	5,039	3,123							
HVAC	Advanced Rooftop Controls	4,189	4,189	4,189									
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	1,071	1,071	285									
Compressed Air	No-Loss Condensate Drains	1,911	1,911	1,911									
HVAC	Programmable to Smart or Advanced Thermostat	1,116	1,116	1,116	1,116								
CY2020 Program Total Electric Contribution to CPAS		6,947,268	6,437,366	6,435,268	6,428,741	4,656,305	1,768,172	1,685,680	1,663,739	-	-	-	-
Historic Program Total Electric Contribution to CPAS‡		12,813,710	9,377,165	5,522,714	3,777,378	1,552,683	1,273,273	95,009	-	-	-	-	-
Program Total Electric CPAS		19,760,978	15,814,531	11,957,982	10,206,119	6,208,987	3,041,445	1,780,689	1,663,739	-	-	-	-
CY2020 Program Incremental Expiring Electric Savings§		1,898,815	509,902	2,098	6,527	1,772,437	2,888,132	82,493	21,941	1,663,739	-	-	-
Historic Program 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	-	-	-	-
Program Total Incremental Expiring Electric Savings§		2,553,770	3,946,447	3,856,548	1,751,863	3,997,132	3,167,542	1,260,756	116,950	1,663,739	-	-	-

Note: The green highlighted cell shows program total first-year electric savings. The gray cells are blank, indicating no values or no contribution to calculating CPAS in CY2020.

* A deemed value. Source found on the Illinois Stakeholder Advisory Group (SAG) website here: https://www.ilsag.info/ntg_2020.

† Lifetime savings are the sum of CPAS savings through the effective useful life (EUL).

‡ Historic 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	CY2020 Verified Gross Savings (Therms)	NTG*	Lifetime Net Savings (Therms)†	Verified Net Therms Savings 2018	2019	2020	2021	2022	2023	2024	2025	2026
Lighting	Exterior Fixtures	11.6	-	0.97	-			-	-	-	-	-	-	-
Lighting	Interior Fixtures	8.8	-	0.97	-			-	-	-	-	-	-	-
Lighting	Interior Fixtures - T12	10.5	-	0.97	-			-	-	-	-	-	-	-
Lighting	Lighting Controls	8.0	-	0.97	-			-	-	-	-	-	-	-
Lighting	Permanent Fixture Removal	11.4	-	0.97	-			-	-	-	-	-	-	-
Lighting	Interior Fixtures - Omnidirectional and Specialty	8.6	-	0.97	-			-	-	-	-	-	-	-
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	15.0	-	0.97	-			-	-	-	-	-	-	-
Lighting	Exterior Fixtures - Omnidirectional and Specialty	8.9	-	0.97	-			-	-	-	-	-	-	-
HVAC	Early Replacement for Air Cooled AC	15.0	-	0.97	-			-	-	-	-	-	-	-
Lighting	Permanent Fixture Removal - T12	7.4	-	0.97	-			-	-	-	-	-	-	-
Lighting	Exit Signs	5.0	-	0.97	-			-	-	-	-	-		
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	15.0	-	0.97	-			-	-	-	-	-	-	-
HVAC	Economizer with DCV (Gas Heating)	5.0	905	0.97	4,390			878	878	878	878	878		
HVAC	Non-Programmable to Smart or Advanced Thermostat	11.0	449	0.97	4,786			435	435	435	435	435	435	435
HVAC	Packaged RTU Sealing	5.0	901	0.97	4,368			874	874	874	874	874		
Lighting	Exterior Fixtures - T12	11.6	-	0.97	-			-	-	-	-	-	-	-
HVAC	Advanced Rooftop Controls	10.0	571	0.97	5,535			553	553	553	553	553	553	553
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	8.9	-	0.97	-			-	-	-	-	-	-	-
Compressed Air	No-Loss Condensate Drains	10.0	-	0.97	-			-	-	-	-	-	-	-
HVAC	Programmable to Smart or Advanced Thermostat	11.0	77	0.97	820			75	75	75	75	75	75	75
CY2020 Program Total Gas Contribution to CPAS (Therms)			2,902		19,899			2,815	2,815	2,815	2,815	2,815	1,063	1,063
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡						-	-	82,499	82,499	82,499	82,499	82,499	31,160	31,160
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§						-	227,321	227,321	226,544	226,544	226,544	157,780	157,780	157,780
Program Total Gas CPAS (kWh Equivalent)‡						-	227,321	309,820	309,043	309,043	309,043	240,279	188,941	188,941
CY2020 Program Incremental Expiring Gas Savings (Therms)‖									-	-	-	-	1,752	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖									-	-	-	-	51,339	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖								-	777	-	-	68,763	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖								-	777	-	-	68,763	51,339	-

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Exterior Fixtures	-	-	-	-	-							
Lighting	Interior Fixtures	-	-										
Lighting	Interior Fixtures - T12	-	-	-	-								
Lighting	Lighting Controls	-											
Lighting	Permanent Fixture Removal	-	-	-	-	-							
Lighting	Interior Fixtures - Omnidirectional and Specialty	-	-										
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	-	-	-	-	-	-	-	-				
Lighting	Exterior Fixtures - Omnidirectional and Specialty	-	-										
HVAC	Early Replacement for Air Cooled AC	-	-	-	-	-	-	-	-				
Lighting	Permanent Fixture Removal - T12	-											
Lighting	Exit Signs												
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	-	-	-	-	-	-	-	-				
HVAC	Economizer with DCV (Gas Heating)												
HVAC	Non-Programmable to Smart or Advanced Thermostat	435	435	435	435								
HVAC	Packaged RTU Sealing												
Lighting	Exterior Fixtures - T12	-	-	-	-	-							
HVAC	Advanced Rooftop Controls	553	553	553									
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	-	-										
Compressed Air	No-Loss Condensate Drains	-	-	-									
HVAC	Programmable to Smart or Advanced Thermostat	75	75	75	75								
CY2020 Program Total Gas Contribution to CPAS (Therms)		1,063	1,063	1,063	510	-	-	-	-	-	-	-	-
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		31,160	31,160	31,160	14,938	-	-	-	-	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		157,780	157,780	126,865	-	-	-	-	-	-	-	-	-
Program Total Gas CPAS (kWh Equivalent)‡		188,941	188,941	158,025	14,938	-	-	-	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (Therms)||		-	-	-	553	510	-	-	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡||		-	-	-	16,222	14,938	-	-	-	-	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§||		-	-	30,916	126,865	-	-	-	-	-	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡||		-	-	30,916	143,087	14,938	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first-year gas savings in kWh equivalents. The gray cells are blank, indicating no values or no contribution to calculating CPAS in CY2020.

* A deemed value. Source found on the Illinois SAG website here: https://www.ilsag.info/ntg_2020.

† 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	CY2020 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	Exterior Fixtures	11.6	4,769,919	0.97	53,605,256			4,626,821	4,626,821	4,626,821	4,626,821	4,622,148	4,611,423	4,602,370
Lighting	Interior Fixtures	8.8	4,407,877	0.97	37,434,478			4,275,641	4,275,641	4,260,524	4,235,215	4,235,076	4,212,634	2,850,960
Lighting	Interior Fixtures - T12	10.5	773,682	0.97	5,100,671			750,472	690,802	511,124	496,076	464,882	345,960	286,829
Lighting	Lighting Controls	8.0	513,957	0.97	3,988,309			498,539	498,539	498,539	498,539	498,539	498,539	498,539
Lighting	Permanent Fixture Removal	11.4	390,756	0.97	4,303,541			379,034	379,034	379,034	379,034	379,034	379,034	309,346
Lighting	Interior Fixtures - Omnidirectional and Specialty	8.6	192,650	0.97	1,145,863			186,871	186,871	186,871	186,871	84,155	78,981	50,446
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	15.0	113,889	0.97	1,657,084			110,472	110,472	110,472	110,472	110,472	110,472	110,472
Lighting	Exterior Fixtures - Omnidirectional and Specialty	8.9	70,221	0.97	436,556			68,114	68,114	68,114	68,114	31,839	26,983	18,734
HVAC	Early Replacement for Air Cooled AC	15.0	52,904	0.97	565,614			51,317	51,317	51,317	51,317	51,317	30,903	30,903
Lighting	Permanent Fixture Removal - T12	7.4	51,713	0.97	257,304			50,162	45,081	29,779	29,779	29,191	28,200	17,441
Lighting	Exit Signs	5.0	50,928	0.97	247,002			49,400	49,400	49,400	49,400	49,400		
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	15.0	49,837	0.97	725,122			48,341	48,341	48,341	48,341	48,341	48,341	48,341
HVAC	Economizer with DCV (Gas Heating)	5.0	37,527	0.97	182,004			36,401	36,401	36,401	36,401	36,401		
HVAC	Non-Programmable to Smart or Advanced Thermostat	11.0	21,767	0.97	232,255			21,114	21,114	21,114	21,114	21,114	21,114	21,114
HVAC	Packaged RTU Sealing	5.0	35,010	0.97	169,800			33,960	33,960	33,960	33,960	33,960		
Lighting	Exterior Fixtures - T12	11.6	7,263	0.97	64,773			7,046	7,046	7,046	5,237	5,039	5,039	5,039
HVAC	Advanced Rooftop Controls	10.0	21,042	0.97	204,110			20,411	20,411	20,411	20,411	20,411	20,411	20,411
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	8.9	2,354	0.97	15,028			2,283	2,283	2,283	2,283	1,191	1,191	1,086
Compressed Air	No-Loss Condensate Drains	10.0	1,970	0.97	19,106			1,911	1,911	1,911	1,911	1,911	1,911	1,911
HVAC	Programmable to Smart or Advanced Thermostat	11.0	3,403	0.97	36,309			3,301	3,301	3,301	3,301	3,301	3,301	3,301
CY2020 Program Total Contribution to CPAS			11,568,669		110,390,183			11,221,609	11,156,858	10,946,762	10,904,597	10,727,720	10,424,437	8,877,242
Historic Program Total Contribution to 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
Program Total CPAS						8,022,573	18,301,012	29,522,621	29,330,680	28,442,449	28,226,574	26,397,240	24,393,371	22,503,688
CY2020 Program Incremental Expiring Savings§									64,751	210,097	42,164	176,877	303,283	1,547,195
Historic Program Incremental Expiring Savings‡§								-	127,191	678,135	173,710	1,652,457	1,700,586	342,488
Program Total Incremental Expiring Savings§								-	191,941	888,231	215,875	1,829,334	2,003,869	1,889,683

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Lighting	Exterior Fixtures	4,602,370	4,602,370	4,602,370	4,602,370	2,852,550							
Lighting	Interior Fixtures	1,150,060	1,148,794	1,148,716	1,148,704	1,148,704	1,143,049	1,110,111	1,090,650				
Lighting	Interior Fixtures - T12	209,988	209,988	209,988	209,988	209,243	200,062	153,652	151,621				
Lighting	Lighting Controls	498,539											
Lighting	Permanent Fixture Removal	218,785	218,785	218,785	218,785	215,429	209,957	209,957	209,508				
Lighting	Interior Fixtures - Omnidirectional and Specialty	33,930	23,833	22,599	22,469	22,469	21,929	18,785	18,785				
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	110,472	110,472	110,472	110,472	110,472	110,472	110,472	110,472				
Lighting	Exterior Fixtures - Omnidirectional and Specialty	18,734	18,734	18,734	18,734	11,611							
HVAC	Early Replacement for Air Cooled AC	30,903	30,903	30,903	30,903	30,903	30,903	30,903	30,903				
Lighting	Permanent Fixture Removal - T12	3,459	3,459	3,459	3,459	3,459	3,459	3,459	3,459				
Lighting	Exit Signs												
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	48,341	48,341	48,341	48,341	48,341	48,341	48,341	48,341				
HVAC	Economizer with DCV (Gas Heating)												
HVAC	Non-Programmable to Smart or Advanced Thermostat	21,114	21,114	21,114	21,114								
HVAC	Packaged RTU Sealing												
Lighting	Exterior Fixtures - T12	5,039	5,039	5,039	5,039	3,123							
HVAC	Advanced Rooftop Controls	20,411	20,411	20,411									
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	1,071	1,071	285									
Compressed Air	No-Loss Condensate Drains	1,911	1,911	1,911									
HVAC	Programmable to Smart or Advanced Thermostat	3,301	3,301	3,301	3,301								
CY2020 Program Total Contribution to CPAS		6,978,428	6,468,526	6,466,428	6,443,679	4,656,305	1,768,172	1,685,680	1,663,739	-	-	-	-
Historic Program Total Contribution to CPAS‡		12,971,491	9,534,945	5,649,579	3,777,378	1,552,683	1,273,273	95,009	-	-	-	-	-
Program Total CPAS		19,949,919	16,003,471	12,116,007	10,221,057	6,208,987	3,041,445	1,780,689	1,663,739	-	-	-	-
CY2020 Program Incremental Expiring Savings§		1,898,815	509,902	2,098	22,749	1,787,375	2,888,132	82,493	21,941	1,663,739	-	-	-
Historic Program Incremental Expiring Savings‡§		654,955	3,436,545	3,885,366	1,872,201	2,224,695	279,410	1,178,263	95,009	-	-	-	-
Program Total Incremental Expiring Savings§		2,553,770	3,946,447	3,887,464	1,894,950	4,012,070	3,167,542	1,260,756	116,950	1,663,739	-	-	-

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 no contribution to calculating CPAS in CY2020.

* A deemed value. Source found on the Illinois SAG website here: https://www.ilsag.info/ntg_2020.

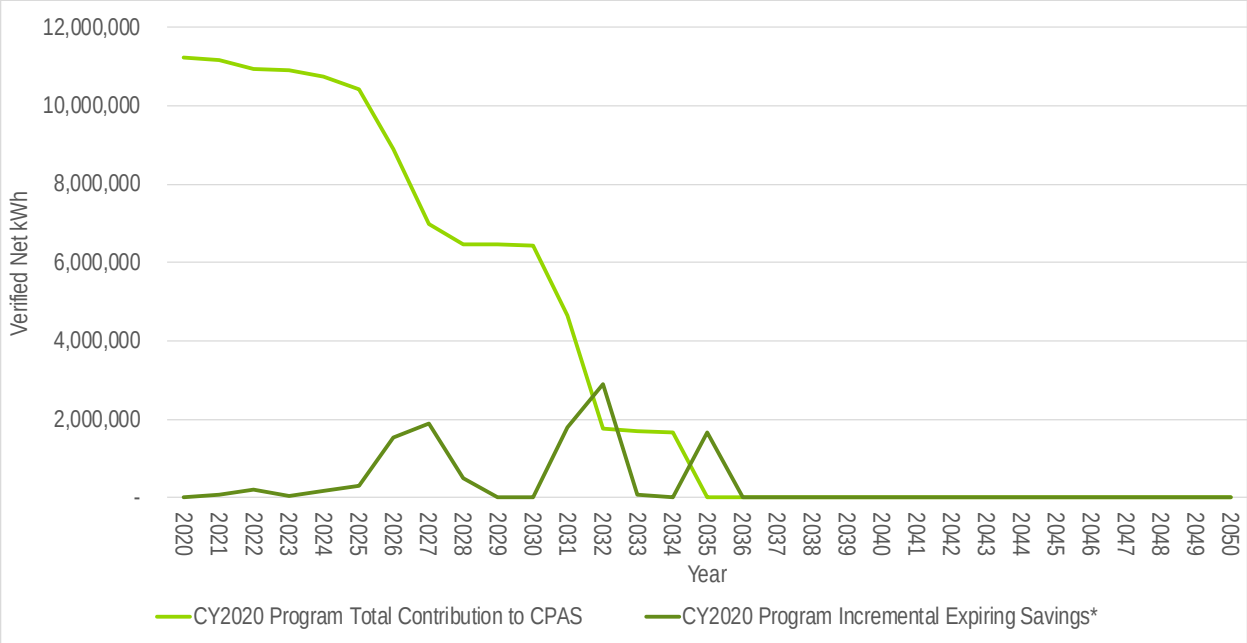
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ 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



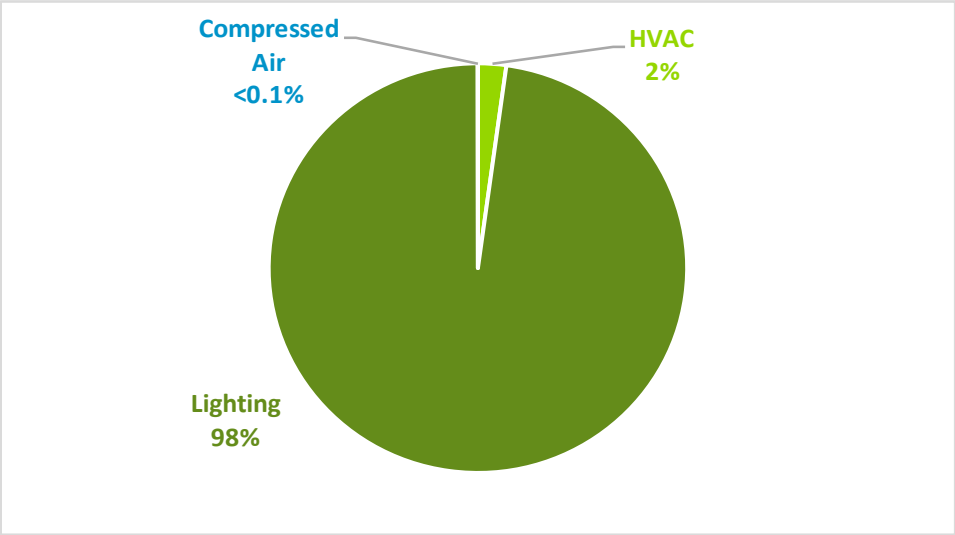
*Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n + Expiring Savings Y_{n-1}.

Source: Evaluation team analysis

5. Program Savings by Measure

The program includes 20 measures, as the following tables show. In CY2020, the exterior and interior LED fixture replacements contributed substantial savings. The lighting end use accounts for the majority of the program's verified energy savings (see Figure 5-1) with 98% of verified net savings. HVAC end use measures account for 2% of verified net savings. 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 1.00.

Figure 5-1. Verified Net Savings by End Use – Electric



Source: Evaluation team analysis

Table 5-1. CY2020 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	Exterior Fixtures	4,769,919	1.00	4,769,919	0.97	4,626,821	11.6
Lighting	Interior Fixtures	4,407,877	1.00	4,407,877	0.97	4,275,641	8.8
Lighting	Interior Fixtures - T12	773,682	1.00	773,682	0.97	750,472	10.5
Lighting	Lighting Controls	517,982	0.99	513,957	0.97	498,539	8.0
Lighting	Permanent Fixture Removal	390,756	1.00	390,756	0.97	379,034	11.4
Lighting	Interior Fixtures - Omnidirectional and Specialty	242,140	0.80	192,650	0.97	186,871	8.6
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	76,996	1.48	113,889	0.97	110,472	15.0
Lighting	Exterior Fixtures - Omnidirectional and Specialty	81,925	0.86	70,221	0.97	68,114	8.9
HVAC	Early Replacement for Air Cooled AC	52,904	1.00	52,904	0.97	51,317	15.0
Lighting	Permanent Fixture Removal - T12	51,713	1.00	51,713	0.97	50,162	7.4
Lighting	Exit Signs	50,928	1.00	50,928	0.97	49,400	5.0
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	22,816	2.18	49,837	0.97	48,341	15.0
HVAC	Economizer with DCV (Gas Heating)	9,014	1.22	10,995	0.97	10,665	5.0
HVAC	Non-Programmable to Smart or Advanced Thermostat	12,825	0.67	8,620	0.97	8,361	11.0
HVAC	Packaged RTU Sealing	8,615	1.00	8,615	0.97	8,357	5.0
Lighting	Exterior Fixtures - T12	7,263	1.00	7,263	0.97	7,046	11.6
HVAC	Advanced Rooftop Controls	4,318	1.00	4,318	0.97	4,189	10.0
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	2,476	0.95	2,354	0.97	2,283	8.9
Compressed Air	No-Loss Condensate Drains	1,970	1.00	1,970	0.97	1,911	10.0
HVAC	Programmable to Smart or Advanced Thermostat	1,933	0.60	1,150	0.97	1,116	11.0
	Total	11,488,052	1.00	11,483,619	0.97	11,139,110	10.2

Note: The savings account for electric heating penalties, where applicable.
*A deemed value. Source found on the Illinois SAG website here: https://www.ilsag.info/ntg_2020.
Source: ComEd tracking data and evaluation team analysis

Table 5-2. CY2020 Summer Peak Demand Savings by Measure

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net Peak Demand Reduction (kW)
Lighting	Exterior Fixtures	0.00	NA	0.00	0.97	0.00
Lighting	Interior Fixtures	583.30	1.00	583.30	0.97	565.80
Lighting	Interior Fixtures - T12	122.32	1.00	122.32	0.97	118.65
Lighting	Lighting Controls	146.06	0.97	141.80	0.97	137.55
Lighting	Permanent Fixture Removal	66.59	1.00	66.59	0.97	64.59
Lighting	Interior Fixtures - Omnidirectional and Specialty	44.87	0.79	35.44	0.97	34.37
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	1.68	2.65	4.45	0.97	4.32
Lighting	Exterior Fixtures - Omnidirectional and Specialty	0.00	NA	0.00	0.97	0.00
HVAC	Early Replacement for Air Cooled AC	3.91	1.00	3.91	0.97	3.79
Lighting	Permanent Fixture Removal - T12	5.45	1.00	5.45	0.97	5.28
Lighting	Exit Signs	6.14	1.00	6.14	0.97	5.96
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	0.50	3.91	1.95	0.97	1.89
HVAC	Economizer with DCV (Gas Heating)	0.00	NA	0.00	0.97	0.00
HVAC	Non-Programmable to Smart or Advanced Thermostat	0.67	1.00	0.67	0.97	0.65
HVAC	Packaged RTU Sealing	1.38	1.00	1.38	0.97	1.34
Lighting	Exterior Fixtures - T12	0.00	NA	0.00	0.97	0.00
HVAC	Advanced Rooftop Controls	0.68	1.00	0.68	0.97	0.66
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	0.60	0.95	0.58	0.97	0.56
Compressed Air	No-Loss Condensate Drains	0.30	1.00	0.30	0.97	0.30
HVAC	Programmable to Smart or Advanced Thermostat	0.19	1.00	0.19	0.97	0.19
	Total	984.66	0.99	975.17	0.97	945.91

*A deemed value. Source found on the Illinois SAG website here: https://www.ilsag.info/ntg_2020.
Source: ComEd tracking data and evaluation team analysis

Table 5-3. CY2020 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	Exterior Fixtures	0	NA	0	0.97	0	11.6
Lighting	Interior Fixtures	0	NA	0	0.97	0	8.8
Lighting	Interior Fixtures - T12	0	NA	0	0.97	0	10.5
Lighting	Lighting Controls	0	NA	0	0.97	0	8.0
Lighting	Permanent Fixture Removal	0	NA	0	0.97	0	11.4
Lighting	Interior Fixtures - Omnidirectional and Specialty	0	NA	0	0.97	0	8.6
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	0	NA	0	0.97	0	15.0
Lighting	Exterior Fixtures - Omnidirectional and Specialty	0	NA	0	0.97	0	8.9
HVAC	Early Replacement for Air Cooled AC	0	NA	0	0.97	0	15.0
Lighting	Permanent Fixture Removal - T12	0	NA	0	0.97	0	7.4
Lighting	Exit Signs	0	NA	0	0.97	0	5.0
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	0	NA	0	0.97	0	15.0
HVAC	Economizer with DCV (Gas Heating)	526	1.72	905	0.97	878	5.0
HVAC	Non-Programmable to Smart or Advanced Thermostat	449	1.00	449	0.97	435	11.0
HVAC	Packaged RTU Sealing	908	0.99	901	0.97	874	5.0
Lighting	Exterior Fixtures - T12	0	NA	0	0.97	0	11.6
HVAC	Advanced Rooftop Controls	571	1.00	571	0.97	553	10.0
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	0	NA	0	0.97	0	8.9
Compressed Air	No-Loss Condensate Drains	0	NA	0	0.97	0	10.0
HVAC	Programmable to Smart or Advanced Thermostat	92	0.83	77	0.97	75	11.0
	Total Therms	2,545	1.14	2,902	0.97	2,815	NA
	Total kWh Converted From Therms†	74,580	1.14	85,050	0.97	82,499	NA

*A deemed value. Source found on the Illinois SAG website here: https://www.ilsag.info/ntg_2020.

† Gas savings converted to kWh by multiplying therms by 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh).

Source: ComEd tracking data and evaluation team analysis

Table 5-4. CY2020 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	Exterior Fixtures	4,769,919	1.00	4,769,919	0.97	4,626,821
Lighting	Interior Fixtures	4,407,877	1.00	4,407,877	0.97	4,275,641
Lighting	Interior Fixtures - T12	773,682	1.00	773,682	0.97	750,472
Lighting	Lighting Controls	517,982	0.99	513,957	0.97	498,539
Lighting	Permanent Fixture Removal	390,756	1.00	390,756	0.97	379,034
Lighting	Interior Fixtures - Omnidirectional and Specialty	242,140	0.80	192,650	0.97	186,871
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	76,996	1.48	113,889	0.97	110,472
Lighting	Exterior Fixtures - Omnidirectional and Specialty	81,925	0.86	70,221	0.97	68,114
HVAC	Early Replacement for Air Cooled AC	52,904	1.00	52,904	0.97	51,317
Lighting	Permanent Fixture Removal - T12	51,713	1.00	51,713	0.97	50,162
Lighting	Exit Signs	50,928	1.00	50,928	0.97	49,400
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	22,816	2.18	49,837	0.97	48,341
HVAC	Economizer with DCV (Gas Heating)	24,419	1.54	37,527	0.97	36,401
HVAC	Non-Programmable to Smart or Advanced Thermostat	25,972	0.84	21,767	0.97	21,114
HVAC	Packaged RTU Sealing	35,216	0.99	35,010	0.97	33,960
Lighting	Exterior Fixtures - T12	7,263	1.00	7,263	0.97	7,046
HVAC	Advanced Rooftop Controls	21,042	1.00	21,042	0.97	20,411
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	2,476	0.95	2,354	0.97	2,283
Compressed Air	No-Loss Condensate Drains	1,970	1.00	1,970	0.97	1,911
HVAC	Programmable to Smart or Advanced Thermostat	4,636	0.73	3,403	0.97	3,301
	Total†	11,562,632	1.00	11,568,669	0.97	11,221,609

*A deemed value. Source found on the Illinois SAG website here: https://www.ilsag.info/ntg_2020.

† 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 CY2020 SBP Program using algorithms as defined by the TRM v8.0 or the ComEd CY2020 workpapers. Table 6-1 presents the key parameters and the references used in the verified gross and net savings calculations; the table indicates which were examined through CY2020 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	CY2020 Program Tracking Database
Net-to-Gross (NTG)	0.97	NA	Deemed	Illinois SAG Consensus
Deemed Lighting Measure Savings Parameters: Hours of Use (HOU), Coincidence Factor, Interactive Effects	Varies	NA	Deemed	TRM v8.0, TRM v8.0 Errata Memo
Lighting Measure Watts (Deemed by TRM), kW Controlled, In-service rate (ISR)	Varies	Watts	Deemed	CY2020 Program Tracking Database, TRM v8.0, Program Measure Workpapers
T12 Baseline Adjustment, EISA Midlife Adjustment (LED Omnidirectional, Decorative, and Directional Lamps)	Varies	kWh	Evaluated	TRM v8.0 Errata Memo
Deemed HVAC, Thermostats, Advanced Rooftop Controls, Early Replacement for Air Cooled AC, Packaged Roof Top Unit (RTU) Sealing, No Loss Condensate Drains, Variable Speed Drives (VSDs) on HVAC Fans	Varies	kWh	Evaluated	TRM v8.0, TRM v8.0 Errata Memo, Program Measure Workpapers, and Evaluation, Measurement, and Verification
Verified Realization Rate on Ex Ante Gross Savings	Varies	NA	Evaluated	CY2020 Evaluation
EUL	Varies	Years	Mixture	TRM v8.0

*TRM is the Illinois Statewide Technical Reference Manual version 8.0 from http://www.ilsag.info/technical-reference-manual.html. The NTG values can be found on the Illinois SAG website here: https://www.ilsag.info/ntg_2020.

6.2 Other Impact Findings and Recommendations

The evaluation team developed several recommendations based on findings from the CY2020 evaluation. These findings suggest ways to improve the measure-level realization rates. The end use-level realization rates and program savings percentages are presented in Table 6-2 to give context to our recommendations. Guidehouse acknowledges that Nexant Inc., which became the implementation contractor for the combined private and public Small Business

Program starting January 1, 2021, has taken steps to address the below recommendations in the combined program tracking data for CY2021.

Table 6-2. End Use-Level Savings and Realization Rates

End Use	Realization Rate	Percent of Verified Net Savings
Lighting	99%	97%
HVAC	127%	3%
Compressed Air	100%	0%

Source: Evaluation team analysis of CY2020 ComEd tracking data

6.2.1 Interior Fixtures, Exterior Fixtures, and Permanent Fixture Removal – Omnidirectional and Specialty

Finding 1. The evaluation team adjusted the ex ante baseline wattages for screw-based omnidirectional LED bulbs (A-lamps) which had incandescent baselines to meet the EISA requirements for higher efficacy (both first-year and lifetime). Table 6-3 shows the baseline wattages used in the ex ante and the verified savings calculations for these lamp types. These measures represent 2.3% of program savings and had a verified gross realization rate of 0.81.

Recommendation 1. Guidehouse recommends that ComEd track and adjust the baseline wattages for general purpose light bulbs that require EISA adjustment as per the TRM requirement.

Table 6-3. Comparing Ex Ante and Verified Lighting Baseline Wattage

Baseline Lamp	Ex Ante Baseline Wattage	Verified Baseline Wattage
A-LMP: INCANDESCENT, (1) 100W LAMP	100 W	72 W
A-LMP: INCANDESCENT, (1) 40W LAMP	40 W	29 W
A-LMP: INCANDESCENT, (1) 60W LAMP	60 W	43 W
A-LMP: INCANDESCENT, (1) 75W LAMP	75 W	53 W
FT: INCANDESCENT, (1) 60W Lamp	60 W	43 W

Source: Evaluation team analysis of CY2020 ComEd tracking data

6.2.2 Lighting Controls

Finding 2. The implementation contractor calculated the ex ante savings for this measure for project IDs 3537759008-A and 447651023-A using incorrect kilowatt (kW) controlled values. The evaluation team calculated verified savings for these projects using kW controlled values corresponding to the lighting control type as per the TRM v8.0. Table 6-4 shows the kW Controlled value used in the ex ante and the verified savings calculations. Lighting controls represent 4.4% of program savings and had a verified gross realization rate of 0.99.

Recommendation 2. Guidehouse recommends that ComEd update the kW controlled values for such projects to be consistent with the lighting control type as per the TRM requirement.

Table 6-4. Comparing Ex Ante and Verified Lighting kW Controlled

Project ID	Lighting Control Type	Ex Ante kW Controlled	Verified kW Controlled
3537759008-A	Integrated Occupancy for LED Interior Fixtures < 10,000 Lumens	0.078	0.031
3537759008-A	Integrated Occupancy for LED Interior Fixtures < 10,000 Lumens	0.084	0.031
3537759008-A	Integrated Occupancy for LED Interior Fixtures < 10,000 Lumens	0.051	0.031
447651023-A	Daylight Sensor - Fixture-Mounted	0.11	0.095

Source: Evaluation team analysis of CY2020 ComEd tracking data

6.2.3 Packaged RTU Sealing

Finding 3. The evaluation team found that Project ID 1619143002-A was installed in a ZIP code (60061) which has different cooling and heating climate zones, according to the TRM v8.0.[3] The implementation team calculated ex ante therm savings for this measure using percent savings and heating effective full load hours (EFLH heating) corresponding to heating climate zone 1. The evaluation team calculated the verified savings using percent savings and EFLH heating corresponding to heating climate zone 2 based on the ZIP code. Table 6-5 shows the verified climate zones used. The difference did not affect the cooling savings but reduced the heating savings slightly. Packaged RTU Sealing represent 0.3% of program savings and had a verified gross realization rate of 0.99.

Recommendation 3. Guidehouse recommends that ComEd determine cooling and heating climate zones for a project independently based on ZIP code.

Table 6-5. Packaged RTU Ex Ante vs. Verified Climate Zone – Project ID 1619143002-A

Zip Code	Ex Ante Cooling Climate Zone	Ex Ante Heating Climate Zone	Verified Cooling Climate Zone	Verified Heating Climate Zone
60061	1	1	1	2

Source: Evaluation team analysis of CY2020 ComEd tracking data

6.2.4 Variable Speed Drives for HVAC Supply and Return Fans (<5 HP and 5 HP-20 HP)

Finding 4. The ex ante motor horsepower (HP) and efficiency specifications were not consistent with expected values from the program workpapers and project files. The evaluation team reviewed additional documentation for VSD measures and made adjustments to the savings

[3] https://ilsag.s3.amazonaws.com/IL-TRM_Effective_01-01-20_v8.0_Vol_1_Overview_10-17-19_Final.pdf

calculations based on verified motor HP and efficiency specifications. The team calculated verified energy and demand realization rates of 218% and 391%, respectively, for the VSD (<5 HP) measure and 148% and 265%, respectively, for the VSD (5 HP-20 HP) measure. Table 6-6 and Table 6-7 provide the comparison of the ex ante and verified input parameter assumptions used to calculate the kWh and kW savings for this measure. These measures represent 1.4% of program savings and had a verified gross realization rate of 1.64.

Recommendation 4. Guidehouse recommends that ComEd update the HP, Motor Eff, Efficient Controls Factor, and Efficient Controls Factor Peak as per Table 6-7 to be consistent with the TRM, workpaper, and project files.

Table 6-6. VSD Ex Ante Input Parameter Assumptions

Project ID	HP	LF	Motor Eff	RHRS	Baseline Controls Factor	Efficient Controls Factor	IE Energy	Baseline Controls Factor Peak	Efficient Controls Factor Peak
1619143002-A	0.77	0.65	0.9	8760	1	0.53	0.157	1	0.91
1619143002-A	1.94	0.65	0.9	8760	1	0.53	0.157	1	0.91
1619143002-A	2.52	0.65	0.9	8760	1	0.53	0.157	1	0.91
1619143002-A	2.52	0.65	0.9	8760	1	0.53	0.157	1	0.91
558498007-E	1.14	0.65	0.9	8760	1	0.53	0.157	1	0.91
198273004-B	10	0.65	0.9	8760	1	0.53	0.157	1	0.91
198273004-B	20	0.65	0.9	8760	1	0.53	0.157	1	0.91

LF – Load Factor
RHRS – Annual operating hours for fan motor
IE Energy– HVAC interactive effects factor for energy

Source: Evaluation team analysis of CY2020 ComEd tracking data and project files

Table 6-7. VSD Verified Input Parameter Assumptions

Project ID	HP	LF	Motor Eff	RHRS	Baseline Controls Factor	Efficient Controls Factor	IE Energy	Baseline Controls Factor Peak	Efficient Controls Factor Peak
1619143002-A	2.75	0.65	0.895	8760	1	0.285	0.157	1	0.755
1619143002-A	2.75	0.65	0.895	8760	1	0.285	0.157	1	0.755
1619143002-A	3	0.65	0.895	8760	1	0.285	0.157	1	0.755
1619143002-A	3	0.65	0.895	8760	1	0.285	0.157	1	0.755
558498007-E	1.14	0.65	0.855	8760	1	0.285	0.157	1	0.755
198273004-B	10	0.65	0.917	8760	1	0.285	0.157	1	0.755
198273004-B	20	0.65	0.93	8760	1	0.285	0.157	1	0.755

Source: Evaluation team analysis of CY2020 ComEd tracking data and project files

Finding 5. The ex ante calculations were based on an Efficient Controls Type of Outlet Damper, FC Fans and a Baseline Controls Type of No Control or Bypass Damper. The verified savings were based on an assumption of a Baseline Controls Type of No Control or Bypass Damper. However, because the actual Efficient Control Type was not provided in the tracking data, the evaluation team calculated Efficient Control Type input values as the average of the VFD with

duct static pressure controls and VFD with low/no duct static pressure measure types based on the measure workpaper.

Recommendation 5. Guidehouse recommends that ComEd use an average of the VFD with duct static pressure controls and VFD with low/no duct static pressure measure types for the Efficient Control Type based on the measure workpaper. The team recommends this because the tracking data does not provide sufficient information to support the use of the Outlet Damper, FC Fans Efficient Control Type in the ex ante calculations.

Finding 6. In the project documentation review, the evaluation team found that the tracking data for VSD HP did not correspond with the nominal HP of the motor. The team calculated verified savings for the Project ID 1619143002-A using nominal HP values as available in the specification sheets. For the Project ID 558498007-E where a nominal HP value was not available in the project documentation, the team calculated verified savings using the Motor BHP as a proxy for nominal HP.

Recommendation 6. Guidehouse recommends that ComEd review the motor HP values in the tracking data to ensure they represent the nominal HP of the motor.

6.2.5 Economizer with Demand Controlled Ventilation (DCV)

Finding 7. The total ex ante kWh and total ex ante therms savings for this measure for project IDs 264428006-B and 558498007-D were calculated using an incorrect algorithm. The ex ante savings algorithm multiplied only the Economizer portion of the per-unit kWh/ton by the total tonnage capacity of the unit while the Demand Controlled Ventilation (DCV) component accounted for only the per-unit savings. The evaluation team calculated the total verified kWh and total verified therms by multiplying the combined total per-unit savings from the Economizer and DCV by the capacity of the unit. Details of the verified savings analysis are shown in Appendix B.2. Economizer with DCV represents 0.3% of program savings and had a verified gross realization rate of 1.54.

Recommendation 7. Guidehouse recommends that ComEd update the total kWh and total therms savings algorithm for the DCV component to account for the capacity of the unit.

Finding 8. The total ex ante kWh and total ex ante therms savings for this measure for project IDs 933369003-B were calculated using the correct savings algorithm. However, while the Economizer portion of the kWh/ton was multiplied by the actual tonnage capacity of the unit from the tracking data, the DCV portion of the per-unit kWh/ton and therm/ton was multiplied by a deemed tonnage capacity of 7.5 tons. The evaluation team calculated the total verified kWh and total verified therms by multiplying the combined total per-unit savings from the Economizer and DCV by the actual tonnage capacity of the unit from the tracking data. Table 6-8 provides comparison of the capacity values used for the Economizer and DCV savings calculations. Details of the verified savings analysis are shown in Appendix B.2.

Recommendation 8. Guidehouse recommends that ComEd use the actual tonnage capacity of the unit from the tracking data for the DCV savings component.

Table 6-8. Economizer DCV Ex Ante vs. Verified Cooling Capacity Comparison

Project ID	Tracking Data Cooling Capacity (Tons)	Ex Ante Cooling Capacity (Tons) - Economizer	Ex Ante Cooling Capacity (Tons) - DCV	Verified Cooling Capacity (Tons) – Economizer and DCV
933369003-B	10	10	7.5	10
933369003-B	5	5	7.5	5

Source: Evaluation team analysis of CY2020 ComEd tracking

6.2.6 Non-Programmable to Smart or Advanced Thermostat

Finding 9. The ex ante kWh savings for this measure for project ID 933369003-B with a natural gas heating system type consisted of cooling kWh, electric heating kWh, and gas heating kWh savings. The verified kWh savings for this measure consisted of only the cooling kWh and gas heating kWh savings—not the electric heating kWh—because it was a natural gas heating system as per the TRM v8.0. Table 6-9 outlines the portion of the verified kWh savings the program can claim for this project.

Recommendation 9. Guidehouse recommends that ComEd consider only the cooling kWh and gas heating kWh savings for this measure for natural gas heating system type projects as per the TRM v8.0. This measure represents 0.2% of program savings and had a verified gross realization rate of 0.84.

Table 6-9. Advanced Thermostat Ex Ante vs. Verified kWh Savings Comparison

Savings Component	Project 933369003-B	Project 933369003-B
Cooling kWh Savings	2,000	902
Gas Heating kWh Savings	275	137
Ex Ante Electric Heating kWh Savings	2,803	1,401
Verified Electric Heating kWh Savings	0	0
Total Ex Ante kWh Savings	5,079	2,442
Total Verified kWh Savings	2,276	1,040
Gross kWh Realization Rate	45%	43%

Source: Evaluation team analysis of CY2020 ComEd tracking

6.2.7 Programmable to Smart or Advanced Thermostat

Finding 10. The evaluation team was unable to recreate the therms savings for this measure for Project ID 264428006-B with the input assumptions provided in the tracking data, workpaper, and the TRM. Table 6-10 provides the input assumptions used to calculate the verified therm savings for this measure. This measure represents 0.0% of program savings and had a verified gross realization rate of 0.73.

Recommendation 10. Guidehouse recommends that ComEd rely on the workpaper and the TRM to calculate measure savings.

Table 6-10. Project 264428006-B Input Parameter Assumptions – Therm Savings

Input Parameter	Verified Value	Source
EFLH Heat	1,220 Hours	TRM v8.0 (Hospital CAV no econ building type for Climate Zone 2)
Capacity	60 kBtu/hr	Tracking Data
AFUE	80%	Tracking Data
Heating Reduction	4.20%	Workpaper

AFUE – Annual Fuel Utilization Efficiency Rating
CAV – Constant Air Volume

Source: Evaluation team analysis of CY2020 ComEd tracking

Finding 11. The ex ante kWh savings for this measure for project ID 264428006-B with a natural gas heating system type consisted of cooling kWh, electric heating kWh, and gas heating kWh savings. The verified kWh savings for this measure only consist of the cooling kWh and gas heating kWh savings because it was a natural gas heating system as per the TRM v8.0.

Recommendation 11. Guidehouse recommends that ComEd consider only the cooling kWh and gas heating kWh savings for this measure natural gas heating system type projects as per the TRM v8.0.

Appendix A. Impact Analysis Methodology

A.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 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 the team'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 CY2020 impact evaluation from the ComEd Evaluation ShareFile site. The team relied on the following documents to verify the per-unit savings for each program measure:

- Final CY2020 tracking database file: "SBSB_CY2020_EOY_Data_Rev1_01072021"
- ComEd Small Business Offering Workpaper[4]
- ComEd SBP Program Workpapers (lighting, compressed air, HVAC, and VSDs workpapers)[5]
- TRM v8.0 and TRM v8.0 Errata Memo 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

A.2 Verified Net Program Savings Analysis Approach

The team calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a NTG ratio. In CY2020, the NTG ratio estimate used to calculate the net verified savings was 0.97 based on past evaluation research and defined by a consensus process through the Illinois SAG. This document is found on the SAG website.[6]

[4] 2020 SBO Workpaper Final_072420.pdf
[5] 2020 HVAC Workpaper-Willdan-Public Small Facilities Set 2 Rev.3 2020-01-29
[6] The Illinois SAG website is found here: https://www.ilsag.info/ntg_2020/.

Appendix B. Impact Analysis Detail

B.1 T12 Baseline and EISA Midlife Adjustments

The tracking data provided sufficient information for the evaluation team to determine the measures affected by T12 adjustment and EISA midlife adjustment. The team found that 8% of the savings from affected LED fixtures involved T12 baselines (Interior Fixtures – T12, Exterior Fixtures – T12, and Permanent Fixture Removal – T12), and 5% of LED lamps (Interior Fixtures – Omnidirectional and Specialty, Exterior Fixtures – Omnidirectional and Specialty, and Permanent Fixture Removal – Omnidirectional and Specialty) involved EISA midlife adjustment.

In CY2020, the remaining useful life (RUL) for the T12 midlife adjustment was calculated as one-third of the 40,000-hour ballast life divided by the average HOU per year as per the TRM v8.0 Errata Memo. To account for EISA backstop adjustment for omnidirectional, decorative, and directional lamps in CY2020, the TRM v8.0 (CY2020) specifies these lamps will have a baseline adjustment starting January 1, 2024.

Using the TRM, Guidehouse developed the T12 midlife adjustment baselines and used the EISA midlife adjustment factors for the omnidirectional, decorative, and directional lamps post 2024.

B.2 Economizer with DCV Total Savings Algorithm

Project ID – 558498007-D: As mentioned in Finding 7, the total ex ante kWh and therms savings for the Economizer with DCV measure were incorrectly calculated. The ex ante and verified algorithms are shown below.

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

$$Ex\ Ante\ DCV\ Per\ Unit\ Savings = 381 \frac{kWh}{1{,}000\ Square\ Feet} = 0.381 \frac{kWh}{Square\ Feet}$$

$$Ex\ Ante\ Total\ kWh\ Savings = \left(202.281 \frac{kWh}{Ton} * 6\ Ton\right) + \left(0.381 \frac{kWh}{Square\ Feet} * 400 \frac{Square\ Feet}{Ton}\right)$$

$$= 1{,}213.69\ kWh + 152.4 \frac{kWh}{Ton} = 1{,}366.09$$

$$Ex\ Post\ DCV\ Per\ Unit\ Savings = 381 \frac{kWh}{1{,}000\ Square\ Feet} * 400 \frac{Square\ Feet}{Ton} = 152.4 \frac{kWh}{Ton}$$

$$Ex\ Post\ Total\ kWh\ Savings = \left(202.281 \frac{kWh}{Ton} + 152.4 \frac{kWh}{Ton}\right) * 6\ Ton = 2{,}128.09\ kWh$$

$$Ex\ Ante\ DCV\ Per\ Unit\ Savings = 73 \frac{Therms}{1{,}000\ Square\ Feet} = 0.073 \frac{Therms}{Square\ Feet}$$

$$Ex\ Ante\ Total\ Therms\ Savings = 0.073 \frac{Therms}{Square\ Feet} * 400\ \frac{Square\ Feet}{Ton} = 29.2 \frac{Therms}{Ton}$$

$$Ex\ Post\ DCV\ Per\ Unit\ Savings = 73 \frac{Therms}{1{,}000\ Square\ Feet} * 400\ \frac{Square\ Feet}{Ton}$$
$$= 29.2 \frac{Therms}{Ton}$$

$$Ex\ Post\ Total\ Therms\ Savings = 29.2 \frac{Therms}{Ton} * 6\ Ton = 175.2\ Therms$$

Project ID – 933369003-B: As mentioned in Finding 8, the total ex ante kWh and therms savings for the Economizer with DCV measure were incorrectly calculated. The ex ante and verified algorithms are shown below.

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

$$DCV\ Per\ Unit\ Savings = 152.4 \frac{kWh}{Ton}$$

$$Ex\ Ante\ Total\ kWh\ Savings = \left(202.281 \frac{kWh}{Ton} * 10\ Ton\right) + \left(152.4 \frac{kWh}{Ton} * 7.5\ Ton\right)$$
$$= 3{,}165.8\ kWh$$

$$Ex\ Post\ Total\ kWh\ Savings = \left(202.281 \frac{kWh}{Ton} + 152.4 \frac{kWh}{Ton}\right) * 10\ Ton = 3{,}546.8\ kWh$$

$$DCV\ Per\ Unit\ Savings = 29.2 \frac{Therms}{Ton}$$

$$Ex\ Ante\ Total\ Therms\ Savings = 29.2 \frac{Therms}{Ton} * 7.5\ Ton = 219\ Therms$$

$$Ex\ Post\ Total\ Therms\ Savings = 29.2 \frac{Therms}{Ton} * 10\ Ton = 292\ Therms$$

Appendix C. Total Resource Cost Detail

Table C-1 shows the 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) is not included in this table and will be provided to the evaluation team during the 2020 Total Resource Cost analysis to be completed after the calendar year by June 29, 2021.

Table C-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Gross Electric Energy Savings (kWh)	Gross Peak Demand Reduction (kW)	Gross Gas Savings (Therms)	Gross Secondary Savings due to Water Reduction (kWh)	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG (kWh)	NTG (kW)	NTG (Therms)	Net Electric Energy Savings (kWh)	Net Peak Demand Reduction (kW)	Net Gas Savings (Therms)	Net Secondary Savings due to Water Reduction (kWh)	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
Lighting	Exterior Fixtures	Fixtures	2,512	11.6	NO	4,769,919	0.00	0	0	0	0	0.97	0.97	0.97	4,626,821	0.00	0	0	0	0
Lighting	Interior Fixtures	Fixtures	11,576	8.8	NO	4,407,877	583.30	0	0	-9,138	-32,790	0.97	0.97	0.97	4,275,641	565.80	0	0	-8,864	-31,807
Lighting	Interior Fixtures - T12	Fixtures	1,756	10.5	NO	773,682	122.32	0	0	-5,874	-5,310	0.97	0.97	0.97	750,472	118.65	0	0	-5,698	-5,150
Lighting	Lighting Controls	Sensors	5,570	8.0	NO	513,957	141.80	0	0	-310	-4,151	0.97	0.97	0.97	498,539	137.55	0	0	-301	-4,026
Lighting	Permanent Fixture Removal	Fixtures	903	11.4	NO	390,756	66.59	0	0	-4	-4,144	0.97	0.97	0.97	379,034	64.59	0	0	-4	-4,020
Lighting	Interior Fixtures - Omnidirectional and Specialty	Fixtures	1,103	8.6	NO	192,650	35.44	0	0	-21	-956	0.97	0.97	0.97	186,871	34.37	0	0	-20	-927
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (5HP to 20HP)	Each	2	15.0	NO	113,889	4.45	0	0	0	0	0.97	0.97	0.97	110,472	4.32	0	0	0	0
Lighting	Exterior Fixtures - Omnidirectional and Specialty	Fixtures	192	8.9	NO	70,221	0.00	0	0	0	0	0.97	0.97	0.97	68,114	0.00	0	0	0	0
HVAC	Early Replacement for Air Cooled AC	Each	8	15.0	YES	52,904	3.91	0	0	0	0	0.97	0.97	0.97	51,317	3.79	0	0	0	0
Lighting	Permanent Fixture Removal - T12	Fixtures	43	7.4	NO	51,713	5.45	0	0	-3,817	-430	0.97	0.97	0.97	50,162	5.28	0	0	-3,703	-417
Lighting	Exit Signs	Signs	116	5.0	NO	50,928	6.14	0	0	-66	-191	0.97	0.97	0.97	49,400	5.96	0	0	-64	-186
HVAC	Variable Speed Drives for HVAC Supply and Return Fans (<5HP)	Each	5	15.0	NO	49,837	1.95	0	0	0	0	0.97	0.97	0.97	48,341	1.89	0	0	0	0
HVAC	Economizer with DCV (Gas Heating)	Each	5	5.0	NO	10,995	0.00	905	0	0	0	0.97	0.97	0.97	10,665	0.00	878	0	0	0
HVAC	Non-Programmable to Smart or Advanced Thermostat	Each	4	11.0	NO	8,620	0.67	449	0	0	0	0.97	0.97	0.97	8,361	0.65	435	0	0	0
HVAC	Packaged RTU Sealing	Each	5	5.0	NO	8,615	1.38	901	0	0	0	0.97	0.97	0.97	8,357	1.34	874	0	0	0
Lighting	Exterior Fixtures - T12	Fixtures	12	11.6	NO	7,263	0.00	0	0	0	0	0.97	0.97	0.97	7,046	0.00	0	0	0	0
HVAC	Advanced Rooftop Controls	Each	2	10.0	NO	4,318	0.68	571	0	0	0	0.97	0.97	0.97	4,189	0.66	553	0	0	0
Lighting	Permanent Fixture Removal - Omnidirectional and Specialty	Fixtures	13	8.9	NO	2,354	0.58	0	0	0	-6	0.97	0.97	0.97	2,283	0.56	0	0	0	-6
Compressed Air	No-Loss Condensate Drains	Each	1	10.0	NO	1,970	0.30	0	0	0	0	0.97	0.97	0.97	1,911	0.30	0	0	0	0
HVAC	Programmable to Smart or Advanced Thermostat	Each	2	11.0	NO	1,150	0.19	77	0	0	0	0.97	0.97	0.97	1,116	0.19	75	0	0	0
	Total			10.2		11,483,619	975	2,902	0	-19,231	-47,978	0.97	0.97	0.97	11,139,110	946	2,815	0	-18,654	-46,539

*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 Table 4-1 to Table 4-3.

|| The therm savings from this measure may also be claimed by the gas companies.

†§ The kWh savings account for electric heating penalties, where applicable. The electric heating penalties columns show the magnitude of adjustments applied to the program savings. Gas heating penalties represent the program therms heating penalties. The therms penalties are not required to be applied to the program savings.

Source: ComEd tracking data and evaluation team analysis