

# 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:** 

ComEd FINAL

April 26, 2021

Prepared by:

Sagar Phalke Guidehouse Sagar Deo Guidehouse

guidehouse.com



### Submitted to:

ComEd 2011 Swift Drive Oak Brook, IL 60523

### Submitted by:

Guidehouse Inc. 150 N. Riverside Plaza, Suite 2100 Chicago, IL 60606

### Contact:

Charles Maglione, Partner 703.431.1983 <u>cmaglione@guidehouse.com</u> Jeff Erickson, Director 608.616.4962 jeff.erickson@guidehouse.com Patricia Plympton, Associate Director 202.253.9356 patricia.plympton@guidehouse.com

This report was prepared by Guidehouse for ComEd. The work presented in this report represents Guidehouse's professional judgment based on the information available at the time this report was prepared. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Guidehouse nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.



# **Table of Contents**

1. Introduction	1
1.1 Program Description	1
2. IEMS Program Component	1
2.1 IEMS Program Component Description	1
2.2 IEMS Program Component Savings Detail	2
2.3 IEMS Program Component Cumulative Persisting Annual Savings	3
2.4 IEMS Program Component Savings by Measure1	4
2.5 IEMS Program Component Impact Analysis Findings and Recommendations 2	20
2.5.1 IEMS Program Component Impact Parameter Estimates2	20
2.5.2 Other IEMS Program Component Impact Findings and Recommendations2	22
2.6 IEMS Program Component Impact Analysis Methodology 2	27
2.7 IEMS Program Component Total Resource Cost Detail	28
3. IHWAP Program Component3	51
3.1 IHWAP Program Component Description	31
3.2 IHWAP Program Component Savings Detail	32
3.3 IHWAP Program Component Cumulative Persisting Annual Savings	33
3.4 IHWAP Program Component Savings by Measure	3
3.5 IHWAP Program Component Impact Analysis Findings and Recommendations 4	9
3.5.1 IHWAP Program Component Impact Parameter Estimates4	19
3.5.2 Other IHWAP Program Component Impact Findings and Recommendations .5	50
3.6 IHWAP Program Component Impact Analysis Methodology5	57

# List of Tables, Figures, and Equations

2
. 14
. 14
. 32
.43
. 44
2
3
5
8
. 11
15



Table 2-8. IEMS CY2020 Energy Savings by Measure – Gas	17
Table 2-9. IEMS CY2020 Energy Savings by Measure – Total Combining Electricity and	Gas 18
Table 2-10. IEMS Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Energy Savings from Water Reduction by Measure - Electronic Secondary Electronic Second	ric 19
Table 2-11. IEMS Savings Parameters	20
Table 2-12. IEMS End Use-Level Savings and Realization Rates	22
Table 2-13. IEMS Quantity Comparison – Refrigerator	26
Table 2-14. IEMS Total Resource Cost Savings Summary	29
Table 3-1. IHWAP CY2020 Volumetric Findings Detail	31
Table 3-2. IHWAP CY2020 Total Annual Incremental Electric Savings	33
Table 3-3. IHWAP Cumulative Persisting Annual Savings (CPAS) – Electric	34
Table 3-4. IHWAP Cumulative Persisting Annual Savings (CPAS) – Gas	37
Table 3-5. IHWAP Cumulative Persisting Annual Savings (CPAS) – Total	40
Table 3-6. IHWAP CY2020 Energy Savings by Measure – Electric	45
Table 3-7. IHWAP CY2020 Summer Peak Demand Savings by Measure	46
Table 3-8. IHWAP CY2020 Energy Savings by Measure – Gas	47
Table 3-9. IHWAP CY2020 Energy Savings by Measure – Total Combining Electricity an	d Gas
	48
Table 3-10. IHWAP Secondary Energy Savings from Water Reduction by Measure - Ele	ctric 49
Table 3-11. IHWAP Savings Parameters	50
Table 3-12. IHWAP End Use-Level Savings and Realization Rates	51
Table 3-13. IHWAP Wattage Comparison	51
Table 3-14. IHWAP Total Resource Cost Savings Summary	58
Equation 1. EER calculations	56



# **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.

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

### Table 2-1. IEMS CY2020 Volumetric Findings Detail

\*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.<sup>1</sup> 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	<b>Electric Savings</b>
------------------------------	--------------------	-------------------------

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

<sup>&</sup>lt;sup>1</sup> 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.



									•	·				
			CV/2020			Verified Net kW	h Savings							
		V	CY2020		Lifotimo Not									
			Savings		Savings									
End Use Type	Research Category	EUL	(kWh)	NTG*	(kWh)†	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 Tot	al 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 To	tal 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 Electi	ric 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 Inc	cremental Expiring Electric Savings§								6,575	11,346	50,566	41,687	160,552	204,170
Historic Program Inc	cremental Expiring Electric Savings‡§							10,406	638,287	207,181	392,636	1,323,200	994,052	608,492
Program Total Incre	mental Expiring Electric Savings§							10,406	644,862	218,527	443,202	1,364,887	1,154,604	812,662

### Table 2-3. IEMS Cumulative Persisting Annual Savings (CPAS) – Electric

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

End bar Sype         Research Category         2027         2028         2037         2031         2032         2038														
End Liss PryceResearch Category202920292009201020112003203420382034203820342037773.277														
ShellCA Alle insulation and Af Soaling174,626174,626174,626174,271173,2	End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
LighingED CA hearing 24/7 - Fixang130.724130.724130.72481.0231LighingED CA hearing relational68.44668.44668.44677.6577	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
LighingLED A Exhibitor - Findance130,724130,74	Lighting	LED CA Interior 24/7 - Fixture												
LighingLED Universe08.44608.44708.42008.42008.42008.42008.42008.446 <t< td=""><td>Lighting</td><td>LED CA Exterior - Fixture</td><td>130,724</td><td>130,724</td><td>130,724</td><td>130,724</td><td>81,023</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Lighting	LED CA Exterior - Fixture	130,724	130,724	130,724	130,724	81,023							
ShellCAF oundation Stlewall mesulation77, 65787, 7877, 65787, 7877, 65787, 7877, 65787, 7877, 65787, 7877, 65787, 7877, 65787, 7877, 65787, 7877, 65787, 7877, 65787, 7887, 7838, 993, 8493, 8493, 8493, 8493, 8493, 8493, 8493, 8493, 8493, 8493, 8493, 8493, 8473, 8473, 8473, 8473, 8473, 8473, 8473, 8473, 8473, 8473, 847<	Lighting	LED IU Interior - Omnidirectional	68,446	68,446	68,446									
LippingLED Ca Name or - Future76,621 <th76,700< th="">76,62176,</th76,700<>	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
LiphingLEB CA Interior - Omdirectional	Lighting	LED CA Interior - Fixture	76,621	76,621	76,621	76,621	76,621	76,621	76,621	76,621				
LiphingLED CA Interior - OrnalidecionalLiphingED CA Interior - 71223.03723.03723.03723.03723.03723.0373.849 <td>Lighting</td> <td>LED Exit Sign</td> <td></td>	Lighting	LED Exit Sign												
LippingLB CA Interior 71723.03733.6493.8493.8493.8493.8493.8493.8493.8493.8493.8493.8493.8493.8493.8493.847 </td <td>Lighting</td> <td>LED CA Interior - Omnidirectional</td> <td></td>	Lighting	LED CA Interior - Omnidirectional												
LightingLightingLight normal consistency3.8493.8	Lighting	LED CA Interior - T12	23,037	23,037	23,037	23,037	23,037	23,037	23,037	23,037				
Appliancial Appliancial LED Univerion Decoration LED Univerion Decorative3.8493.8	Lighting	LED CA Interior 24/7 - T12												
LiphingE10 linkeior - Decorative12,37012,37012,37012,700 <th< td=""><td>Appliances</td><td>Refrigerator</td><td>3,849</td><td>3,849</td><td>3,849</td><td>3,849</td><td>3,849</td><td>3,849</td><td>3,849</td><td>3,849</td><td>3,849</td><td>3,849</td><td></td><td></td></th<>	Appliances	Refrigerator	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849	3,849		
Hordward10,70017	Lighting	LED IU Interior - Decorative	12,370	12,370	12,370									
LiphingLED C Alterior DecorativeLes or SurveyLes or Survey <th< td=""><td>Hot Water</td><td>IU Showerhead</td><td>17,770</td><td>17,770</td><td>17,770</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	Hot Water	IU Showerhead	17,770	17,770	17,770									
HorkadeId. AgainId. Again<	Lighting	LED CA Interior Decorative												
Consume ElectronicU Strant StripU Strant	Hot Water	IU Aerator	14,629	14,629	14,629									
HVACIL Contral ACIL S93IL S93	Consumer Electronics	IU Smart Strip												
LighingLED CA Interior - Omnidirectional CFLRetigentCA Vending MserHyACDIE DIM Biover - Fixture6,735	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	
Refigeration       CA Vending Miser         HVAC       IU ECM Blower         Lighting       LED ICM Elover       6,735 <td>Lighting</td> <td>LED CA Interior - Omnidirectional CFL</td> <td></td>	Lighting	LED CA Interior - Omnidirectional CFL												
HVAC       ILI ECM Blower         Lighing       LED IL Inherior - Fixture       6,735       6,735       6,735       6,735       6,735       6,735       6,735       5,735       6,735	Refrigeration	CA Vending Miser												
LighingLED IU Interior - Fixture6,7357,735<	HVAC	IU ECM Blower												
LED CA Exterior - Omnidirectional       Les in the second se	Liahtina	LED IU Interior - Fixture	6.735	6,735	6.735	6,735	6.735	6.735	6.735	6,735				
HVAC       IU Programmable Thermostat       6,782         HVAC       IU Room AC       1,897       1,968 <t< td=""><td>Liahtina</td><td>LED CA Exterior - Omnidirectional</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Liahtina	LED CA Exterior - Omnidirectional												
HVAC       IU Room AC       1,897       1,897       1,897       1,897       1,897       1,897         HVAC       IU Room AC       1,968	HVAC	IU Programmable Thermostat	6.782											
Hot Water       CA DHW Controls       1,968<	HVAC	IU Room AC	1.897	1.897	1.897	1.897	1.897							
HVAC       IU Advanced Thermostat       1,506       1,50	Hot Water	CA DHW Controls	1.968	1,968	1,968	1.968	1,968	1.968	1,968	1,968				
Lighting       LED IU Starior - Omnidirectional       851         Lighting       LED CA Exterior - Omnidirectional       851         Hot Water       IU Shower Timer       851         Lighting       LED CA Exterior - Omnidirectional CFL       900         Hot Water       IU Reprogram Thermostat       900         Lighting       LED CA Garage - Omnidirectional CFL       900         Miscellaneous       CA Smart Strip       900         Lighting       LED CA Garage - Omnidirectional CFL       900         Lighting       Ca Smart Strip       900         Lighting       LED CA Garage - Omnidirectional CFL       900         Lighting       Ca Smart Strip       900         Lighting       Ca Smart Strip       900         Lighting       LED CA Garage - Omnidirectional       900         Lighting       Ca Air Sealing       900         Lighting       LED CA Garage - Omnidirectional       900       900       900         HVAC       CA Air Sealing       900       900       900	HVAC	IU Advanced Thermostat	1.506	1.506	1.506	1.506		,						
Lighting       LED CA Exterior - Directional         Lighting       IU Shower Timer         Lighting       LED CA Exterior - Omnidirectional CFL         HVAC       IU Reprogram Thermostat         Lighting       LED CA Garage - Omnidirectional CFL         Miscellaneous       CA Smart Strip         Lighting       Decupancy Sensor         196       IU Reprogram Thermostat         Lighting       LED CA Garage - Omnidirectional CFL         Shell       CA Airs Sening         CA Airs Sening       -         Kord A fase Sening       -         HVAC       CA Pige Insulation         A Seam Boiler       -         HVAC       CA Pige Steam Averaging Controls         -       -         HVAC       IU Furnace	Lighting	I ED IU Exterior - Omnidirectional	851	.,	.,	.,								
Automation       Automation         100 Materia       100 Shower Timer         Lighting       LED CA Exterior - Omnidirectional CFL         HVAC       100 Reprogram Thermostat         Lighting       LED CA Garage - Omnidirectional CFL         Miscellaneous       CA Smart Strip         Lighting       Occupancy Sensor         196         VAC       LED CA Garage - Omnidirectional         Shell       CA Airs Sealing         CA Airs Sealing       -         VAC       A Pise Insulation         VAC       -         HVAC       CA Pige Insulation         -       -         HVAC       CA Pige Steam Averaging Controls         -       -         HVAC       IU Furnace	Lighting	LED CA Exterior - Directional												
Instruction       INFORMETATION         Instruction       INFORMETATION         Lighting       ILED CA Exterior - Omnidirectional CFL         HVAC       IU Reprogram Thermostat         Lighting       LED CA Garage - Omnidirectional CFL         Miscellaneous       CA Smart Strip         Lighting       Occupancy Sensor         196         VAC       LED CA Garage - Omnidirectional         Stell       CA Argealing         CA Sealing       -         VAC       CA Pige Insulation         -       -         VAC       CA Pige Steam Averaging Controls         -       -         HVAC       IU Furnace         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -       -         -	Hot Water	III Shower Timer												
HVAC       IU Reprogram Thermostat         Lighting       LED CA Garage - Omnidirectional CFL         Miscellaneous       CA Smart Strip         Lighting       Occupancy Sensor       196         Lighting       LED CA Garage - Omnidirectional	Lighting	LED CA Exterior - Omnidirectional CEL												
LightingCA Smart StripLightingOccupancy Sensor196LightingLED CA Garage - OmnidirectionalShellCA Air Sealing-Air SealingCA Air SealingVACCA Steam Boller-HVACCA Steam Aberaging Controls-HVACIU Furnace-IU FurnaceII Column 2II Column 2-<	HVAC	III Reprogram Thermostat												
Bisellanous       CA SmartStrip         Lighting       Occupancy Sensor       196         Lighting       LED CA Garage - Omnidirectional       1       -	Lighting	LED CA Garage - Omnidirectional CEL												
Indication of the formation of the formatio	Miscellaneous	CA Smart Strin												
Lighting       LED CA Garage - Omildirectional         Shell       CA Air Sealing       - <td>Lighting</td> <td></td> <td>196</td> <td></td>	Lighting		196											
Library	Lighting	LED CA Garage Omnidirectional	170											
HVAC       CA Pipe Insulation       -	Shell		-		-			-				-		
HVAC       CA Steam Boiler       -	HVAC													
HVAC     CA Pipe Steam Averaging Controls     -	HVAC	CA Steam Boiler	-	-	-	-	-	-	-	-				
HVAC IU Furnace	HVAC	CA Dipe Steam Averaging Controls							-	_			-	_
	HVAC			-		-	-		-	-	-		-	-
	Hot Wator		-	-	-	-	-	-	-	-	-	-	-	-
		CA Undrapia Bailer	-	-	-	-	-	-	-	-				
Trivic Califyring During Durin	HVAC		-	-	-	-	-	-	-	-	-	-	-	-
11/1/0 10 / C COVER and Dap Search	CV2020 Program Tat	al Electric Contribution to CDAS	1 221 057	1 212 220	1 212 220	1 009 944	1 0/7 457	06/ 707	06/ 727	064 727	954 274	856 276	822 237	850 024
Circuit Organi Total Electric Contribution to Cho 1,221,031 1,21,227 1,21,227 1,21,3,227 1,010,004 1,047,037 704,737 704,737 704,737 800,070 630,070 630,070 632,027 630,094	Historic Program Tot	tal Electric Contribution to CPAS	2 944 007	2 214 515	2 121 421	1 010 025	1 415 721	1 415 721	704,737	277 007	277.007	245 412	244 157	225 125
$ \begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	Program Total Floots		2,000,007	2,314,315	2,121,421	3 017 600	2 663 399	2 580 469	922,303	3/7,067	1 233 462	343,012	344,137	323,125
1/0/10/2010 Trogram Index Letter 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5	CV2020 Program Inc	remental Expiring Electric Savings	81 020	7 829	3,334,030	114 365	2,003,300	2,000,400	1,007,300	1,341,624	108 361	1,201,707	3 840	1,170,039
Historic Drogram Incremental Expiring Electric Savingsts         01020         102,00         01,207         02,720         -         100,001         -         3,047         1,073           Historic Drogram Incremental Expiring Electric Savingsts         310.031         551.402         103,005         2015         -         403.147         545.474         -         -         1,003         -         1,073	Historic Program Inc	cremental Expiring Electric Savingss	310 021	551 /020	193 005	202 585	302 105	02,720	602 167	545 474	100,001	31 /75	1 455	10 022
Program Total Incremental Explining Electric Savings 3 310,052 559,320 193,095 225,005 316,950 593,167 545,476 108,361 31,475 5,303 20,625	Program Total Increr	mental Expiring Electric Savings+9	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	Pasaarch Catagory	2030	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shell	CA Attic Insulation and Air Sealing	773 277	2040	2041	2042	2045	2044	2045	2040	2047	2040	2047	2030
Lighting	LED CA Interior 24/7 - Eixture	113,211											
Lighting	LED CA Exterior - Eixture												
Lighting	ED III Interior - Ompidirectional												
Shell	CA Equindation Sidewall Insulation	77.657											
Lighting	LED CA Interior - Eixture	77,037											
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 III Interior - Decorative												
Hot Water	III Showerhead												
Lighting	LED CA Interior Decorative												
Lighting Hat Water	LED CA Interior Decorative												
Consumer Electronics	IU Smart Strip												
HVAC	IU Control AC												
Lighting	LED CA Interior Omnidiractional CEL												
Defineretien	CA Verdine Mine												
Reingeration	CA Vending Miser												
HVAC	ID ECIVI Blower												
Lighting	LED TO Interior - Fixture												
	LED CA Exterior - Orinidirectional												
HVAC													
HVAC													
Hot vvater	CA DHW Controls												
HVAC	IU Advanced I nermostat												
Lighting	LED IU Exterior - Omnidirectional												
Lighting	LED CA Exterior - Directional												
Hot vvater	IU Snower Limer												
Lighting	LED CA Exterior - Omnidirectional CFL												
HVAC	IU Reprogram I nermostat												
Lighting	LED CA Garage - Omnidirectional CFL												
Miscellaneous	CA Smart Strip												
Lighting	Occupancy Sensor												
Lighting	LED CA Garage - Omnidirectional												
Snell	CA Air Sealing	-											
HVAC	CA Pipe Insulation												
HVAC	CA Steam Boller	-	-	-	-	-	-						
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 Tot	al Electric Contribution to CPAS	850,934		-	-	-	-	-	-	-	-	-	-
Historic Program Tol	al Electric Contribution to CPAS‡	224,116	224,116	224,116	224,116	-	-	-	-	-	-	-	-
Program Total Electr	IC CPAS	1,075,050	224,116	224,116	224,116	-	-	-	-	-	-	-	-
CY2020 Program Inc	remental Expiring Electric Savings§	-	850,934	-	-	-	-	-	-	-	-	-	-
Program Total Income	mental Expiring Electric Savings1§	101,009	-	-	-	224,116	-	-	-	-	-	-	-
i rogram rotar merer	nentai Explinity Electric Savingss	101,009	030,734	-	-	224,110	-	-	-	-	-	-	-

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: <u>https://www.ilsag.info/ntg\_2020</u>.

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

‡ Historical savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Yn-1 - CPAS Yn.

Source: Evaluation team analysis



Table 2-4 IFM	S Cumulative	Persisting	Annual	Savings	(CPAS)	– Gas	
	S Cumulative	i cisisuny	Amuai	Savings		- Gas	

						Verified Net 1	Therms Saving	s						
			CY2020 Verified		Lifetime Net									
	Posoarch Catagory	FUL	GIOSS Savings (Therms)	NTG*	(Therms)†	2019	2010	2020	2021	2022	2022	2024	2025	2026
Shell	CA Attic Insulation and Air Sealing	20.0	47.699	1.00	942 212	2010	2017	47 699	47 699	47 699	47 699	47 699	47 699	47 699
Liabling	LED CA Interior 24/7 Eixture	5.7	47,077	1.00	742,212			47,077	47,077	47,077	47,077	47,077	47,077	47,077
Lighting	LED CA Exterior Eixture	11.6		1.00						-	-	-	-	
Lighting		10.0		1.00				-		-	-	-		
Shell	CA Foundation Sidewall Insulation	20.0		1.00				-						
Liabling	LED CA Interior - Eixture	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	Politionalor	17.0		1.00										
Lighting	LED III Interior Decorative	10.0		1.00						-	-	-	-	-
Lighting Hot Water	III Showerbead	10.0	7 001	1.00	70.006			7 001	7 001	7 001	7 901	7 901	7 001	7 001
Lighting	LED CA Interior Decorative	2.0	7,701	1.00	77,000			7,301	7,701	7,701	7,701	7,701	7,701	7,901
Hot Water		10.0	6 138	1.00	61 383			6 138	6 138	6 138	6 138	6 138	6 1 3 8	6 138
Consumer Electronic	s III Smart Strin	7.0	0,150	1.00	01,303			0,130	0,130	0,130	0,130	0,130	0,130	0,130
		19.0	-	1.00	-			-	-	-	-	-	-	-
Lighting		3.4	-	1.00	-			-	-	-	-	-	-	-
Defrigeration	CA Vending Misor	5.0		1.00				-		-	-			
		5.0		1.00				-		-	-	-		
Lighting		15.0	-	1.00	-			-	-	-	-	-	-	
Lighting	LED CA Exterior Omnidirectional	15.0	-	1.00	-			-	-	-	-	-	-	-
	III Drogrammable Thermostat	4.0	7 010	1.00	-			-	- 7.010	- 7.010	7 010	7 010	7.010	7.010
HVAC		12.0	7,019	1.00	50,151			7,019	7,019	7,019	7,019	7,019	7,019	7,019
HotWater		12.0	- 2 127	1.00	22.049			- 2 1 2 7	- 2 1 2 7	-	- 2 127	- 2 127	- 2 1 2 7	- 2 127
	III Advanced Thermostat	11.0	2,137	1.00	2 440			2,137	2,137	2,137	2,137	2,137	2,137	2,137
Liabling	LED III Exterior Omnidirectional	8.0	515	1.00	3,409			515	315	310	313	515	515	310
Lighting	LED CA Exterior Directional	5.9		1.00				-		-	-	-		-
Lighting Het Water	III Shower Timer	3.0	1 077	1.00	2 05 2			1 077	1.077	-	-	-		
Lighting	LED CA Exterior Ompidiractional CEL	2.0	1,777	1.00	3,733			1,777	1,777					
	III Poprogram Thormostat	4.0	524	1.00	1.049			524	524	-	-	-		
Lighting	LED CA Garage Ompidirectional CEL	5.6	J24	1.00	1,040			J24	J24					
Missellaneous	CA Smort Skin	7.0		1.00				-		-	-	-		
Lighting		7.0	-	1.00	•			-	-	-	-	-	-	-
Lighting	LED CA Garage Ompidirectional	5.6		1.00				-		-	-	-		-
Sholl	CA Air Sealing	20.0	554	1.00	11 072			554	554	554	554	554	554	554
HVAC	CA Pine Insulation	15.0	01.091	1.00	1 266 221			01.091	01.091	01 091	01.091	01.091	01.091	01 091
HVAC	CA Steam Boiler	25.0	91,001	1.00	2 201 791			91,001	91,001	91,001	91,001	91,001	91,001	99,001
HVAC	CA Bipa Steam Averaging Controls	20.0	40.276	1.00	2,201,701			40.276	40.276	40.276	40.276	40.276	40.276	40.276
HVAC	III Europeo	20.0	1 050	1.00	21 175			1 050	1 050	1 050	1 050	1 059	1 050	1 050
HotWater		15.0	1,057	1.00	19 704			1,037	1,037	1,037	1,037	1,037	1,057	1,057
	CA Hydropic Boiler	25.0	6 810	1.00	170 254			6,910	6 910	6.910	6 910	6 910	6 910	6,210
HVAC	III AC Cover and Can Sealer	5.0	125	1.00	624			125	125	125	125	125	0,010	0,010
CV2020 Drogram Tr	atal Cas Contribution to CBAS (Thorms)	5.0	202.014	1.00	E 774 414			202 014	202.014	200 515	200 515	200 515	200.245	200.245
CV2020 Program T	atal Cas Contribution to CDAS (Henris)		303,010		5,774,014			0 001 000	0 001 000	0 000 001	0 000 001	0 000 001	0 000 750	0 000 750
CY2020 Program To	tal Gas Contribution to CPAS (kwn Equivalent)‡					-	-	8,881,389	8,881,389	8,808,091	8,808,091	8,808,091	8,800,753	8,800,753
HISTORIC Program I	ODAG (HM/L Employee)					12,834,959	26,702,999	26,702,999	26,562,915	26,533,120	20,382,519	23,647,864	18,158,875	18,158,875
Program Total Gas	CPAS (KWR Equivalent)I					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
C 12020 Program In	Icremental Expiring Gas Savings (Therms)								-	2,501	-	-	250	-
CY2020 Program In	cremental Expiring Gas Savings (KWh Equivalent)‡									/3,298	-	-	7,339	-
Historic Program Ir	ncremental Expiring Gas Savings (kWh Equivalent)‡§							-	140,085	29,795	150,601	2,734,655	5,488,990	-
Program Total Incr	emental Expiring Gas Savings (kWh Equivalent)‡							-	140,085	103,092	150,601	2,734,655	5,496,328	-



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

		0007	0000		0000	0004	0000	0000		0005	000/	0007	0000
End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Snell	LED CA Interior 24/7 Eivture	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 _ Fixture												
Lighting		-	-	-	-	-							
Lignung	CA Equipation Sidewall Inculation	-	-	-									
Lighting		-	-	-	-	-	-	-	-	-	-	-	-
Lighting	LED CA Interior - Fixible	-	-	-	-	-	-	-	-				
Lighting	LED CA Interior - Ompidirectional												
Lighting	LED CA Interior - T12						-						
Lighting	LED CA Interior 24/7 - T12	-		_			-	-	-				
Appliances	Pefrigerator												
Lighting	LED III Interior Decorative	-	_	-	_		-	-	_		-		
Hot Water	III Showerbead	7 901	7 901	7 901									
Lighting	LED CA Interior Decorative	7,701	7,901	7,701									
Hot Water		6 139	6 1 2 8	6 138									
Consumer Electronics		0,130	0,130	0,130									
HVAC							-						
Lighting	LED CA Interior - Omnidirectional CEL	-	-	_			-	-	-		_		
Defrigeration	CA Vending Miser												
HVAC													
Lighting	LED III Interior - Eixture				_		-						
Lighting		-		-			-	-	-				
HVAC		7 019											
HVAC		7,019											
Hot Water	CA DHW Controls	2 1 2 7	2 127	2 127	2 127	2 1 2 7	2 1 2 7	2 1 2 7	2 1 2 7				
HVAC	III Advanced Thermostat	2,137	2,137	2,137	2,137	2,137	2,137	2,137	2,137				
Lighting	LED III Exterior - Ompidirectional		515	515	515								
Lighting													
Hot Water													
Lighting	LED CA Exterior - Omnidirectional CEL												
HVAC													
Lighting	LED CA Garage - Omnidirectional CEL												
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 Pine 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 Tota	al 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 Tota	al 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 Tot	al Gas Contribution to CPAS (kWh Equivalent)+8	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 C	PAS (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 Inc	remental Expiring Gas Savings (Therms)		7.019	,	13.945	315		1.816		94.423		-	
CY2020 Program Inc	remental Expiring Gas Savings (kWh Equivalent)	-	205 724		408 720	9 244	-	53 213		2.767 537			-
Historic Program Inc	remental Expiring Gas Savings (kWh Equivalent)+8	371 194	1.382 881	423 816	33 913	-	33 109	3,910,300	2,226 477	_,	-	-	2,280 128
Program Total Increm	nental Expiring Gas Savings (kWh Equivalent)+	371 104	1 588 605	423 814	442 622	9 244	33 109	3 963 512	2 226 477	2 767 527			2 280 129
	ional Expring ous savings (kwri Equivalent)+	571,174	1,000,000	723,010	772,033	7,244	33,107	3,703,313	2,220,411	2,101,331	-	-	2,200,120



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

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												
Liahtina	LED IU Interior - Fixture												
Lighting	LED CA Exterior - Omnidirectional												
HVAC	IU Programmable Thermostat												
HVAC	III Room AC												
Hot Water	CA DHW Controls												
HVAC	III Advanced Thermostat												
Lighting	LED III Exterior - Ompidirectional												
Lighting	LED CA Exterior - Directional												
Hot Water	III Shower Timer												
Lighting	LED CA Exterior - Ompidirectional CEL												
HVAC	III Penrogram Thermostat												
Lighting	LED CA Carago Ompidiractional CEL												
Miscellapeous	CA Smart Strip												
Lighting	Occupancy Soncer												
Lighting	LED CA Casage Omnidizedianel												
Eignung	CA Air Seeling	EE 4											
Shell	CA Air Sealing	554											
HVAC	CA Sham Bailer	00.071	00.071	00.071	00.071	00.071	00.071						
HVAC	CA Sleant Boller	88,071	88,071	88,071	66,071	66,071	66,071						
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 Tot	al Gas Contribution to CPAS (Therms)	182,747	94,881	94,881	94,881	94,881	94,881	-	-	-	-	-	-
CY2020 Program Tot	al 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	-	-	-	-	-	-	-	-
Program Total Gas C	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)‡§			-	-	-	2,042,538	-	-	-	-	-	-	-
Program Total Increr	nental 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: <u>https://www.ilsag.info/ntg\_2020</u>.

† 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 Yn.

Source: Evaluation team analysis



						•		Ŭ						
						Verified Net kWh Savings (Including Those Converted from Gas Savings)								
			CY2020 Verified											
			Gross Savings		Lifetime Net									
End Use Type	Research Category	EUL	(KWh)	NIG	Savings (kWh)T	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
Liahtina	ED CA Interior - Omnidirectional CEI	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	III ECM Blower	6.0	10 192	1.00	61 152			10 192	10 192	10 192	10 192	10 192	10 192	
Lighting	I ED III Interior - Eixture	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 8 25	5 718	10,032	10,032
НИЛС	III Programmable Thermostat	9.0	212 506	1.00	1 700 048			212 506	212 506	212 506	212 506	212 506	212 506	212 506
HVAC		12.0	212,500	1.00	26 155			212,500	212,500	212,500	212,500	1 907	1 907	1 907
Hot Water	CA DHW Controls	12.0	64 590	1.00	068 834			64 590	64 580	64 590	64 590	64 580	64 589	64 599
HVAC	III Advanced Thermostat	11.0	10 750	1.00	118 246			10 750	10 750	10 750	10 750	10 750	10 750	10 750
Liahting	LED III Exterior Omeidiractional	0.0	1 402	1.00	110,240			1 402	1 402	1 402	1 402	1 402	1 402	1 402
Lighting	LED TO Exterior Directional	0.U E 0	1,492	1.00	7 225			1,492	1,492	1,492	1,492	705	1,492	1,492
Lighting	LED CA Extend - Directorial	3.0	1,47Z	1.00	1,323			1,472 E0.324	1,472 E0.334	1,472	1,472	795	044	
HULWAIEI	LED CA Exterior Ormidicational CEL	2.0	39,220	1.00	116,452			39,220	39,220	1 2 4 0	1 0 4 0	000		
Lighting	LED CA Exterior - On indirectional CFL	4.0	1,240	1.00	5,600			1,248	1,240	1,240	1,240	009		
HVAC	IU Reprogram Thermostal	2.0	15,995	1.00	31,989			15,995	15,995	222	222	222	21/	
Ligning	LED CA Garage - Omnidirectional CFL	5.0	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	Uccupancy 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 To	tal 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 To	tal 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	6					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 Inc	cremental Expiring Savings§								6,575	84,643	50,566	41,687	167,891	204,170
Historic Program In	cremental Expiring Savings‡§							10,406	778,372	236,976	543,237	4,057,855	6,483,041	608,492
Program Total Incre	mental Expiring Savings§							10,406	784,947	321,619	593,803	4,099,542	6,650,933	812,662

# Table 2-5. IEMS Cumulative Persisting Annual Savings (CPAS) – Total

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

	Desearch Catagory	2027	2020	2020	2020	2021	2022	2022	2024	2025	2024	2027	2020
Sholl	CA Attic Insulation and Air Scaling	2027	2028	2029	2030	2031	2032	2033	2034	2035	2030	2037	2038
Lighting	LED CA Interior 24/7 - Eixture	2,172,402	2,172,402	2,172,402	2,174,074	2,174,074	2,174,074	2,120,001	2,120,001	2,120,001	2,120,001	2,120,001	2,120,001
Lighting	LED CA Exterior - Fixture	130 724	130 724	130 724	130 724	81.023							
Lighting	ED III Interior - Omnidirectional	68.446	68 446	68.446	130,724	01,025							
Sholl	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		76,601	76,601	76,601	76,601	76,601	76.601	76.601	76.601	11,031	11,031	11,001	11,031
Lighting	I ED Evit Sign	70,021	70,021	70,021	70,021	70,021	70,021	70,021	70,021				
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	23,037	23,037	23,037	23,037	23,037	23,037	23,037	23,037				
Appliances	Refrigerator	3.840	3 8/0	3 8/0	3 8/10	3 8/0	3 8/0	3 8/0	3 8/0	3.840	3 8/0		
Lighting	LED III Interior - Decorative	12 370	12 370	12 370	5,047	5,047	3,047	3,047	3,047	3,047	5,047		
Hot Water	III Showerhead	2/0 337	2/0 337	2/0 337									
Lighting	I ED CA Interior Decorative	247,557	247,337	247,337									
Hot Water		104 544	104 544	10/ 5//									
Consumer Electronic	s III Smart Strin	174,544	174,344	174,344									
HVAC		1 503	1 503	1 503	1 503	1 503	1 503	1 503	1 503	1 503	1 503	1 503	
Lighting	LED CA Interior - Omnidirectional CEL	1,575	1,373	1,375	1,375	1,373	1,575	1,575	1,373	1,373	1,375	1,373	
Defrigeration	CA Vending Miser												
HVAC	III ECM Blower												
Lighting		6 735	6 735	6 735	6 735	6 735	6 735	6 735	6 735				
Lighting	LED CA Exterior - Omnidirectional	0,735	0,733	0,735	0,735	0,733	0,755	0,735	0,755				
HVAC		212 506											
HVAC		1 897	1 897	1 897	1 897	1 897							
Hot Water	CA DHW Controls	64 589	64 589	64 589	64 580	64 589	64 580	64 580	64 580				
HVAC	III Advanced Thermostat	10 750	10 750	10 750	10 750	04,507	04,307	04,507	04,507				
Lighting		851	10,730	10,730	10,730								
Lighting	LED CA Exterior - Directional	031											
Hot Water													
Lighting	LED CA Exterior - Omnidirectional CEL												
HVAC													
Lighting	LED CA Garage - Omnidirectional CEL												
Miscellaneous	CA Smart Strin												
Lighting		196											
Lighting	LED CA Garage - Omnidirectional	170											
Shell		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		2 669 596	2 669 596	2 669 596	2 669 596	2 669 596	2 669 596	2 669 596	2 669 596	10,223	10,223	10,223	10,223
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 Pine 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		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	31,032	51,032	51,032	31,032
HVAC		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	III AC Cover and Can Sealer	177,000	177,000	177,000	177,000	177,000	177,000	177,000	177,000	177,000	177,000	177,000	177,000
CV2020 Program T	atal Contribution to CBAS	10 021 910	0 000 257	0 000 257	0 205 172	0 224 721	0 1/1 001	0.000 500	0.000 500	6 212 690	6 212 690	6 209 941	6 207 247
Listoric Program T		20 452 400	10 710 215	10 102 404	17 945 004	7,224,721	17 520 602	12 026 224	10 154 272	10 154 272	10 122 704	10 121 242	7 022 102
Drogrom Tatal CDA		20,000,000	10,/17,313	10,102,404	17,000,700	1/,302,002	1/,327,073	12,720,220	10,104,272	16 26/ 0/1	14 225 407	16 220 102	14 020 420
CV2020 Dra an		30,0/5,498	28,527,573	21,910,002	27,101,078	20,181,523	20,0/1,494	22,014,813	19,242,859	10,300,901	10,335,480	10,330,182	14,029,429
C r 2020 Program Ir	Icremental Expiring Savingss	81,020	213,552	-	523,085	oU,451	82,920	53,213	-	2,875,898	-	3,849	1,593
Historic Program II	ncremental 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 Incr	emental 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



	Research Category	2020	2040	2041	2042	2042	2044	2045	2046	2047	2048	2040	2050
Chall	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Liahfing	CA Allic Insulation and All Sealing	2,120,661											
Lighting	LED CA Interior _ Fixture												
Lighting	LED CA Exterior - Fixible												
Lignung	LED TO Interior - Omnidirectional	77 / 67											
Snell	CA Foundation Sidewall Insulation	//,65/											
Lighting	LED CA Interior - Fixture												
Lighting	LED EXITSIGN												
Lighting	LED CA Interior - Umnidirectional												
Lighting	LED CA Interior - 112												
Lignung	LED CA Interior 24/7 - 112												
Appliances	Refrigerator												
Lighting	LED IU Interior - Decorative												
Hot Water	IU Showerhead												
Lighting	LED CA Interior Decorative												
Hot Water	IU Aerator												
Consumer Electronic	cs 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	III AC Cover and Gan Sealer	177,000	177,000	177,000	177,000	177,000	177,000						
CV2020 Brogram T	To AG Cover and Gap Sealer	6 207 247	2 790 074	2 790 074	2 790 074	2 790 074	2 790 074						
Uistaria Dragona 7	Fatal Contribution to CPAS	0,207,247	2,760,974	2,760,974	2,100,914	2,100,914	2,100,914	-	•	-	-	-	-
HISTORIC Program I	IOTAL CONTRIDUTION TO CPAST	2,266,654	2,266,654	2,266,654	2,266,654	-	-	-	-	-	-	-	
Program Total CPA	45	8,473,902	5,047,629	5,047,629	5,047,629	2,780,974	2,780,974	-	-	-	-	-	
CY2020 Program I	ncremental Expiring Savings§	-	3,426,273	-	-	-	-	2,780,974	-	-	-	-	-
Historic Program I	ncremental Expiring Savings‡§	5,555,527		-	-	2,266,654		-	-		-		-
Program Total Incr	remental 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: <u>https://www.ilsag.info/ntg\_2020</u>.

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

‡ Historic savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Yn-1 - CPAS Yn.

Source: Evaluation team analysis





Figure 2-2. IEMS Cumulative Persisting Annual Savings

 $equal to CPAS \ Y_{n-1}$  - 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



		Ex Ante	Varified Gross	Verified		Varified Nat	
End Use Type	Research Category	Gross	Realization	Gross	NTG*	Savings	EUL
		Sávings (kWb)	Rate	Sávings (kWb)		(kWh)	(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

### Table 2-6. IEMS CY2020 Energy Savings by Measure – Electric

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: <u>https://www.ilsag.info/ntg\_2020</u>.



### Table 2-7. IEMS CY2020 Summer Peak Demand Savings by Measure

		Ex Ante Gross Peak	Verified Gross	Verified Gross Peak		Verified Net Peak
End Use Type	Research Category	Demand Reduction	Realization	Demand Reduction	NTG*	Demand Reduction
Sholl	CA Attic Inculation and Air Scaling	(KW)	Rate	(KW)	1.00	(KW)
		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		0.00	NA 1.00	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		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 - 112	7.88	1.52	11.94	1.00	11.94
Lighting	LED CA Interior 24// - 112	3.9/	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.



End Use Type         Research Category         Savings         Realization         Savings         Ntic         Otherwise         Otherwise <thotherwise< th=""></thotherwise<>			Ex Ante Gross	Verified Gross	Verified Gross		Verified Net	FUL
Chemistry         India         Unitarity         India         India           Stel         CA Add: Insulation and Air Scaling         (7)700         10.0         (7)700	End Use Type	Research Category	Savings	Realization	Savings	NTG*	Savings	(years)
John         Origination and in Johns         11/10         11/1	Shell	CA Affic Insulation and Air Scaling		1.00	(Therms)	1 00	(Inerms)	20.0
Optimizy         LED CA Number 201 - Tratute         0         NA         0         1.00         0.0         1.01           Liphing         LED LD CA Eventor - Finture         0         NA         0         1.00         0         110           Shell         CAF Gundalon Sidewall Insulation         0         NA         0         1.00         0         150           Liphing         LED CA Interior - Future         0         NA         0         1.00         0         3.5           Liphing         LED CA Interior - Tizz         0         NA         0         1.00         0         3.5           Liphing         LED CA Interior - Tizz         0         NA         0         1.00         0         1.50           Liphing         LED CA Interior - Tizz         0         NA         0         1.00         0         1.00           Liphing         LED CA Interior - Decorative         0         NA         0         1.00         0         7.0           Liphing         LED CA Interior Domaintrectional CFL         0         NA         0         1.00         0         1.00           Liphing         LED CA Interior Domaintrectional CFL         0         NA         0         1.0	Lighting	LED CA Interior 24/7 Eixture	47,700	1.00 NA	47,077	1.00	47,077	5.7
Lighting         LED UL heiror - Nondirectonal         0         NA         0         1.00         0         1.10           Shef         CAF bundation Stelevall insulation         0         NA         0         1.00         0         200           Lighting         LED CA Inertior - Floture         0         NA         0         1.00         0         550           Lighting         LED CA Inertior - Tritz         0         NA         0         1.00         0         550           Lighting         LED CA Inertior - Tritz         0         NA         0         1.00         0         1.50           Lighting         LED CA Inertior 2/17-112         0         NA         0         1.00         0         1.50           Lighting         LED CA Inertior 2/17-112         0         NA         0         1.00         0         1.00           Lighting         LED CA Inertior 2/17-112         0         NA         0         1.00         0         1.00         1.00           Lighting         LED CA Inertior 2/17-112         0         NA         0         1.00         0         1.00           Lighting         LED CA Inertior 2/17-112         0         NA         0	Lighting		0	NA	0	1.00	0	11.6
Capital         CD Media         Control         NA         O         NA         O         NA           Uphting         LED CA hunchor         Fikure         0         NA         0         1.00         0         2.00           Lighting         LED CA hunchor         Fikure         0         NA         0         1.00         0         3.0           Lighting         LED CA hunchor         Fikure         0         NA         0         1.00         0         3.4           Lighting         LED CA hunchor         Filz         0         NA         0         1.00         0         1.75           Applances         Refigerator         0         NA         0         1.00         0         1.70           Lighting         LED CA hunchor         Activative         0         NA         0         1.00         0         1.00           Lighting         LED CA hunchor         Activative         0         NA         0         1.00         0         7.00           Lighting         LED CA hunchor         Activative         0         NA         0         1.00         0         7.00           Lighting         LED CA hunchor         Filzeron	Lighting		0	NA	0	1.00	0	10.0
Schein         C.A.Y Outnation Sockwain Nationality         0         NA         0         1.00         0         0         150           Lighting         LED CA Interior - Fixatre         0         NA         0         1.00         0         3.50           Lighting         LED CA Interior - Tiz         0         NA         0         1.00         0         7.57           Appliances         Refigerator         0         NA         0         1.00         0         100 <td< td=""><td>Sholl</td><td></td><td>0</td><td>NA</td><td>0</td><td>1.00</td><td>0</td><td>20.0</td></td<>	Sholl		0	NA	0	1.00	0	20.0
Lighing         LED CALINE DE FAUE         D         NA         O         1.00         D         150           Lighing         LED CALINERIO - Omdificational         0         NA         0         1.00         0         3.4           Lighing         LED CALINERIO - T12         0         NA         0         1.00         0         1.50           Applances         Refigerator         0         NA         0         1.00         0         1.70           Lighing         LED CALINERIO 24/7-T12         0         NA         0         1.00         0         1.00	Lighting		0	NA	0	1.00	0	15.0
Lighing         LED CA Interior - Ormidirectional         0         NA         0         1.00         0         3.4           Lighing         LED CA Interior - 17.2         0         NA         0         1.00         0         3.4           Lighing         LED CA Interior - 17.2         0         NA         0         1.00         0         17.0           Lighing         LED CA Interior 247 - 17.2         0         NA         0         1.00         0         17.0           Lighing         LED CA Interior 247 - 17.2         0         NA         0         1.00         0         17.0           Lighing         LED CA Interior 247 - 17.2         0         NA         0         1.00         7.01         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         0         2.9         Hot Water         IU Acraber         0         NA         0         1.00         0         1.00         0         1.00         0         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00 </td <td>Lighting</td> <td></td> <td>0</td> <td>NA</td> <td>0</td> <td>1.00</td> <td>0</td> <td>5.0</td>	Lighting		0	NA	0	1.00	0	5.0
Lighting         LED A Interior - Tri2         0         NA         0         1.00         0         150           Lighting         LED CA Interior - Tri2         0         NA         0         1.00         0         7.7           Appliances         Refrigerator         0         NA         0         1.00         0         0         1.00           Lighting         LED CA Interior Decorative         0         NA         0         1.00         7.901         1.00         7.901         1.00         1.00         0         0         2.9           Hot Water         IU Showerhead         7.901         1.00         7.901         1.00         0         0         2.9         1.00         7.901         1.00         0         0         2.9         1.00         1.00         0	Lighting	LED CA Interior Ompidirectional	0	NA	0	1.00	0	3.0
Legining         LED CA Infradi         1/L         0         NA         0         1/30         0         0         1/30           Appliances         Reitigerator         0         NA         0         1/00         0         1/10           Liphing         LED LI Inferior 2/07-112         0         NA         0         1/00         0         1/10           Liphing         LED CA Interior Decorative         0         NA         0         1/00         0         2.9           Hot Water         IU Acerator         6,105         1.01         6,138         1.00         6,138         100           Consumer Electonics         IU Smart Stip         0         NA         0         1.00         0         18.0           Liphing         LED CA Interior - Omnidirectonal CFL         0         NA         0         1.00         0         5.0           Liphing         LED CA Linetor - Fixture         0         NA         0         1.00         0         6.0           Liphing         LED CA Exterior - Omnidirectonal         0         NA         0         1.00         0         1.00           Liphing         LED CA Exterior - Omnidirectonal         0         NA         0<	Lighting		0	NA	0	1.00	0	15.0
Leginary         LED Xn line 2 Pri 112         0         NA         0         100         0         0         0           Lighing         LED U Interior - Decorative         0         NA         0         1.00         0         0         100           Hot Water         IU Showehead         7.901         1.00         7.901         100         0         0         2.9           Hot Water         IU Anator         6.105         1.01         6.138         1.00         0         7.901         1.00           Consumer Electonics         IU Smart Stip         0         NA         0         1.00         0         7.80           Lighting         LED CA Interior - formidirectonal CFL         0         NA         0         1.00         0         3.4           Reifigeration         CA Vending Miser         0         NA         0         1.00         0         4.6           HVAC         IL ED U Interior - Fourier         0         NA         0         1.00         0         1.00           Lighting         LED U Interior - Fourier         0         NA         0         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00 </td <td>Lighting</td> <td></td> <td>0</td> <td>NA</td> <td>0</td> <td>1.00</td> <td>0</td> <td>5.7</td>	Lighting		0	NA	0	1.00	0	5.7
Applications         Explore         O         IVA         IVA         IVA         O         IVA         O         IVA         O         IVA         O         IVA         O         IVA         IVA <thiva< th="">         IVA         IVA</thiva<>	Appliances	Definerator	0	NA	0	1.00	0	17.0
Lighting         LED to Minicial - Decorative         0         NA         0         1.00         7.00         1	Lighting		0	NA	0	1.00	0	17.0
Individes         1,701         1,00         7,701         1,00         7,701         1,00         7,701         1,00         7,701         1,00         7,701         1,00         7,701         1,00         0,00         2,90           Hot Water         IU Smart Srip         0         NA         0         1,00         0         7,00         1,00         0         7,00         1,00         0         7,00         1,00         0         7,00         1,00         0         7,00         1,00         0         7,00         1,00         0         7,00         1,00         0         7,00         1,00         0         7,00         1,00         0         0         7,00         1,00         0         0         7,00         1,00         0         0         7,00         1,00         0         0         0         0         7,00         1,00         0	Lighting Hot Water		7 001	1.00	7 001	1.00	7 001	10.0
Lighting			7,901	1.00	0,701	1.00	7,901	2.0
Increase         ID         <	Lighting Hot Water		6 105	1.01	6 120	1.00	6 120	10.0
Consider Electionics         O Strukt Styp         O         NA         O         1.00         O         7.80           HVAC         IL Central AC         0         NA         0         1.00         0         3.4           Refigeration         CA Vending Miser         0         NA         0         1.00         0         3.4           Refigeration         CA Vending Miser         0         NA         0         1.00         0         6.0           Lighting         LED UI Interior - Fixture         0         NA         0         1.00         0         4.6           HVAC         IU Programmable Thermostat         7.019         1.00         7.019         8.0         4.6           HVAC         IU Room AC         0         NA         0         1.00         7.019         8.0           HVAC         IU Room AC         0         NA         0         1.00         2.137         1.00         2.137         1.00         2.137         1.00         2.137         1.00         3.15         1.10           Lighting         LED CA Exterior - Directional         0         NA         0         1.00         0         8.8           HVAC         IU Advanced T		IU Aeratol	0,105	1.01	0,130	1.00	0,130	7.0
Investigating         LED Charatrice         D         IVA         D         1.00         D         1.00           Lighting         LED CA Interior - Considirectional CFL         0         NA         0         1.00         0         3.4           Refigeration         CA Vending Miser         0         NA         0         1.00         0         6.0           Lighting         LED IL Interior - Fixture         0         NA         0         1.00         0         4.6           LVAC         IU Programmabile Thermostat         7,019         1.00         7,019         8.0           HVAC         IU Programmabile Thermostat         7,019         1.00         7,019         8.0           HVAC         IU Programmabile Thermostat         2,137         1.00         2,137         1.00         2,137           HVAC         IU Advanced Thermostat         315         1.00         315         11.0           Lighting         LED CA Exterior - Ornidirectional         0         NA         0         1.00         0         8.8           HVAC         IU Advanced Thermostat         294         1.78         524         1.00         5.6           HoltWater         LBD CA Exterior - Ornidirectional CFL <td></td> <td></td> <td>0</td> <td>NA</td> <td>0</td> <td>1.00</td> <td>0</td> <td>19.0</td>			0	NA	0	1.00	0	19.0
Lighting         Leb of minited of the formal feature of	Lighting		0	NA	0	1.00	0	2.4
NAME         CALVERIANT         CALVERIANT <td>Defrigeration</td> <td>CA Vonding Misor</td> <td>0</td> <td>NA</td> <td>0</td> <td>1.00</td> <td>0</td> <td>5.0</td>	Defrigeration	CA Vonding Misor	0	NA	0	1.00	0	5.0
Investighting         LED Link binding         0         NA         0         1.00         0         0         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         1.00         8.0           Lighting         LED U Exterior - Omnidirectional         0         NA         0         1.00         0         8.0           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 Exterior - Omnidirectional CFL         0			0	NA	0	1.00	0	5.0
Lighting         LED Kinken Frikatie         0         NA         0         1.00         0         1.53           Lighting         LED CA Exterior - Omnidirectional         0         NA         0         1.00         0         4.6           HVAC         IU Room AC         0         NA         0         1.00         7.019         8.0           HVAC         IU Room AC         0         NA         0         1.00         0         120           Hot Water         CA DHW Controls         2,137         1.00         2,137         1.00         2,137         150           HVAC         IU Advanced Thermostat         315         1.00         315         1.00         315         1.10           Lighting         LED LE Xetrior - Ornnidirectional         0         NA         0         1.00         0         8.0           Lighting         LED CA Exterior - Directional 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 - Ornnidirectional CFL         0         NA         0         1.00         <	Lighting		0	NA	0	1.00	0	15.0
Lighting         LED CA Case for Formatication         0         TAX         0         TAX         0         1.00         0         0         1.00           HVAC         IU Programmable Thermostat         7,019         1.00         7,019         1.00         0         12.0           HVAC         IU Room AC         0         NA         0         1.00         2.137         1.00         2.137         1.00         2.137         1.00         2.137         1.00         3.15         1.00         3.15         1.10           HVAC         IU Advanced Thermostat         3.15         1.00         3.15         1.00         3.15         1.10           Lighting         LED CA Exterior - Directional         0         NA         0         1.00         0         8.0           Lighting         LED CA Exterior - Ornidirectional CFL         0         NA         0         1.00         0         4.6           HVAC         IU ReprogramThermostat         2.94         1.78         5.24         1.00         5.6           Miscellaneous         CA Smart Strip         0         NA         0         1.00         0         7.0           Lighting         LED CA Garage - Ornidirectional         0 <td>Lighting</td> <td>LED TO Intention - Fixture</td> <td>0</td> <td>NA</td> <td>0</td> <td>1.00</td> <td>0</td> <td>15.0</td>	Lighting	LED TO Intention - Fixture	0	NA	0	1.00	0	15.0
HVAC         IU Room AC         0         NA         0         1.00         7,019         1.00         7,019         1.00 <th< td=""><td></td><td></td><td>7 010</td><td>1.00</td><td>7 010</td><td>1.00</td><td>7 010</td><td>4.0</td></th<>			7 010	1.00	7 010	1.00	7 010	4.0
Hyke         Is Robin Re         Is Robin Re <this re<="" robin="" th=""> <this< td=""><td></td><td></td><td>7,019</td><td>1.00</td><td>7,019</td><td>1.00</td><td>7,019</td><td>12.0</td></this<></this>			7,019	1.00	7,019	1.00	7,019	12.0
Individe         CERDITIVE Controls         2,137         1.00         2,137         1.00         2,137         1.00           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         8.0           HotWater         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         7.0           Lighting         Occupancy Sensor         0         NA         0         1.00         0         8.0           Lighting         LED CA Garage - Omnidirectional         0         NA	Hot Water		2 127	1.00	2 127	1.00	2 127	12.0
HVAC         ID Advanced Intermostat         313         1.00         313         1.00         313         1.10           Lighting         LED IU Exterior - Omnidirectional         0         NA         0         1.00         0         8.0           Lighting         LED CA Exterior - Omnidirectional         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         8.0           Lighting         De CA Garage - Omnidirectional         0         NA         0         1.00         5.6           Shell         CA Air Sealing         554         1.00         554         2.0.			2,137	1.00	2,137	1.00	2,137	11.0
Lighting         LED to Exterior - Orinditicational         0         NA         0         1.00         0         0         0.5           Lighting         LED CA Exterior - Orindirectional         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         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         91,081         15.0           HVAC         CA Pipe Insulation         89,485         1.02 </td <td>Lighting</td> <td></td> <td>315</td> <td>1.00</td> <td>515</td> <td>1.00</td> <td>0</td> <td>8.0</td>	Lighting		315	1.00	515	1.00	0	8.0
Lighting       LED CA Extends - Directional       0       NA       0       1.00       0       0       3.8         Hot Water       IU Shower Timer       1,977       1.00       1,977       1.00       1,977       2.0         Lighting       LED CA Exterior - Ornidirectional 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 - Ornidirectional CFL       0       NA       0       1.00       0       5.6         Miscellaneous       CA Smart Strip       0       NA       0       1.00       0       8.0         Lighting       Occupancy Sensor       0       NA       0       1.00       0       8.0         Lighting       LED CA Garage - Ornidirectional       0       NA       0       1.00       0       8.0         Lighting       LED CA Garage - Ornidirectional       0       NA       0       1.00       0       5.6         Shell       CA Air Sealing       554       1.00       554       1.00       1.00       1.00       1.00       1.00       1.00       1.00	Lighting		0	NA	0	1.00	0	5.0
Hot Water         Ito Shower Finiter         It,977         Itoo         Ition         O         Addition           Lighting         LED CA Exterior - Omnidirectional CFL         0         NA         0         1.00         0         5.6           Miscellaneous         CA Smart Strip         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         91,081         15.0           HVAC         CA Steam Boiler         87,550 <td>Lighting Hot Water</td> <td></td> <td>1 077</td> <td>1.00</td> <td>1 077</td> <td>1.00</td> <td>1 077</td> <td>2.0</td>	Lighting Hot Water		1 077	1.00	1 077	1.00	1 077	2.0
Lighting         LED CA Extender - Onlinditectional CFL         0         NA         0         1.00         0         4.0           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         Decupancy Sensor         0         NA         0         1.00         0         8.0           Lighting         LED CA Garage - Omnidirectional         0         NA         0         1.00         0         8.0           Lighting         LED CA Garage - Omnidirectional         0         NA         0         1.00         0         8.0           Lighting         LED CA Garage - Omnidirectional         0         NA         0         1.00         0         8.0           Lighting         LED CA Garage - Omnidirectional         0         NA         0         1.00         5.6           Shell         CA Air Sealing         554         1.00         5.6         1.00			1,977	1.00	1,9/7	1.00	1,977	2.0
HVAC         ID Reprogram Thermostat         274         1.78         324         1.00         324         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         8.0           Lighting         LED CA Garage - Omnidirectional         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         20.0           HVAC         CA Pipe Insulation         89,485         1.02         91,081         15.0           HVAC         CA Pipe Steam Averaging Controls         40,130         1.00         40,276         20.0           HVAC         IU Furnace			204	1 70	E24	1.00	524	4.0
Lighting         LED CA Garage - Onlide ectorial CFL         0         NA         0         1.00         0         0         3.0           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 - Onnidirectional         0         NA         0         1.00         0         8.0           Lighting         LED CA Garage - Onnidirectional         0         NA         0         1.00         0         8.0           Lighting         LED CA Garage - Onnidirectional         0         NA         0         1.00         0         5.6           Shell         CA Air Sealing         554         1.00         554         20.0           HVAC         CA Steam Boiler         87,550         1.01         88,071         1.00         1.03         40,276         20.0           HVAC         CA Pipe Steam Averaging Controls         40,130         1.00         40,276         20.0         1.00         1.059         20.0           HVAC         IU Furnace         1.435         0.74         1.05	Lighting		294	1.70	524	1.00	524	Z.U
Inscenareous         CA Smart Strip         0         NA         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         8.0           Shell         CA Air Sealing         554         1.00         554         1.00         91,081         15.0           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         1.059         20.0           HVAC         IU Furnace         1,435         0.74         1.059         1.00         1,059         20.0           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 </td <td>Miscollanoous</td> <td>CA Smart Strip</td> <td>0</td> <td>NA</td> <td>0</td> <td>1.00</td> <td>0</td> <td>7.0</td>	Miscollanoous	CA Smart Strip	0	NA	0	1.00	0	7.0
Lighting         Occupancy Sensor         O         NA         O         1.00         O         6.0           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         15.0           HVAC         CA Hydronic Boiler         6,724         1.01         6,810         1.01         25.0           HVAC         IU AC Cover and Gap Sealer         133         0.93         125         1.00         125         5.0	Lighting		0	NA	0	1.00	0	7.0
Lighting         LED CA Garage Control         Total         Total Result         Total Result <tht action<="" column="" td=""><td>Lighting</td><td>LED CA Carago Omnidiractional</td><td>0</td><td>NA</td><td>0</td><td>1.00</td><td>0</td><td>5.6</td></tht>	Lighting	LED CA Carago Omnidiractional	0	NA	0	1.00	0	5.6
Shein         CA All Sealing         334         1.00         334         1.00         334         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 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           HVAC         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           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 <t< td=""><td>Sholl</td><td></td><td>554</td><td>1.00</td><td>554</td><td>1.00</td><td>554</td><td>20.0</td></t<>	Sholl		554	1.00	554	1.00	554	20.0
HVAC         CA Pipe Instalation         67,403         1.02         91,001         1.00         91,001         10.0           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         8881.389         NA		CA Air Sedility	90 / 95	1.00	01 091	1.00	01 091	15.0
HVAC         CA Steam Bolier         67,330         1.01         50,071         1.00         50,071         23.0           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         8.881.389         NA	HVAC	CA Stoam Boilor	97,403	1.02	91,001	1.00	91,001	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         8.881.389         NA		CA Dipo Steam Averaging Controls	40,120	1.01	40.074	1.00	40.274	20.0
HVAC         In Full lade         1,433         0.74         1,037         1.00         1,039         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         8.881.389         NA	HVAC		40,130	0.74	40,270	1.00	40,270	20.0
Hot Water         CA DHW Buller         1,331         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.00         1.01         1.00         1.01         1.00         1.01         NA         1.00         NA			1,430	1.00	1,009	1.00	1,009	15.0
Invac         CA myorinic bolier         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 Thermst         8.816,080         1.01         8.881.389         NA         8.881.389         NA			1,331	1.00	1,331	1.00	1,331	15.0
Total KWh Converted From Thermst         8.816.080         1.01         8.881.389         NA         8.881.389         NA			0,/24	1.01	0,8 IU	1.00	0,810	25.0
Total kWh Converted From Thermst 8.816.080 1.01 8.881.389 NA 8.881.389 NA	IL VAL		133	0.93	125	1.00	125	0.0
		Total kWh Converted From Thermst	8.816.080	1.01	8.881.389	NA	8.881.389	

### Table 2-8. IEMS CY2020 Energy Savings by Measure – Gas

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).



# 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: <u>https://www.ilsag.info/ntg\_2020</u>.

† The total includes the electric equivalent of the total therms.



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

		Ex Ante Annual	Ev Anto Cross	Verified Gross	Varified Crass		Verified Net
End Use Type	Research Category	Water Savings (gallons)	Savings (kWh)	Realization Rate (RR <sub>water</sub> )	Savings (kWh)	NTG*	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.

# 2.5 IEMS Program Component Impact Analysis Findings and Recommendations

### 2.5.1 IEMS Program Component Impact Parameter Estimates

Guidehouse

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.

Measure Name	Custom Input Parameters	Deemed Input Parameters	Source *
Common area (CA) Air Sealing	N <sub>sweeps</sub> , linear feet <sub>wx</sub>	$\Delta$ Therms <sub>wx</sub> , $\Delta$ Therms <sub>sweep</sub> , adjustment factor (ADJ) ADJ <sub>RxAirSealing</sub> , in-service rate (ISR)	TRM v8.0 – Section 5.6.1
CA Attic Insulation and Air Sealing	Rold, Rattic, Aattic, Eff <sub>heat</sub> , Eff <sub>cool</sub> , linear feet <sub>AirSealing</sub>	Framing factor (FF), cooling degree days (CDD), heating degree days (HDD), Eff <sub>heat</sub> , ADJ <sub>heat</sub> , furnace fan energy consumption (F <sub>e</sub> ), ADJ <sub>heat fan</sub> , discretionary use adjustment (DUA), Eff <sub>cool</sub> , ADJ <sub>cool</sub> , full load hours (FLH), coincidence factor (CF), IE <sub>NetCorrection</sub> , ADJ <sub>RxAirSealing</sub> , ISR, ΔThermsAirSealing	TRM v8.0 – Section 5.6.5 and Section 5.6.1
CA DHW Boiler	#Units, tank temperature, Eff <sub>Exist</sub> , Eff <sub>EE</sub> , 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 <sub>Base</sub> , Hours/yr	TRM v8.0 – Section 4.3.7
CA DHW Controls	Boiler input capacity	Total operating hours <sub>normal occ</sub> , total operating hours <sub>low occ</sub> , reduction in operating hours <sub>normal occ</sub> , reduction in operating hours <sub>low occ</sub>	TRM v8.0 – Section 4.3.8
CA Foundation Sidewall Insulation	Rnew-AG, Lwall-Total, Hwall-AG, Rold-BG, Rnew- BG, Hwall-Total	Rold-AG, FF, HDD, Effheat, ADJheat, Fe, CDD, DUA, Effcool, ADJcool, FLH, CF	TRM v8.0 – Section 5.6.2
CA Hydronic Boiler / CA Steam Boiler	Capacity, Eff <sub>actual</sub>	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 <sub>Boiler</sub>	TRM v8.0 – Section 4.4.14

### Table 2-11. IEMS Savings Parameters



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 <sub>wkday</sub> , kW <sub>wkend</sub> , hrs <sub>wkday</sub> , hrs <sub>wkend</sub> , hrs <sub>wkday-open</sub> , hrs <sub>wkend-open</sub> , ISR, weeks/year	TRM v8.0 – Section 4.8.7
CA Vending Miser	None	Watts <sub>Base</sub> , Hours, ESF	TRM v8.0 – Section 4.6.2
In unit (IU) AC Cover and Gap Sealer	Air infiltration (Q <sub>inf</sub> )	Average outside air temperature (T <sub>OA</sub> ), average indoor air temperature (T <sub>SA</sub> ), 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, Fe, 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 <sub>Base</sub> ), GPM <sub>Low</sub> , 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 <sub>adj</sub> , EER	SEER, DeratingCool <sub>Base</sub> , DeratingCool <sub>Eff</sub> , 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_ ${\mbox{\scriptsize Eff}}$ , derating $_{\mbox{\scriptsize Base}}$ , 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 <sub>Base</sub> ), L <sub>Timer</sub> , hours, CF	TRM v8.0 – Section 5.4.9
IU Showerhead	%Electric DHW, %Fossil DHW	GPM <sub>Base</sub> , GPM <sub>Low</sub> , 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 <u>http://www.ilsag.info/technical-reference-manual.html</u>. The NTG values can be found on the Illinois SAG website: <u>https://www.ilsag.info/ntg\_2020</u>. 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.

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%

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

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 multifamily buildings, the ex ante savings were calculated using deemed input assumptions for midrise multi-family buildings, including hours, CF, WHF<sub>e</sub>, WHF<sub>d</sub> for occupancy sensor measures and WHF<sub>e</sub>, and WHF<sub>d</sub> 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.

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

### Table 2-13. IEMS Quantity Comparison – Refrigerator

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.

						Gross	Gross		Gross						Net			Net Secondary		
					50	Electric	Peak	Gross	Secondary	Gross	Gross	NITO	NTO	NITO	Electric	Net Peak	Net Gas	Savings due to	Net	Net
End Use Type	Research Category	Units	Quantity	EUL	ER Elaat	Energy	Demand	Gas	Savings due to Water	Penalty	Heating Penalty	NIG (FMP)	NIG (VM) (T	NIG horme)	Energy	Demand	Savings	Water	Heating Popalty	Heating Penalty
				(years)	i iag i	Savings	Reduction	(Therms)	Reduction	(kWh)	(Therms)	(((1))	(KWV) (1	nenns)	Savings	(kW)	(Therms)	Reduction	(kWh) (	(Therms)
						(kWh)	(kW)	· /	(kWh)	. ,	. ,				(kWh)	. ,		(kWh)		
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	1,4/2	0.00	0	0	0	0	1.00	1.00	1.00	1,4/2	0.00	0	0	0	0
Hot Water	IU Shower Timer	Each	/23	2.0	No	0	0.00	1,977	1,289	0	0	1.00	1.00	1.00	0	0.00	1,9//	1,289	0	0
Lighting	LED CA Exterior - Omnidirectional CFL	Lamp	/2	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	1/	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 Ship	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
Ligning	Occupancy Sensor	Each	2	8.0	INO	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
	lotal			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

## Table 2-14. IEMS Total Resource Cost Savings Summary



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.



# 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.

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

### Table 3-1. IHWAP CY2020 Volumetric Findings Detail

\* 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.<sup>2</sup> 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.

<sup>&</sup>lt;sup>2</sup> The evaluation will determine which gas savings will be counted toward goal while producing the portfolio-wide Summary Report.



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

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

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 nonholiday 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.



								•	· · ·					
						Verified Net kW	h Savings							
		Ma	CY2020		Lifatima Nat									
		vc	Savings		Savings									
End Use Type	Research Category	EUL	(kWh)	NTG*	(kWh)†	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 El	ectric 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 In	cremental Expiring Electric Savings§							-	131,948	122,246	115,309	86,993	175,043	18,329

## Table 3-3. IHWAP Cumulative Persisting Annual Savings (CPAS) – Electric

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

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	n 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 E	lectric 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 Progran	istoric Program Incremental Expiring Electric Savings‡§		73,433	34,500	42,642	105,165	-	218,456	-	-	18,053	60,618	26,615
Program Total Ir	am Total Incremental Expiring Electric Savings§		73,433	34,500	60,832	109,032	3,787	218,456	-	81,226	18,053	60,618	27,349



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

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	n Total Electric Contribution to CPAS‡	14,533	14,533	14,471	14,471	-	-	-	-	-	-	-	-
Program Total El	lectric CPAS	17,635	14,533	14,471	14,471	-	-	-	-	-	-	-	-
CY2020 Program	Incremental Expiring Electric Savings§	1,917	3,101	-	-	-	-	-	-	-	-	-	-
Historic Program	n Incremental Expiring Electric Savings‡§	115,946	-	62	-	14,471	-	-	-	-	-	-	-
Program Total In	ncremental 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 Yn-1 - CPAS Yn.

Source: Evaluation team analysis



### Table 3-4. IHWAP Cumulative Persisting Annual Savings (CPAS) – Gas

			CY2020 Verified		Lifetime Net	Verified Net T	herms Saving	S						
			Gross Savings		Savings									
End Use Type	Research Category	EUL	(Therms)	NTG*	(Therms)†	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 Ga	s 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	CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡								-	-	-	147,232	-	-
Historic Program	Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§										39,033	-	924,485	-
Program Total In	cremental Expiring Gas Savings (kWh Equivalent)‡							-	-	-	39,033	147,232	924,485	-



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

Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Advanced Thermostat	-	-	-	-								
Air Sealing	1,001	1,001	1,001	427	427	427	427	427	427	427	427	427
Attic Insulation	-	-	-	-	-	-	-	-	-	-	-	-
Bathroom Aerator	18	18	18									
Bathroom Exhaust Fan	-	-	-	-	-	-	-	-	-	-	-	-
Central Air Conditioning	-	-	-	-	-	-	-	-	-	-	-	
Handheld Showerhead	40	40	40									
Kitchen Aerator	87	87	87									
LED Indoor Specialty	-	-	-									
LED Indoor Standard	-	-	-									
LED Outdoor Specialty	-	-	-									
LED Outdoor Standard	-	-	-									
Programmable Thermostat	684											
Room Air Conditioner	-	-	-	-	-							
Custom Measure - HHW System Upgrade	-	-	-	-	-	-	-	-				
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 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 Measure - Lighting	-	-	-	-	-							
Custom Measure - Secondary Pump Improvement	-	-	-	-	-	-	-	-				
Custom Measure - New Air Handlers	-	-	-	-	-	-	-	-				
Custom Measure - Kitchen Exhaust and MAU	-	-	-	-	-	-	-	-				
Custom Measure - Exhaust Fans	-	-	-	-	-	-	-	-				
Custom Measure - HVAC	-	-	-	-	-	-	-	-				
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
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
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
s 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
Incremental Expiring Gas Savings (Therms)	4,741	684	-	719	-	-	-	-	6,381	-	-	-
Incremental Expiring Gas Savings (kWh Equivalent) ‡	138,962	20,045	-	21,076	-	-	-	-	187,016	-	-	-
Incremental Expiring Gas Savings (kWh Equivalent) \$	476	-	75,327	215,709	-	395,657	60,946	29,895	65,141	-	-	-
cremental Expiring Gas Savings (kWh Equivalent)‡	139,438	20,045	75,327	236,784	-	395,657	60,946	29,895	252,158	-	-	-
	Research Category         Advanced Thermostat         Air Sealing         Attic Insulation         Bathroom Aerator         Bathroom Exhaust Fan         Central Air Conditioning         Handheld Showerhead         Kitchen Aerator         LED Indoor Specialty         LED Indoor Specialty         LED Outdoor Specialty         LED Outdoor Standard         Programmable Thermostat         Room Air Conditioner         Custom Measure - HHW System Upgrade         Custom Measure - DHW Plant Improvement         Custom Measure - Secondary Pump Improvement         Custom Measure - Secondary Pump Improvement         Custom Measure - Kitchen Exhaust and MAU         Custom Measure - HVAC         Total Gas Contribution to CPAS (kWh Equivalent)‡         Total Gas Contribution to CPAS (kWh Equivalent)‡         Incremental Expiring Gas Savings (KWh Equivalent)‡           Incremental Expiring Gas Savings (kWh Equivalent)‡	Research Category2027Advanced Thermoslat-Air Sealing1,001Attic Insulation-Bathroom Aerator18Bathroom Exhaust Fan-Central Air Conditioning-Handheld Showerhead40Kitchen Aerator87LED Indoor Specially-LED Undoor Specially-LED Outdoor Specially-LED Outdoor Standard-Ceustom Measure - HHW System Upgrade-Custom Measure - HHW System Upgrade-Custom Measure - Lighting-Custom Measure - Secondary Pump Improvement-Custom Measure - Kitchen Exhaust and MAU-Custom Measure - Kitchen Exhaust and MAU-Custom Measure - New Air Handlers-Custom Measure - Kitchen Exhaust and MAU-Custom Measure - K	Research Category20272028Advanced Thermostat-Air Sealing1,001Atic Insulation-Bathroom Aerator18Bathroom Exhaust Fan-Central Air Conditioning-Handheld Showerhead40Kichen Aerator87Bathroom Specially-LED Indoor Specially-LED Undoor Specially-LED Undoor Specially-LED Outdoor Specially-Censmannee-Custom Measure - HHW System Upgrade-Custom Measure - HHW System Upgrade-Custom Measure - Heating Plant Improvement6,897Custom Measure - Heating Plant Improvement-Custom Measure - Kitchen Exhaust and MAU-Custom Measure - HVAC-Custom Measure - Kitchen Exhaust and MAU-Custom Measure - HVAC-Total Gas Contribution to CPAS (kWh Equivalent)‡358,241338,1965,161,835Incremental Expiring Gas Savings (kWh Equivalent)‡  139,438Lencemental Expiring Gas Savings (kWh Equivalent)‡  139,438Lencemental Expiring Gas Savings (kWh Equivalent)‡  139,438Lencemental Expiring Gas Savings (kWh Equivalent)‡  139,438Lenceme	Research Category         2027         2028         2029           Advanced Thermostat         -         -         -           Air Sealing         1,001         1,001         1,001           Atic Insulation         -         -         -           Bathroom Aerator         18         18         18           Bathroom Exhaust Fan         -         -         -           Central Air Conditioning         -         -         -           Handheld Showerhead         40         40         40           Kitchen Aerator         87         87         87           LED Indoor Specially         -         -         -           LED Outdoor Specially         -         -         -           LED Outdoor Standard         -         -         -           Room Air Conditioner         -         -         -           Custom Measure - HHW System Upgrade         -         -         -           Custom Measure - Heating Plant Improvement         -         -         -           Custom Measure - Secondary Pump Improvement         -         -         -           Custom Measure - Klichen Exhaust and MAU         -         -         - <t< td=""><td>Research Category         2027         2028         2029         2030           Advanced Thermostat         -         -         -         -           Air Sealing         1,001         1,001         1,001         427           Altic Insulation         -         -         -         -           Bathroom Aerator         18         18         18         18           Bathroom Exhaust Fan         -         -         -         -           Handheld Showerhead         40         40         40         40           Kitchen Aerator         87         87         87         -           LED Indoor Sberdard         -         -         -         -           LED Outdoor Shandard         -         -         -         -           LED Outdoor Shandard         -         -         -         -           LED Outdoor Shandard         -         -         -         -           Custom Measure - HHW System Upgrade         -         -         -         -           Custom Measure - HHW System Upgravement         6,897         6,897         6,897         -           Custom Measure - New Air Handlers         -         -         -         <t< td=""><td>Research Category         2027         2028         2029         2030         2031           Advanced Thermostat         -         -         -         -         -           Air Sealing         1,001         1,001         1,001         427         427           Aik Insulation         -         -         -         -         -           Bahroom Aerator         18         18         18         18         -         -           Bahroom Exhaust Fan         -         <td< td=""><td>Research Category         2027         2028         2029         2030         2031         2032           Advanced Thermostat         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033           Ari Sealing         1.001         1.001         1.001         1.001         427         427         427           Atir Sealing         1.001         1.001         1.001         427         427         427           Atic Insulation         -         -         -         -         -         -           Batroom Acrabar         18         18         18         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033         2034           Advanced Thermoslat         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033         2034         2035           Advanced Thermostat         -</td></td<><td>Research Gategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2036           Advanced Thermshit         -<!--</td--><td>Research Oategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2030         2037           Adranced Thermoslat         -         <td< td=""></td<></td></td></td></t<></td></t<>	Research Category         2027         2028         2029         2030           Advanced Thermostat         -         -         -         -           Air Sealing         1,001         1,001         1,001         427           Altic Insulation         -         -         -         -           Bathroom Aerator         18         18         18         18           Bathroom Exhaust Fan         -         -         -         -           Handheld Showerhead         40         40         40         40           Kitchen Aerator         87         87         87         -           LED Indoor Sberdard         -         -         -         -           LED Outdoor Shandard         -         -         -         -           LED Outdoor Shandard         -         -         -         -           LED Outdoor Shandard         -         -         -         -           Custom Measure - HHW System Upgrade         -         -         -         -           Custom Measure - HHW System Upgravement         6,897         6,897         6,897         -           Custom Measure - New Air Handlers         -         -         - <t< td=""><td>Research Category         2027         2028         2029         2030         2031           Advanced Thermostat         -         -         -         -         -           Air Sealing         1,001         1,001         1,001         427         427           Aik Insulation         -         -         -         -         -           Bahroom Aerator         18         18         18         18         -         -           Bahroom Exhaust Fan         -         <td< td=""><td>Research Category         2027         2028         2029         2030         2031         2032           Advanced Thermostat         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033           Ari Sealing         1.001         1.001         1.001         1.001         427         427         427           Atir Sealing         1.001         1.001         1.001         427         427         427           Atic Insulation         -         -         -         -         -         -           Batroom Acrabar         18         18         18         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033         2034           Advanced Thermoslat         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033         2034         2035           Advanced Thermostat         -</td></td<><td>Research Gategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2036           Advanced Thermshit         -<!--</td--><td>Research Oategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2030         2037           Adranced Thermoslat         -         <td< td=""></td<></td></td></td></t<>	Research Category         2027         2028         2029         2030         2031           Advanced Thermostat         -         -         -         -         -           Air Sealing         1,001         1,001         1,001         427         427           Aik Insulation         -         -         -         -         -           Bahroom Aerator         18         18         18         18         -         -           Bahroom Exhaust Fan         - <td< td=""><td>Research Category         2027         2028         2029         2030         2031         2032           Advanced Thermostat         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033           Ari Sealing         1.001         1.001         1.001         1.001         427         427         427           Atir Sealing         1.001         1.001         1.001         427         427         427           Atic Insulation         -         -         -         -         -         -           Batroom Acrabar         18         18         18         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033         2034           Advanced Thermoslat         -</td><td>Research Category         2027         2028         2029         2030         2031         2032         2033         2034         2035           Advanced Thermostat         -</td></td<> <td>Research Gategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2036           Advanced Thermshit         -<!--</td--><td>Research Oategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2030         2037           Adranced Thermoslat         -         <td< td=""></td<></td></td>	Research Category         2027         2028         2029         2030         2031         2032           Advanced Thermostat         -	Research Category         2027         2028         2029         2030         2031         2032         2033           Ari Sealing         1.001         1.001         1.001         1.001         427         427         427           Atir Sealing         1.001         1.001         1.001         427         427         427           Atic Insulation         -         -         -         -         -         -           Batroom Acrabar         18         18         18         -	Research Category         2027         2028         2029         2030         2031         2032         2033         2034           Advanced Thermoslat         -	Research Category         2027         2028         2029         2030         2031         2032         2033         2034         2035           Advanced Thermostat         -	Research Gategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2036           Advanced Thermshit         - </td <td>Research Oategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2030         2037           Adranced Thermoslat         -         <td< td=""></td<></td>	Research Oategory         2027         2028         2029         2030         2031         2032         2033         2034         2035         2030         2037           Adranced Thermoslat         - <td< td=""></td<>



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

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	n Total Gas Contribution to CPAS (kWh Equivalent)‡§	3,036,777	2,973,734	2,973,734	2,973,734	2,973,734							
Program Total G	rogram Total Gas CPAS (kWh Equivalent)‡			3,059,743	3,059,743	3,059,743	86,009	-	-	-	-	-	-
CY2020 Program	Y2020 Program Incremental Expiring Gas Savings (Therms)			1,078	-	-	-	2,934	-	-	-	-	-
CY2020 Program	Y2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡			31,587	-	-	-	86,009	-	-	-	-	-
Historic Program	istoric Program Incremental Expiring Gas Savings (kWh Equivalent)‡§			-	-	-	2,973,734	-	-	-	-	-	-
Program Total In	cremental 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: <u>https://www.ilsag.info/ntg\_2020</u>.

† 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 Yn.

Source: Evaluation team analysis



	Таыс	J-J. II		ou	mulative			inual Sa	viligs (C	// A0) -	lotai			
		CY2 Gro	020 Verified oss Savings		Lifetime Net	Verified Net k	Wh Savings (Ir	ncluding Those C	onverted from (	Gas Savings)				
End Use Type	Research Category	EUL	(kWh)	NTG* S	Savings (kWh)†	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	listoric 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 C	rogram 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	Y2020 Program Incremental Expiring Savings§								-	6,247	5,247	148,619	51,632	18,329
Historic Program	istoric Program Incremental Expiring Savings‡§							-	131,948	115,999	149,095	85,605	1,047,896	-
Program Total Ir	cremental Expiring Savings§						-	131,948	122,246	154,342	234,225	1,099,528	18,329	

### Table 3-5. IHWAP Cumulative Persisting Annual Savings (CPAS) – Total



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

		2027	2020	2020	2020	2021	2022	2022	2024	2025	2024	2027	2020
End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Shell	Air Sealing	30 508	30 508	30 508	13 303	13 303	13 303	13 303	13 303	13 303	13 303	13 303	13 303
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	2,210	2,210	2,210	2,210	2,210	2,210	2,210	2,210	2,210
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	n 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 C	PAS	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	n 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 In	cremental 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	n Total Contribution to CPAS‡	3,051,310	2,988,267	2,988,205	2,988,205	2,973,734	-	-	-	-	-	-	-
Program Total C	PAS	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	n Incremental Expiring Savings‡§	1,060,132	63,043	62	-	14,471	2,973,734	-	-	-	-	-	-
Program Total Ir	cremental 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: <u>https://www.ilsag.info/ntg\_2020</u>.

† 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<sub>n-1</sub> - CPAS Y<sub>n</sub>.

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



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

### Table 3-6. IHWAP CY2020 Energy Savings by Measure – Electric

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.



### Table 3-7. IHWAP CY2020 Summer Peak Demand Savings by Measure

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction	Verified Gross Realization	Verified Gross Peak Demand Reduction	NTG*	Verified Net Peak Demand Reduction
<u> </u>		(kW)	Rate	(kW)		(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.



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	

### Table 3-8. IHWAP CY2020 Energy Savings by Measure – Gas

\* 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).



# 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: <u>https://www.ilsag.info/ntg\_2020</u>.

† 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 <sub>water</sub> )	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: <u>https://www.ilsag.info/ntg\_2020</u>.

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.



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

### Table 3-11. IHWAP Savings Parameters

\* TRM is the State of Illinois Technical Reference Manual version 8.0 from <u>http://www.ilsag.info/technical-reference-manual.html</u>. The NTG values can be found on the Illinois SAG website: <u>https://www.ilsag.info/ntg\_2020</u>. 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.

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

### Table 3-13. IHWAP Wattage Comparison

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<sub>EFF</sub> 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<sub>EFF</sub> 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**

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



### 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.

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 I Penalty (k <sup>h</sup> (Therms)	NTG NTG Nh) (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 1	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

### Table 3-14. IHWAP Total Resource Cost Savings Summary

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).