



ComEd Appliance Rebates Program Impact Evaluation Report

Energy Efficiency/Demand Response Plan:
Program Year 2021 (CY2021)
(1/1/2021-12/31/2021)

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FINAL

March 2, 2022

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1. Introduction

This report presents the results of the impact evaluation of the CY2021 Appliance Rebates Program.

It summarizes the total energy and demand impacts for the program broken out by relevant measure and program structure details. The appendices provide the impact analysis methodology and details of the total resource cost (TRC) analysis inputs. CY2021 covers January 1, 2021 through December 31, 2021.

2. Program Description

The Appliance Rebates Program is designed to increase the market share of ENERGY STAR appliances sold through retail (in-store or online) sales channels. The program provides rebates to decrease customer costs and information and education to increase customer awareness and acceptance of energy efficient appliances.

In CY2021, the program had 155,403 participants and distributed 428,717 measures through the online marketplace and direct rebates to customers (see Table 2-1).

Table 2-1. Number of Participants and Projects

Participation	Appliance Rebates	Marketplace 2.0	Total
Unique Participants	92,812	66,791	155,403*
Installed Projects	127,397	74,108	201,505
Total Measures	355,808	72,909	428,717

* Unique participants across the Appliance Rebates and Marketplace 2.0 channels. Some participants participated in both.

Source: ComEd tracking data and evaluation team analysis

The program included the measures shown in Table 2-2 and Figure 2-1. The program targets residential customers who purchase new or replacement ENERGY STAR appliances including air purifiers, clothes washers, clothes dryers, dehumidifiers, freezers, refrigerators, water coolers, tier 1 advanced power strips (APS), advanced thermostats, bathroom exhaust fans, and pool pumps. Beginning in 2021, ComEd also distributed air purifiers through the ComEd Marketplace 2.0.

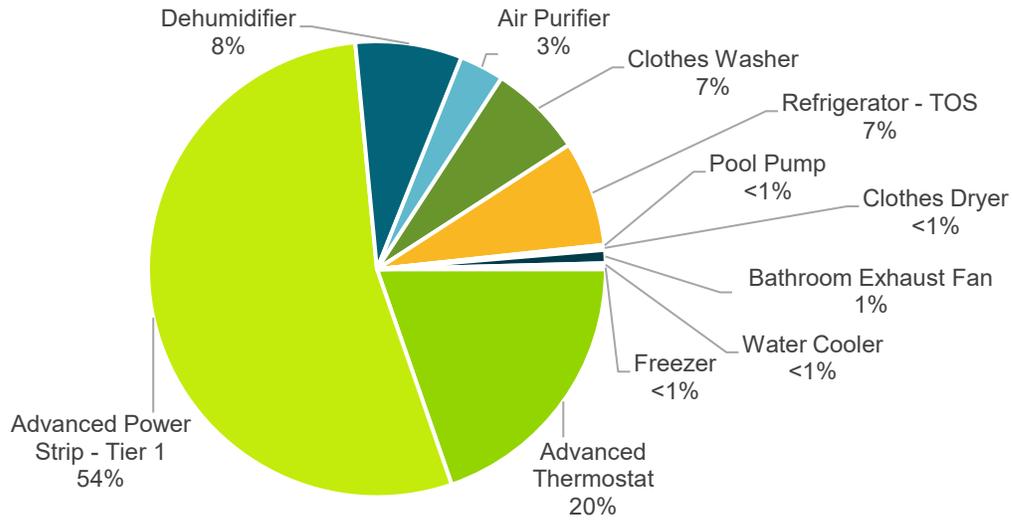
Table 2-2. Number of Measures by Type

End Use Type	Research Category	Quantity Unit
HVAC	Advanced Thermostat	84,472 Each
Consumer Electronics	Advanced Power Strip - Tier 1	230,556 Each
Appliance	Dehumidifier	32,325 Each
Appliance	Air Purifier	13,484 Each
Appliance	Clothes Washer	28,546 Each
Appliance	Refrigerator - TOS	31,996 Each
Miscellaneous	Pool Pump	372 Each
Appliance	Clothes Dryer	1,157 Each
HVAC	Bathroom Exhaust Fan	4,003 Each
Appliance	Water Cooler	882 Each
Appliance	Freezer	924 Each
	Total	428,717

TOS – Time of sale. Data sorted by verified net savings.

Source: ComEd tracking data and evaluation team analysis

Figure 2-1. Share of Measures Installed



Source: ComEd tracking data and evaluation team analysis

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the Appliance Rebate Program achieved in CY2021. The gas savings are only those that ComEd may be able to claim, which excludes savings the gas utilities claim, either via joint or non-joint programs.¹

Table 3-1. Total Annual Incremental Electric Savings

Savings Category	Units	Ex Ante Gross Savings	Program Gross Realization Rate	Verified Gross Savings	Program Net-to-Gross Ratio (NTG)	CY2019 Net Carryover Savings	CY2020 Net Carryover Savings	Verified Net Savings
Electric Energy Savings - Direct	kWh	58,199,834	0.97	56,668,076	Varies	N/A	N/A	44,878,796
Electric Energy Savings - Converted from Gas [‡]	kWh	188,760,331	0.99	185,951,265	Varies	N/A	N/A	166,339,132
Total Electric Energy Savings	kWh	246,960,165	0.98	242,619,341	Varies	N/A	N/A	211,217,928
Summer Peak [§] Demand Savings	kW	12,934	0.98	12,663	Varies	N/A	N/A	9,861

N/A = not applicable (refers to a piece of data that cannot be produced or does not apply).

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

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

Source: ComEd tracking data and evaluation team analysis

¹ The evaluation will determine which gas savings will be counted toward goal while producing the portfolio-wide Summary Report.

4. Cumulative Persisting Annual Savings

Table 4-1 to Table 4-3 and Figure 4-1 show the measure-specific and total verified gross savings for the Appliance Rebate Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2021. The electric CPAS across all measures installed in 2021 is shown in Table 4-1. The CY2021 gas contribution to CPAS (converted to equivalent electricity) is shown in Table 4-2. The combined savings are shown in Table 4-3. The historic rows in each table are the CPAS contribution back to CY2018. The Program Total Electric CPAS and the Program Total Gas CPAS are the sum of the CY2021 contribution and the historic contribution. Figure 4-1 shows the savings across the effective useful life (EUL) of the measures.

Table 4-1. Cumulative Persisting Annual Savings – Electric

End Use Type	Research Category	EUL	CY2021 Verified Gross Savings (kWh)		Lifetime Net Savings (kWh)†	Verified Net kWh Savings										
			NTG*	NTG*		2018	2019	2020	2021	2022	2023	2024	2025	2026		
HVAC	Advanced Thermostat	11.0	29,137,432	Multiple†	271,421,141				24,674,649	24,674,649	24,674,649	24,674,649	24,674,649	24,674,649	24,674,649	
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	16,860,560	0.76	89,698,181				12,814,026	12,814,026	12,814,026	12,814,026	12,814,026	12,814,026	12,814,026	
Appliance	Dehumidifier	12.0	3,491,284	0.67	28,069,925				2,339,160	2,339,160	2,339,160	2,339,160	2,339,160	2,339,160	2,339,160	
Appliance	Air Purifier	9.0	2,207,965	0.79	15,698,631				1,744,292	1,744,292	1,744,292	1,744,292	1,744,292	1,744,292	1,744,292	
Appliance	Clothes Washer	14.0	1,910,688	0.63	16,852,264				1,203,733	1,203,733	1,203,733	1,203,733	1,203,733	1,203,733	1,203,733	
Appliance	Refrigerator - TOS	17.0	1,848,261	0.65	20,423,284				1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	
Miscellaneous	Pool Pump	7.0	714,875	0.80	4,003,299				571,900	571,900	571,900	571,900	571,900	571,900	571,900	
Appliance	Clothes Dryer	16.0	187,339	0.67	2,008,273				125,517	125,517	125,517	125,517	125,517	125,517	125,517	
HVAC	Bathroom Exhaust Fan	19.0	154,516	0.66	1,937,628				101,980	101,980	101,980	101,980	101,980	101,980	101,980	
Appliance	Water Cooler	10.0	110,498	0.67	740,334				74,033	74,033	74,033	74,033	74,033	74,033	74,033	
Appliance	Freezer	22.0	44,659	0.63	618,974				28,135	28,135	28,135	28,135	28,135	28,135	28,135	
CY2021 Program Total Electric Contribution to CPAS			56,668,076		451,471,934				44,878,796	44,878,796	44,878,796	44,878,796	44,878,796	44,878,796	44,878,796	
Historic Program Total Electric Contribution to CPAS‡						34,269,851	68,811,985	104,854,076	104,854,076	104,854,076	104,854,076	104,854,076	98,459,928	97,031,568		
Program Total Electric CPAS						34,269,851	68,811,985	104,854,076	149,732,872	149,732,872	149,732,872	149,732,872	143,338,725	141,910,365		
CY2021 Program Incremental Expiring Electric Savings§																
Historic Program Incremental Expiring Electric Savings														6,394,147	1,428,360	
Program Total Incremental Expiring Electric Savings														6,394,147	1,428,360	

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
HVAC	Advanced Thermostat	24,674,649	24,674,649	24,674,649	24,674,649	24,674,649							
Consumer Electronics	Advanced Power Strip - Tier 1	12,814,026											
Appliance	Dehumidifier	2,339,160	2,339,160	2,339,160	2,339,160	2,339,160	2,339,160						
Appliance	Air Purifier	1,744,292	1,744,292	1,744,292									
Appliance	Clothes Washer	1,203,733	1,203,733	1,203,733	1,203,733	1,203,733	1,203,733	1,203,733	1,203,733				
Appliance	Refrigerator - TOS	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	
Miscellaneous	Pool Pump	571,900											
Appliance	Clothes Dryer	125,517	125,517	125,517	125,517	125,517	125,517	125,517	125,517	125,517	125,517		
HVAC	Bathroom Exhaust Fan	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980
Appliance	Water Cooler	74,033	74,033	74,033	74,033								
Appliance	Freezer	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135
CY2021 Program Total Electric Contribution to CPAS		44,878,796	31,492,871	31,492,871	29,748,578	29,674,545	4,999,896	2,660,735	2,660,735	1,457,002	1,457,002	1,331,485	130,116
Historic Program Total Electric Contribution to CPAS‡		84,266,435	58,435,578	51,417,180	27,833,066	8,777,767	5,556,771	3,811,841	2,625,834	2,450,098	1,310,062	65,168	61,927
Program Total Electric CPAS		129,145,232	89,928,449	82,910,051	57,581,645	38,452,312	10,556,667	6,472,576	5,286,570	3,907,100	2,767,065	1,396,653	192,042
CY2021 Program Incremental Expiring Electric Savings§			13,385,926		1,744,292	74,033	24,674,649	2,339,160		1,203,733		125,517	1,201,370
Historic Program Incremental Expiring Electric Savings		12,765,133	25,830,857	7,018,398	23,584,114	19,055,299	3,220,997	1,744,930	1,186,006	175,736	1,140,036	1,244,894	3,241
Program Total Incremental Expiring Electric Savings		12,765,133	39,216,783	7,018,398	25,328,406	19,129,332	27,895,646	4,084,090	1,186,006	1,379,469	1,140,036	1,370,411	1,204,611

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
HVAC	Advanced Thermostat												
Consumer Electronics	Advanced Power Strip - Tier 1												
Appliance	Dehumidifier												
Appliance	Air Purifier												
Appliance	Clothes Washer												
Appliance	Refrigerator - TOS												
Miscellaneous	Pool Pump												
Appliance	Clothes Dryer												
HVAC	Bathroom Exhaust Fan	101,980											
Appliance	Water Cooler												
Appliance	Freezer	28,135	28,135	28,135	28,135								
CY2021 Program Total Electric Contribution to CPAS		130,116	28,135	28,135	28,135	-	-	-	-	-	-	-	-
Historic Program Total Electric Contribution to CPAS†		61,890	61,890	23,259	-	-	-	-	-	-	-	-	-
Program Total Electric CPAS		192,006	90,026	51,394	28,135	-	-	-	-	-	-	-	-
CY2021 Program Incremental Expiring Electric Savings‡		-	101,980	-	-	28,135	-	-	-	-	-	-	-
Historic Program Incremental Expiring Electric Savings		36	-	38,631	23,259	-	-	-	-	-	-	-	-
Program Total Incremental Expiring Electric Savings		36	101,980	38,631	23,259	28,135	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first-year electric savings. The gray cells are blank, indicating values irrelevant to the CY2021 contribution to CPAS.

* A deemed value. Source: Illinois Stakeholder Advisory Group (SAG) website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021>.

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

‡ Historic savings go back to CY2018.

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

Source: Evaluation team analysis

Table 4-2. Cumulative Persisting Annual Savings – Gas

End Use Type	Research Category	EUL	CY2021 Verified Gross Savings		Lifetime Net Savings (Therms)†	Verified Net Therms Savings									
			(Therms)	NTG*		2018	2019	2020	2021	2022	2023	2024	2025	2026	
HVAC	Advanced Thermostat	11.0	6,215,782	Multiple‡	61,536,242				5,594,204	5,594,204	5,594,204	5,594,204	5,594,204	5,594,204	5,594,204
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	-	0.76	-				-	-	-	-	-	-	-
Appliance	Dehumidifier	12.0	-	0.67	-				-	-	-	-	-	-	-
Appliance	Air Purifier	9.0	-	0.79	-				-	-	-	-	-	-	-
Appliance	Clothes Washer	14.0	128,512	0.63	1,133,478				80,963	80,963	80,963	80,963	80,963	80,963	80,963
Appliance	Refrigerator - TOS	17.0	-	0.65	-				-	-	-	-	-	-	-
Miscellaneous	Pool Pump	7.0	-	0.80	-				-	-	-	-	-	-	-
Appliance	Clothes Dryer	16.0	-	0.67	-				-	-	-	-	-	-	-
HVAC	Bathroom Exhaust Fan	19.0	-	0.66	-				-	-	-	-	-	-	-
Appliance	Water Cooler	10.0	-	0.67	-				-	-	-	-	-	-	-
Appliance	Freezer	22.0	-	0.63	-				-	-	-	-	-	-	-
CY2021 Program Total Gas Contribution to CPAS (Therms)			6,344,294		62,669,720				5,675,167						
CY2021 Program Total Gas Contribution to CPAS (kWh Equivalent)‡									166,339,132						
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)§						60,598,906	176,247,714	273,018,371							
Program Total Gas CPAS (kWh Equivalent)						60,598,906	176,247,714	273,018,371	439,357,503						
CY2021 Program Incremental Expiring Gas Savings (Therms)									-	-	-	-	-	-	-
CY2021 Program Incremental Expiring Gas Savings (kWh Equivalent) 									-	-	-	-	-	-	-
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)									-	-	-	-	-	-	-
Program Total Incremental Expiring Gas Savings (kWh Equivalent)									-	-	-	-	-	-	-

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
HVAC	Advanced Thermostat	5,594,204	5,594,204	5,594,204	5,594,204	5,594,204							
Consumer Electronics	Advanced Power Strip - Tier 1	-											
Appliance	Dehumidifier	-	-	-	-	-	-						
Appliance	Air Purifier	-	-	-	-	-							
Appliance	Clothes Washer	80,963	80,963	80,963	80,963	80,963	80,963	80,963	80,963				
Appliance	Refrigerator - TOS	-	-	-	-	-	-	-	-	-	-	-	-
Miscellaneous	Pool Pump	-											
Appliance	Clothes Dryer	-	-	-	-	-	-	-	-	-	-	-	-
HVAC	Bathroom Exhaust Fan	-	-	-	-	-	-	-	-	-	-	-	-
Appliance	Water Cooler	-	-	-	-	-	-	-	-	-	-	-	-
Appliance	Freezer	-	-	-	-	-	-	-	-	-	-	-	-
CY2021 Program Total Gas Contribution to CPAS (Therms)		5,675,167	5,675,167	5,675,167	5,675,167	5,675,167	80,963	80,963	80,963				
CY2021 Program Total Gas Contribution to CPAS (kWh Equivalent)†		166,339,132	166,339,132	166,339,132	166,339,132	166,339,132	2,373,017	2,373,017	2,373,017				
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)§		273,018,371	214,599,833	214,599,833	100,800,333	6,119,866	3,939,499	2,090,191					
Program Total Gas CPAS (kWh Equivalent)		439,357,503	380,938,964	380,938,964	267,139,464	172,458,998	6,312,516	4,463,208	2,373,017				
CY2021 Program Incremental Expiring Gas Savings (Therms)							5,594,204			80,963			
CY2021 Program Incremental Expiring Gas Savings (kWh Equivalent) 							163,966,115			2,373,017			
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)			58,418,539		113,799,500	94,680,467	2,180,367	1,849,308	2,090,191				
Program Total Incremental Expiring Gas Savings (kWh Equivalent)			58,418,539		113,799,500	94,680,467	166,146,482	1,849,308	2,090,191	2,373,017			

Note: The green highlighted cell shows program total first-year gas savings in kWh equivalents. The gray cells are blank, indicating no values or do not contribute to calculating CPAS in CY2021.

* A deemed value. Source: Illinois SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021>.

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

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

§ Historic savings go back to CY2018.

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

Source: Evaluation team analysis

Table 4-3. Cumulative Persisting Annual Savings – Total

End Use Type	Research Category	EUL	CY2021 Verified Gross Savings		Lifetime Net Savings (kWh)†	Verified Net kWh Savings (Including Those Converted from Gas Savings)									
			(kWh)	NTG* Savings (kWh)†		2018	2019	2020	2021	2022	2023	2024	2025	2026	
HVAC	Advanced Thermostat	11.0	211,322,003	Multiple†	2,075,048,402				188,640,764	188,640,764	188,640,764	188,640,764	188,640,764	188,640,764	188,640,764
Consumer Electronics	Advanced Power Strip - Tier 1	7.0	16,860,560	0.76	89,698,181				12,814,026	12,814,026	12,814,026	12,814,026	12,814,026	12,814,026	12,814,026
Appliance	Dehumidifier	12.0	3,491,284	0.67	28,069,925				2,339,160	2,339,160	2,339,160	2,339,160	2,339,160	2,339,160	2,339,160
Appliance	Air Purifier	9.0	2,207,965	0.79	15,698,631				1,744,292	1,744,292	1,744,292	1,744,292	1,744,292	1,744,292	1,744,292
Appliance	Clothes Washer	14.0	5,677,381	0.63	50,074,502				3,576,750	3,576,750	3,576,750	3,576,750	3,576,750	3,576,750	3,576,750
Appliance	Refrigerator - TOS	17.0	1,848,261	0.65	20,423,284				1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370
Miscellaneous	Pool Pump	7.0	714,875	0.80	4,003,299				571,900	571,900	571,900	571,900	571,900	571,900	571,900
Appliance	Clothes Dryer	16.0	187,339	0.67	2,008,273				125,517	125,517	125,517	125,517	125,517	125,517	125,517
HVAC	Bathroom Exhaust Fan	19.0	154,516	0.66	1,937,628				101,980	101,980	101,980	101,980	101,980	101,980	101,980
Appliance	Water Cooler	10.0	110,498	0.67	740,334				74,033	74,033	74,033	74,033	74,033	74,033	74,033
Appliance	Freezer	22.0	44,659	0.63	618,974				28,135	28,135	28,135	28,135	28,135	28,135	28,135
CY2021 Program Total Contribution to CPAS			242,619,341		2,288,321,432				211,217,928						
Historic Program Total Contribution to CPAS‡						94,868,757	245,059,699	377,872,447	377,872,447	377,872,447	377,872,447	377,872,447	371,478,300	370,049,940	
Program Total CPAS						94,868,757	245,059,699	377,872,447	589,090,375	589,090,375	589,090,375	589,090,375	582,696,228	581,267,868	
CY2021 Program Incremental Expiring Savings§										-	-	-	-	-	-
Historic Program Incremental Expiring Savings														6,394,147	1,428,360
Program Total Incremental Expiring Savings														6,394,147	1,428,360

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
HVAC	Advanced Thermostat	188,640,764	188,640,764	188,640,764	188,640,764	188,640,764							
Consumer Electronics	Advanced Power Strip - Tier 1	12,814,026											
Appliance	Dehumidifier	2,339,160	2,339,160	2,339,160	2,339,160	2,339,160	2,339,160						
Appliance	Air Purifier	1,744,292	1,744,292	1,744,292									
Appliance	Clothes Washer	3,576,750	3,576,750	3,576,750	3,576,750	3,576,750	3,576,750	3,576,750	3,576,750				
Appliance	Refrigerator - TOS	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	1,201,370	
Miscellaneous	Pool Pump	571,900											
Appliance	Clothes Dryer	125,517	125,517	125,517	125,517	125,517	125,517	125,517	125,517	125,517	125,517		
HVAC	Bathroom Exhaust Fan	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980	101,980
Appliance	Water Cooler	74,033	74,033	74,033	74,033								
Appliance	Freezer	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135	28,135
CY2021 Program Total Contribution to CPAS		211,217,928	197,832,002	197,832,002	196,087,710	196,013,677	7,372,913	5,033,752	5,033,752	1,457,002	1,457,002	1,331,485	130,116
Historic Program Total Contribution to CPAS‡		357,284,807	273,035,411	266,017,013	128,633,399	14,897,634	9,496,270	5,902,031	2,625,834	2,450,098	1,310,062	65,168	61,927
Program Total CPAS		568,502,735	470,867,413	463,849,015	324,721,109	210,911,310	16,869,183	10,935,784	7,659,587	3,907,100	2,767,065	1,396,653	192,042
CY2021 Program Incremental Expiring Savings§			13,385,926		1,744,292	74,033	188,640,764	2,339,160		3,576,750		125,517	1,201,370
Historic Program Incremental Expiring Savings		12,765,133	84,249,396	7,018,398	137,383,614	113,735,765	5,401,364	3,594,239	3,276,197	175,736	1,140,036	1,244,894	3,241
Program Total Incremental Expiring Savings		12,765,133	97,635,321	7,018,398	139,127,906	113,809,799	194,042,128	5,933,399	3,276,197	3,752,486	1,140,036	1,370,411	1,204,611

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
HVAC	Advanced Thermostat												
Consumer Electronics	Advanced Power Strip - Tier 1												
Appliance	Dehumidifier												
Appliance	Air Purifier												
Appliance	Clothes Washer												
Appliance	Refrigerator - TOS												
Miscellaneous	Pool Pump												
Appliance	Clothes Dryer												
HVAC	Bathroom Exhaust Fan	101,980											
Appliance	Water Cooler												
Appliance	Freezer	28,135	28,135	28,135	28,135								
CY2021 Program Total Contribution to CPAS		130,116	28,135	28,135	28,135	-	-	-	-	-	-	-	-
Historic Program Total Contribution to CPAS†		61,890	61,890	23,259	-	-	-	-	-	-	-	-	-
Program Total CPAS		192,006	90,026	51,394	28,135	-	-	-	-	-	-	-	-
CY2021 Program Incremental Expiring Savings§		-	101,980	-	-	28,135	-	-	-	-	-	-	-
Historic Program Incremental Expiring Savings		36	-	38,631	23,259	-	-	-	-	-	-	-	-
Program Total Incremental Expiring Savings		36	101,980	38,631	23,259	28,135	-	-	-	-	-	-	-

Note: The green highlighted cell shows program total first-year electric savings (including direct electric savings and those converted from gas). The gray cells are blank, indicating no values or do not contribute to calculating CPAS in CY2021.

* A deemed value. Source: Illinois SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021>.

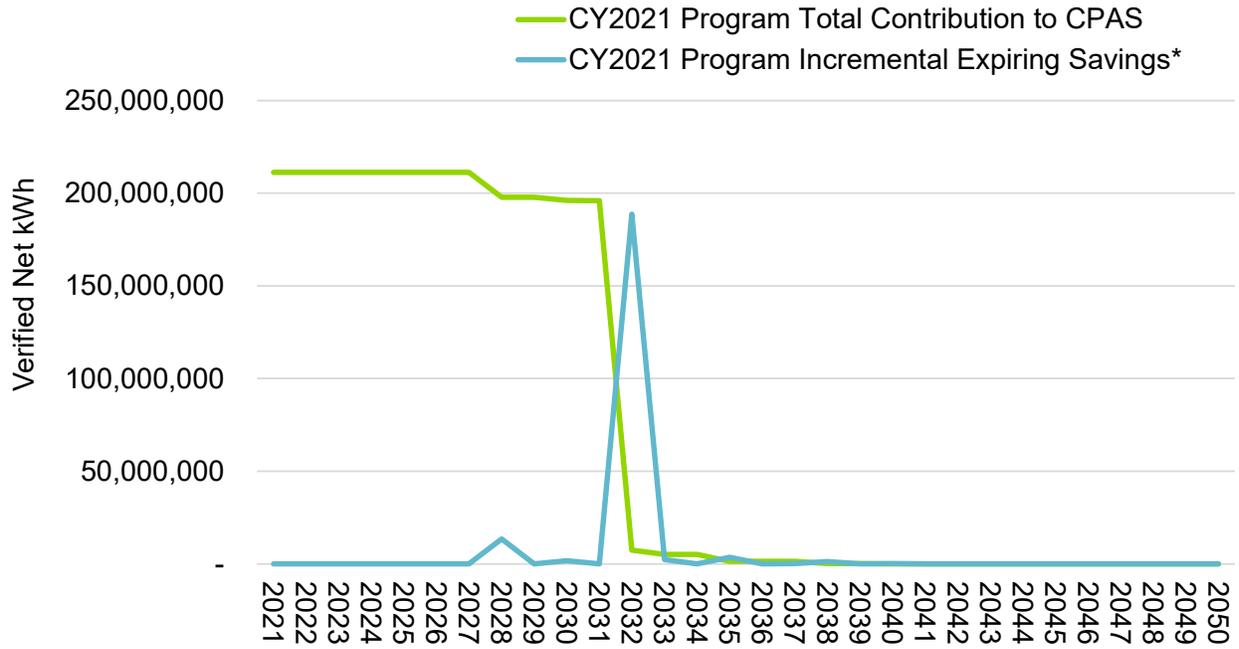
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ Historic savings go back to CY2018.

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

Source: Evaluation team analysis

Figure 4-1. Cumulative Persisting Annual Savings



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

Source: Evaluation team analysis

5. Program Savings by Measure

The program included the measures shown in Table 5-1 and Figure 5-1. Of the 11 unique measures, advanced thermostats, APS, and dehumidifiers contributed the most savings.

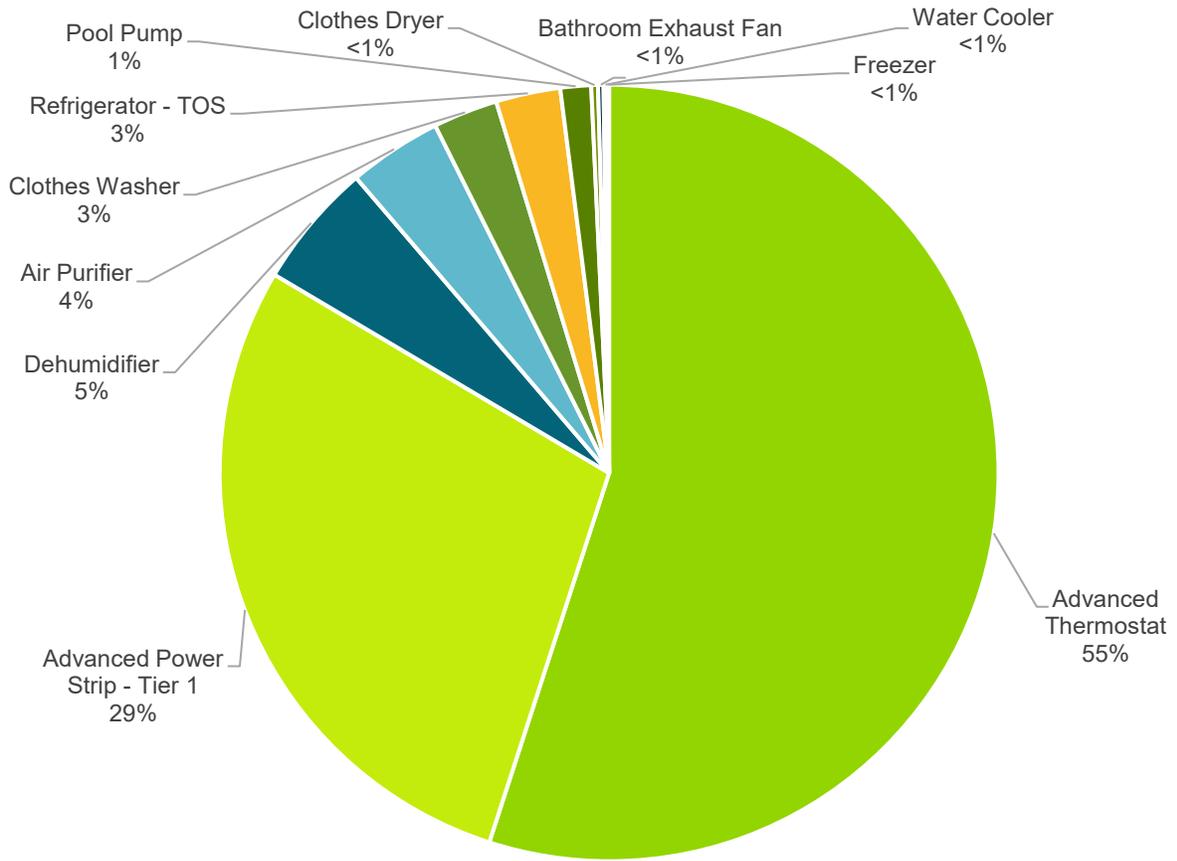
Table 5-1. Number of Measures by Type

End Use Type	Research Category	Quantity Unit
HVAC	Advanced Thermostat	84,472 Each
Consumer Electronics	Advanced Power Strip - Tier 1	230,556 Each
Appliance	Dehumidifier	32,325 Each
Appliance	Air Purifier	13,484 Each
Appliance	Clothes Washer	28,546 Each
Appliance	Refrigerator - TOS	31,996 Each
Miscellaneous	Pool Pump	372 Each
Appliance	Clothes Dryer	1,157 Each
HVAC	Bathroom Exhaust Fan	4,003 Each
Appliance	Water Cooler	882 Each
Appliance	Freezer	924 Each
	Total	428,717

Note: This is the same table as Table 2-2.

Source: ComEd tracking data and evaluation team analysis

Figure 5-1. Verified Net Savings by Measure – Electric



Source: ComEd tracking data and evaluation team analysis

Measure-level energy and demand savings are provided in the following tables.

Table 5-2. Energy Savings by Measure – Electric

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)	EUL (years)
HVAC	Advanced Thermostat	29,635,339	0.98	29,137,432	Multiple†	24,674,649	11.0
Consumer Electronics	Advanced Power Strip - Tier 1	17,085,757	0.99	16,860,560	0.76	12,814,026	7.0
Appliance	Dehumidifier	3,492,040	1.00	3,491,284	0.67	2,339,160	12.0
Appliance	Air Purifier	3,186,043	0.69	2,207,965	0.79	1,744,292	9.0
Appliance	Clothes Washer	1,716,943	1.11	1,910,688	0.63	1,203,733	14.0
Appliance	Refrigerator - TOS	1,871,721	0.99	1,848,261	0.65	1,201,370	17.0
Miscellaneous	Pool Pump	714,875	1.00	714,875	0.80	571,900	7.0
Appliance	Clothes Dryer	187,339	1.00	187,339	0.67	125,517	16.0
HVAC	Bathroom Exhaust Fan	154,516	1.00	154,516	0.66	101,980	19.0
Appliance	Water Cooler	110,603	1.00	110,498	0.67	74,033	10.0
Appliance	Freezer	44,659	1.00	44,659	0.63	28,135	22.0
Total		58,199,834	0.97	56,668,076		44,878,796	

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

* A deemed value. Source: Illinois SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021>.

† Cooling NTG = 0.8, heating NTG = 0.9.

Source: ComEd tracking data and evaluation team analysis

Table 5-3. Summer Peak Demand Savings by Measure

End Use Type	Research Category	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Peak Demand Reduction (kW)	NTG*	Verified Net Peak Demand Reduction (kW)
HVAC	Advanced Thermostat	8,824.79	0.98	8,692.00	Multiple†	6,953.60
Consumer Electronics	Advanced Power Strip - Tier 1	1,916.95	0.99	1,892.05	0.76	1,437.96
Appliance	Dehumidifier	791.70	1.00	791.53	0.67	530.32
Appliance	Air Purifier	361.54	0.70	252.00	0.79	199.08
Appliance	Clothes Washer	220.78	1.00	221.49	0.63	139.54
Appliance	Refrigerator - TOS	282.12	0.99	278.58	0.65	181.08
Miscellaneous	Pool Pump	471.75	1.00	471.69	0.80	377.35
Appliance	Clothes Dryer	25.16	1.00	25.16	0.67	16.85
HVAC	Bathroom Exhaust Fan	19.21	1.00	19.15	0.66	12.64
Appliance	Water Cooler	12.61	1.00	12.61	0.67	8.45
Appliance	Freezer	7.20	1.00	7.20	0.63	4.54
Total		12,933.81	0.98	12,663.46		9,861.41

* A deemed value. Source: Illinois SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021>.

† Cooling NTG = 0.8, heating NTG = 0.9.

Source: ComEd tracking data and evaluation team analysis

The Appliance Rebates Program includes measures that save water. That reduction in water produces secondary kWh savings from water supply and wastewater treatment. Table 5-4 shows the secondary measure-level savings. The savings in this table are included in the electricity savings in the previous tables in this section.

Table 5-4. Secondary Energy Savings from Water Reduction by Measure – Electric

End Use Type	Research Category	Ex Ante Annual Water Savings (gallons)	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate (RR _{water})	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
HVAC	Advanced Thermostat	0	0	N/A	0	Multiple†	0
Consumer Electronics	Advanced Power Strip - Tier 1	0	0	N/A	0	0.76	0
Appliance	Dehumidifier	0	0	N/A	0	0.67	0
Appliance	Air Purifier	0	0	N/A	0	0.79	0
Appliance	Clothes Washer	48,003,200	NR	N/A	191,250	0.63	120,488
Appliance	Refrigerator - TOS	0	0	N/A	0	0.65	0
Miscellaneous	Pool Pump	0	0	N/A	0	0.80	0
Appliance	Clothes Dryer	0	0	N/A	0	0.67	0
HVAC	Bathroom Exhaust Fan	0	0	N/A	0	0.66	0
Appliance	Water Cooler	0	0	N/A	0	0.67	0
Appliance	Freezer	0	0	N/A	0	0.63	0
Total		48,003,200	0	N/A	191,250		120,488

Note: The savings in this table reflect only secondary electric energy (kWh) savings from water supply and wastewater treatment plants for measures claimed by ComEd, not those claimed by gas utilities.

N/A = not applicable (refers to a piece of data that cannot be produced or does not apply).

NR = not reported.

* A deemed value. Source: Illinois SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021>.

† Cooling NTG = 0.8, heating NTG = 0.9.

Source: ComEd tracking data and evaluation team analysis

The Appliance Rebates Program includes measures that save gas. Table 5-5 shows the measure-level gas savings.

Table 5-5. Energy Savings by Measure – Gas

End Use Type	Research Category	Ex Ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)	EUL (years)
HVAC	Advanced Thermostat	6,312,761	0.98	6,215,782	Multiple‡	5,594,204	11.0
Consumer Electronics	Advanced Power Strip - Tier 1	0	N/A	0	0.76	0	7.0
Appliance	Dehumidifier	0	N/A	0	0.67	0	12.0
Appliance	Air Purifier	0	N/A	0	0.79	0	9.0
Appliance	Clothes Washer	127,374	1.01	128,512	0.63	80,963	14.0
Appliance	Refrigerator - TOS	0	N/A	0	0.65	0	17.0
Miscellaneous	Pool Pump	0	N/A	0	0.80	0	7.0
Appliance	Clothes Dryer	0	N/A	0	0.67	0	16.0
HVAC	Bathroom Exhaust Fan	0	N/A	0	0.66	0	19.0
Appliance	Water Cooler	0	N/A	0	0.67	0	10.0
Appliance	Freezer	0	N/A	0	0.63	0	22.0
Total Therms		6,440,134	0.99	6,344,294		5,675,167	
Total kWh Converted From Therms†		188,760,331	0.99	185,951,265		166,339,132	

N/A = not applicable (refers to a piece of data that cannot be produced or does not apply).

* A deemed value. Source: Illinois SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021>.

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

‡ Cooling NTG = 0.8, heating NTG = 0.9.

Source: ComEd tracking data and evaluation team analysis

Table 5-6 is combined savings from Table 5-2 and Table 5-5.

Table 5-6. Energy Savings by Measure – Total

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
HVAC	Advanced Thermostat	214,662,349	0.98	211,322,003	Multiple‡	188,640,764
Consumer Electronics	Advanced Power Strip - Tier 1	17,085,757	0.99	16,860,560	0.76	12,814,026
Appliance	Dehumidifier	3,492,040	1.00	3,491,284	0.67	2,339,160
Appliance	Air Purifier	3,186,043	0.69	2,207,965	0.79	1,744,292
Appliance	Clothes Washer	5,450,263	1.04	5,677,381	0.63	3,576,750
Appliance	Refrigerator - TOS	1,871,721	0.99	1,848,261	0.65	1,201,370
Miscellaneous	Pool Pump	714,875	1.00	714,875	0.80	571,900
Appliance	Clothes Dryer	187,339	1.00	187,339	0.67	125,517
HVAC	Bathroom Exhaust Fan	154,516	1.00	154,516	0.66	101,980
Appliance	Water Cooler	110,603	1.00	110,498	0.67	74,033
Appliance	Freezer	44,659	1.00	44,659	0.63	28,135
Total†		246,960,165	0.98	242,619,341		211,217,928

* A deemed value. Source: Illinois SAG website: <https://www.ilsag.info/evaluator-ntg-recommendations-for-2021>.

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

‡ Cooling NTG = 0.8, heating NTG = 0.9.

Source: ComEd tracking data and evaluation team analysis

6. Impact Analysis Findings and Recommendations

The issues that had the largest effect on adjusting ex ante gross savings were the use of the ENERGY STAR qualified product list (QPL) to verify input parameters for air purifiers and the advanced thermostat quantity adjustment.

The evaluation team developed several recommendations based on findings from the CY2021 evaluation.

6.1 Advanced Thermostats

Finding 1. Ex ante savings were claimed for more than one thermostat per household at 1,157 site addresses. Guidehouse identified unique site addresses in the tracking data across the Appliance Rebates and Marketplace 2.0 channels and verified savings for one thermostat per unique site address per the Illinois Technical Reference Manual v9.0 (IL-TRM)² Errata, Section 5.3.16. Advanced thermostats represent 51% of the program total gross verified kWh savings and have a realization rate of 0.98.

Recommendation 1. Claim savings for only one thermostat per household for this measure to be consistent with the IL-TRM Errata, Section 5.3.16.

Finding 2. Ex ante savings for project IDs EA-0008746769 and EA-0008839536 were calculated using a heating reduction of 8.6% from the IL-TRM, Section 5.3.16. Guidehouse calculated verified savings for these project IDs using a heating reduction of 8.5% from the IL-TRM Errata, Section 5.3.16. This finding did not appreciably impact the CY2021 measure realization rate.

Recommendation 2. Use heating reduction values from the IL-TRM Errata, Section 5.3.16 to calculate savings for this measure.

Finding 3. Ex ante savings for two site addresses located in McHenry and Ogle counties (example project IDs: EA-0009961044 and EA-0010347542) were calculated using full load cooling hours corresponding to climate zone 2 from the IL-TRM Errata, Section 5.3.16. Guidehouse determined these site addresses to be located in cooling climate zone 1 and heating climate zone 2 and calculated verified savings for these project IDs using full load cooling hours corresponding to climate zone 1 from the IL-TRM Errata, Section 5.3.16. This finding did not appreciably impact the CY2021 measure realization rate.

Recommendation 3. Confirm the correct climate zone for each project when determining the full load cooling hours to calculate savings for this measure.

Finding 4. Ex ante savings for one site address located in Winnebago County (example project IDs: EA-0010082973 and EA-0010083309) were calculated using gas heating consumption and full load cooling hours corresponding to climate zone 2 from the IL-TRM Errata, Section 5.3.16. Guidehouse determined this site address to be located in cooling and heating climate zone 1 and calculated verified savings for these project IDs using gas heating consumption and full

² In this report, unless stated otherwise, IL-TRM and IL-TRM Errata refers to version 9.0 (v9.0).

load cooling hours corresponding to climate zone 1 from the IL-TRM Errata, Section 5.3.16. This finding did not appreciably impact the CY2021 measure realization rate.

Recommendation 4. Confirm correct climate zone for each project when determining the gas heating consumption and full load cooling hours to calculate savings for this measure.

6.2 Advanced Power Strip – Tier 1

Finding 5. The ex ante savings for the APS measures distributed through the Marketplace 2.0 and Appliance Rebates channels were calculated using a direct install in-service rate (ISR) of 100% and a time-of-sale ISR of 71%, respectively. Guidehouse calculated verified energy and demand savings for all APS measures using a time-of-sale ISR of 71% from the IL-TRM, Section 5.2.1 irrespective of the distribution channel. APS represent 30% of the program total gross verified kWh savings and have a realization rate of 0.99.

Recommendation 5. Calculate energy and demand savings for this measure using a time-of-sale ISR of 71% from the IL-TRM, Section 5.2.1 irrespective of the distribution channel.

6.3 Dehumidifiers

Finding 6. The ex ante savings for three project IDs that installed Hisense dehumidifier models DH10019TP1WG and DH10020KP1WG with a capacity of 100 pints/day were incorrectly calculated in the tracking data. Guidehouse calculated verified savings for these project IDs as per the IL-TRM, Section 5.1.3 using the capacity of the installed unit (see Table 6-1). Dehumidifiers represent 6% of the program total gross verified kWh savings and have a realization rate of 1.00. This finding did not appreciably impact the CY2021 measure realization rate.

Table 6-1. Dehumidifiers – kWh Savings Comparison

Project ID	ENERGY STAR Most Efficient	Capacity (Pints/Day)	Ex Ante kWh Savings	Verified kWh Savings
EA-0009819526	No	100	425.49	174.05
EA-0009822394	No	100	425.49	174.05
EA-0010196163	No	100	425.49	174.05

Source: ComEd tracking data and evaluation team analysis

Recommendation 6. Calculate energy and demand savings for this measure as per the IL-TRM, Section 5.1.3 using the capacity of the installed unit.

6.4 Air Purifiers

Finding 7. The evaluation team compared the clean air delivery rate (CADR) for smoke values provided in the Appliance Rebates channel tracking data for the product make and model against the corresponding values in the ENERGY STAR QPL (downloaded on January 28, 2022) for the same make and model. The team found that the smoke CADR range classification in the tracking data did not match the corresponding classification based on the ENERGY STAR

QPL for 1,221 products (example project IDs: EA-0008043266, EA-0008165787, EA-0008380057, EA-0008802701, EA-0008841688) out of 3,316 products where this information was available. For these products, the evaluation team calculated verified savings using smoke CADR values from the ENERGY STAR QPL. Air purifiers represent 4% of the program total gross verified kWh savings and have a realization rate of 0.69.

Recommendation 7. Cross-check the ENERGY STAR QPL with the make and model of the rebated air purifiers to ensure that smoke CADR values are accurately recorded in the tracking data.

Finding 8. For the air purifiers installed through the Marketplace 2.0 channel, the smoke CADR value was not provided in the tracking data. The ex ante savings for all air purifiers distributed through this channel were calculated using an assumption of a smoke CADR value of 200 or greater. The evaluation team determined the smoke CADR value for the air purifier models installed through the Marketplace 2.0 channel using the ENERGY STAR QPL (downloaded on January 28, 2022). The team found that the smoke CADR values assumed in the ex ante calculations did not match the corresponding value in the ENERGY STAR QPL for seven out of the nine models (2,680 products out of 2,754 products) installed through this channel. For these products, the evaluation team calculated verified savings using smoke CADR values from the ENERGY STAR QPL (see Table 6-2).

Table 6-2. Air Purifiers – Smoke CADR Value Comparison

Make and Model	Quantity Installed	Ex Ante Smoke CADR Range Assumption	Verified Smoke CADR
Honeywell HHT270W	1,549	200 <= Smoke CADR	62
Medify Air Z-MA-25-B1	66	200 <= Smoke CADR	128.5
Medify Air Z-MA-14-B1	283	200 <= Smoke CADR	70
Medify Air Z-MA-40-W1	27	200 <= Smoke CADR	206
Medify Air Z-MA-14-W1	183	200 <= Smoke CADR	70
Medify Air Z-MA-40-B1	47	200 <= Smoke CADR	206
Medify Air Z-MA-25-W1	28	200 <= Smoke CADR	128.5
Honeywell HPA020B	570	200 <= Smoke CADR	60
Honeywell HPA100	1	200 <= Smoke CADR	100

Source: ComEd tracking data and evaluation team analysis

Recommendation 8. Provide the smoke CADR value for air purifiers installed through the Marketplace 2.0 channel as part of the tracking data. Cross-check the ENERGY STAR QPL with the make and model of the rebated air purifiers to ensure that smoke CADR values are accurately recorded in the tracking data.

6.5 Clothes Washers

Finding 9. The ex ante savings do not include the secondary kWh savings from water. The IL-TRM allows for secondary kWh savings derived from water supply and wastewater treatment reduction to be included in total savings for this measure. Secondary savings from water reduction are included in the verified energy savings for this measure. Clothes washers represent 3% of the program total gross verified kWh savings and have a realization rate of

1.11. The realization rate for primary energy savings (excluding the secondary kWh savings from water) is 1.00.

Recommendation 9. The implementer should continue tracking gallons of water saved from this measure. Guidehouse also recommends incorporating necessary calculations to capture secondary kWh savings from water reduction in ex ante savings going forward.

6.6 Refrigerators

Finding 10. The evaluation team compared the US Federal Standard Energy Usage and Annual Energy Usage values provided in the tracking data for the product make and model against the corresponding values in the ENERGY STAR QPL (downloaded on January 28, 2022) for the same make and model. The team found that either or both of the values in the tracking data did not match the corresponding value in the ENERGY STAR QPL for 4,611 products (example project IDs: EA-0008170492, EA-0008385765, EA-0008502546, EA-0008808622, EA-0008816963) out of 29,432 products where this information was available. For these products, the evaluation team calculated verified savings using US federal standard energy usage and annual energy usage values from the ENERGY STAR QPL. Refrigerators represent 3% of the program total gross verified kWh savings and have a realization rate of 0.99.

Recommendation 10. Cross-check the ENERGY STAR QPL with the make and model of the rebated refrigerators to ensure that energy usage and savings are accurately recorded in the tracking data.

Appendix A. Impact Analysis Methodology

The evaluation team determined verified gross savings for each program measure by:

- Reviewing the savings algorithm inputs in the tracking data for agreement with the IL-TRM and IL-TRM Errata, where applicable. The IL-TRM allows for custom or actual values to be used for some of the input parameters; the evaluation team based these values on the program tracking data when available.
- Validating the savings algorithm was applied correctly.
- Cross-checking per-unit savings values in the program tracking data with the verified values in the measure workbook or in Guidehouse's calculations if the workbook did not agree with the IL-TRM.
- Multiplying the verified per-unit savings value by the quantity reported in the tracking data.

The evaluation team calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a NTG ratio. In CY2021, NTG estimates used to calculate the net verified savings were based on past evaluation research and defined by a consensus process through Illinois SAG.

Appendix B. Total Resource Cost Detail

Table B-1 shows the TRC cost-effectiveness analysis inputs available at the time of finalizing this impact evaluation report. This table does not include additional required cost data (e.g., measure costs, program-level incentives, and non-incentive costs). ComEd will provide this data to the evaluation team later.

Table B-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Gross Electric Savings (kWh)	Gross Peak Demand Reduction (kW)	Gross Gas Savings (Therms)	Gross Secondary Savings due to Water Reduction (kWh)	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG (kWh)	NTG (kW)	NTG (Therms)	Net Electric Energy Savings (kWh)	Net Peak Demand Reduction (kW)	Net Gas Savings (Therms)	Net Secondary Savings due to Water Reduction (kWh)	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
HVAC	Advanced Thermostat	Each	84,472	11.0	NO	29,137,432	8,692.00	6,215,782	0	0	0	Multiple‡	Multiple‡	Multiple‡	24,674,649	6,953.60	5,594,204	0	0	0
Consumer Electronics	Advanced Power Strip - Tier 1	Each	230,556	7.0	NO	16,860,560	1,892.05	0	0	0	0	0.76	0.76	0.76	12,814,026	1,437.96	0	0	0	0
Appliance	Dehumidifier	Each	32,325	12.0	NO	3,491,284	791.53	0	0	0	0	0.67	0.67	0.67	2,339,160	530.32	0	0	0	0
Appliance	Air Purifier	Each	13,484	9.0	NO	2,207,965	252.00	0	0	0	0	0.79	0.79	0.79	1,744,292	199.08	0	0	0	0
Appliance	Clothes Washer	Each	28,546	14.0	NO	1,719,437	221.49	128,512	191,250	0	0	0.63	0.63	0.63	1,083,246	139.54	80,963	120,488	0	0
Appliance	Refrigerator - TOS	Each	31,996	17.0	NO	1,848,261	278.58	0	0	0	0	0.65	0.65	0.65	1,201,370	181.08	0	0	0	0
Miscellaneous	Pool Pump	Each	372	7.0	NO	714,875	471.69	0	0	0	0	0.80	0.80	0.80	571,900	377.35	0	0	0	0
Appliance	Clothes Dryer	Each	1,157	16.0	NO	187,339	25.16	0	0	0	0	0.67	0.67	0.67	125,517	16.85	0	0	0	0
HVAC	Bathroom Exhaust Fan	Each	4,003	19.0	NO	154,516	19.15	0	0	0	0	0.66	0.66	0.66	101,980	12.64	0	0	0	0
Appliance	Water Cooler	Each	882	10.0	NO	110,498	12.61	0	0	0	0	0.67	0.67	0.67	74,033	8.45	0	0	0	0
Appliance	Freezer	Each	924	22.0	NO	44,659	7.20	0	0	0	0	0.63	0.63	0.63	28,135	4.54	0	0	0	0
Total				10.1		56,476,826	12,663	6,344,294	191,250	0	0				44,758,309	9,861	5,675,167	120,488	0	0

Note: To avoid double counting, the verified gross kWh and net kWh used in the TRC analysis exclude secondary energy savings from water reduction measures.

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

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

‡ Cooling NTG = 0.8, heating NTG = 0.9

Source: ComEd tracking data and evaluation team analysis