



# **ComEd Single Family Assessment Impact Evaluation Report**

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

**Prepared for:**

**ComEd  
FINAL**

April 13, 2021

**Prepared by:**

**Andy Erickson**  
Guidehouse

**Karl Walter**  
Guidehouse

**Christy Zook**  
Guidehouse

**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  
[cmaglione@guidehouse.com](mailto:cmaglione@guidehouse.com)

Jeff Erickson, Director  
608.616.4962  
[jeff.erickson@guidehouse.com](mailto:jeff.erickson@guidehouse.com)

Nishant Mehta, Associate Director  
608.616.5823  
[nishant.mehta@guidehouse.com](mailto:nishant.mehta@guidehouse.com)

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## 1. Introduction

This report presents results from the CY2020 impact evaluation of ComEd's Residential Single Family Assessment Program (aka Home Energy Assessments (HEA)). 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.

## 2. Program Description

The Single Family Assessment Program is an assessment and direct install program jointly implemented by ComEd, Nicor Gas, and Peoples Gas (PGL) and North Shore Gas (NSG) with Franklin Energy Services (Franklin) implementing the program. The primary objective of this residential direct install program was to secure energy savings through direct installation of low-cost efficiency measures such as: water efficient showerheads and faucet aerators, hot water (HW) pipe insulation, programmable thermostats, reprogramming programmable thermostats, co-pay smart thermostats, and LEDs at eligible single-family residences. The program also offers co-pay advanced power strips (APS) provided to the customer. In CY2020, ComEd added a Virtual Assessment (VA) where after the assessment is complete, a subset of the efficiency measures are sent to participants and installed by the homeowner (water efficient showerheads and faucet aerators, hot water (HW) pipe insulation, and LEDs).

The secondary objective of this program was to function as the “gateway” for homeowners to participate in other residential programs. The Single Family Assessment Program performs a brief assessment of the major retrofit opportunities (e.g., furnace, boiler, air conditioning, insulation, and air sealing) and brings heightened awareness to the homeowners about efficiency programs offered by ComEd, PGL, NSG and Nicor Gas.

In CY2020, the program had 10,570 participants, installed 42,888 unique measures across 10,717 projects as Table 2-1 and Figure 2-1 show. This includes only projects with measures with ComEd-claimed savings.

**Table 2-1. CY2020 Volumetric Findings Detail**

Participation	Program Overall
Unique Participants*	10,570
Total Measures‡	42,888
Unique Projects†	10,717
LED Omnidirectional Bulb	24,020
LED Specialty Lamp	13,298
Programmable Thermostat	2,911
Advanced Thermostat	1,232
Advanced Power Strip – Tier 1	685
Low Flow Showerhead	360
Low Flow Faucet Aerator	300
HW Pipe Insulation	82

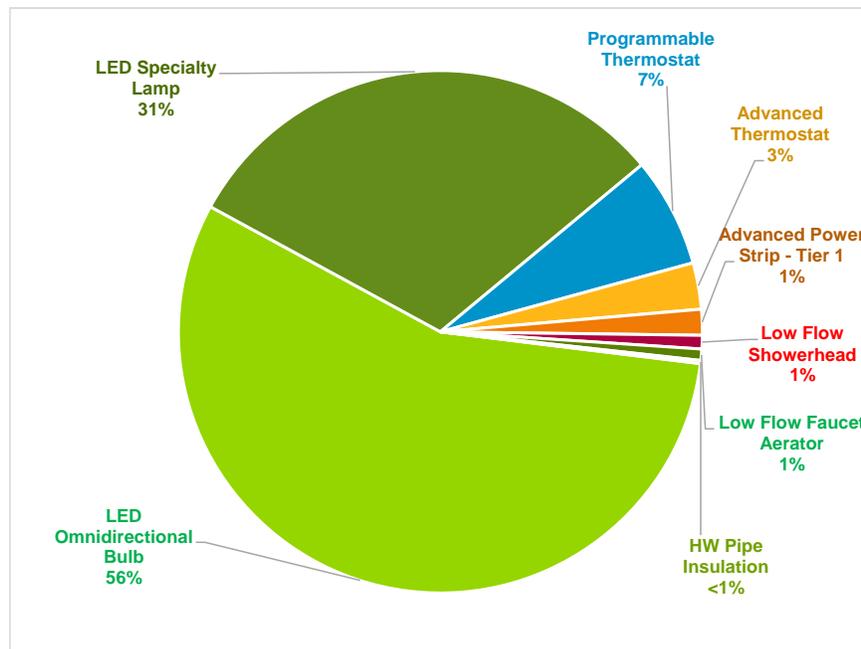
Note: Hot Water (HW) insulation installed on hot water pipes only.

\*Participants are defined as unique ComEd account numbers.

† Unique projects are defined as unique project IDs.

‡Total Measures is reported quantity. Guidehouse later adjusted thermostat quantities in its analysis to prevent counting multiple thermostat measures per home.

Source: ComEd tracking data and evaluation team analysis.

**Figure 2-1. Share of Measures Installed by Type**


Source: ComEd tracking data and evaluation team analysis.

### 3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the Single Family Assessment Program achieved in CY2020. 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>

**Table 3-1. CY2020 Total Annual Incremental Electric Savings**

Savings Category	Energy Savings (kWh)	Summer Peak* Demand Savings (kW)
<b>Electricity</b>		
Ex Ante Gross Savings	14,866,529	2,009
Program Gross Realization Rate	1.03	1.02
Verified Gross Savings	15,279,900	2,042
Program Net-to-Gross Ratio (NTG)	Varies	Varies
Verified Net Savings	12,923,176	1,737
<b>Converted from Gas†</b>		
Ex Ante Gross Savings	NA	NA
Program Gross Realization Rate	NA	NA
Verified Gross Savings	NA	NA
Program Net-to-Gross Ratio (NTG)	NA	NA
Verified Net Savings	NA	NA
<b>Total Electric Plus Gas</b>		
Ex Ante Gross Savings	14,866,529	2,009
Program Gross Realization Rate	1.03	1.02
Verified Gross Savings	15,279,900	2,042
Program Net-to-Gross Ratio (NTG)	Varies	Varies
Verified Net Savings	12,923,176	1,737

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 kilowatt-hours (kWh) by multiplying therms by 29.31 (which is based on 100,000 Btu/therm and 3,412 Btu/kWh). The evaluation determines which gas savings are converted to kWh and counted toward ComEd's electric savings goal while producing the portfolio-wide summary report. According to Section 8-103B(b-25) of the Illinois Public Utilities Act, "In no event shall more than 10% of each year's applicable annual incremental goal as defined in paragraph (7) of subsection (g) of this Section be met through savings of fuels other than electricity." ComEd claimed no gas savings for this program.

Source: ComEd tracking data and evaluation team analysis.

<sup>1</sup> The evaluation determines which gas savings are counted toward the goal while producing the portfolio-wide summary report.

## 4. Cumulative Persisting Annual Savings

Table 4-1 to Table 4-3 show the measure-specific and total verified gross savings for the Single Family Assessment Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2020. Figure 4-1 shows the savings across the useful life of the measures. The electric CPAS across all measures installed in 2020 is 12,923,176 kWh (Table 4-1). The historic rows in the table are the CPAS contribution back to CY2018. The Program Total Electric CPAS and Program Total Gas CPAS rows are the sum of the CY2020 contribution and the historic contribution.

ComEd did not claim any gas savings for this program in CY2020; as such, electric CPAS is equivalent to total CPAS.

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

End Use Type	Research Category	EUL	CY2020 Verified Gross Savings		Lifetime Net Savings (kWh)†	Verified Net kWh Savings								
			(kWh)	NTG*		2018	2019	2020	2021	2022	2023	2024	2025	2026
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	151,410	0.85	900,890			128,699	128,699	128,699	128,699	128,699	128,699	128,699
HVAC	Programmable Thermostat	8.0	330,906	0.90	2,382,523			297,815	297,815	297,815	297,815	297,815	297,815	297,815
HVAC	Advanced Thermostat	11.0	267,882	NA	2,946,703			267,882	267,882	267,882	267,882	267,882	267,882	267,882
Hot Water	HW Pipe Insulation	15.0	4,639	0.80	55,663			3,711	3,711	3,711	3,711	3,711	3,711	3,711
Hot Water	HW Pipe Insulation - VA	15.0	480	0.80	5,757			384	384	384	384	384	384	384
Hot Water	Low Flow Faucet Aerator	10.0	14,002	1.04	145,616			14,562	14,562	14,562	14,562	14,562	14,562	14,562
Hot Water	Low Flow Faucet Aerator - VA	10.0	1,532	1.04	15,933			1,593	1,593	1,593	1,593	1,593	1,593	1,593
Hot Water	Low Flow Showerhead	10.0	94,509	1.04	982,889			98,289	98,289	98,289	98,289	98,289	98,289	98,289
Hot Water	Low Flow Showerhead - VA	10.0	10,132	1.04	105,371			10,537	10,537	10,537	10,537	10,537	10,537	10,537
Lighting	LED Specialty Lamp - Exterior	6.9	654,069	0.84	3,089,925			549,418	549,418	549,418	549,418	307,674	307,674	276,907
Lighting	LED Specialty Lamp - Exterior - VA	6.9	74,588	0.84	352,366			62,654	62,654	62,654	62,654	35,086	35,086	31,578
Lighting	LED Specialty Lamp - Interior	10.0	4,004,925	0.84	24,760,046			3,364,137	3,364,137	3,364,137	3,364,137	1,883,917	1,883,917	1,883,917
Lighting	LED Specialty Lamp - Interior - VA	10.0	272,997	0.84	1,687,779			229,318	229,318	229,318	229,318	128,418	128,418	128,418
Lighting	LED Omnidirectional Bulb - Exterior	8.0	1,480,047	0.84	6,962,142			1,243,240	1,243,240	1,243,240	1,243,240	497,296	497,296	497,296
Lighting	LED Omnidirectional Bulb - Exterior - VA	8.0	129,572	0.84	609,507			108,841	108,841	108,841	108,841	43,536	43,536	43,536
Lighting	LED Omnidirectional Bulb - Interior	10.0	7,319,686	0.84	39,350,632			6,148,536	6,148,536	6,148,536	6,148,536	2,459,414	2,459,414	2,459,414
Lighting	LED Omnidirectional Bulb - Interior - VA	10.0	468,526	0.84	2,518,795			393,562	393,562	393,562	393,562	157,425	157,425	157,425
<b>CY2020 Program Total Electric Contribution to CPAS</b>			<b>15,279,900</b>		<b>86,872,536</b>			<b>12,923,176</b>	<b>12,923,176</b>	<b>12,923,176</b>	<b>12,923,176</b>	<b>6,336,237</b>	<b>6,336,237</b>	<b>6,301,961</b>
<b>Historic Program Total Electric Contribution to CPAS‡</b>						<b>24,149,880</b>	<b>51,570,248</b>	<b>51,348,507</b>	<b>40,909,172</b>	<b>40,909,172</b>	<b>40,715,486</b>	<b>29,069,194</b>	<b>25,929,091</b>	<b>23,319,154</b>
<b>Program Total Electric CPAS</b>						<b>24,149,880</b>	<b>51,570,248</b>	<b>64,271,682</b>	<b>53,832,348</b>	<b>53,832,348</b>	<b>53,638,661</b>	<b>35,405,432</b>	<b>32,265,328</b>	<b>29,621,115</b>
<b>CY2020 Program Incremental Expiring Electric Savings§</b>												<b>6,586,938</b>		<b>34,276</b>
<b>Historic Program Incremental Expiring Electric Savings‡§</b>								<b>221,741</b>	<b>10,439,334</b>		<b>193,687</b>	<b>11,646,291</b>	<b>3,140,103</b>	<b>2,609,937</b>
<b>Program Total Incremental Expiring Electric Savings§</b>								<b>221,741</b>	<b>10,439,334</b>		<b>193,687</b>	<b>18,233,230</b>	<b>3,140,103</b>	<b>2,644,213</b>

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Consumer Electronics	Advanced Power Strip - Tier 1												
HVAC	Programmable Thermostat	297,815											
HVAC	Advanced Thermostat	267,882	267,882	267,882	267,882								
Hot Water	HW Pipe Insulation	3,711	3,711	3,711	3,711	3,711	3,711	3,711	3,711				
Hot Water	HW Pipe Insulation - VA	384	384	384	384	384	384	384	384				
Hot Water	Low Flow Faucet Aerator	14,562	14,562	14,562									
Hot Water	Low Flow Faucet Aerator - VA	1,593	1,593	1,593									
Hot Water	Low Flow Showerhead	98,289	98,289	98,289									
Hot Water	Low Flow Showerhead - VA	10,537	10,537	10,537									
Lighting	LED Specialty Lamp - Exterior												
Lighting	LED Specialty Lamp - Exterior - VA												
Lighting	LED Specialty Lamp - Interior	1,883,917	1,883,917	1,883,917									
Lighting	LED Specialty Lamp - Interior - VA	128,418	128,418	128,418									
Lighting	LED Omnidirectional Bulb - Exterior	497,296											
Lighting	LED Omnidirectional Bulb - Exterior - VA	43,536											
Lighting	LED Omnidirectional Bulb - Interior	2,459,414	2,459,414	2,459,414									
Lighting	LED Omnidirectional Bulb - Interior - VA	157,425	157,425	157,425									
<b>CY2020 Program Total Electric Contribution to CPAS</b>		<b>5,864,779</b>	<b>5,026,131</b>	<b>5,026,131</b>	<b>271,977</b>	<b>4,095</b>	<b>4,095</b>	<b>4,095</b>	<b>4,095</b>				
<b>Historic Program Total Electric Contribution to CPAS†</b>		<b>23,065,256</b>	<b>6,381,025</b>	<b>1,206,784</b>	<b>572,009</b>	<b>572,009</b>	<b>572,009</b>	<b>8,381</b>					
<b>Program Total Electric CPAS</b>		<b>28,930,035</b>	<b>11,407,156</b>	<b>6,232,915</b>	<b>843,985</b>	<b>576,103</b>	<b>576,103</b>	<b>12,475</b>	<b>4,095</b>				
<b>CY2020 Program Incremental Expiring Electric Savings§</b>		<b>437,183</b>	<b>838,647</b>		<b>4,754,154</b>	<b>267,882</b>				<b>4,095</b>			
<b>Historic Program Incremental Expiring Electric Savings§§</b>		<b>253,898</b>	<b>16,684,232</b>	<b>5,174,241</b>	<b>634,775</b>			<b>563,628</b>	<b>8,381</b>				
<b>Program Total Incremental Expiring Electric Savings§</b>		<b>691,080</b>	<b>17,522,879</b>	<b>5,174,241</b>	<b>5,388,929</b>	<b>267,882</b>		<b>563,628</b>	<b>8,381</b>	<b>4,095</b>			

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 found on the Illinois Stakeholder Advisory Group (SAG) website: [https://www.ilsag.info/ntg\\_2020](https://www.ilsag.info/ntg_2020).

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

‡ Historic savings go back to CY2018.

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

|| The Illinois Statewide Technical Reference Manual (TRM) v8.0 algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis.

**Table 4-2. Cumulative Persisting Annual Savings (CPAS) – Gas**

End Use Type	Research Category	EUL	CY2020 Verified Gross Savings (Therms)	Lifetime Net Savings (Therms)†	Verified Net Therms Savings								
					2018	2019	2020	2021	2022	2023	2024	2025	2026
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	0.85										
HVAC	Programmable Thermostat	8.0	0.90										
HVAC	Advanced Thermostat	11.0	NA#										
Hot Water	HW Pipe Insulation	15.0	0.80										
Hot Water	HW Pipe Insulation - VA	15.0	0.80										
Hot Water	Low Flow Faucet Aerator	10.0	1.04										
Hot Water	Low Flow Faucet Aerator - VA	10.0	1.04										
Hot Water	Low Flow Showerhead	10.0	1.04										
Hot Water	Low Flow Showerhead - VA	10.0	1.04										
Lighting	LED Specialty Lamp - Exterior	6.9	0.84										
Lighting	LED Specialty Lamp - Exterior - VA	6.9	0.84										
Lighting	LED Specialty Lamp - Interior	10.0	0.84										
Lighting	LED Specialty Lamp - Interior - VA	10.0	0.84										
Lighting	LED Omnidirectional Bulb - Exterior	8.0	0.84										
Lighting	LED Omnidirectional Bulb - Exterior - VA	8.0	0.84										
Lighting	LED Omnidirectional Bulb - Interior	10.0	0.84										
Lighting	LED Omnidirectional Bulb - Interior - VA	10.0	0.84										
<b>CY2020 Program Total Gas Contribution to CPAS (Therms)</b>													
<b>CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)‡</b>													
<b>Historic Program Total Gas Contribution to CPAS (kWh Equivalent)‡§</b>					16,496	33,601	33,601	33,601	33,601	33,601	33,601	33,601	33,601
<b>Program Total Gas CPAS (kWh Equivalent)‡</b>					16,496	33,601	33,601	33,601	33,601	33,601	33,601	33,601	33,601
<b>CY2020 Program Incremental Expiring Gas Savings (Therms)  </b>													
<b>CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)‡  </b>													
<b>Historic Program Incremental Expiring Gas Savings (kWh Equivalent)‡§  </b>													
<b>Program Total Incremental Expiring Gas Savings (kWh Equivalent)‡  </b>													

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Consumer Electronics	Advanced Power Strip - Tier 1												
HVAC	Programmable Thermostat												
HVAC	Advanced Thermostat												
Hot Water	HW Pipe Insulation												
Hot Water	HW Pipe Insulation - VA												
Hot Water	Low Flow Faucet Aerator												
Hot Water	Low Flow Faucet Aerator - VA												
Hot Water	Low Flow Showerhead												
Hot Water	Low Flow Showerhead - VA												
Lighting	LED Specialty Lamp - Exterior												
Lighting	LED Specialty Lamp - Exterior - VA												
Lighting	LED Specialty Lamp - Interior												
Lighting	LED Specialty Lamp - Interior - VA												
Lighting	LED Omnidirectional Bulb - Exterior												
Lighting	LED Omnidirectional Bulb - Exterior - VA												
Lighting	LED Omnidirectional Bulb - Interior												
Lighting	LED Omnidirectional Bulb - Interior - VA												
<b>CY2020 Program Total Gas Contribution to CPAS (Therms)</b>													
<b>CY2020 Program Total Gas Contribution to CPAS (kWh Equivalent)†</b>													
<b>Historic Program Total Gas Contribution to CPAS (kWh Equivalent)†§</b>		<b>33,601</b>	<b>17,106</b>	<b>17,106</b>									
<b>Program Total Gas CPAS (kWh Equivalent)†</b>		<b>33,601</b>	<b>17,106</b>	<b>17,106</b>									
<b>CY2020 Program Incremental Expiring Gas Savings (Therms)  </b>													
<b>CY2020 Program Incremental Expiring Gas Savings (kWh Equivalent)†  </b>													
<b>Historic Program Incremental Expiring Gas Savings (kWh Equivalent)†§  </b>			<b>16,496</b>		<b>17,106</b>								
<b>Program Total Incremental Expiring Gas Savings (kWh Equivalent)†  </b>			<b>16,496</b>		<b>17,106</b>								

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

\*A deemed value. Source found on the Illinois SAG website: [https://www.ilsag.info/ntg\\_2020](https://www.ilsag.info/ntg_2020).

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

‡ kWh equivalent savings are calculated by multiplying therm savings by 29.31.

§ Historic savings go back to CY2018.

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

# The TRM v8.0 algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis.

**Table 4-3. Cumulative Persisting Annual Savings (CPAS) – Total**

End Use Type	Research Category	EUL	CY2020		Lifetime Net Savings (kWh)†	Verified Net kWh Savings (Including Those Converted from Gas Savings)									
			Verified Gross Savings (kWh)	NTG*		2018	2019	2020	2021	2022	2023	2024	2025	2026	
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	151,410	0.85	900,890			128,699	128,699	128,699	128,699	128,699	128,699	128,699	128,699
HVAC	Programmable Thermostat	8.0	330,906	0.90	2,382,523			297,815	297,815	297,815	297,815	297,815	297,815	297,815	297,815
HVAC	Advanced Thermostat	11.0	267,882	NA	2,946,703			267,882	267,882	267,882	267,882	267,882	267,882	267,882	267,882
Hot Water	HW Pipe Insulation	15.0	4,639	0.80	55,663			3,711	3,711	3,711	3,711	3,711	3,711	3,711	3,711
Hot Water	HW Pipe Insulation - VA	15.0	480	0.80	5,757			384	384	384	384	384	384	384	384
Hot Water	Low Flow Faucet Aerator	10.0	14,002	1.04	145,616			14,562	14,562	14,562	14,562	14,562	14,562	14,562	14,562
Hot Water	Low Flow Faucet Aerator - VA	10.0	1,532	1.04	15,933			1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593
Hot Water	Low Flow Showerhead	10.0	94,509	1.04	982,889			98,289	98,289	98,289	98,289	98,289	98,289	98,289	98,289
Hot Water	Low Flow Showerhead - VA	10.0	10,132	1.04	105,371			10,537	10,537	10,537	10,537	10,537	10,537	10,537	10,537
Lighting	LED Specialty Lamp - Exterior	6.9	654,069	0.84	3,089,925			549,418	549,418	549,418	549,418	549,418	307,674	307,674	276,907
Lighting	LED Specialty Lamp - Exterior - VA	6.9	74,588	0.84	352,366			62,654	62,654	62,654	62,654	62,654	35,086	35,086	31,578
Lighting	LED Specialty Lamp - Interior	10.0	4,004,925	0.84	24,760,046			3,364,137	3,364,137	3,364,137	3,364,137	3,364,137	1,883,917	1,883,917	1,883,917
Lighting	LED Specialty Lamp - Interior - VA	10.0	272,997	0.84	1,687,779			229,318	229,318	229,318	229,318	229,318	128,418	128,418	128,418
Lighting	LED Omnidirectional Bulb - Exterior	8.0	1,480,047	0.84	6,962,142			1,243,240	1,243,240	1,243,240	1,243,240	1,243,240	497,296	497,296	497,296
Lighting	LED Omnidirectional Bulb - Exterior - VA	8.0	129,572	0.84	609,507			108,841	108,841	108,841	108,841	108,841	43,536	43,536	43,536
Lighting	LED Omnidirectional Bulb - Interior	10.0	7,319,686	0.84	39,350,632			6,148,536	6,148,536	6,148,536	6,148,536	6,148,536	2,459,414	2,459,414	2,459,414
Hot Water	LED Omnidirectional Bulb - Interior - VA	10.0	468,526	0.84	2,518,795			393,562	393,562	393,562	393,562	393,562	157,425	157,425	157,425
<b>CY2020 Program Total Contribution to CPAS</b>			<b>15,279,900</b>		<b>86,872,536</b>			<b>12,923,176</b>	<b>12,923,176</b>	<b>12,923,176</b>	<b>12,923,176</b>	<b>6,336,237</b>	<b>6,336,237</b>	<b>6,301,961</b>	
<b>Historic Program Total Contribution to CPAS‡</b>						<b>24,166,376</b>	<b>51,603,850</b>	<b>51,382,108</b>	<b>40,942,774</b>	<b>40,942,774</b>	<b>40,749,087</b>	<b>29,102,796</b>	<b>25,962,692</b>	<b>23,352,755</b>	
<b>Program Total CPAS</b>						<b>24,166,376</b>	<b>51,603,850</b>	<b>64,305,284</b>	<b>53,865,950</b>	<b>53,865,950</b>	<b>53,672,263</b>	<b>35,439,033</b>	<b>32,298,930</b>	<b>29,654,717</b>	
<b>CY2020 Program Incremental Expiring Savings§</b>												<b>6,586,938</b>		<b>34,276</b>	
<b>Historic Program Incremental Expiring Savings‡§</b>							<b>221,741</b>	<b>10,439,334</b>			<b>193,687</b>	<b>11,646,291</b>	<b>3,140,103</b>	<b>2,609,937</b>	
<b>Program Total Incremental Expiring Savings§</b>							<b>221,741</b>	<b>10,439,334</b>			<b>193,687</b>	<b>18,233,230</b>	<b>3,140,103</b>	<b>2,644,213</b>	

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Consumer Electronics	Advanced Power Strip - Tier 1												
HVAC	Programmable Thermostat	297,815											
HVAC	Advanced Thermostat	267,882	267,882	267,882	267,882								
Hot Water	HW Pipe Insulation	3,711	3,711	3,711	3,711	3,711	3,711	3,711	3,711				
Hot Water	HW Pipe Insulation - VA	384	384	384	384	384	384	384	384				
Hot Water	Low Flow Faucet Aerabr	14,562	14,562	14,562									
Hot Water	Low Flow Faucet Aerabr - VA	1,593	1,593	1,593									
Hot Water	Low Flow Showerhead	98,289	98,289	98,289									
Hot Water	Low Flow Showerhead - VA	10,537	10,537	10,537									
Lighting	LED Specialty Lamp - Exterior												
Lighting	LED Specialty Lamp - Exterior - VA												
Lighting	LED Specialty Lamp - Interior	1,883,917	1,883,917	1,883,917									
Lighting	LED Specialty Lamp - Interior - VA	128,418	128,418	128,418									
Lighting	LED Omnidirectional Bulb - Exterior	497,296											
Lighting	LED Omnidirectional Bulb - Exterior - VA	43,536											
Lighting	LED Omnidirectional Bulb - Interior	2,459,414	2,459,414	2,459,414									
Hot Water	LED Omnidirectional Bulb - Interior - VA	157,425	157,425	157,425									
<b>CY2020 Program Total Contribution to CPAS</b>		<b>5,864,779</b>	<b>5,026,131</b>	<b>5,026,131</b>	<b>271,977</b>	<b>4,095</b>	<b>4,095</b>	<b>4,095</b>	<b>4,095</b>				
<b>Historic Program Total Contribution to CPAS†</b>		<b>23,098,858</b>	<b>6,398,130</b>	<b>1,223,889</b>	<b>572,009</b>	<b>572,009</b>	<b>572,009</b>	<b>8,381</b>					
<b>Program Total CPAS</b>		<b>28,963,636</b>	<b>11,424,262</b>	<b>6,250,020</b>	<b>843,985</b>	<b>576,103</b>	<b>576,103</b>	<b>12,475</b>	<b>4,095</b>				
<b>CY2020 Program Incremental Expiring Savings§</b>		<b>437,183</b>	<b>838,647</b>		<b>4,754,154</b>	<b>267,882</b>				<b>4,095</b>			
<b>Historic Program Incremental Expiring Savings‡§</b>		<b>253,898</b>	<b>16,700,727</b>	<b>5,174,241</b>	<b>651,881</b>			<b>563,628</b>	<b>8,381</b>				
<b>Program Total Incremental Expiring Savings§</b>		<b>691,080</b>	<b>17,539,375</b>	<b>5,174,241</b>	<b>5,406,035</b>	<b>267,882</b>		<b>563,628</b>	<b>8,381</b>	<b>4,095</b>			

Note: The green highlighted cell shows program total first-year electric savings (including direct electric savings and those converted from gas). The gray cells are blank, indicating no values or no contribution to calculating CPAS in CY2020.

\*A deemed value. Source found on the Illinois SAG website: [https://www.ilsag.info/ntg\\_2020](https://www.ilsag.info/ntg_2020).

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

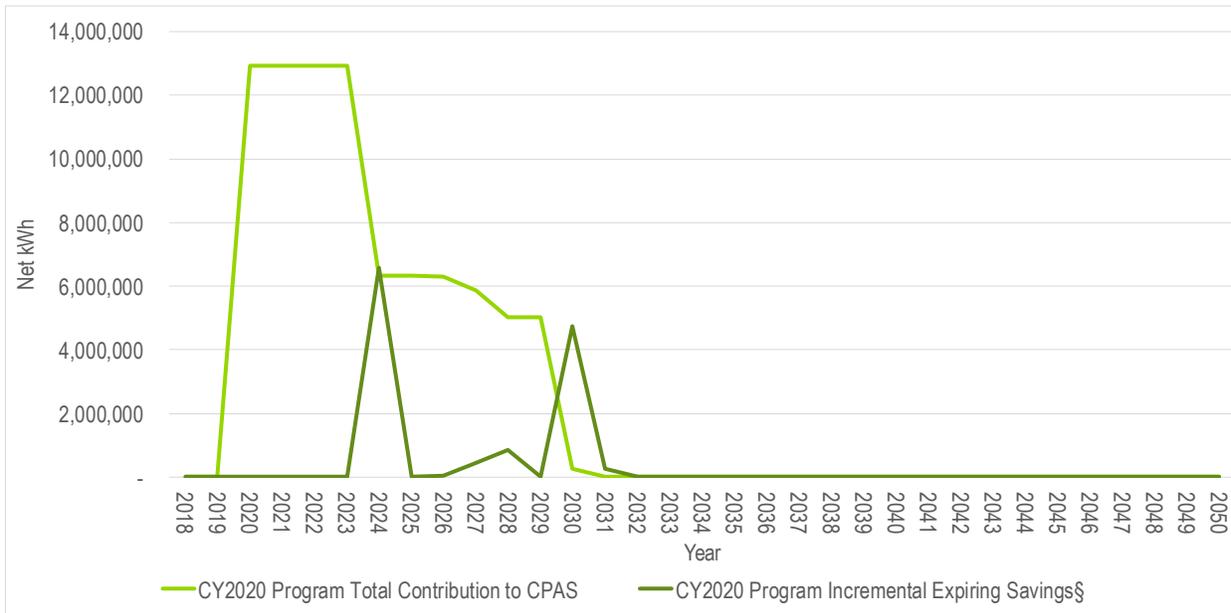
‡ Historic savings go back to CY2018.

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

// The TRM v8.0 algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis.

**Figure 4-1. Cumulative Persisting Annual Savings**



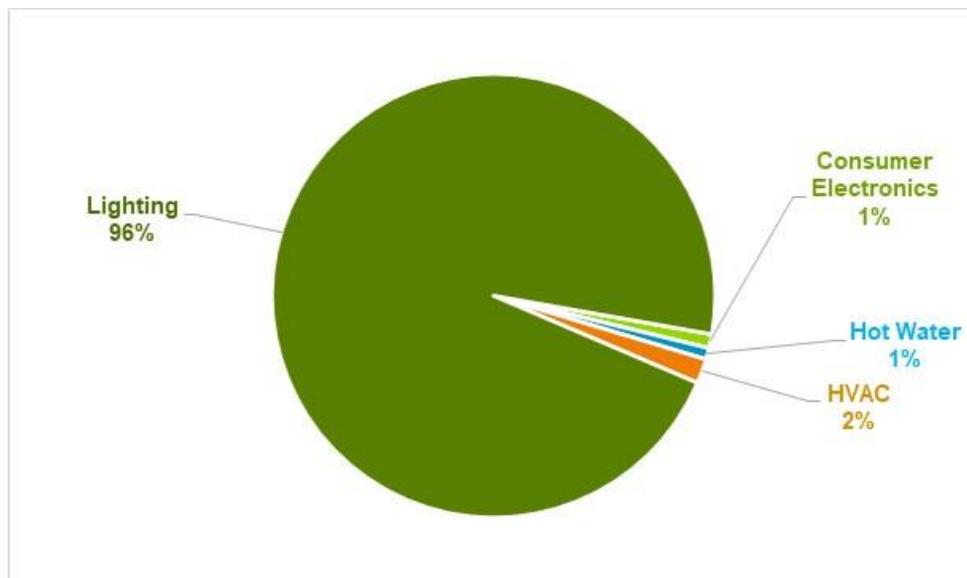
§Expiring savings are equal to CPAS  $Y_{n-1}$  - CPAS  $Y_n$ .

Source: ComEd tracking data and evaluation team analysis.

## 5. Program Savings by Measure

The program includes eight measures, as the following tables show. The LED omnidirectional bulbs and LED specialty lamps measures contributed almost all of the savings (see Figure 5-1).

**Figure 5-1. Verified Net Savings by End Use Type**



Source: ComEd tracking data and evaluation team analysis

**Table 5-1. CY2020 Energy Savings by End Use Type – Electric and Total**

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)
Consumer Electronics	Advanced Power Strip - Tier 1	151,410	1.00	151,410	0.85	128,699	7.0
HVAC	Programmable Thermostat	325,070	1.02	330,906	0.90	297,815	8.0
HVAC	Advanced Thermostat	389,253	0.69	267,882	NA†	267,882	11.0
Hot Water	HW Pipe Insulation	4,659	1.00	4,639	0.80	3,711	15.0
Hot Water	HW Pipe Insulation - VA	618	0.78	480	0.80	384	15.0
Hot Water	Low Flow Faucet Aerator	13,311	1.05	14,002	1.04	14,562	10.0
Hot Water	Low Flow Faucet Aerator - VA	1,769	0.87	1,532	1.04	1,593	10.0
Hot Water	Low Flow Showerhead	91,591	1.03	94,509	1.04	98,289	10.0
Hot Water	Low Flow Showerhead - VA	11,859	0.85	10,132	1.04	10,537	10.0
Lighting	LED Specialty Lamp - Exterior	654,067	1.00	654,069	0.84	549,418	6.9
Lighting	LED Specialty Lamp - Exterior - VA	87,778	0.85	74,588	0.84	62,654	6.9
Lighting	LED Specialty Lamp - Interior	4,064,994	0.99	4,004,925	0.84	3,364,137	10.0
Lighting	LED Specialty Lamp - Interior - VA	323,705	0.84	272,997	0.84	229,318	10.0
Lighting	LED Omnidirectional Bulb - Exterior	1,480,044	1.00	1,480,047	0.84	1,243,240	8.0
Lighting	LED Omnidirectional Bulb - Exterior - VA	152,485	0.85	129,572	0.84	108,841	8.0
Lighting	LED Omnidirectional Bulb - Interior	6,614,788	1.11	7,319,686	0.84	6,148,536	10.0
Lighting	LED Omnidirectional Bulb - Interior - VA	499,129	0.94	468,526	0.84	393,562	10.0
	<b>Total</b>	<b>14,866,529</b>	<b>1.03</b>	<b>15,279,900</b>		<b>12,923,176</b>	

Note: The savings in this table include 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 found on the Illinois SAG website: [https://www.ilsag.info/ntg\\_2020](https://www.ilsag.info/ntg_2020).

† The TRM v8.0 algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis.

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

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net Peak Demand Reduction (kW)
Consumer Electronics	Advanced Power Strip - Tier 1	16.99	1.00	16.99	0.85	14.44
HVAC	Programmable Thermostat	0.00	NA	0.00	0.90	0.00
HVAC	Advanced Thermostat	101.52	0.99	100.99	NA†	100.99
Hot Water	HW Pipe Insulation	0.00	NR	0.53	0.80	0.42
Hot Water	HW Pipe Insulation - VA	0.00	NR	0.05	0.80	0.04
Hot Water	Low Flow Faucet Aerator	11.55	1.01	11.69	1.04	12.16
Hot Water	Low Flow Faucet Aerator - VA	1.56	0.83	1.30	1.04	1.35
Hot Water	Low Flow Showerhead	10.62	1.00	10.62	1.04	11.05
Hot Water	Low Flow Showerhead - VA	1.44	0.83	1.19	1.04	1.24
Lighting	LED Specialty Lamp - Exterior	72.14	1.00	72.16	0.84	60.61
Lighting	LED Specialty Lamp - Exterior - VA	9.68	0.85	8.22	0.84	6.91
Lighting	LED Specialty Lamp - Interior	613.91	1.00	611.51	0.84	513.67
Lighting	LED Specialty Lamp - Interior - VA	48.89	0.84	41.21	0.84	34.62
Lighting	LED Omnidirectional Bulb - Exterior	163.25	1.00	163.37	0.84	137.23
Lighting	LED Omnidirectional Bulb - Exterior - VA	16.82	0.85	14.31	0.84	12.02
Lighting	LED Omnidirectional Bulb - Interior	875.06	1.06	929.06	0.84	780.41
Lighting	LED Omnidirectional Bulb - Interior - VA	65.61	0.90	58.75	0.84	49.35
	<b>Total</b>	<b>2,009.04</b>	<b>1.02</b>	<b>2,041.96</b>		<b>1,736.51</b>

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)

\*A deemed value. Source found on the Illinois SAG website: [https://www.ilsag.info/ntg\\_2020](https://www.ilsag.info/ntg_2020).

† The TRM v8.0 algorithm calculates net savings for advanced thermostats.

Source: ComEd tracking data and evaluation team analysis.

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

**Table 5-3. Secondary Energy Savings from Water Reduction by Measure**

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)
Consumer Electronics	Advanced Power Strip - Tier 1	NA	NA	NA	NA	0.85	NA
HVAC	Programmable Thermostat	NA	NA	NA	NA	0.90	NA
HVAC	Advanced Thermostat	NA	NA	NA	NA	NA†	NA
Hot Water	HW Pipe Insulation	NA	NA	NA	NA	0.80	NA
Hot Water	HW Pipe Insulation - VA	NA	NA	NA	NA	0.80	NA
Hot Water	Low Flow Faucet Aerator	154,590	593	1.00	593	1.04	617
Hot Water	Low Flow Faucet Aerator - VA	20,920	71	0.83	59	1.04	61
Hot Water	Low Flow Showerhead	781,160	2,911	1.00	2,917	1.04	3,034
Hot Water	Low Flow Showerhead - VA	101,190	375	0.83	310	1.04	323
Lighting	LED Specialty Lamp - Exterior	NA	NA	NA	NA	0.84	NA
Lighting	LED Specialty Lamp - Exterior - VA	NA	NA	NA	NA	0.84	NA
Lighting	LED Specialty Lamp - Interior	NA	NA	NA	NA	0.84	NA
Lighting	LED Specialty Lamp - Interior - VA	NA	NA	NA	NA	0.84	NA
Lighting	LED Omnidirectional Bulb - Exterior	NA	NA	NA	NA	0.84	NA
Lighting	LED Omnidirectional Bulb - Exterior - VA	NA	NA	NA	NA	0.84	NA
Lighting	LED Omnidirectional Bulb - Interior	NA	NA	NA	NA	0.84	NA
Lighting	LED Omnidirectional Bulb - Interior - VA	NA	NA	NA	NA	0.84	NA
	<b>Total</b>	<b>1,057,860</b>	<b>3,950</b>	<b>0.98</b>	<b>3,880</b>		<b>4,035</b>

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 found on the Illinois SAG website: [https://www.ilsag.info/ntg\\_2020](https://www.ilsag.info/ntg_2020).

† The TRM algorithm calculates net savings for advanced thermostats.

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

Source: ComEd tracking data and evaluation team analysis.

## 6. Impact Analysis Findings and Recommendations

### 6.1 Impact Parameter Estimates

Table 6-1 summarizes the parameters and references used in the verified gross and net savings calculations. Guidehouse calculated savings for each measure following algorithms defined by the TRM v8.0 and TRM v8.0 Errata.

**Table 6-1. Savings Parameters**

Gross Savings Input Parameters	Value	Units	Deemed or Evaluated?	Source*
Quantity	Varies	# measures	Evaluated	Program Tracking Data
NTG	Varies		Deemed	SAG Consensus
Advanced Power Strip – Tier 1	41	kWh	Deemed	TRM v8.0 – Section 5.2.1
HW Pipe Insulation	Varies	kWh	Deemed	TRM v8.0 – Section 5.4.1
Low Flow Faucet Aerator - Bathroom	Varies	kWh	Deemed	TRM v8.0 – Section 5.4.4
Low Flow Faucet Aerator - Kitchen	Varies	kWh	Deemed	TRM v8.0 – Section 5.4.4
Low Flow Showerhead	Varies	kWh	Deemed	TRM v8.0 – Section 5.4.5
Advanced Thermostat	Varies	kWh and/or therms	Deemed	TRM v8.0 – Section 5.3.16
Programmable Thermostat	Varies	kWh	Deemed	TRM v8.0 – Section 5.3.11
Programmable Thermostat – Reprogram	Varies	kWh	Deemed	TRM v8.0 – Section 5.3.11
LED Omnidirectional Bulb – Exterior	Varies	kWh	Deemed	TRM v8.0 Errata – Section 5.5.8
LED Omnidirectional Bulb – Interior	Varies	kWh	Deemed	TRM v8.0 Errata – Section 5.5.8
LED Specialty Lamp	Varies	kWh	Deemed	TRM v8.0 Errata – Section 5.5.6
LED Specialty Lamp – Recessed/Track	Varies	kWh	Deemed	TRM v8.0 Errata – Section 5.5.6

\*TRM is the Illinois Statewide Technical Reference Manual version 8.0 from <http://www.ilsag.info/technical-reference-manual.html>. The NTG values can be found on the Illinois SAG website: [https://www.ilsag.info/ntg\\_2020](https://www.ilsag.info/ntg_2020).

Source: TRM v8.0 and Errata

## 6.2 Other Impact Findings and Recommendations

The evaluation team developed several recommendations based on findings from the CY2020 evaluation. These findings suggest ways to improve the measure-level realization rates. Table 6-2 presents the end use-level realization rates and program savings percentages to give context to the team’s recommendations.

**Table 6-2. Realization Rates and Program Savings**

End Use Type	Realization Rate	Percentage of Verified Net Savings
Lighting	0.95	94%
HVAC	0.85	4%
Hot Water	0.93	1%
Consumer Electronics	1.00	1%

Source: ComEd tracking data and evaluation team analysis.

### 6.2.1 All Measures – Building Type

ComEd indicated it is defining multi-family (MF) as a building with five or more units. Guidehouse used this working definition to determine its mapping for CY2020. The evaluation team used the building type mapping shown in Table 6-3. .

**Table 6-3. Home Type Definition**

Tracking Data Building Type	Guidehouse Assigned building Type
One Unit	Single Family
Two Unit	Single Family
Three Unit	Single Family
Four Unit	Single Family
Five Unit	Multi-Family
Six Unit	Multi-Family
Condo (6 or more)	Multi-Family
Mobile Home	Multi-Family

Source: Gutierrez, Vincent. "Re: HEA - Res Building Type." Message to Nishant Mehta. October 01, 2018. E-mail

**Finding 1.** The evaluation team found that the HVAC measure name and building type columns did not properly match. For example, some multi-family thermostat projects (six examples) with a building type of MF had a measure name containing SF (for single family). For these projects, Guidehouse used MF inputs while the ex ante savings incorrectly used single-family inputs. See Table 6-4.

**Recommendation 1.** Guidehouse recommends Franklin search to ensure the measure name accurately reflects the correct building type.

**Table 6-4. Measure Name and Building Type Mismatch Examples**

Project ID	Measure Name	Residential Building Type	Verified RR kWh
5195006	SF - Gas - Nest (\$150) - Base Prog - Furnace&AC	MF	0.73
6013921	SF - Gas - Sensi (\$75) - Base Manual - Furnace&AC	MF	0.72
6510810	SF - Gas - Nest (\$150) - Base Prog - Furnace&AC	MF	0.68
6423768	SF - Gas - Nest (\$150) - Base Prog - Furnace&AC	MF	0.73
6421105	SF - Gas - Nest (\$150) - Base Manual - Furnace&AC	MF	0.72
6639220	SF - Gas Tstat - Reprogram Existing - Furnace	MF	0.65

Source: ComEd tracking data and evaluation team analysis.

## 6.2.2 Virtual Assessment (VA) Measures – ISR

**Finding 2.** Guidehouse found that the implementation of VA measures led to lower realization rates in all circumstances. The evaluation team used in-service rates (ISRs) from the memo we provided to ComEd and Franklin in August 2020<sup>2</sup> to determine savings. After applying the ISR to the VA measures, kWh and kW realization rates often dropped below 1.0. Table 6-5 lists the prospective ISR values the evaluation team used.

<sup>2</sup> Single Family Virtual Assessment ISR Memo 2020-08-20.docx

**Recommendation 2.** Guidehouse recommends Franklin use the VA ISR values in Table 6-5 to determine ex ante savings values for all applicable measures for CY2020.

**Table 6-5. Virtual Assessment ISRs**

Measure Category	Prospective Custom ISR for CY2020 Single Family Virtual Assessment Measures
Showerheads	0.795
Areators - Bathroom	0.780
Areators - Kitchen	0.765
DHW Pipe Insulation	0.780
Omnidirectional LEDs	0.803
Specialty LEDs	0.803

*Source: Evaluation team analysis, TRM v8.0, and Single Family Virtual Assessment ISR Memo 2020-08-20.docx*

### 6.2.3 Lighting

Lighting measures account for 94% of program savings and together had a realization rate of 0.95.

**Finding 3.** Guidehouse found that lighting realization rates varied significantly. The values ranged from a minimum 0.837 kWh realization rate to a maximum 1.42 kWh realization rate, with many realization rates within a few points of 1.0 (see Table 6-6). One of the reasons the realization rates were significantly below 1.0 is due to the ex ante savings not including the VA ISR (see Finding 2).

**Recommendation 3.** Guidehouse recommends Franklin clarify the inputs (WattsBase, WattsEE, etc.) used in its ex ante savings calculations and include the same in the tracking data consistent with IL TRM v8.0.

**Table 6-6. Lighting Measure Results**

End Use	Measure Name	Unit	Ex ante kWh	Ex ante kW	Verified Gross kWh	Verified Gross kW	Verified kWh RR	Verified kW RR
Lighting	Exterior LED - 11W (75W)	Each	136,151	15.02	136,151	14.97	1.00	1.00
Lighting	Exterior LED - 15W (100W)	Each	527,927	58.23	527,931	58.21	1.00	1.00
Lighting	Exterior LED - 15W PAR38 (120W)	Each	419,700	46.29	419,699	46.31	1.00	1.00
Lighting	Exterior LED - 4W Candelabra (40W)	Each	496,864	54.80	496,861	54.88	1.00	1.00
Lighting	Exterior LED - 6W (40W)	Each	6,186	0.68	6,186	0.68	1.00	0.99
Lighting	Exterior LED - 8W Flood (65W)	Each	234,368	25.85	234,369	25.84	1.00	1.00
Lighting	Exterior LED - 9W (60W)	Each	312,915	34.51	312,918	34.63	1.00	1.00
Lighting	Interior LED - 11W (75W)	Each	294,127	36.55	293,052	36.24	1.00	0.99
Lighting	Interior LED - 15W (100W)	Each	522,300	64.91	519,136	65.17	0.99	1.00
Lighting	Interior LED - 15W PAR38 (120W)	Each	155,093	23.42	155,437	23.38	1.00	1.00
Lighting	Interior LED - 4W Candelabra (40W)	Each	1,263,569	190.87	1,798,704	222.39	1.42	1.17
Lighting	Interior LED - 5W Mini Globe (25W)	Each	124,225	18.76	122,939	18.84	0.99	1.00
Lighting	Interior LED - 6/12/19W 3-Way (50/100/150W)	Each	525,705	79.40	521,885	79.16	0.99	1.00
Lighting	Interior LED - 6W (40W)	Each	74,655	9.28	74,558	9.30	1.00	1.00
Lighting	Interior LED - 6W Globe (40/60W)	Each	720,179	108.75	1,020,359	128.46	1.42	1.18
Lighting	Interior LED - 7W Mini-Flood PAR20 (45W)	Each	280,987	42.44	279,588	41.96	1.00	0.99
Lighting	Interior LED - 7W Track Light (50W) - Pin Base GU5.3	Each	71,523	10.80	71,207	10.75	1.00	1.00
Lighting	Interior LED - 7W Track Light (50W) - Prong Base GU10	Each	211,803	31.99	209,511	31.79	0.99	0.99
Lighting	Interior LED - 8W Flood (65W)	Each	2,695,658	407.09	2,692,245	405.61	1.00	1.00
Lighting	Interior LED - 9W (60W)	Each	3,739,957	464.71	3,718,075	467.51	0.99	1.01
Lighting	VA- Exterior LED - 11W (75W)	Each	491	0.05	417	0.05	0.85	0.85
Lighting	VA- Exterior LED - 15W (100W)	Each	88,788	9.79	75,447	8.33	0.85	0.85
Lighting	VA- Exterior LED - 15W PAR38 (120W)	Each	67,781	7.48	57,596	6.35	0.85	0.85
Lighting	VA- Exterior LED - 4W Candelabra (40W)	Each	38,816	4.28	32,983	3.64	0.85	0.85
Lighting	VA- Exterior LED - 6W (40W)	Each	215	0.02	183	0.02	0.85	0.84
Lighting	VA- Exterior LED - 8W Flood (65W)	Each	19,997	2.21	16,992	1.88	0.85	0.85
Lighting	VA- Exterior LED - 9W (60W)	Each	24,174	2.67	20,542	2.28	0.85	0.86
Lighting	VA- Interior LED - 11W (75W)	Each	9,167	1.14	7,855	0.97	0.86	0.85
Lighting	VA- Interior LED - 15W (100W)	Each	37,941	4.71	32,324	4.00	0.85	0.85
Lighting	VA- Interior LED - 15W PAR38 (120W)	Each	5,962	0.90	5,114	0.77	0.86	0.85
Lighting	VA- Interior LED - 4W Candelabra (40W)	Each	84,545	12.77	102,287	12.70	1.21	0.99
Lighting	VA- Interior LED - 5W Mini Globe (25W)	Each	6,996	1.06	5,952	0.88	0.85	0.83
Lighting	VA- Interior LED - 6/12/19W 3-Way (50/100/150W)	Each	15,740	2.38	13,319	2.01	0.85	0.84
Lighting	VA- Interior LED - 6W (40W)	Each	2,063	0.26	1,767	0.22	0.86	0.84
Lighting	VA- Interior LED - 6W Globe (40/60W)	Each	49,421	7.46	59,725	7.45	1.21	1.00
Lighting	VA- Interior LED - 7W Mini-Flood PAR20 (45W)	Each	20,282	3.06	17,343	2.61	0.86	0.85
Lighting	VA- Interior LED - 7W Track Light (50W) - Pin Base GU5.3	Each	6,999	1.06	5,921	0.89	0.85	0.84
Lighting	VA- Interior LED - 7W Track Light (50W) - Prong Base GU10	Each	18,296	2.76	15,325	2.34	0.84	0.85
Lighting	VA- Interior LED - 8W Flood (65W)	Each	249,430	37.67	212,188	31.73	0.85	0.84
Lighting	VA- Interior LED - 9W (60W)	Each	315,992	39.26	268,628	33.42	0.85	0.85

Source: ComEd tracking data and evaluation team analysis.

## 6.2.4 HVAC – Thermostats

Advanced thermostats represented 2.07% of program verified net savings and had a realization rate of 0.69. Programmable thermostats represented 2.30% of program verified net savings and had a realization rate of 1.02.

**Finding 4.** Franklin claimed savings for more than one thermostat per account number or project in 11 projects. Per TRM v8.0, savings for only one thermostat can be claimed per household. Table 6-7 shows some examples project numbers where this was an issue.

The TRM v8.0 assigns household energy savings for thermostat measures. To determine the appropriate savings, Guidehouse assumed all installed thermostats shared equal responsibility for this household energy savings. Thus, the evaluation team averaged savings of all thermostats for a given account number. For example, a home with two claimed thermostats, one with 100 kWh savings and another with 200 kWh savings, would achieve verified savings of 150 kWh.

**Recommendation 4.** Guidehouse recommends ComEd claim savings for only one programmable or one advanced thermostat per household.

**Table 6-7. Multiple Thermostat Project IDs**

Project Id	Measure Name	Quantity
6580000	SF - Gas - Sensi (\$75) - Base Manual - Furnace&AC	3
6405495	SF - Gas - Sensi (\$75) - Base Prog - Furnace&AC	1
6405495	SF - Gas Tstat - Programmable Installed - Furnace	1
6458617	SF - Gas - Sensi (\$75) - Base Manual - Furnace&AC	1
6458617	SF - Gas Tstat - Programmable Installed - Furnace	1
6622620	SF - Gas - Sensi (\$75) - Base Prog - Furnace&AC	1
6622620	SF - Gas Tstat - Programmable Installed - Furnace	1

Source: ComEd tracking data and evaluation team analysis.

**Finding 5.** For CY2020, the evaluation team used the measure name to determine the existing thermostat type and found that the existing thermostat type field often did not match the measure name (see Table 6-8). The team searched the measure name for 'Base Prog' or 'Programmable Installed' to consider the thermostat as *programmable baseline* and 'Base Manual' to indicate *baseline manual* thermostats. In many cases (972), the existing thermostat field conflicted with that finding. The team also found 35 measures with the existing thermostat type Smart, while the measure name did not indicate Smart (see Table 6-8. for details).

**Recommendation 5.** Franklin should ensure the existing thermostat field is consistently applied to the details found onsite. Additionally, if the measure name is used to verify the previous thermostat type, the implementer should use a consistent format across all new measures installed. If there are existing Smart thermostats, they should be listed in the measure name and the existing thermostat field.

**Table 6-8. Existing Thermostat Mismatches**

Existing Thermostat Type	Measure_Name	Quantity
Manual	SF - Gas Tstat - Programmable Installed - Furnace	715
Manual	SF - Gas Tstat - Reprogram Existing - Furnace	56
Manual	CONDO - Gas Tstat - Programmable Installed - Furnace	33
Manual	SF - Electric Tstat - Programmable Installed - Heat Pump	31
Manual	SF - Electric Tstat - Programmable Installed - Resistance	29
Manual	SF - Gas - Nest E (\$75) - Base Prog - Furnace&AC	29
Manual	SF - Gas - Nest (\$150) - Base Prog - Furnace&AC	20
Manual	SF - Gas - Sensi (\$75) - Base Prog - Furnace&AC	20
Manual	CONDO - Electric Tstat - Programmable Installed - Resistance	14
Manual	Condo - Gas - Nest (\$150) - Base Prog - Furnace&AC	5
Manual	SF - Electric - Nest (\$150) - Base Prog - Furnace&AC	5
None	SF - Gas Tstat - Reprogram Existing - Furnace	5
Manual	SF - Electric - Sensi (\$75) - Base Prog - Furnace&AC	3
None	SF - Gas Tstat - Programmable Installed - Furnace	3
Manual	CONDO - Electric Tstat - Programmable Installed - Heat Pump	1
Manual	Condo - Gas - Nest E (\$75) - Base Prog - Furnace&AC	1
Manual	Condo - Gas - Sensi (\$75) - Base Prog - Furnace&AC	1
Manual	SF - Electric - Nest E (\$75) - Base Prog - Furnace&AC	1
Smart	CONDO - Electric Tstat - Reprogram Existing - Resistance	1
Smart	CONDO - Gas Tstat - Reprogram Existing - Furnace	1
Smart	SF - Electric Tstat - Reprogram Existing - Heat Pump	1
Smart	SF - Electric Tstat - Reprogram Existing - Resistance	1

Source: ComEd tracking data and evaluation team analysis.

### 6.2.5 Hot Water

Hot water measures represent 1% of program verified net savings and had a verified gross realization rate of 0.93. Table 6-9. shows realization rates for the various hot water measures.

**Table 6-9. Verified Measure Total Savings – Hot Water**

End Use	Measure Name	Unit	Ex ante kWh	Ex ante kW	Verified Gross kWh	Verified Gross kWh Water	Verified Gross kW	Verified kWh RR	Verified kW RR
Hot Water	CONDO - Electric - Bathroom - Aerator	Each	1,766	1.77	1,864	73.65	1.79	1.06	1.01
Hot Water	CONDO - Electric - Handheld - Showerhead	Each	10,902	1.46	11,240	338.05	1.46	1.03	1.00
Hot Water	CONDO - Electric - Kitchen - Aerator	Each	1,221	0.32	1,266	45.70	0.32	1.04	1.00
Hot Water	CONDO - Electric - Standard - Showerhead	Each	14,990	2.00	15,414	424.57	2.00	1.03	1.00
Hot Water	SF - Electric - Bathroom - Aerator	Each	5,340	8.39	5,671	257.62	8.51	1.06	1.01
Hot Water	SF - Electric - Handheld - Showerhead	Each	24,637	2.69	25,478	840.36	2.69	1.03	1.00
Hot Water	SF - Electric - Kitchen - Aerator	Each	4,984	1.08	5,200	216.15	1.08	1.04	1.00
Hot Water	SF - Electric - Pipe Insulation - DHW Outlet	Linear Feet	4,659	0.00	4,639	0.00	0.53	1.00	NA
Hot Water	SF - Electric - Standard - Showerhead	Each	41,062	4.48	42,377	1314.51	4.48	1.03	1.00
Hot Water	VA- CONDO - Electric - Bathroom - Aerator	Each	662	0.66	572	20.37	0.55	0.86	0.83
Hot Water	VA- CONDO - Electric - Handheld - Showerhead	Each	3,180	0.42	2,731	70.16	0.36	0.86	0.84
Hot Water	VA- CONDO - Electric - Kitchen - Aerator	Each	509	0.13	441	13.87	0.11	0.87	0.84
Hot Water	VA- CONDO - Electric - Standard - Showerhead	Each	2,725	0.36	2,345	63.99	0.30	0.86	0.84
Hot Water	VA- SF - Electric - Bathroom - Aerator	Each	469	0.74	410	20.16	0.61	0.88	0.83
Hot Water	VA- SF - Electric - Handheld - Showerhead	Each	1,437	0.16	1,225	47.46	0.13	0.85	0.82
Hot Water	VA- SF - Electric - Kitchen - Aerator	Each	129	0.03	109	4.27	0.02	0.84	0.81
Hot Water	VA- SF - Electric - Pipe Insulation - DHW Outlet	Linear Feet	618	0.00	615	0.00	0.07	1.00	NA
Hot Water	VA- SF - Electric - Standard - Showerhead	Each	4,517	0.49	3,831	128.71	0.40	0.85	0.82

Note: Realization Rate is abbreviated RR in the table.

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

Source: ComEd tracking data and evaluation team analysis.

**Finding 6.** The evaluation team found that water supply and treatment kWh savings were not separately reported in the tracking data. In addition to energy savings from the water heater for showerheads and aerators, TRM v8.0 includes kWh savings from water supply and wastewater treatment for water savings measures. The ex ante gross savings excluded secondary savings. Guidehouse and ComEd agreed that ComEd would provide water savings in gallons and Guidehouse would convert those savings to kWh. The tracking data did include gallons saved.

**Recommendation 6.** Guidehouse recommends Franklin report the secondary water supply and treatment kWh savings in a separate field in the tracking data for showerhead and aerator measures.

**Finding 7.** The evaluation team found water input columns that were missing data. The following inputs, which may be used for pipe insulation and aerator measures, were blank for all entries in the tracking data: Pipe\_Insulation\_Rnew\_Value, GPM\_base, GPM\_low, C\_exist, and C\_new. Guidehouse used the TRM default values for these inputs.

**Recommendation 7.** Guidehouse recommends Franklin collect these values when they are onsite and report them in the tracking data.

**Finding 8.** The evaluation team was unable to determine the GPM\_base and GPM\_low values Franklin used to calculate savings for aerators because the tracking data fields are blank. Given the differences in ex ante and verified savings, the team believes there may be

differences between the sets of Gallons per Minute (GPM) inputs used. As a result, ex ante aerator GPM inputs do not always match verified GPM inputs.

**Recommendation 8.** Guidehouse recommends Franklin provide exact GPM\_base and GPM\_low values in the tracking data to ensure calculations are correctly applied. See Table 6-10. for the calculation inputs Guidehouse used to determine realization rates.

**Finding 9.** Realization rates for hot water measures varied, ranging from 0.838 for single family VA kitchen aerators to 1.062 for single family bathroom aerators. The evaluation team was unable to determine a single cause for the variability.

**Recommendation 9.** Guidehouse recommends Franklin provide exact inputs for all calculated values in the tracking data, especially GPM\_base, GPM\_low, ISR, Drain Factor (DF), Faucets per Household (FPH), where possible. Table 6-10. shows the calculations used by the evaluation team.

**Table 6-10. Hot Water Measure Inputs**

Measure	TRM Measure	GPM base	GPM low	Household	Household type	ISR	DF	FPH	Faucet type	Quantity
Aerators	Low Flow Faucet Aerator	1.537	0.962	2.100	MF	0.950	0.900	1.500	Bathroom	49
Aerators	Low Flow Faucet Aerator	1.537	0.962	2.560	SF	0.950	0.900	2.830	Bathroom	151
Aerators	Low Flow Faucet Aerator	1.632	1.409	2.100	MF	0.910	0.750	1.000	Kitchen	32
Aerators	Low Flow Faucet Aerator	1.632	1.409	2.560	SF	0.950	0.750	1.000	Kitchen	68
Showerheads	Low Flow Showerhead	2.240	1.500	2.100	MF	0.950	NA	NA	Showerhead	113
Showerheads	Low Flow Showerhead	2.240	1.500	2.560	SF	0.970	NA	NA	Showerhead	247

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

Source: ComEd tracking data and evaluation team analysis.

**Finding 10.** Showerhead verified realization rates were consistently high on a per-unit examination. A possible issue seems to be incorrect application of the Ewater value, as seen in Table 6-11. All other variables were applied per TRM v8.0.

**Recommendation 10.** Guidehouse requests Franklin clarify why the per-unit savings are inconsistent with TRM v8.0 with supporting custom inputs or that Franklin use the default values provided in TRM v8.0, Section 5.4.5.

**Table 6-11. Showerhead Measure Inputs**

Measure Name	Residential Building Type	GPM base	GPM low	Household	SPH	ISR	Ewater Total	Ex Ante kWh Per Unit	Verified kWh Per Unit	Verified RR kWh
CONDO - Electric - Handheld - Showerhead	MF	2.24	1.50	2.10	1.30	0.95	2937	227.12	232.82	1.03
CONDO - Electric - Standard - Showerhead	MF	2.24	1.50	2.10	1.30	0.95	2937	227.12	232.82	1.03
CONDO - Electric - Handheld - Showerhead	MF	2.24	1.50	2.10	1.30	0.95	5010	227.12	236.84	1.04
CONDO - Electric - Standard - Showerhead	MF	2.24	1.50	2.10	1.30	0.95	5010	227.12	236.84	1.04
VA- CONDO - Electric - Standard - Showerhead	MF	2.24	1.50	2.10	1.30	0.95	2937	227.12	232.82	1.03
VA- CONDO - Electric - Handheld - Showerhead	MF	2.24	1.50	2.10	1.30	0.95	2937	227.12	232.82	1.03
VA- CONDO - Electric - Standard - Showerhead	MF	2.24	1.50	2.10	1.30	0.95	5010	227.12	236.84	1.04
VA- CONDO - Electric - Handheld - Showerhead	MF	2.24	1.50	2.10	1.30	0.95	5010	227.12	236.84	1.04
SF - Electric - Handheld - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	5010	205.31	214.10	1.04
SF - Electric - Standard - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	5010	205.31	214.10	1.04
SF - Electric - Standard - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	2937	205.31	210.46	1.03
SF - Electric - Handheld - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	2937	205.31	210.46	1.03
VA- SF - Electric - Standard - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	5010	205.31	214.10	1.04
SF - Electric - Handheld - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	5010	205.31	214.10	1.04
VA- SF - Electric - Handheld - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	5010	205.31	214.10	1.04
VA- SF - Electric - Standard - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	2937	205.31	210.46	1.03
SF - Electric - Standard - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	5010	205.31	214.10	1.04
VA- SF - Electric - Handheld - Showerhead	SF	2.24	1.50	2.56	1.79	0.97	2937	205.311	210.46	1.03

Source: ComEd tracking data and evaluation team analysis.

## Appendix A. Impact Analysis Methodology

### A.1 Verified Gross Program Savings Analysis Approach

Guidehouse determined verified gross savings for each program measure by:

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

## Appendix B. Total Resource Cost Detail

Table B-1 shows the TRC cost-effectiveness analysis inputs available at the time of finalizing this impact evaluation report. Additional required cost data (e.g., measure costs, program-level incentive and non-incentive costs) is not included in this table and will be provided to the evaluation team later.

**Table B-1. Total Resource Cost Savings Summary**

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Gross Electric Energy Savings (kWh)	Gross Peak Demand Reduction (kW)	Gross Gas Savings (Therms)	Gross Secondary Savings due to Water Reduction (kWh)	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG (kWh)	NTG (kW)	NTG (Therms)	Net Electric Energy Savings (kWh)	Net Peak Demand Reduction (kW)	Net Gas Savings (Therms)	Net Secondary Savings due to Water Reduction (kWh)	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
Consumer Electronics	Advanced Power Strip - Tier 1	Each	1,470	7.0	No	151,410	16.99	NA	NA	NA	NA	0.85	0.85	0.85	128,699	14.44	NA	NA	NA	NA
HVAC	Programmable Thermostat	Each	2,905	8.0	No	330,906	NA	NA	NA	NA	NA	0.90	0.90	0.90	297,815	NA	NA	NA	NA	NA
HVAC	Advanced Thermostat	Each	1,229	11.0	No	267,882	100.99	NA	NA	NA	NA	1.00	1.00	1.00	267,882	100.99	NA	NA	NA	NA
Hot Water	HW Pipe Insulation	Linear Ft	362	15.0	No	4,639	0.53	NA	NA	NA	NA	0.80	0.80	0.80	3,711	0.42	NA	NA	NA	NA
Hot Water	HW Pipe Insulation - VA	Linear Ft	48	15.0	No	480	0.05	NA	NA	NA	NA	0.80	0.80	0.80	384	0.04	NA	NA	NA	NA
Hot Water	Low Flow Faucet Aerator	Each	419	10.0	No	13,408	11.69	NA	593	NA	NA	1.04	1.04	1.04	13,945	12.16	NA	617	NA	NA
Hot Water	Low Flow Faucet Aerator - VA	Each	56	10.0	No	1,473	1.30	NA	59	NA	NA	1.04	1.04	1.04	1,532	1.35	NA	61	NA	NA
Hot Water	Low Flow Showerhead	Each	434	10.0	No	91,591	10.62	NA	2,917	NA	NA	1.04	1.04	1.04	95,255	11.05	NA	3,034	NA	NA
Hot Water	Low Flow Showerhead - VA	Each	55	10.0	No	9,821	1.19	NA	310	NA	NA	1.04	1.04	1.04	10,214	1.24	NA	323	NA	NA
Lighting	LED Specialty Lamp - Exterior	Each	3,467	6.9	No	654,069	72.16	NA	NA	NA	NA	0.84	0.84	0.84	549,418	60.61	NA	NA	NA	NA
Lighting	LED Specialty Lamp - Exterior - VA	Each	426	6.9	No	74,588	8.22	NA	NA	NA	NA	0.84	0.84	0.84	62,654	6.91	NA	NA	NA	NA
Lighting	LED Specialty Lamp - Interior	Each	102,113	10.0	No	4,004,925	611.51	NA	NA	-47,887	-87,983	0.84	0.84	0.84	3,364,137	513.67	NA	NA	-40,225	-73,906
Lighting	LED Specialty Lamp - Interior - VA	Each	8,129	10.0	No	272,997	41.21	NA	NA	-2,164	-6,054	0.84	0.84	0.84	229,318	34.62	NA	NA	-1,818	-5,086
Lighting	LED Omnidirectional Bulb - Exterior	Each	15,297	8.0	No	1,480,047	163.37	NA	NA	NA	NA	0.84	0.84	0.84	1,243,240	137.23	NA	NA	NA	NA
Lighting	LED Omnidirectional Bulb - Exterior - VA	Each	1,440	8.0	No	129,572	14.31	NA	NA	NA	NA	0.84	0.84	0.84	108,841	12.02	NA	NA	NA	NA
Lighting	LED Omnidirectional Bulb - Interior	Each	194,103	10.0	No	7,319,686	929.06	NA	NA	-104,198	-159,994	0.84	0.84	0.84	6,148,536	780.41	NA	NA	-87,526	-134,395
Lighting	LED Omnidirectional Bulb - Interior - VA	Each	14,524	10.0	No	468,526	58.75	NA	NA	-4,059	-10,374	0.84	0.84	0.84	393,562	49.35	NA	NA	-3,410	-8,714
<b>Total</b>			<b>346,476</b>	<b>9.6</b>		<b>15,276,021</b>	<b>2,041.96</b>	<b>NA</b>	<b>3,880</b>	<b>-158,309</b>	<b>-264,405</b>				<b>12,919,141</b>	<b>1,736.51</b>	<b>NA</b>	<b>4,035</b>	<b>-132,980</b>	<b>-222,101</b>

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 B-1 represents the kWh savings from Table 5-1 minus those shown in 5-4.

\*The total of the EUL column is the weighted average measure life (WAML) and is calculated as the sum product of EUL and measure savings divided by total program savings.

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

‡ The EUL for this measure varies over time. See Table 4-1 to Table 4-3.

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

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

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

Source: ComEd tracking data and evaluation team analysis.