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ComEd Facility Assessments Impact Evaluation Report

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

Prepared for:

ComEd

FINAL

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1. Introduction

This report presents the results of the impact evaluation of the CY2021 Facility Assessments (FA) 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 FA Program consists of low-cost and operational measures identified by ComEd engineers during their commercial and industrial facility assessments. These measures focus on existing equipment and apply maintenance and operational best practices to realize energy savings with little or no investment from the customer. Measures claimed in the FA Program are not covered by the Custom or Standard Programs because of their no-cost or low-cost nature, but they are identified during customer audits completed by ComEd. Implementation of the identified measures can occur at the time of the audit. If measures are not installed during the audit, the program outreach staff follows up with the customer to check on progress.

ComEd staff developed a calculator for each measure to estimate program savings. The measures and operational efficiencies identified through this program include turning off lights and equipment when not needed, addressing air compressor leaks and system pressure, adjusting space temperatures setpoints, and simple heating, ventilation, and air conditioning (HVAC) maintenance.

In CY2021, the program had 60 participants that completed 81 measures (see Table 2-1).

Table 2-1. Number of Participants and Projects

Participation	Total
Participants	60
Total Measures	81
Measure Types	15
End Use Types	5

Source: ComEd tracking data and evaluation team analysis

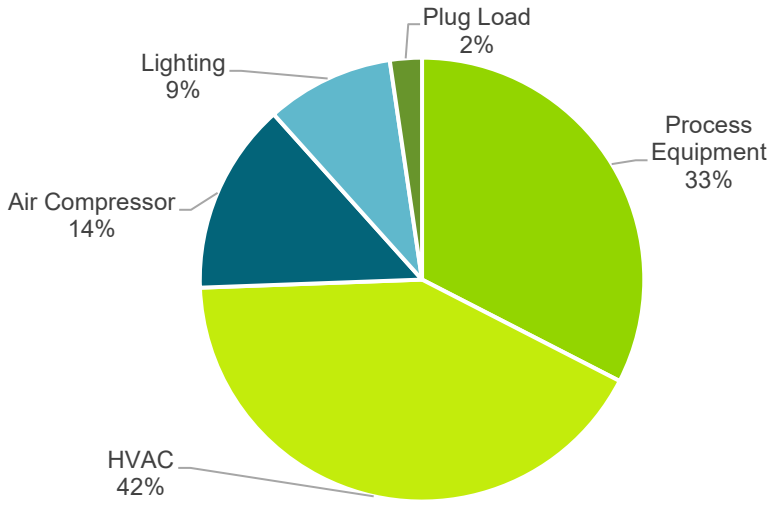
The implementer labeled measures with three high level categories: Operational Savings, Operational Savings – Standard, or Operational Savings – Custom. The implementer included descriptions for most measures, which the evaluation team used to refine the grouping into more specific measure types, as Table 2-2 and Figure 2-1 show.

Table 2-2. Number of Measures by Type

End Use Type	Research Category	Count	Unit
Process Equipment	Process Equipment Setpoints	4	Each
HVAC	HVAC System Controls	28	Each
Process Equipment	Hot Water Control	5	Each
Air Compressor	Reduced Compressor Pressure	5	Each
HVAC	Manual HVAC Temp Adjustments	4	Each
HVAC	HVAC Maintenance	4	Each
Air Compressor	Air Compressor Other	3	Each
Lighting	Manual Light Controls	6	Each
HVAC	Heater Control	1	Each
Process Equipment	Manual On/Off Process Controls	5	Each
Plug Load	Computer Power Controls	3	Each
Lighting	Photocell Repair	2	Each
Air Compressor	Compressor Air Leaks	2	Each
HVAC	Server Closest HVAC Setpoint	8	Each
Plug Load	Turn Off TV	1	Each
	Total	**81**	

Source: ComEd tracking data and evaluation team analysis

Figure 2-1. Share of Measures Installed by End Use Type



Source: ComEd tracking data and evaluation team analysis

3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the FA Program achieved in CY2021. These calculations did not include demand savings estimates and, due to the custom nature of these measures and calculations, the evaluation team did not apply a standard demand factor to these measures. 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	2,655,095	0.88	2,339,216	0.94	N/A	N/A	2,198,863
Electric Energy Savings - Converted from Gas‡	kWh	491,646	1.00	491,646	0.94	N/A	N/A	462,147
Total Electric Energy Savings	kWh	3,146,741	0.90	2,830,862	0.94	N/A	N/A	2,661,010
Summer Peak§ Demand Savings	kW	-	N/A	-	N/A	N/A	N/A	-

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.

The “Verified Net Savings” in row one (Electric Energy Savings – Direct) includes primary kWh savings as a result of measure implementation. It does not include carryover savings, secondary kWh savings from wastewater treatment or electric heating penalties as they don’t apply to this program.

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 FA 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)	NTG*	Lifetime Net Savings (kWh)†	Verified Net kWh Savings 2018	2019	2020	2021	2022	2023	2024	2025	2026
Process Equipment	Process Equipment Setpoints	3.5	843,703	0.94	2,775,784				793,081	793,081	793,081	396,541		
HVAC	HVAC System Controls	4.8	810,337	0.94	3,618,155				761,717	761,717	761,717	761,717	571,288	
Process Equipment	Hot Water Control	4.2	180,469	0.94	712,492				169,641	169,641	169,641	169,641	33,928	
Air Compressor	Reduced Compressor Pressure	3.6	101,677	0.94	344,075				95,576	95,576	95,576	57,346		
HVAC	Manual HVAC Temp Adjustments	4.0	99,826	0.94	375,345				93,836	93,836	93,836	93,836		
HVAC	HVAC Maintenance	2.8	79,345	0.94	205,108				74,585	74,585	55,939			
Air Compressor	Air Compressor Other	3.0	62,971	0.94	177,577				59,192	59,192	59,192			
Lighting	Manual Light Controls	2.5	56,776	0.94	133,424				53,370	53,370	26,685			
HVAC	Heater Control	2.0	25,626	0.94	48,176				24,088	24,088				
Process Equipment	Manual On/Off Process Controls	2.0	23,623	0.94	44,411				22,206	22,206				
Plug Load	Computer Power Controls	3.0	16,914	0.94	47,697				15,899	15,899	15,899			
Lighting	Photocell Repair	2.5	15,291	0.94	35,934				14,374	14,374	7,187			
Air Compressor	Compressor Air Leaks	3.0	11,870	0.94	33,474				11,158	11,158	11,158			
HVAC	Server Closest HVAC Setpoint	5.1	10,450	0.94	50,342				9,823	9,823	9,823	9,823	9,823	1,228
Plug Load	Turn Off TV	3.0	338	0.94	952				317	317	317			
CY2021 Program Total Electric Contribution to CPAS			**2,339,216**		**8,602,947**				**2,198,863**	**2,198,863**	**2,100,051**	**1,488,903**	**615,039**	**1,228**
Historic Program Total Electric Contribution to CPAS‡						**3,282,694**	**6,646,478**	**10,315,942**	**9,206,835**	**6,653,388**	**4,479,800**	**1,849,638**	**1,849,638**	**-**
Program Total Electric CPAS						**3,282,694**	**6,646,478**	**10,315,942**	**11,405,698**	**8,852,251**	**6,579,851**	**3,338,542**	**2,464,677**	**1,228**
CY2021 Program Incremental Expiring Electric Savings§										**-**	**98,812**	**611,148**	**873,865**	**613,811**
Historic Program Incremental Expiring Electric Savings									**1,109,106**	**2,553,447**	**2,173,588**	**2,630,162**	**-**	**1,849,638**
Program Total Incremental Expiring Electric Savings									**1,109,106**	**2,553,447**	**2,272,399**	**3,241,310**	**873,865**	**2,463,449**

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Process Equipment	Process Equipment Setpoints												
HVAC	HVAC System Controls												
Process Equipment	Hot Water Control												
Air Compressor	Reduced Compressor Pressure												
HVAC	Manual HVAC Temp Adjustments												
HVAC	HVAC Maintenance												
Air Compressor	Air Compressor Other												
Lighting	Manual Light Controls												
HVAC	Heater Control												
Process Equipment	Manual On/Off Process Controls												
Plug Load	Computer Power Controls												
Lighting	Photocell Repair												
Air Compressor	Compressor Air Leaks												
HVAC	Server Closest HVAC Setpoint												
Plug Load	Turn Off TV												
CY2021 Program Total Electric Contribution to CPAS		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Historic Program Total Electric Contribution to CPAS‡		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Program Total Electric CPAS		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CY2021 Program Incremental Expiring Electric Savings§		**1,228**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Historic Program Incremental Expiring Electric Savings		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Program Total Incremental Expiring Electric Savings		**1,228**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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 (Therms)	NTG*	Lifetime Net Savings (Therms)†	Verified Net Therms Savings 2018	2019	2020	2021	2022	2023	2024	2025	2026
Process Equipment	Process Equipment Setpoints	3.5	-	0.94	-				-	-	-	-		
HVAC	HVAC System Controls	4.8	16,744	0.94	74,762				15,739	15,739	15,739	15,739	11,805	
Process Equipment	Hot Water Control	4.2	30	0.94	118				28	28	28	28	6	
Air Compressor	Reduced Compressor Pressure	3.6	-	0.94	-				-	-	-	-		
HVAC	Manual HVAC Temp Adjustments	4.0	-	0.94	-				-	-	-	-		
HVAC	HVAC Maintenance	2.8	-	0.94	-				-	-	-			
Air Compressor	Air Compressor Other	3.0	-	0.94	-				-	-	-			
Lighting	Manual Light Controls	2.5	-	0.94	-				-	-	-			
HVAC	Heater Control	2.0	-	0.94	-				-	-				
Process Equipment	Manual On/Off Process Controls	2.0	-	0.94	-				-	-				
Plug Load	Computer Power Controls	3.0	-	0.94	-				-	-	-			
Lighting	Photocell Repair	2.5	-	0.94	-				-	-	-			
Air Compressor	Compressor Air Leaks	3.0	-	0.94	-				-	-	-			
HVAC	Server Closest HVAC Setpoint	5.1	-	0.94	-				-	-	-	-	-	-
Plug Load	Turn Off TV	3.0	-	0.94	-				-	-	-			
CY2021 Program Total Gas Contribution to CPAS (Therms)			**16,774**		**74,880**				**15,768**	**15,768**	**15,768**	**15,768**	**11,810**	**-**
CY2021 Program Total Gas Contribution to CPAS (kWh Equivalent)‡						**-**	**-**	**-**	**462,147**	**462,147**	**462,147**	**462,147**	**346,156**	**-**
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)§						**1,522,282**	**2,478,545**	**2,748,951**	**2,128,487**	**2,027,456**	**1,125,638**	**174,621**	**174,621**	**-**
Program Total Gas CPAS (kWh Equivalent)						**1,522,282**	**2,478,545**	**2,748,951**	**2,590,634**	**2,489,603**	**1,587,785**	**636,768**	**520,777**	**-**
CY2021 Program Incremental Expiring Gas Savings (Therms)										**-**	**-**	**-**	**3,957**	**11,810**
CY2021 Program Incremental Expiring Gas Savings (kWh Equivalent)‖										**-**	**-**	**-**	**115,991**	**346,156**
Historic Program Incremental Expiring Gas Savings (kWh Equivalent)									**620,464**	**101,031**	**901,818**	**951,017**	**-**	**174,621**
Program Total Incremental Expiring Gas Savings (kWh Equivalent)									**620,464**	**101,031**	**901,818**	**951,017**	**115,991**	**520,777**

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Process Equipment	Process Equipment Setpoints												
HVAC	HVAC System Controls												
Process Equipment	Hot Water Control												
Air Compressor	Reduced Compressor Pressure												
HVAC	Manual HVAC Temp Adjustments												
HVAC	HVAC Maintenance												
Air Compressor	Air Compressor Other												
Lighting	Manual Light Controls												
HVAC	Heater Control												
Process Equipment	Manual On/Off Process Controls												
Plug Load	Computer Power Controls												
Lighting	Photocell Repair												
Air Compressor	Compressor Air Leaks												
HVAC	Server Closest HVAC Setpoint												
Plug Load	Turn Off TV												
CY2021 Program Total Gas Contribution to CPAS (Therms)		-	-	-	-	-	-	-	-	-	-	-	-
CY2021 Program Total Gas Contribution to CPAS (kWh Equivalent)‡		-	-	-	-	-	-	-	-	-	-	-	-
Historic Program Total Gas Contribution to CPAS (kWh Equivalent)§		-	-	-	-	-	-	-	-	-	-	-	-
Program Total Gas CPAS (kWh Equivalent)		-	-	-	-	-	-	-	-	-	-	-	-
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)		-	-	-	-	-	-	-	-	-	-	-	-

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 (kWh)	NTG*	Lifetime Net Savings (kWh)†	Verified Net kWh Savings (Including Those Converted from Gas Savings) 2018	2019	2020	2021	2022	2023	2024	2025	2026
Process Equipment	Process Equipment Setpoints	3.5	843,703	0.94	2,775,784				793,081	793,081	793,081	396,541		
HVAC	HVAC System Controls	4.8	1,301,104	0.94	5,809,428				1,223,038	1,223,038	1,223,038	1,223,038	917,278	
Process Equipment	Hot Water Control	4.2	181,348	0.94	715,963				170,467	170,467	170,467	170,467	34,093	
Air Compressor	Reduced Compressor Pressure	3.6	101,677	0.94	344,075				95,576	95,576	95,576	57,346		
HVAC	Manual HVAC Temp Adjustments	4.0	99,826	0.94	375,345				93,836	93,836	93,836	93,836		
HVAC	HVAC Maintenance	2.8	79,345	0.94	205,108				74,585	74,585	55,939			
Air Compressor	Air Compressor Other	3.0	62,971	0.94	177,577				59,192	59,192	59,192			
Lighting	Manual Light Controls	2.5	56,776	0.94	133,424				53,370	53,370	26,685			
HVAC	Heater Control	2.0	25,626	0.94	48,176				24,088	24,088				
Process Equipment	Manual On/Off Process Controls	2.0	23,623	0.94	44,411				22,206	22,206				
Plug Load	Computer Power Controls	3.0	16,914	0.94	47,697				15,899	15,899	15,899			
Lighting	Photocell Repair	2.5	15,291	0.94	35,934				14,374	14,374	7,187			
Air Compressor	Compressor Air Leaks	3.0	11,870	0.94	33,474				11,158	11,158	11,158			
HVAC	Server Closest HVAC Setpoint	5.1	10,450	0.94	50,342				9,823	9,823	9,823	9,823	9,823	1,228
Plug Load	Turn Off TV	3.0	338	0.94	952.2				317	317	317			
CY2021 Program Total Contribution to CPAS			**2,830,862**		**10,797,692**				**2,661,010**	**2,661,010**	**2,562,199**	**1,951,050**	**961,195**	**1,228**
Historic Program Total Contribution to CPAS‡						**4,804,976**	**9,125,023**	**13,064,892**	**11,335,322**	**8,680,844**	**5,605,438**	**2,024,259**	**2,024,259**	**-**
Program Total CPAS						**4,804,976**	**9,125,023**	**13,064,892**	**13,996,332**	**11,341,854**	**8,167,637**	**3,975,309**	**2,985,454**	**1,228**
CY2021 Program Incremental Expiring Savings§										**-**	**98,812**	**611,148**	**989,856**	**959,967**
Historic Program Incremental Expiring Savings									**1,729,570**	**2,654,479**	**3,075,406**	**3,581,179**	**-**	**2,024,259**
Program Total Incremental Expiring Savings									**1,729,570**	**2,654,479**	**3,174,217**	**4,192,327**	**989,856**	**2,984,226**

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Process Equipment	Process Equipment Setpoints												
HVAC	HVAC System Controls												
Process Equipment	Hot Water Control												
Air Compressor	Reduced Compressor Pressure												
HVAC	Manual HVAC Temp Adjustments												
HVAC	HVAC Maintenance												
Air Compressor	Air Compressor Other												
Lighting	Manual Light Controls												
HVAC	Heater Control												
Process Equipment	Manual On/Off Process Controls												
Plug Load	Computer Power Controls												
Lighting	Photocell Repair												
Air Compressor	Compressor Air Leaks												
HVAC	Server Closest HVAC Setpoint												
Plug Load	Turn Off TV												
CY2021 Program Total Contribution to CPAS		-	-	-	-	-	-	-	-	-	-	-	-
Historic Program Total Contribution to CPAS‡		-	-	-	-	-	-	-	-	-	-	-	-
Program Total CPAS		-	-	-	-	-	-	-	-	-	-	-	-
CY2021 Program Incremental Expiring Savings§		**1,228**	-	-	-	-	-	-	-	-	-	-	-
Historic Program Incremental Expiring Savings		-	-	-	-	-	-	-	-	-	-	-	-
Program Total Incremental Expiring Savings		**1,228**	-	-	-	-	-	-	-	-	-	-	-

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**.

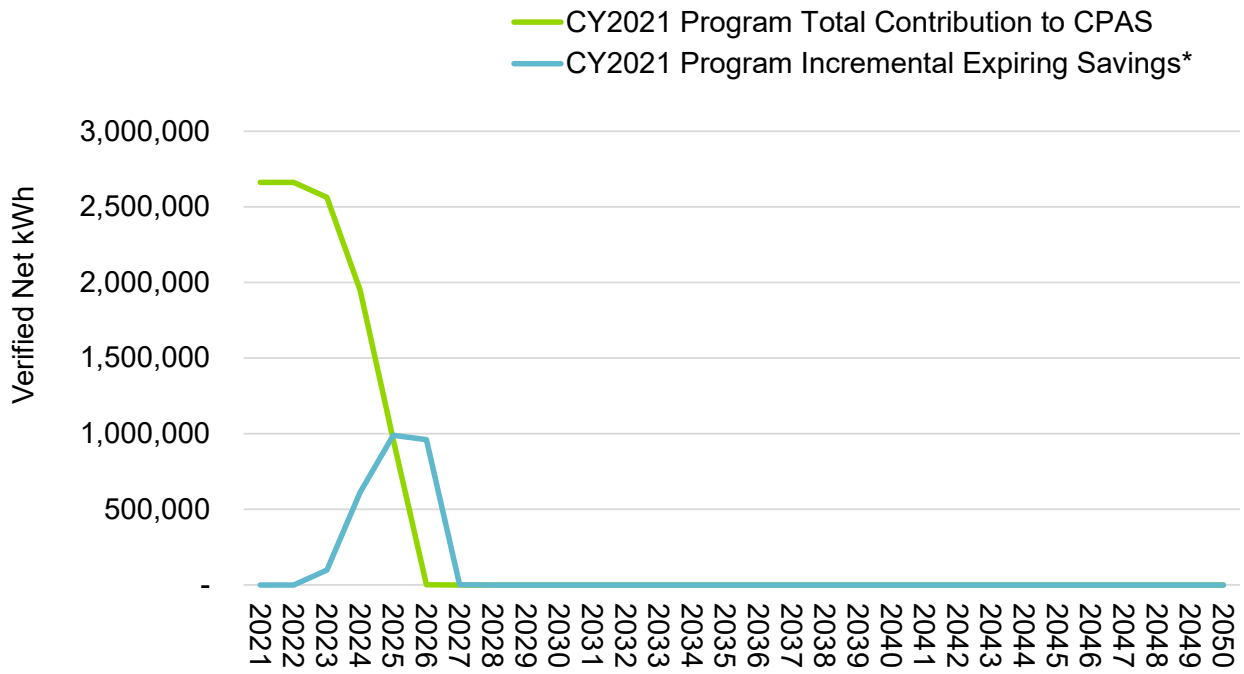
† Lifetime savings are the sum of CPAS savings through the EUL.

‡ 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.

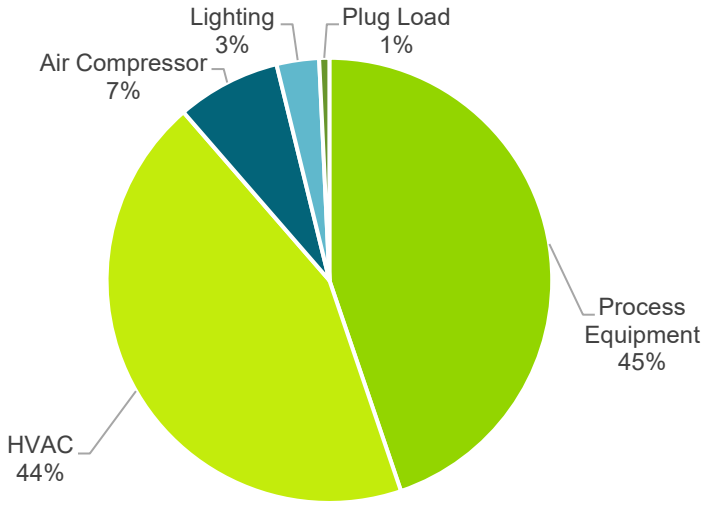
Table 5-1. Number of Measures by Type

End Use Type	Research Category	Count	Unit
Process Equipment	Process Equipment Setpoints	4	Each
HVAC	HVAC System Controls	28	Each
Process Equipment	Hot Water Control	5	Each
Air Compressor	Reduced Compressor Pressure	5	Each
HVAC	Manual HVAC Temp Adjustments	4	Each
HVAC	HVAC Maintenance	4	Each
Air Compressor	Air Compressor Other	3	Each
Lighting	Manual Light Controls	6	Each
HVAC	Heater Control	1	Each
Process Equipment	Manual On/Off Process Controls	5	Each
Plug Load	Computer Power Controls	3	Each
Lighting	Photocell Repair	2	Each
Air Compressor	Compressor Air Leaks	2	Each
HVAC	Server Closest HVAC Setpoint	8	Each
Plug Load	Turn Off TV	1	Each
	Total	**81**	

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 End Use – Electric



Source: ComEd tracking data and evaluation team analysis

The evaluation team reviewed a sample of projects and calculated the realization rate at the program level, not at the measure level. As a result, the measure-level verified gross and net savings in the following tables are the result of applying the program-level realization to the

measure-level ex ante savings. The gas savings realization rate was calculated independently from electric savings as shown in Appendix B. The program reported no demand savings in the tracking system for the FA Program. The provided calculations did not include demand savings estimates and, due to the custom nature of these measures and calculations, the evaluation team did not apply a standard demand factor to these measures.

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)
Process Equipment	Process Equipment Setpoints	957,634	0.88	843,703	0.94	793,081	3.5
HVAC	HVAC System Controls	919,762	0.88	810,337	0.94	761,717	4.8
Process Equipment	Hot Water Control	204,839	0.88	180,469	0.94	169,641	4.2
Air Compressor	Reduced Compressor Pressure	115,407	0.88	101,677	0.94	95,576	3.6
HVAC	Manual HVAC Temp Adjustments	113,306	0.88	99,826	0.94	93,836	4.0
HVAC	HVAC Maintenance	90,060	0.88	79,345	0.94	74,585	2.8
Air Compressor	Air Compressor Other	71,474	0.88	62,971	0.94	59,192	3.0
Lighting	Manual Light Controls	64,443	0.88	56,776	0.94	53,370	2.5
HVAC	Heater Control	29,086	0.88	25,626	0.94	24,088	2.0
Process Equipment	Manual On/Off Process Controls	26,813	0.88	23,623	0.94	22,206	2.0
Plug Load	Computer Power Controls	19,198	0.88	16,914	0.94	15,899	3.0
Lighting	Photocell Repair	17,356	0.88	15,291	0.94	14,374	2.5
Air Compressor	Compressor Air Leaks	13,473	0.88	11,870	0.94	11,158	3.0
HVAC	Server Closest HVAC Setpoint	11,861	0.88	10,450	0.94	9,823	5.1
Plug Load	Turn Off TV	383	0.88	338	0.94	317	3.0
	Total	**2,655,095**	**0.88**	**2,339,216**		**2,198,863**	

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

Source: ComEd tracking data and evaluation team analysis

Table 5-3. Energy Savings by Measure – Gas

End Use Type	Research Category	Ex Ante Gross Savings	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)	EUL (years)
Process Equipment	Process Equipment Setpoints	0	N/A	0	0.94	0	3.5
HVAC	HVAC System Controls	16,744	1.00	16,744	0.94	15,739	4.8
Process Equipment	Hot Water Control	30	1.00	30	0.94	28	4.2
Air Compressor	Reduced Compressor Pressure	0	N/A	0	0.94	0	3.6
HVAC	Manual HVAC Temp Adjustments	0	N/A	0	0.94	0	4.0
HVAC	HVAC Maintenance	0	N/A	0	0.94	0	2.8
Air Compressor	Air Compressor Other	0	N/A	0	0.94	0	3.0
Lighting	Manual Light Controls	0	N/A	0	0.94	0	2.5
HVAC	Heater Control	0	N/A	0	0.94	0	2.0
Process Equipment	Manual On/Off Process Controls	0	N/A	0	0.94	0	2.0
Plug Load	Computer Power Controls	0	N/A	0	0.94	0	3.0
Lighting	Photocell Repair	0	N/A	0	0.94	0	2.5
Air Compressor	Compressor Air Leaks	0	N/A	0	0.94	0	3.0
HVAC	Server Closest HVAC Setpoint	0	N/A	0	0.94	0	5.1
Plug Load	Turn Off TV	0	N/A	0	0.94	0	3.0
	Total Therms	**16,774**	**1.00**	**16,774**		**15,768**	
	Total kWh Converted From Therms†	**491,646**	**1.00**	**491,646**		**462,147**	

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).

Source: ComEd tracking data and evaluation team analysis

Table 5-4. 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)
Process Equipment	Process Equipment Setpoints	957,634	0.88	843,703	0.94	793,081
HVAC	HVAC System Controls	1,410,529	0.92	1,301,104	0.94	1,223,038
Process Equipment	Hot Water Control	205,718	0.88	181,348	0.94	170,467
Air Compressor	Reduced Compressor Pressure	115,407	0.88	101,677	0.94	95,576
HVAC	Manual HVAC Temp Adjustments	113,306	0.88	99,826	0.94	93,836
HVAC	HVAC Maintenance	90,060	0.88	79,345	0.94	74,585
Air Compressor	Air Compressor Other	71,474	0.88	62,971	0.94	59,192
Lighting	Manual Light Controls	64,443	0.88	56,776	0.94	53,370
HVAC	Heater Control	29,086	0.88	25,626	0.94	24,088
Process Equipment	Manual On/Off Process Controls	26,813	0.88	23,623	0.94	22,206
Plug Load	Computer Power Controls	19,198	0.88	16,914	0.94	15,899
Lighting	Photocell Repair	17,356	0.88	15,291	0.94	14,374
Air Compressor	Compressor Air Leaks	13,473	0.88	11,870	0.94	11,158
HVAC	Server Closest HVAC Setpoint	11,861	0.88	10,450	0.94	9,823
Plug Load	Turn Off TV	383	0.88	338	0.94	317
	Total†	**3,146,741**	**0.90**	**2,830,862**		**2,661,010**

* 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.
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 additional data available for the evaluation team for one large strata project and an incorrect fan speed assumption for another large strata project.

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

6.1 Overall Program Results

Finding 1. The FA Program has an overall verified gross realization rate of 0.90 and an electric-only realization rate of 0.88, which are driven largely by lower savings verified for large strata projects. The small and medium strata projects had strata-level realization rates of 0.96 and 1.00, respectively. Large strata projects had a strata-level realization rate of 0.78.

> **Recommendation 1.** Require additional supporting data collection for larger projects (100,000 kWh) or include them in the Custom Program. Additional supporting data could include pre- and post-trend data, onsite measurements, and annual operation information for relevant parameters to inform savings calculations.

6.2 Program Tracking

Finding 2. The program tracking system had limited measure descriptions. All measures were labeled as Operational Savings, Operational Savings – Custom, or Operational Savings – Standard. Because not all measures in the final tracking data included notes, the evaluation team had difficulty categorizing measures.

> **Recommendation 2.** Include detailed measure descriptions in the tracking system to help identify and categorize measures more accurately.

Finding 3. FA measures with similar names in the notes were reported to have different measure lives in the tracking data. This may be a result of the limited measure descriptions and lack of measure categorization in the program tracking system. The evaluation team used an average of the EUL for each measure category resulting in fractional EUL for measures as reported in the previous tables.

> **Recommendation 3.** Use the same EUL for measures of the same type.

6.3 Project-Specific Findings

Finding 4. Project FACA-41329, Reduce Aeration Air Flow, with ex ante savings of 333,283 kWh, represented 12% of the FA Program's overall savings. The ex ante calculations used a fan curve for a throttle type control and an estimated minimum fan flow based on information collected by the implementer during its initial onsite visit. The evaluation-verified calculations used the annual operation data based on additional data provided by the implementer that indicated fan usage throughout the year to identify and update the annual minimum fan flow. This updated minimum fan flow resulted in a project realization rate of 0.31.

Recommendation 4. If possible, the program should use trend data to estimate system operation before and after installation. Extra effort, such as collecting post-installation trend data, should be considered for projects above 100,000 kWh.

Finding 5. Project FACA-41375, HVAC System Controls, with ex ante savings of 214,449 kWh, represented 8% of the FA Program's overall savings. The ex ante calculations stated "Engineer confirmed that the lowest fan speed seen was 40-50% for a single pump during early November. Keeping upper band value as a conservative estimate." The evaluation team noted that using the upper band of 50% fan speed resulted in higher savings and updated the verified calculations to use a more conservative 40% fan speed assumption.

Recommendation 5. Check the impact of assumptions on project savings, especially for projects where parameter assumptions are made to be conservative.

Finding 6. Project FACA-41372, Adjust Space Thermostat Setpoint, with ex ante savings of 18,005 kWh, represented less than 1% of the FA Program's overall savings. The ex ante calculations used the heater capacity (in watts), a 75% load factor, and effective full load hours to estimate heating load. The evaluation-verified calculations used the system load and heating seasonal performance factor (HSPF) of 3.41 corresponding to an electric resistance heating system to estimate the heating load as per the Illinois Technical Reference Manual v9.0 (IL-TRM),[2] Section 4.4.48. This resulted in a project realization rate of 0.81.

Recommendation 6. When using the IL-TRM to estimate savings, follow the IL-TRM as closely as possible. Exceptions could include specific actual equipment information, values for parameters that the IL-TRM does not cover or availability of site-specific hours that differ from the IL-TRM standard operating hours.

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

Appendix A. Impact Analysis Methodology

Guidehouse selected a sample of projects from the tracking data to calculate verified savings with a target of 10% precision at 90% confidence. The evaluation team developed the sample using strata based on the size of the energy efficiency projects installed, as Table A-1 shows. The large stratum was selected to include projects with ex ante savings greater than 100,000 kWh as the evaluation team determined that this is a reasonable cutoff point to move projects to the Custom Program as discussed in finding 1 above. The medium stratum size was selected to be from 25,001 kWh to 100,000 kWh to represent around 1/3rd of the total program ex ante savings and represented 34% of the program savings.

Table A-1. FA Program Sample Details

Strata	Population Quantity	Sample Quantity	Average Savings of Installed Measures (kWh)
Small (0 kWh-25,000 kWh)	59	6	6,891
Medium (25,001 kWh-100,000 kWh)	16	7	56,085
Large (100,001+ kWh)	6	6	225,194

Source: ComEd tracking data and evaluation team analysis

The evaluation team requested the documentation associated with the sampled projects for review. Guidehouse determined final verified savings through a detailed review of the sampled projects. The evaluation team developed realization rates for each stratum from the verified savings, and this strata realization rate was weighted against the total savings in each stratum to come up with a final program realization rate.

In CY2021, program data was collected over the course of the year in two evaluation waves. Evaluation of the initial wave one projects was completed in November 2021. The final wave evaluation was completed in February 2021.

ComEd provided several key program documents for this program:

- **Tracking data:** This information provided ex ante savings and a detailed customer interaction log regarding each claimed measure.
- **Facility assessment report, final customer call log, and supporting calculations:** This documentation included the measure identified during the site visit and the estimated savings for each recommended measure.

Appendix B. Impact Findings Detailed Results

B.1 Savings by Stratum

The FA Program sample consisted of 19 sites across three strata. The following tables provide the ex ante and verified energy and gas savings for each strata. The evaluation achieved a relative precision of 9.2% for electric savings.

Table B-1. Energy Savings by Strata

Sample Strata	Sample Size	Ex ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
Small	6	406,570	0.96	390,817	0.94	367,368
Medium	7	897,359	1.00	897,359	0.94	843,518
Large	6	1,351,166	0.78	1,051,039	0.94	987,977
CY2021 Total	**19**	**2,655,095**	**0.88**	**2,339,216**	**0.94**	**2,198,863**

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

Source: ComEd tracking data and evaluation team analysis

Table B-2. Gas Savings by Strata

Sample Strata	Sample Size	Ex ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)
Small	6	9,686	1.00	9,686	0.94	9,105
Medium	7	7,088	1.00	7,088	0.94	6,663
Large	6	0	N/A	0	0.94	0
CY2021 Total	**19**	**16,774**	**1.00**	**16,774**	**0.94**	**15,768**

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**.

Source: ComEd tracking data and evaluation team analysis

B.2 Savings by Project

The following tables show the verified energy and gas savings for each sampled project.

Table B-3. CY2021 Energy Savings by Project

Evaluation Site ID	Sample Strata	Ex ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
FACA-41329	Large	333,283	0.31	101,666	0.94	95,566
FACA-41355	Large	132,265	1.00	132,265	0.94	124,329
FACA-41357	Large	128,481	1.00	128,481	0.94	120,772
FACA-41339	Medium	27,979	1.00	27,979	0.94	26,300
FACA-41351	Medium	56,686	1.00	56,686	0.94	53,285
FACA-41311	Medium	87,762	1.00	87,762	0.94	82,496
FACA-41350	Medium	31,211	1.00	31,211	0.94	29,338
FACA-41348	Small	634	1.00	634	0.94	596
FACA-41362	Small	22,143	1.00	22,143	0.94	20,814
FACA-41326	Small	15,574	1.00	15,574	0.94	14,640
FACA-41363	Medium	60,594	1.00	60,594	0.94	56,958
FACA-41366	Small	16,482	1.00	16,482	0.94	15,493
FACA-41372	Small	18,005	0.81	14,517	0.94	13,646
FACA-41375	Large	214,449	0.78	167,819	0.94	157,750
FACA-41377	Small	17,179	1.00	17,179	0.94	16,148
FACA-41379	Medium	88,247	1.00	88,247	0.94	82,952
FACA-41380	Medium	65,602	1.00	65,602	0.94	61,666
FACA-41381	Large	299,388	1.00	299,388	0.94	281,425
FACA-41382	Large	144,796	1.00	144,796	0.94	136,108

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

Source: ComEd tracking data and evaluation team analysis

Table B-4. CY2021 Gas Savings by Project

Evaluation Site ID	Sample Strata	Ex ante Gross Savings (Therms)	Verified Gross Realization Rate	Verified Gross Savings (Therms)	NTG*	Verified Net Savings (Therms)
FACA-41329	Large	0	N/A	0	0.94	0
FACA-41355	Large	0	N/A	0	0.94	0
FACA-41357	Large	0	N/A	0	0.94	0
FACA-41339	Medium	6,088	1.00	6,088	0.94	5,723
FACA-41351	Medium	1,000	1.00	1,000	0.94	940
FACA-41311	Medium	0	N/A	0	0.94	0
FACA-41350	Medium	0	N/A	0	0.94	0
FACA-41348	Small	849	1.00	849	0.94	798
FACA-41362	Small	103	1.00	103	0.94	97
FACA-41326	Small	0	N/A	0	0.94	0
FACA-41363	Medium	0	N/A	0	0.94	0
FACA-41366	Small	0	N/A	0	0.94	0
FACA-41372	Small	0	N/A	0	0.94	0
FACA-41375	Large	0	N/A	0	0.94	0
FACA-41377	Small	0	N/A	0	0.94	0
FACA-41379	Medium	0	N/A	0	0.94	0
FACA-41380	Medium	0	N/A	0	0.94	0
FACA-41381	Large	0	N/A	0	0.94	0
FACA-41382	Large	0	N/A	0	0.94	0

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**.

Source: ComEd tracking data and evaluation team analysis

Appendix C. Total Resource Cost Detail

Table C-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 C-1. Total Resource Cost Savings Summary

End Use Type	Research Category	Units	Quantity	EUL (years)*	ER Flag†	Gross Electric Energy Savings (kWh)	Gross Peak Demand Reduction (kW)	Gross Gas Savings (Therms)	Gross Secondary Savings due to Water Reduction (kWh)	Gross Heating Penalty (kWh)	Gross Heating Penalty (Therms)	NTG (kWh)	NTG (kW)	NTG (Therms)	Net Electric Energy Savings (kWh)	Net Peak Demand Reduction (kW)	Net Gas Savings (Therms)	Net Secondary Savings due to Water Reduction (kWh)	Net Heating Penalty (kWh)	Net Heating Penalty (Therms)
Process Equipment	Process Equipment Setpoints	Each	4	3.5	NO	843,703	0	0	0	0	0	0.94	0.94	0.94	793,081	0.00	0	0	0	0
HVAC	HVAC System Controls	Each	28	4.8	NO	810,337	0	16,744	0	0	0	0.94	0.94	0.94	761,717	0.00	15,739	0	0	0
Process Equipment	Hot Water Control	Each	5	4.2	NO	180,469	0	30	0	0	0	0.94	0.94	0.94	169,641	0.00	28	0	0	0
Air Compressor	Reduced Compressor Pressure	Each	5	3.6	NO	101,677	0	0	0	0	0	0.94	0.94	0.94	95,576	0.00	0	0	0	0
HVAC	Manual HVAC Temp Adjustments	Each	4	4.0	NO	99,826	0	0	0	0	0	0.94	0.94	0.94	93,836	0.00	0	0	0	0
HVAC	HVAC Maintenance	Each	4	2.8	NO	79,345	0	0	0	0	0	0.94	0.94	0.94	74,585	0.00	0	0	0	0
Air Compressor	Air Compressor Other	Each	3	3.0	NO	62,971	0	0	0	0	0	0.94	0.94	0.94	59,192	0.00	0	0	0	0
Lighting	Manual Light Controls	Each	6	2.5	NO	56,776	0	0	0	0	0	0.94	0.94	0.94	53,370	0.00	0	0	0	0
HVAC	Heater Control	Each	1	2.0	NO	25,626	0	0	0	0	0	0.94	0.94	0.94	24,088	0.00	0	0	0	0
Process Equipment	Manual On/Off Process Controls	Each	5	2.0	NO	23,623	0	0	0	0	0	0.94	0.94	0.94	22,206	0.00	0	0	0	0
Plug Load	Computer Power Controls	Each	3	3.0	NO	16,914	0	0	0	0	0	0.94	0.94	0.94	15,899	0.00	0	0	0	0
Lighting	Photocell Repair	Each	2	2.5	NO	15,291	0	0	0	0	0	0.94	0.94	0.94	14,374	0.00	0	0	0	0
Air Compressor	Compressor Air Leaks	Each	2	3.0	NO	11,870	0	0	0	0	0	0.94	0.94	0.94	11,158	0.00	0	0	0	0
HVAC	Server Closest HVAC Setpoint	Each	8	5.1	NO	10,450	0	0	0	0	0	0.94	0.94	0.94	9,823	0.00	0	0	0	0
Plug Load	Turn Off TV	Each	1	3.0	NO	338	0	0	0	0	0	0.94	0.94	0.94	317	0.00	0	0	0	0
	Total			**3.9**		**2,339,216**	**0**	**16,774**	**0**	**0**	**0**				**2,198,863**	**0**	**15,768**	**0**	**0**	**0**

* 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.

Source: ComEd tracking data and evaluation team analysis