



Ameren Illinois Company 2020 Residential Program Impact Evaluation Report

Final
April 26, 2021

Table of Contents

1. Executive Summary	1
1.1 Program Overview.....	1
1.2 Policy Background	2
1.3 Program Savings.....	2
2. Evaluation Approach	7
2.1 Research Objectives and Evaluation Activities.....	7
2.2 Verified Gross Impact Analysis Approach.....	8
2.3 Verified Net Impact Analysis Approach	8
2.4 Sources and Mitigation of Error.....	9
3. Initiative-Level Results.....	10
3.1 Retail Products Initiative	10
3.2 Income Qualified Initiative	23
3.3 Multifamily Initiatives	44
3.4 HVAC Initiative.....	60
3.5 Appliance Recycling Initiative	68
3.6 Direct Distribution Initiative	74
Appendix A. Impact Analysis Methodology.....	88
Retail Products Initiative	88
Income Qualified Initiative	102
Multifamily Initiatives	103
HVAC Initiative.....	104
Appliance Recycling Initiative.....	106
Direct Distribution Initiative	107
Appendix B. Cost-Effectiveness Inputs.....	109
Retail Products Initiative	110
Income Qualified Initiative	111
Multifamily Initiatives	112
HVAC Initiative.....	114
Appliance Recycling Initiative.....	115
Direct Distribution Initiative	115

Appendix C. Cumulative Persisting Annual Savings	117
Retail Products Initiative	119
Income Qualified Initiative	122
Multifamily Initiatives	124
HVAC Initiative.....	127
Appliance Recycling Initiative.....	128
Direct Distribution Initiative	129

Table of Tables

Table 1. 2020 Residential Program Electric Energy Annual Savings Summary.....	3
Table 2. 2020 Residential Program Electric Demand Annual Savings Summary.....	4
Table 3. 2020 Residential Program Gas Annual Savings Summary.....	5
Table 4. 2020 Residential Program CPAS and WAML.....	6
Table 5. 2020 Residential Program Impact Evaluation Activities.....	7
Table 6. 2020 Residential Program Verified Net Savings Summary for Non-Income-Qualified Initiatives	9
Table 7. 2020 Retail Products Initiative Participation Summary.....	11
Table 8. 2020 Retail Products Initiative Historical Non-Lighting Sales	12
Table 9. 2020 Retail Products Initiative Sales by Delivery Channel	13
Table 10. 2020 Retail Products Initiative Lighting Sales by Retail Channel	13
Table 11. 2020 Retail Products Initiative Income Qualified Allocations	14
Table 12. 2020 Retail Products Initiative Annual Savings	14
Table 13. 2020 Retail Products Initiative Electric Energy Savings by Measure.....	15
Table 14. 2020 Retail Products Initiative Electric Demand Savings by Measure.....	15
Table 15. 2020 Retail Products Initiative Gas Savings by Measure.....	16
Table 16. 2020 Retail Products Initiative CPAS and WAML.....	21
Table 17. 2020 Retail Products Gas Conversion CPAS and WAML.....	22
Table 18. 2020 Income Qualified Initiative Key Implementation Partners and Roles	24
Table 19. 2020 Single Family Core and CAA Channel Participation Summary.....	26
Table 20. 2020 SAVE Kit Participation Summary	27
Table 21. 2020 Additional Offerings Participation Summary.....	27
Table 22. 2020 BN Pilot Project Participation Summary.....	27
Table 23. 2020 Smart Savers Channel Participation Summary	27
Table 24: 2020 Income Qualified Initiative Measures	28
Table 25. 2020 Income Qualified Initiative Annual Savings	29
Table 26. 2020 Income Qualified Initiative Electric Energy Savings by Measure.....	30
Table 27. 2020 Income Qualified Initiative Electric Demand Savings by Measure.....	32
Table 28. 2020 Income Qualified Initiative Gas Savings by Measure	34
Table 29. 2020 Income Qualified Initiative CPAS and WAML by Channel.....	40
Table 30. 2020 Income Qualified Initiative – Single Family Channel CPAS and WAML.....	40

Table 31. 2020 Income Qualified Initiative – CAA Channel CPAS and WAML	42
Table 32. 2020 Income Qualified Initiative – Smart Savers Channel CPAS and WAML	42
Table 33. 2020 Income Qualified Initiative – Smart Savers Channel (Gas Conversion) CPAS and WAML.....	43
Table 34. Multifamily Initiatives Measure Offerings and Delivery Methods	46
Table 35. 2020 Multifamily Initiatives Participation Summary	48
Table 36. 2020 Multifamily Initiatives Quantity of Measures Delivered	48
Table 37. Multifamily Initiatives Frequency of Properties That Received Each Measure Type	49
Table 38. 2020 Public Housing Initiative Annual Savings.....	49
Table 39. 2020 Income Qualified – Multifamily Annual Savings.....	50
Table 40. 2020 Multifamily Initiative Annual Savings	50
Table 41. 2020 Multifamily Initiatives Electric Energy Savings by Measure.....	50
Table 42. 2020 Multifamily Initiatives Electric Demand Savings by Measure.....	52
Table 43. 2020 Multifamily Initiatives Gas Savings by Measure	53
Table 44. 2020 Multifamily Initiatives CPAS and WAML	56
Table 45. 2020 Public Housing Initiative CPAS and WAML.....	57
Table 46. 2020 Income Qualified – Multifamily CPAS and WAML.....	58
Table 47. 2020 Multifamily Initiative CPAS and WAML	59
Table 48. HVAC Initiative Measure and Incentive Summary	61
Table 49. 2020 HVAC Initiative Participation Summary	62
Table 50. 2020 HVAC Initiative Annual Savings.....	63
Table 51. 2020 HVAC Initiative Electric Energy Savings by Measure.....	63
Table 52. 2020 HVAC Initiative Electric Demand Savings by Measure	64
Table 53. 2020 HVAC Initiative Gas Savings by Measure	64
Table 54. 2020 HVAC Initiative CPAS and WAML	67
Table 55. 2020 Appliance Recycling Initiative Participation Summary	69
Table 56. 2020 Appliance Recycling Initiative Annual Savings.....	69
Table 57. 2020 Appliance Recycling Initiative Electric Energy Savings by Measure.....	70
Table 58. 2020 Appliance Recycling Initiative Electric Demand Savings by Measure	70
Table 59. 2020 Appliance Recycling Initiative CPAS and WAML	72
Table 60. Direct Distribution Initiative Channel Kit Contents.....	74
Table 61. Kits Distributed	75
Table 62. 2020 Direct Distribution Initiative Annual Savings	76
Table 63. 2020 Direct Distribution Initiative Electric Energy Savings by Measure and Channel	76

Table 64. 2020 Direct Distribution Initiative Electric Demand Savings by Measure.....	78
Table 65. 2020 Direct Distribution Initiative Gas Savings by Measure.....	79
Table 66. 2020 Direct Distribution Initiative CPAS and WAML.....	82
Table 67. 2020 School Kits Channel CPAS and WAML.....	83
Table 68. 2020 Appliance Recycling Kits Channel CPAS and WAML.....	84
Table 69. 2020 Community Kits Channel CPAS and WAML.....	85
Table 70. 2020 Smart Home Kits Channel CPAS and WAML.....	86
Table 71. Retail Products Initiative Measures Evaluated.....	88
Table 72. Baseline Wattages for Standard LEDs.....	89
Table 73. Baseline Wattages for Reflector LEDs.....	90
Table 74. Baseline Wattages for Specialty Non-Reflector LEDs.....	91
Table 75. Illinois Statewide TRM Version 8.0 LED Lighting ISR Trajectory.....	92
Table 76. Illinois Statewide TRM Version 8.0 Lighting HOU Assumptions.....	92
Table 77. Illinois Statewide TRM Version 8.0 Lighting Waste Heat Factor Assumptions.....	92
Table 78. Illinois Statewide TRM Version 8.0 Lighting Coincidence Factor Assumptions.....	92
Table 79. Electric Heating Consumption (kWh) by Climate Zone.....	94
Table 80. Full Load Cooling Hours by Climate Zone.....	94
Table 81. Gas Heating Consumption by Climate Zone.....	94
Table 82. Refrigerator Energy Usage Specifications.....	98
Table 83. IL-TRM V8.0 Recommended Effective Useful Life Assumptions.....	101
Table 84. SAG-Approved Retail Products Initiative NTGRs.....	101
Table 85. Income Qualified Initiative Measures Evaluated.....	102
Table 86. Multifamily Initiatives Measures Evaluated.....	103
Table 87. SAG-Approved Multifamily Initiatives NTGRs.....	104
Table 88. HVAC Initiative Measures Evaluated.....	105
Table 89. SAG-Approved HVAC Initiative NTGRs.....	105
Table 90. Appliance Recycling Initiative Measures Evaluated.....	106
Table 91. Appliance Recycling Initiative Energy Savings Calculation Coefficients.....	106
Table 92. SAG-Approved Appliance Recycling NTGRs.....	107
Table 93. Direct Distribution Initiative Measures Evaluated.....	108
Table 94. 2020 Retail Products Initiative Interactive Effects.....	110
Table 95. 2020 Retail Products Initiative Secondary Electric Savings.....	110
Table 96. 2020 Retail Products Verified Gross Impacts for Cost-Effectiveness.....	110

Table 97. 2020 Income Qualified Initiative Gas Penalties by Channel and End Use	111
Table 98. 2020 Income Qualified Initiative Secondary Electric Savings	111
Table 99. 2020 Income Qualified Initiative Verified Gross Impacts for Cost-Effectiveness.....	112
Table 100. 2020 Public Housing Initiative Gas Penalties	112
Table 101. 2020 Income Qualified – Multifamily Gas Penalties	113
Table 102. 2020 Multifamily Initiative Gas Penalties.....	113
Table 103. 2020 Public Housing Initiative Secondary Electric Savings	113
Table 104. 2020 Income Qualified – Multifamily Secondary Electric Savings	113
Table 105. 2020 Multifamily Initiative Secondary Electric Savings.....	113
Table 106. 2020 Public Housing Initiative Verified Gross Impacts for Cost-Effectiveness.....	114
Table 107. 2020 Income Qualified – Multifamily Verified Gross Impacts for Cost-Effectiveness.....	114
Table 108. 2020 Multifamily Initiative Verified Gross Impacts for Cost-Effectiveness	114
Table 109. 2020 HVAC Initiative Gas Penalties.....	114
Table 110. 2020 HVAC Initiative Verified Gross Impacts for Cost-Effectiveness.....	115
Table 111. 2020 Direct Distribution Initiative Gas Penalties.....	115
Table 112. 2020 Direct Distribution Initiative Secondary Electric Savings.....	115
Table 113. 2020 Direct Distribution Initiative Verified Gross Impacts for Cost-Effectiveness	116
Table 114. 2020 Residential Program CPAS and WAML	117
Table 115. 2020 Retail Products Initiative CPAS and WAML.....	119
Table 116. 2020 Retail Products Initiative Gas Conversion CPAS and WAML	121
Table 117. 2020 Retail Products Initiative Carryover CPAS and WAML.....	121
Table 118. 2020 Income Qualified Initiative CPAS and WAML.....	122
Table 119. 2020 Income Qualified Initiative Gas Conversion CPAS and WAML.....	123
Table 120. 2020 Public Housing Initiative CPAS and WAML	124
Table 121. 2020 Income Qualified – Multifamily CPAS and WAML	125
Table 122. 2020 Multifamily Initiative CPAS and WAML.....	126
Table 123. 2020 HVAC Initiative CPAS and WAML	127
Table 124. 2020 Appliance Recycling Initiative CPAS and WAML.....	128
Table 125. 2020 Direct Distribution Initiative CPAS and WAML.....	129
Table 126. 2020 Direct Distribution Initiative Carryover CPAS and WAML.....	130

Table of Figures

Figure 1. Retail Products Initiative Historical Lighting Sales (PY1-2020).....	12
--	----

Table of Equations

Equation 1. Lighting Energy and Demand Savings Equations.....	88
Equation 2. Baseline Wattage for PAR and MR Reflector LEDs	90
Equation 3. Advanced Power Strip Energy and Demand Savings Equations	93
Equation 4. Advanced Thermostat Energy and Demand Savings Equation	93
Equation 5. Clothes Washer Energy and Demand Savings Equations	96
Equation 6. Electric Clothes Dryer Energy and Demand Savings Equations.....	97
Equation 7. Refrigerator Energy and Demand Savings Equations.....	98
Equation 8. Freezer Energy and Demand Savings Equations	99
Equation 9. Variable Speed Pool Pump Energy and Demand Savings Equations	99

1. Executive Summary

This report presents impact evaluation results from Ameren Illinois Company's (AIC) 2020 Residential Program. The Residential Program is part of AIC's overall portfolio of residential and non-residential energy efficiency programs implemented during the 2020 calendar year. The overarching objective of the 2020 Residential Program impact evaluation is to determine the gross and net electric energy, electric demand, and natural gas impacts associated with the Program.

1.1 Program Overview

The Residential Program is made up of seven initiatives (some further broken down into channels), which the evaluation team assessed as part of the 2020 evaluation:

- Retail Products Initiative
- Income Qualified Initiative
 - Single Family
 - Community Action Agency (CAA)
 - Smart Savers
 - Multifamily
- Public Housing Initiative
- Multifamily Initiative¹
- Heating and Cooling (HVAC) Initiative
- Appliance Recycling Initiative
- Direct Distribution of Efficient Products (Direct Distribution) Initiative
 - School Kits
 - Appliance Recycling Kits (AR Kits)
 - Community Kits
 - Smart Home Kits

The initiatives are designed to achieve energy savings from residential customers in accordance with AIC's plan filing and to provide energy efficiency services and assistance to customers through a wide range of channels. The Retail Products Initiative, which provides point-of-sale (POS) and instant discounts to customers purchasing energy-efficient products, is the largest component of the Program from an electric energy and gas savings perspective. The Income Qualified Initiative, which provides whole-home retrofit services and energy efficiency measures through a range of channels, is the largest component of the Program from a spending perspective.

Additionally, AIC has continued to develop a one-stop-shop approach to serving multifamily customers. Based on this model, AIC and their implementation team work to recruit and channel customers into the appropriate

¹ Throughout this report, "Multifamily Initiative" refers to AIC's market-rate multifamily initiative, whereas the Multifamily channel of the Income Qualified Initiative is referred to as "Income Qualified – Multifamily."

initiative offering, which includes the Income Qualified, Public Housing, and Multifamily initiatives. Overall, the delivery models and measure offerings for these efforts are similar, with some variation between initiatives, so we have grouped these efforts for evaluation reporting purposes (see Section 3.3).

1.2 Policy Background

This is the third calendar year of AIC's four-year 2018 Plan, which was developed based on guidance provided through Illinois Senate Bill 2814 (the Future Energy Jobs Act [FEJA]). Based on this legislation, key concepts that affect program evaluation include:

- **Cumulative Persisting Annual Savings (CPAS):** Since 2018, electric energy savings goals for Illinois utilities have been primarily defined based on persisting savings as a percentage of sales. As such, annual evaluations of AIC's electric programs, including this one, present both annual and persisting savings over the life of delivered measures. As a result, AIC and its program implementer have also sought to deliver programs that achieve savings that persist for a longer period of time.
- **Applicable Annual Incremental Goal (AAIG):** AAIG is defined as the difference between the cumulative persisting electric savings goal for the year being evaluated and the cumulative persisting electric savings goal for the previous year. On a year-to-year basis, AIC must meet an AAIG. The utility must achieve sufficient savings through its programs to replace savings from measures at the end of their measure life before progress can be counted toward the AAIG.
- **Weighted Average Measure Life (WAML):** FEJA replaced the existing funding mechanism for electric energy efficiency in Illinois by allowing AIC to create a regulatory asset and amortize and recover the total expenditures of that regulatory asset "over a period that is equal to the weighted average of the measure lives implemented for that year that are reflected in the regulatory asset."² Therefore, we present WAML for AIC's electric Residential Program in this report in accordance with the guidelines for calculation presented in the Illinois Stakeholder Advisory Group's (SAG) WAML Report.³
- **Savings Conversion:** FEJA allows electric utilities to "convert" non-electric energy savings achieved to electric savings for the purposes of goal attainment in certain cases. The total amount of savings allowed to be converted is capped at a maximum of 10% of the utility's AAIG. AIC met the criteria to convert savings in 2020 and chose to convert savings from two subcomponents of the Residential Program the Retail Products Initiative and the Smart Savers channel of the Income Qualified Initiative.

1.3 Program Savings

In the following sections, the evaluation team presents annual savings (annualized 2020 energy savings) and CPAS. As discussed in greater detail in the forthcoming *2020 AIC Integrated Impact Evaluation Report*, AIC's performance compared to its AAIG is determined based on both types of savings.

1.3.1 Annual Savings

The 2020 Residential Program achieved 124,892 MWh, 19.82 MW, and 2,339,137 therms in verified net savings. These savings include a non-participant spillover (NPSO) "addition" on net savings.^{4,5} These savings are

² Illinois Energy Efficiency Stakeholder Advisory Group. *Weighted Average Measure Life Report*. 2018.

³ Ibid.

⁴ Opinion Dynamics. *Ameren Illinois Company Energy Efficiency Portfolio 2020 Net-to-Gross Ratios*. Accessed at: https://ilsag.s3.amazonaws.com/AIC_2020_NTGR_Recommendations_Summary_FINAL_2019-09-27.pdf.

⁵ The process of computing savings from the residential NPSO adder is complex. See Section 2.3.1 for more detail.

also reported after accounting for the FEJA-allowed “conversion” of natural gas savings to electric energy savings for the purpose of goal attainment. Table 1, Table 2, and Table 3 present ex ante gross, verified gross, and verified net electric energy, electric demand, and gas savings by initiative and channel for the 2020 Residential Program.

Table 1. 2020 Residential Program Electric Energy Annual Savings Summary

Initiative	Channel	Ex Ante Gross MWh	Gross Realization Rate	Verified Gross MWh	Net-to-Gross Ratio (NTGR)	Verified Net MWh
Retail Products	Retail Products	78,543	100%	78,572	0.774	60,846
	Retail Products Carryover ^a	16,929	100%	16,929	0.693	11,739
Income Qualified	Single Family	9,253	105%	9,760	1.000	9,760
	CAA	565	102%	574	1.000	574
	Smart Savers	5,826	102%	5,923	1.000	5,923
	Multifamily	1,224	95%	1,158	1.000	1,158
Public Housing	Public Housing	735	92%	680	1.000	680
Multifamily	Multifamily	398	89%	354	0.989	350
HVAC	HVAC	6,103	129%	7,867	0.748	5,884
Appliance Recycling	Appliance Recycling	3,517	101%	3,543	0.695	2,461
Direct Distribution	School Kits	2,075	94%	1,955	1.000	1,955
	School Kits Carryover ^a	274	100%	274	0.836	229
	AR Kits	98	100%	98	1.000	98
	AR Kits Carryover ^a	11	100%	11	1.000	11
	Community Kits	5,728	101%	5,762	1.000	5,762
	Smart Home Kits	140	121%	169	1.000	169
Residential Program Subtotal		131,417	102%	133,629	0.805	107,599
Residential NPSO Adder						1,788
Retail Products (gas conversion)						5,934
Smart Savers (gas conversion)						9,572
Residential Program Total						124,892

^a Carryover savings are those achieved through installation of measures during 2020 that were distributed or rebated in prior program years. For clarity, we break out carryover separately throughout this report.

Table 2. 2020 Residential Program Electric Demand Annual Savings Summary

Initiative	Channel	Ex Ante Gross MW	Gross Realization Rate	Verified Gross MW	NTGR	Verified Net MW
Retail Products	Retail Products	11.86	102%	12.06	0.803	9.68
	Retail Products Carryover	2.03	100%	2.03	0.693	1.41
Income Qualified	Single Family	1.82	95%	1.73	1.000	1.73
	CAA	0.16	102%	0.17	1.000	0.17
	Smart Savers	1.19	106%	1.26	1.000	1.26
	Multifamily	0.18	99%	0.17	1.000	0.17
Public Housing	Public Housing	0.11	115%	0.13	1.000	0.13
Multifamily	Multifamily	0.05	100%	0.05	0.986	0.05
HVAC	HVAC	4.12	112%	4.63	0.736	3.41
Appliance Recycling	Appliance Recycling	0.46	100%	0.46	0.684	0.31
Direct Distribution	School Kits	0.31	92%	0.28	1.000	0.28
	School Kits Carryover	0.03	100%	0.03	0.837	0.03
	AR Kits	0.01	101%	0.01	1.000	0.01
	AR Kits Carryover	0.00	100%	0.00	1.000	0.00
	Community Kits	0.78	99%	0.78	1.000	0.78
	Smart Home Kits	0.02	122%	0.02	1.000	0.02
<i>Residential Program Subtotal</i>		23.13	103%	23.82	0.816	19.44
Residential NPSO Adder						0.37
Residential Program Total						19.82

Table 3. 2020 Residential Program Gas Annual Savings Summary

Initiative	Channel	Ex Ante Gross Therms	Gross Realization Rate	Verified Gross Therms	NTGR	Verified Net Therms
Retail Products	Retail Products	1,503,202	97%	1,457,318	0.999	1,456,548
	Retail Products Carryover	0	N/A	0	N/A	0
Income Qualified	Single Family	594,194	115%	682,068	1.000	682,068
	CAA	45,361	100%	45,435	1.000	45,435
	Smart Savers	434,093	102%	440,873	1.000	440,873
	Multifamily	5,267	95%	4,996	1.000	4,996
Public Housing	Public Housing	8,232	100%	8,254	1.000	8,254
Multifamily	Multifamily	3,214	100%	3,214	1.000	3,214
HVAC	HVAC	71,996	104%	75,185	0.981	73,773
Appliance Recycling	Appliance Recycling	0	N/A	0	N/A	0
Direct Distribution	School Kits	66,574	90%	60,128	1.000	60,128
	School Kits Carryover	0	N/A	0	N/A	0
	AR Kits	4,059	101%	4,100	1.000	4,100
	AR Kits Carryover	0	N/A	0	N/A	0
	Community Kits	21,959	98%	21,486	1.000	21,486
	Smart Home Kits	0	N/A	0	N/A	0
<i>Residential Program Subtotal</i>		<i>2,758,150</i>	<i>102%</i>	<i>2,803,055</i>	<i>0.999</i>	<i>2,800,872</i>
Residential NPSO Adder						67,476
Retail Products (gas conversion)						-202,514
Smart Savers (gas conversion)						-326,697
Residential Program Total						2,339,137

1.3.2 Cumulative Persisting Annual Savings

Table 4 summarizes CPAS and WAML for the 2020 Residential Program at the channel level. For additional detail related to CPAS and measure life, please see the individual initiative chapters in Section 3, the overall CPAS spreadsheet provided with this report, and Appendix C, which presents CPAS for each year of program operation. The overall WAML for the 2020 Residential Program is 10.3 years.

Table 4. 2020 Residential Program CPAS and WAML

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Retail Products	9.7	78,572	0.774			60,846	60,846	...	15,185	...	506,858
Retail Products Carryover	9.7	16,929	0.693			11,739	11,739	...	0	...	84,386
Income Qualified - Single Family	11.3	9,760	1.000			9,760	9,760	...	2,177	...	101,524
Income Qualified - CAA	15.6	574	1.000			574	574	...	288	...	8,279
Smart Savers	11.0	5,923	1.000			5,923	5,923	...	5,923	...	65,150
Income Qualified - Multifamily	11.5	1,158	1.000			1,158	1,158	...	652	...	13,190
Public Housing	12.6	680	1.000			680	680	...	368	...	8,186
Multifamily	10.4	354	0.989			350	350	...	235	...	3,374
HVAC	17.0	7,867	0.748			5,884	5,884	...	3,147	...	67,050
Appliance Recycling	6.5	3,543	0.695			2,461	2,461	...	0	...	15,943
School Kits	8.7	1,955	1.000			1,955	1,955	...	107	...	15,978
School Kits Carryover	10.0	274	0.836			229	229	...	0	...	1,464
AR Kits	8.9	98	1.000			98	98	...	0	...	820
AR Kits Carryover	10.0	11	1.000			11	11	...	0	...	98
Community Kits	9.5	5,762	1.000			5,762	5,762	...	0	...	48,810
Smart Home Kits	8.9	169	1.000			169	169	...	0	...	1,365
Residential NPSO	10.3	2,372	0.754			1,788	1,788	...	555	...	14,837
Retail Products (gas conversion)	11.0	5,934	1.000			5,934	5,934	...	5,934	...	65,270
Smart Savers (gas conversion)	11.0	9,572	1.000			9,572	9,572	...	9,572	...	105,294
2020 CPAS		151,507	0.824			124,892	124,892	...	44,143	...	1,127,877
Expiring 2020 CPAS						0	0	...	31,873	...	
Expired 2020 CPAS						0	0	...	80,749	...	
WAML	10.3										

2. Evaluation Approach

The following section of the report describes the evaluation approach taken for the 2020 Residential Program impact evaluation. As part of the evaluation process, the evaluation team applied versions of the Illinois Energy Efficiency Policy Manual and the Illinois Technical Reference Manual (IL-TRM) applicable to the 2020 program year (generally Version 1.1⁶ and Version 8.0, respectively) wherever relevant.⁷ Appendix A of this report provides more-detailed initiative-specific methodology where appropriate.

2.1 Research Objectives and Evaluation Activities

The overarching research objectives for the impact evaluation of AIC's 2020 Residential Program are as follows:

- What were the estimated gross energy and demand impacts from the Program?
- What were the estimated net energy and demand impacts from the Program?

The evaluation team met these objectives by conducting the impact evaluation activities outlined in Table 5. As shown, for each initiative, the impact evaluation primarily consisted of applying savings algorithms from the IL-TRM V8.0 to final initiative tracking databases to estimate verified gross savings and applying SAG-approved net-to-gross ratios (NTGRs) to these verified gross savings to derive verified net savings. In addition, we reviewed initiative materials and interviewed all initiative managers.

Table 5. 2020 Residential Program Impact Evaluation Activities

Initiative	Gross Impacts		Net Impacts	
	IL-TRM Application Review	Engineering Desk Reviews	Consumption Analysis	Application of SAG-Approved NTGRs
Retail Products	✓			✓
Income Qualified	✓			✓
Public Housing	✓			✓
Multifamily	✓			✓
HVAC	✓			✓
Appliance Recycling	✓			✓
Direct Distribution	✓			✓

The following sections provide further detail on the approaches to estimating verified gross and net savings.

⁶ Broadly speaking, Version 1.1 of the Policy Manual was in effect during this evaluation. However, a number of individual policies from Version 2.0 of the Policy Manual were also in effect during this evaluation; those individual policies (e.g., Section 11.1) were applied in this evaluation as well.

⁷ In future years, the evaluation team will apply updated versions of these manuals to the evaluation of this Program as required by law, Illinois Commerce Commission orders, and changes to the manuals themselves.

2.2 Verified Gross Impact Analysis Approach

2.2.1 Application of IL-TRM V8.0

To determine verified gross impacts associated with the measures delivered through the Residential Program, we reviewed the content of the initiative tracking databases to identify database errors and duplicate records, and to ensure that the implementer correctly applied savings algorithms and assumptions stated in the IL-TRM V8.0 and the IL-TRM V8.0 errata document. In particular, we applied the algorithms and assumptions provided in the IL-TRM V8.0, while using project-specific data from the initiative tracking databases as inputs where appropriate. As part of this process, we also verified measure installations through analysis of initiative tracking databases, as well as through a review of supporting project documentation.

We resolved any discrepancies found in the databases and provide details related to any gross savings adjustments in the initiative-specific sections of this report.

In accordance with Illinois policy, the evaluation team omitted gas penalties from savings reported in the body of this report. Appendix B presents detail on gas penalties for use in cost-effectiveness analysis.

2.2.2 Carryover Savings

In addition to savings achieved by AIC's Residential Program through measures delivered during the 2020 program year, AIC also claims savings in 2020 from lighting measures distributed by the Residential Program in prior years but not installed until 2020. The relevant initiatives include:

- 2018 and 2019 Retail Products Initiatives
- 2018 and 2019 Direct Distribution of Efficient Products – School Kits Initiative
- 2019 Direct Distribution of Efficient Products – Appliance Recycling Kits Initiative

Carryover savings are evaluated using the applicable NTGR from the year in which the product was sold, the applicable in-service rate (ISR) trajectory assumption based on the year in which the product was sold, and IL-TRM V8.0 and IL-TRM V8.0 errata assumptions for all other relevant impact parameters.

We reported previously on AIC's 2020 carryover savings as part of an earlier memo.⁸ Carryover savings are not reported as part of individual initiative subsections in Section 3.

2.3 Verified Net Impact Analysis Approach

To determine verified net savings for the 2020 Residential Program, we primarily applied SAG-approved NTGRs to verified gross savings. The only exception to this approach is for advanced thermostats. The evaluation team did not apply a NTGR to savings achieved by advanced thermostats; by SAG agreement, savings achieved by these measures in the 2020 program year are considered to be net and, therefore, not subject to adjustment with an NTGR.

⁸ Opinion Dynamics. "Ameren Illinois Company Lighting Carryover Savings Claimable in 2020." 2021. Accessed at: <https://ilsag.s3.amazonaws.com/AIC-2020-Lighting-Carryover-Savings-Memo-FINAL-2021-02-20.pdf>.

2.3.1 Non-Participant Spillover

Net impact evaluation of AIC's Residential Program includes a NPSO adder on net savings for non-income qualified (IQ) efforts.⁹ This adder is 3.1% for non-IQ electric savings (energy and demand) and 4.4% for non-IQ gas savings. Table 6 summarizes verified, non-IQ net savings for AIC's Residential Program by initiative and computes the NPSO adder as defined above.

Table 6. 2020 Residential Program Verified Net Savings Summary for Non-Income-Qualified Initiatives

Channel	Verified Net MWh	Verified Net MW	Verified Net Therms
Retail Products (non-IQ)	41,065	7.33	1,456,548
Retail Products Carryover (non-IQ)	7,909	0.95	0
HVAC	5,884	3.41	73,773
Appliance Recycling	2,461	0.31	0
Multifamily	350	0.05	3,214
<i>Non-Income Qualified Residential Program Subtotal</i>	<i>57,669</i>	<i>12.05</i>	<i>1,533,534</i>
Residential NPSO Adder	1,788	0.37	67,476

2.4 Sources and Mitigation of Error

The evaluation team took steps to mitigate potential sources of error throughout the planning and implementation of the 2020 evaluation. In particular, we took the following action to address potential sources of non-survey-related error.¹⁰

- **Analysis Error:** For prescriptive gross impact calculations, we applied IL-TRM V8.0 calculations to the participant data in the tracking database to calculate gross impacts. To minimize data analysis error, a separate team member reviewed all calculations to verify their accuracy. For net impact calculations, we applied SAG-approved NTGRs to estimated gross impacts to derive net impacts where appropriate. To minimize analytical errors, all calculations were reviewed by a separate team member to verify their accuracy.

Please also note that the calculations in some of the tables in this report cannot be exactly reproduced due to rounding.

⁹ Opinion Dynamics. *Ameren Illinois Company Energy Efficiency Portfolio 2020 Net-to-Gross Ratios*. 2019. Accessed at: https://ilsag.s3.amazonaws.com/AIC_2020_NTGR_Recommendations_Summary_FINAL_2019-09-27.pdf.

¹⁰ There is no sampling error or measurement error associated with any Residential Program evaluation activity because we did not conduct any sampling-based evaluation activities for the 2020 impact evaluation.

3. Initiative-Level Results

3.1 Retail Products Initiative

3.1.1 Initiative Description

The AIC Retail Products Initiative partners with retailers and manufacturers to offer discounts on a wide range of qualifying ENERGY STAR® products, which in 2020 included:

- LED lighting, including a variety of bulb shapes and fixtures
- Consumer electronics, including advanced thermostats and Tier 1 advanced power strips (APS)
- Appliances, including dehumidifiers, air purifiers, clothes washers, clothes dryers, refrigerators, freezers, and water dispensers
- Miscellaneous other equipment, including variable-speed pool pumps and bathroom vent fans

CLEAResult implements the Initiative, facilitating several delivery channels, including in-store point-of-sale (POS) discounts, an Online Marketplace, downstream rebates (application-based post-purchase rebates), and instant rebates. The Initiative also began working with Greenlite to offer advanced thermostat rebates through an application-based process and ran a “Blitz” campaign in partnership with Google which offered stacked incentives for part of the year. Discounts provided through the Initiative are designed to motivate customers to purchase the more expensive energy-efficient versions of these products rather than cheaper, less-efficient alternatives. As the offering continues in future years, AIC will consider incorporating additional products into the offering.

Summary of Key Implementation Changes in 2020

For the 2020 program year, the Retail Products Initiative adapted its measure offerings and incentives as follows:

- Incorporated downstream rebates for dehumidifiers, air purifiers, water dispensers, and bathroom vent fans
- Reincorporated variable-speed pool pumps, last offered in early 2019
- Began offering advanced thermostats via Greenlite
- Operated a Google-partnered “Blitz” campaign to offer additional incentives for a portion of the year

3.1.2 Participation Summary

LED lighting remained the primary end use for the Retail Products Initiative in 2020, accounting for 93% of all units sold through the Initiative. Standard LEDs played a less dominant role than in prior years, accounting for 24% of all products sold in 2020, down from 63% in 2019. In an effort to provide standard LEDs primarily to lower-income customers less likely to adopt them on their own, the Initiative only sold standard bulbs at select retailers, while specialty bulbs continued to sell in large numbers at a wider variety of retailers. The Retail Products Initiative also introduced LED fixtures in 2020, through the Online Marketplace and in brick-and-mortar Dollar Store locations to improve reach to IQ customers. The program also sold more than 66,000 Tier 1 APS and 33,000 advanced thermostats, which accounted for more than 99% of non-lighting sales. The

remaining measures collectively accounted for 1% of sales. Table 7 presents Retail Products Initiative participation during 2020.

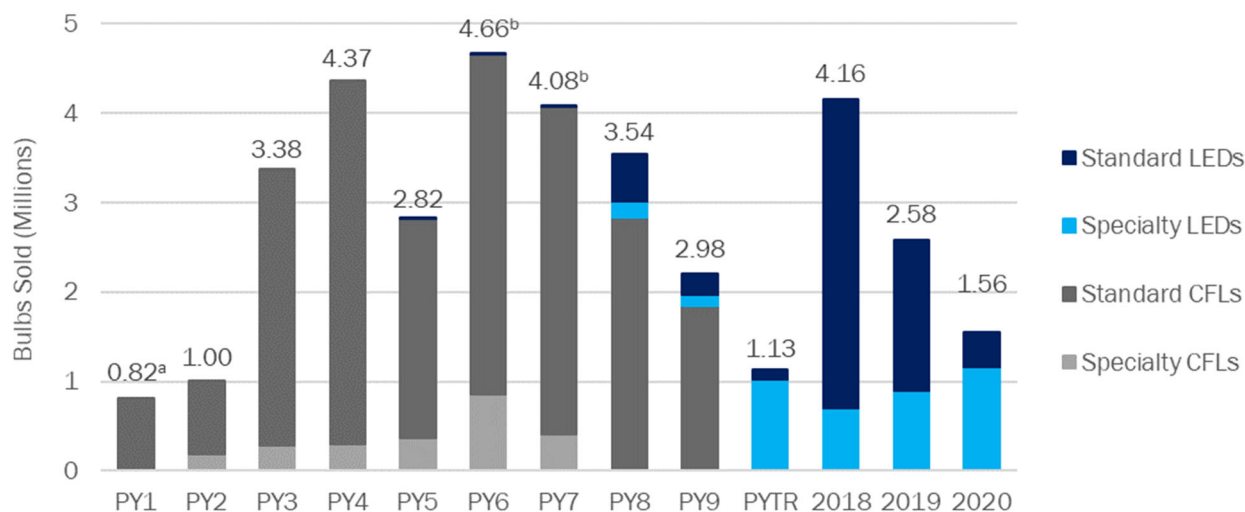
Table 7. 2020 Retail Products Initiative Participation Summary

Measure Type	Bulb Shape	Sales Quantity	Share of Sales
Standard LEDs	A-line	396,369	24%
Specialty LEDs (Reflector)	BR/R	385,523	23%
	PAR/MR	66,958	4%
Specialty LEDs (Other)	Decorative	561,528	34%
	Globe	95,154	6%
	3-way	26,591	2%
LED Fixtures	N/A	25,513	2%
APS	N/A	66,438	4%
Advanced Thermostats	N/A	33,073	2%
Dehumidifiers	N/A	5,768	<1%
Air Purifiers	N/A	1,237	<1%
Clothes Washers	N/A	2,587	<1%
Electric Clothes Dryers	N/A	1,357	<1%
Refrigerators	N/A	1,388	<1%
Freezers	N/A	83	<1%
Variable-Speed Pool Pumps	N/A	59	<1%
Water Dispensers	N/A	611	<1%
Bathroom Vent Fans	N/A	1,675	<1%
Total	N/A	1,671,912	100%

Historic Product Sales

The Retail Products Initiative discounted 1,557,636 LED bulbs and fixtures during 2020, adding to more than a decade of AIC-driven efficient lighting sales. While the Initiative discounted roughly 40% fewer bulbs in 2020 than in 2019, it sold nearly 30% more specialty LED products, amounting to more than 1.1 million specialty LED bulbs. Since 2009, AIC has offered discounts on 36.3 million energy-efficient lighting products. Figure 1 shows efficient lighting sales from PY1 through 2020.

Figure 1. Retail Products Initiative Historical Lighting Sales (PY1-2020)



^a We do not have a record of the number of CFLs sold by shape for PY1.

^b LEDs were sold, but the quantity is too small for the bar to be clearly visible.

The Retail Products Initiative featured 11 non-lighting measures in 2020, with APS and advanced thermostats accounting for more than 99% of those sales. In addition to reintroducing variable-speed pool pumps and incorporating four new measures in 2020, the Initiative managed to sell more than twice as many advanced thermostats and 20% more APS than the year prior. These non-lighting measure-mix trends are outlined in Table 8.

Table 8. 2020 Retail Products Initiative Historical Non-Lighting Sales

Measure Type	Transition Period	2018	2019	2020
APS	0	25,803	55,275	66,438
Advanced Thermostats	1,916	14,403	16,044	33,073
Variable-Speed Pool Pumps	0	206	8	59
Clothes Washers	0	0	177	2,587
Electric Clothes Dryers	0	0	79	1,357
Refrigerators	0	0	82	1,388
Freezers	0	0	6	83
Dehumidifiers	0	0	0	5,768
Air Purifiers	0	0	0	1,237
Vent Fans	0	0	0	1,675
Water Dispensers	0	0	0	611
Total	1,916	40,412	71,671	114,276

Sales by Delivery Channel

Nearly all LEDs (more than 99%) and the vast majority of APS (97%) were discounted at the POS at participating retailers, while the remainder were sold through the Online Marketplace. Program staff engaged two new partners in 2020 to support distribution of advanced thermostats: the Initiative began working with Greenlite

to offer advanced thermostat rebates through an application-based process and coordinated with Google to offer stacked incentives whereby the Retail Products Initiative boosted advanced thermostat incentives from \$100 to \$125 in concert with promotions and special discounts from manufacturers and other program partners during August and September of 2020. Table 9 provides a breakdown of 2020 Retail Products Initiative sales of each measure by delivery channel.

Table 9. 2020 Retail Products Initiative Sales by Delivery Channel

Measure Type	POS	Downstream Rebate	Instant Rebate	Greenlite	Online Store	Google Blitz
LED Lighting	1,551,484	0	0	0	6,152	0
APS	64,759	0	0	0	1,679	0
Advanced Thermostat	0	10,274	822	546	9,701	11,730
Dehumidifier	5,741	1	0	0	26	0
Air Purifier	1,014	0	0	0	223	0
Clothes Washer	0	2,587	0	0	0	0
Electric Clothes Dryer	0	1,357	0	0	0	0
Refrigerator	0	1,388	0	0	0	0
Freezer	0	83	0	0	0	0
Variable-Speed Pool Pump	0	59	0	0	0	0
Water Dispenser	611	0	0	0	0	0
Vent Fan	1,664	0	0	0	11	0
Total	1,625,273	15,749	822	546	17,792	11,730

Lighting Retail Channel Coverage

Throughout 2020, AIC offered discounted LED products across 64 retailers at 528 storefronts. Despite selling almost no standard LEDs, Big Box, DIY, and Warehouse retailers accounted for nearly two-thirds (64%) of all LED sales. Table 10 provides a breakdown of lighting sales and total store locations by retail channel.

Table 10. 2020 Retail Products Initiative Lighting Sales by Retail Channel

Retail Channel	Store Locations	Sales Quantity	Share of Sales
Big Box	83	478,470	31%
DIY	65	387,073	25%
Thrift	52	283,439	18%
Warehouse	12	126,744	8%
Hardware	88	107,338	7%
Dollar	141	98,936	6%
Other	23	37,935	2%
Grocery	57	30,011	2%
Pharmacy	29	1,538	0%
Online	1	6,152	0%
Total	528	1,557,636	100%

Income Qualified Purchases

Table 11 summarizes sales volumes for each measure type provided in the initiative tracking data and included in this analysis, along with the distribution of IQ sales for each measure. Although these allocations do not directly affect 2020 impacts for most measures,¹¹ they will inform NTGR assignment for virtually all measures beginning in 2021.

Table 11. 2020 Retail Products Initiative Income Qualified Allocations

Measure Category	IQ Allocation	Total Sales Quantity	IQ Sales Quantity	Non-IQ Sales Quantity
Standard LED	32%	396,369	128,804	267,565
Reflector LED	38%	452,481	171,469	281,012
Specialty LED	38%	683,273	256,669	426,604
LED Fixtures	87%	25,513	22,116	3,397
APS	97%	66,438	64,759	1,679
Advanced Thermostat	15%	33,073	5,026	28,047
Dehumidifier	33%	5,768	1,888	3,880
Air Purifier	26%	1,237	327	910
Clothes Washer	25%	2,587	652	1,935
Electric Clothes Dryer	24%	1,357	320	1,037
Refrigerator	25%	1,388	353	1,035
Freezer	11%	83	9	74
Variable-Speed Pool Pump	27%	59	16	43
Water Dispenser	32%	611	198	413
Bathroom Vent Fan	33%	1,675	551	1,124
Total	39%	1,671,912	653,157	1,018,755

3.1.3 Initiative Annual Savings Summary

Table 12 presents Retail Products Initiative annual savings achieved in 2020. The 2020 Retail Products Initiative achieved 60,846 MWh, 9.68 MW, and 1,456,548 therms in verified net savings.

Table 12. 2020 Retail Products Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	78,543	11.86	1,503,202
Gross Realization Rate	100%	102%	97%
Verified Gross Savings	78,572	12.06	1,457,318
NTGR	0.774	0.803	0.999
Verified Net Savings	60,846	9.68	1,456,548

3.1.4 Initiative Savings Detail

The Retail Products Initiative achieved 78,572 MWh in verified gross energy savings and 60,846 MWh in verified net energy savings, as shown in Table 13. Lighting products accounted for the vast majority of energy

¹¹ In 2020, CPAS for LED lighting and NTGRs for APS and LED fixtures were dependent on income qualified allocations.

savings (71% of gross and 64% of net). Advanced thermostats and power strips each made up between 9% and 17% of gross and net energy savings. Total ex ante electric energy savings included as part of the Initiative's tracking data were very closely aligned with verified gross estimates, resulting in an overall gross realization rate of 100%. It appeared that implementer staff continued to apply conservative ex ante savings estimates for appliances newly introduced in late 2019 and 2020 (clothes washers, clothes dryers, refrigerators, and freezers), resulting in realization rates ranging from 140% to 178%.

Table 13. 2020 Retail Products Initiative Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Standard LED	10,717	100%	10,707	0.690	7,388
Reflector LED	21,609	101%	21,797	0.690	15,040
Specialty LED	22,253	101%	22,554	0.690	15,562
LED Fixture	1,411	91%	1,280	0.955	1,222
APS	6,843	100%	6,843	0.996	6,819
Advanced Thermostat	14,007	96%	13,501	N/A	13,501
Dehumidifier	626	100%	626	0.670	419
Air Purifier	501	86%	429	0.790	339
Clothes Washer	167	178%	298	0.630	188
Electric Clothes Dryer	146	149%	218	0.670	146
Refrigerator	53	153%	81	0.650	52
Freezer	3	140%	4	0.630	2
Variable-Speed Pool Pump	87	132%	115	0.760	88
Water Dispenser	72	100%	72	0.670	48
Bathroom Vent Fan	48	102%	49	0.660	32
Total	78,543	100%	78,572	0.774	60,846

The Retail Products Initiative achieved 12.06 MW in verified gross peak demand savings and 9.68 MW in verified net demand savings, as shown in Table 14. As with energy savings, lighting products accounted for the vast majority of demand savings (62% of gross and 54% of net). Advanced thermostats amounted to another 29% of gross and 36% of net demand savings. Ex ante demand savings included as part of the Initiative's tracking data nearly matched verified gross estimates for first-year lighting, APS, advanced thermostats, dehumidifiers, and water dispensers. As mentioned above, it appeared that implementer staff continued to apply conservative ex ante savings estimates for appliances newly introduced in late 2019 and 2020 (clothes washers, clothes dryers, refrigerators, and freezers), resulting in realization rates ranging from 140% to 178%.

Table 14. 2020 Retail Products Initiative Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Standard LED	1.40	100%	1.40	0.690	0.97
Reflector LED	2.89	100%	2.89	0.690	2.00
Specialty LED	2.95	101%	2.99	0.690	2.07
LED Fixture	0.20	103%	0.21	0.955	0.20
APS	0.77	100%	0.77	0.996	0.77

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Advanced Thermostat	3.33	103%	3.44	N/A	3.44
Dehumidifier	0.14	100%	0.14	0.670	0.10
Air Purifier	0.06	86%	0.05	0.790	0.04
Clothes Washer	0.02	178%	0.04	0.630	0.02
Electric Clothes Dryer	0.02	149%	0.03	0.670	0.02
Refrigerator	0.01	153%	0.01	0.650	0.01
Freezer	0.00	140%	0.00	0.630	0.00
Variable-Speed Pool Pump	0.06	131%	0.08	0.760	0.06
Water Dispenser	0.01	106%	0.01	0.670	0.01
Bathroom Vent Fan	0.01	117%	0.01	0.660	0.00
Total	11.86	102%	12.06	0.803	9.68

The Retail Products Initiative achieved 1,457,318 therms in verified gross gas savings and 1,456,548 therms in verified net gas savings, as shown in Table 15. Advanced thermostats amounted to virtually 100% of gas savings, while the remaining fraction of a percent was attributable to clothes washers. Ex ante energy savings included as part of the Initiative's tracking data slightly overestimated gas savings, resulting in an overall gross realization rate of 97%.

Table 15. 2020 Retail Products Initiative Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Advanced Thermostat	1,496,384	97%	1,455,237	N/A	1,455,237
Clothes Washer	6,819	31%	2,080	0.630	1,310
Total	1,503,202	97%	1,457,318	0.999	1,456,548

We compared ex ante and verified savings for each measure and found the following explanations for differences between ex ante and verified savings (i.e., explanations for gross realization rates not equal to 100%):

- **Standard LEDs:** The gross realization rate for standard LEDs sold during 2020 was 100% for electric energy savings and 100% for electric demand savings.
 - Verified gross energy savings do not exactly match ex ante energy savings in any cases but do fall within 10% of ex ante energy savings in 99% of cases.
 - The evaluation team compared detailed savings documentation provided by program staff to values used to develop verified savings and found that, while all relevant savings parameters are specified in the documentation, they did not enable the evaluation team to fully replicate ex ante savings shown in the tracking data. As a result, the source of discrepancies between ex ante and verified savings remains unclear. Based on available documentation, the most likely explanations include differences in how baseline wattages are assigned.
- **Specialty LEDs:** The gross realization rate for reflector and other specialty LEDs sold during 2020 was 101% for electric energy and demand savings. Although gross realization rates vary slightly for reflector and other specialty bulb shapes, the underlying details and key takeaways are nearly identical.

- Verified gross energy savings do not exactly match ex ante energy savings in any cases but do fall within 10% of ex ante energy savings in 87% of cases.
- The evaluation team compared detailed savings documentation provided by program staff to values used to develop verified savings and found that, while all savings parameters except for coincidence factors (CFs) are specified in the documentation, they did not enable the evaluation team to fully replicate ex ante savings shown in the tracking data. As a result, the source of discrepancies between ex ante and verified savings remains unclear for 13% of cases. Based on available documentation, the most likely explanations include differences in how baseline wattages are assigned.
- **LED Fixtures:** The gross realization rate for LED fixtures sold during 2020 was 91% for electric energy savings and 103% for electric demand savings.
 - Verified gross energy savings fall within 10% of ex ante energy savings in 96% of cases.
 - The evaluation team compared detailed savings documentation provided by program staff to values used to develop verified savings and found that, while all savings parameters with the exception of CFs are specified in the documentation, they did not enable the evaluation team to fully replicate ex ante savings shown in the tracking data. As a result, the source of discrepancies between ex ante and verified savings remains unclear for 4% of cases. Based on available documentation, the most likely explanations include differences in how baseline wattages are assigned.
- **Advanced Power Strips:** The gross realization rate for APS was 100% for energy and demand savings, and ex ante and verified per-unit electric savings matched perfectly in all cases.
- **Advanced Thermostats:** The gross realization rate for advanced thermostats was 96% for electric energy savings, 103% for electric demand savings, and 97% for gas savings.
 - Ex ante and verified gross estimates match in just 7% of cases for energy savings and 6% of cases for demand savings, with the majority of differences attributable to the use of single-family assumptions for ex ante calculations, which produce slightly higher savings than the “unknown” assumptions used for verified estimates. This difference explains the misaligned savings for 85% of cases. In another 7% of cases, ex ante savings reflect just one of multiple valid sources (e.g., only furnace fan savings are claimed), and in 2% of cases, ex ante savings include electric savings for gas-only accounts (whereas verified electric savings are set to zero for these customers). These differences collectively explain 94% of differences between ex ante and verified electric savings.
 - For gas savings, ex ante and verified savings match in 18% of cases, and 95% of discrepancies are explained by the use of single-family assumptions for ex ante calculations and “unknown” assumptions for verified savings.
 - The small number of remaining differences between ex ante and verified savings are mostly attributable to differences in how repeat participants were identified for exclusion from claimed savings.
- **Dehumidifiers:** The gross realization rate for dehumidifiers is close to 100% for both electric energy and demand savings.
 - Ex ante savings reflect manufacturer-specific deemed values, resulting in per-unit savings from 68.24 to 114.40 kWh and 0.0155 to 0.0260 kW.

- The evaluation team used product-specific information provided in tracking data to inform assumptions specified in the IL-TRM V8.0, producing estimates ranging from 67.01 to 121.83 kWh and from 0.0152 to 0.0276 kW.
- Verified and ex ante energy savings matched for 81% of 50-pint units, which account for 17% of all dehumidifier sales. The evaluation team compared detailed savings documentation provided by program staff to values used to develop verified savings and was able to confirm alignment of all stated parameters except for efficient unit liters/kWh, which was not included in program documentation. As a result, we were unable to identify the exact source of differences between verified and ex ante savings. Appendix A provides greater detail on how the evaluation team applied IL-TRM V8.0 recommendations to calculate verified savings for dehumidifiers.
- **Air Purifiers:** The gross realization rate for air purifiers was 86% for both electric energy and demand savings.
 - Ex ante and verified gross savings match for 64% of cases. The remaining 36% of cases can likely be explained by differences in Clean Air Delivery Rate (CADR) assumptions for individual products between the evaluation team and those made for ex ante calculations.
 - If available, the inclusion of CADR in future tracking data would allow evaluators to produce more-accurate, product-specific verified savings.
- **Clothes washers:** The gross realization rate for clothes washers was 178% for both electric energy and demand savings and 31% for gas savings.
 - Ex ante and verified gross savings do not match in any cases for energy or demand savings. For gas savings, ex ante and verified gross savings match in 10% of cases where both verified and ex ante gas savings were equal to zero.
 - Ex ante savings appear to reflect deemed average values provided by the IL-TRM V8.0 for ENERGY STAR and Consortium for Energy Efficiency (CEE) Tier 2 clothes washers multiplied by a NTGR of 0.62. As a result, ex ante savings amount to 45.76 kWh, 0.0066 kW, and 0.806 therms for 72% of cases identified as ENERGY STAR and 60.64 kWh, 0.0087 kW, and 2.604 therms for the remaining 18% based on CEE Tier 2 values.
 - Verified gross savings are calculated using product-specific capacities recorded in the tracking data, along with IL-TRM V8.0 assumptions given for ENERGY STAR products, resulting in values ranging from 34.45 to 209.73 kWh, 0.0044 to 0.0270 kW, and 0 to 1.43 therms. Appendix A provides greater detail on how the evaluation team applied IL-TRM V8.0 recommendations to calculate verified savings for clothes washers.
- **Electric clothes dryers:** The gross realization rate for clothes dryers was 149% for both electric energy and demand savings.
 - Ex ante and verified gross savings do not match in any cases for electric energy or for demand savings. In 98% of cases, ex ante values are equivalent to or within 1% of verified net savings (i.e., gross savings multiplied by the SAG-approved NTGR of 0.670). In these 98% of cases, ex ante per-unit savings are 107.49 kWh and 0.014 kW. The other 2% of cases show substantially higher ex ante savings, ranging from 142.57 to 207.06 kWh and 0.019 to 0.027 kW.
 - The evaluation team calculated verified per-unit electric gross savings using IL-TRM V8.0 for standard-sized units, amounting to savings of 160.44 kWh and 0.0215 kW. Appendix A provides greater detail on how the evaluation team applied IL-TRM V8.0 recommendations to calculate verified savings for electric clothes dryers.

- **Refrigerators:** The gross realization rate for refrigerators was 153% for both electric energy and demand savings.
 - Ex ante gross savings and verified gross savings did not match in any cases for electric energy or demand savings. Ex ante per-unit energy savings ranged from 12.35 kWh to 91.65 kWh and ex ante demand savings ranged from 0.0018 kW to 0.0138 kW.
 - The evaluation team used product-specific volumes and refrigerator types from tracking data (and from manual look-ups when tracking data were unavailable) to inform assumptions specified in the IL-TRM V8.0, producing estimates ranging from 27.63 to 71.83 kWh and from 0.0042 to 0.0108 kW. Appendix A provides greater detail on how the evaluation team applied IL-TRM V8.0 recommendations to calculate verified savings for refrigerators.
- **Freezers:** The gross realization rate for freezers was 140% for both electric energy and demand savings.
 - Ex ante gross savings and verified gross savings did not match in any cases, either for energy or for demand savings. Ex ante savings have per-unit savings ranging from 15.08 to 85.48 kWh and 0.0024 to 0.014 kW.
 - The evaluation team used product-specific volumes and freezer types provided in tracking data to inform assumptions as specified by the IL-TRM V8.0, producing estimates ranging from 43.33 to 54.04 kWh and from 0.0070 to 0.0088 kW. Appendix A provides greater detail on how the evaluation team applied IL-TRM V8.0 recommendations to calculate verified savings for freezers.
- **Variable-Speed Pool Pumps:** The gross realization rate for variable-speed pool pumps was 132% for electric energy savings and 131% for electric demand savings.
 - In 95% of cases, ex ante savings values are equivalent to or within 2% of verified net savings (i.e., gross savings multiplied by the SAG-approved NTGR of 0.760). In these 95% of cases, ex ante per-unit savings are 1,483.5 kWh and 0.9743 kW. In the remaining 5% of cases, ex ante savings appear to reflect deemed per-unit values provided by the IL-TRM multiplied by 0.800.
 - The evaluation team used deemed per-unit gross savings of 1,952 kWh and 1.282 kW specified by the IL-TRM V8.0 for in-ground pool pumps. The detailed savings documentation provided by program staff shows per-unit savings values that align with verified savings. As a result, the exact source of differences between verified and ex ante savings remains unclear for the cases not explained by application of a NTGR.
- **Water Dispensers:** The gross realization rate for water dispensers was 100% for electric energy savings and 106% for electric demand savings.
 - Ex ante and verified per-unit electric savings match for 91% of cases for both energy and demand savings. The remaining 9% of cases were all “Glacier Bay Top Load HC&R SS Dispensers” products where the ex ante demand savings were zero.
- **Bathroom Vent Fans:** The gross realization rate for bathroom vent fans was 102% for electric energy savings and 117% for electric demand savings.
 - Ex ante savings and verified gross savings match for just 5% of cases for both energy and demand savings. Ex ante savings have per-unit savings ranging from 12.5 to 44.8 kWh and per-unit demand savings ranging from 0.0015 to 0.0051 kW.
 - The evaluation team used product-specific information provided in tracking data to inform assumptions as specified by the IL-TRM V8.0, producing estimates ranging from 20.27 to 43.43

kWh and from 0.0044 to 0.0054 kW. Appendix A provides greater detail on how the evaluation team applied IL-TRM V8.0 recommendations to calculate verified savings for bathroom vent fans.

3.1.5 Cumulative Persisting Annual Savings

Table 16 presents CPAS and WAML for the 2020 Retail Products Initiative. The measure-specific and total verified gross savings for the Initiative are summarized, and CPAS in each year of the 2018–2021 Plan are presented.¹² The WAML for the Initiative is 9.6 years.

In 2020, AIC converted some natural gas savings produced by Retail Products Initiative advanced thermostats received by IQ customers to CPAS for the purposes of goal attainment; those savings are presented separately in Table 17.

Table 16. 2020 Retail Products Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Standard LED - Res. Non-IQ	10.0	6,520	0.690			4,499	4,499	...	0	...	28,793
Standard LED - Res. IQ	10.0	3,147	0.690			2,171	2,171	...	0	...	18,913
Standard LED - Comm.	5.5	1,039	0.690			717	717	...	0	...	3,299
Reflector LED - Res. Non-IQ	10.0	11,751	0.690			8,108	8,108	...	0	...	58,702
Reflector LED - Res. IQ	10.0	7,134	0.690			4,923	4,923	...	0	...	44,353
Reflector LED - Comm.	6.9	2,912	0.690			2,010	2,010	...	0	...	11,185
Specialty LED - Res. Non-IQ	10.0	12,289	0.690			8,480	8,480	...	0	...	62,411
Specialty LED - Res. IQ	10.0	7,251	0.690			5,003	5,003	...	0	...	42,976
Specialty LED - Comm.	4.7	3,013	0.690			2,079	2,079	...	0	...	9,132
LED Fixture - Res. Non-IQ	15.0	135	0.690			93	93	...	50	...	929
LED Fixture - Res. IQ	15.0	34	0.690			23	23	...	16	...	288
LED Fixture - Comm.	14.8	17	0.690			12	12	...	12	...	171
LED Fixture - Dollar Store - Res. IQ	15.0	991	1.000			991	991	...	664	...	12,249
LED Fixture - Dollar Store - Comm.	14.8	103	1.000			103	103	...	103	...	1,521
Tier 1 APS	7.0	173	0.860			149	149	...	0	...	1,041
Tier 1 APS - Dollar Store	7.0	6,670	1.000			6,670	6,670	...	0	...	46,691
Advanced Thermostat	11.0	13,501	N/A			13,501	13,501	...	13,501	...	148,512
Dehumidifier	12.0	626	0.670			419	419	...	419	...	5,033

¹² For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Air Purifier	9.0	429	0.790			339	339	...	0	...	3,049
Clothes Washer	14.0	298	0.630			188	188	...	188	...	2,628
Electric Clothes Dryer	16.0	218	0.670			146	146	...	146	...	2,334
Refrigerator	17.0	81	0.650			52	52	...	52	...	892
Freezer	22.0	4	0.630			2	2	...	2	...	49
Pool Pump	7.0	115	0.760			88	88	...	0	...	613
Water Dispenser	10.0	72	0.670			48	48	...	0	...	482
Vent Fan	19.0	49	0.660			32	32	...	32	...	612
2020 CPAS		78,572	0.774			60,846	60,846	...	15,185	...	506,858
Expiring 2020 CPAS						0	0	...	18,162	...	
Expired 2020 CPAS						0	0	...	45,661	...	
WAML	9.6										

Table 17. 2020 Retail Products Gas Conversion CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Advanced Thermostat	11.0	5,934	N/A			5,934	5,934	...	5,934	...	65,270
2020 CPAS		5,934	1.000			5,934	5,934	...	5,934	...	65,270
Expiring 2020 CPAS						0	0	...	0	...	
Expired 2020 CPAS						0	0	...	0	...	
WAML	11.0										

3.1.6 Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Retail Products Initiative moving forward:

- **Key Finding #1:** Program tracking data is clear, comprehensive, and free of any noteworthy data entry errors, gaps, or inconsistencies, with the exception of ex ante savings values for some measures.
- **Key Finding #2:** Program administrators continued to update and incorporate IL-TRM-based savings calculations for measures introduced to the program over the course of 2020, but ex ante savings estimates for several measures are inconsistent or not fully replicable by the evaluation team. A discussion of measure-specific differences between ex ante and verified savings is included earlier in this chapter and Appendix A outlines in greater detail how the evaluation team applied IL-TRM V8.0 recommendations to calculate verified savings.
 - **Recommendation:** We recommend the implementation team continue to work towards consistently applying and codifying exact specifications and assumptions used to calculate ex ante savings and that those parameters be provided alongside program tracking data for future impact evaluations. We expect that the discussion earlier in this chapter and detailed outline of verified savings assumptions provided in Appendix A can help illustrate the types of information required from the implementation team in order for the evaluation team to more fully explain differences between ex ante and verified savings in the future.
- **Key Finding #3:** Program tracking data included RSAT-based allocations by retail location and corrected minor inconsistencies identified by the evaluation team in the 2020 IQ Classification Memo but did not address that same memo's recommendation regarding the base or denominator used to calculate RSAT IQ allocations. To correct for this, the evaluation team re-based or recalculated these estimates prior to developing verified savings using overall allocation values in the method outlined by the 2020 IQ Classification Memo. This ensures that IQ allocations are not erroneously deflated to exclude RSAT-identified "leakage" as leakage is already addressed in savings calculations using deemed values recommended by the IL-TRM V8.0.
 - **Recommendation:** We recommend that the implementation team incorporate revisions to RSAT IQ allocation calculations as outlined in the 2020 IQ Classification Memo for the purposes of future tracking data extracts..

3.2 Income Qualified Initiative

This section describes the 2020 evaluation of the single family portions of the AIC Income Qualified (IQ) Initiative. While the Initiative also includes a multifamily component,¹³ for clarity this chapter uses "IQ Initiative" to refer to only the single family components of the Initiative, excluding the Multifamily channel.

3.2.1 Initiative Description

This evaluation of the IQ Initiative covers three distinct channels:

- The Single Family channel, which includes:

¹³ The 2020 evaluation of the Income Qualified Initiative's Multifamily channel is included in Section 3.3, along with other multifamily initiatives.

- Single Family “Core”
- Safe and Virtual Energy Efficiency (SAVE) Kits
- Additional Offerings
- The CAA channel
- The Smart Savers channel

The core service provided by the IQ Initiative’s Single Family and CAA channels is a home energy diagnostic and whole house retrofit offering. The target market for the Initiative is single family customers with household incomes up to 300% of federal poverty guidelines for a given household size. In addition to this service, the Initiative provides services through the Smart Savers channel, SAVE Kits, and other offerings.

Single Family Core and CAA Channel

In this section, we use “Single Family Core” to refer to the traditional in-person activities of the Single Family channel, distinct from the SAVE Kits or Additional Offerings (described below).

The Single Family Core and CAA channels provide no-cost Building Performance Institute (BPI) energy audits that identify building shell and HVAC retrofit opportunities and provide health and safety inspections. During the audit, implementation staff also install energy-efficient “direct install” measures, such as LEDs, showerheads, faucet aerators, APS, pipe insulation, and advanced thermostats, at no cost. Following the audit, customers may also receive building shell measures, such as air sealing and insulation, and HVAC measures, such as central air conditioner (CAC) replacements, boilers, and heat pumps.

The Initiative provides all audit services and direct install measures at no cost to the customer. While CAA channel participants pay no out-of-pocket costs for HVAC and shell retrofits, Single Family Core participants may pay out-of-pocket costs for HVAC-related mechanical repairs and building shell retrofits.

Leidos oversees the implementation of these channels in coordination with several implementation partners. For Single Family Core, Walker-Miller and AIC program allies serve moderate-income single family customers and low-income single family customers who do not participate in the Illinois Home Weatherization Assistance Program (IHWAP). For the CAA channel, CAAs, with support from AIC partner Resource Innovations, serve low-income single family customers who participate in the IHWAP program at the same time. All AIC program allies providing Initiative services must be “core” allies, meaning that they are themselves BPI-certified or are affiliated with a BPI-certified contractor company. Table 18 describes each implementation partner’s role.

Table 18. 2020 Income Qualified Initiative Key Implementation Partners and Roles

Partner	Single Family Core Channel	CAA Channel
Leidos	Overall marketing and implementation lead, customer eligibility review, quality control (QC) field inspections, technical reviews of scopes of work, and incentive application review	
Walker-Miller	Marketing, audits and direct install, and QC field inspections of program ally projects	None
Resource Innovations	None	Marketing, CAA oversight and support, and incentive application review
CAAs	Marketing, audits and DI, and building envelope/HVAC retrofits ^a	Marketing, waitlist management, eligibility review, audits and direct install, building envelope/HVAC retrofits, and QC field inspections
Program Allies	Marketing, audits and DI, and building envelope/HVAC retrofits	None

^a Two CAAs participate in the Single Family channel as Program Allies.

SAVE Kits

SAVE Kits are a distinct offering within the Single Family channel. In June 2020, AIC developed the completely virtual SAVE Kits offering to continue helping income-qualified customers manage their energy costs and improve the comfort of their home while avoiding in-person contact during the COVID-19 pandemic. SAVE kits and virtual assessments were implemented as a replacement for program staff-led in-person direct installs and in-person assessments. Walker-Miller oversees the implementation of the SAVE Kits offering in coordination with Leidos and Market Development Initiative (MDI) partners (many of whom are CAAs), as well as other subcontractors. SAVE Kits include several energy- and water-saving products (e.g., LEDs, low-flow showerheads, APS, and door sweeps), a booklet of installation instructions, and the tools customers need to install the products (e.g., a screwdriver and plumber's tape). Customers apply for kits online or through MDI partners, and once they have received the kit, they may choose from several verification options to receive an incentive:

- **Virtually Assisted Install:** A video call with an Energy Advisor (EA) who will walk the customer through product installation, verify that the customer installed the products correctly, and ensure that the customer installed enough products to receive the incentive; customers receive a \$150 incentive for participating in this option.
- **Verified Self-Install:** Customers attend the Virtually Assisted Install Webinar, perform the product installations themselves, and then submit photos of their installation and a verification postcard; customers receive a \$75 incentive for participating in this option.
- **Non-Verified Self-Install:** Customers submit the verification postcard and receive a \$20 Online Marketplace coupon.

Customers may also choose not to complete a verification option. AIC provides SAVE Kits at no cost to the customer and the contents do not vary by customer type (e.g., dual-fuel or single-fuel customers, single family, or multifamily). AIC also uses the offering to promote the core Single Family IQ Initiative to customers when they complete a verification option.

Additional Offerings

The Initiative included multiple ad hoc offerings under the Single Family channel in 2020, including a pilot offering in Bloomington and Normal operated jointly with Nicor Gas (the "BN" pilot) and implemented by Resource Innovations. The BN pilot included community kits, direct install, and retrofit measures. In total, the pilot distributed 17 kits and completed six direct install and retrofit projects. Additionally, the Single Family channel distributed air purifier kits to elderly SAVE Kit recipients who entered the program through a community partner, and distributed kits at food banks along with APS and other energy-saving products.

Smart Savers Channel

The Smart Savers channel was launched in August 2018 as a pilot market development effort to provide advanced thermostats at no cost to hard-to-reach customers. Customers in targeted communities receive e-mail invitations to apply online or by phone for a free advanced thermostat. Participating customers have the option of requesting a thermostat to install themselves or having a contractor install the device.

Summary of Key Implementation Changes in 2020

- Between approximately March and July 2020, in-person activities for the Single Family and CAA channels were temporarily suspended due to the COVID-19 pandemic.
- The Single Family channel introduced the SAVE Kits as a completely virtual way to provide some single family offerings while in-person activities were on hold.
- Program bonuses were reduced in 2020 for both the Single Family and CAA channels.
- There were several additional offerings unique to 2020, including air purifier kits, food bank kits, and the BN pilot.

3.2.2 Participation Summary

Single Family Core and the CAA Channel

The in-person activities of the Initiative reached more than 1,600 homes by providing home audits, direct install measures, and building envelope or HVAC retrofits. Of these homes, Walker-Miller and program allies (Single Family Core) served 82%, while CAAs (CAA Channel) served the remaining 18%. Despite the shutdowns related to the pandemic, the Initiative exceeded its overall goal to serve 1,260 households. Notably, Single Family Core greatly exceeded its specific participation goal (829 homes, 160% achieved), while the CAA channel fell short of its specific goal (431 homes, 69% achieved). Table 19 presents Initiative participation during 2020 for Single Family Core and the CAA channel.

Table 19. 2020 Single Family Core and CAA Channel Participation Summary

Participation	Offering		Total
	Single Family Core	CAA Channel	
Number of Single Family Homes Served	1,329	299	1,628
Direct Install and Building Envelope or HVAC Measures	291	274	565
Direct Install Measures Only	457	1	458
Building Shell or HVAC Measures Only	581	24	605

Source: We determined unique homes based on electric or gas account numbers. These counts exclude 33 unique account numbers with only “other” measures (based on the “product family” field in the tracking data). “Other” measures have no ex ante savings estimates and include Administration Cost, Health and Safety, Authorized Measure, and Program Support.

SAVE Kits

The Single Family channel of the Initiative also distributed 9,000 SAVE Kits in 2020, reaching 8,763 unique customers.¹⁴ A total of 669 kit recipients (8%, N=8,763) verified the energy-saving measures they installed through one of the three verification options (see Section 3.2.1 for details on those options). The Initiative initially expected to get a 50% verification rate, considering that customers could get an incentive of up to \$150 for participating. However, after a few months of implementation, verification participation was not meeting expectations and, as such, Initiative staff revised the goal to 5% (or 450 verifications), which the Initiative ultimately exceeded. Table 20 provides the total number of SAVE Kits distributed, by verification type.

¹⁴ The Initiative provided 9,000 kits to customers. However, in 212 cases, the Initiative provided more than one kit to the same account, resulting in 237 duplicate kits. According to Initiative staff, this situation occurred when customers ordered kits through multiple channels, such as two different MDI partners. AIC included enough measures in each kit to generally serve one household, so it is unclear how the customers used these additional kits; they may have left them unused or given them away as gifts. As such, the evaluation team determined that it was appropriate to give savings credit for only one SAVE Kit per household, based on account number. A total of 8,763 SAVE kits received savings credit in the verified savings analysis.

Table 20. 2020 SAVE Kit Participation Summary

Verification Type	Total Recipients	Total Kits
Unverified	8,094	8,330
Virtually Assisted Install	529	529
Non-Verified Self-Install	131	132
Verified Self-Install	9	9
Total SAVE Kits Distributed	8,763	9,000

Additional Offerings

The Single Family channel of the Initiative distributed nearly 6,500 additional kits and completed six BN pilot projects in 2020. Table 21 and Table 22 summarize participation in these additional offerings.

Table 21. 2020 Additional Offerings Participation Summary

Kit Type	Kits Distributed
Air Purifier Kit	1,951 ^a
APS Food Bank Kits	4,500
BN Community Kit	17
Total	6,468

^a Initiative tracking data included one air purifier kit line item with a quantity of 2,012 kits. Upon reviewing supplemental tracking data, the evaluation team verified 1,951 kits. More detail is available in Section 3.2.4.

Table 22. 2020 BN Pilot Project Participation Summary

Project Type	Number of Projects
Direct Install Measures Only	2
Direct Install and Building Envelope or HVAC Measures	4
Total	6

Smart Savers Channel

The Smart Savers channel provided thermostats to more than 10,000 customers in 2020. Nearly all participants enrolled online. Most customers (83%) installed the thermostat themselves, while relatively few (17%) had their new thermostat installed by a service professional. Table 23 presents participation in the Smart Savers channel during 2020.

Table 23. 2020 Smart Savers Channel Participation Summary

Install Type	Total
Self-Install	8,670
Direct Install	1,732
Total	10,402

IQ Initiative Measures Summary

Table 24 presents overall IQ Initiative measure units distributed in 2020.

Table 24: 2020 Income Qualified Initiative Measures

Measure Category	Measure Quantity	Measure Quantity Units
Single Family Channel		
Single Family Core		
CAC	403	Systems
Air Sealing	947,550	CFM
BPM Motor	590	Motors
Standard LED	6,660	Bulbs
Attic Insulation	771,619	Square Feet
Air Source Heat Pump (ASHP)	29	Power Strips
Advanced Thermostat	696	Square Feet
Bathroom Exhaust Fan	705	Fans
Specialty LED	3,260	Bulbs
APS - Tier 1	1,068	Power Strips
Crawl Space Insulation	36,540	Square Feet
Wall Insulation	241,042	Square Feet
Heat Pump Water Heater (HPWH)	21	Systems
Exterior Standard LED	280	Bulbs
Duct Sealing	24	Participants
Rim Joist Insulation	72,527	Square Feet
Showerhead	372	Showerheads
Faucet Aerator	588	Aerators
Exterior Specialty LED	61	Bulbs
Pipe Insulation	2,757	Linear Feet
Gas Furnace	585	Systems
Gas Boiler	7	Systems
SAVE Kits		
Unverified SAVE Kits	8,330	Kits
Standard LED	3,954	Bulbs
APS - Tier 1	1,318	Power Strips
Specialty LED	3,954	Bulbs
Faucet Aerator	1,314	Aerators
Showerhead	657	Showerheads
Door Sweep	1,314	Door Sweeps
Restrictor Shower Valve	657	Valves
Pipe Insulation	1,971	Linear Feet
Wall Plate Gasket	15,768	Gaskets
Air Purifier Kits		
Air Purifier	1,951	Systems
APS Food Bank Kits		
APS Food Bank Kit	4,500	Kits

Measure Category	Measure Quantity	Measure Quantity Units
BN Pilot		
Community Kit	17	Kits
Standard LED	37	Bulbs
Specialty LED	31	Bulbs
CAC	1	Systems
Bathroom Exhaust Fan	3	Fans
Advanced Thermostat	4	Thermostats
Air Sealing	3	CFM
Exterior Standard LED	5	Bulbs
Attic Insulation	3	Square Feet
APS - Tier 1	3	Power Strips
Rim Joist Insulation	3	Square Feet
Wall Insulation	2	Square Feet
CAA Channel		
Standard LED	6,476	Bulbs
Air Sealing	543,780	CFM
Attic Insulation	242,251	Square Feet
Bathroom Exhaust Fan	161	Fans
Floor Insulation	53,904	Square Feet
Crawlspace Insulation	17,241	Square Feet
Showerhead	132	Showerheads
Wall Insulation	79,615	Square Feet
Faucet Aerator	299	Aerators
Rim Joist Insulation	20,201	Square Feet
Advanced Thermostat	8	Thermostats
Smart Savers Channel		
Advanced Thermostat	10,402	Thermostats

3.2.3 Initiative Annual Savings Summary

Table 25 presents overall Income Qualified Initiative annual savings achieved in 2020. The 2020 Income Qualified Initiative achieved 16,257 MWh, 3.15 MW, and 1,168,375 therms in verified net savings. Total savings by channel are presented in the next section.

Table 25. 2020 Income Qualified Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	15,643	3.17	1,073,647
Gross Realization Rate	104%	99%	109%
Verified Gross Savings	16,257	3.15	1,168,375
NTGR	1.000	1.000	1.000
Verified Net Savings	16,257	3.15	1,168,375

3.2.4 Initiative Savings Detail

The Income Qualified Initiative distributed 30 categories of measures (and 122 distinct products) across the three channels, as shown in the tables below. Overall, the Initiative achieved strong gross realization rates of 104%, 99%, and 109% for electric energy, electric demand, and gas savings, respectively. SAVE Kits and Smart Savers were by far the largest driver of Initiative savings, representing three-quarters of verified electric energy savings, more than half of verified electric demand savings, and two-thirds of verified gas savings. We multiplied the verified gross savings by the SAG-approved NTGR of 1.0 to derive verified net savings.

Table 26. 2020 Income Qualified Initiative Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Single Family Channel					
Single Family Core^a					
CAC	444	100%	445	1.000	445
Air Sealing	318	101%	321	1.000	321
BPM Motor	261	90%	235	1.000	235
Standard LED	256	98%	251	1.000	251
Attic Insulation	216	101%	218	1.000	218
Air Source Heat Pump (ASHP)	210	108%	228	1.000	228
Advanced Thermostat	188	98%	184	N/A	184
Bathroom Exhaust Fan	153	96%	146	1.000	146
Specialty LED	100	98%	97	1.000	97
APS - Tier 1	79	100%	79	1.000	79
Crawl Space Insulation	71	100%	70	1.000	70
Wall Insulation	59	103%	61	1.000	61
Heat Pump Water Heater (HPWH)	52	88%	46	1.000	46
Exterior Standard LED	26	100%	26	1.000	26
Duct Sealing	22	88%	16	1.000	16
Rim Joist Insulation	13	117%	15	1.000	15
Showerhead	12	100%	12	1.000	12
Faucet Aerator	10	100%	10	1.000	10
Exterior Specialty LED	8	100%	8	1.000	8
Pipe Insulation	4	100%	4	1.000	4
<i>Single Family Core Subtotal</i>	<i>2,501</i>	<i>99%</i>	<i>2,472</i>	<i>1.000</i>	<i>2,472</i>
SAVE Kits^{a,b}					
Unverified SAVE Kits	5,209	111%	5,761	1.000	5,761
Standard LED	143	96%	137	1.000	137
APS - Tier 1	128	100%	127	1.000	127
Specialty LED	124	96%	119	1.000	119
Faucet Aerator	31	100%	31	1.000	31
Showerhead	30	101%	30	1.000	30
Door Sweep	13	101%	14	1.000	14

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Restrictor Shower Valve	10	80%	8	1.000	8
Pipe Insulation	9	152%	13	1.000	13
Wall Plate Gasket	8	101%	8	1.000	8
<i>SAVE Kits Subtotal</i>	<i>5,704</i>	<i>109%</i>	<i>6,247</i>	<i>1.000</i>	<i>6,247</i>
Air Purifier Kits^a					
Air Purifier	590	97%	572	1.000	572
<i>Air Purifier Kits Subtotal</i>	<i>590</i>	<i>97%</i>	<i>572</i>	<i>1.000</i>	<i>572</i>
APS Food Bank Kits^a					
APS Food Bank Kit	442	100%	442	1.000	442
<i>APS Food Bank Kits Subtotal</i>	<i>442</i>	<i>100%</i>	<i>442</i>	<i>1.000</i>	<i>442</i>
BN Pilot^a					
Community Kit	10	213%	22	1.000	22
Standard LED	1	100%	1	1.000	1
Specialty LED	1	101%	1	1.000	1
CAC	1	100%	1	1.000	1
Bathroom Exhaust Fan	1	97%	1	1.000	1
Advanced Thermostat	1	100%	1	N/A	1
Air Sealing	0	100%	0	1.000	0
Exterior Standard LED	0	108%	0	1.000	0
Attic Insulation	0.176	0%	0.00038	1.000	0
APS - Tier 1	0	100%	0	1.000	0
Rim Joist Insulation	0	5%	0	1.000	0
Wall Insulation	0	69%	0	1.000	0
<i>BN Pilot Subtotal</i>	<i>16</i>	<i>173%</i>	<i>27</i>	<i>1.000</i>	<i>27</i>
<i>Single Family Channel Subtotal</i>	<i>9,253</i>	<i>105%</i>	<i>9,760</i>	<i>1.000</i>	<i>9,760</i>
CAA Channel					
Standard LED	232	96%	223	1.000	223
Air Sealing	156	102%	160	1.000	160
Attic Insulation	56	105%	59	1.000	59
Bathroom Exhaust Fan	35	124%	43	1.000	43
Floor Insulation	27	100%	27	1.000	27
Crawlspace Insulation	18	102%	18	1.000	18
Showerhead	16	102%	17	1.000	17
Wall Insulation	14	112%	15	1.000	15
Faucet Aerator	6	102%	6	1.000	6
Rim Joist Insulation	2	158%	4	1.000	4
Advanced Thermostat	2	99%	2	N/A	2
<i>CAA Channel Subtotal</i>	<i>565</i>	<i>102%</i>	<i>574</i>	<i>1.000</i>	<i>574</i>

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Smart Savers Channel					
Advanced Thermostat	5,826	102%	5,923	N/A	5,923
<i>Smart Savers Channel Subtotal</i>	5,826	102%	5,923	1.000	5,923
Total	15,643	104%	16,257	1.000	16,257

^a All Single Family offerings are included in Single Family CPAS line items in Table 29 and Table 30.

^b Verified SAVE Kits had installation confirmed and included measure-specific information available in the Initiative tracking data. This allowed the evaluation team to estimate and present savings separately for each measure type, and to use 100% in-service rates (ISRs) reflecting confirmation of installation. “Unverified” SAVE Kits refer to SAVE Kits which did not have delivery directly confirmed by the implementation team, and therefore use kit-based IL-TRM assumptions rather than 100% installation rates.

Table 27. 2020 Income Qualified Initiative Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Single Family Channel					
Single Family Core					
CAC	0.462	73%	0.337	1.000	0.337
Air Sealing	0.204	102%	0.208	1.000	0.208
Attic Insulation	0.085	128%	0.109	1.000	0.109
Advanced Thermostat	0.054	96%	0.052	N/A	0.052
BPM Motor	0.049	68%	0.034	1.000	0.034
Standard LED	0.032	100%	0.032	1.000	0.032
Wall Insulation	0.031	101%	0.032	1.000	0.032
ASHP	0.028	107%	0.030	1.000	0.030
Bathroom Exhaust Fan	0.017	96%	0.017	1.000	0.017
Crawlspace Insulation	0.017	101%	0.017	1.000	0.017
Specialty LED	0.015	100%	0.015	1.000	0.015
APS - Tier 1	0.009	100%	0.009	1.000	0.009
Duct Sealing	0.007	85%	0.006	1.000	0.006
Faucet Aerator	0.004	69%	0.003	1.000	0.003
Rim Joist Insulation	0.004	120%	0.005	1.000	0.005
Exterior Standard LED	0.003	100%	0.003	1.000	0.003
HPWH	0.002	88%	0.002	1.000	0.002
Showerhead	0.001	72%	0.001	1.000	0.001
Exterior Specialty LED	0.001	100%	0.001	1.000	0.001
Pipe Insulation	0.0004	100%	0.0004	1.000	0.000
<i>Single Family Core Subtotal</i>	<i>1.026</i>	<i>89%</i>	<i>0.911</i>	<i>1.000</i>	<i>0.911</i>
SAVE Kits					
Unverified SAVE Kits	0.609	106%	0.643	1.000	0.643
Standard LED	0.018	100%	0.018	1.000	0.018
Specialty LED	0.017	100%	0.017	1.000	0.017
APS - Tier 1	0.014	100%	0.014	1.000	0.014

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Faucet Aerator	0.011	78%	0.008	1.000	0.008
Showerhead	0.003	83%	0.003	1.000	0.003
Pipe Insulation	0.001	152%	0.002	1.000	0.002
Restrictor Shower Valve	0.0007	54%	0.0004	1.000	0.000
<i>SAVE Kits Subtotal</i>	<i>0.674</i>	<i>105%</i>	<i>0.705</i>	<i>1.000</i>	<i>0.705</i>
Air Purifier Kits					
Air Purifier	0.067	97%	0.065	1.000	0.065
<i>Air Purifier Kits Subtotal</i>	<i>0.067</i>	<i>97%</i>	<i>0.065</i>	<i>1.000</i>	<i>0.065</i>
APS Food Bank Kits					
APS Food Bank Kit	0.049	100%	0.049	1.000	0.049
<i>APS Food Bank Kits Subtotal</i>	<i>0.049</i>	<i>100%</i>	<i>0.049</i>	<i>1.000</i>	<i>0.049</i>
BN Pilot					
Community Kit	0.001	105%	0.0010	1.000	0.001
CAC	0.001	76%	0.0007	1.000	0.001
Air Sealing	0.0003	100%	0.0003	1.000	0.000
Standard LED	0.0002	100%	0.0002	1.000	0.000
Advanced Thermostat	0.0002	100%	0.0002	N/A	0.000
Specialty LED	0.0001	101%	0.0001	1.000	0.000
Attic Insulation	0.00007	0%	0.000000	1.000	0.000
APS - Tier 1	0.00001	100%	0.000014	1.000	0.000
Bathroom Exhaust Fan	0.000074	97%	0.000072	1.000	0.000
Exterior Standard LED	0.000041	108%	0.000044	1.000	0.000
Rim Joist Insulation	0.00000012	118%	0.00000014	1.000	0.000
Wall Insulation	0.00000029	100%	0.00000029	1.000	0.000
<i>BN Pilot Subtotal</i>	<i>0.003</i>	<i>91%</i>	<i>0.0026</i>	<i>1.000</i>	<i>0.003</i>
<i>Single Family Channel Subtotal</i>	<i>1.819</i>	<i>95%</i>	<i>1.732</i>	<i>1.000</i>	<i>1.732</i>
CAA Channel					
Air Sealing	0.073	107%	0.078	1.000	0.078
Attic Insulation	0.032	89%	0.029	1.000	0.029
Standard LED	0.028	100%	0.028	1.000	0.028
Wall Insulation	0.007	109%	0.008	1.000	0.008
Faucet Aerator	0.006	91%	0.006	1.000	0.006
Bathroom Exhaust Fan	0.004	124%	0.005	1.000	0.005
Crawlspace Insulation	0.004	115%	0.005	1.000	0.005
Floor Insulation	0.004	99%	0.004	1.000	0.004
Showerhead	0.002	94%	0.002	1.000	0.002
Rim Joist Insulation	0.001	220%	0.002	1.000	0.002
Advanced Thermostat	0.001	94%	0.001	N/A	0.001
<i>CAA Channel Subtotal</i>	<i>0.162</i>	<i>102%</i>	<i>0.166</i>	<i>1.000</i>	<i>0.166</i>

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Smart Savers Channel					
Advanced Thermostat	1.189	106%	1.256	N/A	1.256
<i>Smart Savers Channel Subtotal</i>	1.189	106%	1.256	1.000	1.256
Total	3.170	99%	3.154	1.000	3.154

Table 28. 2020 Income Qualified Initiative Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Single Family Channel					
Single Family Core					
Gas Furnace	129,580	101%	131,142	1.000	131,142
Attic Insulation	55,325	100%	55,455	1.000	55,455
Air Sealing	54,571	101%	54,852	1.000	54,852
Advanced Thermostat	41,848	100%	41,979	N/A	41,979
Wall Insulation	23,603	99%	23,350	1.000	23,350
Crawlspace Insulation	19,130	100%	19,178	1.000	19,178
Duct Sealing	7,607	84%	6,397	1.000	6,397
Rim Joist Insulation	3,983	118%	4,689	1.000	4,689
Showerhead	2,939	100%	2,939	1.000	2,939
Gas Boiler	2,413	100%	2,413	1.000	2,413
Faucet Aerator	2,085	100%	2,085	1.000	2,085
Pipe Insulation	1,185	100%	1,184	1.000	1,184
<i>Single Family Core Subtotal</i>	344,270	100%	345,662	1.000	345,662
SAVE Kits					
Unverified SAVE Kits	223,702	139%	309,943	1.000	309,943
Door Sweep	6,905	100%	6,916	1.000	6,916
Showerhead	4,300	100%	4,316	1.000	4,316
Faucet Aerator	4,209	100%	4,200	1.000	4,200
Wall Plate Gasket	4,169	100%	4,175	1.000	4,175
Pipe Insulation	1,704	139%	2,375	1.000	2,375
Restrictor Shower Valve	1,404	67%	939	1.000	939
<i>SAVE Kits Subtotal</i>	246,393	135%	332,864	1.000	332,864
APS Food Bank Kits					
APS Food Bank Kit	3,531	100%	3,541	1.000	3,541
<i>APS Food Bank Kits Subtotal</i>	3,531	100%	3,541	1.000	3,541
<i>Single Family Channel Subtotal</i>	594,194	115%	682,068	1.000	682,068
CAA Channel					
Air Sealing	17,116	99%	16,985	1.000	16,985
Attic Insulation	13,567	100%	13,607	1.000	13,607
Wall Insulation	5,410	100%	5,407	1.000	5,407

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Crawlspace Insulation	5,392	100%	5,400	1.000	5,400
Floor Insulation	2,027	98%	1,989	1.000	1,989
Rim Joist Insulation	675	118%	794	1.000	794
Showerhead	628	100%	628	1.000	628
Advanced Thermostat	275	128%	352	N/A	352
Faucet Aerator	272	100%	272	1.000	272
<i>CAA Channel Subtotal</i>	<i>45,361</i>	<i>100%</i>	<i>45,435</i>	<i>1.000</i>	<i>45,435</i>
Smart Savers Channel					
Advanced Thermostat	434,093	102%	440,873	N/A	440,873
<i>Smart Savers Channel Subtotal</i>	<i>434,093</i>	<i>102%</i>	<i>440,873</i>	<i>1.000</i>	<i>440,873</i>
Total	1,073,647	109%	1,168,375	1.000	1,168,375

We describe the key drivers of realization rates different from 100% (i.e., “discrepancies” between ex ante and verified gross savings estimates) below. We discovered more than 50 individual discrepancies in our final impact analysis. In part, this reflects the size of the Initiative, which includes three implementation channels, several additional offerings, and a wide variety of available measures. Many of these discrepancies affect measure categories that provide a relatively small proportion of Initiative savings (less than 5%), while others affected only a few measures within a category. As such, the list below includes the most significant, but not all, realization rate drivers. Opinion Dynamics is prepared to share and discuss the full list of discrepancies with AIC, if desired.

We ordered the list of discrepancies below from largest to smallest contribution to Initiative ex ante MWh savings.

- **Unverified SAVE Kits:** The gross realization rate for unverified SAVE kits was 111% for MWh, 106% for MW, and 139% for therms.
 - The Initiative provided 8,330 unverified kits to customers. However, in 211 cases, the Initiative provided more than one kit to the same account, resulting in 236 duplicate unverified kits. According to Initiative staff, this situation occurred when customers ordered kits through multiple channels, such as two different MDI partners. AIC included enough measures in each kit to generally serve one household. It is unclear how the customers used these additional kits; they may have left them unused or given them away as gifts. As such, the evaluation team determined that it was appropriate to give savings credit for only one SAVE Kit per household, based on account number. A total of 8,094 unverified SAVE kits received savings credit in the verified savings analysis, resulting in lower verified savings.
 - For all 8,094 unverified SAVE kits in the analysis, we estimated domestic hot water (DHW) pipe insulation savings over five times the ex ante claims for MWh, MW, and therms savings. The verified savings analysis applied algorithms and default assumptions from the IL-TRM V8.0, matching what AIC provided in the ex ante detailed calculation document,¹⁵ but a significant savings discrepancy remained. The cause of this savings discrepancy is unclear.
 - For all 8,094 unverified SAVE kits in the analysis, ex ante applied heating fuel shares representative of single family housing types only for outlet gaskets and door sweeps. The verified

¹⁵ Provided Excel file titled: PY20 TRM Calculations_REV1_20201222.xlsx.

savings analysis applied heating fuel shares based on historical program data,¹⁶ weighted by the unknown housing type shares provided in the IL-TRM V8.0 (79% single family and 21% multifamily), resulting in higher verified MWh savings and lower verified therms savings.

- **Advanced Thermostats (Smart Savers):** The gross realization rate for Smart Savers advanced thermostats was 102% for MWh, 106% for MW, and 102% for therms savings.
 - For 5% of projects (n=393), ex ante estimates did not claim cooling savings for projects where the existing cooling type is defined as “Other” in the tracking database. Verified savings applied the assumption from the IL-TRM V8.0 that 82.5% of households have central cooling controlled by a thermostat, resulting in higher verified MWh and MW savings.
 - For 2% of projects (n=181), ex ante estimates claimed furnace fan runtime savings when the tracking database indicated that the primary heating type is a natural gas boiler. The verified analysis did not include these savings, resulting in lower verified MWh savings.
 - For 1% of projects (n=105), ex ante estimates did not claim gas heating savings when the tracking database reported existing heating type as a natural gas furnace. The verified analysis included gas heating savings for these records, resulting in higher verified therms savings.
 - For 1% of projects (n=63), ex ante estimates did not claim cooling savings when the database reported existing cooling type as a CAC. The verified analysis calculated cooling savings for these records, resulting in higher verified MWh and MW savings.
 - For less than 1% of projects (n=17), ex ante estimates did not claim any savings for projects. There was nothing in the Initiative tracking data that distinguished these records from others (e.g., no notations about being canceled or returned; no notable difference in heating and cooling system types that might suggest zero savings). As such, the verified analysis assumed these cases were data entry errors and credited them with savings, resulting in higher verified MWh, MW, and therms savings.
 - For less than 1% of projects (n=15), ex ante estimates did not claim electric heating or cooling savings when the database reported existing central cooling and existing electric heating equipment. The verified analysis included electric heating and cooling savings for these projects, resulting in higher verified MWh and MW savings.
 - For less than 1% of projects (n=5), there was a mismatch in the tracking database between existing heating type (electric furnace) and primary heating fuel (natural gas). This suggests a data tracking error. Ex ante estimates claimed electric heating savings while the verified analysis applied IL-TRM V8.0 defaults for unknown heating type (i.e., 3% electric, 97% gas), resulting in lower verified MWh savings and higher verified therms savings.
- **Air Purifier Kits:** The gross realization rate for air purifier kits was 97% for MWh and MW savings.
 - For 3% of projects (n=61), we could not verify measures using supplemental tracking data. Ex ante estimates applied a quantity of 2,012 kits in a single line item in the Initiative tracking database. However, supplemental tracking data provided by AIC included 1,999 total records of kits, a difference of 13 kits. Additionally, the “Stage” field in the supplemental tracking data listed 48 kits as “Void” or “Denied.” The verified analysis removed these 61 kits and applied a quantity of 1,951 kits, resulting in lower verified MWh and MW savings.
- **Central Air Conditioners (Single Family Core):** The gross realization rate for CACs was 100% for MWh and 73% for MW savings for Single Family Core. The CAA Channel does not include CACs.

¹⁶ Provided Excel file titled: *Prescriptive Measures Blended Averages – 20210219.xlsx*.

- For all 404 projects, ex ante estimates applied an existing energy efficiency rating (EER) of 7.5 to all early retirement cases. The IL-TRM V8.0 provides the formula to convert an actual seasonal energy efficiency rating (SEER) to an EER, when known, and otherwise recommends using 7.5 EER when actual is unknown. The verified analysis either (1) converted the known SEER values in the database to EER and used those values or (2) when actual SEER or EER was unknown, applied the default value of 7.5 EER, resulting in lower verified MW savings.
- **Air Sealing (Single Family Core):** The gross realization rate for air sealing ranged between 101% and 102% for MWh, 102% and 107% for MW, and 99% and 101% for therms savings between Single Family Core and the CAA Channel.
 - For 5% of projects (n=54), ex ante estimates applied N_heat and N_cool leakage assumptions for climate zone 3 (Springfield) when the climate zone provided in the tracking data differs. The verified analysis corrected the climate zone, resulting in a net lower verified MWh and higher verified MW and therms savings.
 - For 3% of projects (n=26), ex ante did not claim MWh or MW cooling savings for projects with central cooling. The verified analysis calculated MWh and MW cooling savings for these projects, resulting in higher verified MWh and MW savings.
 - For 2% of projects (n=25), ex ante estimates did not claim furnace fan runtime savings for projects when primary heating type in the database is “natural gas furnace.” The verified analysis included furnace fan runtime savings, resulting in higher verified MWh and MW savings.
 - For 1% of projects (n=6), ex ante estimates applied a cooling savings adjustment factor of 121% when the IL-TRM V8.0 specifies an adjustment factor of 100% in cases where no attic insulation was installed. The verified analysis applied 100% (i.e., no cooling savings adjustment) in cases where no attic insulation was installed, resulting in lower verified MWh and MW savings.
- **Attic Insulation (Single Family Core and CAA Channel):** The gross realization rate for attic insulation ranged between 101% and 105% for MWh and between 89% and 128% for MW, and was 100% for therms savings between Single Family Core and the CAA Channel.
 - For 81% of projects (n=821), ex ante MW savings estimates simultaneously applied summer system peak CFs for both CAC and heat pump cooling types from the IL-TRM V8.0, 68% and 72%, respectively. The verified analysis applied only one CF for the corresponding reported cooling system type, resulting in higher verified MW savings.
 - For 3% of projects (n=32), ex ante estimates claimed furnace fan runtime savings when the tracking database indicated that the primary heating type is a natural gas boiler. The verified analysis did not include these savings, resulting in lower verified MWh savings.
 - For 2% of projects (n=21), ex ante estimates did not claim either furnace fan runtime or central cooling savings for projects when primary heating and cooling type reported in the database were natural gas furnace and CAC, respectively. The verified analysis included furnace fan runtime and cooling savings for these projects, resulting in higher verified MWh and MW savings.
 - For 1% of projects (n=12), ex ante estimates did not claim cooling savings when cooling system type was blank or unknown in the tracking data. The verified analysis applies the IL-TRM V8.0 default percent cooling value of 66% (specified for evaluation purposes only) to estimate cooling savings, resulting in higher verified MW and MWh savings.
- **Advanced Thermostats (Single Family Core and CAA Channel):** The gross realization rate for advanced thermostats ranged between 98% and 99% for MWh, 94% and 96% for MW, and 100% and 128% for therms savings between Single Family Core and the CAA Channel.

- For 12% of projects (n=86), ex ante estimates used existing central cooling system efficiency values (SEER and EER) when new central cooling efficiency values were available in the database. The verified analysis used the new central cooling efficiencies, resulting in lower verified MWh and MW savings.
- For 1% of projects (n=10), ex ante estimates did not claim cooling savings when a CAC was the primary cooling type according to the tracking database. The verified analysis included cooling savings in these cases, resulting in higher verified MWh and MW savings.
- **Crawlspace Insulation (Single Family Core and CAA Channel):** The gross realization rate for crawlspace insulation ranged between 100% and 102% for MWh and between 101% and 115% for MW, and was 100% for therms savings between Single Family Core and the CAA Channel.
 - For 2% of projects (n=11), ex ante did not claim MWh or MW cooling savings for projects with central cooling. The verified analysis calculated MWh and MW cooling savings for these projects, resulting in higher verified MWh and MW savings.
- **Wall Insulation (Single Family Core and CAA Channel):** The gross realization rate for wall insulation ranged between 103% and 112% for MWh, 101% and 109% for MW, and 99% and 100% for therms savings between Single Family Core and the CAA Channel.
 - For 11% of projects (n=48), ex ante estimates did not claim furnace fan runtime savings for projects when primary heating type in the database was “natural gas furnace.” The verified analysis included furnace fan runtime savings, resulting in higher verified MWh and MW savings.
 - For 2% of projects (n=9), ex ante estimates applied insulation area values differing from those reported in the database. The verified analysis applied insulation area values reported in the database, resulting in lower verified MWh, MW, and therms savings.
 - For 2% of projects (n=8), ex ante estimates did not claim cooling savings when cooling system type was blank or unknown in the tracking data. The verified analysis applied the IL-TRM V8.0 default percent cooling value of 66% (specified for evaluation purposes only) to estimate cooling savings, resulting in higher verified MW and MWh savings.
 - For 2% of projects (n=7), ex ante estimates did not include MWh or MW savings claimed when the primary cooling type in the tracking database indicated central cooling was present. The verified analysis included cooling savings, resulting in higher verified MWh and MW savings.
 - For 1% of projects (n=3), ex ante estimates applied heat pump efficiencies inconsistent with what was provided in the “COP” (“coefficient of performance”) field in the tracking database. Verified savings applied the reported “COP” values as provided in the database, resulting in lower verified MWh savings.
- **Furnaces (Single Family Core):** The gross realization rate for furnaces was 101% for Single Family Core therms savings. The CAA channel does not include gas furnaces.
 - For 4% of projects (n=23), ex ante estimates applied existing AFUE values that were inconsistent with what was reported in the tracking database. The verified analysis applied the reported AFUE, resulting in higher verified therms savings.
- **Heat Pump Water Heater (Single Family Core):** The gross realization rate for Heat Pump Water Heaters (HPWHs) was 88% for Single Family Core MWh and MW savings. The CAA channel did not include HPWHs in 2020.
 - For all projects (n=21), ex ante estimates applied location factors and heating fuel type percentages for unknown space conditioning type for all records even though the tracking

database reports actual heating and cooling characteristics. The verified analysis applied location factors and heating fuel type percentages based on actual space conditioning type, resulting in lower verified MW and MWh savings.

- **Duct Sealing (Single Family Core):** The gross realization rates for duct sealing in the Single Family Core channel were 71% for MWh, 85% for MW, and 84% for therms. The CAA channel did not include duct sealing measures in 2020.
- For 38% of projects (n=9), ex ante estimates applied existing heating and cooling efficiency values where a home also received a heating and cooling system replacement. The verified analysis applies the new heating and cooling system efficiency values, resulting in lower verified MWh, MW, and therms savings.

3.2.5 Cumulative Persisting Annual Savings

Table 29 presents CPAS and WAML for the 2020 Income Qualified Initiative. The total verified gross savings for the Initiative are summarized by channel, and CPAS in each year of the 2018–2021 Plan are presented.¹⁷ The WAML for the Initiative is 11.3 years. CPAS and WAML for each channel at a measure level are summarized in Table 30 through Table 32.

In 2020, AIC converted some natural gas savings produced by Smart Savers channel measures to CPAS for the purposes of goal attainment; those savings are presented separately in Table 33.

Table 29. 2020 Income Qualified Initiative CPAS and WAML by Channel

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Single Family	11.3	9,760	1.000			9,760	9,760	...	2,177	...	101,524
CAA	15.6	574	1.000			574	574	...	288	...	8,279
Smart Savers	11.0	5,923	1.000			5,923	5,923	...	5,923	...	65,150
2020 CPAS		16,257	1.000			16,257	16,257	...	8,388	...	174,953
Expiring 2020 CPAS						0	0	...	3,387	...	
Expired 2020 CPAS						0	0	...	7,869	...	
WAML	11.3										

Table 30. 2020 Income Qualified Initiative – Single Family Channel CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
BPM Motor	6.0	235	1.000			235	235	...	0	...	1,411
Advanced Thermostat	11.0	184	N/A			184	184	...	184	...	2,028
Bathroom Exhaust Fan	19.0	147	1.000			147	147	...	147	...	2,793
Rim Joist Insulation	20.0	15	1.000			15	15	...	11	...	254
Wall Insulation	20.0	61	1.000			61	61	...	50	...	1,102
Attic Insulation	20.0	218	1.000			218	218	...	165	...	3,832
CAC (early replacement [ER])	18.0	445	1.000			445	445	...	148	...	4,445

¹⁷ For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Air Sealing	20.0	321	1.000			321	321	...	236	...	5,575
Specialty LED	10.0	189	1.000			189	189	...	0	...	1,649
Reflector LED	10.0	28	1.000			28	28	...	0	...	249
APS - Tier 1	7.0	206	1.000			206	206	...	0	...	1,443
Crawl Space Insulation	20.0	70	1.000			70	70	...	63	...	1,336
Duct Sealing	20.0	16	1.000			16	16	...	14	...	293
Standard LED	10.0	389	1.000			389	389	...	0	...	3,389
Hot Water Pipe Insulation	15.0	17	1.000			17	17	...	17	...	258
Faucet Aerator	10.0	41	1.000			41	41	...	0	...	413
Showerhead	10.0	42	1.000			42	42	...	0	...	418
ASHP (TOS)	16.0	5	1.000			5	5	...	5	...	85
ASHP (ER) - Replaces Elec. Resist.	16.0	202	1.000			202	202	...	202	...	3,238
ASHP (ER) - Replaces ASHP	16.0	20	1.000			20	20	...	3	...	153
Standard LED - Exterior	8.0	27	1.000			27	27	...	0	...	203
Reflector LED - Exterior	10.0	7	1.000			7	7	...	0	...	65
Specialty LED - Exterior	6.9	0.6	1.000			0.59	0.59	...	0	...	3
Wall Plate Gasket	20.0	8	1.000			8	8	...	8	...	167
Door Sweep	20.0	14	1.000			14	14	...	14	...	273
Air Purifier	9.0	572	1.000			572	572	...	0	...	5,145
Restrictor Shower Valve	10.0	8	1.000			8	8	...	0	...	76
HPWH	15.0	46	1.000			46	46	...	45	...	685
CAC (TOS)	18.0	1	1.000			1	1	...	1	...	17
Unverified SAVE Kits ^a	10.3	5,761	1.000			5,761	5,761	...	848	...	57,015
BN Community Kits ^a	16.6	22	1.000			22	22	...	15	...	358
APS Food Bank Kits ^a	7.1	442	1.000			442	442	...	0	...	3,151
2020 CPAS		9,760	1.000			9,760	9,760	...	2,177	...	101,524
Expiring 2020 CPAS						0	0	...	3,197	...	
Expired 2020 CPAS						0	0	...	7,583	...	
WAML	11.3										

^a These kit types are presented aggregated in CPAS tables to save space. For further detail by measure, please see the summary CPAS spreadsheet presented with this report.

Table 31. 2020 Income Qualified Initiative – CAA Channel CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Advanced Thermostat	11.0	2	N/A			2	2	...	2	...	21
Air Sealing	20.0	160	1.000			160	160	...	135	...	2,954
Attic Insulation	20.0	59	1.000			59	59	...	49	...	1,078
Bathroom Exhaust Fan	19.0	43	1.000			43	43	...	43	...	820
Crawl Space Insulation	20.0	18	1.000			18	18	...	17	...	354
Faucet Aerator	10.0	6	1.000			6	6	...	0	...	60
Floor Insulation	20.0	27	1.000			27	27	...	26	...	529
Standard LED	10.0	223	1.000			223	223	...	0	...	1,945
Rim Joist Insulation	20.0	4	1.000			4	4	...	2	...	58
Showerhead	10.0	17	1.000			17	17	...	0	...	168
Wall Insulation	20.0	15	1.000			15	15	...	14	...	292
2020 CPAS		574	1.000			574	574	...	288	...	8,279
Expiring 2020 CPAS						0	0	...	190	...	
Expired 2020 CPAS						0	0	...	286	...	
WAML	15.6										

Table 32. 2020 Income Qualified Initiative – Smart Savers Channel CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Advanced Thermostat	11.0	5,923	N/A			5,923	5,923	...	5,923	...	65,150
2020 CPAS		5,923	1.000			5,923	5,923	...	5,923	...	65,150
Expiring 2020 CPAS						0	0	...	0	...	
Expired 2020 CPAS						0	0	...	0	...	
WAML	11.0										

Table 33. 2020 Income Qualified Initiative – Smart Savers Channel (Gas Conversion) CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Advanced Thermostat	11.0	9,572	1.000			9,572	9,572	...	9,572	...	105,294
2020 CPAS		9,572	1.000			9,572	9,572	...	9,572	...	105,294
Expiring 2020 CPAS						0	0	...	0	...	
Expired 2020 CPAS						0	0	...	0	...	
WAML	11.0										

3.2.6 Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Income Qualified Initiative moving forward:

- **Key Finding #1:** The tracking data included two line items with large quantities of kits: one line item represented 2,012 air purifier kits and another line item represented 1,998 unverified SAVE Kits. Tracking the kits in this way necessitated an additional data request to verify the number of kits distributed and prevented the evaluation team from applying more-accurate savings assumptions about recipient households (e.g., single family versus multifamily, gas versus electric heating, water heating type).
 - Recommendation: Track all kits separately (i.e., as separate line items) and include all savings-relevant recipient household characteristics that are available.
- **Key Finding #2:** For some weatherization (e.g., air sealing, attic insulation, crawlspace insulation, wall insulation) and advanced thermostats measures, ex ante estimates did not properly account for heating and cooling types. Common examples included erroneously including or excluding furnace fan runtime savings or erroneously excluding cooling savings when CAC was present. While these affected relatively small percentages of projects in each measure category (typically less than 5%), the number of total instances of this issue numbered in the hundreds across all categories.
 - Recommendation: Review ex ante savings algorithms for weatherization and thermostat measures to ensure that savings estimates are pulling the relevant heating and cooling system information in the tracking data.
- **Key Finding #3:** Ex ante savings calculations exclude electric heating penalties for all lighting measures installed in electrically heated spaces. SAG has reached consensus that electric heating penalties must be incorporated into verified savings, and a formal Illinois policy agreement will be issued in 2021 codifying this agreement.¹⁸ The evaluation team regrets any inconsistent guidance on this topic in previous program years but has now consistently incorporated this treatment across the portfolio.
 - Recommendation: Moving forward, consistently account for interactive effects when reporting total ex ante lighting savings, including both heating penalties and cooling benefits, to align with Illinois policy.
- **Key Finding #4:** For CACs, ex ante estimates applied an existing EER of 7.5 to all early retirement cases. The IL-TRM V8.0 provides the formula to convert actual SEER to EER, when known, and otherwise recommends using 7.5 EER when the actual is unknown.
 - Recommendation: When existing SEER is available in the tracking data, convert SEER to EER using the formula the IL-TRM specifies.

3.3 Multifamily Initiatives

AIC has continued to develop a one-stop-shop approach to serving multifamily customers in 2020. Based on this model, CMC Energy Services (CMC) serves multifamily properties through the Income Qualified Initiative's Multifamily channel, the Public Housing Initiative, and the Multifamily Initiative. CMC recruits multifamily

¹⁸ Treatment of electric heating penalties is consistent with a draft SAG policy agreement on this topic. Illinois Energy Efficiency Stakeholder Advisory Group. "Policy Resolution - 2020 Program Year." 2020. Accessed at: <https://ilsag.s3.amazonaws.com/SAG-Policy-Res-Heating-Penalties-Negative-Savings-11-30.docx>.

property managers¹⁹ to participate and channels them into the appropriate initiative offering based on tenant income guidelines and the property's Public Housing Authority status. Overall, the delivery models and measure offerings for these efforts are similar, with some variation between initiatives, and so we have grouped these efforts for evaluation reporting purposes.

3.3.1 Description of the Initiatives

AIC's Multifamily initiatives are designed to provide a range of measures that result in lower energy use, lower costs of living, and increased comfort for tenants, and lower operating costs for building owners of subsidized or low-income housing, publicly owned housing serving low-income customers, and non-subsidized or market-rate multifamily and mixed-use buildings with three or more units. AIC serves these types of multifamily residents through the Income Qualified Initiative's Multifamily channel, the Public Housing Initiative, and the Multifamily Initiative, respectively. Overall, the delivery models and measure offerings for these initiatives are similar, though there are some variations between initiatives.

Leidos and CMC work together to implement the Multifamily initiatives. Leidos' role is to provide oversight for the Multifamily initiatives, including support for marketing efforts and initiative implementation, while CMC's role is to conduct outreach, install measures, conduct QC inspections on direct install measures, and manage project submissions, inventory, and initiative tracking data.

In 2020, AIC transitioned the delivery of the Multifamily initiatives to a one-stop shop model. Through this approach, upon initial contact initiative staff conduct a detailed property assessment and interview that includes highlighting any available incentive opportunities for the property across AIC Residential and Business programs. The goal of the one-stop shop model is to make access to Multifamily initiative offerings as streamlined and seamless as possible for property managers and housing authorities.

The CMC outreach coordinator generates the bulk of leads for the Multifamily initiatives by conducting outreach to public housing associations and other housing organizations. The Leidos team also refers customers to the initiatives.

The one-stop shop approach begins with an EA from CMC conducting a full property assessment to identify the available energy-saving opportunities for which the property may qualify. CMC staff act as a central point of contact for initial identification and coordination of direct install and program ally-installed measures. This process involves an extensive interview with the property manager, during which implementation staff obtain a detailed understanding of the history of building envelope and interior upgrades at the property. Upon assessment completion, the EA recommends appropriate upgrades to the property manager. As customers begin their engagement with the Multifamily initiatives, the EA introduces them to the AIC Multifamily resources webpage,²⁰ which is set up as a resource for customers to access information regarding incentive offerings, energy efficiency grants, loans, and rebates. Property managers may also access educational and support resources, including ENERGY STAR information and the Efficient Choice Tool²¹ for selecting energy-efficient appliances.

The initiatives provide energy-efficient upgrades for all aspects of multifamily properties, including in-unit, common area, and exterior spaces. The measure offerings and delivery methods differ based on the location of the installation. Table 34 includes an overview of these nuances.

¹⁹ We use the term "property manager" to refer to both property managers and property owners.

²⁰ <https://www.amerenillinoisavings.com/multifamily-properties>.

²¹ <https://www.amerenillinoisefficientchoice.com/>.

Table 34. Multifamily Initiatives Measure Offerings and Delivery Methods

Location	Measures Offered	Installation Process
In-unit	<ul style="list-style-type: none"> ▪ New measures: Thermostatic restrictor shower valves, door sweeps, outlet and switch wall plate gaskets on exterior walls ▪ Existing measures: Standard and specialty LED light bulbs, low-flow showerheads, low-flow kitchen faucet aerators, low-flow bathroom faucet aerators, water heater pipe insulation, Tier 1 APS, advanced thermostats 	<ul style="list-style-type: none"> ▪ CMC staff complete the assessment and installation for in-unit measures ▪ CMC performs a 10% administrative review on 100% of the properties
Common Area	<ul style="list-style-type: none"> ▪ New measures: ENERGY STAR bathroom lights, ductless heat pumps ▪ Existing measures: Retrofit 4' light fixtures, LED lighting fixture retrofits ▪ Ductless heat pump offering available to Public Housing and Income Qualified – Multifamily participants only 	<ul style="list-style-type: none"> ▪ CMC staff complete the assessment ▪ Program allies install common area measures ▪ Vending machine controls offering available to Public Housing and Multifamily participants only
Exterior	<ul style="list-style-type: none"> ▪ New measures: Security lighting, walkway lighting, parking lot lighting 	<ul style="list-style-type: none"> ▪ CMC staff complete the assessment ▪ Program allies install exterior measures
Building Envelope	<ul style="list-style-type: none"> ▪ Existing measures: Air sealing, attic insulation ▪ Measure offerings available to Public Housing and Income Qualified – Multifamily participants only 	<ul style="list-style-type: none"> ▪ CMC staff complete the assessment ▪ Program allies install building envelope measures ▪ 100% of multifamily building envelope projects receive both pre- and post-installation inspections
Room Air Conditioner Replacement Pilot	<ul style="list-style-type: none"> ▪ New measure: Room air conditioner unit ▪ Measure offering available to Public Housing and Income Qualified – Multifamily participants only 	<ul style="list-style-type: none"> ▪ Property manager completes installation process, with QA/QC from CMC ▪ Room Air Conditioner pilot requires a 100% validation of new unit installation and removal and recycling of old unit

In cases where participating customers chose to pursue additional upgrades beyond the offerings available through the Multifamily initiatives, the EA continued to serve as the single point of contact in helping the customer navigate an expanded project scope. This hallmark of the one-stop shop model ensures that these customers can seamlessly tap into all opportunities available to their properties. Program allies conducted their own in-depth audit to develop work scopes and incentive quotes. The EA communicated with the property manager throughout the process, providing support and expertise to create a smooth participation experience. If the property manager chose not to take full advantage of the available incentives at the time of the assessment, CMC staff also followed up about completing additional work in the future.

Summary of Key Implementation Changes in 2020

AIC made several changes to the Multifamily initiatives in 2020 to support transition to the one-stop shop delivery model and to address the impacts of COVID-19:

- **One-stop shop approach:** The primary 2020 implementation change was the transition to the one-stop shop model described in the previous section. This change consolidated many AIC services and measures into one streamlined offering for Multifamily property managers and tenants. The model allows property managers to maintain a single point of contact while accessing separately administered offerings for their property. This delivery model provides property managers with an

opportunity to develop a trusted relationship with their EA, through whom they can obtain technical assistance on any aspect of their project.

- **COVID-19 Impacts on Delivery:** In response to statewide restrictions and social distancing guidelines due to the COVID-19 pandemic, AIC suspended most in-person installation activities for the majority of the 2020 calendar year. As a result, implementation shifted to several virtual delivery methods, including the Material Drop Ship option, the Green Bag option, Virtual Property Assessments, and the Room Air Conditioner Installation pilot.
- **Material Drop Ship and Green Bag Options:** For the Material Drop Ship and Green Bag delivery models, CMC compiled an order based on the qualifying measures recommended in each property's assessment and CMC drop-shipped the order contact-free to the property. The primary distinction between the Material Drop Ship and Green Bag options is that property management staff installs the measures provided through Material Drop Ship, while the tenant installs the measures in the Green Bag left at their door. The Green Bag option includes primarily in-unit measures that tenants can install, such as LEDs and power strips. The Material Drop Ship option can include any measure type that qualified in the assessment at the discretion of the property. Property managers had the option to choose which measures they would like to receive through their bag drop.
- **Virtual Property Assessments:** As a result of COVID-19, AIC shifted its on-site property assessments to online assessments, which consist of a short intake application and virtual interview to determine property characteristics and eligibility. Measure offerings remained the same under the modification to the assessment process. AIC staff noted the virtual option allowed them to expand the reach of the assessments to rural areas.
- **Room Air Conditioner Installation Pilot:** As highlighted above, AIC began offering a Room Air Conditioner Installation pilot in 2020. This pilot allows properties participating in the Public Housing and Income Qualified – Multifamily initiatives to replace their existing room air conditioner units with higher-efficiency units free of charge. Due to COVID-19 restrictions during the 2020 program year, AIC implemented the pilot without in-person contact. Upon completion of an application with approval from both CMC and Leidos, CMC shipped room air conditioners to the complex for maintenance staff to install. EAs verified unit installation through direct observation or through photos provided by the property managers.

3.3.2 Participation Summary

Table 35 presents participation in the Multifamily initiatives in 2020. Despite being required to pause and pivot initiative delivery methods due to the COVID-19 pandemic, Income Qualified – Multifamily and Public Housing surpassed expectations for the number of tenant units served. Implementation staff reported that the new virtual outreach and audit initiative components were very effective and helped staff reach more customers than they would otherwise have been able to reach with in-person only outreach approaches. Additional successful aspects of these initiatives in 2020 include two pilot offerings that were unavailable to Multifamily Initiative customers: the Room Air Conditioner Replacement and ductless mini-split heat pump offerings. Overall, AIC delivered 20,557 measures through 214 unique projects at 127 unique properties and 3,997 unique tenant units through Multifamily initiatives in 2020.²²

²² Estimates of property and tenant unit counts were developed through Opinion Dynamics' analysis of tracking data, including categorization of different addresses together, and may differ from internal implementation estimates. In particular, the evaluation team received two datasets from the implementer: a tenant-level dataset and a property-level dataset. The evaluation team calculated

Table 35. 2020 Multifamily Initiatives Participation Summary

Unique Properties	Public Housing	Income Qualified – Multifamily	Multifamily	Total
Unique Properties ^a	48	73	6	127
Unique Projects	91	109	14	214
Unique Tenant Units	1,273	1,801	923	3,997
Measure Count ^b	9,464	9,445	4,629	23,538

^a Unique properties are defined by geographic location, so multiple buildings in the same location comprise one property.

^b The units for attic insulation, pipe insulation, and air sealing represent the number of discrete installations.

Table 36 and Table 37 present the quantity and frequency of measures delivered to property managers through the Multifamily initiatives. Property managers most frequently received APS, LEDs, air sealing, and faucet aerators. LEDs, APS, and faucet aerators also comprised the greatest quantity of measures delivered to property managers. While not available to Multifamily Initiative customers this year, Public Housing and Income Qualified – Multifamily distributed a total of 77 ductless heat pumps in their pilot years, surpassing expectations.

Implementation staff reported that the Public Housing Initiative was most affected by the COVID-19 pandemic regulations. Properties within this delivery channel were especially sensitive because AIC serves more susceptible populations, such as senior living facilities, through the Public Housing Initiative. In particular, implementation staff reported that the delivery of advanced thermostats to public housing residents was lower than expected and that gaining interest in this sector has been a challenge. In 2020, the Initiative distributed 66 advanced thermostats, compared to 440 and 291 advanced thermostats through the Income Qualified – Multifamily and Multifamily Initiatives, respectively. Educational resources are under development to improve advanced thermostat offering uptake among property managers in 2021.

Table 36. 2020 Multifamily Initiatives Quantity of Measures Delivered

Measure Type	Public Housing	Income Qualified – Multifamily	Multifamily
LED	6,906	4,651	3,578
APS	1,103	1,264	700
Faucet Aerator	716	974	39
Room Air Conditioner	289	132	Not Offered
Showerhead	267	1,901	20
Advanced Thermostat	66	440	291
Air Sealing	45	23	1
Attic Insulation	41	2	Not Offered
Ductless Heat Pump	28	49	Not Offered
Pipe Insulation	3	9	0
Total	9,464	9,445	4,629

Note: The units for attic insulation, pipe insulation, and air sealing are the number of discrete installations, and all other quantities are measured in units of equipment.

counts of unique participants and measures using the property-level dataset and calculated counts of unique tenant units using the tenant-level dataset. These two databases are not linked, and the initiative implementer reports that counts of tenant units are subject to greater incidence of human error.

Table 37. Multifamily Initiatives Frequency of Properties That Received Each Measure Type

Measure Type	Public Housing	Income Qualified – Multifamily	Multifamily
APS	29	40	3
LED	28	29	3
Air Sealing	12	23	1 ^a
Faucet Aerator	12	13	1
Attic Insulation	9	2	Not Offered
Showerhead	8	37	1
Room Air Conditioner	8	12	Not Offered
Advanced Thermostat	3	27	4
Pipe Insulation	3	8	0
Ductless Heat Pump	2	9	Not Offered

Note: Units shown are the number of unique properties that received each measure type. Unique properties are defined by geographic location, so multiple buildings in the same location comprise one property.

^a While the Building Envelope air sealing measures were available only to Public Housing and Income Qualified – Multifamily participants, outlet and switch wall plate gaskets and door sweeps were available for in-unit installations for Multifamily Initiative customers.

3.3.3 Annual Savings Summary

Table 38 through Table 40 present the annual savings achieved from the Multifamily initiatives in 2020. Initiative staff reported serving more all-electric properties and fewer dual-fuel properties in 2020 than in previous years, which reduced opportunities to reach gas goals. COVID-19 modestly affected the savings performance for the Multifamily Initiative and Income Qualified – Multifamily but significantly affected performance for the Public Housing Initiative. The SAG-approved NTGRs were used to convert verified gross energy and demand annual savings to verified net annual energy and demand savings.

The 2020 Public Housing Initiative achieved 680 MWh, 0.13 MW, and 8,254 therms in verified net annual savings (Table 38).

Table 38. 2020 Public Housing Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	735	0.11	8,232
Gross Realization Rate	92%	115%	100%
Verified Gross Savings	680	0.13	8,254
NTGR	1.000	1.000	1.000
Verified Net Savings	680	0.13	8,254

The 2020 Income Qualified Initiative – Multifamily channel achieved 1,158 MWh, 0.17 MW, and 4,996 therms in verified net annual savings (Table 39).

Table 39. 2020 Income Qualified – Multifamily Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	1,224	0.18	5,267
Gross Realization Rate	95%	99%	95%
Verified Gross Savings	1,158	0.17	4,996
NTGR	1.000	1.000	1.000
Verified Net Savings	1,158	0.17	4,996

The 2020 Multifamily Initiative achieved 350 MWh, 0.05 MW, and 3,214 therms in verified net annual savings (Table 40).

Table 40. 2020 Multifamily Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	398	0.05	3,214
Gross Realization Rate	89%	100%	100%
Verified Gross Savings	354	0.05	3,214
NTGR	0.989	0.986	1.000
Verified Net Savings	350	0.05	3,214

3.3.4 Savings Detail

Table 41 through Table 43 show the measures distributed through the Multifamily initiatives in 2020. The Multifamily initiatives distributed 15 measure types overall. The Income Qualified – Multifamily, Public Housing, and Multifamily initiatives delivered 15, 14, and 8 measure types, respectively. The measure types that comprised the largest share of overall savings varied by initiative. For the Public Housing Initiative, standard LEDs and ductless heat pumps contributed 28% and 26% of the total verified energy savings, respectively. Advanced thermostats and ductless heat pumps together contributed 48% of the total verified energy savings for Income Qualified – Multifamily, while advanced thermostats contributed 59% of the total verified energy savings for the Multifamily Initiative.

Table 41. 2020 Multifamily Initiatives Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Public Housing					
Standard LED	243	78%	190	1.000	190
Ductless Heat Pump	179	100%	179	1.000	179
Room Air Conditioner	72	100%	72	1.000	72
APS - Tier 1	47	100%	47	1.000	47
Advanced Thermostat	47	100%	47	N/A	47
Attic Insulation	45	100%	45	1.000	45
Pipe Insulation	30	100%	30	1.000	30
Air Sealing	19	99%	19	1.000	19

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Faucet Aerator	18	100%	18	1.000	18
Showerhead	17	100%	17	1.000	17
Specialty LED	8	100%	8	1.000	8
Door Sweep	5	100%	5	1.000	5
Thermostatic Restrictor Shower Valve	5	67%	3	1.000	3
Wall Plate Gasket	0.3	100%	0.3	1.000	0.3
Total	735	92%	680	1.000	680
Income Qualified – Multifamily					
Advanced Thermostat	318	100%	318	N/A	318
Ductless Heat Pump	264	100%	264	1.000	264
Showerhead	172	101%	174	1.000	174
Standard LED	146	73%	106	1.000	106
Faucet Aerator	72	100%	72	1.000	72
Thermostatic Restrictor Shower Valve	62	87%	54	1.000	54
APS - Tier 1	57	100%	57	1.000	57
Standard LED (Common Area)	37	58%	22	1.000	22
Room Air Conditioner	34	100%	34	1.000	34
Pipe Insulation	18	100%	18	1.000	18
Door Sweep	13	100%	13	1.000	13
Specialty LED	13	64%	8	1.000	8
Wall Plate Gasket	9	100%	9	1.000	9
Air Sealing	5	100%	5	1.000	5
Attic Insulation	2	100%	2	1.000	2
Total	1,224	95%	1,158	1.000	1,158
Multifamily					
Advanced Thermostat	235	100%	235	N/A	235
Standard LED	116	67%	78	0.960	75
APS - Tier 1	29	100%	29	0.980	28
Specialty LED	10	53%	5	0.960	5
Faucet Aerator	4	100%	4	1.004	4
Showerhead	3	100%	3	1.004	3
Thermostatic Restrictor Shower Valve	1	67%	0.5	0.800	0.4
Wall Plate Gasket	0.4	100%	0.4	0.861	0.4
Total	398	89%	354	0.989	350

Table 42. 2020 Multifamily Initiatives Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Public Housing					
Room Air Conditioner	0.047	134%	0.064	1.000	0.064
Standard LED	0.029	100%	0.029	1.000	0.029
Advanced Thermostat	0.007	100%	0.007	N/A	0.007
Faucet Aerator	0.005	95%	0.005	1.000	0.005
APS - Tier 1	0.005	100%	0.005	1.000	0.005
Ductless Heat Pump	0.005	100%	0.005	1.000	0.005
Air Sealing	0.004	95%	0.003	1.000	0.003
Pipe Insulation	0.003	100%	0.003	1.000	0.003
Attic Insulation	0.003	134%	0.004	1.000	0.004
Showerhead	0.002	88%	0.002	1.000	0.002
Specialty LED	0.001	100%	0.001	1.000	0.001
Thermostatic Restrictor Shower Valve	0.0004	64%	0.0002	1.000	0.0002
Total	0.113	115%	0.130	1.000	0.130
Income Qualified – Multifamily					
Advanced Thermostat	0.041	101%	0.042	N/A	0.042
Faucet Aerator	0.035	94%	0.033	1.000	0.033
Showerhead	0.023	96%	0.022	1.000	0.022
Room Air Conditioner	0.023	134%	0.030	1.000	0.030
Standard LED	0.018	100%	0.018	1.000	0.018
Ductless Heat Pump	0.011	100%	0.011	1.000	0.011
Thermostatic Restrictor Shower Valve	0.010	39%	0.004	1.000	0.004
APS - Tier 1	0.006	100%	0.006	1.000	0.006
Standard LED (Common Area)	0.004	100%	0.004	1.000	0.004
Pipe Insulation	0.002	100%	0.002	1.000	0.002
Specialty LED	0.002	100%	0.002	1.000	0.002
Air Sealing	0.0002	95%	0.0001	1.000	0.0001
Attic Insulation	0.0001	132%	0.0002	1.000	0.0002
Total	0.175	99%	0.174	1.000	0.174
Multifamily					
Advanced Thermostat	0.030	100%	0.030	N/A	0.030
Standard LED	0.014	100%	0.014	0.960	0.014
APS - Tier 1	0.003	100%	0.003	0.980	0.003
Faucet Aerator	0.002	95%	0.001	1.004	0.001
Specialty LED	0.001	100%	0.001	0.960	0.001
Showerhead	0.0003	96%	0.0003	1.004	0.0003
Thermostatic Restrictor Shower Valve	0.0001	64%	0.00004	0.800	0.00003
Total	0.050	100%	0.050	0.986	0.049

Table 43. 2020 Multifamily Initiatives Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Public Housing					
Faucet Aerator	3,747	100%	3,747	1.000	3,747
Showerhead	1,618	100%	1,618	1.000	1,618
Attic Insulation	1,375	102%	1,396	1.000	1,396
Advanced Thermostat	927	100%	927	N/A	927
Air Sealing	456	100%	456	1.000	456
Wall Plate Gasket	109	100%	109	1.000	109
Total	8,232	100%	8,254	1.000	8,254
Income Qualified – Multifamily					
Showerhead	2,411	100%	2,411	1.000	2,411
Advanced Thermostat	999	100%	999	N/A	999
Thermostatic Restrictor Shower Valve	821	67%	550	1.000	550
Wall Plate Gasket	804	100%	804	1.000	804
Faucet Aerator	233	100%	233	1.000	233
Total	5,267	95%	4,996	1.000	4,996
Multifamily					
Advanced Thermostat	3,214	100%	3,214	N/A	3,214
Total	3,214	100%	3,214	1.000	3,214

The 2020 Public Housing, Income Qualified – Multifamily, and Multifamily initiatives achieved the following gross realization rates:

- **Public Housing:** 92% electric energy savings, 115% electric demand savings, 100% gas savings
- **Income Qualified – Multifamily:** 95% electric energy savings, 99% electric demand savings, 95% gas savings
- **Multifamily:** 89% electric energy savings, 100% electric demand savings, 100% gas savings

The decrease in electric realization rates across each initiative is primarily driven by decreased verified savings from lighting measures due the inclusion of electric heating penalties (further discussion is provided in Section 3.3.6). Demand realization rates are primarily driven by increased verified savings from room air conditioners and attic insulation. The gas realization rate is due to decreased verified savings for thermostatic restrictor shower valves.

- **LEDs:** The gross realization rate for standard LEDs was 74% for electric energy savings and 100% for electric demand savings. The gross realization rate for common area standard LEDs was 58% for electric energy savings and 100% for electric demand savings. The gross realization rate for specialty LEDs was 69% for electric energy savings and 100% for electric demand savings.
- The verified analysis claims electric heating penalties for LEDs installed in electrically heated space, where ex ante excludes them, resulting in considerably lower verified electric energy savings.

- **Advanced Thermostat:** The gross realization rate for advanced thermostats was 100% for electric energy savings, 101% for electric demand savings, and 100% for gas savings.
 - When calculating demand savings, the ex ante analysis applied the default cooling efficiency (7.5 EER) from the IL-TRM V8.0. The IL-TRM V8.0 states that the default should be used when actual SEER is unknown, instead of converting SEER to EER using the conversion formula when actual SEER is known. As a result, the default efficiency is lower, resulting in slightly higher verified demand savings.
- **Showerhead:** The gross realization rate for showerheads was 101% for electric energy savings, 95% for electric demand savings, and 100% for gas savings.
 - The verified analysis claims secondary electric savings from showerheads with gas water heating per the IL-TRM V8.0, where ex ante savings excludes them, resulting in slightly higher verified electric energy savings.
 - The verified analysis excludes secondary electric savings when calculating demand savings, resulting in lower electric demand savings.
- **Room Air Conditioner:** The gross realization rate for room air conditioners was 100% for electric energy savings and 134% for electric demand savings.
 - The IL-TRM V8.0 suggests converting the efficient combined energy efficiency rating (CEER) value to EER when developing existing efficiency assumptions. Instead, ex ante mistakenly converted the efficient EER value in place of CEER when deriving existing conditions, resulting in higher verified electric demand savings.
- **Faucet Aerator:** The gross realization rate for faucet aerators was 100% for electric energy savings, 94% for electric demand savings, and 100% for gas savings.
 - The verified analysis excludes secondary electric savings when calculating demand savings, resulting in lower electric demand savings.
- **Thermostatic Restrictor Shower Valve:** The gross realization rate for thermostatic restrictor shower valves was 86% for electric energy savings, 40% for electric demand savings, and 67% for gas savings.
 - The verified analysis applies the flow-rate of the installed showerhead (1.5 gpm) for customers who received them through the initiatives, instead of the flow-rate for the thermostatic restrictor valve device (2.24 gpm) per the IL-TRM V8.0, resulting in significantly lower electric energy and gas savings.
 - The verified analysis claims secondary electric savings from thermostatic restrictor shower valves installed in dwellings with gas water heating per the IL-TRM V8.0, where ex ante excludes them, resulting in slightly higher verified electric energy savings.
 - The verified analysis excludes secondary electric savings when calculating demand savings, resulting in lower electric demand savings.
- **Attic Insulation:** The gross realization rate for attic insulation was 100% for electric energy savings, 134% for electric demand savings, and 102% for gas savings.
 - The Initiative tracking database excludes cooling equipment age. Therefore, the verified analysis relied on the cooling efficiency default from the IL-TRM V8.0 for unknown equipment age (10.5 SEER). The ex ante savings applied the default from the IL-TRM V8.0 for cooling equipment manufactured prior to 2006, resulting in slightly lower electric energy and demand savings.

- The verified analysis applied a net savings adjustment of 110% to Income Qualified – Multifamily properties that installed both air sealing and attic insulation per the IL-TRM V8.0. In very few cases (n=2), ex ante misapplied the net savings adjustment when the project met the conditions, resulting in higher electric energy and gas savings.
- The verified analysis is unable to recreate the demand savings for attic insulation using the provided ex ante savings assumptions, and we are therefore unable to identify a specific cause for the higher demand realization rates.
- **Air Sealing:** The gross realization rate for air sealing was 99% for electric energy savings, 95% for electric demand savings, and 100% for gas savings.
- Because the Initiative tracking database excludes cooling equipment age, the verified analysis relied on the cooling efficiency default from the IL-TRM V8.0 for unknown equipment age (10.5 SEER). The ex ante savings applied the default from the IL-TRM V8.0 for cooling equipment manufactured prior to 2006, resulting in lower electric energy and demand savings.

3.3.5 Cumulative Persisting Annual Savings

Table 44 presents combined CPAS and WAML for the 2020 Multifamily initiatives. The measure-specific and total verified gross savings for each channel and CPAS in each year of the 2018–2021 Plan are presented. The combined WAML for the initiatives is 11.7 years. CPAS and WAML for each channel at a measure level are summarized in Table 45 through Table 47.

Table 44. 2020 Multifamily Initiatives CPAS and WAML

Channel	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Public Housing	12.6	680	1.000			680	680	...	368	...	8,186
Income Qualified – Multifamily	11.5	1,158	1.000			1,158	1,158	...	652	...	13,190
Multifamily	10.4	354	0.989			350	350	...	235	...	3,374
2020 CPAS		2,192	0.998			2,188	2,188	...	1,255	...	24,750
Expiring 2020 CPAS						0	0	...	612	...	
Expired 2020 CPAS						0	0	...	933	...	
WAML	11.7										

Table 45. 2020 Public Housing Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Standard LED	10.0	190	1.000			190	190	...	0	...	1,747
Ductless Heat Pump	15.0	179	1.000			179	179	...	179	...	2,690
Room Air Conditioner	12.0	72	1.000			72	72	...	45	...	646
APS - Tier 1	7.0	47	1.000			47	47	...	0	...	328
Advanced Thermostat	11.0	47	N/A			47	47	...	47	...	513
Attic Insulation	20.0	45	1.000			45	45	...	44	...	887
Pipe Insulation	15.0	30	1.000			30	30	...	30	...	454
Air Sealing	20.0	19	1.000			19	19	...	18	...	366
Faucet Aerator	10.0	18	1.000			18	18	...	0	...	176
Showerhead	10.0	17	1.000			17	17	...	0	...	175
Specialty LED	10.0	8	1.000			8	8	...	0	...	66
Door Sweep	20.0	5	1.000			5	5	...	5	...	104
Thermostatic Restrictor Shower Valve	10.0	3	1.000			3	3	...	0	...	31
Wall Plate Gasket	20.0	0.3	1.000			0.3	0.3	...	0.3	...	6
2020 CPAS		680	1.000			680	680	...	368	...	8,186
Expiring 2020 CPAS						0	0	...	182	...	
Expired 2020 CPAS						0	0	...	312	...	
WAML	12.6										

Table 46. 2020 Income Qualified – Multifamily CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)						Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...
Advanced Thermostat	11.0	318	N/A			318	318	...	318	...
Ductless Heat Pump	15.0	264	1.000			264	264	...	264	...
Showerhead	10.0	174	1.000			174	174	...	0	...
Standard LED	10.0	106	1.000			106	106	...	0	...
Faucet Aerator	10.0	72	1.000			72	72	...	0	...
APS - Tier 1	7.0	57	1.000			57	57	...	0	...
Thermostatic Restrictor Shower Valve	10.0	54	1.000			54	54	...	0	...
Room Air Conditioner	12.0	34	1.000			34	34	...	21	...
Standard LED (Common Area)	3.4	22	1.000			22	22	...	0	...
Pipe Insulation	15.0	18	1.000			18	18	...	18	...
Door Sweep	20.0	13	1.000			13	13	...	13	...
Wall Plate Gasket	20.0	9	1.000			9	9	...	9	...
Specialty LED	10.0	8	1.000			8	8	...	0	...
Air Sealing	20.0	5	1.000			5	5	...	5	...
Attic Insulation	20.0	2	1.000			2	2	...	2	...
2020 CPAS		1,158	1.000			1,158	1,158	...	652	...
Expiring 2020 CPAS						0	0	...	390	...
Expired 2020 CPAS						0	0	...	506	...
WAML	11.5									

Table 47. 2020 Multifamily Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Advanced Thermostat	11.0	235	N/A			235	235	...	235	...	2,586
Standard LED	10.0	78	0.960			75	75	...	0	...	479
APS - Tier 1	7.0	29	0.980			28	28	...	0	...	198
Specialty LED	10.0	5	0.960			5	5	...	0	...	38
Faucet Aerator	10.0	4	1.004			4	4	...	0	...	36
Showerhead	10.0	3	1.004			3	3	...	0	...	26
Thermostatic Restrictor Shower Valve	10.0	0.5	0.800			0.4	0.4	...	0	...	4
Wall Plate Gasket	20.0	0.4	0.861			0.4	0.4	...	0.4	...	8
2020 CPAS		354	0.989			350	350	...	235	...	3,374
Expiring 2020 CPAS						0	0	...	39	...	
Expired 2020 CPAS						0	0	...	115	...	
WAML	10.4										

3.3.6 Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Multifamily initiatives moving forward:

- **Key Finding #1:** Ex ante savings calculations exclude electric heating penalties for all lighting measures installed in electrically heated space. SAG has reached consensus that electric heating penalties must be incorporated into verified savings, and a formal Illinois policy agreement will be issued in 2021 codifying this agreement.²³ The evaluation team regrets any inconsistent guidance on this topic in previous program years but has now consistently incorporated this treatment across the portfolio. Incorporation of electric heating penalties into verified savings is responsible for a substantial amount of variance between ex ante and verified savings.
- **Recommendation:** Moving forward, consistently account for interactive effects when reporting total ex ante lighting savings, including both heating penalties and cooling benefits, to align with Illinois policy.
- **Key Finding #2:** Ex ante savings calculations inconsistently claim secondary electric savings from water conservation measures installed in homes with gas water heating.
- **Recommendation:** Ensure that all water conservation measures claim secondary electric savings, regardless of the water heating fuel type.
- **Key Finding #3:** Ex ante includes secondary electric savings from water conservation measures when calculating demand savings. IL-TRM guidance in past years on this matter has been inconsistent, but the IL-TRMs for 2021 and beyond have clarified that secondary electric savings from water conservation measures should not be included when calculating demand savings.
- **Recommendation:** Exclude secondary electric savings from demand savings calculations.
- **Key Finding #4:** Minor errors in the application of IL-TRM V8.0 and relevant parameters exist across the Initiatives.
- **Recommendation:** While errors beyond those discussed in more detail above do not significantly affect realization rates for the initiatives, the implementation team should carefully examine IL-TRM algorithms and assumptions each year to ensure continued success in initiative performance.

3.4 HVAC Initiative

3.4.1 Initiative Description

During the 2020 program year, the HVAC Initiative offered incentives for advanced thermostats, ASHPs, CACs, and HPWHs to AIC residential customers. AIC provides incentives to customers through registered trade allies as direct discounts on the equipment and installation costs, which typically appear as a line-item deduction on the installation invoices. Table 48 summarizes the incentives available for each Initiative measure and the requirements to receive those incentives.

²³ Treatment of electric heating penalties is consistent with a draft SAG policy agreement on this topic. Illinois Energy Efficiency Stakeholder Advisory Group. "Policy Resolution - 2020 Program Year." 2020. Accessed at: <https://ilsag.s3.amazonaws.com/SAG-Policy-Res-Heating-Penalties-Negative-Savings-11-30.docx>.

Table 48. HVAC Initiative Measure and Incentive Summary

Measure	Description
CACs	<ul style="list-style-type: none"> ▪ \$350 incentive to replace existing CAC ▪ Must be ≥ 16 SEER and ≥ 12.5 EER
ASHPs	<ul style="list-style-type: none"> ▪ \$600 incentive to replace existing ASHP ▪ \$850 incentive to replace a working ASHP w/SEER rating ≤ 10 ▪ \$1,200 incentive to replace an electric furnace/baseboard and CAC; existing CAC must be SEER ≤ 10 ▪ All replacements must be ≥ 16 SEER and ≥ 12.5 EER
Advanced Thermostats	<ul style="list-style-type: none"> ▪ \$100 incentive when installed by trade ally and part of heating and cooling project
HPWHs	<ul style="list-style-type: none"> ▪ \$500 incentive to install a HPWH (offered through September 2020 and then the measure moved to a midstream approach, where the incentive to the distributor was set at \$1,000)

Summary of Key Implementation Changes in 2020

Overall, the 2020 HVAC Initiative looked very similar to the 2019 implementation of the Initiative, with some notable exceptions. Interviews with program staff and program implementers revealed the following changes to initiative offerings and delivery in 2020:

- **Reduced the CAC incentive by \$50:** Lowering the incentive amount helped the Initiative serve more AIC customers with the same budget. Program staff noted participation was similar to 2019 despite lowering the incentive and challenges to implementation due to COVID-19. Instead, participation in the Initiative and interest in CACs started earlier in the year than in years past.
- **Pilot for Building Envelope Services:** The Initiative began making insulation measures available to market rate customers, but they saw little interest among customers in the spring. By Q4, the Initiative had booked 39 projects, yet they planned for 400. The smaller-than-anticipated number of participants was partially due to COVID-19 affecting trade allies' ability to serve customers and customers being able to pay for such services. In addition, the marketing team tasked with building awareness of the building envelope program had to transition to generating awareness about COVID-related safety protocols. The Initiative team has a plan to transition this service into its own offering independent of the HVAC Initiative in 2021—the Home Efficiency – Market Rate Initiative—and will strengthen these services in 2021, including:
 - Administering a concerted marketing effort
 - Creating one workbook for contractors to use for both market-rate and low-income customers; currently, contractors must use two different workbooks, which has caused confusion for contractors who are not sure which workbook to use
 - Developing an online application process for building envelope services
- **On-Bill Financing:** The Initiative offered OBF starting on January 1, 2020, after a pause in OBF in 2018 and 2019 due to implementation partner changes. The implementation team noted a few challenges associated with offering OBF in 2020:
 - The financing company requires the name on the utility bill, the name on a mortgage, and the name on the OBF application to be the same. However, many households have one spouse's name on the utility bill and a different spouse's name on the mortgage. Getting these items changed can be a barrier to a customer proceeding with the OBF process.

- Some trade allies do not want to use the online application process for financing and instead send the implementation team paper applications to submit, which can slow down the process dramatically. Implementation staff have noted that they plan on increasing training for such trade allies who have reported challenges using the online portal.
- Several customers do not have high enough credit scores to make them eligible for OBF. However, program staff noted that this challenge was consistent with previous program years.
- **Transition to Midstream Program Model for HPWH:** Like 2019, the Initiative struggled to increase uptake of the HPWH measure. Program staff attributed the slow uptake to a lack of customer awareness of HPWH technology, as well as the limited number of trained program allies who can perform HPWH installations. Complicating matters was the delay of a marketing push scheduled for HPWHs in the first half of 2020 due to COVID-19. To increase traction with the measure, the Initiative took a new approach in September of 2020 by moving from a downstream incentive approach to a midstream approach. The Initiative will fully transition to a midstream model for all measures in 2021.

3.4.2 Participation Summary

The HVAC Initiative distributed 14 measures (Table 49) in 2020. Measures included ASHPs, CACs, HPWHs, ductless heat pumps, and advanced thermostats. For both ASHP and CAC measures, the Initiative supported the ER of existing heating and cooling equipment. Additionally, in 2020, the HVAC Initiative piloted seven building weatherization measures: air sealing, attic insulation, crawl space insulation, duct sealing, bathroom exhaust fans, rim joist insulation, and wall insulation.

Despite reducing the CAC incentive, the Initiative saw similar, if not slightly greater, levels of uptake for that measure compared to 2019. This equipment, along with advanced thermostats, represent more than three-quarters of measures installed through the program.

Table 49. 2020 HVAC Initiative Participation Summary

Measure Type	Project Count	Measure Count ^a
CAC	2,275	2,277
CAC ER	1,920	1,920
Advanced Thermostat	1,423	1,423
ASHP	408	408
ASHP ER	137	137
Ductless Heat Pump	75	77
Air Sealing	42	51,026
Attic Insulation	33	48,080
Bathroom Exhaust Fan	28	28
Rim Joist Insulation	25	2,679
HPWH	20	20
Wall Insulation	15	13,601
Crawl Space Insulation	11	1,033
Duct Sealing	4	4
Total	5,154	122,713

^a Units for shell measures are reported in linear or square feet rather than individual measures.

3.4.3 Initiative Annual Savings Summary

Table 50 presents HVAC Initiative annual savings achieved in 2020. The 2020 HVAC Initiative achieved 5,884 MWh, 3.41 MW, and 73,773 therms in verified net savings. SAG-approved NTGRs were used to convert verified annual gross energy and demand savings to verified net savings.

Table 50. 2020 HVAC Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	6,103	4.12	71,996
Gross Realization Rate	129%	112%	104%
Verified Gross Savings	7,867	4.63	75,185
NTGR	0.748	0.736	0.981
Verified Net Savings	5,884	3.41	73,773

3.4.4 Initiative Savings Detail

Table 51 presents the HVAC Initiative electric energy savings achieved in 2020 by measure. CAC ER (54%), CAC (12%), ASHP ER (16%), and ASHP (5%) measures contributed a majority (88%) of verified net electric energy savings. Advanced thermostats contributed 8%, followed by ductless heat pumps (3%) and HPWHs (1%). The building weatherization pilot measures made up a small percentage of distributed measures in 2020, together contributing the remaining (<1%) ex ante electric energy savings.

Table 51. 2020 HVAC Initiative Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
CAC ER	2,545	165%	4,207	0.761	3,202
ASHP ER	1,105	113%	1,246	0.761	948
CAC	1,097	100%	1,097	0.641	703
Advanced Thermostat	489	99%	483	N/A	483
ASHP	475	100%	477	0.641	306
Ductless Heat Pump	292	89%	260	0.641	167
HPWH	48	95%	46	0.760	35
Air Sealing	20	100%	20	0.800	16
Attic Insulation	15	99%	14	0.800	12
Bathroom Exhaust Fan	6	95%	6	0.800	5
Duct Sealing	5	100%	5	0.800	4
Wall Insulation	5	100%	5	0.800	4
Crawl Space Insulation	1	100%	1	0.800	1
Rim Joist Insulation	1	100%	1	0.800	<1
Total	6,103	129%	7,867	0.748	5,884

Table 52 presents the HVAC Initiative electric demand savings achieved in 2020 by measure. The CAC ER (70%) and CAC (20%) measures contributed the majority (approximately 90%) of verified net demand savings. ASHP ER measures contributed to 5% of ex ante electric demand savings, followed by ASHP (2%) and

advanced thermostat (3%) measures. The remaining measures in the HVAC Initiative collectively contributed the remaining (1%) ex ante demand savings.

Table 52. 2020 HVAC Initiative Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
CAC ER	2.64	118%	3.12	0.761	2.37
CAC	1.05	100%	1.05	0.641	0.67
ASHP ER	0.19	118%	0.22	0.761	0.17
ASHP	0.11	100%	0.11	0.641	0.07
Advanced Thermostat	0.11	98%	0.11	N/A	0.11
Air Sealing	0.01	100%	0.01	0.800	0.01
Ductless Heat Pump	0.01	88%	<0.01	0.641	<0.01
Attic Insulation	0.01	93%	0.01	0.800	<0.01
HPWH	<0.01	95%	<0.01	0.760	<0.01
Wall Insulation	<0.01	96%	<0.01	0.800	<0.01
Duct Sealing	<0.01	100%	<0.01	0.800	<0.01
Bathroom Exhaust Fan	<0.01	95%	<0.01	0.800	<0.01
Crawl Space Insulation	<0.01	100%	<0.01	0.800	<0.01
Rim Joist Insulation	<0.01	100%	<0.01	0.800	<0.01
Total	4.12	112%	4.63	0.736	3.41

Table 53 presents the HVAC Initiative gas savings achieved in 2020 by measure. Advanced thermostat measures contributed the majority (92%) of verified net gas savings, followed by air sealing (2%), attic insulation (2%), wall insulation (1%), duct sealing (1%), and crawl space insulation (1%) measures. Rim joist insulation measures contributed the remaining (<1%) of verified net gas savings.

Table 53. 2020 HVAC Initiative Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
Advanced Thermostat	65,203	104%	68,122	N/A	68,122
Air Sealing	2,259	100%	2,259	0.800	1,808
Attic Insulation	2,105	100%	2,105	0.800	1,684
Wall Insulation	1,019	95%	963	0.800	771
Duct Sealing	805	140%	1,131	0.800	905
Crawl Space Insulation	462	100%	462	0.800	369
Rim Joist Insulation	143	100%	143	0.800	114
Total	71,996	104%	75,185	0.981	73,773

Overall, the 2020 HVAC Initiative achieved 129%, 112%, and 104% gross realization rates for electric energy, electric demand, and gas savings, respectively. The high electric energy and demand gross realization rates are due primarily to increased verified savings for the CAC ER and ASHP ER measures. The gas realization rate is due to increased verified savings from advanced thermostats and duct sealing.

We describe the key drivers of differences between ex ante and verified savings below.

- **CAC ER and ASHP ER:** The gross realization rate for CAC ERs was 165% for electric energy savings and 118% for electric demand savings. The gross realization rate for ASHP ERs was 113% for electric energy savings and 118% for electric demand savings. Both of these results drive up the electric energy and demand realization rates for the overall HVAC Initiative.
 - The verified analysis de-rated actual existing efficiencies by 1% per year based on the age of the existing equipment, as required by the IL-TRM V8.0 when using rated efficiencies. The de-rated efficiency levels were lower than the rated efficiencies used in the ex ante estimates, contributing to higher verified electric energy savings. This is the primary driver of discrepancies between ex ante and verified electric energy savings.
 - While ex ante calculations assume an existing efficiency of 7.5 EER (the IL-TRM V8.0 default value) for all measures, the IL-TRM V8.0 instructs the use of actual EER ratings when possible. The verified analysis calculates existing EER from actual tracked existing SEER values, when available, and de-rates these existing efficiency values as instructed in the TRM. This disparity in the existing efficiency values drives almost 90% of the difference between ex ante and verified electric demand savings.
- **Advanced Thermostat:** The gross realization rate for advanced thermostats was 99% for electric energy savings, 98% for electric demand savings, and 104% for gas savings.
 - Ex ante misclassified 62 records with tracked gas heating equipment as having the electric heating product code "SMARTTSTAT_ELECTRIC." Ex ante claimed no therms savings for these records. The verified analysis includes therms savings for all records with tracked natural gas heating, increasing overall therms savings. This is the primary driver of discrepancies between ex ante and verified gas savings.
- **Ductless Heat Pump:** The gross realization rate for ductless heat pumps was 89% for electric energy savings and 88% for electric demand savings.
 - For 24% of measures, ex ante assumes electric resistance or ASHP existing heating equipment for a record with a natural gas tracked heating equipment type. The verified analysis treats these records as having 100% gas heating, contributing to lower verified electric energy savings.
 - Ex ante savings assumes whole-house cooling for all measures. The verified analysis classifies systems as having limited or whole-house cooling, based on the cooling equipment types included in the Initiative tracking database. The classification of homes with limited cooling reduces savings, accounting for 99% of discrepancies between ex ante and verified electric demand savings.
- **Heat Pump Water Heater:** The gross realization rate for HPWHs was 95% for electric energy and electric demand savings.
 - Ex ante calculations add electric heating penalties as a positive value to electric energy savings. The verified analysis subtracts electric heating penalties from electric energy savings, in accordance with the IL-TRM V8.0, resulting in lower verified savings. This is the primary driver of discrepancies between ex ante and verified energy and demand savings.
 - Ex ante applies default heating and cooling COP values from the IL-TRM V8.0 for all measures. The verified analysis applies actual tracked efficiency values where available, contributing to higher verified savings.
- **Attic Insulation:** The gross realization rate for attic insulation was 99% for electric energy savings, 93% for electric demand savings, and 100% for gas savings.

- The IL-TRM V8.0 provides two CF values: one to apply to projects with CACs and one to apply to projects with ASHPs. Ex ante applies both CFs to demand savings. The verified analysis applies the CF for only the cooling equipment associated with each project. This is the primary contributor to discrepancies between ex ante and verified electric demand savings.
- For one record, ex ante includes electric energy savings from gas heating for a project with a natural gas boiler. The IL-TRM V8.0 specifies electric energy heating savings from gas heating are claimable only for projects with natural gas furnaces. The verified analysis does not include electric energy heating savings for this project, accounting for all discrepancy between ex ante and verified electric energy savings.
- **Bathroom Exhaust Fan:** The gross realization rate for bathroom exhaust fans was 95% for electric energy and electric demand savings.
 - Ex ante applies the ENERGY STAR Most Efficient default fan efficiency value from the IL-TRM V8.0 for all measures. The verified analysis applies actual tracked efficiency values, where available, driving all discrepancy between ex ante and verified savings.
- **Duct Sealing:** The gross realization rate for duct sealing was 100% for electric energy savings, 100% for electric demand savings, and 140% for gas savings.
 - For records with natural gas heating, ex ante applies default values from the IL-TRM V8.0 for the efficiency parameters $\eta_{\text{Equipment}}$ and η_{System} . The verified analysis applies actual tracked efficiency values. This drives all of the differences between ex ante and verified gas savings.
- **Wall Insulation:** The gross realization rate for wall insulation was 100% for electric energy savings, 96% for electric demand savings, and 95% for gas savings.
 - For two projects, the square foot area applied by ex ante does not align with the area recorded in the Initiative tracking data. The verified analysis applies actual area from tracking data for all projects. This is the primary driver of differences between ex ante and verified savings.

3.4.5 Cumulative Persisting Annual Savings

Table 54 presents CPAS and WAML for the 2020 HVAC Initiative. The measure-specific and total verified gross savings for the Initiative are summarized, and CPAS in each year of the 2018–2021 Plan are presented.²⁴ The WAML for the Initiative is 17.0 years.

ASHP ER and CAC ER measures receive ER savings for the remaining useful life (RUL) of the existing equipment—6 years, or 18 years when replacing electric resistance. Additionally, there are two mid-life adjustments for HPWH, air sealing, and insulation measures for the RUL of the existing equipment—once at 10 years, and again at 13 years for homes with a gas boiler. During the RUL of the existing equipment, savings are calculated based on the existing heating and cooling equipment. After this period, the baseline changes to a federal standard baseline for the remaining duration of the equipment’s existing useful life (EUL).

Table 54. 2020 HVAC Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
ASHP	16.0	477	0.641			306	306	...	306	...	4,893
ASHP ER (Replaces ASHP)	16.0	379	0.761			288	288	...	92	...	2,651
ASHP ER (Replaces Resistance)	16.0	867	0.761			660	660	...	660	...	10,560
CAC	18.0	1,097	0.641			703	703	...	703	...	12,653
CAC ER	18.0	4,207	0.761			3,202	3,202	...	665	...	27,188
HPWH	15.0	46	0.760			35	35	...	34	...	519
Advanced Thermostat	11.0	483	N/A			483	483	...	483	...	5,312
Ductless Heat Pump	15.0	260	0.641			167	167	...	167	...	2,500
Air Sealing	20.0	20	0.800			16	16	...	14	...	295
Attic Insulation	20.0	14	0.800			12	12	...	11	...	222
Crawl Space Insulation	20.0	1	0.800			1	1	...	1	...	16
Duct Sealing	20.0	5	0.800			4	4	...	4	...	75
Bathroom Exhaust Fan	19.0	6	0.800			5	5	...	5	...	88
Rim Joist Insulation	20.0	1	0.800			0	0	...	0	...	9
Wall Insulation	20.0	5	0.800			4	4	...	3	...	69
2020 CPAS		7,867	0.748			5,884	5,884	...	3,147	...	67,050
Expiring 2020 CPAS						0	0	...	4	...	
Expired 2020 CPAS						0	0	...	2,737	...	
WAML	17.0										

²⁴ For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

3.4.6 Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the HVAC Initiative moving forward:

- **Key Finding #1:** Ex ante savings did not de-rate existing efficiencies for CAC ER and ASHP ER measures. Verified savings de-rate existing efficiencies by 1% per year, based on the age of the existing equipment, in accordance with the IL-TRM V8.0.
 - **Recommendation:** The implementation team should de-rate existing efficiencies from the Initiative tracking data by 1% per year, based on the tracked age of the existing equipment. De-rating efficiency accounts for the degradation of the performance of the existing equipment over time.
- **Key Finding #2:** Ex ante savings do not always use actual efficiency ratings (SEER/EER/COP) when they are available in the Initiative tracking data to estimate savings. Instead, ex ante applies default values from the IL-TRM V8.0. This issue occurs for the CAC, ASHP, HPWH, bathroom exhaust fan, and duct sealing measures.
 - **Recommendation:** Apply Initiative tracking data to ex ante savings estimations whenever available. In cases where actual project values are unknown, the default deemed in the IL-TRM V8.0 is appropriate.

3.5 Appliance Recycling Initiative

3.5.1 Initiative Description

The goal of the Appliance Recycling Initiative is to eliminate the electricity consumption associated with old, inefficient appliances. AIC offers incentives to its residential electric customers to encourage the recycling of functioning full-size²⁵ refrigerators and freezers. In 2020, participants received a \$50 incentive and free pickup and recycling services for up to two eligible appliances. The Appliance Recycling Initiative also partnered with multifamily housing organizations to recycle room air conditioners in 2020.

The Initiative implementer, Solutions for Energy Efficient Logistics (SEEL), is responsible for scheduling appointments, picking up appliances, delivering units to the recycling partner, sending out incentives, collecting data, and reporting. SEEL is also responsible for conducting QA/QC inspections throughout the implementation process. Leidos administers the program and is responsible for the generation and distribution of marketing materials, data validation, and general oversight of SEEL.

²⁵ Defined as 10–27 cubic feet.

Summary of Key Implementation Changes in 2020

In 2020, the Appliance Recycling Initiative partnered with Public Housing organizations and Income Qualified – Multifamily properties to conduct bulk room air conditioner recycling events. Initiative staff visited these properties on specific pickup dates to collect the units. AIC also made several changes to the design of the Appliance Recycling Initiative in response to the COVID-19 pandemic.

- AIC paused all Initiative activity from late March through late June for the safety of implementation staff and customers.
- When Initiative activity resumed, AIC restricted implementation staff from entering customer homes and asked participants to move all appliances to a garage or other outdoor space for pickup. This directive remained in effect until SEEL provided AIC and Leidos with a COVID-19 Health and Safety Plan, which outlined a process where SEEL staff could enter participant homes to remove appliances but maintain a contactless pickup. The process included asking participants to maintain social distance and rearranging items to create a clear entry and exit path for implementation crews.
- SEEL staff added COVID-19 screening questions to the enrollment process. During the scheduling process, customers reported if they, or anyone in their household, had symptoms of COVID-19. Pickup crews asked the screening questions again on the day of the appliance pickup.

3.5.2 Participation Summary

Table 55 presents Appliance Recycling Initiative participation during 2020. In total, AIC customers recycled 4,587 units through the Appliance Recycling Initiative. Refrigerators represented the bulk of Initiative activity with 3,595 refrigerators recycled compared to 872 freezers and 120 room air conditioners.

Table 55. 2020 Appliance Recycling Initiative Participation Summary

Participation	Quantity
Refrigerators	3,595
Freezers	872
Room Air Conditioners	120

3.5.3 Initiative Annual Savings Summary

Table 56 presents Appliance Recycling Initiative annual savings achieved in 2020. The 2020 Appliance Recycling Initiative achieved 2,461 MWh and 0.31 MW in verified net savings.

Table 56. 2020 Appliance Recycling Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)
Ex Ante Gross Savings	3,517	0.46
Gross Realization Rate	101%	100%
Verified Gross Savings	3,543	0.46
NTGR	0.695	0.684
Verified Net Savings	2,461	0.31

3.5.4 Initiative Savings Detail

The Appliance Recycling Initiative achieved 3,543 MWh in verified gross energy savings and 2,461 MWh in verified net energy savings. Refrigerators represented the majority of total Initiative savings (Table 57 and Table 58).

Table 57. 2020 Appliance Recycling Initiative Electric Energy Savings by Measure

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Refrigerators	2,832	100%	2,845	0.710	2020
Freezers	659	99%	656	0.640	420
Room Air Conditioner	26	164%	42	0.500	21
Total	3,517	101%	3,543	0.695	2,461

Table 58. 2020 Appliance Recycling Initiative Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Refrigerators	0.35	100%	0.35	0.710	0.25
Freezers	0.08	99%	0.08	0.640	0.05
Room Air Conditioner	0.03	100%	0.03	0.500	0.02
Total	0.46	100%	0.46	0.684	0.31

The 2020 Appliance Recycling Initiative achieved gross realization rates of 101% and 100% for electric energy and electric demand, respectively. We describe the key drivers of differences between ex ante and verified savings below.

- The gross realization rate for energy savings from room air conditioners was 164%.
 - The implementation team applied default full load hours (FLH) from the IL-TRM in ex ante savings calculations for all units. In the verified analysis, the evaluation team used the zip code associated with each recycled unit to identify the corresponding climate zone and applied climate zone-specific FLH values for each unit. The FLH values used in the verified savings calculations were higher than the IL-TRM default value, leading to a realization rate substantially greater than 100%.
- Gross realization rates for refrigerators and freezers were 100% and 99%, respectively.
 - While verified savings did not vary widely from ex ante savings, the evaluation team identified several data quality issues that could pose future evaluation risks if the scale of these issues were to expand.
 - Operational Location: The tracking data did not include reliable information on unit operational location. The evaluation team found that the information in the operational location field often mimicked the information from the pickup location field. In many cases, this led to non-intuitive unit characteristics, such as primary refrigerators operating outdoors or in garages. The evaluation team addressed this issue by making assumptions using supporting variables (e.g., primary appliances operate in conditioned spaces).
 - Unit Type: 38 records included conflicting information in the unit type and unit model fields (e.g., “chest” refrigerators, “side-by-side” freezers). In these cases, we assumed the unit model information was accurate and reclassified the unit types.

- **Unit Models:** We identified 18 records with unit models listed as “0” or “35.” We made conservative assumptions for the purposes of verified savings calculations (e.g., refrigerators are not side-by-side models, freezers are chest models).

3.5.5 Cumulative Persisting Annual Savings

Table 59 presents CPAS and WAML for the 2020 Appliance Recycling Initiative. The measure-specific and total verified gross savings for the Initiative are summarized, and CPAS in each year of the 2018–2021 Plan are presented.²⁶ The WAML for the Initiative is 6.5 years.

Table 59. 2020 Appliance Recycling Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Refrigerator	6.5	2,845	0.710			2,020	2,020	...	0	...	13,131
Freezer	6.5	656	0.640			420	420	...	0	...	2,728
Room Air Conditioner	4.0	42	0.500			21	21	...	0	...	84
2020 CPAS		3,543	0.695			2,461	2,461	...	0	...	15,943
Expiring 2020 CPAS						0	0	...	0	...	
Expired 2020 CPAS						0	0	...	2,461	...	
WAML	6.5										

²⁶ For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

3.5.6 Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Appliance Recycling Initiative moving forward:

- **Key Finding #1:** The evaluation team observed cases of missing and erroneous data in the operational location, unit model, and unit type fields of the tracking database. These observations are described in detail in the Initiative Savings Detail section. We addressed these data quality issues by using conservative assumptions in the verified savings calculations.
 - Recommendation: We recommend that the implementation team record the operational location of the unit during the enrollment process to ensure this information is accurately recorded. We also recommend that the program administrator prioritize the operational location and unit model fields in their QA/QC efforts.
- **Key Finding #2:** The Initiative tracking data lacked unit-specific characteristics for recycled room air conditioners. The implementation team was able to provide additional information on location of recycled appliances upon request.
 - Recommendation: Depending on the implementation team's available resources and desire for increased accuracy of ex ante savings estimates, we suggest that the implementation team could transition to a record-level savings analysis to mirror the IL-TRM methodology used by the evaluation team. Specifically, using the zip codes tracked in the Initiative tracking database to apply climate zone-specific FLH would improve the accuracy of ex ante calculations and would likely be relatively simple to implement. The implementation team could also consider attempting to collect unit-specific information on room air conditioner nameplate capacity to allow energy savings calculations reflecting the specific units recycled.
- **Key Finding #3:** The evaluation team identified cases where recycled units deviated from the Initiative's stated guidelines on unit size and age.
 - Recommendation: While the evaluation team has no concerns with evaluating savings from recycled units outside of the Initiative's eligibility guidelines,²⁷ we felt that highlighting this observation for AIC consideration was important in case AIC intended for these guidelines to serve as rigid criteria for the implementation team. If so, AIC should revisit these guidelines with the implementation team.
- **Key Finding #4:** AIC implemented a novel room air conditioner recycling program in 2020, one that recycled room air conditioners from multifamily facilities.
 - Recommendation: Existing Illinois guidance around room air conditioner recycling in the IL-TRM, Illinois Net-to-Gross Protocols and Opinion Dynamics' NTGR recommendations for AIC has been primarily focused on a different style of program implementation where room air conditioners are picked up directly from single family customer homes, typically alongside a refrigerator and/or freezer. If AIC plans to continue offering room air conditioner recycling for Income Qualified – Multifamily facilities, we advise the program team to work with us to determine the correct methodology to ensure savings claims and applicable NTGRs are reflective of the unique nature of this program design.

²⁷ The Illinois SAG has considered this topic and agreed that such savings should be evaluated, as documented in the 2020 SAG "Policy Resolution on Non-Qualified Equipment." Accessed at: https://ilsag.s3.amazonaws.com/SAG_Policy_Resolution_Non-Qualified_Equipment_Final_1-24-2020.pdf.

3.6 Direct Distribution Initiative

3.6.1 Initiative Description

The Direct Distribution Initiative provided energy savings kits to low-income AIC customers through four delivery channels in 2020:

- **School Kits:** The School Kits channel provided free energy savings kits and in-class energy education presentations to students throughout AIC's service territory. In 2020, the School Kits channel focused entirely on low-income customers by delivering kits only to schools in low-income areas.
- **AR Kits:** Through this channel, AIC distributed free energy savings kits to low-income customers who (1) participated in the Appliance Recycling Initiative (see Section 3.5) and (2) resided in low-income areas. The kits are provided by SEEL staff (the Appliance Recycling Initiative implementer) immediately after appliance pickup.
- **Community Kits:** The Community Kits channel distributed energy efficiency kits to income-qualified customers at community events or following home visits conducted as part of the Income Qualified Initiative.
- **Smart Home Kits:** Smart home kits were provided to customers through AIC's MDI.

Table 60 outlines the measures included in each separate kit type.

Table 60. Direct Distribution Initiative Channel Kit Contents

Channel	Kit Type	Kit Contents
School Kits	School Kit 1	<ul style="list-style-type: none"> ▪ Four 9W LEDs ▪ APS ▪ Furnace filter alarm ▪ Kitchen aerator ▪ Bath aerator ▪ Showerhead ▪ Shower timer ▪ Water heater temperature card ▪ Pipe insulation
	School Kit 2	<ul style="list-style-type: none"> ▪ Four 9W LEDs ▪ APS ▪ Door sweep ▪ Kitchen aerator ▪ Bath aerator ▪ Showerhead ▪ Shower timer ▪ Water heater temperature card ▪ Pipe insulation
AR Kits	AR Kit	<ul style="list-style-type: none"> ▪ Four 9W LEDs ▪ APS ▪ Showerhead ▪ Kitchen aerator ▪ Bath aerator ▪ Water heater temperature card

Channel	Kit Type	Kit Contents
Community Kits	Electric Community Kit 1	<ul style="list-style-type: none"> Eight 9W LEDs APS
	Electric Community Kit 2	<ul style="list-style-type: none"> Six 9W LEDs Four 4.5W globe LEDs Two 8W reflector LEDs Two APS
	Gas Community Kit	<ul style="list-style-type: none"> Showerhead Thermostatic restrictor shower valve Kitchen aerator Bath aerator Water heater temperature card Shower timer
	Customer Assistance Kit	<ul style="list-style-type: none"> Four 9W LEDs ENERGY STAR desk lamp Kitchen aerator Bath aerator Showerhead Water heater temperature card
Smart Home Kits	Smart Home Kit	<ul style="list-style-type: none"> Google Home Mini Four 9W connected LEDs APS Two smart plugs

3.6.2 Participation Summary

Table 61 summarizes the number of kits distributed through the Direct Distribution Initiative in 2020.

Table 61. Kits Distributed

Channel	Kit Type	Kits Distributed
School Kits	School Kit 1	437
	School Kit 2	7,066
AR Kits	AR Kit	372
Community Kits	Electric Community Kit 1	95
	Electric Community Kit 2	493
	Gas Community Kit	440
	Customer Assistance Kit	1,428
Smart Home Kits	Smart Home Kit	657

The Community Kits channel also distributed Standard LEDs and Tier 1 APS to customers through food pantries; those products were not tracked as being part of a specific kit.

3.6.3 Initiative Annual Savings Summary

Table 62 presents Direct Distribution Initiative annual savings achieved in 2020. The Initiative achieved 7,984 MWh, 1.09 MW, and 85,713 therms in verified net savings.

Table 62. 2020 Direct Distribution Initiative Annual Savings

	Electric Energy Savings (MWh)	Electric Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	8,040	1.12	92,591
Gross Realization Rate	99%	98%	93%
Verified Gross Savings	7,984	1.09	85,713
NTGR	1.000	1.000	1.000
Verified Net Savings	7,984	1.09	85,713

Ex ante savings presented in this report differ slightly from the savings claim provided by AIC in master tracking data. Master tracking data and backup calculations provided disagreed in several places. To provide the most useful discussion of our results, we chose to report savings as described in backup calculations where possible when a disagree occurred. For further discussion of this issue, please see Finding #1 in Section 3.6.6.

3.6.4 Initiative Savings Detail

Table 63 through Table 65 summarize 2020 Direct Distribution Initiative savings by measure and channel.

Table 63. 2020 Direct Distribution Initiative Electric Energy Savings by Measure and Channel

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
School Kits					
School Kit #1					
9W LED	43	100%	43	1.000	43
Tier 1 APS	18	100%	18	1.000	18
Furnace Filter Alarm	4	100%	4	1.000	4
Kitchen Aerator	13	100%	13	1.000	13
Bathroom Aerator	2	100%	2	1.000	2
Showerhead	15	100%	15	1.000	15
Shower Timer	15	100%	15	1.000	15
Water Temperature Card	2	100%	2	1.000	2
Pipe Insulation	12	38%	4	1.000	4
School Kit #2					
9W LED	702	100%	702	1.000	702
Tier 1 APS	291	100%	291	1.000	291
Bathroom Aerator	25	100%	25	1.000	25
Kitchen Aerator	206	100%	206	1.000	206
Showerhead	236	100%	236	1.000	236
Shower Timer	239	100%	239	1.000	239
Water Temperature Card	37	100%	37	1.000	37

Measure Category	Ex Ante Gross Savings (MWh)	Gross Realization Rate	Verified Gross Savings (MWh)	NTGR	Verified Net Savings (MWh)
Pipe Insulation	187	38%	72	1.000	72
Door Sweep	28	110%	31	1.000	31
<i>School Kits Subtotal</i>	<i>2,075</i>	<i>94%</i>	<i>1,955</i>	<i>1.000</i>	<i>1,955</i>
AR Kits					
9W LED	41	100%	41	1.000	41
Tier 1 APS	35	100%	35	1.000	35
Kitchen Aerator	9	100%	9	1.000	9
Bath Aerator	1	100%	1	1.000	1
Showerhead	12	100%	12	1.000	12
Water Temperature Card	<1	100%	<1	1.000	<1
<i>AR Kits Subtotal</i>	<i>98</i>	<i>100%</i>	<i>98</i>	<i>1.000</i>	<i>98</i>
Community Kits					
Food Pantry Distribution					
9W LED	4,341	100%	4,341	1.000	4,341
Tier 1 APS	767	100%	767	1.000	767
Customer Assistance Kit					
9W LED	208	100%	208	1.000	208
ENERGY STAR Desk Lamp	33	100%	33	1.000	33
Showerhead	45	100%	45	1.000	45
Kitchen Aerator	35	100%	35	1.000	35
Bathroom Aerator	5	100%	5	1.000	5
Water Temperature Card	2	100%	2	1.000	2
Electric Community Kit #1					
9W LED	21	133%	28	1.000	28
Tier 1 APS	9	100%	9	1.000	9
Electric Community Kit #2					
9W LED	81	133%	108	1.000	108
4.5 W Globe	49	100%	49	1.000	49
8W Reflector	39	100%	39	1.000	39
Tier 1 APS	92	100%	92	1.000	92
<i>Community Kits Subtotal</i>	<i>5,728</i>	<i>101%</i>	<i>5,762</i>	<i>1.000</i>	<i>5,762</i>
Smart Home Kits					
Tier 1 APS	62	100%	62	1.000	62
Connected LED	78	137%	107	1.000	107
<i>Smart Home Kits Subtotal</i>	<i>140</i>	<i>121%</i>	<i>169</i>	<i>1.000</i>	<i>169</i>
Total	8,040	99%	7,984	1.000	7,984

Table 64. 2020 Direct Distribution Initiative Electric Demand Savings by Measure

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
School Kits					
School Kit #1					
9W LED	0.005	100%	0.005	1.000	0.005
APS Tier 1	0.002	100%	0.002	1.000	0.002
Furnace Filter Alarm	0.002	101%	0.002	1.000	0.002
Bathroom Aerator	0.002	89%	0.002	1.000	0.002
Kitchen Aerator	0.003	91%	0.003	1.000	0.003
Showerhead	0.001	101%	0.001	1.000	0.001
Shower Timer	0.003	91%	0.002	1.000	0.002
Water Temperature Card	<0.001	100%	<0.001	1.000	< 0.001
Pipe Insulation	0.001	39%	0.001	1.000	0.001
School Kit #2					
9W LED	0.085	100%	0.085	1.000	0.085
APS Tier 1	0.033	100%	0.033	1.000	0.033
Bathroom Aerator	0.035	89%	0.031	1.000	0.031
Kitchen Aerator	0.046	91%	0.042	1.000	0.042
Showerhead	0.023	101%	0.023	1.000	0.023
Shower Timer	0.042	91%	0.038	1.000	0.038
Water Temperature Card	0.004	100%	0.004	1.000	0.004
Pipe Insulation	0.021	39%	0.008	1.000	0.008
Door Sweep	0.000	N/A	0.000	1.000	0.000
<i>School Kits Subtotal</i>	<i>0.308</i>	<i>92%</i>	<i>0.282</i>	<i>1.000</i>	<i>0.282</i>
AR Kits					
9W LED	0.005	100%	0.005	1.000	0.005
Tier 1 APS	0.004	100%	0.004	1.000	0.004
Kitchen Aerator	0.002	101%	0.002	1.000	0.002
Bath Aerator	0.001	100%	0.001	1.000	0.001
Showerhead	0.001	101%	0.001	1.000	0.001
Water Temperature Card	0.000	149%	0.000	1.000	0.000
<i>AR Kits Subtotal</i>	<i>0.013</i>	<i>101%</i>	<i>0.013</i>	<i>1.000</i>	<i>0.013</i>
Community Kits					
Food Pantry Distribution					
9W LED	0.601	101%	0.605	1.000	0.605
Tier 1 APS	0.086	100%	0.086	1.000	0.086
Customer Assistance Kit					
9W LED	0.025	100%	0.025	1.000	0.025
ENERGY STAR Desk Lamp	0.004	100%	0.004	1.000	0.004
Showerhead	0.017	23%	0.004	1.000	0.004
Kitchen Aerator	0.008	100%	0.008	1.000	0.008

Measure Category	Ex Ante Gross Savings (MW)	Gross Realization Rate	Verified Gross Savings (MW)	NTGR	Verified Net Savings (MW)
Bathroom Aerator	0.006	100%	0.006	1.000	0.006
Water Temperature Card	0.000	100%	0.000	1.000	0.000
Electric Community Kit #1					
9W LED	0.003	134%	0.003	1.000	0.003
Tier 1 APS	0.001	100%	0.001	1.000	0.001
Electric Community Kit #2					
9W LED	0.010	134%	0.013	1.000	0.013
4.5 W Globe	0.007	100%	0.007	1.000	0.007
8W Reflector	0.006	100%	0.006	1.000	0.006
Tier 1 APS	0.010	100%	0.010	1.000	0.010
<i>Community Kits Subtotal</i>	0.784	99%	0.780	1.000	0.780
Smart Home Kits					
Tier 1 APS	0.007	100%	0.007	1.000	0.007
Connected LED	0.009	138%	0.013	1.000	0.013
<i>Smart Home Kits Subtotal</i>	0.016	122%	0.020	1.000	0.020
Total	1.121	98%	1.094	1.000	1.094

Table 65. 2020 Direct Distribution Initiative Gas Savings by Measure

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
School Kits					
School Kit #1					
Furnace Filter Alarm	586	100%	585	1.000	585
Bathroom Aerator	61	102%	62	1.000	62
Kitchen Aerator	533	100%	532	1.000	532
Showerhead	621	100%	619	1.000	619
Shower Timer	629	100%	628	1.000	628
Water Temperature Card	105	100%	105	1.000	105
Pipe Insulation	516	38%	198	1.000	198
School Kit #2					
Bathroom Aerator	989	102%	1,011	1.000	1,011
Kitchen Aerator	8,621	100%	8,602	1.000	8,602
Showerhead	10,034	100%	10,010	1.000	10,010
Shower Timer	10,175	100%	10,153	1.000	10,153
Water Temperature Card	1,696	100%	1,699	1.000	1,699
Pipe Insulation	8,338	38%	3,206	1.000	3,206
Door Sweep	23,671	96%	22,718	1.000	22,718
<i>School Kits Subtotal</i>	66,574	90%	60,128	1.000	60,128

Measure Category	Ex Ante Gross Savings (Therms)	Gross Realization Rate	Verified Gross Savings (Therms)	NTGR	Verified Net Savings (Therms)
AR Kits					
Showerhead	2,150	102%	2,187	1.000	2,187
Kitchen Aerator	1,600	100%	1,602	1.000	1,602
Bath Aerator	197	100%	198	1.000	198
Water Temperature Card	112	102%	113	1.000	113
<i>AR Kits Subtotal</i>	4,059	101%	4,100	1.000	4,100
Community Kits					
Customer Assistance Kit					
Showerhead	8,260	100%	8,263	1.000	8,263
Kitchen Aerator	6,151	100%	6,151	1.000	6,151
Bathroom Aerator	760	100%	760	1.000	760
Water Temperature Card	435	100%	435	1.000	435
Gas Kit					
Showerhead	2,543	100%	2,546	1.000	2,546
Thermostatic Shower Valve	510	100%	513	1.000	513
Kitchen Aerator	1,892	78%	1,470	1.000	1,470
Bathroom Aerator	233	74%	173	1.000	173
Water Temperature Card	132	102%	134	1.000	134
Shower Timer	1,043	100%	1,041	1.000	1,041
<i>Community Kits Subtotal</i>	21,959	98%	21,486	1.000	21,486
Total	92,591	93%	85,713	1.000	85,713

Overall, the 2020 Direct Distribution Initiative achieved strong gross realization rates of 99%, 98%, and 93% for electric energy, electric demand, and gas, respectively. We describe the key drivers of differences between ex ante and verified savings below.

- **Rounding Errors:** As discussed further in Section 3.6.6, the Initiative generally claimed savings at an aggregated level; aggregated savings rounded unit savings in a manner that produces noticeable differences in realization rates throughout the tables above. These differences are small but noted here for clarity.
- **Demand Errors:** A number of ex ante peak demand savings calculations for water conservation measures included verified savings from secondary water savings. The verified analysis excluded these savings when making these calculations per IL-TRM guidance.
- **Pipe Insulation:** We could not reproduce the ex ante savings claim made for pipe insulation across both School Kits. The gross realization rate for pipe insulation was 38% for electric energy, 39% for electric demand, and 38% for gas. The verified analysis applied the 56% ISR for kit-distributed pipe insulation present in IL-TRM V9.0,²⁸ which likely reduced savings significantly. The remaining source of variation could not be identified.

²⁸ IL-TRM V8.0 does not characterize pipe insulation delivered through kits as a prescriptive measure; we used the IL-TRM V9.0 measure characterization to evaluate this measure for increased transparency.

- **Door Sweep:** The gross realization rate for door sweeps was 110% for electric energy and 96% for gas. The ex ante analysis applied single family assumptions, while the verified analysis applied a 79%/21% single family/multifamily split to align with other measure assumptions.
- **9W LEDs – Community Kits:** The gross realization rate for 9W LEDs distributed as part of Electric Community Kit #1 and Electric Community Kit #2 was 133% for electric energy savings and 134% for electric demand savings. For electric community kits, ex ante applied the ISR for Direct Mail Kits (66%) in the IL-TRM. The verified analysis applied the ISR for Community Distributed Kits (88%) in the IL TRM, resulting in increased savings.
- **Connected LED – Smart Home Kit:** The gross realization rates for Connected LEDs were 137% for electric energy savings and 138% for electric demand savings.
 - Ex ante applied separate ISRs for wattage kWh savings (68%) and connected kWh savings (92%), while the verified analysis applied the same ISR (92%), resulting in increased savings.
- **Water Conservation Measures – Gas Kit:** The gross realization rate for water conservation measures in the gas kit were 78% for kitchen aerators and 74% for bathroom aerators. The ex ante analysis applied the ISR for Efficiency Kits; the verified analysis applied the ISR for Community Distributed Kits.

3.6.5 Cumulative Persisting Annual Savings

Table 66 presents CPAS and WAML by channel for the 2020 Direct Distribution Initiative. The measure-specific and total verified gross savings for the Initiative are summarized, and CPAS in each year of the 2018–2021 Plan are presented.²⁹ The WAML for the Initiative is 9.3 years. CPAS and WAML for each channel at a measure level are summarized in Table 67, Table 68, Table 69, and Table 70.

Table 66. 2020 Direct Distribution Initiative CPAS and WAML

Channel	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
School Kits	8.7	1,955	1.000			1,955	1,955	...	107	...	15,978
AR Kits	8.9	98	1.000			98	98	...	0	...	820
Community Kits	9.5	5,762	1.000			5,762	5,762	...	0	...	48,810
Smart Home Kits	8.9	169	1.000			169	169	...	0	...	1,365
2020 CPAS		7,984	1.000			7,984	7,984	...	107	...	66,974
Expiring 2020 CPAS						0	0	...	3,857	...	
Expired 2020 CPAS						0	0	...	7,877	...	
WAML	9.3										

²⁹ For further detail, including achieved CPAS in years not presented in this table, please see the summary CPAS spreadsheet attached to this report.

Table 67. 2020 School Kits Channel CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
9W LED - School Kit 1	10.0	43	1.000			43	43	...	0	...	378
Tier 1 APS - School Kit 1	7.0	18	1.000			18	18	...	0	...	126
Furnace Filter Alarm - School Kit 1	3.0	4	1.000			4	4	...	0	...	13
Kitchen Aerator - School Kit 1	10.0	13	1.000			13	13	...	0	...	127
Bathroom Aerator - School Kit 1	10.0	2	1.000			2	2	...	0	...	15
Showerhead - School Kit 1	10.0	15	1.000			15	15	...	0	...	146
Shower Timer - School Kit 1	2.0	15	1.000			15	15	...	0	...	30
Water Temperature Card - School Kit 1	2.0	2	1.000			2	2	...	0	...	5
Pipe Insulation - School Kit 1	15.0	4	1.000			4	4	...	4	...	67
9W LED - School Kit 2	10.0	702	1.000			702	702	...	0	...	6,117
Tier 1 APS - School Kit 2	7.0	291	1.000			291	291	...	0	...	2,038
Bathroom Aerator - School Kit 2	10.0	25	1.000			25	25	...	0	...	247
Kitchen Aerator - School Kit 2	10.0	206	1.000			206	206	...	0	...	2,061
Showerhead - School Kit 2	10.0	236	1.000			236	236	...	0	...	2,361
Shower Timer - School Kit 2	2.0	239	1.000			239	239	...	0	...	478
Water Temperature Card - School Kit 2	2.0	37	1.000			37	37	...	0	...	73
Pipe Insulation - School Kit 2	15.0	72	1.000			72	72	...	72	...	1,078
Door Sweep - School Kit 2	20.0	31	1.000			31	31	...	31	...	617
2020 CPAS		1,955	1.000			1,955	1,955	...	107	...	15,978
Expiring 2020 CPAS						0	0	...	921	...	
Expired 2020 CPAS						0	0	...	1,848	...	
WAML	8.7										

Table 68. 2020 Appliance Recycling Kits Channel CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
9W LED	10.0	41	1.000			41	41	...	0	...	354
Tier 1 APS	7.0	35	1.000			35	35	...	0	...	244
Kitchen Aerator	10.0	9	1.000			9	9	...	0	...	91
Bath Aerator	10.0	1	1.000			1	1	...	0	...	12
Showerhead	10.0	12	1.000			12	12	...	0	...	117
Water Temperature Card	2.0	0	1.000			0	0	...	0	...	1
2020 CPAS		98	1.000			98	98	...	0	...	820
Expiring 2020 CPAS						0	0	...	45	...	
Expired 2020 CPAS						0	0	...	98	...	
WAML	8.9										

Table 69. 2020 Community Kits Channel CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
9W LED - Food Pantry Distribution	10.0	4,341	1.000			4,341	4,341	...	0	...	37,813
Tier 1 APS - Food Pantry Distribution	7.0	767	1.000			767	767	...	0	...	5,370
9W LED - Customer Assistance Kit	10.0	208	1.000			208	208	...	0	...	1,813
ENERGY STAR Desk Lamp - Customer Assistance Kit	10.0	33	1.000			33	33	...	0	...	297
Showerhead - Customer Assistance Kit	10.0	45	1.000			45	45	...	0	...	450
Kitchen Aerator - Customer Assistance Kit	10.0	35	1.000			35	35	...	0	...	350
Bathroom Aerator - Customer Assistance Kit	10.0	5	1.000			5	5	...	0	...	45
Water Temperature Card - Customer Assistance Kit	2.0	2	1.000			2	2	...	0	...	4
9W LED - Electric Kit 1	10.0	28	1.000			28	28	...	0	...	241
Tier 1 APS - Electric Kit 1	7.0	9	1.000			9	9	...	0	...	62
9W LED - Electric Kit 2	10.0	108	1.000			108	108	...	0	...	939
4.5 W Globe - Electric Kit 2	10.0	49	1.000			49	49	...	0	...	422
8W Reflector - Electric Kit 2	10.0	39	1.000			39	39	...	0	...	356
Tier 1 APS - Electric Kit 2	7.0	92	1.000			92	92	...	0	...	647
2020 CPAS		5,762	1.000			5,762	5,762	...	0	...	48,810
Expiring 2020 CPAS						0	0	...	2,830	...	
Expired 2020 CPAS						0	0	...	5,762	...	
WAML	9.5										

Table 70. 2020 Smart Home Kits Channel CPAS and WAML

Measure	Measure Life	First-Year Verified Gross Savings (MWh)	NTGR	CPAS - Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Tier 1 APS	7.0	62	1.000			62	62	...	0	...	431
Connected LED	10.0	107	1.000			107	107	...	0	...	934
2020 CPAS		169	1.000			169	169	...	0	...	1,365
Expiring 2020 CPAS						0	0	...	61	...	
Expired 2020 CPAS						0	0	...	169	...	
WAML	8.9										

3.6.6 Conclusions and Recommendations

Based on the results of this evaluation, the evaluation team offers the following key findings and recommendations for the Direct Distribution Initiative moving forward:

- **Key Finding #1:** The tracking data tracked most kits as aggregated line items with large quantities of kits. Tracking the kits in this way necessitated additional data requests to verify the number of kits distributed and the contents of each kit. In addition, aggregated kit tracking data savings claims did not match provided backup data in several cases (most notably for Customer Assistance Kits, but also for other parameters, such as gas savings for School Kit 1), which made it challenging to accurately determine what the actual ex ante savings claim was and therefore to identify why ex ante savings and verified savings differed.
 - Recommendation: While we recognize that implementation challenges may prevent this recommendation from being implemented, the ideal approach for tracking savings from energy efficiency kits is to track all kits and measures as separate line items in alignment with other AIC initiatives.
 - Recommendation: If kit measures cannot be tracked as separate line items, the implementation team should carefully verify ex ante savings claims against backup information before year-end data delivery to ensure that savings claims align with intent.
 - Recommendation: For each individual kit type, most, if not all, savings parameters are typically held constant across all kits. This presents an ideal opportunity for the implementation and evaluation teams to confirm verified savings for kits *before* implementation. Ongoing dialogue between the implementation team and evaluation team will lead to higher realization rates and decreased need for communication after the close of a program year.
- **Key Finding #2:** Incorrect ISR values were applied across different kits. For example, within the Community Kits, ex ante applied the Direct Mail Kit ISR for 9W LEDs and the Efficiency Kit ISR for aerators.
 - Recommendation: Ensure that claimed savings are applying the correct ISR value given the corresponding kit type.
- **Key Finding #3:** Secondary wastewater kWh savings being applied to the electric demand algorithm led to decreased verified savings for relevant water-saving measures.
 - Recommendation: Secondary wastewater kWh savings are applied only to the electric energy algorithm and not to the electric demand algorithm.
- **Key Finding #4:** Heating type weights did not always match the corresponding kit type. For example, measures within the Gas Community Kit applied the IL-TRM assumed unknown heating type for %Electric DHW (16%) and %Gas DHW (84%).
 - Recommendation: Ensure that the correct heating type weights are applied for the relevant kit type to improve overall realization rates.

Appendix A. Impact Analysis Methodology

This appendix presents details of the impact analysis methods used for the 2020 Residential Program.

Retail Products Initiative

Gross Impact Methodology

The evaluation team calculated verified savings for the Retail Products Initiative by applying savings algorithms from the IL-TRM V8.0. The team leveraged Initiative tracking data containing a wide range of measure specifications and participant information (e.g., LED wattage, bulb type, heating and cooling equipment type) to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V8.0. Table 71 lists the measures in the Retail Products Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2020 evaluation.

Table 71. Retail Products Initiative Measures Evaluated

Evaluation Measure Category	IL-TRM Measure	Errata Applied?
Standard LEDs	4.5.4 & 5.5.8	Errata applied
Specialty LEDs	4.5.4 & 5.5.6	Errata applied
LED fixtures	4.5.4 & 5.5.9	Errata applied
Advanced power strips	5.2.1	No errata present
Advanced thermostat	5.3.16	No errata present
Variable-speed pool pump	5.7.1	No errata present
Clothes washer	5.1.2	No errata present
Electric clothes dryer	5.1.10	No errata present
Refrigerator	5.1.6	No errata present
Freezer	5.1.5	No errata present
Dehumidifier	5.1.3	No errata present
Air purifier	5.1.1	No errata present
Water dispenser	5.1.11	No errata present

Lighting Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for 2020 Retail Products Initiative lighting products using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for LED lighting:

Equation 1. Lighting Energy and Demand Savings Equations

$$\begin{aligned}
 kWh = & \left[Qty \times LA \times \%Res \times \left[\frac{(Watt_{base} - Watt_{ee})}{1000} \times ISR_{res} \times HOU_{res} \times WHFe_{res} \right] \right] \\
 & + \left[Qty \times LA \times \%Com \times \left[\frac{(Watt_{base} - Watt_{ee})}{1000} \times ISR_{com} \times HOU_{com} \times WHFe_{com} \right] \right]
 \end{aligned}$$

$$kW = \left[Qty \times LA \times \%Res \times \left[\frac{(Watt_{base} - Watt_{ee})}{1000} \times ISR_{res} \times CF_{res} \times WHFd_{res} \right] \right] + \left[Qty \times LA \times \%Com \times \left[\frac{(Watt_{base} - Watt_{ee})}{1000} \times ISR_{com} \times CF_{com} \times WHFd_{com} \right] \right]$$

where:

Qty	= Quantity of bulbs from Initiative tracking data
LA	= Leakage adjustment (1 – leakage rate)
%Res	= Portion of bulbs purchased for residential application
%Com	= Portion of bulbs purchased for commercial application
Watt_base	= Energy Independence and Security Act (EISA)-compliant baseline wattage
Watt_ee	= Actual wattage of installed energy-efficient bulb
ISR	= In-service rate
HOU	= Hours of use
WHFe	= Waste heat factor for energy savings
WHFd	= Waste heat factor for demand savings
CF	= Coincidence factor
res	= Residential values
com	= Commercial values

Lighting Leakage and Residential Versus Commercial Installation

The nature of an upstream lighting offering prevents implementers from directly verifying that each bulb sold goes to an AIC customer and is installed in a residential setting. The IL-TRM V8.0, therefore, stipulates a 13.1% leakage rate for AIC upstream lighting programs to account for bulbs sold to non-AIC customers. Of the remaining 86.9% of bulbs, the IL-TRM V8.0 stipulates that 97% of standard and 96% of specialty LEDs go to residential applications, and 3% of standard and 4% of specialty LEDs are purchased for commercial applications.

Lighting Baseline Wattage and EISA Compliance

The baseline wattages in the IL-TRM V8.0 vary depending on the bulb type. Baseline wattages for standard LEDs are based on the lumen output and account for EISA efficiency standards, where appropriate. Table 72 lists the baseline wattages as they were applied to calculate 2020 verified savings for standard LEDs.

Table 72. Baseline Wattages for Standard LEDs

Lumen Range	Base Wattage
250–309	25
310–749	29
750–1,049	43
1,050–1,489	53
1,490–2,600	72
2,601–3,300	150
3,301–5,279	200
5,280–6,209	300

The baseline wattages for directional LEDs vary depending on the directional bulb type and lumen range and account for the Department of Energy (DOE) energy efficiency standards for incandescent reflector lamps and any appropriate exemptions to the standards. Table 73 lists the baseline wattages as they were applied to calculate 2020 verified savings for specialty reflector LEDs.

Table 73. Baseline Wattages for Reflector LEDs

Bulb Type	Lumen Range	Base Wattage
R, ER, BR with medium screw bases w/diameter >2.25" (*see exceptions below)	420-472	40
	473-524	45
	525-714	50
	715-937	65
	938-1,259	75
	1,260-1,399	90
	1,400-1,739	100
	1,740-2,174	120
	2,175-2,624	150
	2,625-2,999	175
	3,000-4,500	200
*R, BR, and ER with medium screw bases w/diameter ≤2.25"	400-449	40
	450-499	45
	500-649	50
	650-1,199	65
*ER30, BR30, BR40, or ER40	400-449	40
	450-499	45
	500-649	50
BR30, BR40, or ER40	650-1419	65
*R20	400-449	40
	450-719	45
*All reflector lamps below lumen ranges specified above	200-299	20
	300-399	30

For PAR and MR directional products, we used bulb diameter (D), center beam candle power (CBCP), and beam angle (BA) to calculate baseline wattage using the following equation:

Equation 2. Baseline Wattage for PAR and MR Reflector LEDs

$$375.1 - 4.355(D) - \sqrt{227,800 - 937.9(D) - 0.9903(D^2) - 1479(BA) - 12.02(D*BA) + 14.69(BA^2) - 16,720 * \ln(CBCP)}$$

Table 74 lists the baseline wattages as they were applied to calculate 2020 verified savings for specialty non-reflector LEDs, such as 3-way, globe, and candelabra bulbs.

Table 74. Baseline Wattages for Specialty Non-Reflector LEDs

Bulb Type	Lumen Range	Base Wattage
3-way	250–449	25
	450–799	40
	800–1,099	60
	1,100–1,599	75
	1,600–1,999	100
	2,000–2,549	125
	2,550–2,999	150
Globe (medium and intermediate bases less than 750 lumens)	90–179	10
	180–249	15
	250–349	25
	350–749	40
Decorative (Shapes B, BA, C, CA, DC, F, G, medium and intermediate bases less than 750 lumens)	70–89	10
	90–149	15
	150–299	25
	300–749	40
Globe (candelabra bases less than 1050 lumens)	90–179	10
	180–249	15
	250–349	25
	350–499	40
	500–1,049	60
Decorative (Shapes B, BA, C, CA, DC, F, G, candelabra bases less than 1050 lumens)	70–89	10
	90–149	15
	150–299	25
	300–499	40
	500–1,049	60

Lighting In-Service Rate and Carryover Savings

Per the IL-TRM V8.0, the first-year ISR varies by bulb type and installation location, and 98% of all bulbs are projected to be installed within three years of purchase, while the remaining 2% are never installed. Using this trajectory, savings are claimed in the year that bulbs are installed. Therefore, the 2020 Retail Products Initiative claims savings from first-year installations of 2020 bulb sales, as well as carryover savings from bulbs sold in previous years but not installed until 2020. Likewise, savings associated with bulbs purchased in 2020 but not installed until the second or third year after purchase will be claimed as carryover savings the year they get installed. One hundred percent of residential LED fixtures are assumed installed in the year purchased. Table 75 provides an installation trajectory by bulb type and installation location.

Table 75. Illinois Statewide TRM Version 8.0 LED Lighting ISR Trajectory

Install Location	Bulb Type	First Year	Second Year	Third Year	Cumulative
Residential	Standard LEDs	76.0%	11.9%	10.1%	98.0%
	Specialty LEDs	81.5%	8.9%	7.6%	98.0%
	LED fixtures	100.0%	0.0%	0.0%	100.0%
Commercial	All	82.5%	8.4%	7.1%	98.0%

Lighting Hours of Use

The IL-TRM V8.0 provides different residential HOU assumptions for different bulb types depending on where they get installed. Table 76 provides the applied HOU assumptions.

Table 76. Illinois Statewide TRM Version 8.0 Lighting HOU Assumptions

Install Location	Bulb Type	HOU
Residential	Standard LEDs	1,159
	Specialty LEDs	1,020
	Indoor and downlight fixtures	926
	Task/under cabinet fixtures	730
	Outdoor fixtures	2,475
Commercial	LED bulbs	3,612
	LED fixtures	3,379

Lighting Waste Heat Factor

The IL-TRM V8.0 provides different waste heat factor values for energy and demand savings, depending on installation location. Table 77 outlines waste heat factor assumptions by savings type and installation location.

Table 77. Illinois Statewide TRM Version 8.0 Lighting Waste Heat Factor Assumptions

Install Location	Bulb Type	Waste Heat Factor (Energy)	Waste Heat Factor (Demand)
Residential	Standard LEDs	1.051	1.093
	Specialty LEDs	1.046	1.083
	LED Fixtures	1.051	1.093
Commercial	All	1.09	1.36

Lighting Coincidence Factor

The IL-TRM V8.0 provides peak CFs based on installation location and bulb type. Table 78 provides the applied CF assumptions.

Table 78. Illinois Statewide TRM Version 8.0 Lighting Coincidence Factor Assumptions

Install Location	Bulb Type	Coincidence Factor
Residential	Standard LEDs	0.135
	Specialty LEDs	0.117
	LED fixtures	0.127
Commercial	All	0.580

Advanced Power Strip Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for 2020 Retail Products Initiative APS using the Initiative tracking database and applying the following algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for APS:

Equation 3. Advanced Power Strip Energy and Demand Savings Equations

$$\Delta kWh = Qty \times kWh_{per} \times ISR$$

$$\Delta kW = \Delta kWh / HOU \times CF$$

where:

Qty	= Quantity of APS from Initiative tracking data
kWh _{per}	= Per-unit deemed energy savings = 56.5 (5-plug); 103.0 (7-plug)
ISR	= In-service rate = 100%
HOU	= Hours of use = 7,129
CF	= Coincidence factor = 0.80

Advanced Thermostat Savings Assumptions

The evaluation team calculated verified gross electric and gas savings for 2020 Retail Products Initiative advanced thermostats using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy, electric demand, and gas savings for advanced thermostats:

Equation 4. Advanced Thermostat Energy and Demand Savings Equation

$$kWh = kWh_{Cool} + kWh_{Heat}$$

$$\Delta kWh_{Heat} = Qty \times \%Elec_{Heat} \times ElecUse_{Heat} \times Reduct_{Heat} \times HF \times ISR + (Qty \times \Delta Therms \times Furnace_e \times 29.3)$$

$$\Delta kWh_{Cool} = Qty \times Ctrl_{Cool} \times ((FLH_{Cool} \times Capacity_{Cool} \times 1/SEER)/1000) \times Reduct_{Cool} \times ISR$$

$$\Delta kW = Qty \times \%AC \times (1 \div EER)/1000 \times Capacity_{Cool} \times Reduct_{Cool} \times CF \times ISR$$

$$\Delta Therms = Qty \times Gas_{Heat} \times GasUse_{Heat} \times HF \times Reduct_{Heat} \times ISR$$

where:

Qty	= Quantity of homes with advanced thermostats from tracking data
%Elec _{Heat}	= Portion of heating assumed to be electric = 100% if electric space heating fuel, 0% if gas space heating fuel, 3% if unknown
ElecUse _{Heat}	= Estimated annual household heating consumption for electrically heated homes applied by heating type and climate zone (see Table 79)

Table 79. Electric Heating Consumption (kWh) by Climate Zone

Climate Zone	Electric Resistance	Heat Pump
1 (Rockford)	21,748	12,793
2 (Chicago)	20,778	12,222
3 (Springfield)	17,794	10,467
4 (Belleville)	13,726	8,074
5 (Marion)	13,970	8,218
Weighted Average	21,749	11,617

Reduct_{Heat} = Reduction in heating energy consumption = 7.0% if unknown previous thermostat
 HF = Household factor to adjust heating consumption for multifamily = 96.5% if unknown
 ISR = Percentage of thermostats installed and effectively programmed = 100%
 Ctrl_{Cool} = Portion of cooling controlled by thermostat = 100% if central cooling or heat pump, 82.5% if unknown
 FLH_{Cool} = Full load cooling hours applied by home type and climate zone (assume 90% SF and 10% MF if home type unknown; see Table 80)

Table 80. Full Load Cooling Hours by Climate Zone

Climate Zone	FLH (Single family)	FLH (Multifamily)	FLH (Blended)
1 (Rockford)	512	467	507.5
2 (Chicago)	570	506	563.8
3 (Springfield)	730	663	723.3
4 (Belleville)	1,035	940	1025.5
5 (Marion)	903	820	894.7
Weighted Average	629	564	N/A

Capacity_{Cool} = Cooling capacity of air conditioner by home type = 31,864 BTU/hour if home type unknown
 SEER = Cooling equipment seasonal energy efficiency ratio = 9.3 if unknown
 Reduct_{Cool} = Reduction in cooling energy consumption due to installing an advanced thermostat = 8.0%
 EER = Cooling efficiency of CAC or heat pump = 7.5 if unknown
 CF = Summer system peak coincidence factor = 0.34
 Gas_{Heat} = 100% if gas space heating fuel, 0% if electric space heating fuel, 97% if unknown
 GasUse_{Heat} = Estimated annual household heating consumption for gas-heated homes applied by climate zone (see Table 81)

Table 81. Gas Heating Consumption by Climate Zone

Climate Zone	Therms
1 (Rockford)	1,052
2 (Chicago)	1,005
3 (Springfield)	861
4 (Belleville)	664
5 (Marion)	676

Climate Zone	Therms
Average	955

Furnace_e = Furnace fan energy consumption as a percentage of annual fuel consumption = 3.14%

Advanced thermostat tracking data included detailed information on heating fuel and heating and cooling systems for most participants. Climate zones were assigned based on customer zip code from the Initiative tracking data. Per the IL-TRM V8.0, additional savings cannot be claimed for a second advanced thermostat installed in a single location.

Dehumidifier Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for 2020 Retail Products Initiative dehumidifiers using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for dehumidifiers:

$$\Delta kWh = \left(((Capacity * 0.473) / 24) * Hours \right) * \left(1 / (L/kWh_Base) - 1 / (L/kWh_Eff) \right)$$

$$\Delta kW = \Delta kWh / Hours * CF$$

where:

Capacity = Average capacity of the unit (pints/day) from tracking data
Hours = Annual operating hours = 1,632
L/kWh =

Capacity (pints/day)	Federal Standard (L/kWh_Base)	ENERGY STAR (L/kWh_Eff)
<25	1.30	1.57
25 and ≤50	1.60	1.80
>50	2.80	3.30
Unknown	2.80	3.30

CF = Summer coincidence factor = 0.37

Air Purifier Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for 2020 Retail Products Initiative air purifiers using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for air purifiers :

$$\Delta kWh = kWh_{Base} - kWh_{Eff}$$

$$\Delta kW = \Delta kWh / Hours * CF$$

where:

Hours = Average annual operating hours = 5,844

CF = Summer coincidence factor = 0.667

kWh_{Base} and kWh_{Eff} are defined as below:

Clean Air Delivery Rate (CADR)	kWh_Base	kWh_Eff
51-100	441	148
101-150	733	245
151-200	1,025	342
201-250	1,317	440
Over 250	1,755	586

Clothes Washer Savings Assumptions

The evaluation team calculated verified gross electric and gas savings for the 2020 Retail Products Initiative clothes washers using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy, electric demand, and gas savings for clothes washers:

Equation 5. Clothes Washer Energy and Demand Savings Equations

$$\Delta kWh = \left[Capacity \times \frac{1}{IMEF_{base}} \times Ncycles \times (\%CW_{base} + (\%DHW_{base} \times \%Elec_{DHW})) + (\%Dryer_{base} \times \%Elec_{Dryer}) \right] - \left[Capacity \times \frac{1}{IMEF_{ee}} \times Ncycles \times (\%CW_{ee} + (\%DHW_{ee} \times \%Elec_{DHW})) + (\%Dryer_{ee} \times \%Elec_{Dryer}) \right]$$

$$\Delta kW = \Delta kWh / Hours * CF$$

$$\Delta Therms = \left[\left(Capacity \times \frac{1}{IMEF_{base}} \times Ncycles \times (\%DHW_{base} \times \%Gas_{DHW} \times R_{eff}) + (\%Dryer_{base} \times \%Gas_{Dryer}) \right) - \left(Capacity \times \frac{1}{IMEF_{ee}} \times Ncycles \times (\%DHW_{ee} \times \%Gas_{DHW} \times R_{eff}) + (\%Dryer_{ee} \times \%Gas_{Dryer}) \right) \right] \times kWh_{therm}$$

where:

Capacity	= Clothes washer capacity from tracking data (cubic feet)
IMEF	= Integrated Modified Energy Factor = 1.75 for baseline, 2.23 for ENERGY STAR
Ncycles	= Number of annual cycles = 264
%CW	= % of energy consumption from clothes washer = 8.1% for baseline, 5.8% for ENERGY STAR
%DHW	= % of energy consumption from water heating = 26.5% for baseline, 31.2% for ENERGY STAR
%Dryer	= % of energy consumption from dryer = 65.4% for baseline, 63.0% for ENERGY STAR
%EleCDHW	= % of water heaters with electric heaters = 32% for unknown
%EleCDryer	= % of dryers with electric heaters = 100% for electric dryers, 62% for unknown
Hours	= Annual hours = 264
CF	= Summer coincidence factor = 0.038
R_eff	= Recovery efficiency factor = 1.26
%GasDHW	= 62%
%GasDryer	= 0%
kWh_therm	= kWh to therms conversion factor = 0.03412

Electric Clothes Dryer Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for 2020 Retail Products Initiative electric clothes dryers using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for electric clothes dryers:

Equation 6. Electric Clothes Dryer Energy and Demand Savings Equations

$$\Delta kWh = \left(\frac{Load}{CEF_{base}} - \frac{Load}{CEF_{ee}} \right) \times Ncycles \times \%Elec$$

$$\Delta kW = \Delta kWh / HOU \times CF$$

where:

Load	= Drum capacity (standard = 8.45, compact = 3)
CEF	= Combined Energy Factor = 3.11 lbs/kWh for baseline standard vented electric, 3.93 lbs/kWh for ENERGY STAR standard vented electric
Ncycles	= 283 if actual is unknown
%Elec	= Portion of usage assumed to be electric = 100%
HOU	= Annual hours = 283
CF	= Summer peak coincidence factor = 3.8%

Refrigerator Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for the 2020 Retail Products Initiative refrigerators using the initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for refrigerators:

Equation 7. Refrigerator Energy and Demand Savings Equations

$$\Delta kWh = Qty \times UEC_{base} - UEC_{ee}$$

$$\Delta kW = (\Delta kWh / Hours) \times TAF \times LSAF$$

where:

Qty	= Quantity of refrigerators from tracking data
AV	= Adjusted volume = (Refrigerator volume * (14.75 / 21.51)) + (Freezer volume * (6.76 / 21.51) * 1.63)
UEC _{base}	= Federal baseline unit energy consumption (see Table 82)
UEC _{ee}	= ENERGY STAR unit energy consumption (see Table 82)

Table 82. Refrigerator Energy Usage Specifications

Product Category	Assumptions after September 2014	
	Federal Baseline UEC in kWh/year	ENERGY STAR UEC in kWh/year
Refrigerator-Freezers—automatic defrost with top-mounted freezer without through-the-door ice service and all-refrigerators—automatic defrost	8.07AV + 233.7	7.26 * AV + 210.3
Refrigerator-Freezers—automatic defrost with side-mounted freezer without through-the-door ice service	8.51AV + 297.8	7.66 * AV + 268.0
Refrigerator-Freezers—automatic defrost with bottom-mounted freezer without through-the-door ice service	8.85AV + 317.0	7.97 * AV + 285.3
Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service	9.25AV + 475.4	8.33 * AV + 436.3
Refrigerator-Freezers—automatic defrost with top-mounted freezer with through-the-door ice service	8.40AV + 385.4	7.56 * AV + 355.3
Refrigerator-Freezers—automatic defrost with side-mounted freezer with through-the-door ice service	8.54AV + 432.8	7.69 * AV + 397.9

TAF	= Temperature adjustment factor = 1.25
LSAF	= Load shape adjustment factor = 1.057
Hours	= Annual hours of use = 8,766

Freezer Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for the 2020 Retail Products Initiative freezers using the initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand for freezers:

Equation 8. Freezer Energy and Demand Savings Equations

$$\Delta kWh = Qty \times UEC_{base} - UEC_{ee}$$

$$\Delta kW = (\Delta kWh / \text{Hours}) \times CF$$

where:

Qty	= Quantity of freezers from tracking data
AV	= Adjusted volume = 1.73 * actual volume (cubic ft)
UEC _{base}	= Federal baseline unit energy consumption = 8.62 * AV + 228.3 for upright freezers with automatic defrost
UEC _{ee}	= ENERGY STAR unit energy consumption = 7.76 * AV + 205.5 for upright freezers with automatic defrost
Hours	= Full load hours per year = 5,890
CF	= Summer peak coincidence factor

Variable-Speed Pool Pump Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for 2020 Retail Products Initiative variable-speed pool pumps using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for variable-speed pool pumps:

Equation 9. Variable Speed Pool Pump Energy and Demand Savings Equations

$$\Delta kWh = Qty \times \frac{\left[\left(\frac{(HOU_{base} \times GPM_{base} \times 60)}{EF_{base}} \right) - \left(\frac{(HOU_{vsH} \times GPM_{vsH} \times 60)}{EF_{vsH}} \right) + \left(\frac{(HOU_{vsL} \times GPM_{vsL} \times 60)}{EF_{vsL}} \right) \right]}{1000 \times \text{Days}}$$

$$\Delta kW = \left[\left(\frac{kWh_{day_{base}}}{\text{Days}} \right) / HOU_{base} \right] - \left[\left(\frac{kWh_{day_{vsH}} + kWh_{day_{vsL}}}{\text{Days}} \right) / (HOU_{vsH} + HOU_{vsL}) \right] \times CF$$

where:

Qty	= Quantity of variable-speed pool pumps from tracking data
HOU	= Daily runtime/daily hours of use = 11.4 for single-speed in-ground, 2 for variable-speed in-ground at high speed, 16 for variable-speed in-ground at low speed
GPM	= Gallons per minute = 64.4 for single-speed in-ground, 50 for variable-speed in-ground at high speed, 30.6 for variable-speed in-ground at low speed
EF	= Energy factor = 2.1 for single-speed, 3.8 for variable-speed at high speed, 7.3 for variable-speed at low speed
Days	= Days per year that swimming pool is operational = 125
CF	= Coincidence factor = 0.831
kWh _{day}	= Daily energy consumption
base	= Single-speed pump
vsH	= Variable-speed pump at high speed
vsL	= Variable-speed pump at low speed

Water Dispenser Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for 2020 Retail Products Initiative water dispensers using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for water dispensers:

$$\Delta kWh = (kWh_{Base} - kWh_{Eff}) * Days$$

$$\Delta kW = \Delta kWh / Hours * CF$$

Type	kWh_Base	kWh_Eff
On Demand	0.330	0.170
Storage	1.090	0.747

where:

kWh_Base	= Daily energy use for baseline measure
kWh_Eff	= Daily energy use for ENERGY STAR measure
Days	= Days per year = 365.25
Hours	= Average annual operating hours = 5844
CF	= Summer coincidence factor = 0.667

Vent Fan Savings Assumptions

The evaluation team calculated verified gross electric and demand savings for 2020 Retail Products Initiative bathroom vent fans using the Initiative tracking database and applying algorithms and savings assumptions based on the IL-TRM V8.0. The evaluation team used the following equations from the IL-TRM V8.0 to estimate electric energy and electric demand savings for bathroom vent fans:

$$\Delta kWh = CFM * (1/n_{Base} - 1/n_{Eff}/1000) * Hours$$

$$\Delta kW = CFM * (1/n_{Base} - 1/n_{Eff}/1000) * CF$$

where:

CFM	= Nominal capacity from tracking data or lookup
n_Base	= Average efficacy for baseline fan (CFM/watts)
n_Eff	= Average efficacy for efficient fan (CFM/watts)

Standard Usage CFM	Baseline Efficacy (n_Base)	ENERGY STAR Efficacy (n_Eff)
10-89	1.7	4.9
90-200	2.6	5.6
Unknown	2.2	5.3

Hours	= Annual run hours = 1,089 for standard usage
CF	= Coincidence factor = 0.135 for standard usage

Measure Lives and Cumulative Persisting Annual Savings

The evaluation team assigned the following EUL assumptions recommended by the Illinois TRM Version 8.0 to calculate CPAS.

Table 83. IL-TRM V8.0 Recommended Effective Useful Life Assumptions

Measure	EUL (Years)
LED bulbs (residential application)	10.0
LED fixtures (residential application)	15.0
Standard LEDs (commercial application)	5.5
Reflector LEDs (commercial application)	6.9
Specialty LEDs (commercial application)	4.7
LED fixtures (commercial application)	14.8
APS	7.0
Advanced thermostats	11.0
Dehumidifiers	12.0
Air purifiers	9.0
Clothes washers	14.0
Electric clothes dryers	16.0
Refrigerators	17.0
Freezers	22.0
Variable-speed pool pumps	7.0
Water dispensers	10.0
Bathroom vent fans	19.0

Net Impact Methodology

The evaluation team applied SAG-approved 2020 NTGRs to verified gross savings to calculate verified net savings. Table 84 outlines the SAG-approved NTGR values applied to verified gross savings to calculate verified net savings.

Table 84. SAG-Approved Retail Products Initiative NTGRs

Measure	Electric NTGR	Gas NTGR
LED Lighting	0.690	N/A
LED Fixtures (Income Qualified)	1.000	N/A
APS	0.860	N/A
APS (Income Qualified)	1.000	N/A
Advanced Thermostats	N/A	N/A
Dehumidifiers	0.670	N/A
Air Purifiers	0.790	N/A
Clothes Washers	0.630	0.630
Electric Clothes Dryers	0.670	N/A
Refrigerators	0.650	N/A

Measure	Electric NTGR	Gas NTGR
Freezers	0.630	N/A
Variable-Speed Pool Pumps	0.760	N/A
Water Dispensers	0.670	N/A
Bathroom Vent Fans	0.660	N/A

Income Qualified Initiative

Gross Impact Methodology

The evaluation team calculated verified savings for the Income Qualified Initiative by applying savings algorithms from the IL-TRM V8.0. The team leveraged Initiative tracking data, such as primary heating and cooling type, delivery mechanism (e.g., direct install, leave behind), LED wattage, LED lamp type, project location (e.g., for weather-dependent variables), installed measure location (e.g., for faucet aerators), and air sealing and attic insulation parameters (e.g., R values), to inform savings assumptions. For variables outside these parameters, the evaluation team typically relied on defaults from the IL-TRM V8.0, except in the following circumstance:

- The IL-TRM V8.0 does not provide specific guidance for mobile homes in all cases. The evaluation team provided a memo to AIC on June 8, 2018, regarding mobile home savings calculations. We used this memo when determining verified savings for mobile home applications if IL-TRM guidance was not provided.³⁰

Table 85. Income Qualified Initiative Measures Evaluated

Evaluation Measure Category	IL-TRM Measure	Errata Applied?
ENERGY STAR Air Purifier/Cleaner	5.1.1	No errata present for this measure
Advanced Power Strip – Tier 1	5.2.1	No errata present for this measure
Air Source Heat Pump	5.3.1	No errata present for this measure
Central Air Conditioning	5.3.3	No errata present for this measure
Duct Insulation and Sealing	5.3.4	No errata present for this measure
Furnace Blower Motor	5.3.5	No errata present for this measure
Gas High Efficiency Boiler	5.3.6	No errata present for this measure
Gas High Efficiency Furnace	5.3.7	No errata present for this measure
High Efficiency Bathroom Exhaust Fan	5.3.9	No errata present for this measure
Advanced Thermostats	5.3.16	No errata present for this measure
Domestic Hot Water Pipe Insulation	5.4.1	No errata present for this measure
Heat Pump Water Heaters	5.4.3	No errata present for this measure
Low Flow Faucet Aerators	5.4.4	No errata present for this measure
Low Flow Showerheads	5.4.5	No errata present for this measure
Thermostatic Restrictor Shower Valve	5.4.8	No errata present for this measure
Shower Timer	5.4.9	No errata present for this measure
LED Specialty Lamps	5.5.6	Errata applied

³⁰ Memo from Opinion Dynamics to AIC. “Mobile Home Savings Calculations Using the IL-TRM.” June 8, 2018.

Evaluation Measure Category	IL-TRM Measure	Errata Applied?
LED Screw Based Omnidirectional Bulbs	5.5.8	Errata applied
Air Sealing	5.6.1	No errata present for this measure
Basement Sidewall Insulation	5.6.2	No errata present for this measure
Floor Insulation Above Crawlspace	5.6.3	No errata present for this measure
Wall Insulation	5.6.4	No errata present for this measure
Ceiling/Attic Insulation	5.6.5	No errata present for this measure
Rim/Band Joist Insulation	5.6.6	No errata present for this measure

Measure Lives and Cumulative Persisting Annual Savings

The evaluation team applied measure lives and baseline shifts from the IL-TRM V8.0 to calculate CPAS.

Net Impact Methodology

The SAG-approved NTGRs for the Income Qualified Initiative are 1.00 for all measures. Therefore, gross savings are equivalent to net savings.

Multifamily Initiatives

Gross Impact Methodology

The evaluation team calculated verified savings for the Multifamily initiatives by applying savings algorithms from the IL-TRM V8.0. The team leveraged initiative tracking data, such as primary heating and cooling type, water heating fuel type, cooling and heating capacities, delivery mechanism (e.g., direct install, leave behind), LED wattage, LED lamp type, project location (e.g., for weather-dependent variables), and installed measure location (e.g., for faucet aerators), to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V8.0. Table 86 lists the measures in the Multifamily initiatives, their corresponding IL-TRM V8.0 entry, and whether IL TRM V8.0 errata applied to the measure in the 2020 evaluation.

Table 86. Multifamily Initiatives Measures Evaluated

Measure Category	IL-TRM Measure	Errata Applied?
Standard LED - Common Area	4.5.4	Errata applied
Room Air Conditioner	5.1.7	No errata present for this measure
Advanced Power Strip - Tier 1	5.2.1	No errata present for this measure
Ductless Heat Pump	5.3.12	No errata present for this measure
Advanced Thermostat	5.3.16	No errata present for this measure
Pipe Insulation	5.4.1	No errata present for this measure
Faucet Aerator	5.4.4	No errata present for this measure
Showerhead	5.4.5	No errata present for this measure
Thermostatic Restrictor Shower Valve	5.4.8	No errata present for this measure
Specialty LED - In Unit	5.5.6	Errata applied
Standard LED - In Unit	5.5.8	Errata applied
Air Sealing	5.6.1	No errata present for this measure

Measure Category	IL-TRM Measure	Errata Applied?
Door Sweep	5.6.1	No errata present for this measure
Wall Plate Gasket	5.6.1	No errata present for this measure
Attic Insulation	5.6.5	No errata present for this measure

Measure Lives and Cumulative Persisting Annual Savings

The evaluation team applied measure lives and mid-life adjustments as provided in the IL-TRM V8.0 to determine CPAS for the Multifamily initiatives.

Net Impact Methodology

The evaluation team applied SAG-approved 2020 NTGRs to verified gross savings to calculate verified net savings. Table 87 outlines the SAG-approved NTGR values applied to verified gross savings to calculate verified net savings.

Table 87. SAG-Approved Multifamily Initiatives NTGRs

Measure	Electric NTGR	Gas NTGR
Public Housing		
All measures	1.000	1.000
Income Qualified – Multifamily		
All measures	1.000	1.000
Multifamily		
Advanced Power Strip - Tier 1	0.980	N/A
Advanced Thermostat	1.000	1.000
Air Sealing	0.861	0.800
Faucet Aerator	1.004	1.000
Pipe Insulation	0.794	1.000
Showerhead	1.004	1.000
Specialty LED - Common Area	0.773	N/A
Specialty LED – In Unit	0.960	N/A
Standard LED - Common Area	0.773	N/A
Standard LED - In Unit	0.960	N/A
Thermostatic Restrictor Shower Valve	0.800	0.800

HVAC Initiative

Gross Impact Methodology

The evaluation team calculated verified savings for the HVAC Initiative by applying savings algorithms from the IL-TRM V8.0. The team leveraged Initiative tracking data, such as quantity, primary heating and cooling type, efficiencies, and installed measure location, to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V8.0. Table 88 lists the measures in the HVAC Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2020 evaluation.

Table 88. HVAC Initiative Measures Evaluated

Evaluation Measure Category	IL-TRM Measure	Errata Applied?
ASHP	5.3.1	No errata present for this measure
ASHP ER	5.3.1	No errata present for this measure
CAC	5.3.3	No errata present for this measure
CAC ER	5.3.3	No errata present for this measure
Heat Pump Water Heater	5.4.3	No errata present for this measure
Advanced Thermostat	5.3.16	No errata present for this measure
Ductless Heat Pump	5.3.12	No errata present for this measure
Air Sealing	5.6.1	No errata present for this measure
Attic Insulation	5.6.5	No errata present for this measure
Crawl Space Insulation	5.6.2	No errata present for this measure
Duct Sealing	5.3.4	No errata present for this measure
Bathroom Exhaust Fan	5.3.9	No errata present for this measure
Rim Joist Insulation	5.6.6	No errata present for this measure
Wall Insulation	5.6.4	No errata present for this measure

Measure Lives and Cumulative Persisting Annual Savings

The evaluation applied the measure lives deemed in the IL-TRM V8.0 to determine CPAS for the HVAC Initiative.

Net Impact Methodology

The evaluation team applied SAG-approved 2020 NTGRs to verified gross savings to calculate verified net savings. In the case of the weatherization pilot measures, we applied a value of 0.800 per the Illinois Policy Manual. Table 89 outlines the NTGR values applied to verified gross savings to calculate verified net savings.

Table 89. SAG-Approved HVAC Initiative NTGRs

Measure	Electric NTGR	Gas NTGR
ASHP	0.641	N/A
ASHP ER	0.761	N/A
CAC	0.641	N/A
CAC ER	0.761	N/A
HPWH	0.760	0.760
Advanced Thermostat	N/A	N/A
Ductless Heat Pump	0.641	0.641
Air Sealing	0.800	0.800
Attic Insulation	0.800	0.800
Crawl Space Insulation	0.800	0.800
Duct Sealing	0.800	0.800
Bathroom Exhaust Fan	0.800	0.800
Rim Joist Insulation	0.800	0.800
Wall Insulation	0.800	0.800

Appliance Recycling Initiative

Gross Impact Methodology

The evaluation team calculated verified savings for the Appliance Recycling Initiative by applying savings algorithms from the IL-TRM V8.0. The team leveraged Initiative tracking data, such as appliance type, age, size, model, usage type, operational location, and zip code, to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V8.0. Table 90 lists the measures in the Appliance Recycling Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2020 evaluation.

Table 90. Appliance Recycling Initiative Measures Evaluated

Evaluation Measure Category	IL-TRM Measure	Errata Applied?
Refrigerator Recycling	5.1.8	No errata present for this measure
Freezer Recycling	5.1.8	No errata present for this measure
Room Air Conditioner Recycling	5.1.9	No errata present for this measure

The IL-TRM V8.0 algorithms provide coefficients to calculate the energy consumption of recycled appliances based on a collaborative metering study conducted for Commonwealth Edison Company and two Michigan utilities (Consumers Energy and DTE Energy). Holding all other variables constant, the coefficient of each independent variable indicates the influence of that variable on annual consumption:

- A positive coefficient indicates an upward influence on consumption
- A negative coefficient indicates a downward influence on consumption

With the exception of the intercept, the coefficient value indicates the marginal impact of a one-point increase in the independent variable on the UEC. For instance, a single cubic foot increase in refrigerator size results in a 27.149 kWh increase in average annual consumption. For dummy variables, the coefficient value represents the difference in consumption if a given condition holds true. For example, the 161.857 coefficient for the dummy variable “Primary Usage Type” indicates the customer used the refrigerator as a primary unit; all else being equal, this means that a primary refrigerator annually consumes 161.857 kWh more than a secondary unit. Table 91 lists the IL-TRM V8.0 coefficients for refrigerators and freezers.

Table 91. Appliance Recycling Initiative Energy Savings Calculation Coefficients

Appliance	Independent Variable Description	Estimate Coefficient
Refrigerator	Intercept	83.324
	Age (years)	3.678
	Pre-1990 (= 1 if manufactured pre-1990)	485.037
	Size (cubic feet)	27.149
	Dummy: Side-by-Side (= 1 if side-by-side refrigerator)	406.779
	Dummy: Primary Usage Type (in absence of the program) (= 1 if primary unit)	161.857
	Interaction: Located in Unconditioned Space x CDD/365.25	15.366
	Interaction: Located in Unconditioned Space x HDD/365.25	-11.067
Freezer	Intercept	132.122
	Age (years)	12.130

Appliance	Independent Variable Description	Estimate Coefficient
	Pre-1990 (= 1 if manufactured pre-1990)	156.181
	Size (cubic feet)	31.839
	Dummy: Chest (= 1 if chest freezer)	-19.709
	Interaction: Located in Unconditioned Space x CDD/365.25	9.778
	Interaction: Located in Unconditioned Space x HDD/365.25	-12.755

The evaluation team applied appliance-specific characteristics included in the 2020 tracking database to the regression model coefficients in Table 91 to calculate unit-level energy savings using the algorithms in Section 5.1.8 of IL-TRM V8.0. Note that the part-use factor included in the savings algorithms accounts for appliances not plugged in year-round prior to participation. For 2020, the evaluation team applied a part-use factor of 0.86 for refrigerators and 0.81 for freezers, estimated using 2019 and 2020 survey responses. We also calculated demand savings using the algorithm in Section 5.1.8 of IL-TRM V8.0.

We calculated energy and demand savings for room air conditioners by applying the applicable savings algorithms from Section 5.1.9 of IL-TRM V8.0. The 2020 tracking data did not include information on unit capacity or efficiency, so we applied the default values included in IL-TRM V8.0: 8,500 Btu/hr and 9.8 EER for capacity and efficiency, respectively.

Measure Lives and Cumulative Persisting Annual Savings

The evaluation team applied the measure lives from Measures 5.1.8 and 5.1.9 of the IL-TRM V8.0 to determine CPAS for the Appliance Recycling Initiative.

Net Impact Methodology

The evaluation team applied SAG-approved 2020 NTGRs to verified gross savings to calculate verified net savings (Table 92).

Table 92. SAG-Approved Appliance Recycling NTGRs

Measure	Electric NTGR	Gas NTGR
Refrigerator	0.710	N/A
Freezer	0.640	N/A
Room Air Conditioner	0.500	N/A

Direct Distribution Initiative

Gross Impact Methodology

The evaluation team calculated verified savings for the Direct Distribution Initiative by applying savings algorithms from the IL-TRM V8.0. The team leveraged Initiative tracking data, such as primary heating and cooling type, delivery mechanism (e.g., direct install, leave behind), LED wattage, LED lamp type, project location (e.g., for weather-dependent variables), home type (single family or family), and installed measure location (e.g., for faucet aerators), to inform savings assumptions. For variables outside these parameters, the evaluation team relied on defaults from the IL-TRM V8.0. Table 93 lists the measures in the Direct Distribution Initiative, their corresponding IL-TRM entry, and whether or not TRM errata applied to the measure in the 2020 evaluation.

Table 93. Direct Distribution Initiative Measures Evaluated

Evaluation Measure Category	IL-TRM Measure	Errata Applied?
9W LED	5.5.8	Errata applied
4.5 W Globe	5.5.6	Errata applied
8W Reflector	5.5.6	Errata applied
ENERGY STAR Desk Lamp	5.5.8	Errata applied
Connected LED	5.5.12	Errata applied
Advanced Power Strip - Tier 1	5.2.1	No errata present for this measure
Furnace Filter Alarm	5.3.18	No errata present for this measure
Showerhead	5.4.5	No errata present for this measure
Shower Timer	5.4.9	No errata present for this measure
Bathroom Aerator	5.4.4	No errata present for this measure
Kitchen Aerator	5.4.4	No errata present for this measure
Water Temperature Card	5.4.6	No errata present for this measure
Thermostatic Shower Valve	5.4.8	No errata present for this measure
Pipe Insulation	5.4.1	No errata present for this measure
Door Sweep	5.6.1	No errata present for this measure

Measure Lives and Cumulative Persisting Annual Savings

The evaluation team applied measure lives and mid-life adjustments from the IL-TRM V8.0 and errata to calculate CPAS for the Direct Distribution Initiative.

Net Impact Methodology

All channels of the Direct Distribution Initiative delivered kits to IQ customers only and therefore a 1.00 NTGR is applied to all measures.

Appendix B. Cost-Effectiveness Inputs

In this appendix, we provide additional inputs for the cost-effectiveness testing of AIC's Residential Program. Two specific types of additional inputs are provided: summaries of gas penalties that are not counted toward gas goal attainment and summaries of secondary electric savings from water supply and wastewater treatment.

Gas Penalties

By agreement with SAG,³¹ AIC is not penalized for gas penalties resulting from the installation of efficient prescriptive measures that create an increase in energy usage when considering savings for goal attainment purposes. Therefore, we exclude those effects in all savings reported throughout the body of this report. However, these effects must be evaluated and considered as part of cost-effectiveness testing and are therefore presented in this appendix.

In the following sections, the evaluation team focuses specifically on the following gas penalties:

- **Lighting Heating Penalties.** The inclusion of waste heat factors for lighting is based on the concept that heating loads are increased to supplement the reduction in heat that was once provided by the existing, less-efficient lamp type. The team applied the IL-TRM waste heat factors to lamps based on heating fuel types provided in the tracking database to arrive at gross heating penalties. For the cases where tracking data did not provide the heating type, the team assumed natural gas heating per the IL-TRM.
- **Furnace Blower Motor Heating Penalties.** High-efficiency fan motors operate at cooler temperatures than traditional furnace blower motors. The amount of heat that is released decreases due to cooler operating conditions. Heating equipment must make up for this loss of heat during the heating season, resulting in an increase in HVAC heating loads. The team applied IL-TRM algorithms to calculate the associated heating penalty.
- **Heat Pump Water Heater Penalties.** When HPWHs are installed in conditioned space, they move heat from the ambient air into water stored in a tank. During the heating season, this can result in an increase in HVAC heating loads. The team applied IL-TRM algorithms to calculate the associated heating penalty.

All heating penalties were calculated using algorithms from the IL-TRM V8.0 (with applicable errata applied).

Secondary Electric Savings from Water Supply and Wastewater Treatment

Some measures delivered through the Residential Program produce water savings as well as energy savings. For applicable measures, the IL-TRM V8.0 includes an algorithm to calculate the secondary electric impacts of these water savings and decreased electricity usage for water supply and wastewater treatment as a result of water savings stemming from the energy efficient measures. As directly instructed in the IL-TRM, these savings may be included in savings when considered for goal attainment but must be removed from savings for the purpose of cost-effectiveness calculations. Therefore, we present these savings separately in this

³¹ Treatment of interactive effects is consistent with a draft SAG policy agreement on this topic. Illinois Energy Efficiency Stakeholder Advisory Group. "Policy Resolution - 2020 Program Year." 2020. Accessed at: <https://ilsag.s3.amazonaws.com/SAG-Policy-Res-Heating-Penalties-Negative-Savings-11-30.docx>.

appendix to provide transparency on the reduced savings that will be used when conducting testing for cost-effectiveness. All secondary electric savings were calculated using algorithms from the IL-TRM V8.0.

Retail Products Initiative

Gas Penalties

Table 94 presents gas penalties not reported in the body of the report for the Retail Products Initiative.

Table 94. 2020 Retail Products Initiative Interactive Effects

Measure	Therms
LED Lighting (Residential Application)	-1,247,985
LED Lighting (Commercial Application)	-115,176
Total Interactive Effects	-1,363,161

Secondary Electric Savings from Water Supply and Wastewater Treatment

We calculated secondary electric savings from water supply and wastewater treatment for measures installed through the Retail Products Initiative during 2020. These savings are included in the body of the report and for goal attainment purposes in line with guidance provided in IL-TRM V8.0.

Table 95 presents secondary electric savings claimed through the Retail Products Initiative that will be excluded from cost-effectiveness calculations.

Table 95. 2020 Retail Products Initiative Secondary Electric Savings

Measure	kWh
ENERGY STAR Clothes Washer Secondary Electric Savings	22,904
Total Secondary Electric Savings	22,904

Total Impacts for Cost-Effectiveness

Table 96 presents final total 2020 Retail Products Initiative verified gross impacts to be used for cost-effectiveness, adjusted for gas penalties and secondary electric savings.

Table 96. 2020 Retail Products Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms
Verified Gross Impacts for Goal Attainment	78,572,243	1,457,318
Gas Penalties	N/A	-1,363,161
Secondary Electric Savings	-22,904	N/A
Final Verified Gross Impacts for Cost-Effectiveness	78,549,339	94,157

Income Qualified Initiative

Gas Penalties

Table 97 presents gas penalties not reported in the body of the report for the Income Qualified Initiative by channel and end use.

Table 97. 2020 Income Qualified Initiative Gas Penalties by Channel and End Use

End Use	Therms
Single Family Channel	
Single Family Core	
Lighting Heating Penalty	-7,607
Furnace Blower Motor Heating Penalty	-2,304
HPWH Heating Penalty	-186
<i>Single Family Core Subtotal</i>	<i>-10,097</i>
SAVE Kits	
Verified SAVE Kit Lighting Heating Penalty	-5,477
Unverified SAVE Kit Lighting Heating Penalty	-55,373
<i>SAVE Kits Subtotal</i>	<i>-60,850</i>
<i>Single Family Channel Subtotal</i>	<i>-70,947</i>
CAA Channel	
Lighting Heating Penalty	-4,516
<i>CAA Channel Subtotal</i>	<i>-4,516</i>
Total	-75,463

Secondary Electric Savings from Water Supply and Wastewater Treatment

We calculated secondary electric savings from water supply and wastewater treatment for measures installed through the Income Qualified Initiative during 2020. These savings are included in the body of the report and for goal attainment purposes in line with guidance provided in IL-TRM V8.0.

Table 95 presents secondary electric savings claimed through the Income Qualified Initiative that will be excluded from cost-effectiveness calculations.

Table 98. 2020 Income Qualified Initiative Secondary Electric Savings

End Use	kWh
Single Family Channel	
Single Family Core	
Faucet Aerator	2,989
Showerhead	3,304
<i>Single Family Core Subtotal</i>	<i>6,292</i>
SAVE Kits	
Unverified SAVE Kits	126,603
Faucet Aerator (Verified Kits)	6,449

End Use	kWh
Showerhead (Verified Kits)	5,358
Restrictor Shower Valve (Verified Kits)	1,166
<i>SAVE Kits Subtotal</i>	<i>139,577</i>
APS Food Bank Kits	
APS Food Bank Kit	4,076
<i>APS Food Bank Kits Subtotal</i>	<i>4,076</i>
BN Pilot	
Community Kit	274
<i>BN Pilot Subtotal</i>	<i>274</i>
<i>Single Family Channel Subtotal</i>	<i>150,218</i>
CAA Channel	
Faucet Aerator	685
Showerhead	1,290
<i>CAA Channel Subtotal</i>	<i>1,974</i>
Total Secondary Electric Savings	152,193

Total Impacts for Cost-Effectiveness

Table 99 presents final total 2020 Income Qualified Initiative verified gross impacts to be used for cost-effectiveness, adjusted for interactive effects and secondary electric savings.

Table 99. 2020 Income Qualified Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms
Verified Gross Impacts for Goal Attainment	16,257,246	1,168,375
Gas Penalties	N/A	-75,463
Secondary Electric Savings	-152,193	N/A
Final Verified Gross Impacts for Cost-Effectiveness	16,409,438	1,092,912

Multifamily Initiatives

Gas Penalties

Table 100 through Table 102 present gas penalties not reported in the body of the report for the Multifamily initiatives.

Table 100. 2020 Public Housing Initiative Gas Penalties

Measure	Therms
Standard LED - Gas Heating Penalty	-2,989
Specialty LED - Gas Heating Penalty	-176
Total Interactive Effects	-3,165

Table 101. 2020 Income Qualified – Multifamily Gas Penalties

Measure	Therms
Standard LED - Gas Heating Penalty	-1,401
Specialty LED - Gas Heating Penalty	-71
Standard LED (Common Area) - Gas Heating Penalty	-25
Total Interactive Effects	-1,496

Table 102. 2020 Multifamily Initiative Gas Penalties

Measure	Therms
Standard LED - Gas Heating Penalty	0
Specialty LED - Gas Heating Penalty	0
Total Interactive Effects	0

Secondary Electric Savings from Water Supply and Wastewater Treatment

We calculated secondary electric savings from water supply and wastewater treatment for measures installed through the Multifamily initiatives during 2020. These savings are included in the body of the report and for goal attainment purposes in line with guidance provided in IL-TRM V8.0.

Table 103 through Table 105 present secondary electric savings claimed through the Multifamily initiatives to be excluded from cost-effectiveness calculations.

Table 103. 2020 Public Housing Initiative Secondary Electric Savings

	kWh
Faucet Aerator	4,622
Showerhead	2,052
Thermostatic Restrictor Shower Valve	126
Total Secondary Electric Savings	6,800

Table 104. 2020 Income Qualified – Multifamily Secondary Electric Savings

	kWh
Faucet Aerator	4,001
Showerhead	9,122
Thermostatic Restrictor Shower Valve	2,668
Total Secondary Electric Savings	15,791

Table 105. 2020 Multifamily Initiative Secondary Electric Savings

	kWh
Faucet Aerator	184
Showerhead	107
Thermostatic Restrictor Shower Valve	20
Total Secondary Electric Savings	311

Total Impacts for Cost-Effectiveness

Table 106 through Table 108 presents final total 2020 Multifamily initiatives verified gross impacts to be used for cost-effectiveness, adjusted for gas penalties and secondary electric savings.

Table 106. 2020 Public Housing Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms
Verified Gross Impacts for Goal Attainment	679,903	8,254
Gas Penalties	0	-3,165
Secondary Electric Savings	-6,800	N/A
Final Verified Gross Impacts for Cost-Effectiveness	673,103	5,089

Table 107. 2020 Income Qualified – Multifamily Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms
Verified Gross Impacts for Goal Attainment	1,157,505	4,996
Gas Penalties	0	-1,496
Secondary Electric Savings	-15,791	N/A
Final Verified Gross Impacts for Cost-Effectiveness	1,141,714	3,500

Table 108. 2020 Multifamily Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms
Verified Gross Impacts for Goal Attainment	354,394	3,214
Gas Penalties	0	0
Secondary Electric Savings	-311	N/A
Final Verified Gross Impacts for Cost-Effectiveness	354,083	3,214

HVAC Initiative

Gas Penalties

Table 109 presents gas penalties not reported in the body of the report for the HVAC Initiative.

Table 109. 2020 HVAC Initiative Gas Penalties

Measure	kWh	Therms
HPWH Heating Penalty	N/A	-325
Total Interactive Effects	N/A	-325

Secondary Electric Savings from Water Supply and Wastewater Treatment

No measures delivered through the HVAC Initiative in 2020 produced quantifiable water savings.

Total Impacts for Cost-Effectiveness

Table 110 presents final total 2020 HVAC Initiative verified gross impacts to be used for cost-effectiveness, adjusted for interactive effects and secondary electric savings.

Table 110. 2020 HVAC Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms
Verified Gross Impacts for Goal Attainment	7,866,643	75,185
Interactive Effects	N/A	-325
Secondary Electric Savings	N/A	N/A
Final Verified Gross Impacts for Cost-Effectiveness	7,866,643	74,860

Appliance Recycling Initiative

No measures delivered through the Appliance Recycling Initiative in 2020 produced gas penalties or secondary electric savings, and therefore savings presented in the body of the report will be used for cost-effectiveness testing.

Direct Distribution Initiative

Gas Penalties

Table 111 presents gas penalties not reported in the body of the report for the Direct Distribution Initiative.

Table 111. 2020 Direct Distribution Initiative Gas Penalties

Measure	Therms
9W LED Gas Heating Penalty	-106,578
4.5W Globe Gas Heating Penalty	-962
8W Reflector Gas Heating Penalty	-773
ENERGY STAR Desk Lamp Gas Heating Penalty	-641
Connected LED Gas Heating Penalty	-1,950
Total Interactive Effects	-110,904

Secondary Electric Savings from Water Supply and Wastewater Treatment

We calculated secondary electric savings from water supply and wastewater treatment for measures installed through the Direct Distribution Initiative during 2020. These savings are included in the body of the report and for goal attainment purposes in line with guidance provided in IL-TRM V8.0.

Table 112 presents secondary electric savings claimed through the Direct Distribution Initiative that will be excluded from cost-effectiveness calculations.

Table 112. 2020 Direct Distribution Initiative Secondary Electric Savings

Measure	kWh
Showerhead Secondary Electric Savings	35,066
Kitchen Aerator Secondary Electric Savings	33,699
Bathroom Aerator Secondary Electric Savings	4,900
Shower Timer Secondary Electric Savings	21,634
Thermostatic Shower Valve Secondary Electric Savings	590
Total Secondary Electric Savings	95,890

Total Impacts for Cost-Effectiveness

Table 113 presents final total 2020 Direct Distribution Initiative verified gross impacts to be used for cost-effectiveness, adjusted for gas penalties and secondary electric savings.

Table 113. 2020 Direct Distribution Initiative Verified Gross Impacts for Cost-Effectiveness

	kWh	Therms
Verified Gross Impacts for Goal Attainment	7,983,741	85,713
Gas Penalties	N/A	-110,904
Secondary Electric Savings	-95,890	N/A
Final Verified Gross Impacts for Cost-Effectiveness	7,887,851	-25,191

Appendix C. Cumulative Persisting Annual Savings

This appendix presents detailed CPAS for the Residential Program and its subcomponents. Due to many years of CPAS, tables can be challenging to read; please reference the separately provided CPAS spreadsheet for additional detail as needed.

Table 114 provides CPAS for the 2020 Residential Program through 2047 at the channel level. Lifetime savings for the 2020 Residential Program are 1,127,877 MWh.

Table 114. 2020 Residential Program CPAS and WAML

Initiative/Channel	WAML	First-Year Verified Gross MWh	NTGR	CPAS - Verified Net MWh														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Retail Products	9.7	78,572	0.774			60,846	60,846	60,846	60,846	48,024	47,066	46,814	33,686	33,686	33,348	15,185	1,684	1,265
Retail Products Carryover	9.7	16,929	0.693			11,739	11,739	11,739	11,739	7,284	7,150	7,048	5,316	5,316	5,316	0	0	0
Income Qualified - Single Family	11.3	9,760	1.000			9,760	9,760	9,760	9,760	9,760	9,760	9,210	5,961	5,946	5,375	2,177	1,993	1,993
Income Qualified - CAA	15.6	574	1.000			574	574	574	574	574	574	574	478	478	478	288	286	286
Smart Savers	11.0	5,923	1.000			5,923	5,923	5,923	5,923	5,923	5,923	5,923	5,923	5,923	5,923	5,923	0	0
Income Qualified - Multifamily	11.5	1,158	1.000			1,158	1,158	1,158	1,149	1,123	1,123	1,123	1,042	1,042	1,042	652	333	312
Public Housing	12.6	680	1.000			680	680	680	680	652	652	652	551	551	551	368	322	277
Multifamily	10.4	354	0.989			350	350	350	350	303	303	303	275	275	275	235	0	0
HVAC	17.0	7,867	0.748			5,884	5,884	5,884	5,884	5,884	5,884	3,151	3,151	3,151	3,151	3,147	2,664	2,664
Appliance Recycling	6.5	3,543	0.695			2,461	2,461	2,461	2,461	2,440	2,440	1,220	0	0	0	0	0	0
School Kits	8.7	1,955	1.000			1,955	1,955	1,662	1,658	1,658	1,658	1,658	1,028	1,028	1,028	107	107	107
School Kits Carryover	10.0	274	0.836			229	229	229	229	91	91	91	91	91	91	0	0	0
AR Kits	8.9	98	1.000			98	98	98	98	98	98	98	45	45	45	0	0	0
AR Kits Carryover	10.0	11	1.000			11	11	11	11	11	11	11	6	6	6	0	0	0
Community Kits	9.5	5,762	1.000			5,762	5,762	5,760	5,760	5,760	5,760	5,760	2,830	2,830	2,830	0	0	0
Smart Home Kits	8.9	169	1.000			169	169	169	169	169	169	169	61	61	61	0	0	0
Residential NPSO	10.3	2,372	0.754			1,788	1,788	1,788	1,788	1,250	1,216	1,083	1,002	1,002	992	555	114	101
Retail Products (gas conversion)	11.0	5,934	1.000			5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	0	0
Smart Savers (gas conversion)	11.0	9,572	1.000			9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	0	0
2020 Portfolio CPAS		151,507	0.824			124,892	124,892	124,597	124,584	106,510	105,383	100,394	76,953	76,938	76,017	44,143	7,504	7,006
Expiring 2020 Portfolio CPAS						0	0	296	13	18,074	1,127	4,990	23,441	15	921	31,873	36,640	498
Expired 2020 Portfolio CPAS						0	0	296	308	18,382	19,509	24,499	47,939	47,955	48,876	80,749	117,389	117,887

Cumulative Persisting Annual Savings

Initiative/Channel	WAML	First-Year Verified Gross MWh	NTGR	CPAS - Verified Net MWh														
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Retail Products	9.7	78,572	0.774	1,265	1,054	233	87	34	34	2	2	2	0	0	0	0	0	0
Retail Products Carryover	9.7	16,929	0.693	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Income Qualified - Single Family	11.3	9,760	1.000	1,993	1,993	1,522	1,311	1,311	1,162	1,015	0	0	0	0	0	0	0	0
Income Qualified - CAA	15.6	574	1.000	286	286	286	286	286	286	243	0	0	0	0	0	0	0	0
Smart Savers	11.0	5,923	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Income Qualified - Multifamily	11.5	1,158	1.000	312	312	30	30	30	30	30	0	0	0	0	0	0	0	0
Public Housing	12.6	680	1.000	277	277	67	67	67	67	67	0	0	0	0	0	0	0	0
Multifamily	10.4	354	0.989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HVAC	17.0	7,867	0.748	2,664	2,664	2,463	1,405	1,405	37	32	0	0	0	0	0	0	0	0
Appliance Recycling	6.5	3,543	0.695	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
School Kits	8.7	1,955	1.000	107	107	31	31	31	31	31	0	0	0	0	0	0	0	0
School Kits Carryover	10.0	274	0.836	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AR Kits	8.9	98	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AR Kits Carryover	10.0	11	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Community Kits	9.5	5,762	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smart Home Kits	8.9	169	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential NPSO	10.3	2,372	0.754	101	94	84	46	45	2	1	0	0	0	0	0	0	0	0
Retail Products (gas conversion)	11.0	5,934	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smart Savers (gas conversion)	11.0	9,572	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020 Portfolio CPAS		151,507	0.824	7,006	6,789	4,716	3,265	3,211	1,651	1,423	2	2	0	0	0	0	0	0
Expiring 2020 Portfolio CPAS				0	217	2,072	1,452	54	1,559	228	1,421	0	2	0	0	0	0	0
Expired 2020 Portfolio CPAS				117,887	118,104	120,176	121,628	121,682	123,241	123,469	124,890	124,890	124,892	124,892	124,892	124,892	124,892	124,892
WAML	10.3																	

Retail Products Initiative

Table 115 provides CPAS for the 2020 Retail Products Initiative through 2047. Lifetime savings for the Initiative are 506,858 MWh.

Table 115. 2020 Retail Products Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Standard LED - Residential Non-IQ	10.0	6,520	0.690			4,499	4,499	4,499	4,499	1,800	1,800	1,800	1,800	1,800	1,800	0	0	0
Standard LED - Residential IQ	10.0	3,147	0.690			2,171	2,171	2,171	2,171	2,171	2,171	2,171	1,238	1,238	1,238	0	0	0
Standard LED - Commercial	5.5	1,039	0.690			717	717	717	717	287	143	0	0	0	0	0	0	0
Reflector LED - Residential Non-IQ	10.0	11,751	0.690			8,108	8,108	8,108	8,108	4,378	4,378	4,378	4,378	4,378	4,378	0	0	0
Reflector LED - Residential IQ	10.0	7,134	0.690			4,923	4,923	4,923	4,923	4,923	4,923	4,923	3,298	3,298	3,298	0	0	0
Reflector LED - Commercial	6.9	2,912	0.690			2,010	2,010	2,010	2,010	1,085	1,085	977	0	0	0	0	0	0
Specialty LED - Residential Non-IQ	10.0	12,289	0.690			8,480	8,480	8,480	8,480	4,749	4,749	4,749	4,749	4,749	4,749	0	0	0
Specialty LED - Residential IQ	10.0	7,251	0.690			5,003	5,003	5,003	5,003	5,003	5,003	5,003	2,652	2,652	2,652	0	0	0
Specialty LED - Commercial	4.7	3,013	0.690			2,079	2,079	2,079	2,079	815	0	0	0	0	0	0	0	0
LED Fixture - Residential Non-IQ	15.0	135	0.690			93	93	93	93	50	50	50	50	50	50	50	50	50
LED Fixture - Residential IQ	15.0	34	0.690			23	23	23	23	23	23	23	16	16	16	16	16	16
LED Fixture - Commercial	14.8	17	0.690			12	12	12	12	12	12	12	12	12	12	12	12	12
LED Fixture - Dollar Store - Residential IQ	15.0	991	1.000			991	991	991	991	991	991	991	664	664	664	664	664	664
LED Fixture - Dollar Store - Commercial	14.8	103	1.000			103	103	103	103	103	103	103	103	103	103	103	103	103
Advanced Power Strip	7.0	173	0.860			149	149	149	149	149	149	149	0	0	0	0	0	0
Advanced Power Strip - Dollar Store	7.0	6,670	1.000			6,670	6,670	6,670	6,670	6,670	6,670	6,670	0	0	0	0	0	0
Advanced Thermostat	11.0	13,501	N/A			13,501	13,501	13,501	13,501	13,501	13,501	13,501	13,501	13,501	13,501	13,501	0	0
Dehumidifier	12.0	626	0.670			419	419	419	419	419	419	419	419	419	419	419	419	0
Air Purifier	9.0	429	0.790			339	339	339	339	339	339	339	339	339	0	0	0	0
Clothes Washer	14.0	298	0.630			188	188	188	188	188	188	188	188	188	188	188	188	188
Electric Clothes Dryer	16.0	218	0.670			146	146	146	146	146	146	146	146	146	146	146	146	146
Refrigerator	17.0	81	0.650			52	52	52	52	52	52	52	52	52	52	52	52	52
Freezer	22.0	4	0.630			2	2	2	2	2	2	2	2	2	2	2	2	2
Pool Pump	7.0	115	0.760			88	88	88	88	88	88	88	0	0	0	0	0	0
Water Dispenser	10.0	72	0.670			48	48	48	48	48	48	48	48	48	48	0	0	0
Vent Fan	19.0	49	0.660			32	32	32	32	32	32	32	32	32	32	32	32	32
Total		78,572	0.774			60,846	60,846	60,846	60,846	48,024	47,066	46,814	33,686	33,686	33,348	15,185	1,684	1,265
Expiring 2020 CPAS						0	0	0	0	12,822	958	252	13,127	0	339	18,162	13,501	419
Expired 2020 CPAS						0	0	0	0	12,822	13,780	14,032	27,160	27,160	27,499	45,661	59,162	59,581

Cumulative Persisting Annual Savings

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)															
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	
Standard LED - Residential Non-IQ	10.0	6,520	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Standard LED - Residential IQ	10.0	3,147	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Standard LED - Commercial	5.5	1,039	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Reflector LED - Residential Non-IQ	10.0	11,751	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Reflector LED - Residential IQ	10.0	7,134	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Reflector LED - Commercial	6.9	2,912	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Specialty LED - Residential Non-IQ	10.0	12,289	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Specialty LED - Residential IQ	10.0	7,251	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Specialty LED - Commercial	4.7	3,013	0.690	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LED Fixture - Residential Non-IQ	15.0	135	0.690	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	
LED Fixture - Residential IQ	15.0	34	0.690	16	16	0	0	0	0	0	0	0	0	0	0	0	0	0	
LED Fixture - Commercial	14.8	17	0.690	12	9	0	0	0	0	0	0	0	0	0	0	0	0	0	
LED Fixture - Dollar Store - Residential IQ	15.0	991	1.000	664	664	0	0	0	0	0	0	0	0	0	0	0	0	0	
LED Fixture - Dollar Store - Commercial	14.8	103	1.000	103	82	0	0	0	0	0	0	0	0	0	0	0	0	0	
Advanced Power Strip	7.0	173	0.860	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Advanced Power Strip - Dollar Store	7.0	6,670	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Advanced Thermostat	11.0	13,501	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dehumidifier	12.0	626	0.670	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Air Purifier	9.0	429	0.790	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Clothes Washer	14.0	298	0.630	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Electric Clothes Dryer	16.0	218	0.670	146	146	146	0	0	0	0	0	0	0	0	0	0	0	0	
Refrigerator	17.0	81	0.650	52	52	52	52	0	0	0	0	0	0	0	0	0	0	0	
Freezer	22.0	4	0.630	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	
Pool Pump	7.0	115	0.760	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Water Dispenser	10.0	72	0.670	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Vent Fan	19.0	49	0.660	32	32	32	32	32	32	0	0	0	0	0	0	0	0	0	
Total		78,572	0.774	1,265	1,054	233	87	34	34	2	2	2	0	0	0	0	0	0	
Expiring 2020 CPAS				0	211	821	146	52	0	32	0	0	2	0	0	0	0	0	
Expired 2020 CPAS				59,581	59,792	60,614	60,759	60,812	60,812	60,844	60,844	60,844	60,846	60,846	60,846	60,846	60,846	60,846	
WAML	9.7																		

Table 116 provides CPAS converted from therms for the 2020 Retail Products Initiative through 2032 by measure. Lifetime savings for the 2020 Retail Products Initiative conversion are 65,270 MWh.

Table 116. 2020 Retail Products Initiative Gas Conversion CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Advanced Thermostat	11.0	5,934	N/A			5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	0	0
2020 CPAS		5,934	1.000			5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	5,934	0	0
Expiring 2020 CPAS						0	0	0	0	0	0	0	0	0	0	0	0	0
Expired 2020 CPAS						0	0	0	0	0	0	0	0	0	0	0	0	0
WAML	11.0																	

Table 117 provides CPAS for 2020 Retail Products Initiative carryover savings through 2032 by measure. Lifetime savings for 2020 Retail Products Initiative carryover are 84,386 MWh.

Table 117. 2020 Retail Products Initiative Carryover CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
2019 Standard LED - Residential Non-IQ	10.0	4,458	0.690			3,076	3,076	3,076	3,076	1,230	1,230	1,230	1,230	1,230	1,230	0	0	0
2019 Standard LED - Residential IQ	10.0	2,510	0.690			1,732	1,732	1,732	1,732	1,732	1,732	1,732	1,732	987	987	987	0	0
2019 Standard LED - Commercial	5.5	496	0.690			342	342	342	342	137	68	0	0	0	0	0	0	0
2019 Reflector LED - Residential Non-IQ	10.0	1,433	0.690			989	989	989	989	534	534	534	534	534	534	0	0	0
2019 Reflector LED - Residential IQ	10.0	730	0.690			504	504	504	504	504	504	504	337	337	337	0	0	0
2019 Reflector LED - Commercial	6.9	364	0.690			251	251	251	251	136	136	122	0	0	0	0	0	0
2019 Specialty LED - Residential Non-IQ	10.0	631	0.690			435	435	435	435	244	244	244	244	244	244	0	0	0
2019 Specialty LED - Residential IQ	10.0	332	0.690			229	229	229	229	229	229	229	122	122	122	0	0	0
2019 Specialty LED - Commercial	4.7	162	0.690			112	112	112	112	44	0	0	0	0	0	0	0	0
2018 Standard LED - Residential Non-IQ	10.0	3,237	0.700			2,266	2,266	2,266	2,266	906	906	906	906	906	906	0	0	0
2018 Standard LED - Residential IQ	10.0	1,725	0.700			1,207	1,207	1,207	1,207	1,207	1,207	1,207	688	688	688	0	0	0
2018 Standard LED - Commercial	5.5	132	0.700			93	93	93	93	37	19	0	0	0	0	0	0	0
2018 Reflector LED - Residential Non-IQ	10.0	332	0.700			233	233	233	233	126	126	126	126	126	126	0	0	0
2018 Reflector LED - Residential IQ	10.0	161	0.700			112	112	112	112	112	112	112	75	75	75	0	0	0
2018 Reflector LED - Commercial	6.9	39	0.700			28	28	28	28	15	15	13	0	0	0	0	0	0
2018 Specialty LED - Residential Non-IQ	10.0	107	0.700			75	75	75	75	42	42	42	42	42	42	0	0	0
2018 Specialty LED - Residential IQ	10.0	65	0.700			46	46	46	46	46	46	46	24	24	24	0	0	0
2018 Specialty LED - Commercial	4.7	14	0.700			10	10	10	10	4	0	0	0	0	0	0	0	0
2020 CPAS		16,929	0.693			11,739	11,739	11,739	11,739	7,284	7,150	7,048	5,316	5,316	5,316	0	0	0
Expiring 2020 CPAS						0	0	0	0	4,455	135	102	1,732	0	0	5,316	0	0
Expired 2020 CPAS						0	0	0	0	4,455	4,589	4,691	6,423	6,423	6,423	11,739	11,739	11,739
WAML	9.7																	

Income Qualified Initiative

Table 118 provides CPAS for the Income Qualified Initiative³² through 2047 by channel. Lifetime savings for the Initiative are 174,953 MWh.

Table 118. 2020 Income Qualified Initiative CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Single Family	11.3	9,760	1.000			9,760	9,760	9,760	9,760	9,760	9,760	9,210	5,961	5,946	5,375	2,177	1,993	1,993
CAA	15.6	574	1.000			574	574	574	574	574	574	574	478	478	478	288	286	286
Smart Savers	11.0	5,923	1.000			5,923	5,923	5,923	5,923	5,923	5,923	5,923	5,923	5,923	5,923	5,923	0	0
2020 CPAS		16,257	1.000			16,257	16,257	16,257	16,257	16,257	16,257	15,708	12,363	12,347	11,776	8,388	2,279	2,279
Expiring 2020 CPAS						0	0	0	0	0	0	549	3,345	15	572	3,387	6,109	0
Expired 2020 CPAS						0	0	0	0	0	0	550	3,895	3,910	4,481	7,869	13,978	13,978

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Single Family	11.3	9,760	1.000	1,993	1,993	1,522	1,311	1,311	1,162	1,015	0	0	0	0	0	0	0	0
CAA	15.6	574	1.000	286	286	286	286	286	286	243	0	0	0	0	0	0	0	0
Smart Savers	11.0	5,923	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020 CPAS		16,257	1.000	2,279	2,279	1,808	1,598	1,598	1,449	1,259	0	0	0	0	0	0	0	0
Expiring 2020 CPAS				0	0	471	211	0	149	190	1,259	0	0	0	0	0	0	0
Expired 2020 CPAS				13,978	13,978	14,449	14,659	14,659	14,809	14,999	16,257	16,257	16,257	16,257	16,257	16,257	16,257	16,257
WAML	11.3																	

³² Less the Multifamily channel.

Table 119 provides CPAS converted from therms for the 2020 Income Qualified Initiative through 2032 by measure. Lifetime savings for the 2020 Income Qualified Initiative conversion are 105,294 MWh.

Table 119. 2020 Income Qualified Initiative Gas Conversion CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Advanced Thermostat	11.0	9,572	N/A			9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	0	0
2020 CPAS		9,572	1.000			9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	9,572	0	0
Expiring 2020 CPAS						0	0	0	0	0	0	0	0	0	0	0	0	0
Expired 2020 CPAS						0	0	0	0	0	0	0	0	0	0	0	0	0
WAML	11.0																	

Multifamily Initiatives

Table 120 through Table 122 provide CPAS for the 2020 Multifamily Initiatives through 2047 by measure. Lifetime savings for the initiatives are 8,186 MWh, 13,190 MWh, and 3,374 MWh for the Public Housing, Income Qualified – Multifamily, and Multifamily initiatives, respectively.

Table 120. 2020 Public Housing Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Advanced Power Strip - Tier 1	7.0	47	1.000			47	47	47	47	47	47	47	0	0	0	0	0	0
Advanced Thermostat	11.0	47	N/A			47	47	47	47	47	47	47	47	47	47	47	0	0
Air Sealing	20.0	19	1.000			19	19	19	19	19	19	19	19	19	19	18	18	18
Attic Insulation	20.0	45	1.000			45	45	45	45	45	45	45	45	45	45	44	44	44
Door Sweep	20.0	5	1.000			5	5	5	5	5	5	5	5	5	5	5	5	5
Ductless Heat Pump	15.0	179	1.000			179	179	179	179	179	179	179	179	179	179	179	179	179
Faucet Aerator	10.0	18	1.000			18	18	18	18	18	18	18	18	18	18	0	0	0
Pipe Insulation	15.0	30	1.000			30	30	30	30	30	30	30	30	30	30	30	30	30
Thermostatic Restrictor Shower Valve	10.0	3	1.000			3	3	3	3	3	3	3	3	3	3	0	0	0
Room Air Conditioner	12.0	72	1.000			72	72	72	72	45	45	45	45	45	45	45	45	0
Showerhead	10.0	17	1.000			17	17	17	17	17	17	17	17	17	17	0	0	0
Specialty LED	10.0	8	1.000			8	8	8	8	8	8	8	4	4	4	0	0	0
Standard LED	10.0	190	1.000			190	190	190	190	190	190	190	139	139	139	0	0	0
Wall Plate Gasket	20.0	0	1.000			0	0	0	0	0	0	0	0	0	0	0	0	0
2020 CPAS		680	1.000			680	680	680	680	652	652	652	551	551	551	368	322	277
Expiring 2020 CPAS						0	0	0	0	28	0	0	102	0	0	182	47	45
Expired 2020 CPAS						0	0	0	0	28	28	28	129	129	129	312	358	403

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Advanced Power Strip - Tier 1	7.0	47	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Advanced Thermostat	11.0	47	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Air Sealing	20.0	19	1.000	18	18	18	18	18	18	18	0	0	0	0	0	0	0	0
Attic Insulation	20.0	45	1.000	44	44	44	44	44	44	44	0	0	0	0	0	0	0	0
Door Sweep	20.0	5	1.000	5	5	5	5	5	5	5	0	0	0	0	0	0	0	0
Ductless Heat Pump	15.0	179	1.000	179	179	0	0	0	0	0	0	0	0	0	0	0	0	0
Faucet Aerator	10.0	18	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pipe Insulation	15.0	30	1.000	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0
Thermostatic Restrictor Shower Valve	10.0	3	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Room Air Conditioner	12.0	72	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Showerhead	10.0	17	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Specialty LED	10.0	8	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard LED	10.0	190	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wall Plate Gasket	20.0	0	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020 CPAS		680	0.099	277	277	67	67	67	67	67	0	0	0	0	0	0	0	0
Expiring 2020 CPAS				0	0	210	0	0	0	0	67	0	0	0	0	0	0	0
Expired 2020 CPAS				403	403	612	612	612	612	612	680	680	680	680	680	680	680	680
WAML	12.6																	

Table 121. 2020 Income Qualified – Multifamily CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Advanced Power Strip - Tier 1	7.0	57	1.000			57	57	57	57	57	57	57	0	0	0	0	0	0
Advanced Thermostat	11.0	318	N/A			318	318	318	318	318	318	318	318	318	318	318	0	0
Air Sealing	20.0	5	1.000			5	5	5	5	5	5	5	5	5	5	5	5	5
Attic Insulation	20.0	2	1.000			2	2	2	2	2	2	2	2	2	2	2	2	2
Door Sweep	20.0	13	1.000			13	13	13	13	13	13	13	13	13	13	13	13	13
Ductless Heat Pump	15.0	264	1.000			264	264	264	264	264	264	264	264	264	264	264	264	264
Faucet Aerator	10.0	72	1.000			72	72	72	72	72	72	72	72	72	72	0	0	0
Pipe Insulation	15.0	18	1.000			18	18	18	18	18	18	18	18	18	18	18	18	18
Thermostatic Restrictor Shower Valve	10.0	54	1.000			54	54	54	54	54	54	54	54	54	54	0	0	0
Room Air Conditioner	12.0	34	1.000			34	34	34	34	21	21	21	21	21	21	21	21	0
Showerhead	10.0	174	1.000			174	174	174	174	174	174	174	174	174	174	0	0	0
Specialty LED	10.0	8	1.000			8	8	8	8	8	8	8	7	7	7	0	0	0
Standard LED	10.0	106	1.000			106	106	106	106	106	106	106	83	83	83	0	0	0
Standard LED (Common Area)	3.4	22	1.000			22	22	22	14	0	0	0	0	0	0	0	0	0
Wall Plate Gasket	20.0	9	1.000			9	9	9	9	9	9	9	9	9	9	9	9	9
2020 CPAS		1,158	1.000			1,158	1,158	1,158	1,149	1,123	1,123	1,123	1,042	1,042	1,042	652	333	312
Expiring 2020 CPAS						0	0	0	8	26	0	0	81	0	0	390	318	21
Expired 2020 CPAS						0	0	0	8	34	34	34	116	116	116	506	824	845

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Advanced Power Strip - Tier 1	7.0	57	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Advanced Thermostat	11.0	318	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Air Sealing	20.0	5	1.000	5	5	5	5	5	5	5	5	0	0	0	0	0	0	0
Attic Insulation	20.0	2	1.000	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0
Door Sweep	20.0	13	1.000	13	13	13	13	13	13	13	0	0	0	0	0	0	0	0
Ductless Heat Pump	15.0	264	1.000	264	264	0	0	0	0	0	0	0	0	0	0	0	0	0
Faucet Aerator	10.0	72	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pipe Insulation	15.0	18	1.000	18	18	0	0	0	0	0	0	0	0	0	0	0	0	0
Thermostatic Restrictor Shower Valve	10.0	54	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Room Air Conditioner	12.0	34	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Showerhead	10.0	174	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Specialty LED	10.0	8	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard LED	10.0	106	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standard LED (Common Area)	3.4	22	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wall Plate Gasket	20.0	9	1.000	9	9	9	9	9	9	9	0	0	0	0	0	0	0	0
2020 CPAS		1,158	1.000	312	312	30	30	30	30	30	0	0	0	0	0	0	0	0
Expiring 2020 CPAS				0	0	282	0	0	0	0	30	0	0	0	0	0	0	0
Expired 2020 CPAS				845	845	1,127	1,127	1,127	1,127	1,127	1,158	1,158	1,158	1,158	1,158	1,158	1,158	1,158
WAML	11.5																	

Table 122. 2020 Multifamily Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Advanced Power Strip - Tier 1	7.0	29	0.980			28	28	28	28	28	28	28	0	0	0	0	0	0
Advanced Thermostat	11.0	235	N/A			235	235	235	235	235	235	235	235	235	235	235	235	0
Faucet Aerator	10.0	4	1.004			4	4	4	4	4	4	4	4	4	4	4	0	0
Thermostatic Restrictor Shower Valve	10.0	0	0.800			0	0	0	0	0	0	0	0	0	0	0	0	0
Showerhead	10.0	3	1.004			3	3	3	3	3	3	3	3	3	3	3	0	0
Specialty LED	10.0	5	0.960			5	5	5	5	3	3	3	3	3	3	3	0	0
Standard LED	10.0	78	0.960			75	75	75	75	30	30	30	30	30	30	30	0	0
Wall Plate Gasket	20.0	0	0.861			0	0	0	0	0	0	0	0	0	0	0	0	0
2020 CPAS		354	0.989			350	350	350	350	303	303	303	275	275	275	235	0	0
Expiring 2020 CPAS						0	0	0	0	47	0	0	28	0	0	39	235	0
Expired 2020 CPAS						0	0	0	0	47	47	47	75	75	75	115	350	350
WAML	10.4																	

HVAC Initiative

Table 123 provides CPAS for the 2020 HVAC Initiative through 2047. Lifetime savings for the Initiative are 67,050 MWh.

Table 123. 2020 HVAC Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Central Air Conditioning	18.0	5,304	0.736			3,905	3,905	3,905	3,905	3,905	3,905	1,368	1,368	1,368	1,368	1,368	1,368	1,368
Air Source Heat Pump	16.0	1,723	0.728			1,254	1,254	1,254	1,254	1,254	1,254	1,058	1,058	1,058	1,058	1,058	1,058	1,058
Advanced Thermostat	11.0	483	N/A			483	483	483	483	483	483	483	483	483	483	483	0	0
Ductless Heat Pump	15.0	260	0.641			167	167	167	167	167	167	167	167	167	167	167	167	167
Heat Pump Water Heater	15.0	46	0.760			35	35	35	35	35	35	35	35	35	35	34	34	34
Air Sealing	20.0	20	0.800			16	16	16	16	16	16	16	16	16	16	14	14	14
Attic Insulation	20.0	14	0.800			12	12	12	12	12	12	12	12	12	12	11	11	11
Bathroom Exhaust Fan	19.0	6	0.800			5	5	5	5	5	5	5	5	5	5	5	5	5
Duct Sealing	20.0	5	0.800			4	4	4	4	4	4	4	4	4	4	4	4	4
Wall Insulation	20.0	5	0.800			4	4	4	4	4	4	4	4	4	4	3	3	3
Crawl Space Insulation	20.0	1	0.800			1	1	1	1	1	1	1	1	1	1	1	1	1
Rim Joist Insulation	20.0	1	0.800			0	0	0	0	0	0	0	0	0	0	0	0	0
Total		7,867	0.748			5,884	5,884	5,884	5,884	5,884	5,884	3,151	3,151	3,151	3,151	3,147	2,664	2,664
Expiring 2020 CPAS						0	0	0	0	0	0	2,733	0	0	0	4	483	0
Expired 2020 CPAS						0	0	0	0	0	0	2,733	2,733	2,733	2,733	2,737	3,220	3,220

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Central Air Conditioning	18.0	5,304	0.736	1,368	1,368	1,368	1,368	1,368	0	0	0	0	0	0	0	0	0	0
Air Source Heat Pump	16.0	1,723	0.728	1,058	1,058	1,058	0	0	0	0	0	0	0	0	0	0	0	0
Advanced Thermostat	11.0	483	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ductless Heat Pump	15.0	260	0.641	167	167	0	0	0	0	0	0	0	0	0	0	0	0	0
Air Sealing	20.0	20	0.800	14	14	14	14	14	14	14	0	0	0	0	0	0	0	0
Attic Insulation	20.0	14	0.800	11	11	11	11	11	11	11	0	0	0	0	0	0	0	0
Bathroom Exhaust Fan	19.0	6	0.800	5	5	5	5	5	5	0	0	0	0	0	0	0	0	0
Duct Sealing	20.0	5	0.800	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0
Wall Insulation	20.0	5	0.800	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0
Crawl Space Insulation	20.0	1	0.800	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Rim Joist Insulation	20.0	1	0.800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		7,821	0.748	2,664	2,664	2,463	1,405	1,405	37	32	0	0	0	0	0	0	0	0
Expiring 2020 CPAS				0	0	201	1,058	0	1,368	5	32	0	0	0	0	0	0	0
Expired 2020 CPAS				3,220	3,220	3,421	4,479	4,479	5,847	5,851	5,884	5,884	5,884	5,884	5,884	5,884	5,884	5,884
WAML	17.0																	

Appliance Recycling Initiative

Table 124 provides CPAS for the 2020 Appliance Recycling Initiative through 2032. Lifetime savings for the Initiative are 15,943 MWh.

Table 124. 2020 Appliance Recycling Initiative CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Refrigerator	6.5	2,845	0.710			2,020	2,020	2,020	2,020	2,020	2,020	1,010	0	0	0	0	0	0
Freezer	6.5	656	0.640			420	420	420	420	420	420	210	0	0	0	0	0	0
Room Air Conditioner	4.0	42	0.500			21	21	21	21	0	0	0	0	0	0	0	0	0
Total		3,543	0.695			2,461	2,461	2,461	2,461	2,440	2,440	1,220	0	0	0	0	0	0
Expiring 2020 CPAS						0	0	0	0	21	0	1,220	1,220	0	0	0	0	0
Expired 2020 CPAS						0	0	0	0	21	21	1,241	2,461	2,461	2,461	2,461	2,461	2,461
WAML	6.5																	

Direct Distribution Initiative

Table 125 provides CPAS and WAML for the 2020 Direct Distribution Initiative through 2047 by channel. Lifetime savings for the Initiative are 66,974 MWh.

Table 125. 2020 Direct Distribution Initiative CPAS and WAML

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
School Kits	8.7	1,955	1.000			1,955	1,955	1,662	1,658	1,658	1,658	1,658	1,028	1,028	1,028	107	107	107
Appliance Recycling Kits	8.9	98	1.000			98	98	98	98	98	98	98	45	45	45	0	0	0
Community Kits	9.5	5,762	1.000			5,762	5,762	5,760	5,760	5,760	5,760	5,760	2,830	2,830	2,830	0	0	0
Smart Home Kits	8.9	169	1.000			169	169	169	169	169	169	169	61	61	61	0	0	0
2020 CPAS		7,984	1.000			7,984	7,984	7,688	7,684	7,684	7,684	7,684	3,964	3,964	3,964	107	107	107
Expiring 2020 CPAS						0	0	295	4	0	0	0	3,720	0	0	3,857	0	0
Expired 2020 CPAS						0	0	295	300	300	300	300	4,020	4,020	4,020	7,877	7,877	7,877

Channel	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
School Kits	8.7	1,955	1.000	107	107	31	31	31	31	31	0	0	0	0	0	0	0	0
Appliance Recycling Kits	8.9	98	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Community Kits	9.5	5,762	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smart Home Kits	8.9	169	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020 CPAS		7,984	1.000	107	107	31	31	31	31	31	0	0	0	0	0	0	0	0
Expiring 2020 CPAS				0	0	76	0	0	0	0	31	0	0	0	0	0	0	0
Expired 2020 CPAS				7,877	7,877	7,953	7,953	7,953	7,953	7,953	7,984	0	0	0	0	0	0	0
WAML	9.3																	

Table 126 provides CPAS for 2020 Direct Distribution Initiative carryover savings through 2032 by measure. Lifetime savings for 2020 Direct Distribution Initiative carryover are 1,562 MWh.

Table 126. 2020 Direct Distribution Initiative Carryover CPAS and WAML

Measure	Measure Life	First-Year Verified Gross MWh	NTGR	CPAS (Verified Net MWh)														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
2019 School Kits 9W Standard LED	10.0	162	0.840			136	136	136	136	54	54	54	54	54	54	0	0	0
2018 School Kits 9W Standard LED	10.0	112	0.830			93	93	93	93	37	37	37	37	37	37	0	0	0
2019 Appliance Recycling Kits 9W Standard LED	10.0	11	1.000			11	11	11	11	11	11	11	6	6	6	0	0	0
2020 CPAS		285	0.842			240	240	240	240	103	103	103	98	98	98	0	0	0
Expiring 2020 CPAS						0	0	0	0	137	0	0	5	0	0	98	0	0
Expired 2020 CPAS						0	0	0	0	137	137	137	142	142	142	240	240	240
WAML	10.0																	

For more information, please contact:

Hannah Howard
Managing Director/V.P.

510-214-0183 tel
510-444-5222 fax
hhoward@opiniondynamics.com

1000 Winter Street
Waltham, MA 02451



Opinion **Dynamics**

Boston | Headquarters

617 492 1400 [tel](#)
617 492 7944 [fax](#)
800 966 1254 [toll free](#)

1000 Winter Street
Waltham, MA 02451

San Francisco Bay

510 444 5050 [tel](#)
510 444 5222 [fax](#)

1 Kaiser Plaza
Suite 445
Oakland, CA 94612

San Diego

858 270 5010 [tel](#)
858 270 5211 [fax](#)

7590 Fay Avenue
Suite 406
La Jolla, CA 92037

Portland

503 287 9136 [tel](#)
503-281-7375 [fax](#)

3934 NE MLK Jr. Blvd.
Suite 300
Portland, OR 97212