Guidehouse

ComEd Multi-Family Retrofits-Income Eligible Program Impact Evaluation Report

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

Prepared for:

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FINAL

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1. Introduction

This report presents results from the CY2020 impact evaluation of ComEd's Multi-Family Retrofits – Income Eligible Program. It summarizes the total energy and demand impacts for the 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) inputs. CY2020 covers January 1, 2020 through December 31, 2020.

1.1 Program Description

The Multi-Family Retrofits – Income Eligible Program offers direct installation of energy efficiency measures and replacement of inefficient equipment as well as educational information to save money on energy bills. Eligible measures include LED and energy efficient lighting retrofits, programmable thermostats, advanced power strips, water efficiency devices, weatherization measures, pipe insulation, refrigerators, heating and cooling equipment, and custom energy saving measures for eligible properties. The program also offers installation of health and safety measures, including installation of vents, electrical repairs, and asbestos and mold remediation.

There are two components for this program. The Income Eligible Multi-Family Savings (IEMS) program component is administered by ComEd, Peoples Gas, and North Shore Gas companies and implemented by Elevate Energy. Section 2 presents the evaluation of this component.

The Multi-Family Retrofits – Illinois Home Weatherization Assistance Program (IHWAP) program component is administered by ComEd, Peoples Gas, North Shore Gas, and Nicor Gas and implemented by Resource Innovations in partnership with IHWAP. Section 3 presents the evaluation of this component.

Both components of the program provide retrofits in common areas and tenant spaces to eligible multi-family properties in the ComEd service territory and serve as a one-stop-shop to multi-family building owners and managers whose buildings serve income eligible residents. In the deemed NTG spreadsheet, the NTG values deemed for the Multi-Family Retrofits Income Eligible program applies to some of the measures installed as a part of both the programs and the NTG value deemed for Low Income Multi-Family program applies to the rest of the measures.

2. IEMS Program Component

2.1 IEMS Program Component Description

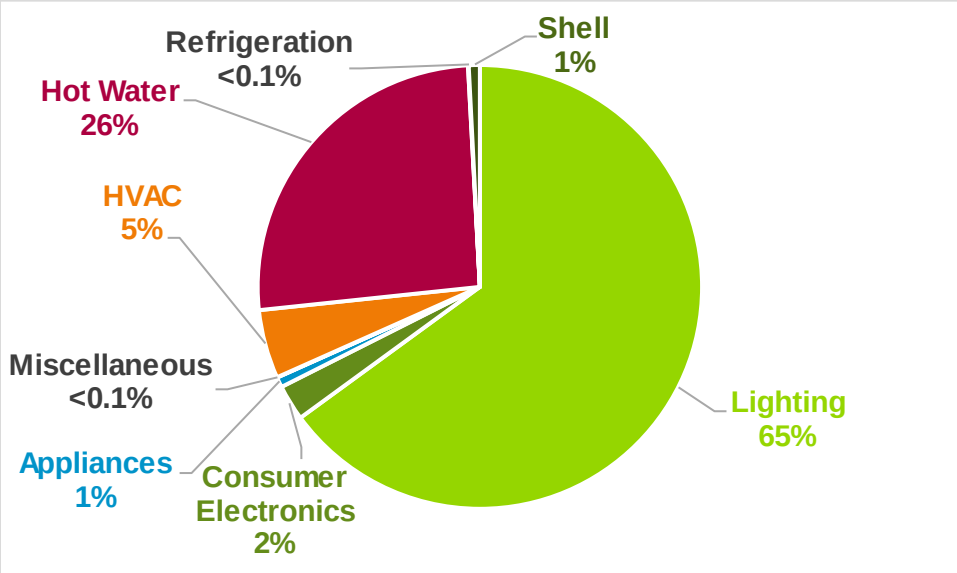
The IEMS program component had 258 participants in CY2020 and distributed 13,208 measures as the following table and graph show. Lighting measures made up 65% of the measure mix, followed by hot water measures, which represented 26% of all measures installed. HVAC measures represented 5% of the total measures installed, and the remaining 4% included appliances, consumer electronics, shell, refrigeration, and miscellaneous measures.

Table 2-1. IEMS CY2020 Volumetric Findings Detail

Participation	Total
Participants*	258
Installed Projects†	387
Total Measures‡	13,208
Lighting	8,580
Hot Water	3,410
HVAC	661
Consumer Electronics	343
Shell	106
Appliances	98
Refrigeration	7
Miscellaneous	3
Installed Projects‡	387

*Participants comprise of distinct ComEd Account Numbers.
†Number of unique project IDs in the tracking data.
‡ Measure quantities for certain measures with units of kBtu/hr and Sq. Ft. have been adjusted to number of projects implemented to provide a more representative count.
Source: ComEd tracking data and evaluation team analysis

Figure 2-1. IEMS Number of Measures Installed by Type



Source: ComEd tracking data and evaluation team analysis

2.2 IEMS Program Component Savings Detail

Table 2-2 summarizes the incremental energy and demand savings achieved in CY2020 by the IEMS program component. 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.[1] The IEMS program component had an overall realization rate of 0.98 and 0.94 for the electric energy and demand savings, respectively, and an overall realization rate of 1.01 for the therm savings.

Table 2-2. IEMS CY2020 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Summer Peak* Demand Savings (kW)
Electricity		
Ex Ante Gross Savings	1,812,402	142
Program Gross Realization Rate	0.98	0.94
Verified Gross Savings	1,776,974	133
Program Net-to-Gross Ratio (NTG)	1.00	1.00
Verified Net Savings	1,776,974	133
Converted from Gas†		
Ex Ante Gross Savings	8,816,080	NA
Program Gross Realization Rate	1.01	NA
Verified Gross Savings	8,881,389	NA
Program Net-to-Gross Ratio (NTG)	1.00	NA
Verified Net Savings	8,881,389	NA
Total Electric Plus Gas		
Ex Ante Gross Savings	10,628,482	142
Program Gross Realization Rate	1.00	0.94
Verified Gross Savings	10,658,363	133
Program Net-to-Gross Ratio (NTG)	1.00	1.00
Verified Net Savings	10,658,363	133

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 converted to 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

2.3 IEMS Program Component Cumulative Persisting Annual Savings

Table 2-3 to Table 2-5 show the measure-specific and total verified gross savings for the IEMS program component and the cumulative persisting annual savings (CPAS) for the measures installed in CY2020. Figure 2-2 shows the savings across the useful life of the measures. The electric CPAS across all measures installed in 2020 is 1,776,974 kWh (Table 2-3). The CY2020 gas contribution to CPAS (converted to equivalent electricity) is 8,881,389 kWh (Table 2-4). Adding the gas and electric contributions produces 10,658,363 kWh of total CY2020

[1] The evaluation will determine which gas savings will be counted toward goal while producing the portfolio-wide summary report.

contribution to CPAS (Table 2-5). 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.

Table 2-3. IEMS 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
Shell	CA Attic Insulation and Air Sealing	20.0	774,426	1.00	15,477,023			774,426	774,426	774,426	774,426	774,426	774,426	774,426
Lighting	LED CA Interior 24/7 - Fixture	5.7	216,187	1.00	1,233,098			216,187	216,187	216,187	216,187	216,187	152,164	
Lighting	LED CA Exterior - Fixture	11.6	130,724	1.00	1,518,991			130,724	130,724	130,724	130,724	130,724	130,724	130,724
Lighting	LED IU Interior - Omnidirectional	10.0	120,080	1.00	1,045,896			120,080	120,080	120,080	120,080	120,080	120,080	120,080
Shell	CA Foundation Sidewall Insulation	20.0	77,657	1.00	1,553,144			77,657	77,657	77,657	77,657	77,657	77,657	77,657
Lighting	LED CA Interior - Fixture	15.0	76,621	1.00	1,149,316			76,621	76,621	76,621	76,621	76,621	76,621	76,621
Lighting	LED Exit Sign	5.0	71,645	1.00	358,223			71,645	71,645	71,645	71,645	71,645		
Lighting	LED CA Interior - Omnidirectional	3.4	45,890	1.00	154,252			45,890	45,890	45,890	16,582			
Lighting	LED CA Interior - T12	15.0	40,667	1.00	418,064			40,667	40,667	40,667	40,667	25,024	23,037	23,037
Lighting	LED CA Interior 24/7 - T12	5.7	29,925	1.00	113,270			29,925	23,350	16,198	16,198	16,198	11,401	
Appliances	Refrigerator	17.0	30,250	1.00	223,838			30,250	30,250	30,250	30,250	30,250	30,250	3,849
Lighting	LED IU Interior - Decorative	10.0	23,340	1.00	200,493			23,340	23,340	23,340	23,340	23,340	23,340	23,340
Hot Water	IU Showerhead	10.0	17,770	1.00	177,704			17,770	17,770	17,770	17,770	17,770	17,770	17,770
Lighting	LED CA Interior Decorative	2.9	15,894	1.00	45,412			15,894	15,894	13,624				
Hot Water	IU Aerator	10.0	14,629	1.00	146,295			14,629	14,629	14,629	14,629	14,629	14,629	14,629
Consumer Electronics	IU Smart Strip	7.0	14,132	1.00	98,921			14,132	14,132	14,132	14,132	14,132	14,132	14,132
HVAC	IU Central AC	18.0	4,713	1.00	47,398			4,713	4,713	4,713	4,713	4,713	4,713	1,593
Lighting	LED CA Interior - Omnidirectional CFL	3.4	11,954	1.00	40,183			11,954	11,954	11,954	4,320			
Refrigeration	CA Vending Miser	5.0	11,291	1.00	56,453			11,291	11,291	11,291	11,291	11,291		
HVAC	IU ECM Blower	6.0	10,192	1.00	61,152			10,192	10,192	10,192	10,192	10,192	10,192	
Lighting	LED IU Interior - Fixture	15.0	10,052	1.00	124,240			10,052	10,052	10,052	10,052	10,052	10,052	10,052
Lighting	LED CA Exterior - Omnidirectional	4.6	8,825	1.00	41,020			8,825	8,825	8,825	8,825	5,718		
HVAC	IU Programmable Thermostat	8.0	6,782	1.00	54,254			6,782	6,782	6,782	6,782	6,782	6,782	6,782
HVAC	IU Room AC	12.0	2,744	1.00	26,155			2,744	2,744	2,744	2,744	1,897	1,897	1,897
Hot Water	CA DHW Controls	15.0	1,968	1.00	29,520			1,968	1,968	1,968	1,968	1,968	1,968	1,968
HVAC	IU Advanced Thermostat	11.0	1,506	1.00	16,561			1,506	1,506	1,506	1,506	1,506	1,506	1,506
Lighting	LED IU Exterior - Omnidirectional	8.0	1,492	1.00	11,296			1,492	1,492	1,492	1,492	1,492	1,492	1,492
Lighting	LED CA Exterior - Directional	5.8	1,472	1.00	7,325			1,472	1,472	1,472	1,472	795	644	
Hot Water	IU Shower Timer	2.0	1,289	1.00	2,578			1,289	1,289					
Lighting	LED CA Exterior - Omnidirectional CFL	4.6	1,248	1.00	5,800			1,248	1,248	1,248	1,248	809		
HVAC	IU Reprogram Thermostat	2.0	633	1.00	1,267			633	633					
Lighting	LED CA Garage - Omnidirectional CFL	5.6	333	1.00	1,880			333	333	333	333	333	216	
Miscellaneous	CA Smart Strip	7.0	326	1.00	2,280			326	326	326	326	326	326	326
Lighting	Occupancy Sensor	8.0	196	1.00	1,566			196	196	196	196	196	196	196
Lighting	LED CA Garage - Omnidirectional	5.6	120	1.00	561			120	120	120	120	48	31	
Shell	CA Air Sealing	20.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	CA Pipe Insulation	15.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	CA Steam Boiler	25.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	CA Pipe Steam Averaging Controls	20.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	IU Furnace	20.0	-	1.00	-			-	-	-	-	-	-	-
Hot Water	CA DHW Boiler	15.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	CA Hydronic Boiler	25.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	IU AC Cover and Gap Sealer	5.0	-	1.00	-			-	-	-	-	-		
CY2020 Program Total Electric Contribution to CPAS			1,776,974		24,445,429			1,776,974	1,770,398	1,759,053	1,708,487	1,666,800	1,506,247	1,302,078
Historic Program Total Electric Contribution to CPAS‡						3,824,064	7,350,293	7,339,887	6,701,600	6,494,419	6,101,782	4,778,583	3,784,531	3,176,038
Program Total Electric CPAS						3,824,064	7,350,293	9,116,861	8,471,998	8,253,471	7,810,269	6,445,382	5,290,778	4,478,116
CY2020 Program Incremental Expiring Electric Savings§									6,575	11,346	50,566	41,687	160,552	204,170
Historic Program Incremental Expiring Electric Savings‡§								10,406	638,287	207,181	392,636	1,323,200	994,052	608,492
Program Total Incremental Expiring Electric Savings§								10,406	644,862	218,527	443,202	1,364,887	1,154,604	812,662

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Shell	CA Attic Insulation and Air Sealing	774,426	774,426	774,426	773,277	773,277	773,277	773,277	773,277	773,277	773,277	773,277	773,277
Lighting	LED CA Interior 24/7 - Fixture												
Lighting	LED CA Exterior - Fixture	130,724	130,724	130,724	130,724	81,023							
Lighting	LED IU Interior - Omnidirectional	68,446	68,446	68,446									
Shell	CA Foundation Sidewall Insulation	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657
Lighting	LED CA Interior - Fixture	76,621	76,621	76,621	76,621	76,621	76,621	76,621	76,621				
Lighting	LED Exit Sign												
Lighting	LED CA Interior - Omnidirectional												
Lighting	LED CA Interior - T12	23,037	23,037	23,037	23,037	23,037	23,037	23,037	23,037				
Lighting	LED CA Interior 24/7 - T12												
Appliances	Refrigerator	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849		
Lighting	LED IU Interior - Decorative	12,370	12,370	12,370									
Hot Water	IU Showerhead	17,770	17,770	17,770									
Lighting	LED CA Interior Decorative												
Hot Water	IU Aerator	14,629	14,629	14,629									
Consumer Electronics	IU Smart Strip												
HVAC	IU Central AC	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	
Lighting	LED CA Interior - Omnidirectional CFL												
Refrigeration	CA Vending Miser												
HVAC	IU ECM Blower												
Lighting	LED IU Interior - Fixture	6,735	6,735	6,735	6,735	6,735	6,735	6,735	6,735				
Lighting	LED CA Exterior - Omnidirectional												
HVAC	IU Programmable Thermostat	6,782											
HVAC	IU Room AC	1,897	1,897	1,897	1,897	1,897							
Hot Water	CA DHW Controls	1,968	1,968	1,968	1,968	1,968	1,968	1,968	1,968				
HVAC	IU Advanced Thermostat	1,506	1,506	1,506	1,506								
Lighting	LED IU Exterior - Omnidirectional	851											
Lighting	LED CA Exterior - Directional												
Hot Water	IU Shower Timer												
Lighting	LED CA Exterior - Omnidirectional CFL												
HVAC	IU Reprogram Thermostat												
Lighting	LED CA Garage - Omnidirectional CFL												
Miscellaneous	CA Smart Strip												
Lighting	Occupancy Sensor	196											
Lighting	LED CA Garage - Omnidirectional												
Shell	CA Air Sealing	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	CA Pipe Insulation	-	-	-	-	-	-	-	-				
HVAC	CA Steam Boiler	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	CA Pipe Steam Averaging Controls	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	IU Furnace	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	CA DHW Boiler	-	-	-	-	-	-	-	-				
HVAC	CA Hydronic Boiler	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	IU AC Cover and Gap Sealer												
CY2020 Program Total Electric Contribution to CPAS		1,221,057	1,213,229	1,213,229	1,098,864	1,047,657	964,737	964,737	964,737	856,376	856,376	852,527	850,934
Historic Program Total Electric Contribution to CPAS‡		2,866,007	2,314,515	2,121,421	1,918,835	1,615,731	1,615,731	922,563	377,087	377,087	345,612	344,157	325,125
Program Total Electric CPAS		4,087,064	3,527,745	3,334,650	3,017,699	2,663,388	2,580,468	1,887,300	1,341,824	1,233,463	1,201,987	1,196,684	1,176,059
CY2020 Program Incremental Expiring Electric Savings§		81,020	7,828	-	114,365	51,207	82,920	-	-	108,361	-	3,849	1,593
Historic Program Incremental Expiring Electric Savings‡§		310,031	551,492	193,095	202,585	303,105	-	693,167	545,476	-	31,475	1,455	19,032
Program Total Incremental Expiring Electric Savings§		391,052	559,320	193,095	316,950	354,311	82,920	693,167	545,476	108,361	31,475	5,303	20,625

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shell	CA Attic Insulation and Air Sealing	773,277											
Lighting	LED CA Interior 24/7 - Fixture												
Lighting	LED CA Exterior - Fixture												
Lighting	LED IU Interior - Omnidirectional												
Shell	CA Foundation Sidewall Insulation	77,657											
Lighting	LED CA Interior - Fixture												
Lighting	LED Exit Sign												
Lighting	LED CA Interior - Omnidirectional												
Lighting	LED CA Interior - T12												
Lighting	LED CA Interior 24/7 - T12												
Appliances	Refrigerator												
Lighting	LED IU Interior - Decorative												
Hot Water	IU Showerhead												
Lighting	LED CA Interior Decorative												
Hot Water	IU Aerator												
Consumer Electronics	IU Smart Strip												
HVAC	IU Central AC												
Lighting	LED CA Interior - Omnidirectional CFL												
Refrigeration	CA Vending Miser												
HVAC	IU ECM Blower												
Lighting	LED IU Interior - Fixture												
Lighting	LED CA Exterior - Omnidirectional												
HVAC	IU Programmable Thermostat												
HVAC	IU Room AC												
Hot Water	CA DHW Controls												
HVAC	IU Advanced Thermostat												
Lighting	LED IU Exterior - Omnidirectional												
Lighting	LED CA Exterior - Directional												
Hot Water	IU Shower Timer												
Lighting	LED CA Exterior - Omnidirectional CFL												
HVAC	IU Reprogram Thermostat												
Lighting	LED CA Garage - Omnidirectional CFL												
Miscellaneous	CA Smart Strip												
Lighting	Occupancy Sensor												
Lighting	LED CA Garage - Omnidirectional												
Shell	CA Air Sealing	-											
HVAC	CA Pipe Insulation												
HVAC	CA Steam Boiler	-	-	-	-	-	-						
HVAC	CA Pipe Steam Averaging Controls	-											
HVAC	IU Furnace	-											
Hot Water	CA DHW Boiler												
HVAC	CA Hydronic Boiler	-	-	-	-	-	-						
HVAC	IU AC Cover and Gap Sealer												
CY2020 Program Total Electric Contribution to CPAS		850,934	-	-	-	-	-	-	-	-	-	-	-
Historic Program Total Electric Contribution to CPAS‡		224,116	224,116	224,116	224,116	-	-	-	-	-	-	-	-
Program Total Electric CPAS		1,075,050	224,116	224,116	224,116	-	-	-	-	-	-	-	-
CY2020 Program Incremental Expiring Electric Savings§		-	850,934	-	-	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Electric Savings‡§		101,009	-	-	-	224,116	-	-	-	-	-	-	-
Program Total Incremental Expiring Electric Savings§		101,009	850,934	-	-	224,116	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first year electric savings. The gray cells are blank, indicating values irrelevant to the CY2020 contribution to CPAS.

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

† 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 2-4. IEMS 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
Shell	CA Attic Insulation and Air Sealing	20.0	47,699	1.00	942,212			47,699	47,699	47,699	47,699	47,699	47,699	47,699
Lighting	LED CA Interior 24/7 - Fixture	5.7	-	1.00	-			-	-	-	-	-	-	
Lighting	LED CA Exterior - Fixture	11.6	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED IU Interior - Omnidirectional	10.0	-	1.00	-			-	-	-	-	-	-	-
Shell	CA Foundation Sidewall Insulation	20.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED CA Interior - Fixture	15.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED Exit Sign	5.0	-	1.00	-			-	-	-	-	-		
Lighting	LED CA Interior - Omnidirectional	3.4	-	1.00	-			-	-	-	-			
Lighting	LED CA Interior - T12	15.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED CA Interior 24/7 - T12	5.7	-	1.00	-			-	-	-	-	-	-	
Appliances	Refrigerator	17.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED IU Interior - Decorative	10.0	-	1.00	-			-	-	-	-	-	-	-
Hot Water	IU Showerhead	10.0	7,901	1.00	79,006			7,901	7,901	7,901	7,901	7,901	7,901	7,901
Lighting	LED CA Interior Decorative	2.9	-	1.00	-			-	-	-				
Hot Water	IU Aerator	10.0	6,138	1.00	61,383			6,138	6,138	6,138	6,138	6,138	6,138	6,138
Consumer Electronics	IU Smart Strip	7.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	IU Central AC	18.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED CA Interior - Omnidirectional CFL	3.4	-	1.00	-			-	-	-	-			
Refrigeration	CA Vending Miser	5.0	-	1.00	-			-	-	-	-	-		
HVAC	IU ECM Blower	6.0	-	1.00	-			-	-	-	-	-	-	
Lighting	LED IU Interior - Fixture	15.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED CA Exterior - Omnidirectional	4.6	-	1.00	-			-	-	-	-	-		
HVAC	IU Programmable Thermostat	8.0	7,019	1.00	56,151			7,019	7,019	7,019	7,019	7,019	7,019	7,019
HVAC	IU Room AC	12.0	-	1.00	-			-	-	-	-	-	-	-
Hot Water	CA DHW Controls	15.0	2,137	1.00	32,048			2,137	2,137	2,137	2,137	2,137	2,137	2,137
HVAC	IU Advanced Thermostat	11.0	315	1.00	3,469			315	315	315	315	315	315	315
Lighting	LED IU Exterior - Omnidirectional	8.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED CA Exterior - Directional	5.8	-	1.00	-			-	-	-	-	-	-	
Hot Water	IU Shower Timer	2.0	1,977	1.00	3,953			1,977	1,977					
Lighting	LED CA Exterior - Omnidirectional CFL	4.6	-	1.00	-			-	-	-	-	-		
HVAC	IU Reprogram Thermostat	2.0	524	1.00	1,048			524	524					
Lighting	LED CA Garage - Omnidirectional CFL	5.6	-	1.00	-			-	-	-	-	-	-	
Miscellaneous	CA Smart Strip	7.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	Occupancy Sensor	8.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED CA Garage - Omnidirectional	5.6	-	1.00	-			-	-	-	-	-	-	
Shell	CA Air Sealing	20.0	554	1.00	11,072			554	554	554	554	554	554	554
HVAC	CA Pipe Insulation	15.0	91,081	1.00	1,366,221			91,081	91,081	91,081	91,081	91,081	91,081	91,081
HVAC	CA Steam Boiler	25.0	88,071	1.00	2,201,781			88,071	88,071	88,071	88,071	88,071	88,071	88,071
HVAC	CA Pipe Steam Averaging Controls	20.0	40,276	1.00	805,512			40,276	40,276	40,276	40,276	40,276	40,276	40,276
HVAC	IU Furnace	20.0	1,059	1.00	21,175			1,059	1,059	1,059	1,059	1,059	1,059	1,059
Hot Water	CA DHW Boiler	15.0	1,331	1.00	18,704			1,331	1,331	1,331	1,331	1,331	1,205	1,205
HVAC	CA Hydronic Boiler	25.0	6,810	1.00	170,254			6,810	6,810	6,810	6,810	6,810	6,810	6,810
HVAC	IU AC Cover and Gap Sealer	5.0	125	1.00	624			125	125	125	125	125		
CY2020 Program Total Gas Contribution to CPAS (Therms)			303,016		5,774,614			303,016	303,016	300,515	300,515	300,515	300,265	300,265
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡						-	-	8,881,389	8,881,389	8,808,091	8,808,091	8,808,091	8,800,753	8,800,753
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§						12,834,959	26,702,999	26,702,999	26,562,915	26,533,120	26,382,519	23,647,864	18,158,875	18,158,875
Program Total Gas CPAS (kWh Equivalent)‡						12,834,959	26,702,999	35,584,389	35,444,304	35,341,211	35,190,611	32,455,955	26,959,627	26,959,627
CY2020 Program Incremental Expiring Gas Savings (Therms)‖									-	2,501	-	-	250	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖									-	73,298	-	-	7,339	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖								-	140,085	29,795	150,601	2,734,655	5,488,990	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖								-	140,085	103,092	150,601	2,734,655	5,496,328	-

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Shell	CA Attic Insulation and Air Sealing	47,699	47,699	47,699	47,793	47,793	47,793	45,978	45,978	45,978	45,978	45,978	45,978
Lighting	LED CA Interior 24/7 - Fixture												
Lighting	LED CA Exterior - Fixture	-	-	-	-	-							
Lighting	LED IU Interior - Omnidirectional	-	-	-									
Shell	CA Foundation Sidewall Insulation	-	-	-	-	-	-	-	-	-	-	-	-
Lighting	LED CA Interior - Fixture	-	-	-	-	-	-	-	-				
Lighting	LED Exit Sign												
Lighting	LED CA Interior - Omnidirectional												
Lighting	LED CA Interior - T12	-	-	-	-	-	-	-	-				
Lighting	LED CA Interior 24/7 - T12												
Appliances	Refrigerator	-	-	-	-	-	-	-	-	-	-		
Lighting	LED IU Interior - Decorative	-	-	-									
Hot Water	IU Showerhead	7,901	7,901	7,901									
Lighting	LED CA Interior Decorative												
Hot Water	IU Aerator	6,138	6,138	6,138									
Consumer Electronics	IU Smart Strip												
HVAC	IU Central AC	-	-	-	-	-	-	-	-	-	-	-	
Lighting	LED CA Interior - Omnidirectional CFL												
Refrigeration	CA Vending Miser												
HVAC	IU ECM Blower												
Lighting	LED IU Interior - Fixture	-	-	-	-	-	-	-	-				
Lighting	LED CA Exterior - Omnidirectional												
HVAC	IU Programmable Thermostat	7,019											
HVAC	IU Room AC	-	-	-	-	-							
Hot Water	CA DHW Controls	2,137	2,137	2,137	2,137	2,137	2,137	2,137	2,137				
HVAC	IU Advanced Thermostat	315	315	315	315								
Lighting	LED IU Exterior - Omnidirectional	-											
Lighting	LED CA Exterior - Directional												
Hot Water	IU Shower Timer												
Lighting	LED CA Exterior - Omnidirectional CFL												
HVAC	IU Reprogram Thermostat												
Lighting	LED CA Garage - Omnidirectional CFL												
Miscellaneous	CA Smart Strip												
Lighting	Occupancy Sensor	-											
Lighting	LED CA Garage - Omnidirectional												
Shell	CA Air Sealing	554	554	554	554	554	554	554	554	554	554	554	554
HVAC	CA Pipe Insulation	91,081	91,081	91,081	91,081	91,081	91,081	91,081	91,081				
HVAC	CA Steam Boiler	88,071	88,071	88,071	88,071	88,071	88,071	88,071	88,071	88,071	88,071	88,071	88,071
HVAC	CA Pipe Steam Averaging Controls	40,276	40,276	40,276	40,276	40,276	40,276	40,276	40,276	40,276	40,276	40,276	40,276
HVAC	IU Furnace	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059	1,059
Hot Water	CA DHW Boiler	1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205				
HVAC	CA Hydronic Boiler	6,810	6,810	6,810	6,810	6,810	6,810	6,810	6,810	6,810	6,810	6,810	6,810
HVAC	IU AC Cover and Gap Sealer												
CY2020 Program Total Gas Contribution to CPAS (Therms)		300,265	293,246	293,246	279,301	278,985	278,985	277,170	277,170	182,747	182,747	182,747	182,747
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		8,800,753	8,595,028	8,595,028	8,186,308	8,177,064	8,177,064	8,123,851	8,123,851	5,356,313	5,356,313	5,356,313	5,356,313
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		17,787,681	16,404,800	15,980,984	15,947,071	15,947,071	15,913,962	12,003,662	9,777,185	9,777,185	9,777,185	9,777,185	7,497,057
Program Total Gas CPAS (kWh Equivalent)‡		26,588,434	24,999,828	24,576,012	24,133,379	24,124,135	24,091,026	20,127,513	17,901,036	15,133,498	15,133,498	15,133,498	12,853,371
CY2020 Program Incremental Expiring Gas Savings (Therms)‖		-	7,019	-	13,945	315	-	1,816	-	94,423	-	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖		-	205,724	-	408,720	9,244	-	53,213	-	2,767,537	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖		371,194	1,382,881	423,816	33,913	-	33,109	3,910,300	2,226,477	-	-	-	2,280,128
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖		371,194	1,588,605	423,816	442,633	9,244	33,109	3,963,513	2,226,477	2,767,537	-	-	2,280,128

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shell	CA Attic Insulation and Air Sealing	45,978											
Lighting	LED CA Interior 24/7 - Fixture												
Lighting	LED CA Exterior - Fixture												
Lighting	LED IU Interior - Omnidirectional												
Shell	CA Foundation Sidewall Insulation	-											
Lighting	LED CA Interior - Fixture												
Lighting	LED Exit Sign												
Lighting	LED CA Interior - Omnidirectional												
Lighting	LED CA Interior - T12												
Lighting	LED CA Interior 24/7 - T12												
Appliances	Refrigerator												
Lighting	LED IU Interior - Decorative												
Hot Water	IU Showerhead												
Lighting	LED CA Interior Decorative												
Hot Water	IU Aerator												
Consumer Electronics	IU Smart Strip												
HVAC	IU Central AC												
Lighting	LED CA Interior - Omnidirectional CFL												
Refrigeration	CA Vending Miser												
HVAC	IU ECM Blower												
Lighting	LED IU Interior - Fixture												
Lighting	LED CA Exterior - Omnidirectional												
HVAC	IU Programmable Thermostat												
HVAC	IU Room AC												
Hot Water	CA DHW Controls												
HVAC	IU Advanced Thermostat												
Lighting	LED IU Exterior - Omnidirectional												
Lighting	LED CA Exterior - Directional												
Hot Water	IU Shower Timer												
Lighting	LED CA Exterior - Omnidirectional CFL												
HVAC	IU Reprogram Thermostat												
Lighting	LED CA Garage - Omnidirectional CFL												
Miscellaneous	CA Smart Strip												
Lighting	Occupancy Sensor												
Lighting	LED CA Garage - Omnidirectional												
Shell	CA Air Sealing	554											
HVAC	CA Pipe Insulation												
HVAC	CA Steam Boiler	88,071	88,071	88,071	88,071	88,071	88,071						
HVAC	CA Pipe Steam Averaging Controls	40,276											
HVAC	IU Furnace	1,059											
Hot Water	CA DHW Boiler												
HVAC	CA Hydronic Boiler	6,810	6,810	6,810	6,810	6,810	6,810						
HVAC	IU AC Cover and Gap Sealer												
CY2020 Program Total Gas Contribution to CPAS (Therms)		182,747	94,881	94,881	94,881	94,881	94,881	-	-	-	-	-	-
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		5,356,313	2,780,974	2,780,974	2,780,974	2,780,974	2,780,974	-	-	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		2,042,538	2,042,538	2,042,538	2,042,538	-	-	-	-	-	-	-	-
Program Total Gas CPAS (kWh Equivalent)‡		7,398,852	4,823,512	4,823,512	4,823,512	2,780,974	2,780,974	-	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (Therms)‖		-	87,866	-	-	-	-	94,881	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖		-	2,575,339	-	-	-	-	2,780,974	-	-	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖		5,454,519	-	-	-	2,042,538	-	-	-	-	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖		5,454,519	2,575,339	-	-	2,042,538	-	2,780,974	-	-	-	-	-

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 CY2020.

* A deemed value. Source: is found on the Illinois SAG website: 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 2-5. IEMS 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
Shell	CA Attic Insulation and Air Sealing	20.0	2,172,482	1.00	43,093,266			2,172,482	2,172,482	2,172,482	2,172,482	2,172,482	2,172,482	2,172,482
Lighting	LED CA Interior 24/7 - Fixture	5.7	216,187	1.00	1,233,098			216,187	216,187	216,187	216,187	216,187	152,164	
Lighting	LED CA Exterior - Fixture	11.6	130,724	1.00	1,518,991			130,724	130,724	130,724	130,724	130,724	130,724	130,724
Lighting	LED IU Interior - Omnidirectional	10.0	120,080	1.00	1,045,896			120,080	120,080	120,080	120,080	120,080	120,080	120,080
Shell	CA Foundation Sidewall Insulation	20.0	77,657	1.00	1,553,144			77,657	77,657	77,657	77,657	77,657	77,657	77,657
Lighting	LED CA Interior - Fixture	15.0	76,621	1.00	1,149,316			76,621	76,621	76,621	76,621	76,621	76,621	76,621
Lighting	LED Exit Sign	5.0	71,645	1.00	358,223			71,645	71,645	71,645	71,645	71,645		
Lighting	LED CA Interior - Omnidirectional	3.4	45,890	1.00	154,252			45,890	45,890	45,890	16,582			
Lighting	LED CA Interior - T12	15.0	40,667	1.00	418,064			40,667	40,667	40,667	40,667	25,024	23,037	23,037
Lighting	LED CA Interior 24/7 - T12	5.7	29,925	1.00	113,270			29,925	23,350	16,198	16,198	16,198	11,401	
Appliances	Refrigerator	17.0	30,250	1.00	223,838			30,250	30,250	30,250	30,250	30,250	30,250	3,849
Lighting	LED IU Interior - Decorative	10.0	23,340	1.00	200,493			23,340	23,340	23,340	23,340	23,340	23,340	23,340
Hot Water	IU Showerhead	10.0	249,337	1.00	2,493,368			249,337	249,337	249,337	249,337	249,337	249,337	249,337
Lighting	LED CA Interior Decorative	2.9	15,894	1.00	45,412			15,894	15,894	13,624				
Hot Water	IU Aerator	10.0	194,544	1.00	1,945,444			194,544	194,544	194,544	194,544	194,544	194,544	194,544
Consumer Electronics	IU Smart Strip	7.0	14,132	1.00	98,921			14,132	14,132	14,132	14,132	14,132	14,132	14,132
HVAC	IU Central AC	18.0	4,713	1.00	47,398			4,713	4,713	4,713	4,713	4,713	4,713	1,593
Lighting	LED CA Interior - Omnidirectional CFL	3.4	11,954	1.00	40,183			11,954	11,954	11,954	4,320			
Refrigeration	CA Vending Miser	5.0	11,291	1.00	56,453			11,291	11,291	11,291	11,291	11,291		
HVAC	IU ECM Blower	6.0	10,192	1.00	61,152			10,192	10,192	10,192	10,192	10,192	10,192	
Lighting	LED IU Interior - Fixture	15.0	10,052	1.00	124,240			10,052	10,052	10,052	10,052	10,052	10,052	10,052
Lighting	LED CA Exterior - Omnidirectional	4.6	8,825	1.00	41,020			8,825	8,825	8,825	8,825	5,718		
HVAC	IU Programmable Thermostat	8.0	212,506	1.00	1,700,048			212,506	212,506	212,506	212,506	212,506	212,506	212,506
HVAC	IU Room AC	12.0	2,744	1.00	26,155			2,744	2,744	2,744	2,744	1,897	1,897	1,897
Hot Water	CA DHW Controls	15.0	64,589	1.00	968,834			64,589	64,589	64,589	64,589	64,589	64,589	64,589
HVAC	IU Advanced Thermostat	11.0	10,750	1.00	118,246			10,750	10,750	10,750	10,750	10,750	10,750	10,750
Lighting	LED IU Exterior - Omnidirectional	8.0	1,492	1.00	11,296			1,492	1,492	1,492	1,492	1,492	1,492	1,492
Lighting	LED CA Exterior - Directional	5.8	1,472	1.00	7,325			1,472	1,472	1,472	1,472	795	644	
Hot Water	IU Shower Timer	2.0	59,226	1.00	118,452			59,226	59,226					
Lighting	LED CA Exterior - Omnidirectional CFL	4.6	1,248	1.00	5,800			1,248	1,248	1,248	1,248	809		
HVAC	IU Reprogram Thermostat	2.0	15,995	1.00	31,989			15,995	15,995					
Lighting	LED CA Garage - Omnidirectional CFL	5.6	333	1.00	1,880			333	333	333	333	333	216	
Miscellaneous	CA Smart Strip	7.0	326	1.00	2,280			326	326	326	326	326	326	326
Lighting	Occupancy Sensor	8.0	196	1.00	1,566			196	196	196	196	196	196	196
Lighting	LED CA Garage - Omnidirectional	5.6	120	1.00	561			120	120	120	120	48	31	
Shell	CA Air Sealing	20.0	16,225	1.00	324,508			16,225	16,225	16,225	16,225	16,225	16,225	16,225
HVAC	CA Pipe Insulation	15.0	2,669,596	1.00	40,043,941			2,669,596	2,669,596	2,669,596	2,669,596	2,669,596	2,669,596	2,669,596
HVAC	CA Steam Boiler	25.0	2,581,368	1.00	64,534,208			2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368
HVAC	CA Pipe Steam Averaging Controls	20.0	1,180,478	1.00	23,609,557			1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478
HVAC	IU Furnace	20.0	31,032	1.00	620,641			31,032	31,032	31,032	31,032	31,032	31,032	31,032
Hot Water	CA DHW Boiler	15.0	39,001	1.00	548,208			39,001	39,001	39,001	39,001	39,001	35,320	35,320
HVAC	CA Hydronic Boiler	25.0	199,606	1.00	4,990,146			199,606	199,606	199,606	199,606	199,606	199,606	199,606
HVAC	IU AC Cover and Gap Sealer	5.0	3,658	1.00	18,290			3,658	3,658	3,658	3,658	3,658		
CY2020 Program Total Contribution to CPAS			10,658,363		193,699,372			10,658,363	10,651,788	10,567,144	10,516,578	10,474,891	10,307,000	10,102,830
Historic Program Total Contribution to CPAS‡						16,659,024	34,053,292	34,042,887	33,264,515	33,027,539	32,484,302	28,426,447	21,943,405	21,334,913
Program Total CPAS						16,659,024	34,053,292	44,701,249	43,916,302	43,594,683	43,000,880	38,901,337	32,250,405	31,437,743
CY2020 Program Incremental Expiring Savings§									6,575	84,643	50,566	41,687	167,891	204,170
Historic Program Incremental Expiring Savings‡§								10,406	778,372	236,976	543,237	4,057,855	6,483,041	608,492
Program Total Incremental Expiring Savings§								10,406	784,947	321,619	593,803	4,099,542	6,650,933	812,662

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Shell	CA Attic Insulation and Air Sealing	2,172,482	2,172,482	2,172,482	2,174,094	2,174,094	2,174,094	2,120,881	2,120,881	2,120,881	2,120,881	2,120,881	2,120,881
Lighting	LED CA Interior 24/7 - Fixture												
Lighting	LED CA Exterior - Fixture	130,724	130,724	130,724	130,724	81,023							
Lighting	LED IU Interior - Omnidirectional	68,446	68,446	68,446									
Shell	CA Foundation Sidewall Insulation	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657	77,657
Lighting	LED CA Interior - Fixture	76,621	76,621	76,621	76,621	76,621	76,621	76,621	76,621				
Lighting	LED Exit Sign												
Lighting	LED CA Interior - Omnidirectional												
Lighting	LED CA Interior - T12	23,037	23,037	23,037	23,037	23,037	23,037	23,037	23,037				
Lighting	LED CA Interior 24/7 - T12												
Appliances	Refrigerator	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849		
Lighting	LED IU Interior - Decorative	12,370	12,370	12,370									
Hot Water	IU Showerhead	249,337	249,337	249,337									
Lighting	LED CA Interior Decorative												
Hot Water	IU Aerator	194,544	194,544	194,544									
Consumer Electronics	IU Smart Strip												
HVAC	IU Central AC	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	
Lighting	LED CA Interior - Omnidirectional CFL												
Refrigeration	CA Vending Miser												
HVAC	IU ECM Blower												
Lighting	LED IU Interior - Fixture	6,735	6,735	6,735	6,735	6,735	6,735	6,735	6,735				
Lighting	LED CA Exterior - Omnidirectional												
HVAC	IU Programmable Thermostat	212,506											
HVAC	IU Room AC	1,897	1,897	1,897	1,897	1,897							
Hot Water	CA DHW Controls	64,589	64,589	64,589	64,589	64,589	64,589	64,589	64,589				
HVAC	IU Advanced Thermostat	10,750	10,750	10,750	10,750								
Lighting	LED IU Exterior - Omnidirectional	851											
Lighting	LED CA Exterior - Directional												
Hot Water	IU Shower Timer												
Lighting	LED CA Exterior - Omnidirectional CFL												
HVAC	IU Reprogram Thermostat												
Lighting	LED CA Garage - Omnidirectional CFL												
Miscellaneous	CA Smart Strip												
Lighting	Occupancy Sensor	196											
Lighting	LED CA Garage - Omnidirectional												
Shell	CA Air Sealing	16,225	16,225	16,225	16,225	16,225	16,225	16,225	16,225	16,225	16,225	16,225	16,225
HVAC	CA Pipe Insulation	2,669,596	2,669,596	2,669,596	2,669,596	2,669,596	2,669,596	2,669,596	2,669,596				
HVAC	CA Steam Boiler	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368
HVAC	CA Pipe Steam Averaging Controls	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478	1,180,478
HVAC	IU Furnace	31,032	31,032	31,032	31,032	31,032	31,032	31,032	31,032	31,032	31,032	31,032	31,032
Hot Water	CA DHW Boiler	35,320	35,320	35,320	35,320	35,320	35,320	35,320	35,320				
HVAC	CA Hydronic Boiler	199,606	199,606	199,606	199,606	199,606	199,606	199,606	199,606	199,606	199,606	199,606	199,606
HVAC	IU AC Cover and Gap Sealer												
CY2020 Program Total Contribution to CPAS		10,021,810	9,808,257	9,808,257	9,285,172	9,224,721	9,141,801	9,088,588	9,088,588	6,212,689	6,212,689	6,208,841	6,207,247
Historic Program Total Contribution to CPAS‡		20,653,688	18,719,315	18,102,404	17,865,906	17,562,802	17,529,693	12,926,226	10,154,272	10,154,272	10,122,796	10,121,342	7,822,182
Program Total CPAS		30,675,498	28,527,573	27,910,662	27,151,078	26,787,523	26,671,494	22,014,813	19,242,859	16,366,961	16,335,486	16,330,182	14,029,429
CY2020 Program Incremental Expiring Savings§		81,020	213,552	-	523,085	60,451	82,920	53,213	-	2,875,898	-	3,849	1,593
Historic Program Incremental Expiring Savings‡§		681,225	1,934,372	616,911	236,498	303,105	33,109	4,603,468	2,771,954	-	31,475	1,455	2,299,160
Program Total Incremental Expiring Savings§		762,245	2,147,925	616,911	759,583	363,556	116,029	4,656,681	2,771,954	2,875,898	31,475	5,303	2,300,753

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shell	CA Attic Insulation and Air Sealing	2,120,881											
Lighting	LED CA Interior 24/7 - Fixture												
Lighting	LED CA Exterior - Fixture												
Lighting	LED IU Interior - Omnidirectional												
Shell	CA Foundation Sidewall Insulation	77,657											
Lighting	LED CA Interior - Fixture												
Lighting	LED Exit Sign												
Lighting	LED CA Interior - Omnidirectional												
Lighting	LED CA Interior - T12												
Lighting	LED CA Interior 24/7 - T12												
Appliances	Refrigerator												
Lighting	LED IU Interior - Decorative												
Hot Water	IU Showerhead												
Lighting	LED CA Interior Decorative												
Hot Water	IU Aerator												
Consumer Electronics	IU Smart Strip												
HVAC	IU Central AC												
Lighting	LED CA Interior - Omnidirectional CFL												
Refrigeration	CA Vending Miser												
HVAC	IU ECM Blower												
Lighting	LED IU Interior - Fixture												
Lighting	LED CA Exterior - Omnidirectional												
HVAC	IU Programmable Thermostat												
HVAC	IU Room AC												
Hot Water	CA DHW Controls												
HVAC	IU Advanced Thermostat												
Lighting	LED IU Exterior - Omnidirectional												
Lighting	LED CA Exterior - Directional												
Hot Water	IU Shower Timer												
Lighting	LED CA Exterior - Omnidirectional CFL												
HVAC	IU Reprogram Thermostat												
Lighting	LED CA Garage - Omnidirectional CFL												
Miscellaneous	CA Smart Strip												
Lighting	Occupancy Sensor												
Lighting	LED CA Garage - Omnidirectional												
Shell	CA Air Sealing	16,225											
HVAC	CA Pipe Insulation												
HVAC	CA Steam Boiler	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368	2,581,368						
HVAC	CA Pipe Steam Averaging Controls	1,180,478											
HVAC	IU Furnace	31,032											
Hot Water	CA DHW Boiler												
HVAC	CA Hydronic Boiler	199,606	199,606	199,606	199,606	199,606	199,606						
HVAC	IU AC Cover and Gap Sealer												
CY2020 Program Total Contribution to CPAS		6,207,247	2,780,974	2,780,974	2,780,974	2,780,974	2,780,974	-	-	-	-	-	-
Historic Program Total Contribution to CPAS‡		2,266,654	2,266,654	2,266,654	2,266,654	-	-	-	-	-	-	-	-
Program Total CPAS		8,473,902	5,047,629	5,047,629	5,047,629	2,780,974	2,780,974	-	-	-	-	-	-
CY2020 Program Incremental Expiring Savings§		-	3,426,273	-	-	-	-	2,780,974	-	-	-	-	-
Historic Program Incremental Expiring Savings‡§		5,555,527	-	-	-	2,266,654	-	-	-	-	-	-	-
Program Total Incremental Expiring Savings§		5,555,527	3,426,273	-	-	2,266,654	-	2,780,974	-	-	-	-	-

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 CY2020.

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

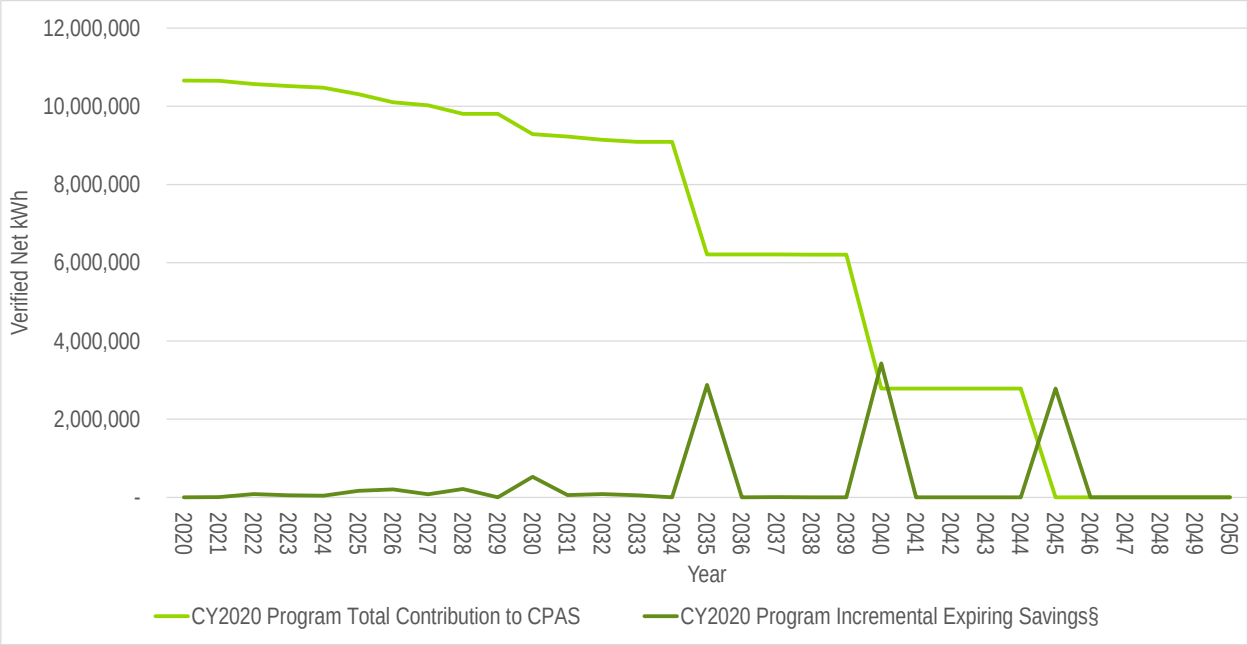
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ Historic savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n.

Source: Evaluation team analysis

Figure 2-2. IEMS Cumulative Persisting Annual Savings



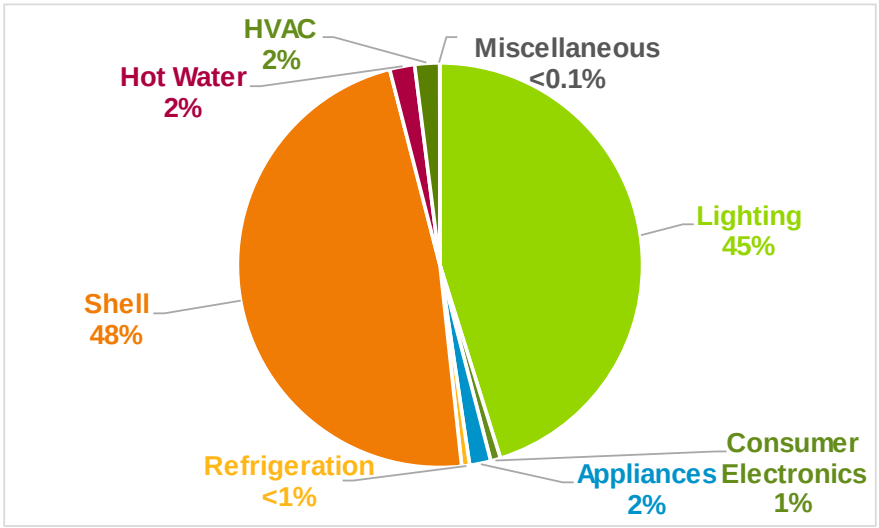
§Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n.

Source: Evaluation team analysis

2.4 IEMS Program Component Savings by Measure

The IEMS program component includes 43 measures as the following tables show. The shell and LED lighting measures contributed the most savings, representing 48% and 45% of the verified net kWh savings, respectively. The HVAC, hot water, and appliance measures represent 2% of the verified net kWh savings each. The consumer electronics, refrigeration, and miscellaneous measures represent the balance of the savings (see Figure 2-3).

Figure 2-3. IEMS Verified Net Savings by Measure – Electric



Source: Evaluation team analysis

Table 2-6. IEMS 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)
Shell	CA Attic Insulation and Air Sealing	791,516	0.98	774,426	1.00	774,426	20.0
Lighting	LED CA Interior 24/7 - Fixture	207,741	1.04	216,187	1.00	216,187	5.7
Lighting	LED CA Exterior - Fixture	130,020	1.01	130,724	1.00	130,724	11.6
Lighting	LED IU Interior - Omnidirectional	129,099	0.93	120,080	1.00	120,080	10.0
Shell	CA Foundation Sidewall Insulation	2,264	34.30	77,657	1.00	77,657	20.0
Lighting	LED CA Interior - Fixture	119,652	0.64	76,621	1.00	76,621	15.0
Lighting	LED Exit Sign	73,444	0.98	71,645	1.00	71,645	5.0
Lighting	LED CA Interior - Omnidirectional	47,988	0.96	45,890	1.00	45,890	3.4
Lighting	LED CA Interior - T12	63,401	0.64	40,667	1.00	40,667	15.0
Lighting	LED CA Interior 24/7 - T12	33,340	0.90	29,925	1.00	29,925	5.7
Appliances	Refrigerator	34,029	0.89	30,250	1.00	30,250	17.0
Lighting	LED IU Interior - Decorative	27,817	0.84	23,340	1.00	23,340	10.0
Hot Water	IU Showerhead	17,770	1.00	17,770	1.00	17,770	10.0
Lighting	LED CA Interior Decorative	26,477	0.60	15,894	1.00	15,894	2.9
Hot Water	IU Aerator	14,629	1.00	14,629	1.00	14,629	10.0
Consumer Electronics	IU Smart Strip	14,132	1.00	14,132	1.00	14,132	7.0
HVAC	IU Central AC	5,525	0.85	4,713	1.00	4,713	18.0
Lighting	LED CA Interior - Omnidirectional CFL	13,368	0.89	11,954	1.00	11,954	3.4
Refrigeration	CA Vending Miser	11,291	1.00	11,291	1.00	11,291	5.0
HVAC	IU ECM Blower	10,192	1.00	10,192	1.00	10,192	6.0
Lighting	LED IU Interior - Fixture	8,085	1.24	10,052	1.00	10,052	15.0
Lighting	LED CA Exterior - Omnidirectional	8,825	1.00	8,825	1.00	8,825	4.6
HVAC	IU Programmable Thermostat	6,782	1.00	6,782	1.00	6,782	8.0
HVAC	IU Room AC	2,744	1.00	2,744	1.00	2,744	12.0
Hot Water	CA DHW Controls	1,968	1.00	1,968	1.00	1,968	15.0
HVAC	IU Advanced Thermostat	1,506	1.00	1,506	1.00	1,506	11.0
Lighting	LED IU Exterior - Omnidirectional	1,492	1.00	1,492	1.00	1,492	8.0
Lighting	LED CA Exterior - Directional	1,472	1.00	1,472	1.00	1,472	5.8
Hot Water	IU Shower Timer	1,289	1.00	1,289	1.00	1,289	2.0
Lighting	LED CA Exterior - Omnidirectional CFL	1,248	1.00	1,248	1.00	1,248	4.6
HVAC	IU Reprogram Thermostat	633	1.00	633	1.00	633	2.0
Lighting	LED CA Garage - Omnidirectional CFL	333	1.00	333	1.00	333	5.6
Miscellaneous	CA Smart Strip	326	1.00	326	1.00	326	7.0
Lighting	Occupancy Sensor	172	1.14	196	1.00	196	8.0
Lighting	LED CA Garage - Omnidirectional	120	1.00	120	1.00	120	5.6
Shell	CA Air Sealing	0	NA	0	1.00	0	20.0
HVAC	CA Pipe Insulation	0	NA	0	1.00	0	15.0
HVAC	CA Steam Boiler	0	NA	0	1.00	0	25.0
HVAC	CA Pipe Steam Averaging Controls	0	NA	0	1.00	0	20.0
HVAC	IU Furnace	1,711	0.00	0	1.00	0	20.0
Hot Water	CA DHW Boiler	0	NA	0	1.00	0	15.0
HVAC	CA Hydronic Boiler	0	NA	0	1.00	0	25.0
HVAC	IU AC Cover and Gap Sealer	0	NA	0	1.00	0	5.0
	Total	1,812,402	0.98	1,776,974	NA	1,776,974	NA

NA = Not applicable (refers to a piece of data that cannot be produced or does not apply).
Note: The savings in this table includes secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd. The savings account for electric heating penalties, where applicable.
* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
Source: ComEd tracking data and evaluation team analysis

Table 2-7. IEMS 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)
Shell	CA Attic Insulation and Air Sealing	22.06	0.26	5.75	1.00	5.75
Lighting	LED CA Interior 24/7 - Fixture	24.77	1.06	26.34	1.00	26.34
Lighting	LED CA Exterior - Fixture	0.00	NA	0.00	1.00	0.00
Lighting	LED IU Interior - Omnidirectional	15.61	1.00	15.61	1.00	15.61
Shell	CA Foundation Sidewall Insulation	2.26	0.00	0.00	1.00	0.00
Lighting	LED CA Interior - Fixture	14.86	1.53	22.69	1.00	22.69
Lighting	LED Exit Sign	8.76	1.03	8.98	1.00	8.98
Lighting	LED CA Interior - Omnidirectional	5.23	1.08	5.67	1.00	5.67
Lighting	LED CA Interior - T12	7.88	1.52	11.94	1.00	11.94
Lighting	LED CA Interior 24/7 - T12	3.97	1.01	4.03	1.00	4.03
Appliances	Refrigerator	5.13	0.89	4.56	1.00	4.56
Lighting	LED IU Interior - Decorative	4.09	1.00	4.09	1.00	4.09
Hot Water	IU Showerhead	1.61	1.00	1.61	1.00	1.61
Lighting	LED CA Interior Decorative	2.88	1.00	2.88	1.00	2.88
Hot Water	IU Aerator	3.00	1.00	3.00	1.00	3.00
Consumer Electronics	IU Smart Strip	1.59	1.00	1.59	1.00	1.59
HVAC	IU Central AC	9.96	0.59	5.85	1.00	5.85
Lighting	LED CA Interior - Omnidirectional CFL	1.46	1.04	1.51	1.00	1.51
Refrigeration	CA Vending Miser	0.00	NA	0.00	1.00	0.00
HVAC	IU ECM Blower	0.44	1.00	0.44	1.00	0.44
Lighting	LED IU Interior - Fixture	1.19	1.16	1.37	1.00	1.37
Lighting	LED CA Exterior - Omnidirectional	0.00	NA	0.00	1.00	0.00
HVAC	IU Programmable Thermostat	0.00	NA	0.00	1.00	0.00
HVAC	IU Room AC	3.88	1.00	3.88	1.00	3.88
Hot Water	CA DHW Controls	0.00	NA	0.00	1.00	0.00
HVAC	IU Advanced Thermostat	0.63	1.00	0.63	1.00	0.63
Lighting	LED IU Exterior - Omnidirectional	0.16	1.00	0.16	1.00	0.16
Lighting	LED CA Exterior - Directional	0.00	NA	0.00	1.00	0.00
Hot Water	IU Shower Timer	0.00	NA	0.00	1.00	0.00
Lighting	LED CA Exterior - Omnidirectional CFL	0.00	NA	0.00	1.00	0.00
HVAC	IU Reprogram Thermostat	0.00	NA	0.00	1.00	0.00
Lighting	LED CA Garage - Omnidirectional CFL	0.09	1.00	0.09	1.00	0.09
Miscellaneous	CA Smart Strip	0.00	NA	0.00	1.00	0.00
Lighting	Occupancy Sensor	0.07	1.35	0.09	1.00	0.09
Lighting	LED CA Garage - Omnidirectional	0.03	1.00	0.03	1.00	0.03
Shell	CA Air Sealing	0.00	NA	0.00	1.00	0.00
HVAC	CA Pipe Insulation	0.00	NA	0.00	1.00	0.00
HVAC	CA Steam Boiler	0.00	NA	0.00	1.00	0.00
HVAC	CA Pipe Steam Averaging Controls	0.00	NA	0.00	1.00	0.00
HVAC	IU Furnace	0.00	NA	0.00	1.00	0.00
Hot Water	CA DHW Boiler	0.00	NA	0.00	1.00	0.00
HVAC	CA Hydronic Boiler	0.00	NA	0.00	1.00	0.00
HVAC	IU AC Cover and Gap Sealer	0.00	NA	0.00	1.00	0.00
	Total	141.59	0.94	132.78	NA	132.78

NA = Not applicable (refers to a piece of data that cannot be produced or does not apply).
* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: ComEd tracking data and evaluation team analysis

Table 2-8. IEMS 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)
Shell	CA Attic Insulation and Air Sealing	47,700	1.00	47,699	1.00	47,699	20.0
Lighting	LED CA Interior 24/7 - Fixture	0	NA	0	1.00	0	5.7
Lighting	LED CA Exterior - Fixture	0	NA	0	1.00	0	11.6
Lighting	LED IU Interior - Omnidirectional	0	NA	0	1.00	0	10.0
Shell	CA Foundation Sidewall Insulation	0	NA	0	1.00	0	20.0
Lighting	LED CA Interior - Fixture	0	NA	0	1.00	0	15.0
Lighting	LED Exit Sign	0	NA	0	1.00	0	5.0
Lighting	LED CA Interior - Omnidirectional	0	NA	0	1.00	0	3.4
Lighting	LED CA Interior - T12	0	NA	0	1.00	0	15.0
Lighting	LED CA Interior 24/7 - T12	0	NA	0	1.00	0	5.7
Appliances	Refrigerator	0	NA	0	1.00	0	17.0
Lighting	LED IU Interior - Decorative	0	NA	0	1.00	0	10.0
Hot Water	IU Showerhead	7,901	1.00	7,901	1.00	7,901	10.0
Lighting	LED CA Interior Decorative	0	NA	0	1.00	0	2.9
Hot Water	IU Aerator	6,105	1.01	6,138	1.00	6,138	10.0
Consumer Electronics	IU Smart Strip	0	NA	0	1.00	0	7.0
HVAC	IU Central AC	0	NA	0	1.00	0	18.0
Lighting	LED CA Interior - Omnidirectional CFL	0	NA	0	1.00	0	3.4
Refrigeration	CA Vending Miser	0	NA	0	1.00	0	5.0
HVAC	IU ECM Blower	0	NA	0	1.00	0	6.0
Lighting	LED IU Interior - Fixture	0	NA	0	1.00	0	15.0
Lighting	LED CA Exterior - Omnidirectional	0	NA	0	1.00	0	4.6
HVAC	IU Programmable Thermostat	7,019	1.00	7,019	1.00	7,019	8.0
HVAC	IU Room AC	0	NA	0	1.00	0	12.0
Hot Water	CA DHW Controls	2,137	1.00	2,137	1.00	2,137	15.0
HVAC	IU Advanced Thermostat	315	1.00	315	1.00	315	11.0
Lighting	LED IU Exterior - Omnidirectional	0	NA	0	1.00	0	8.0
Lighting	LED CA Exterior - Directional	0	NA	0	1.00	0	5.8
Hot Water	IU Shower Timer	1,977	1.00	1,977	1.00	1,977	2.0
Lighting	LED CA Exterior - Omnidirectional CFL	0	NA	0	1.00	0	4.6
HVAC	IU Reprogram Thermostat	294	1.78	524	1.00	524	2.0
Lighting	LED CA Garage - Omnidirectional CFL	0	NA	0	1.00	0	5.6
Miscellaneous	CA Smart Strip	0	NA	0	1.00	0	7.0
Lighting	Occupancy Sensor	0	NA	0	1.00	0	8.0
Lighting	LED CA Garage - Omnidirectional	0	NA	0	1.00	0	5.6
Shell	CA Air Sealing	554	1.00	554	1.00	554	20.0
HVAC	CA Pipe Insulation	89,485	1.02	91,081	1.00	91,081	15.0
HVAC	CA Steam Boiler	87,550	1.01	88,071	1.00	88,071	25.0
HVAC	CA Pipe Steam Averaging Controls	40,130	1.00	40,276	1.00	40,276	20.0
HVAC	IU Furnace	1,435	0.74	1,059	1.00	1,059	20.0
Hot Water	CA DHW Boiler	1,331	1.00	1,331	1.00	1,331	15.0
HVAC	CA Hydronic Boiler	6,724	1.01	6,810	1.00	6,810	25.0
HVAC	IU AC Cover and Gap Sealer	133	0.93	125	1.00	125	5.0
	Total Therms	300,787	1.01	303,016	NA	303,016	NA
	Total kWh Converted From Therms†	8,816,080	1.01	8,881,389	NA	8,881,389	NA

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

* A deemed value. Source: is found on the Illinois SAG website: 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 2-9. IEMS 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)
Shell	CA Attic Insulation and Air Sealing	2,189,602	0.99	2,172,482	1.00	2,172,482
Lighting	LED CA Interior 24/7 - Fixture	207,741	1.04	216,187	1.00	216,187
Lighting	LED CA Exterior - Fixture	130,020	1.01	130,724	1.00	130,724
Lighting	LED IU Interior - Omnidirectional	129,099	0.93	120,080	1.00	120,080
Shell	CA Foundation Sidewall Insulation	2,264	34.30	77,657	1.00	77,657
Lighting	LED CA Interior - Fixture	119,652	0.64	76,621	1.00	76,621
Lighting	LED Exit Sign	73,444	0.98	71,645	1.00	71,645
Lighting	LED CA Interior - Omnidirectional	47,988	0.96	45,890	1.00	45,890
Lighting	LED CA Interior - T12	63,401	0.64	40,667	1.00	40,667
Lighting	LED CA Interior 24/7 - T12	33,340	0.90	29,925	1.00	29,925
Appliances	Refrigerator	34,029	0.89	30,250	1.00	30,250
Lighting	LED IU Interior - Decorative	27,817	0.84	23,340	1.00	23,340
Hot Water	IU Showerhead	249,334	1.00	249,337	1.00	249,337
Lighting	LED CA Interior Decorative	26,477	0.60	15,894	1.00	15,894
Hot Water	IU Aerator	193,559	1.01	194,544	1.00	194,544
Consumer Electronics	IU Smart Strip	14,132	1.00	14,132	1.00	14,132
HVAC	IU Central AC	5,525	0.85	4,713	1.00	4,713
Lighting	LED CA Interior - Omnidirectional CFL	13,368	0.89	11,954	1.00	11,954
Refrigeration	CA Vending Miser	11,291	1.00	11,291	1.00	11,291
HVAC	IU ECM Blower	10,192	1.00	10,192	1.00	10,192
Lighting	LED IU Interior - Fixture	8,085	1.24	10,052	1.00	10,052
Lighting	LED CA Exterior - Omnidirectional	8,825	1.00	8,825	1.00	8,825
HVAC	IU Programmable Thermostat	212,509	1.00	212,506	1.00	212,506
HVAC	IU Room AC	2,744	1.00	2,744	1.00	2,744
Hot Water	CA DHW Controls	64,589	1.00	64,589	1.00	64,589
HVAC	IU Advanced Thermostat	10,750	1.00	10,750	1.00	10,750
Lighting	LED IU Exterior - Omnidirectional	1,492	1.00	1,492	1.00	1,492
Lighting	LED CA Exterior - Directional	1,472	1.00	1,472	1.00	1,472
Hot Water	IU Shower Timer	59,229	1.00	59,226	1.00	59,226
Lighting	LED CA Exterior - Omnidirectional CFL	1,248	1.00	1,248	1.00	1,248
HVAC	IU Reprogram Thermostat	9,252	1.73	15,995	1.00	15,995
Lighting	LED CA Garage - Omnidirectional CFL	333	1.00	333	1.00	333
Miscellaneous	CA Smart Strip	326	1.00	326	1.00	326
Lighting	Occupancy Sensor	172	1.14	196	1.00	196
Lighting	LED CA Garage - Omnidirectional	120	1.00	120	1.00	120
Shell	CA Air Sealing	16,225	1.00	16,225	1.00	16,225
HVAC	CA Pipe Insulation	2,622,793	1.02	2,669,596	1.00	2,669,596
HVAC	CA Steam Boiler	2,566,082	1.01	2,581,368	1.00	2,581,368
HVAC	CA Pipe Steam Averaging Controls	1,176,205	1.00	1,180,478	1.00	1,180,478
HVAC	IU Furnace	43,764	0.71	31,032	1.00	31,032
Hot Water	CA DHW Boiler	39,001	1.00	39,001	1.00	39,001
HVAC	CA Hydronic Boiler	197,080	1.01	199,606	1.00	199,606
HVAC	IU AC Cover and Gap Sealer	3,913	0.93	3,658	1.00	3,658
	Total†	10,628,482	1.00	10,658,363	NA	10,658,363

NA = Not applicable (refers to a piece of data that cannot be produced or does not apply).
* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The total includes the electric equivalent of the total therms.

Source: ComEd tracking data and evaluation team analysis

The IEMS program component includes measures that save water. That reduction in water produces secondary kWh savings from water supply and wastewater treatment. Table 2-10 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 2-10. IEMS 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)
Shell	CA Attic Insulation and Air Sealing	0	NR	NA	0	1.00	0
Lighting	LED CA Interior 24/7 - Fixture	0	NR	NA	0	1.00	0
Lighting	LED CA Exterior - Fixture	0	NR	NA	0	1.00	0
Lighting	LED IU Interior - Omnidirectional	0	NR	NA	0	1.00	0
Shell	CA Foundation Sidewall Insulation	0	NR	NA	0	1.00	0
Lighting	LED CA Interior - Fixture	0	NR	NA	0	1.00	0
Lighting	LED Exit Sign	0	NR	NA	0	1.00	0
Lighting	LED CA Interior - Omnidirectional	0	NR	NA	0	1.00	0
Lighting	LED CA Interior - T12	0	NR	NA	0	1.00	0
Lighting	LED CA Interior 24/7 - T12	0	NR	NA	0	1.00	0
Appliances	Refrigerator	0	NR	NA	0	1.00	0
Lighting	LED IU Interior - Decorative	0	NR	NA	0	1.00	0
Hot Water	IU Showerhead	1,931,481	NR	NA	5,733	1.00	5,733
Lighting	LED CA Interior Decorative	0	NR	NA	0	1.00	0
Hot Water	IU Aerator	1,881,098	NR	NA	5,586	1.00	5,586
Consumer Electronics	IU Smart Strip	0	NR	NA	0	1.00	0
HVAC	IU Central AC	0	NR	NA	0	1.00	0
Lighting	LED CA Interior - Omnidirectional CFL	0	NR	NA	0	1.00	0
Refrigeration	CA Vending Miser	0	NR	NA	0	1.00	0
HVAC	IU ECM Blower	0	NR	NA	0	1.00	0
Lighting	LED IU Interior - Fixture	0	NR	NA	0	1.00	0
Lighting	LED CA Exterior - Omnidirectional	0	NR	NA	0	1.00	0
HVAC	IU Programmable Thermostat	0	NR	NA	0	1.00	0
HVAC	IU Room AC	0	NR	NA	0	1.00	0
Hot Water	CA DHW Controls	0	NR	NA	0	1.00	0
HVAC	IU Advanced Thermostat	0	NR	NA	0	1.00	0
Lighting	LED IU Exterior - Omnidirectional	0	NR	NA	0	1.00	0
Lighting	LED CA Exterior - Directional	0	NR	NA	0	1.00	0
Hot Water	IU Shower Timer	438,865	NR	NA	1,289	1.00	1,289
Lighting	LED CA Exterior - Omnidirectional CFL	0	NR	NA	0	1.00	0
HVAC	IU Reprogram Thermostat	0	NR	NA	0	1.00	0
Lighting	LED CA Garage - Omnidirectional CFL	0	NR	NA	0	1.00	0
Miscellaneous	CA Smart Strip	0	NR	NA	0	1.00	0
Lighting	Occupancy Sensor	0	NR	NA	0	1.00	0
Lighting	LED CA Garage - Omnidirectional	0	NR	NA	0	1.00	0
Shell	CA Air Sealing	0	NR	NA	0	1.00	0
HVAC	CA Pipe Insulation	0	NR	NA	0	1.00	0
HVAC	CA Steam Boiler	0	NR	NA	0	1.00	0
HVAC	CA Pipe Steam Averaging Controls	0	NR	NA	0	1.00	0
HVAC	IU Furnace	0	NR	NA	0	1.00	0
Hot Water	CA DHW Boiler	0	NR	NA	0	1.00	0
HVAC	CA Hydronic Boiler	0	NR	NA	0	1.00	0
HVAC	IU AC Cover and Gap Sealer	0	NR	NA	0	1.00	0
	Total	4,251,444	NR	NA	12,608	NA	12,608

NR = Not reported (refers to a piece of data that was not reported).
NA = Not applicable (refers to a piece of data that cannot be produced or does not apply).
Note: The savings in this table reflect only secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd, not those claimed by gas utilities.
* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: ComEd tracking data and evaluation team analysis

2.5 IEMS Program Component Impact Analysis Findings and Recommendations

2.5.1 IEMS Program Component Impact Parameter Estimates

The evaluation team used the savings algorithms and inputs deemed by the Illinois Statewide Technical Reference Manual (TRM v8.0) and TRM v8.0 Errata, where applicable, to calculate the energy and demand savings for each measure installed as a part of the IEMS program component in CY2020. Table 2-11 presents the deemed input parameter source the evaluation team used by measure. TRM v8.0 allows for custom or actual values to be used for some of the input parameters. The evaluation team based these values on the program tracking database when available.

To estimate lifetime energy and demand savings, the evaluation team multiplied the verified savings by the effective useful life (EUL) for each measure.

The evaluation team conducted research to validate the parameters that were not specified in the TRM. Table 2-11 shows the results.

Table 2-11. IEMS Savings Parameters

Measure Name	Custom Input Parameters	Deemed Input Parameters	Source *
Common area (CA) Air Sealing	N_{sweeps}, linear $feet_{wx}$	$\Delta Therms_{wx}$, $\Delta Therms_{sweep}$, adjustment factor (ADJ) $ADJ_{RxAirSealing}$, in-service rate (ISR)	TRM v8.0 – Section 5.6.1
CA Attic Insulation and Air Sealing	R_{old}, R_{attic}, A_{attic}, Eff_{heat}, Eff_{cool}, linear $feet_{AirSealing}$	Framing factor (FF), cooling degree days (CDD), heating degree days (HDD), Eff_{heat}, ADJ_{heat}, furnace fan energy consumption (F_e), $ADJ_{heat\ fan}$, discretionary use adjustment (DUA), Eff_{cool}, ADJ_{cool}, full load hours (FLH), coincidence factor (CF), $IE_{NetCorrection,}$ $ADJ_{RxAirSealing}$, ISR, $\Delta Therms_{AirSealing}$	TRM v8.0 – Section 5.6.5 and Section 5.6.1
CA DHW Boiler	#Units, tank temperature, Eff_{Exist}, Eff_{EE}, input rating, tank volume, standby loss, input rating, tank volume	Number of people in household (MFHH), gallons of hot water per person per day (GPD), Days/yr, specific weight of water, incoming water temperature, Eff_{Base}, Hours/yr	TRM v8.0 – Section 4.3.7
CA DHW Controls	Boiler input capacity	Total $operating\ hours_{normal\ occ}$, total $operating\ hours_{low\ occ}$, reduction in $operating\ hours_{normal\ occ}$, reduction in $operating\ hours_{low\ occ}$	TRM v8.0 – Section 4.3.8
CA Foundation Sidewall Insulation	$R_{new\text{-}AG}$, $L_{wall\text{-}Total}$, $H_{wall\text{-}AG}$, $R_{old\text{-}BG}$, $R_{new\text{-}BG}$, $H_{wall\text{-}Total}$	$R_{old\text{-}AG}$, FF, HDD, Eff_{heat}, ADJ_{heat}, F_e, CDD, DUA, Eff_{cool}, ADJ_{cool}, FLH, CF	TRM v8.0 – Section 5.6.2
CA Hydronic Boiler / CA Steam Boiler	Capacity, Eff_{actual}	Effective full load hours (EFLH), Eff_{Base}	TRM v8.0 – Section 4.4.10
CA Pipe Insulation	Heat loss (ΔQ)	EFLH, thermal regain factor (TRF), Eff_{Boiler}	TRM v8.0 – Section 4.4.14

Measure Name	Custom Input Parameters	Deemed Input Parameters	Source *
CA Pipe Steam Averaging Controls	Capacity	EFLH, savings factor (SF)	TRM v8.0 – Section 4.4.36
CA Smart Strip	None	kW_{wkday}, kW_{wkend}, hrs_{wkday}, hrs_{wkend}, $hrs_{wkday\text{-}open}$, $hrs_{wkend\text{-}open}$, ISR, weeks/year	TRM v8.0 – Section 4.8.7
CA Vending Miser	None	$Watts_{Base}$, Hours, ESF	TRM v8.0 – Section 4.6.2
In unit (IU) AC Cover and Gap Sealer	Air infiltration (Q_{inf})	Average outside air temperature (T_{OA}), average indoor air temperature (T_{SA}), EFLH, efficiency	TRM v8.0 – Section 4.4.38
IU Advanced Thermostat	%AC, %Electric heat, %Fossil heat	Electric heating consumption, heating reduction, household factor (HF), ISR, F_e, FLH, capacity, Seasonal Energy Efficiency Ratio (SEER), cooling reduction, energy efficiency ratio (EER), CF, gas heating consumption	TRM v8.0 – Section 5.3.16
IU Aerator	%Electric domestic hot water (DHW), %Fossil DHW	Baseline gallons per minute (GPM_{Base}), GPM_{Low}, length of faucet use, household, drain factor (DF), faucets per household (FPH), energy per gallon (EPG), hours, CF, ISR	TRM v8.0 – Section 5.4.4
IU Central AC	SEER, Capacity, $SEER_{adj}$, EER	SEER, $DeratingCool_{Base}$, $DeratingCool_{Eff}$, FLH, EER, CF	TRM v8.0 – Section 5.3.3
IU ECM Blower	None	Capacity, kWh savings per ton, kW savins per ton	TRM v8.0 – Section 5.3.5
IU Furnace	Capacity, AFUE	EFLH, AFUE, $derating_{Eff}$, $derating_{Base}$, heating kWh savings	TRM v8.0 – Section 5.3.5 and 5.3.7
IU Programmable Thermostat / IU Reprogram Thermostat	%Fossil heat	Gas heating consumption, heating reduction, HF, ISR	TRM v8.0 – Section 5.6.11
IU Room AC	Capacity, CEER	FLH, CEER, EER, CF	TRM v8.0 – Section 5.1.7
IU Shower Timer	%Electric DHW, % Fossil DHW	GPM, household, days/year, showers per capita per day (SPCD), usage factor, EPG, number of minutes without shower timer (L_{Base}), L_{Timer}, hours, CF	TRM v8.0 – Section 5.4.9
IU Showerhead	%Electric DHW, %Fossil DHW	GPM_{Base}, GPM_{Low}, shower length, household, SPCD, showerheads per household (SPH), EPG, hours, CF, ISR	TRM v8.0 – Section 5.4.5
IU Smart Strip	None	Annual kWh savings per unit, ISR	TRM v8.0 – Section 5.2.1
Refrigerator	Capacity cooling, SEER, HSPF, capacity heating	FLH cooling, MFe, SEER, EER, MFd, HSPF, FLH heating, CF	TRM v8.0 – Section 5.6.1

* TRM is the State of Illinois 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: https://www.ilsag.info/ntg_2020.

Source: Evaluation team analysis

2.5.2 Other IEMS Program Component Impact Findings and Recommendations

Overall, the implementation team determined that the implementer accurately calculated the savings for the IEMS program component. To further improve realization rates, the evaluation team developed measure-level recommendations based on findings from the CY2020 evaluation. Table 2-12 presents the end use-level realization rates and program savings percentages to give context to the team's recommendations. HVAC measures represent 65% of the IEMS program component's savings; shell measures represent 21% of the savings, lighting represents 8% of the savings; hot water measures represent 6% of the savings.

Table 2-12. IEMS End Use-Level Savings and Realization Rates

End Use Type	Realization Rate	Percentage of Verified Net Savings
HVAC	1.01	65%
Shell	1.03	21%
Lighting	0.90	8%
Hot Water	1.00	6%
Appliances	0.89	<1%
Consumer Electronics	1.00	<1%
Refrigeration	1.00	<1%
Miscellaneous	1.00	<<1%

Source: Evaluation team analysis of CY2020 ComEd tracking data

2.5.2.1 Common Area Steam Boiler and Common Area Hydronic Boiler

Finding 1. The ex ante savings for two projects, project ID 10005587 and 10007100, were calculated using the EFLH heating hours from TRM v7.0. This is incorrect as the EFLH heating values from the TRM v8.0 are more appropriate for CY2020 measures. These measures represented 26.1% of the program savings and had a realization rate of 1.01.

Recommendation 1. The evaluation team recommends that the implementer use the latest version of the TRM for determining the appropriate EFLH heating hours for this measure.

Finding 2. The ex ante savings for a Common Area steam boiler measure (project ID 10005842) with a capacity of 2,403 kBtu/hr was calculated using a baseline efficiency of 80%. This is incorrect and the appropriate baseline efficiency for this boiler size is 79%, as deemed by the TRM v8.0.

Recommendation 2. The evaluation team recommends that the implementer use the latest version of the TRM to determine the appropriate baseline efficiency for this measure.

2.5.2.2 Common Area Pipe Insulation

Finding 3. The ex ante savings for this measure are calculated using the EFLH heating values for measures installed in mid-rise multi-family buildings, however the measures are actually installed in both high rise and mid-rise multi-family buildings. This measure represented 25% of the program component savings and had a realization rate of 1.02.

Recommendation 3. The evaluation team recommends that the implementer use the EFLH heating value of 1,782 and 1,540 for mid-rise and high rise buildings, respectively.

2.5.2.3 Common Area Attic Insulation, Air Sealing, and Common Area Foundation Sidewall Insulation

Finding 4. The ex ante savings for this measure included cooling kWh and kW savings for measures that were installed in buildings with window and mini-split cooling systems. However, the TRM v8.0 only deems cooling kWh and kW savings for buildings with central cooling systems. This measure represented 20% of the program savings and had a realization rate of 0.99.

Recommendation 4. The evaluation team recommends that the implementer include cooling kWh and kW savings only for measures that were installed in buildings with central cooling systems per the TRM v8.0 Section 5.6.5.

Finding 5. The ex ante savings for the Common Area foundation sidewall insulation measure did not include heating kWh savings for measures installed in buildings with an electric resistance heating system type. However, the TRM v8.0 does deem kWh savings for these buildings.

Recommendation 5. The evaluation team recommends that the implementer include heating kWh savings for this measure for projects with an electric resistance heating system type per the TRM v8.0 Section 5.6.2.

2.5.2.4 Common Area Pipe Steam Averaging Controls

Finding 6. The ex ante savings for the project ID 10006567 and 10004887 were calculated using the EFLH heating hours from the TRM v7.0. However, the EFLH heating values from the TRM v8.0 are more appropriate for CY2020 measures. This measure represented 11% of the program savings and had a realization rate of 1.00.

Recommendation 6. The evaluation team recommends that the implementer use the EFLH heating hours deemed in the latest version of the TRM.

2.5.2.5 LED Lighting

Finding 7. The ex ante energy savings for all interior LED lighting measures did not account for the electric heating penalty for measures installed in electrically heated buildings. This is inconsistent with the algorithm deemed in TRM v8.0. The LED lighting measures represent 8% of the program savings and had a realization rate of 0.90.

Recommendation 7. The evaluation team recommends that the implementer track electric heating penalties for affected measures and account for those in ex ante savings, per the TRM.

Finding 8. For all Common Area (CA) LED lighting measures, the ex ante calculations are separated into 24/7 CA measures and non-24/7 CA measures. The 24/7 CA measures use 8,766 annual operating hours and 1.0 as the coincidence factor (CF), while the non-24/7 CA measures use the TRM v8.0 deemed values for annual operating hours and CF. However, these TRM v8.0 deemed values are a blended mix of both 24/7 and non-24/7 spaces. By using the TRM values for just the non-24/7 lighting measures, the ex ante calculations overestimate

the energy and demand savings. Based on guidance provided in CY2019, the evaluation team calculated the verified energy and demand savings using 3,242 as the annual operating hours and 0.9 as the CF for all non-24/7 CA lighting measures.

Recommendation 8. The evaluation team recommends that the implementer use 3,242 as the annual operating hours and 0.9 as the CF for all non-24/7 CA lighting measures if the ex ante calculations for CA LED lighting measures are separated into 24/7 CA measures and non-24/7 CA measures.

Finding 9. The ex ante savings for the Outdoor 251-400 W HID_LED_CA SPIA measure were calculated using a baseline wattage (Watts base) of 366.3 W deemed in Section 4.5.3 of TRM v8.0. However, this is inconsistent with the Watts base used for other outdoor high intensity discharge (HID) fixtures, which are from Section 4.5.4 of the TRM v8.0.

Recommendation 9. The evaluation team recommends that the implementer use a Watts base of 369.3 W for this measure as deemed in Section 4.5.4 of TRM v8.0.

Finding 10. The ex ante savings for the measures IU Interior LED – 7 W Track Light (50 W) - Pin Base GU10 DI, IU Interior LED – 8 W Flood (65W) DI, and IU Interior LED – 7 W Track Light (50 W) - Pin Base GU5.3 DI were calculated using input assumptions deemed for LED specialty lamps (TRM v8.0 Errata Section 5.5.6). However, Section 5.5.9 LED Fixtures of the TRM v8.0 Errata is more appropriate for this measure as these lighting measures fall into the LED fixture category and this section applies specifically to flood light and track lighting fixtures.

Recommendation 10. The evaluation team recommends that the implementer use TRM v8.0 Errata Section 5.5.9 to calculate savings for this measure.

Finding 11. The ex ante savings for the dual-sided (2 lamps) LED exit sign measure LED Exit Sign CHI Retrofit_2L_CA 24/7 SPIA uses an efficient wattage deemed for single-sided (1 lamp) exit signs (2 W).

Recommendation 11. The evaluation team recommends that the implementer use the efficient wattage deemed in Section 4.5.5 of TRM v8.0 for dual-sided fixtures and use 4 W instead of 2 W.

Finding 12. For all LED exit sign and occupancy sensor measures installed in high rise multi-family buildings, the ex ante savings were calculated using deemed input assumptions for mid-rise multi-family buildings, including hours, CF, WHF_e, WHF_d for occupancy sensor measures and WHF_e, and WHF_d for the exit sign measures.

Recommendation 12. The evaluation team recommends that the implementer use the appropriate input assumption for mid-rise and high rise buildings from Section 4.5.4 of the TRM v8.0.

Finding 13. The ex ante savings for all CA LED lighting measures were calculated using the hours, CF, WHFe, WHFd values deemed for mid-rise multi-family buildings, irrespective of the type of building in which the measures were installed.

Recommendation 13. The evaluation team recommends that the implementer use the appropriate input assumption for mid-rise and high rise buildings from Section 4.5.4 of the TRM v8.0.

Finding 14. The ex ante savings for the measure 2L 2ft T12_Linear Retrofit_CA 24/7 SPIA were calculated using a baseline wattage of 28.2 W. This value is appropriate for T8 fixtures and not T12 fixtures.

Recommendation 14. The evaluation team recommends that the implementer use a baseline wattage of 41.5W per TRM v8.0.

Finding 15. The ex ante savings for the 1 lamp 3 feet T8 fixtures (1L 3ft T8_Linear Retrofit_CA 24/7 SPIA and 1L 3ft T8_TLED_CA 24/7 SPIA) were calculated using a baseline wattage assumption of 21.15 W. This value was determined by adjusting the TRM v8.0 deemed baseline wattage of a 1 lamp 4 feet T8 fixture (28.2W * 0.75 = 21.15W). This approximation is not needed as the TRM v8.0 deems a wattage of 22W for 3 feet T8 fixtures.

Recommendation 15. The evaluation team recommends that the implementer use the baseline wattage of 22 W per the TRM v8.0.

Finding 16. The ex ante savings for the 2 lamp 8 feet T12 delamping measures (2L 8ft T12_Delamp 1L 8ft Linear Retrofit_CA Std SPIA and 2L 8ft T12_Delamp 1L 8ft or 2L 4ft TLED_CA Std SPIA) were calculated using an efficient wattage of 63.2 W. This value is calculated by adjusting the TRM v8.0 deemed efficient wattage of a 1 lamp 8 feet T12 fixture (15.8 W * 4 = 63.2 W). The adjustment was applied incorrectly, and the efficient wattage should be 31.6 W (15.8W * 2 = 31.6 W) instead.

Recommendation 16. The evaluation team recommends that the implementer use the efficient wattage of 31.6 W per the TRM v8.0.

Finding 17. The ex ante savings for the 4 lamp 4 feet T8 measures (4L 4ft T8_TLED_CA Std SPIA and 4L 4ft T8_Linear Retrofit_CA Std SPIA) were calculated using an efficient wattage of 61.3 W. The source of this value is unclear and the value should be calculated by adjusting the TRM v8.0 deemed efficient wattage of a 1 lamp 4 feet T8 fixture (15.8 W * 4 = 63.2 W).

Recommendation 17. The evaluation team recommends that the implementer use the efficient wattage of 63.2 W per the TRM v8.0.

Finding 18. The ex ante savings for the 2 lamp 8 feet T8 measures (2L 8ft T8_Linear Retrofit_CA Std SPIA) were calculated using a baseline wattage of 112.64 W. The source of this value is unclear and it should be calculated by adjusting the TRM v8.0 deemed baseline wattage of a 1 lamp 8 feet T8 fixture (61.6 W * 2 = 123.2 W).

Recommendation 18. The evaluation team recommends that the implementer use the baseline wattage of 123.2 W per the TRM v8.0.

Finding 19. The ex ante savings for the 1 lamp 2 feet T8 measure (1L 2ft T8_TLED_CA 24/7 SPIA) was calculated using a baseline wattage of 14.1 W and efficient wattage of 7.9 W. These values were calculated by adjusting the TRM v8.0 deemed values for 1 lamp 4 feet T8 fixtures. These approximations are not needed as the TRM v8.0 deems a baseline and efficient wattage of 15 W and 8.9 W for these fixtures.

Recommendation 19. The evaluation team recommends that the implementer use the baseline and efficient wattage of 15 W and 8.9 W, respectively, per the TRM v8.0.

2.5.2.6 In Unit Furnace

Finding 20. The ex ante savings calculations for this measure assumed that a quality installation was performed by the implementer, as defined by TRM v8.0. This assumption is not appropriate since no supporting documentation was provided. This measure represented 0.3% of the program savings and had a realization rate of 0.71.

Recommendation 20. The evaluation team recommends that the implementer not make this assumption when calculating savings for this measure if no relevant documentation is available to support this assumption.

Finding 21. The ex ante energy savings calculations for this measure double counted the energy savings by claiming both therm savings and kWh equivalent of the therm savings.

Recommendation 21. The evaluation team recommends that the implementer not claim any heating kWh savings for this measure as it is already being accounted for in the therm savings.

2.5.2.7 Refrigerator

Finding 22. There was a discrepancy between the quantity of refrigerators used in the ex ante calculations and the quantity of refrigerators in the tracking data as 2 shows. The verified savings for this measure were calculated using the tracking data quantity of refrigerators. This measure represented 0.3% of the program savings and had a realization rate of 0.89.

Table 2-13. IEMS Quantity Comparison – Refrigerator

Project ID	Tracking Data Quantity	Ex Ante Calculations Quantity
10006097	1	2
10006236	8	7
10006737	14	24
10006375	7	8

Source: Evaluation team analysis

Recommendation 22. The evaluation team recommends that the implementer confirm the actual quantity of refrigerators installed for these project IDs and ensure the tracking data quantity matches the quantity used in the ex ante calculations.

2.5.2.8 In Unit Central AC

Finding 23. The ex ante savings calculations for this measure assumes that a quality installation was performed by the implementer, as defined by the TRM v8.0. This assumption is not appropriate since no supporting documentation is provided. This measure represents 0.1% of the program savings and had a realization rate of 2.46.

Recommendation 23. The evaluation team recommends that the implementer not make this assumption when calculating savings for this measure if no relevant documentation is available to support this assumption.

Finding 24. The ex ante peak demand savings for this measure were calculated using the summer system peak (SSP) CF. This was incorrect and the reporting requirements required the use of PJM CF while calculating the peak demand savings.

Recommendation 24. The evaluation team recommends that the implementer use the PJM CF to calculate peak demand savings for this measure.

2.5.2.9 In Unit AC Cover and Gap Sealer

Finding 25. The ex ante savings for this measure are calculated using the TRM v8.0 deemed effective full load hours (EFLH) heating value of 1,782 hours for mid-rise multi-family buildings. However, the measure was installed in a high rise multi-family building. This measure represents 0.03% of the program savings and had a realization rate of 0.93.

Recommendation 25. The evaluation team recommends that the implementer use the appropriate building type-specific EFLH heating values for this measure.

2.5.2.10 Therms Allocation

Finding 26. The tracking data did not include the gas utility name for the project ID 10005880 and ComEd did not claim any therms savings for this project. After confirming the gas utility name with the implementer, Guidehouse allocated 71% of the verified therm savings for this project ID to ComEd based on the approved therms allocation.

Recommendation 26. The evaluation team recommends that the implementer provide the gas utility name for all applicable projects and claim the approved therms in the tracking data.

2.6 IEMS Program Component Impact Analysis Methodology

The evaluation team calculated gross verified savings for the Multi-Family Retrofits Program by applying savings algorithms from the TRM v8.0. The team determined verified gross savings for each program measure by:

- Reviewing the savings algorithm inputs in the measure databook for agreement with the TRM v8.0 and TRM v8.0 Errata.
- Validating savings algorithms were applied correctly.
- Cross-checking per-unit savings values in the tracking data with the verified values in the measure databook or in the team's calculations if the databook did not agree with the TRM v8.0.
- Multiplying the verified per-unit savings value by the quantity reported in the tracking data.

Guidehouse downloaded the final tracking data and measure databook for the CY2020 impact evaluation from the ComEd Evaluation Share file site. Guidehouse relied on the following documents to verify the per-unit savings for each program measure:

- Final CY2020 tracking data: MFLI_CY2020_EOY_Data_Rev0_01112021.xlsx
- TRM v8.0 for deemed input parameters or secondary evaluation research to verify any custom inputs used in the ex ante calculations
- Implementer Savings Calculations: Refrigerator Calculation Documentation 021820

- Implementer Savings Calculations: 2020 Elevate IEMS PHES Measure Variable Documentation_Rev 2.2

The team calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a net-to-gross (NTG) ratio of 1.0. For CY2020, the Multi-Family Retrofits Program's NTG estimate was defined by a consensus process through the Illinois SAG.

2.7 IEMS Program Component Total Resource Cost Detail

Table 2-14 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) are not included in this table and will be provided to the evaluation team later.

Table 2-14. IEMS 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)
Shell	CA Attic Insulation and Air Sealing‡	Square Feet	378,678	20.0	Yes	774,426	5.75	47,699	0	0	0	1.00	1.00	1.00	774,426	5.75	47,699	0	0	0
Lighting	LED CA Interior 24/7 - Fixture	Lamp	1,258	5.7	No	216,187	26.34	0	0	-7,038	-911	1.00	1.00	1.00	216,187	26.34	0	0	-7,038	-911
Lighting	LED CA Exterior - Fixture	Lamp	224	11.6	No	130,724	0.00	0	0	0	0	1.00	1.00	1.00	130,724	0.00	0	0	0	0
Lighting	LED IU Interior - Omnidirectional‡	Lamp	3,565	10.0	No	120,080	15.61	0	0	-9,020	-2,525	1.00	1.00	1.00	120,080	15.61	0	0	-9,020	-2,525
Shell	CA Foundation Sidewall Insulation	Square Feet	10,060	20.0	No	77,657	0.00	0	0	0	0	1.00	1.00	1.00	77,657	0.00	0	0	0	0
Lighting	LED CA Interior - Fixture	Lamp	797	15.0	No	76,621	22.69	0	0	-2,283	-475	1.00	1.00	1.00	76,621	22.69	0	0	-2,283	-475
Lighting	LED Exit Sign	Exit Sign	265	5.0	No	71,645	8.98	0	0	-4,200	-593	1.00	1.00	1.00	71,645	8.98	0	0	-4,200	-593
Lighting	LED CA Interior - Omnidirectional‡	Lamp	203	3.4	No	45,890	5.67	0	0	-2,693	-685	1.00	1.00	1.00	45,890	5.67	0	0	-2,693	-685
Lighting	LED CA Interior - T12‡	Lamp	183	15.0	No	40,667	11.94	0	0	-651	-534	1.00	1.00	1.00	40,667	11.94	0	0	-651	-534
Lighting	LED CA Interior 24/7 - T12‡	Lamp	68	5.7	No	29,925	4.03	0	0	-3,897	-426	1.00	1.00	1.00	29,925	4.03	0	0	-3,897	-426
Appliances	Refrigerator‡	Each	98	17.0	Yes	30,250	4.56	0	0	0	0	1.00	1.00	1.00	30,250	4.56	0	0	0	0
Lighting	LED IU Interior - Decorative‡	Lamp	1,047	10.0	No	23,340	4.09	0	0	-4,476	-421	1.00	1.00	1.00	23,340	4.09	0	0	-4,476	-421
Hot Water	IU Showerhead	Each	995	10.0	No	12,037	1.61	7,901	5,733	0	0	1.00	1.00	1.00	12,037	1.61	7,901	5,733	0	0
Lighting	LED CA Interior Decorative‡	Lamp	113	2.9	No	15,894	2.88	0	0	-10,583	-42	1.00	1.00	1.00	15,894	2.88	0	0	-10,583	-42
Hot Water	IU Aerator	Each	1,687	10.0	No	9,043	3.00	6,138	5,586	0	0	1.00	1.00	1.00	9,043	3.00	6,138	5,586	0	0
Consumer Electronics	IU Smart Strip	Each	343	7.0	No	14,132	1.59	0	0	0	0	1.00	1.00	1.00	14,132	1.59	0	0	0	0
HVAC	IU Central AC‡	Tons	18	18.0	Yes	4,713	5.85	0	0	0	0	1.00	1.00	1.00	4,713	5.85	0	0	0	0
Lighting	LED CA Interior - Omnidirectional CFL	Lamp	449	3.4	No	11,954	1.51	0	0	-1,486	-175	1.00	1.00	1.00	11,954	1.51	0	0	-1,486	-175
Refrigeration	CA Vending Miser	Each	7	5.0	No	11,291	0.00	0	0	0	0	1.00	1.00	1.00	11,291	0.00	0	0	0	0
HVAC	IU ECM Blower	Each	17	6.0	No	10,192	0.44	0	0	0	0	1.00	1.00	1.00	10,192	0.44	0	0	0	0
Lighting	LED IU Interior - Fixture‡	Lamp	240	15.0	No	10,052	1.37	0	0	-332	-222	1.00	1.00	1.00	10,052	1.37	0	0	-332	-222
Lighting	LED CA Exterior - Omnidirectional‡	Lamp	52	4.6	No	8,825	0.00	0	0	0	0	1.00	1.00	1.00	8,825	0.00	0	0	0	0
HVAC	IU Programmable Thermostat	Each	182	8.0	No	6,782	0.00	7,019	0	0	0	1.00	1.00	1.00	6,782	0.00	7,019	0	0	0
HVAC	IU Room AC‡	Each	88	12.0	Yes	2,744	3.88	0	0	0	0	1.00	1.00	1.00	2,744	3.88	0	0	0	0
Hot Water	CA DHW Controls	Apt Units	56	15.0	No	1,968	0.00	2,137	0	0	0	1.00	1.00	1.00	1,968	0.00	2,137	0	0	0
HVAC	IU Advanced Thermostat	Each	11	11.0	No	1,506	0.63	315	0	0	0	1.00	1.00	1.00	1,506	0.63	315	0	0	0
Lighting	LED IU Exterior - Omnidirectional‡	Lamp	22	8.0	No	1,492	0.16	0	0	0	0	1.00	1.00	1.00	1,492	0.16	0	0	0	0
Lighting	LED CA Exterior - Directional‡	Lamp	6	5.8	No	1,472	0.00	0	0	0	0	1.00	1.00	1.00	1,472	0.00	0	0	0	0
Hot Water	IU Shower Timer	Each	723	2.0	No	0	0.00	1,977	1,289	0	0	1.00	1.00	1.00	0	0.00	1,977	1,289	0	0
Lighting	LED CA Exterior - Omnidirectional CFL	Lamp	72	4.6	No	1,248	0.00	0	0	0	0	1.00	1.00	1.00	1,248	0.00	0	0	0	0
HVAC	IU Reprogram Thermostat	Each	17	2.0	No	633	0.00	524	0	0	0	1.00	1.00	1.00	633	0.00	524	0	0	0
Lighting	LED CA Garage - Omnidirectional CFL	Lamp	13	5.6	No	333	0.09	0	0	0	0	1.00	1.00	1.00	333	0.09	0	0	0	0
Miscellaneous	CA Smart Strip	Each	3	7.0	No	326	0.00	0	0	0	0	1.00	1.00	1.00	326	0.00	0	0	0	0
Lighting	Occupancy Sensor	Each	2	8.0	No	196	0.09	0	0	0	-9	1.00	1.00	1.00	196	0.09	0	0	0	-9
Lighting	LED CA Garage - Omnidirectional‡	Lamp	1	5.6	No	120	0.03	0	0	0	0	1.00	1.00	1.00	120	0.03	0	0	0	0
Shell	CA Air Sealing	Linear Feet	201	20.0	No	0	0.00	554	0	0	0	1.00	1.00	1.00	0	0.00	554	0	0	0
HVAC	CA Pipe Insulation	Linear Feet	31,365	15.0	No	0	0.00	91,081	0	0	0	1.00	1.00	1.00	0	0.00	91,081	0	0	0
HVAC	CA Steam Boiler	kBtu/hr	95,049	25.0	No	0	0.00	88,071	0	0	0	1.00	1.00	1.00	0	0.00	88,071	0	0	0
HVAC	CA Pipe Steam Averaging Controls	Projects	395	20.0	No	0	0.00	40,276	0	0	0	1.00	1.00	1.00	0	0.00	40,276	0	0	0
HVAC	IU Furnace	Each	10	20.0	No	0	0.00	1,059	0	0	0	1.00	1.00	1.00	0	0.00	1,059	0	0	0
Hot Water	CA DHW Boiler‡	Apt Units	76	15.0	Yes	0	0.00	1,331	0	0	0	1.00	1.00	1.00	0	0.00	1,331	0	0	0
HVAC	CA Hydronic Boiler	kBtu/hr	2,404	25.0	No	0	0.00	6,810	0	0	0	1.00	1.00	1.00	0	0.00	6,810	0	0	0
HVAC	IU AC Cover and Gap Sealer	Each	28	5.0	No	0	0.00	125	0	0	0	1.00	1.00	1.00	0	0.00	125	0	0	0
	Total			14.2		1,764,366	133	303,016	12,608	-46,660	-7,019	NA	NA	NA	1,764,366	133	303,016	12,608	-46,660	-7,019

Note: To avoid double counting, the verified gross kWh and net kWh used in the TRC analysis exclude secondary energy savings from water reduction measures. Table 2-14 represents the kWh savings from Table 2-6 minus those shown in Table 2-10.
* The total of the EUL column is the weighted average measure life (WAML) and is calculated as the sum product of EUL and measure savings divided by total program savings.
† Early Replacement (ER) measures are flagged as YES, otherwise a NO is indicated in the column.
‡ The EUL for this measure varies over time. See the CPAS tables (Table 2-3 to Table 2-5).
†§ 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

3. IHWAP Program Component

3.1 IHWAP Program Component Description

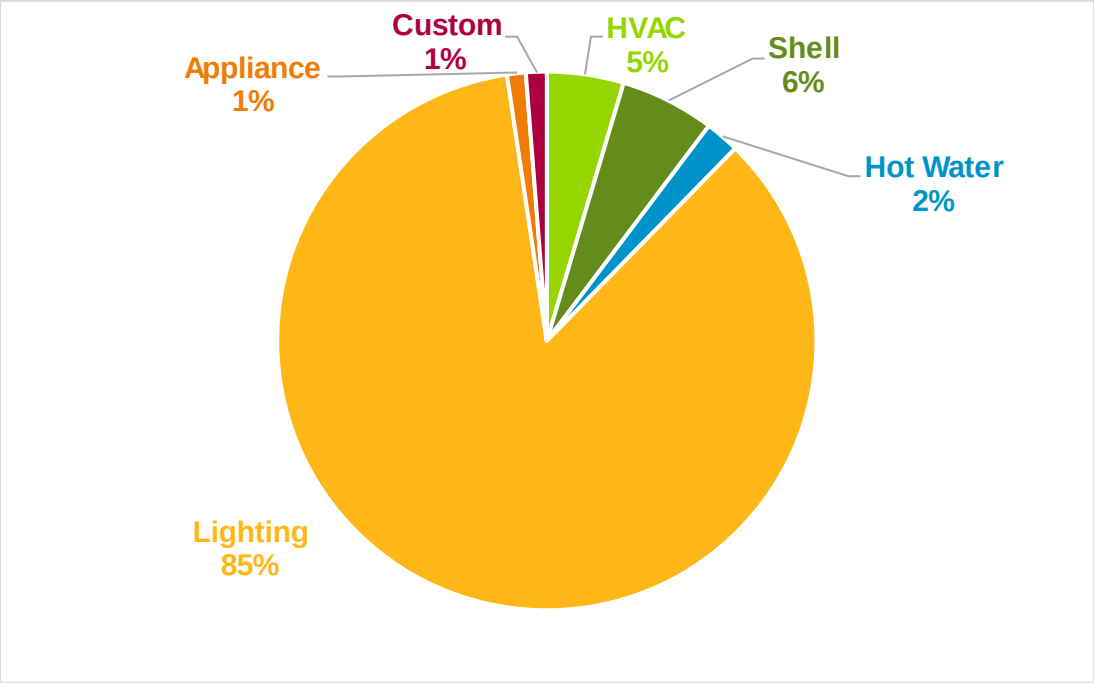
The IHWAP program component had 35 participants in CY2020 and distributed 1,607 measures as the following table and figure show. Lighting measures comprised 85% of the measure mix, followed by shell measures, which represented 6% of all measures installed. HVAC measures represented 5% of the total measures installed, and the remaining 4% included appliances, custom, and hot water measures.

Table 3-1. IHWAP CY2020 Volumetric Findings Detail

Participation	Total
Participants*	35
Installed Projects†	11
Total Measures‡	1,607
Lighting	1,371
Shell	91
HVAC	74
Hot Water	33
Custom	20
Appliance	18

* Participants comprise of distinct ComEd Account Numbers
† Number of Unique addresses in the tracking data
‡Measure quantities for certain measures with units of kBtu/hr and Sq. Ft. have been adjusted to number of projects implemented to provide a more representative count
Source: ComEd tracking data and evaluation team analysis

Figure 3-1. IHWAP Number of Measures Installed by Type



Source: ComEd tracking data and evaluation team analysis

3.2 IHWAP Program Component Savings Detail

Table 3-2 summarizes the incremental energy and demand savings the IHWAP program component achieved in CY2020. 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] This component of the program had an overall realization rate of 1.07 and 1.02 for the electric energy and demand savings, respectively, and an overall realization rate of 0.71 for the therm savings.

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

Table 3-2. IHWAP CY2020 Total Annual Incremental Electric Savings

Savings Category	Energy Savings (kWh)	Summer Peak* Demand Savings (kW)
Electricity		
Ex Ante Gross Savings	195,632	27
Program Gross Realization Rate	1.07	1.02
Verified Gross Savings	208,904	27
Program Net-to-Gross Ratio (NTG)	1.00	1.00
Verified Net Savings	208,904	27
Converted from Gas†		
Ex Ante Gross Savings	904,254	NA
Program Gross Realization Rate	0.71	NA
Verified Gross Savings	644,435	NA
Program Net-to-Gross Ratio (NTG)	1.00	NA
Verified Net Savings	644,435	NA
Total Electric Plus Gas		
Ex Ante Gross Savings	1,099,887	27
Program Gross Realization Rate	0.78	1.02
Verified Gross Savings	853,338	27
Program Net-to-Gross Ratio (NTG)	1.00	1.00
Verified Net Savings	853,338	27

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 converted to 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

3.3 IHWAP Program Component Cumulative Persisting Annual Savings

Table 3-3 to Table 3-5 show the measure-specific and total verified gross savings for the IHWAP program component and the CPAS for the measures installed in CY2020. Figure 3-2 shows the savings across the useful life of the measures. The electric CPAS across all measures installed in 2020 is 208,904 kWh (Table 3-3). The CY2020 gas contribution to CPAS (converted to equivalent electricity) is 644,435 kWh (Table 3-4). Adding the gas and electric contributions produces 853,338 kWh of total CY2020 contribution to CPAS (Table 3-5). 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.

Table 3-3. IHWAP 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
HVAC	Advanced Thermostat	11.0	1,507	1.00	16,578			1,507	1,507	1,507	1,507	1,507	1,507	1,507
Shell	Air Sealing	20.0	1,172	1.00	20,571			1,172	1,172	1,172	1,172	1,172	1,172	1,172
Shell	Attic Insulation	20.0	2,793	1.00	50,089			2,793	2,793	2,793	2,793	2,793	2,793	2,793
Hot Water	Bathroom Aerator	10.0	23	1.00	227			23	23	23	23	23	23	23
HVAC	Bathroom Exhaust Fan	19.0	1,917	1.00	36,430			1,917	1,917	1,917	1,917	1,917	1,917	1,917
HVAC	Central Air Conditioning	18.0	4,840	1.00	37,843			4,840	4,840	4,840	4,840	4,840	4,840	734
Hot Water	Handheld Showerhead	10.0	35	1.00	347			35	35	35	35	35	35	35
Hot Water	Kitchen Aerator	10.0	90	1.00	896			90	90	90	90	90	90	90
Lighting	LED Indoor Specialty	10.0	2,382	1.00	20,458			2,382	2,382	2,382	2,382	2,382	2,382	2,382
Lighting	LED Indoor Standard	10.0	24,623	1.00	214,463			24,623	24,623	24,623	24,623	24,623	24,623	24,623
Lighting	LED Outdoor Specialty	10.0	1,600	1.00	13,742			1,600	1,600	1,600	1,600	1,600	1,600	1,600
Lighting	LED Outdoor Standard	10.0	1,815	1.00	15,808			1,815	1,815	1,815	1,815	1,815	1,815	1,815
HVAC	Programmable Thermostat	8.0	-	1.00	-			-	-	-	-	-	-	-
Appliance	Room Air Conditioner	12.0	1,747	1.00	9,865			1,747	1,747	1,747	1,747	360	360	360
Custom	Custom Measure - HHW System Upgrade	15.0	20,565	1.00	308,469			20,565	20,565	20,565	20,565	20,565	20,565	20,565
Custom	Custom Measure - DHW Plant Improvement	15.2	15,065	1.00	225,980			15,065	15,065	15,065	15,065	15,065	15,065	15,065
Custom	Custom Measure - Heating Plant Improvement	24.0	25,527	1.00	382,906			25,527	25,527	25,527	25,527	25,527	25,527	25,527
Custom	Custom Measure - Lighting	6.3	82,779	1.00	437,031			82,779	82,779	76,532	71,285	71,285	20,010	5,787
Custom	Custom Measure - Secondary Pump Improvement	15.0	6,267	1.00	94,004			6,267	6,267	6,267	6,267	6,267	6,267	6,267
Custom	Custom Measure - New Air Handlers	15.0	6,354	1.00	95,306			6,354	6,354	6,354	6,354	6,354	6,354	6,354
Custom	Custom Measure - Kitchen Exhaust and MAU	15.0	4,184	1.00	62,764			4,184	4,184	4,184	4,184	4,184	4,184	4,184
Custom	Custom Measure - Exhaust Fans	15.0	1,176	1.00	17,646			1,176	1,176	1,176	1,176	1,176	1,176	1,176
Custom	Custom Measure - HVAC	15.0	2,444	1.00	33,098			2,444	2,444	2,444	2,444	2,444	2,088	2,088
CY2020 Program Total Electric Contribution to CPAS			208,904		2,094,522			208,904	208,904	202,657	197,410	196,022	144,390	126,062
Historic Program Total Electric Contribution to CPAS‡						628,175	1,281,093	1,281,093	1,149,146	1,033,147	923,085	837,480	714,068	714,068
Program Total Electric CPAS						628,175	1,281,093	1,489,997	1,358,049	1,235,804	1,120,495	1,033,502	858,459	840,130
CY2020 Program Incremental Expiring Electric Savings§									-	6,247	5,247	1,387	51,632	18,329
Historic Program Incremental Expiring Electric Savings‡§								-	131,948	115,999	110,062	85,605	123,411	-
Program Total Incremental Expiring Electric Savings§								-	131,948	122,246	115,309	86,993	175,043	18,329

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
HVAC	Advanced Thermostat	1,507	1,507	1,507	1,507								
Shell	Air Sealing	1,172	1,172	1,172	885	885	885	885	885	885	885	885	885
Shell	Attic Insulation	2,793	2,793	2,793	2,216	2,216	2,216	2,216	2,216	2,216	2,216	2,216	2,216
Hot Water	Bathroom Aerator	23	23	23									
HVAC	Bathroom Exhaust Fan	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917
HVAC	Central Air Conditioning	734	734	734	734	734	734	734	734	734	734	734	
Hot Water	Handheld Showerhead	35	35	35									
Hot Water	Kitchen Aerator	90	90	90									
Lighting	LED Indoor Specialty	1,262	1,262	1,262									
Lighting	LED Indoor Standard	14,035	14,035	14,035									
Lighting	LED Outdoor Specialty	848	848	848									
Lighting	LED Outdoor Standard	1,035	1,035	1,035									
HVAC	Programmable Thermostat	-											
Appliance	Room Air Conditioner	360	360	360	360	360							
Custom	Custom Measure - HHW System Upgrade	20,565	20,565	20,565	20,565	20,565	20,565	20,565	20,565	-	-	-	-
Custom	Custom Measure - DHW Plant Improvement	15,065	15,065	15,065	15,065	15,065	15,065	15,065	15,065	-	-	-	-
Custom	Custom Measure - Heating Plant Improvement	25,527	25,527	25,527	25,527	25,527	25,527	25,527	25,527	-	-	-	-
Custom	Custom Measure - Lighting	5,787	5,787	5,787	5,787	3,427	-	-	-	-	-	-	-
Custom	Custom Measure - Secondary Pump Improvement	6,267	6,267	6,267	6,267	6,267	6,267	6,267	6,267	-	-	-	-
Custom	Custom Measure - New Air Handlers	6,354	6,354	6,354	6,354	6,354	6,354	6,354	6,354	-	-	-	-
Custom	Custom Measure - Kitchen Exhaust and MAU	4,184	4,184	4,184	4,184	4,184	4,184	4,184	4,184	-	-	-	-
Custom	Custom Measure - Exhaust Fans	1,176	1,176	1,176	1,176	1,176	1,176	1,176	1,176	-	-	-	-
Custom	Custom Measure - HVAC	2,088	2,088	2,088	2,088	2,088	2,088	2,088	2,088	-	-	-	-
CY2020 Program Total Electric Contribution to CPAS		112,822	112,822	112,822	94,632	90,765	86,978	86,978	86,978	5,752	5,752	5,752	5,018
Historic Program Total Electric Contribution to CPAS‡		709,962	636,529	602,029	559,387	454,222	454,222	235,766	235,766	235,766	217,713	157,095	130,479
Program Total Electric CPAS		822,784	749,352	714,851	654,019	544,987	541,200	322,744	322,744	241,518	223,465	162,847	135,498
CY2020 Program Incremental Expiring Electric Savings§		13,239	-	-	18,190	3,866	3,787	-	-	81,226	-	-	734
Historic Program Incremental Expiring Electric Savings‡§		4,106	73,433	34,500	42,642	105,165	-	218,456	-	-	18,053	60,618	26,615
Program Total Incremental Expiring Electric Savings§		17,346	73,433	34,500	60,832	109,032	3,787	218,456	-	81,226	18,053	60,618	27,349

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
HVAC	Advanced Thermostat												
Shell	Air Sealing	885											
Shell	Attic Insulation	2,216											
Hot Water	Bathroom Aerator												
HVAC	Bathroom Exhaust Fan												
HVAC	Central Air Conditioning												
Hot Water	Handheld Showerhead												
Hot Water	Kitchen Aerator												
Lighting	LED Indoor Specialty												
Lighting	LED Indoor Standard												
Lighting	LED Outdoor Specialty												
Lighting	LED Outdoor Standard												
HVAC	Programmable Thermostat												
Appliance	Room Air Conditioner												
Custom	Custom Measure - HHW System Upgrade	-											
Custom	Custom Measure - DHW Plant Improvement	-											
Custom	Custom Measure - Heating Plant Improvement	-											
Custom	Custom Measure - Lighting	-											
Custom	Custom Measure - Secondary Pump Improvement	-											
Custom	Custom Measure - New Air Handlers	-											
Custom	Custom Measure - Kitchen Exhaust and MAU	-											
Custom	Custom Measure - Exhaust Fans	-											
Custom	Custom Measure - HVAC	-											
CY2020 Program Total Electric Contribution to CPAS		3,101	-	-	-	-	-	-	-	-	-	-	-
Historic Program Total Electric Contribution to CPAS‡		14,533	14,533	14,471	14,471	-	-	-	-	-	-	-	-
Program Total Electric CPAS		17,635	14,533	14,471	14,471	-	-	-	-	-	-	-	-
CY2020 Program Incremental Expiring Electric Savings§		1,917	3,101	-	-	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Electric Savings‡§		115,946	-	62	-	14,471	-	-	-	-	-	-	-
Program Total Incremental Expiring Electric Savings§		117,863	3,101	62	-	14,471	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first year electric savings. The gray cells are blank, indicating values irrelevant to the CY2020 contribution to CPAS.

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

† 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 3-4. IHWAP 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
HVAC	Advanced Thermostat	11.0	-	1.00	-			-	-	-	-	-	-	-
Shell	Air Sealing	20.0	1,001	1.00	14,277			1,001	1,001	1,001	1,001	1,001	1,001	1,001
Shell	Attic Insulation	20.0	-	1.00	-			-	-	-	-	-	-	-
Hot Water	Bathroom Aerator	10.0	18	1.00	180			18	18	18	18	18	18	18
HVAC	Bathroom Exhaust Fan	19.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	Central Air Conditioning	18.0	-	1.00	-			-	-	-	-	-	-	-
Hot Water	Handheld Showerhead	10.0	40	1.00	404			40	40	40	40	40	40	40
Hot Water	Kitchen Aerator	10.0	87	1.00	865			87	87	87	87	87	87	87
Lighting	LED Indoor Specialty	10.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED Indoor Standard	10.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED Outdoor Specialty	10.0	-	1.00	-			-	-	-	-	-	-	-
Lighting	LED Outdoor Standard	10.0	-	1.00	-			-	-	-	-	-	-	-
HVAC	Programmable Thermostat	8.0	684	1.00	5,471			684	684	684	684	684	684	684
Appliance	Room Air Conditioner	12.0	-	1.00	-			-	-	-	-	-	-	-
Custom	Custom Measure - HHW System Upgrade	15.0	-	1.00	-			-	-	-	-	-	-	-
Custom	Custom Measure - DHW Plant Improvement	15.2	11,920	1.00	126,639			11,920	11,920	11,920	11,920	6,897	6,897	6,897
Custom	Custom Measure - Heating Plant Improvement	24.0	8,237	1.00	118,343			8,237	8,237	8,237	8,237	8,237	8,237	8,237
Custom	Custom Measure - Lighting	6.3	-	1.00	-			-	-	-	-	-	-	-
Custom	Custom Measure - Secondary Pump Improvement	15.0	-	1.00	-			-	-	-	-	-	-	-
Custom	Custom Measure - New Air Handlers	15.0	-	1.00	-			-	-	-	-	-	-	-
Custom	Custom Measure - Kitchen Exhaust and MAU	15.0	-	1.00	-			-	-	-	-	-	-	-
Custom	Custom Measure - Exhaust Fans	15.0	-	1.00	-			-	-	-	-	-	-	-
Custom	Custom Measure - HVAC	15.0	-	1.00	-			-	-	-	-	-	-	-
CY2020 Program Total Gas Contribution to CPAS (Therms)			21,987		266,180			21,987	21,987	21,987	21,987	16,964	16,964	16,964
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡						-	-	644,435	644,435	644,435	644,435	497,203	497,203	497,203
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§						124,465	5,787,633	5,787,633	5,787,633	5,787,633	5,748,600	5,748,600	4,824,116	4,824,116
Program Total Gas CPAS (kWh Equivalent)‡						124,465	5,787,633	6,432,068	6,432,068	6,432,068	6,393,035	6,245,803	5,321,318	5,321,318
CY2020 Program Incremental Expiring Gas Savings (Therms)‖									-	-	-	5,023	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖									-	-	-	147,232	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖								-	-	-	39,033	-	924,485	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖								-	-	-	39,033	147,232	924,485	-

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
HVAC	Advanced Thermostat	-	-	-	-								
Shell	Air Sealing	1,001	1,001	1,001	427	427	427	427	427	427	427	427	427
Shell	Attic Insulation	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	Bathroom Aerator	18	18	18									
HVAC	Bathroom Exhaust Fan	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Central Air Conditioning	-	-	-	-	-	-	-	-	-	-	-	
Hot Water	Handheld Showerhead	40	40	40									
Hot Water	Kitchen Aerator	87	87	87									
Lighting	LED Indoor Specialty	-	-	-									
Lighting	LED Indoor Standard	-	-	-									
Lighting	LED Outdoor Specialty	-	-	-									
Lighting	LED Outdoor Standard	-	-	-									
HVAC	Programmable Thermostat	684											
Appliance	Room Air Conditioner	-	-	-	-	-							
Custom	Custom Measure - HHW System Upgrade	-	-	-	-	-	-	-	-				
Custom	Custom Measure - DHW Plant Improvement	6,897	6,897	6,897	6,897	6,897	6,897	6,897	6,897	516	516	516	516
Custom	Custom Measure - Heating Plant Improvement	3,496	3,496	3,496	3,496	3,496	3,496	3,496	3,496	3,496	3,496	3,496	3,496
Custom	Custom Measure - Lighting	-	-	-	-	-							
Custom	Custom Measure - Secondary Pump Improvement	-	-	-	-	-	-	-	-				
Custom	Custom Measure - New Air Handlers	-	-	-	-	-	-	-	-				
Custom	Custom Measure - Kitchen Exhaust and MAU	-	-	-	-	-	-	-	-				
Custom	Custom Measure - Exhaust Fans	-	-	-	-	-	-	-	-				
Custom	Custom Measure - HVAC	-	-	-	-	-	-	-	-				
CY2020 Program Total Gas Contribution to CPAS (Therms)		12,222	11,539	11,539	10,820	10,820	10,820	10,820	10,820	4,439	4,439	4,439	4,439
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		358,241	338,196	338,196	317,120	317,120	317,120	317,120	317,120	130,104	130,104	130,104	130,104
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		4,823,640	4,823,640	4,748,312	4,532,603	4,532,603	4,136,946	4,076,000	4,046,105	3,980,964	3,980,964	3,980,964	3,980,964
Program Total Gas CPAS (kWh Equivalent)‡		5,181,880	5,161,835	5,086,508	4,849,724	4,849,724	4,454,067	4,393,121	4,363,225	4,111,068	4,111,068	4,111,068	4,111,068
CY2020 Program Incremental Expiring Gas Savings (Therms)‖		4,741	684	-	719	-	-	-	-	6,381	-	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖		138,962	20,045	-	21,076	-	-	-	-	187,016	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖		476	-	75,327	215,709	-	395,657	60,946	29,895	65,141	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖		139,438	20,045	75,327	236,784	-	395,657	60,946	29,895	252,158	-	-	-

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
HVAC	Advanced Thermostat												
Shell	Air Sealing	427											
Shell	Attic Insulation	-											
Hot Water	Bathroom Aerator												
HVAC	Bathroom Exhaust Fan												
HVAC	Central Air Conditioning												
Hot Water	Handheld Showerhead												
Hot Water	Kitchen Aerator												
Lighting	LED Indoor Specialty												
Lighting	LED Indoor Standard												
Lighting	LED Outdoor Specialty												
Lighting	LED Outdoor Standard												
HVAC	Programmable Thermostat												
Appliance	Room Air Conditioner												
Custom	Custom Measure - HHW System Upgrade												
Custom	Custom Measure - DHW Plant Improvement	516	516										
Custom	Custom Measure - Heating Plant Improvement	3,496	3,496	2,934	2,934	2,934	2,934						
Custom	Custom Measure - Lighting												
Custom	Custom Measure - Secondary Pump Improvement												
Custom	Custom Measure - New Air Handlers												
Custom	Custom Measure - Kitchen Exhaust and MAU												
Custom	Custom Measure - Exhaust Fans												
Custom	Custom Measure - HVAC												
CY2020 Program Total Gas Contribution to CPAS (Therms)		4,439	4,012	2,934	2,934	2,934	2,934	-	-	-	-	-	-
CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		130,104	117,595	86,009	86,009	86,009	86,009	-	-	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§		3,036,777	2,973,734	2,973,734	2,973,734	2,973,734							
Program Total Gas CPAS (kWh Equivalent)‡		3,166,881	3,091,329	3,059,743	3,059,743	3,059,743	86,009	-	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (Therms)‖		-	427	1,078	-	-	-	2,934	-	-	-	-	-
CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡‖		-	12,509	31,587	-	-	-	86,009	-	-	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§‖		944,187	63,043	-	-	-	2,973,734	-	-	-	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡‖		944,187	75,552	31,587	-	-	2,973,734	86,009	-	-	-	-	-

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 CY2020.

* A deemed value. Source: is found on the Illinois SAG website: 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 3-5. IHWAP 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
HVAC	Advanced Thermostat	11.0	1,507	1.00	16,578			1,507	1,507	1,507	1,507	1,507	1,507	1,507
Shell	Air Sealing	20.0	30,508	1.00	439,017			30,508	30,508	30,508	30,508	30,508	30,508	30,508
Shell	Attic Insulation	20.0	2,793	1.00	50,089			2,793	2,793	2,793	2,793	2,793	2,793	2,793
Hot Water	Bathroom Aerator	10.0	551	1.00	5,512			551	551	551	551	551	551	551
HVAC	Bathroom Exhaust Fan	19.0	1,917	1.00	36,430			1,917	1,917	1,917	1,917	1,917	1,917	1,917
HVAC	Central Air Conditioning	18.0	4,840	1.00	37,843			4,840	4,840	4,840	4,840	4,840	4,840	734
Hot Water	Handheld Showerhead	10.0	1,218	1.00	12,180			1,218	1,218	1,218	1,218	1,218	1,218	1,218
Hot Water	Kitchen Aerator	10.0	2,626	1.00	26,262			2,626	2,626	2,626	2,626	2,626	2,626	2,626
Lighting	LED Indoor Specialty	10.0	2,382	1.00	20,458			2,382	2,382	2,382	2,382	2,382	2,382	2,382
Lighting	LED Indoor Standard	10.0	24,623	1.00	214,463			24,623	24,623	24,623	24,623	24,623	24,623	24,623
Lighting	LED Outdoor Specialty	10.0	1,600	1.00	13,742			1,600	1,600	1,600	1,600	1,600	1,600	1,600
Lighting	LED Outdoor Standard	10.0	1,815	1.00	15,808			1,815	1,815	1,815	1,815	1,815	1,815	1,815
HVAC	Programmable Thermostat	8.0	20,045	1.00	160,358			20,045	20,045	20,045	20,045	20,045	20,045	20,045
Appliance	Room Air Conditioner	12.0	1,747	1.00	9,865			1,747	1,747	1,747	1,747	360	360	360
Custom	Custom Measure - HHW System Upgrade	15.0	20,565	1.00	308,469			20,565	20,565	20,565	20,565	20,565	20,565	20,565
Custom	Custom Measure - DHW Plant Improvement	15.2	364,439	1.00	3,937,776			364,439	364,439	364,439	364,439	217,207	217,207	217,207
Custom	Custom Measure - Heating Plant Improvement	24.0	266,959	1.00	3,851,552			266,959	266,959	266,959	266,959	266,959	266,959	266,959
Custom	Custom Measure - Lighting	6.3	82,779	1.00	437,031			82,779	82,779	76,532	71,285	71,285	20,010	5,787
Custom	Custom Measure - Secondary Pump Improvement	15.0	6,267	1.00	94,004			6,267	6,267	6,267	6,267	6,267	6,267	6,267
Custom	Custom Measure - New Air Handlers	15.0	6,354	1.00	95,306			6,354	6,354	6,354	6,354	6,354	6,354	6,354
Custom	Custom Measure - Kitchen Exhaust and MAU	15.0	4,184	1.00	62,764			4,184	4,184	4,184	4,184	4,184	4,184	4,184
Custom	Custom Measure - Exhaust Fans	15.0	1,176	1.00	17,646			1,176	1,176	1,176	1,176	1,176	1,176	1,176
Custom	Custom Measure - HVAC	15.0	2,444	1.00	33,098			2,444	2,444	2,444	2,444	2,444	2,088	2,088
CY2020 Program Total Contribution to CPAS			853,338		9,896,251			853,338	853,338	847,092	841,844	693,225	641,593	623,264
Historic Program Total Contribution to CPAS‡						752,640	7,068,726	7,068,726	6,936,779	6,820,780	6,671,685	6,586,080	5,538,184	5,538,184
Program Total CPAS						752,640	7,068,726	7,922,065	7,790,117	7,667,872	7,513,530	7,279,305	6,179,777	6,161,448
CY2020 Program Incremental Expiring Savings§									-	6,247	5,247	148,619	51,632	18,329
Historic Program Incremental Expiring Savings‡§								-	131,948	115,999	149,095	85,605	1,047,896	-
Program Total Incremental Expiring Savings§								-	131,948	122,246	154,342	234,225	1,099,528	18,329

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
HVAC	Advanced Thermostat	1,507	1,507	1,507	1,507								
Shell	Air Sealing	30,508	30,508	30,508	13,393	13,393	13,393	13,393	13,393	13,393	13,393	13,393	13,393
Shell	Attic Insulation	2,793	2,793	2,793	2,216	2,216	2,216	2,216	2,216	2,216	2,216	2,216	2,216
Hot Water	Bathroom Aerator	551	551	551									
HVAC	Bathroom Exhaust Fan	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917	1,917
HVAC	Central Air Conditioning	734	734	734	734	734	734	734	734	734	734	734	
Hot Water	Handheld Showerhead	1,218	1,218	1,218									
Hot Water	Kitchen Aerator	2,626	2,626	2,626									
Lighting	LED Indoor Specialty	1,262	1,262	1,262									
Lighting	LED Indoor Standard	14,035	14,035	14,035									
Lighting	LED Outdoor Specialty	848	848	848									
Lighting	LED Outdoor Standard	1,035	1,035	1,035									
HVAC	Programmable Thermostat	20,045											
Appliance	Room Air Conditioner	360	360	360	360	360							
Custom	Custom Measure - HHW System Upgrade	20,565	20,565	20,565	20,565	20,565	20,565	20,565	20,565				
Custom	Custom Measure - DHW Plant Improvement	217,207	217,207	217,207	217,207	217,207	217,207	217,207	217,207	15,125	15,125	15,125	15,125
Custom	Custom Measure - Heating Plant Improvement	127,997	127,997	127,997	127,997	127,997	127,997	127,997	127,997	102,470	102,470	102,470	102,470
Custom	Custom Measure - Lighting	5,787	5,787	5,787	5,787	3,427							
Custom	Custom Measure - Secondary Pump Improvement	6,267	6,267	6,267	6,267	6,267	6,267	6,267	6,267				
Custom	Custom Measure - New Air Handlers	6,354	6,354	6,354	6,354	6,354	6,354	6,354	6,354				
Custom	Custom Measure - Kitchen Exhaust and MAU	4,184	4,184	4,184	4,184	4,184	4,184	4,184	4,184				
Custom	Custom Measure - Exhaust Fans	1,176	1,176	1,176	1,176	1,176	1,176	1,176	1,176				
Custom	Custom Measure - HVAC	2,088	2,088	2,088	2,088	2,088	2,088	2,088	2,088				
CY2020 Program Total Contribution to CPAS		471,063	451,018	451,018	411,752	407,885	404,098	404,098	404,098	135,856	135,856	135,856	135,122
Historic Program Total Contribution to CPAS‡		5,533,602	5,460,169	5,350,341	5,091,991	4,986,826	4,591,168	4,311,767	4,281,871	4,216,730	4,198,677	4,138,058	4,111,443
Program Total CPAS		6,004,665	5,911,187	5,801,359	5,503,743	5,394,711	4,995,267	4,715,865	4,685,969	4,352,586	4,334,533	4,273,914	4,246,565
CY2020 Program Incremental Expiring Savings§		152,201	20,045	-	39,266	3,866	3,787	-	-	268,242	-	-	734
Historic Program Incremental Expiring Savings‡§		4,582	73,433	109,828	258,351	105,165	395,657	279,402	29,895	65,141	18,053	60,618	26,615
Program Total Incremental Expiring Savings§		156,784	93,478	109,828	297,617	109,032	399,444	279,402	29,895	333,384	18,053	60,618	27,349

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
HVAC	Advanced Thermostat												
Shell	Air Sealing	13,393											
Shell	Attic Insulation	2,216											
Hot Water	Bathroom Aerator												
HVAC	Bathroom Exhaust Fan												
HVAC	Central Air Conditioning												
Hot Water	Handheld Showerhead												
Hot Water	Kitchen Aerator												
Lighting	LED Indoor Specialty												
Lighting	LED Indoor Standard												
Lighting	LED Outdoor Specialty												
Lighting	LED Outdoor Standard												
HVAC	Programmable Thermostat												
Appliance	Room Air Conditioner												
Custom	Custom Measure - HHW System Upgrade												
Custom	Custom Measure - DHW Plant Improvement	15,125	15,125										
Custom	Custom Measure - Heating Plant Improvement	102,470	102,470	86,009	86,009	86,009	86,009						
Custom	Custom Measure - Lighting												
Custom	Custom Measure - Secondary Pump Improvement												
Custom	Custom Measure - New Air Handlers												
Custom	Custom Measure - Kitchen Exhaust and MAU												
Custom	Custom Measure - Exhaust Fans												
Custom	Custom Measure - HVAC												
CY2020 Program Total Contribution to CPAS		133,205	117,595	86,009	86,009	86,009	86,009	-	-	-	-	-	-
Historic Program Total Contribution to CPAS‡		3,051,310	2,988,267	2,988,205	2,988,205	2,973,734	-	-	-	-	-	-	-
Program Total CPAS		3,184,515	3,105,863	3,074,214	3,074,214	3,059,743	86,009	-	-	-	-	-	-
CY2020 Program Incremental Expiring Savings§		1,917	15,610	31,587	-	-	-	86,009	-	-	-	-	-
Historic Program Incremental Expiring Savings‡§		1,060,132	63,043	62	-	14,471	2,973,734	-	-	-	-	-	-
Program Total Incremental Expiring Savings§		1,062,050	78,653	31,649	-	14,471	2,973,734	86,009	-	-	-	-	-

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 CY2020.

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

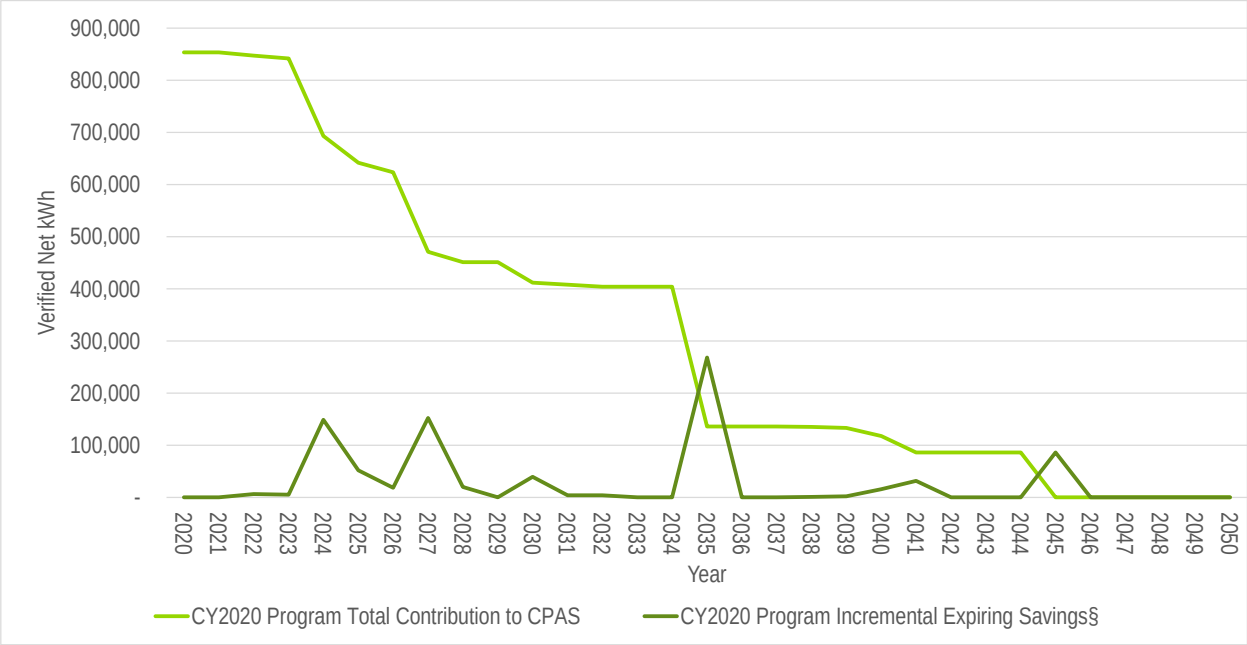
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ Historic savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n.

Source: Evaluation team analysis

Figure 3-2. IHWAP Cumulative Persisting Annual Savings



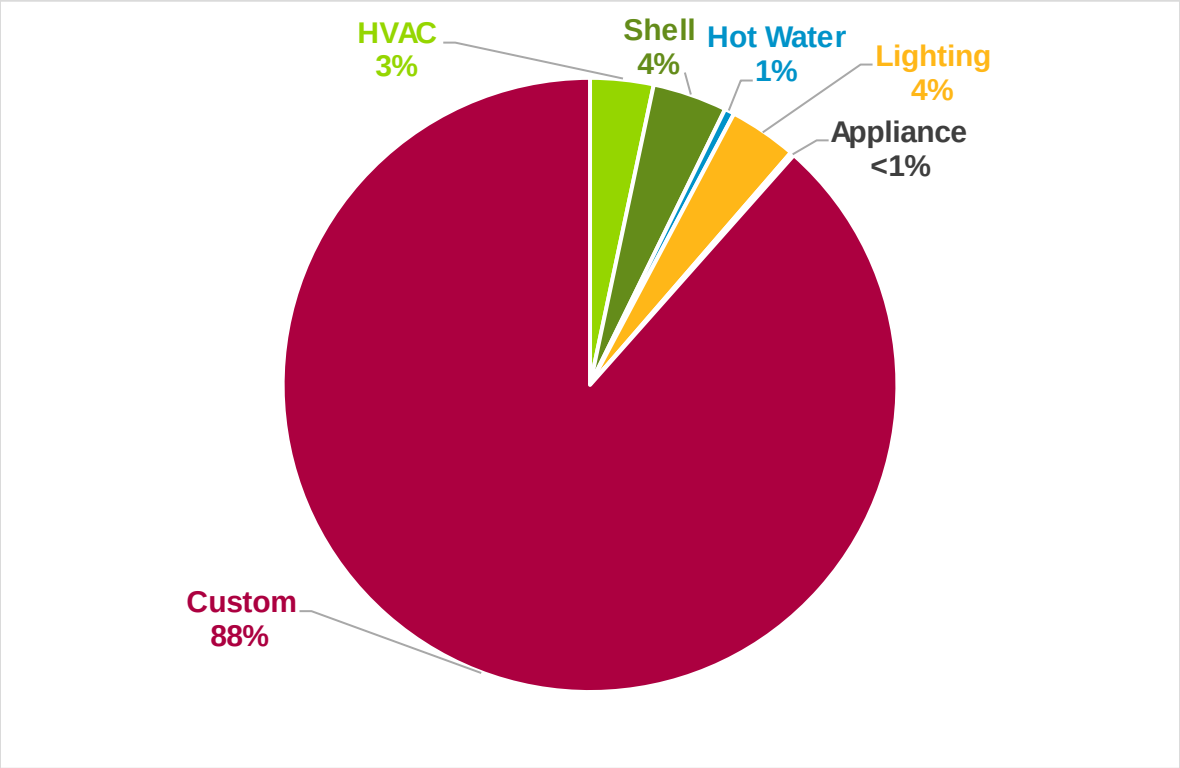
§ Expiring savings are equal to CPAS Y_{n-1} - CPAS Y_n.

Source: Evaluation team analysis

3.4 IHWAP Program Component Savings by Measure

The IHWAP program component includes 15 different measures as shown in the following tables. The custom measures contributed the most savings, representing 88% of the verified net kWh savings. Shell and lighting measures each contributed 4%. HVAC, hot water, and appliance measures represent the remaining 4% of the verified net kWh savings (see Figure 3-3).

Figure 3-3. IHWAP Verified Net Savings by Measure – Electric



Source: Evaluation team analysis

Table 3-6. IHWAP 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)
HVAC	Advanced Thermostat	1,970	0.77	1,507	1.00	1,507	11.0
Shell	Air Sealing	1,092	1.07	1,172	1.00	1,172	20.0
Shell	Attic Insulation	2,793	1.00	2,793	1.00	2,793	20.0
Hot Water	Bathroom Aerator	0	NA	23	1.00	23	10.0
HVAC	Bathroom Exhaust Fan	1,917	1.00	1,917	1.00	1,917	19.0
HVAC	Central Air Conditioning	4,840	1.00	4,840	1.00	4,840	18.0
Hot Water	Handheld Showerhead	0	NA	35	1.00	35	10.0
Hot Water	Kitchen Aerator	0	NA	90	1.00	90	10.0
Lighting	LED Indoor Specialty	2,382	1.00	2,382	1.00	2,382	10.0
Lighting	LED Indoor Standard	24,623	1.00	24,623	1.00	24,623	10.0
Lighting	LED Outdoor Specialty	1,600	1.00	1,600	1.00	1,600	10.0
Lighting	LED Outdoor Standard	1,815	1.00	1,815	1.00	1,815	10.0
HVAC	Programmable Thermostat	0	NA	0	1.00	0	8.0
Appliance	Room Air Conditioner	1,747	1.00	1,747	1.00	1,747	12.0
Custom	Custom Measure - HHW System Upgrade	20,439	1.01	20,565	1.00	20,565	15.0
Custom	Custom Measure - DHW Plant Improvement	3,929	3.83	15,065	1.00	15,065	15.2
Custom	Custom Measure - Heating Plant Improvement	25,527	1.00	25,527	1.00	25,527	24.0
Custom	Custom Measure - Lighting	79,617	1.04	82,779	1.00	82,779	6.3
Custom	Custom Measure - Secondary Pump Improvement	7,289	0.86	6,267	1.00	6,267	15.0
Custom	Custom Measure - New Air Handlers	6,211	1.02	6,354	1.00	6,354	15.0
Custom	Custom Measure - Kitchen Exhaust and MAU	4,184	1.00	4,184	1.00	4,184	15.0
Custom	Custom Measure - Exhaust Fans	971	1.21	1,176	1.00	1,176	15.0
Custom	Custom Measure - HVAC	2,687	0.78	2,444	1.00	2,444	15.0
	Total	195,632	1.07	208,904	NA	208,904	NA

Note: The savings in this table includes secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd. The savings account for electric heating penalties, where applicable.

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

Source: ComEd tracking data and evaluation team analysis

Table 3-7. IHWAP 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)
HVAC	Advanced Thermostat	0.57	0.90	0.51	1.00	0.51
Shell	Air Sealing	0.60	1.15	0.69	1.00	0.69
Shell	Attic Insulation	1.13	1.00	1.13	1.00	1.13
Hot Water	Bathroom Aerator	0.00	NA	0.00	1.00	0.00
HVAC	Bathroom Exhaust Fan	0.23	1.00	0.23	1.00	0.23
HVAC	Central Air Conditioning	2.90	1.00	2.90	1.00	2.90
Hot Water	Handheld Showerhead	0.00	NA	0.00	1.00	0.00
Hot Water	Kitchen Aerator	0.00	NA	0.00	1.00	0.00
Lighting	LED Indoor Specialty	0.35	1.00	0.35	1.00	0.35
Lighting	LED Indoor Standard	2.98	1.00	2.98	1.00	2.98
Lighting	LED Outdoor Specialty	0.18	1.00	0.18	1.00	0.18
Lighting	LED Outdoor Standard	0.20	1.00	0.20	1.00	0.20
HVAC	Programmable Thermostat	0.00	NA	0.00	1.00	0.00
Appliance	Room Air Conditioner	2.36	1.00	2.36	1.00	2.36
Custom	Custom Measure - HHW System Upgrade	0.00	NA	0.00	1.00	0.00
Custom	Custom Measure - DHW Plant Improvement	2.10	1.02	2.14	1.00	2.14
Custom	Custom Measure - Heating Plant Improvement	2.10	1.02	2.14	1.00	2.14
Custom	Custom Measure - Lighting	8.71	1.15	10.03	1.00	10.03
Custom	Custom Measure - Secondary Pump Improvement	0.00	NA	0.00	1.00	0.00
Custom	Custom Measure - New Air Handlers	0.43	0.59	0.25	1.00	0.25
Custom	Custom Measure - Kitchen Exhaust and MAU	0.57	0.57	0.32	1.00	0.32
Custom	Custom Measure - Exhaust Fans	0.10	1.34	0.13	1.00	0.13
Custom	Custom Measure - HVAC	1.06	0.41	0.47	1.00	0.47
	Total	26.55	1.02	27.00	NA	27.00

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

Source: ComEd tracking data and evaluation team analysis

Table 3-8. IHWAP 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)
HVAC	Advanced Thermostat	0	NA	0	1.00	0	11.0
Shell	Air Sealing	1,001	1.00	1,001	1.00	1,001	20.0
Shell	Attic Insulation	0	NA	0	1.00	0	20.0
Hot Water	Bathroom Aerator	9	2.01	18	1.00	18	10.0
HVAC	Bathroom Exhaust Fan	0	NA	0	1.00	0	19.0
HVAC	Central Air Conditioning	0	NA	0	1.00	0	18.0
Hot Water	Handheld Showerhead	19	2.10	40	1.00	40	10.0
Hot Water	Kitchen Aerator	41	2.10	87	1.00	87	10.0
Lighting	LED Indoor Specialty	0	NA	0	1.00	0	10.0
Lighting	LED Indoor Standard	0	NA	0	1.00	0	10.0
Lighting	LED Outdoor Specialty	0	NA	0	1.00	0	10.0
Lighting	LED Outdoor Standard	0	NA	0	1.00	0	10.0
HVAC	Programmable Thermostat	684	1.00	684	1.00	684	8.0
Appliance	Room Air Conditioner	0	NA	0	1.00	0	12.0
Custom	Custom Measure - HHW System Upgrade	0	NA	0	1.00	0	15.0
Custom	Custom Measure - DHW Plant Improvement	9,198	1.30	11,920	1.00	11,920	15.2
Custom	Custom Measure - Heating Plant Improvement	19,900	0.41	8,237	1.00	8,237	24.0
Custom	Custom Measure - Lighting	0	NA	0	1.00	0	6.3
Custom	Custom Measure - Secondary Pump Improvement	0	NA	0	1.00	0	15.0
Custom	Custom Measure - New Air Handlers	0	NA	0	1.00	0	15.0
Custom	Custom Measure - Kitchen Exhaust and MAU	0	NA	0	1.00	0	15.0
Custom	Custom Measure - Exhaust Fans	0	NA	0	1.00	0	15.0
Custom	Custom Measure - HVAC	0	NA	0	1.00	0	15.0
	Total Therms	30,851	0.71	21,987	NA	21,987	NA
	Total kWh Converted From Therms†	904,254	0.71	644,435	NA	644,435	NA

* A deemed value. Source: is found on the Illinois SAG website: 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).
NA = Not applicable (refers to a piece of data that cannot be produced or does not apply).

Source: ComEd tracking data and evaluation team analysis

Table 3-9. IHWAP 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)
HVAC	Advanced Thermostat	1,970	0.77	1,507	1.00	1,507
Shell	Air Sealing	30,428	1.00	30,508	1.00	30,508
Shell	Attic Insulation	2,793	1.00	2,793	1.00	2,793
Hot Water	Bathroom Aerator	252	2.19	551	1.00	551
HVAC	Bathroom Exhaust Fan	1,917	1.00	1,917	1.00	1,917
HVAC	Central Air Conditioning	4,840	1.00	4,840	1.00	4,840
Hot Water	Handheld Showerhead	564	2.16	1,218	1.00	1,218
Hot Water	Kitchen Aerator	1,208	2.17	2,626	1.00	2,626
Lighting	LED Indoor Specialty	2,382	1.00	2,382	1.00	2,382
Lighting	LED Indoor Standard	24,623	1.00	24,623	1.00	24,623
Lighting	LED Outdoor Specialty	1,600	1.00	1,600	1.00	1,600
Lighting	LED Outdoor Standard	1,815	1.00	1,815	1.00	1,815
HVAC	Programmable Thermostat	20,045	1.00	20,045	1.00	20,045
Appliance	Room Air Conditioner	1,747	1.00	1,747	1.00	1,747
Custom	Custom Measure - HHW System Upgrade	20,439	1.01	20,565	1.00	20,565
Custom	Custom Measure - DHW Plant Improvement	273,519	1.33	364,439	1.00	364,439
Custom	Custom Measure - Heating Plant Improvement	608,788	0.44	266,959	1.00	266,959
Custom	Custom Measure - Lighting	79,617	1.04	82,779	1.00	82,779
Custom	Custom Measure - Secondary Pump Improvement	7,289	0.86	6,267	1.00	6,267
Custom	Custom Measure - New Air Handlers	6,211	1.02	6,354	1.00	6,354
Custom	Custom Measure - Kitchen Exhaust and MAU	4,184	1.00	4,184	1.00	4,184
Custom	Custom Measure - Exhaust Fans	971	1.21	1,176	1.00	1,176
Custom	Custom Measure - HVAC	2,687	0.91	2,444	1.00	2,444
	Total†	1,099,887	0.78	853,338	NA	853,338

* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.
† The total includes the electric equivalent of the total therms.

Source: ComEd tracking data and evaluation team analysis

The IHWAP program component includes measures that save water. That reduction in water produces secondary kWh savings from water supply and wastewater treatment. Table 3-10 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 3-10. IHWAP 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)
HVAC	Advanced Thermostat	0	NR	NA	0	1.00	0
Shell	Air Sealing	0	NR	NA	0	1.00	0
Shell	Attic Insulation	0	NR	NA	0	1.00	0
Hot Water	Bathroom Aerator	2,162	NR	NA	23	1.00	23
HVAC	Bathroom Exhaust Fan	0	NR	NA	0	1.00	0
HVAC	Central Air Conditioning	0	NR	NA	0	1.00	0
Hot Water	Handheld Showerhead	3,298	NR	NA	35	1.00	35
Hot Water	Kitchen Aerator	8,514	NR	NA	90	1.00	90
Lighting	LED Indoor Specialty	0	NR	NA	0	1.00	0
Lighting	LED Indoor Standard	0	NR	NA	0	1.00	0
Lighting	LED Outdoor Specialty	0	NR	NA	0	1.00	0
Lighting	LED Outdoor Standard	0	NR	NA	0	1.00	0
HVAC	Programmable Thermostat	0	NR	NA	0	1.00	0
Appliance	Room Air Conditioner	0	NR	NA	0	1.00	0
Custom	Custom Measure - HHW System Upgrade	0	NR	NA	0	1.00	0
Custom	Custom Measure - DHW Plant Improvement	0	NR	NA	0	1.00	0
Custom	Custom Measure - Heating Plant Improvement	0	NR	NA	0	1.00	0
Custom	Custom Measure - Lighting	0	NR	NA	0	1.00	0
Custom	Custom Measure - Secondary Pump Improvement	0	NR	NA	0	1.00	0
Custom	Custom Measure - New Air Handlers	0	NR	NA	0	1.00	0
Custom	Custom Measure - Kitchen Exhaust and MAU	0	NR	NA	0	1.00	0
Custom	Custom Measure - Exhaust Fans	0	NR	NA	0	1.00	0
Custom	Custom Measure - HVAC	0	NR	NA	0	1.00	0
	Total	13,974	NR	NA	147	NA	147

NR = Not reported (refers to a piece of data that was not reported).
NA = Not applicable (refers to a piece of data that cannot be produced or does not apply).
Note: The savings in this table reflect only secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd, not those claimed by gas utilities.
* A deemed value. Source: is found on the Illinois SAG website: https://www.ilsag.info/ntg_2020.

Source: ComEd tracking data and evaluation team analysis

3.5 IHWAP Program Component Impact Analysis Findings and Recommendations

3.5.1 IHWAP Program Component Impact Parameter Estimates

The evaluation team used the savings algorithms and inputs deemed by TRM v8.0 and TRM v8.0 Errata, where applicable, to calculate the energy and demand savings for each measure installed as a part of the IHWAP program component in CY2020. Table 3-11 presents the input parameter source the evaluation team used by measure. The TRM v8.0 allows for custom or actual values to be used for some of the input parameters. We based these values on the program tracking database when available.

To estimate lifetime energy and demand savings, the evaluation team multiplied the verified savings by the EUL for each measure.

The evaluation team conducted research to validate the parameters that were not specified in the TRM v8.0.

Table 3-11. IHWAP Savings Parameters

Measure	Custom Input Parameters	Deemed Input Parameters	Source *
Room Air Conditioner	Btu.hr, CEER_ee, CEER_base	FLH_roomAC, EER_exist, CF	IL TRM v8.0 – Section 5.1.7
Attic Insulation	R_old, R_attic, A_attic, Eff_cool, Eff_heat	Framing Factor_attic, CDD, DUA, HDD, ADJ_WallAtticCool, F_e, CF, FLH_cooling, ADJ_WallAtticHeat	IL TRM v8.0 – Section 5.6.5
Air Sealing	CFM50_existing, CFM50_new	N_heat, HDD, Eff_heat	IL TRM v8.0 – Section 5.6.1
Central Air Conditioning	SEER_ee, EER_ee, SEER_exist, EER_exist	FLH_cool, SEER_base, EER_base, CF	IL TRM v8.0 – Section 5.3.3
Low Flow Faucet Aerator	None	%Electric_DHW, GPM_base, GPM_low, L_base, L_low, Household, DF, FPH, EPG_electric, ISR, Hours, CF %Fossil_DHW, EPG_gas	IL TRM v8.0 – Section 5.4.4
LED Lighting	Watts_ee, Watts_base	ISR, Leakage, Hours, WHF_e, WHF_d, CF	TRM v8.0 – Errata Sept. 25, 2020 – Section 5.5.6, Section 5.5.8
Low Flow Showerhead	None	%Electric_DHW, GPM_base, GPM_low, L_base, L_low, Household, SPCD, SPH EPG_electric, ISR, Hours, CF %Fossil_DHW, EPG_gas, GPH	IL TRM v8.0 – Section 5.4.5
Advanced Thermostat	Capacity, SEER, EER	%ElectricHeat, Elec_Heating_Consumption, Heating_Reduction, HF, EFF_ISR, Fe, %AC, FLH, Cooling_Reduction, ISR, Hours, CF, %FossilHeat	IL TRM v8.0 – Section 5.3.16
Bathroom Exhaust Fan	None	CFM, Eff_baseline, Eff_efficient, Hours, CF	IL TRM v8.0 – Section 5.3.9
Programmable Thermostat	None	%ElectricHeat, Elec_Heating_Consumption, Heating_Reduction, HF, Eff_ISR, Fe, %FossilHeat, Gas_Heating_Consumption	IL TRM v8.0 – Section 5.3.11

* TRM is the State of Illinois 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: https://www.ilsag.info/ntg_2020.

Source: Evaluation team analysis

3.5.2 Other IHWAP Program Component Impact Findings and Recommendations

The evaluation team developed recommendations based on findings from the IHWAP program component CY2020 evaluation. These recommendations suggest ways to improve the measure-level realization rates. Table 3-12 presents the end use-level realization rates and program savings percentages to give context to the team's recommendations. Custom measures represent 88% of the IHWAP program component's savings with a realization rate of 0.75.

Table 3-12. IHWAP End Use-Level Savings and Realization Rates

End Use Type	Realization Rate	Percentage of Verified Net Savings
Custom	0.75	88%
Shell	1.00	4%
Lighting	1.00	4%
HVAC	0.98	3%
Hot Water	2.17	1%
Appliance	1.00	<1%

Source: Evaluation team analysis of CY2020 ComEd tracking data

3.5.2.1 Custom – Lighting Measures

Finding 1. For the CEDA Maywood, Dearborn Homes, and Loomis projects, the ex ante annual operating hours for the 24/7 and 12/7 lighting measures were calculated using 365 days per year as 8,760 and 4,380 hours, respectively. This assumption is less accurate, and the annual operating hours should be calculated using 365.25 days per year as deemed in the TRM v8.0, resulting in 8,766 and 4,383 hours per year.

Recommendation 1. The evaluation team recommends that the implementer use 8,766 and 4,383 hours per year for 24/7 and 12/7 fixtures, respectively.

Finding 2. For CEDA Maywood project, the ex ante savings for the F40T12 fluorescent lamp fixtures were calculated using a baseline wattage of 40 W. This is incorrect as the TRM v8.0 deems a baseline wattage of 41 W for these fixtures.

Recommendation 2. The evaluation team recommends that the implementer use the baseline wattage for the F40T12 fixtures to 41 W per the TRM v8.0.

Finding 3. For the CEDA Maywood and Dearborn Homes projects, the ex ante savings for the F40T12 fluorescent lamp fixtures and exit signs were calculated using incorrect efficient wattage values. This did not align with the values provided in the specification sheets. Table 3-13 compares the ex ante and verified efficient wattages.

Table 3-13. IHWAP Wattage Comparison

Project Name	Lamp Type	Ex Ante Efficient Wattage	Verified Efficient Wattage
CEDA Maywood	F40T12 Fluorescent Lamps	17	13
CEDA Maywood	Exit Signs	3	3.5
CEDA Maywood	F40T12 Fluorescent Lamps	17	14
Dearborn Homes	Exit Signs	2	4.5

Source: ComEd tracking data and evaluation team analysis

Recommendation 3. The evaluation team recommends that the implementer use the efficient wattage for these fixtures to be consistent with the specification sheets.

Finding 4. For the CEDA Maywood project, the ex ante demand savings for the 24/7 common area measures were calculated using a CF of 0.62. This is incorrect as the TRM v8.0 deems a CF value of 1.0 for lights that operate 24/7.

Recommendation 4. The evaluation team recommends that the implementer use the CF for 24/7 measures to 1.00.

Finding 5. For the Dearborn Homes project, the ex ante demand savings for the exit signs were calculated using a baseline wattage of 40 W. This was not consistent with the baseline wattage of 10 W used for calculating the energy savings.

Recommendation 5. The evaluation team recommends that the implementer use the same baseline wattage for both the energy and demand savings calculations.

3.5.2.2 Custom – Heating Hot Water (HHW) Boiler

Finding 6. For the CEDA Maywood, Loomis, and Saratoga Tower projects, the ex ante savings for the efficient HHW boiler measure were calculated using an efficient boiler efficiency of 96.6% adjusted to 90.6% using a typical condensing boiler efficiency curve. This was incorrect as this value did not align with the value provided in the specification sheet of the boiler, which included a value of 95.3% instead.

Recommendation 6. The evaluation team recommends that the implementer use the boiler efficiency to be consistent with the specification sheets.

Finding 7. For the CEDA Maywood, Loomis, and Saratoga Tower projects, the ex ante for the HHW boiler turndown measure calculated an energy loss due to cycling for both the baseline and efficient cases despite the boiler percent load exceeding the minimum turndown ratio for the boiler. This was incorrect as there was not any energy loss due to cycling when the boiler percent load exceeds the minimum turndown ratio.

Recommendation 7. The evaluation team recommends that the implementer use the algorithm for the energy loss due to cycling parameter to use 0% when the boiler percent load exceeds the minimum turndown ratio.

Finding 8. For the Loomis project, the ex ante savings for the HHW boiler turndown measure was calculated by calibrating the baseline consumption to the annual space heating energy consumption at the facility based on actual billing data for a period of two years. This is less accurate, and the TMY3 weather data should be used along with the billing data to ensure the savings estimates are not biased by extreme weather events.

Recommendation 8. The evaluation team recommends that the implementer use the actual normalized usage at the facility to calibrate the baseline consumption when calculating savings for this measure.

Finding 9. For the CEDA Maywood and Saratoga Tower projects, the ex ante savings for the HHW primary pumps were calculated using the baseline boiler percent ON factor of 65%. This was not accurate as the boiler percent ON factor was 80% to account for the higher annual hours of operation of the new boiler, which has a lower turndown ratio.

Recommendation 9. The evaluation team recommends that the implementer use the efficient boiler percent ON factor when calculating savings for this measure to account for the interaction between the HHW primary pump and turndown measures.

3.5.2.3 Custom – Domestic Hot Water (DHW) Boiler

Finding 10. For the Dearborn Homes and Loomis projects, the standby loss for the high efficiency DHW boiler measure in the ex ante savings were calculated using the input rating of the boiler in MBH and the TRM v8.0 algorithm. However, the algorithm used to calculate the energy savings requires the input rating of the boiler to be in Btuh instead.

Recommendation 10. The evaluation team recommends that the implementer use the standby loss calculation for this measure to use the Btuh input rating of the boiler.

Finding 11. For the high efficiency DHW boiler measure installed as a part of the Loomis Project, the evaluation team used a scaling factor of the ratio of normalized usage (using utility bill analysis) at the facility to the baseline usage as predicted by the custom calculations to ensure calibration. The savings calculated using the custom approach were multiplied by the scaling factor. The ex ante calculations did not calibrate the baseline consumption at the facility using a scaling factor.

Recommendation 11. The evaluation team recommends that the implementer calibrate the baseline consumption calculated using the TRM algorithm and the DHW consumption using the scaling factor described in the finding.

Finding 12. For the Dearborn Homes project, no verified savings were calculated for the boiler turndown measure as the boiler percent load always exceeded the minimum turndown ratio, resulting in no energy loss due to cycling for both the baseline and efficient cases.

Recommendation 12. The evaluation team recommends that the implementer use the algorithm for the energy loss due to cycling parameter to use 0% when the boiler percent load exceeds the minimum turndown ratio.

Finding 13. For the boiler turndown measures installed as a part of the Loomis project, the evaluation team used the actual normalized usage at the facility to determine the average DHW heater load and EFLH. The ex ante calculations used the uncalibrated baseline usage calculated using the custom approach to determine these parameters.

Recommendation 13. T The evaluation team recommends that the implementer use the actual normalized usage at the facility to determine the DHW heater load and EFLH when available.

Finding 14. For the Loomis project, the ex ante savings for the DHW pump measure were calculated using the baseline boiler percent ON factor of 22%. The verified savings were calculated using the efficient boiler percent ON factor of 87% to account for the higher annual hours of operation of the new boiler due to a lower turndown ratio.

Recommendation 14. The evaluation team recommends that the implementer use the efficient boiler percent ON factor when calculating savings for this measure to account for the interaction between the two measures.

3.5.2.4 Custom – Building Type Classification

Finding 15. The ex ante savings for the Dearborn Homes project were calculated using deemed parameters corresponding to the mid-rise multi-family building type from the TRM v8.0. The evaluation team verified this building to be a high rise multi-family building based on the building type definition from the TRM v8.0 and consequently used deemed parameters corresponding to the high rise building type.

Recommendation 15. The evaluation team recommends that the implementer use the building type definitions from the TRM v8.0 when classifying the buildings as high rise or mid-rise.

3.5.2.5 Custom – Joshua Arms

Exhaust Fan (EH) 2 Horsepower (HP) Reduction

Finding 16. The ex ante savings for this measure were calculated using an efficient motor HP of 0.167 HP and a motor efficiency of 82.5% for both the baseline and the efficient motor. This did not align with the efficient motor HP of 0.100 provided in the work order and the corresponding motor efficiency deemed in the TRM v8.0. The accurate motor efficiency value for the baseline and efficient motors should be 44% and 68%, respectively.

Recommendation 16. The evaluation team recommends that the implementer use the efficient motor HP from the work order and use the corresponding motor efficiencies from the lookup table provided in TRM v8.0.

Finding17. The ex ante energy and demand savings for this measure did not include the HVAC interactive effects factor (IE). However, this measure usually has an interactive effect on the HVAC load. The energy and demand savings for this measure should account for an IE factor of 15.7%.

Recommendation 17. The evaluation team recommends that the implementer apply the IE factor in the savings algorithm.

EF – 3 and EF – 4 Replacements

Finding 18. The ex ante savings assumed an efficient motor size of 1 HP and uses the corresponding TRM v8.0 deemed motor efficiency of 85.5%. However, the work order indicated that the efficient motor size is 0.25 HP and the corresponding TRM v8.0 deemed motor efficiencies for both the baseline and efficient motors of this size were the same (68%). The energy and demand savings for this measure will be zero.

Recommendation 18. The evaluation team recommends that the implementer use the TRM v8.0 deemed baseline and efficient motor efficiencies corresponding to the HP value provided in the work order.

Finding 19. The ex ante savings for EF – 3 were calculated using an efficient motor HP of 0.167 HP and a TRM v8.0 deemed motor efficiency of 85.5% corresponding to an efficient motor size of 1 HP. The evaluation team calculated verified savings using a deemed motor efficiency of 62.0% corresponding to an efficient motor size of 0.167 HP as per the TRM v8.0.

Recommendation 19. The evaluation team recommends that the implementer use the TRM v8.0 deemed motor efficiencies corresponding to the HP value of the motor installed.

Air Handler (AH) 1 and 2 Fan Variable Speed Drive (VSD)

Finding 20. The baseline and efficient kW for this measure in the ex ante calculations were calculated using an incorrect algorithm (the motor HP was multiplied by the motor efficiency and divided by the load factor). The baseline and efficient kW in the verified calculations were calculated using the correct algorithm from the TRM v8.0.

Recommendation 20. The evaluation team recommends that the implementer use the baseline and efficient kW algorithm per the TRM v8.0.

Finding 21. The ex ante savings for AH – 1 were calculated using motor efficiency of 85.5% for a 0.5 HP motor. The verified savings were calculated using a motor efficiency of 80.0% corresponding to a 0.5 HP motor per the lookup table in TRM v8.0.

Recommendation 21. The evaluation team recommends that the implementer use the TRM v8.0 deemed motor efficiency values corresponding to the HP of the installed motor when actual efficiency values are unavailable.

Kitchen VSD

Finding 22. The ex ante baseline and efficient kW calculations for this measure uses the TRM v8.0 algorithm incorrectly. The motor HP was multiplied by the motor efficiency and divided by the load factor and it should be multiplied by the load factor and divided by the motor efficiency instead.

Recommendation 22. The evaluation team recommends that the implementer use the baseline and efficient kW algorithm per the TRM v8.0.

Finding 23. The ex ante therm savings calculations did not include the 62.5°F temperature bin while calculating the percentage heating hours.

Recommendation 23. The evaluation team recommends that the implementer use the 62.5°F temperature bin when calculating the percentage of heating hours for this project.

Air Cooled Condensing Units

Finding 24. The ex ante demand savings for this measure were calculated using the summer system peak (SSP) CF. The verified demand savings were calculated using the PJM CF.

Recommendation 24. The evaluation team recommends that the implementer use the PJM CF when calculating demand savings for this measure.

Mini-Split Heat Pump

Finding 25. The ex ante savings for this measure were calculated using capacity cooling, capacity heating and energy efficiency ratio (EER_{EFF}) values of 10,900 Btu/hr, 16,000 Btu/hr, and 12.8 respectively. This did not align with the values provided in the AHRI specification sheet

of the installed equipment, . The accurate values for capacity cooling, capacity heating and EER_{EFF} values are 9,000 Btu/hr, 10,900 Btu/hr and 11, respectively.

Recommendation 25. The evaluation team recommends that the implementer use the capacity cooling, capacity heating and EER_{EFF} per the specifications for the installed model.

Finding 26. The ex ante demand savings for this measure were calculated using the summer system peak (SSP) CF. The verified demand savings were calculated using the PJM CF.

Recommendation 26. The evaluation team recommends that the implementer use the PJM CF when calculating demand savings for this measure.

3.5.2.6 Air Sealing

Finding 27. The ex ante energy savings for this measure were calculated using the assumption that the measure was installed in buildings with no attic insulation. Based on the tracking data the following projects received air sealing and attic insulation upgrades:

- 1537770112
- 1537747168
- 1537742074
- 1537746054
- 1537741111
- 1537768112

Recommendation 27. For the projects listed above, the evaluation team recommends that the implementer use the $ADJ_{AirSealingCool}$ and $IE_{NetCorrection}$ inputs deemed for multi-family buildings that received air sealing and attic insulation measures.

3.5.2.7 Advanced Thermostats

Finding 28. The ex ante energy savings for this measure were calculated using FLH deemed by TRM v8.0 for non-weatherized multi-family buildings. Based on the information provided in the tracking data, all buildings that received this measure also received weatherization upgrades.

Recommendation 28. The evaluation team recommends that the implementer use the FLH deemed for weatherized multi-family buildings.

Finding 29. The ex ante demand savings for this measure is calculated using a deemed Energy Efficiency Ratio (EER) value. The TRM v8.0 states that this should only be done when the actual Seasonal Energy Efficiency Ratio (SEER) and EER values are not available.

Recommendation 29. Since the actual SEER value of the cooling system is available, the evaluation team recommends that the implementer calculate the EER value using Equation 1, as deemed by the TRM v8.0.

Equation 1. EER calculations

$$EER = \left(-0.02 \times {SEER_{exist}}^2\right) + (1.12 \times SEER_{exist})$$

3.5.2.8 Showerheads and Kitchen Aerators

Finding 30. The ex ante energy savings for these measures use the assumption that all the multi-family homes that received the measures were occupied by only one person. This does not align with the assumption made while doing the calculations for bathroom aerators installed in the same properties.

Recommendation 30. The evaluation team recommends that the implementer use the average number of people per household value of 2.1 as deemed by TRM v8.0. This is consistent with the assumption made while calculating the ex ante energy savings for aerators.

3.6 IHWAP Program Component Impact Analysis Methodology

The evaluation team calculated gross verified savings for the IHWAP program component by applying savings algorithms from the TRM v8.0. The team determined verified gross savings for each program measure by:

- Reviewing the savings algorithm inputs in the measure databook for agreement with the TRM v8.0 and TRM v8.0 Errata.
- Validating savings algorithms were applied correctly.
- Cross-checking per-unit savings values in the tracking data with the verified values in the measure databook or in the team's calculations if the databook did not agree with the TRM v8.0.
- 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 databook for the CY2020 impact evaluation from the ComEd Evaluation Share file site. We relied on the following documents to verify the per-unit savings for each program measure:

- Final CY2020 tracking data: IHWAP-MF_CY2020_EOY_Data_Rev1_01192021.xlsx
- TRM v8.0 for deemed input parameters or secondary evaluation research to verify any custom inputs used in the ex ante calculations
- Implementer Savings Calculations: 2020_HEWI_IER_Resource Innovations_Savings Calculator Navigant Recommendations

The team calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a NTG ratio of 1.0. For CY2020, the Multi-Family Retrofits Program's NTG estimate was defined by a consensus process through the Illinois SAG.

3.7 IHWAP Program Component Total Resource Cost Detail

Table 3-14 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) are not included in this table and will be provided to the evaluation team later.

Table 3-14. IHWAP 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)
HVAC	Advanced Thermostat	Each	19	11.0	No	1,507	0.51	0	0	0	0	1.00	1.00	1.00	1,507	0.51	0	0	0	0
Shell	Air Sealing‡	Project	78	20.0	Yes	1,172	0.69	1,001	0	0	0	1.00	1.00	1.00	1,172	0.69	1,001	0	0	0
Shell	Attic Insulation‡	Project	13	20.0	Yes	2,793	1.13	0	0	0	0	1.00	1.00	1.00	2,793	1.13	0	0	0	0
Hot Water	Bathroom Aerator	Each	11	10.0	No	0	0.00	18	23	0	0	1.00	1.00	1.00	0	0.00	18	23	0	0
HVAC	Bathroom Exhaust Fan	Each	36	19.0	No	1,917	0.23	0	0	0	0	1.00	1.00	1.00	1,917	0.23	0	0	0	0
HVAC	Central Air Conditioning‡	Each	8	18.0	Yes	4,840	2.90	0	0	0	0	1.00	1.00	1.00	4,840	2.90	0	0	0	0
Hot Water	Handheld Showerhead	Each	11	10.0	No	0	0.00	40	35	0	0	1.00	1.00	1.00	0	0.00	40	35	0	0
Hot Water	Kitchen Aerator	Each	11	10.0	No	0	0.00	87	90	0	0	1.00	1.00	1.00	0	0.00	87	90	0	0
Lighting	LED Indoor Specialty‡	Each	351	10.0	No	2,382	0.35	0	0	0	-55	1.00	1.00	1.00	2,382	0.35	0	0	0	-55
Lighting	LED Indoor Standard‡	Each	994	10.0	No	24,623	2.98	0	0	0	-565	1.00	1.00	1.00	24,623	2.98	0	0	0	-565
Lighting	LED Outdoor Specialty‡	Each	12	10.0	No	1,600	0.18	0	0	0	0	1.00	1.00	1.00	1,600	0.18	0	0	0	0
Lighting	LED Outdoor Standard‡	Each	14	10.0	No	1,815	0.20	0	0	0	0	1.00	1.00	1.00	1,815	0.20	0	0	0	0
HVAC	Programmable Thermostat	Each	11	8.0	No	0	0.00	684	0	0	0	1.00	1.00	1.00	0	0.00	684	0	0	0
Appliance	Room Air Conditioner‡	Each	18	12.0	Yes	1,747	2.36	0	0	0	0	1.00	1.00	1.00	1,747	2.36	0	0	0	0
Custom	Custom Measure - HHW System Upgrade	Project	2	15.0	No	20,565	0.00	0	0	0	0	1.00	1.00	1.00	20,565	0.00	0	0	0	0
Custom	Custom Measure - DHW Plant Improvement‡	Project	3	15.2	Yes	15,065	2.14	11,920	0	0	0	1.00	1.00	1.00	15,065	2.14	11,920	0	0	0
Custom	Custom Measure - Heating Plant Improvement‡	Project	2	24.0	Yes	25,527	2.14	8,237	0	0	0	1.00	1.00	1.00	25,527	2.14	8,237	0	0	0
Custom	Custom Measure - Lighting‡	Project	8	6.3	No	82,779	10.03	0	0	0	-115	1.00	1.00	1.00	82,779	10.03	0	0	0	-115
Custom	Custom Measure - Secondary Pump Improvement	Project	1	15.0	No	6,267	0.00	0	0	0	0	1.00	1.00	1.00	6,267	0.00	0	0	0	0
Custom	Custom Measure - New Air Handlers	Project	1	15.0	No	6,354	0.25	0	0	0	0	1.00	1.00	1.00	6,354	0.25	0	0	0	0
Custom	Custom Measure - Kitchen Exhaust and MAU	Project	1	15.0	No	4,184	0.32	0	0	0	0	1.00	1.00	1.00	4,184	0.32	0	0	0	0
Custom	Custom Measure - Exhaust Fans	Project	1	15.0	No	1,176	0.13	0	0	0	0	1.00	1.00	1.00	1,176	0.13	0	0	0	0
Custom	Custom Measure - HVAC	Project	1	15.0	Yes	2,444	0.47	0	0	0	0	1.00	1.00	1.00	2,444	0.47	0	0	0	0
	Total			12.1		208,757	27	21,987	147	0	-735	NA	NA	NA	208,757	27	21,987	147	0	-735

Note: To avoid double counting, the verified gross kWh and net kWh used in the TRC analysis exclude secondary energy savings from water reduction measures. Table 3-14 represents the kWh savings from Table 3-6 minus those shown in Table 3-10.

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

‡The EUL for this measure varies over time. See the CPAS tables (Table 3-3 to Table 3-5).

Source: ComEd tracking data and evaluation team analysis