



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

Energy Efficiency / Demand Response Plan:  
Program Year 2018 (CY2018)  
(1/1/2018-12/31/2018)

Presented to  
ComEd

DRAFT

March 12, 2019

**Prepared by:**

Sagar Deo  
Navigant

Sagar Phalke  
Navigant



**Submitted to:**

ComEd  
Three Lincoln Centre  
Oakbrook Terrace, IL 60181

**Submitted by:**

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

**Contact:**

Randy Gunn, Managing Director 312.583.5714 Randy.Gunn@Navigant.com	Jeff Erickson, Director 608.497.2322 Jeff.Erickson@Navigant.Com	Chelsea Lamar, Managing Consultant 312.583.2673 Chelsea.Lamar@Navigant.com
--	---	--

Disclaimer: This report was prepared by Navigant Consulting, Inc. ("Navigant") for ComEd based upon information provided by ComEd and from other sources. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report's contents. Neither Navigant nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

## TABLE OF CONTENTS

1. Introduction .....	1
2. Program Description .....	1
3. Program Savings Detail .....	2
4. Cumulative Persisting Annual Savings .....	3
5. Program Savings by Measure .....	11
6. Impact Analysis Findings and Recommendations .....	15
6.1 Impact Parameter Estimates .....	15
6.2 Other Impact Findings and Recommendations .....	16
7. Appendix 1. Impact Analysis Methodology .....	17
8. Appendix 2. Impact Analysis Detail .....	17
9. Appendix 3. Total Resource Cost Detail .....	20

## LIST OF TABLES AND FIGURES

Figure 2-1. Number of Measures Installed by Type .....	2
Figure 4-1. Cumulative Persisting Annual Savings .....	11
Table 2-1. CY2018 Volumetric Findings Detail .....	1
Table 3-1. CY2018 Total Annual Incremental Electric Savings .....	3
Table 4-1. Cumulative Persisting Annual Savings (CPAS) – Electric .....	4
Table 4-2. Cumulative Persisting Annual Savings (CPAS) – Gas .....	6
Table 4-3. Cumulative Persisting Annual Savings (CPAS) – Total .....	9
Table 5-1. CY2018 Energy Savings by Measure – Electric .....	12
Table 5-2. CY2018 Demand Savings by Measure .....	12
Table 5-3. CY2018 Summer Peak Demand Savings by Measure .....	13
Table 5-4. CY2018 Energy Savings by Measure – Gas .....	14
Table 5-5. CY2018 Energy Savings by Measure – Total Combining Electricity and Gas .....	15
Table 6-1. Savings Parameters .....	16
Table 9-1. Total Resource Cost Savings Summary .....	20

## 1. INTRODUCTION

This report presents the results of the impact evaluation of ComEd’s CY2018 Income Eligible Retrofits Multi-Family Program. It presents a summary of the energy and demand impacts for the total program and broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology. CY2018 covers January 1, 2018 through December 31, 2018.

## 2. PROGRAM DESCRIPTION

The Income Eligible Retrofits Multi-Family (IER-MF) Program offers direct installation of energy efficiency measures and replacement of inefficient equipment as well as educational information to further save money on energy bills. Eligible measures include LED and energy efficient lighting retrofits, programmable thermostats, advanced power strips, water efficiency devices, weatherization measures, pipe insulation, and heating, cooling and refrigeration equipment.

The IER-MF Program is jointly administered by ComEd, Peoples Gas (PGL) and North Shore Gas (NSG) companies, and Nicor Gas. The program is implemented by Resource Innovations (RI) and leverages the Illinois Home Weatherization Assistance Program (IHWAP). The program provides retrofits in both common areas (CA) and tenant spaces and serves as a “one stop shop” for multi-family building owners and managers whose buildings are targeted to income eligible residents.

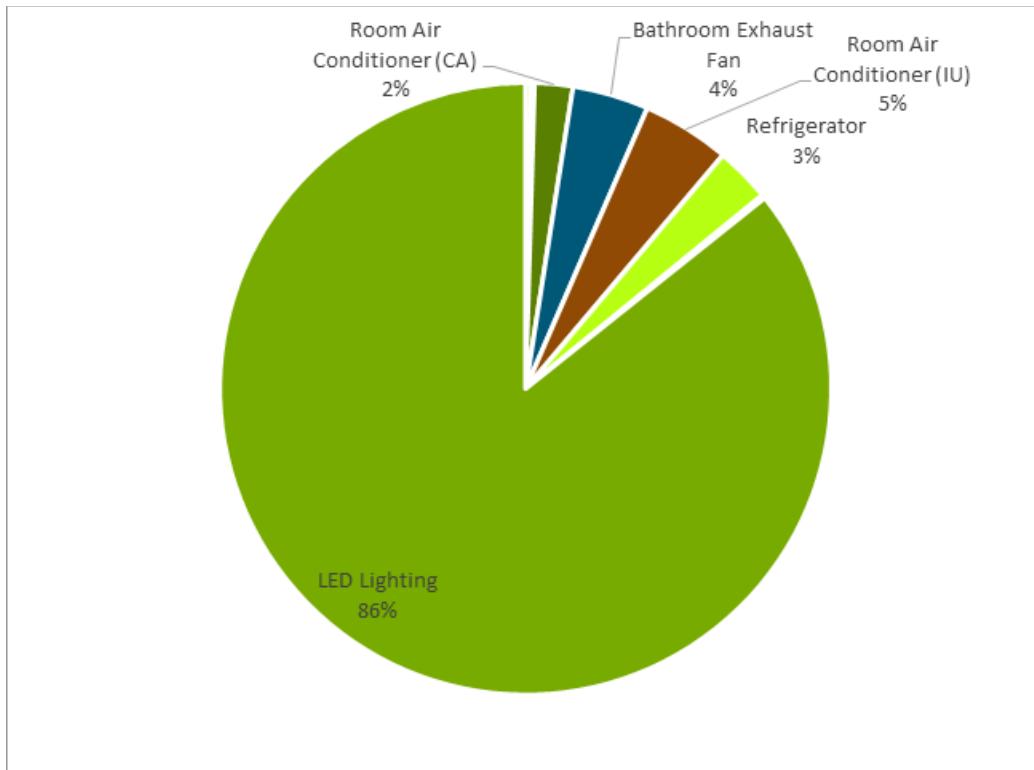
The program had 27 participants in CY2018 and distributed 4,710 measures, as shown in the following table and graph. LED bulbs comprised of 86% of the measure mix, followed by room air conditioner (IU), which contributed 5% of the total measures. Bathroom exhaust fans represented 4% of the measures installed while the remaining 5% comprised of refrigerators, room air conditioners (AC), heat pumps, air sealing, packaged terminal air conditioners (PTAC) or packaged terminal heat pumps (PTHP), attic insulation and custom measures.

**Table 2-1. CY2018 Volumetric Findings Detail**

Participation	Resource Innovation
Participants*	27
Total Measures	4,710
Installed Projects	27

\*Participants comprise of distinct property addresses (including apartment numbers)  
Source: ComEd tracking data and Navigant team analysis.

Figure 2-1. Number of Measures Installed by Type



Source: ComEd tracking data and Navigant team analysis

### 3. PROGRAM SAVINGS DETAIL

Table 3-1 summarizes the incremental energy and demand savings the IER-MF Program achieved in CY2018. The gas savings are only those that the gas utilities are not claiming and ComEd can claim.<sup>1</sup>

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

**Table 3-1. CY2018 Total Annual Incremental Electric Savings**

Savings Category	Energy Savings (kWh)	Demand Savings (kW)	Summer Peak Demand Savings (kW)
<b>Electricity</b>			
Ex Ante Gross Savings	475,290	NA	66.78
Program Gross Realization Rate	0.99	NA	0.99
Verified Gross Savings	469,616	334.24	66.19
Program Net-to-Gross Ratio (NTG)	1.00	1.00	1.00
Verified Net Savings	469,616	334.24	66.19
<b>Converted from Gas*</b>			
Ex Ante Gross Savings	88,835	NA	NA
Program Gross Realization Rate	0.91	NA	NA
Verified Gross Savings	80,405	NA	NA
Program Net-to-Gross Ratio (NTG)	1.00	NA	NA
Verified Net Savings	80,405	NA	NA
<b>Total Electric Plus Gas</b>			
Ex Ante Gross Savings	564,124	NA	66.78
Program Gross Realization Rate	0.98	NA	0.99
Verified Gross Savings	550,021	334.24	66.19
Program Net-to-Gross Ratio (NTG)	1.00	1.00	1.00
Verified Net Savings	550,021	334.24	66.19

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

NA = Not Available

Note: The coincident Summer Peak period is defined as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, June through August.

Source: ComEd tracking data and Navigant team analysis.

## 4. CUMULATIVE PERSISTING ANNUAL SAVINGS

The measure-specific and total verified gross savings for the IER-MF Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 are shown in the following tables and figure.

The total electric CPAS across all measures installed as a part of the program in CY2018 is 469,616 kWh. The program achieved 80,405 kWh CPAS equivalent of gas savings converted to electricity that might be counted toward ComEd’s goal<sup>2</sup> (the middle table in the following set of tables). Adding the savings converted from gas savings to the electric savings produces a total of 550,021 kWh of total CPAS.

Navigant applied the Illinois Technical Reference Manual version 6.0 (IL TRM v6.0) deemed Energy Independence and Security Act (EISA) baseline adjustment for LED lamps starting in 2021 and respective baseline shifts for early replacement measures. The EISA baseline shift only applies to LED omnidirectional bulbs.

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

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

End Use Type	Research Category	EUL	CY2018 Verified Gross Savings	NTG*	Lifetime Net Savings†	Verified Net kWh Savings									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	
Shell	Air Sealing	15.0	0	1.00	-	-	-	-	-	-	-	-	-	-	
HVAC	Heat Pump	15.0	7,043	1.00	105,651	7,043	7,043	7,043	7,043	7,043	7,043	7,043	7,043	7,043	
HVAC	PTAC/PTHP	15.0	13,319	1.00	89,237	13,319	13,319	13,319	13,319	13,319	2,264	2,264	2,264	2,264	
HVAC	Room Air Conditioner (CA)	9.0	3,196	1.00	28,763	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196	
HVAC	Bathroom Exhaust Fan	19.0	16,830	1.00	319,773	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830	
Appliance	Room Air Conditioner (IU)	12.0	22,316	1.00	119,672	22,316	22,316	22,316	22,316	3,801	3,801	3,801	3,801	3,801	
Appliance	Refrigerator	12.0	57,560	1.00	279,146	57,560	57,560	57,560	57,560	6,113	6,113	6,113	6,113	6,113	
Custom	Custom	15.0	196,610	1.00	2,949,152	196,610	196,610	196,610	196,610	196,610	196,610	196,610	196,610	196,610	
Shell	Attic Insulation	25.0	1,934	1.00	48,359	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934	
Lighting	LED Indoor Specialty	10.0	9,089	1.00	90,895	9,089	9,089	9,089	9,089	9,089	9,089	9,089	9,089	9,089	
Lighting	LED Indoor Standard	10.0	4,441	1.00	44,410	4,441	4,441	4,441	4,441	4,441	4,441	4,441	4,441	4,441	
Lighting	LED Indoor Standard (Incandescent)	10.0	132,528	1.00	648,989	132,528	132,528	132,528	35,915	35,915	35,915	35,915	35,915	35,915	
Lighting	LED Outdoor Standard	6.1	4,749	1.00	28,966	4,749	4,749	4,749	4,749	4,749	475				
<b>CY2018 Program Total Electric CPAS</b>			<b>469,616</b>		<b>4,753,012</b>	<b>469,616</b>	<b>469,616</b>	<b>469,616</b>	<b>373,003</b>	<b>303,042</b>	<b>291,986</b>	<b>287,713</b>	<b>287,238</b>	<b>287,238</b>	
<b>CY2018 Program Expiring Electric Savings‡</b>									<b>96,613</b>	<b>166,575</b>	<b>177,630</b>	<b>181,904</b>	<b>182,379</b>	<b>182,379</b>	

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Shell	Air Sealing	-	-	-	-	-	-						
HVAC	Heat Pump	7,043	7,043	7,043	7,043	7,043	7,043						
HVAC	PTAC/PTHP	2,264	2,264	2,264	2,264	2,264	2,264						
HVAC	Room Air Conditioner (CA)												
HVAC	Bathroom Exhaust Fan	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830		
Appliance	Room Air Conditioner (IU)	3,801	3,801	3,801									
Appliance	Refrigerator	6,113	6,113	6,113									
Custom	Custom	196,610	196,610	196,610	196,610	196,610	196,610						
Shell	Attic Insulation	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934	1,934
Lighting	LED Indoor Specialty	9,089											
Lighting	LED Indoor Standard	4,441											
Lighting	LED Indoor Standard (Incandescent)	35,915											
Lighting	LED Outdoor Standard												
<b>CY2018 Program Total Electric CPAS</b>		<b>284,042</b>	<b>234,596</b>	<b>234,596</b>	<b>224,682</b>	<b>224,682</b>	<b>224,682</b>	<b>18,765</b>	<b>18,765</b>	<b>18,765</b>	<b>18,765</b>	<b>1,934</b>	<b>1,934</b>
<b>CY2018 Program Expiring Electric Savings‡</b>		<b>185,574</b>	<b>235,020</b>	<b>235,020</b>	<b>244,934</b>	<b>244,934</b>	<b>244,934</b>	<b>450,852</b>	<b>450,852</b>	<b>450,852</b>	<b>450,852</b>	<b>467,682</b>	<b>467,682</b>

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shell	Air Sealing												
HVAC	Heat Pump												
HVAC	PTAC/PTHP												
HVAC	Room Air Conditioner (CA)												
HVAC	Bathroom Exhaust Fan												
Appliance	Room Air Conditioner (IU)												
Appliance	Refrigerator												
Custom	Custom												
Shell	Attic Insulation	1,934	1,934	1,934	1,934								
Lighting	LED Indoor Specialty												
Lighting	LED Indoor Standard												
Lighting	LED Indoor Standard (Incandescent)												
Lighting	LED Outdoor Standard												
<b>CY2018 Program Total Electric CPAS</b>		<b>1,934</b>	<b>1,934</b>	<b>1,934</b>	<b>1,934</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>CY2018 Program Expiring Electric Savings‡</b>		<b>467,682</b>	<b>467,682</b>	<b>467,682</b>	<b>467,682</b>	<b>469,616</b>	<b>469,616</b>	<b>469,616</b>	<b>469,616</b>	<b>469,616</b>	<b>469,616</b>	<b>469,616</b>	<b>469,616</b>

Note: The green highlighted cell shows program total first year electric savings.

\* A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

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

‡ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.

Source: Navigant analysis



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

End Use Type	Research Category	EUL	CY2018 Verified Gross Savings (Therms)	NTG*	Lifetime Net Savings†	Verified Net Therms Savings									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	
Shell	Air Sealing	15.0	1,907.5	1.0	28,613	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	
HVAC	Heat Pump	15.0	-	1.0	-										
HVAC	PTAC/PTHP	15.0	-	1.0	-										
HVAC	Room Air Conditioner (CA)	9.0	-	1.0	-										
HVAC	Bathroom Exhaust Fan	19.0	-	1.0	-										
Appliance	Room Air Conditioner (IU)	12.0	-	1.0	-										
Appliance	Refrigerator	12.0	-	1.0	-										
Custom	Custom	15.0	-	1.0	-										
Shell	Attic Insulation	25.0	835.7	1.0	20,893	836	836	836	836	836	836	836	836	836	
Lighting	LED Indoor Specialty	10.0	-	1.0	-										
Lighting	LED Indoor Standard	10.0	-	1.0	-										
Lighting	LED Indoor Standard (Incandescent)	10.0	-	1.0	-										
Lighting	LED Outdoor Standard	6.1	-	1.0	-										
<b>CY2018 Program Total Gas CPAS (Therms)</b>			<b>2,743</b>		<b>49,506</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	
<b>CY2018 Program Total Gas CPAS (kWh Equivalent)‡</b>					<b>1,451,033</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	
<b>CY2018 Program Expiring Gas Savings (Therms)§</b>							-	-	-	-	-	-	-	-	
<b>CY2018 Program Expiring Gas Savings (kWh Equivalent)‡§</b>							-	-	-	-	-	-	-	-	

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Shell	Air Sealing	1,908	1,908	1,908	1,908	1,908	1,908						
HVAC	Heat Pump												
HVAC	PTAC/PTHP												
HVAC	Room Air Conditioner (CA)												
HVAC	Bathroom Exhaust Fan												
Appliance	Room Air Conditioner (IU)												
Appliance	Refrigerator												
Custom	Custom												
Shell	Attic Insulation	836	836	836	836	836	836	836	836	836	836	836	836
Lighting	LED Indoor Specialty												
Lighting	LED Indoor Standard												
Lighting	LED Indoor Standard (Incandescent)												
Lighting	LED Outdoor Standard												
<b>CY2018 Program Total Gas CPAS (Therms)</b>		<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>836</b>	<b>836</b>	<b>836</b>	<b>836</b>	<b>836</b>	<b>836</b>
<b>CY2018 Program Total Gas CPAS (kWh Equivalent)‡</b>		<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>24,495</b>	<b>24,495</b>	<b>24,495</b>	<b>24,495</b>	<b>24,495</b>	<b>24,495</b>
<b>CY2018 Program Expiring Gas Savings (Therms)§</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,908</b>	<b>1,908</b>	<b>1,908</b>	<b>1,908</b>	<b>1,908</b>	<b>1,908</b>
<b>CY2018 Program Expiring Gas Savings (kWh Equivalent)‡§</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>55,910</b>	<b>55,910</b>	<b>55,910</b>	<b>55,910</b>	<b>55,910</b>	<b>55,910</b>

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shell	Air Sealing												
HVAC	Heat Pump												
HVAC	PTAC/PTHP												
HVAC	Room Air Conditioner (CA)												
HVAC	Bathroom Exhaust Fan												
Appliance	Room Air Conditioner (IU)												
Appliance	Refrigerator												
Custom	Custom												
Shell	Attic Insulation	836	836	836	836								
Lighting	LED Indoor Specialty												
Lighting	LED Indoor Standard												
Lighting	LED Indoor Standard (Incandescent)												
Lighting	LED Outdoor Standard												
<b>CY2018 Program Total Gas CPAS (Therms)</b>		<b>836</b>	<b>836</b>	<b>836</b>	<b>836</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>CY2018 Program Total Gas CPAS (kWh Equivalent)†</b>		<b>24,495</b>	<b>24,495</b>	<b>24,495</b>	<b>24,495</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>CY2018 Program Expiring Gas Savings (Therms)§</b>		<b>1,908</b>	<b>1,908</b>	<b>1,908</b>	<b>1,908</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>	<b>2,743</b>
<b>CY2018 Program Expiring Gas Savings (kWh Equivalent)†§</b>		<b>55,910</b>	<b>55,910</b>	<b>55,910</b>	<b>55,910</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>	<b>80,405</b>

Note: The green highlighted cell shows program total first year gas savings in kWh equivalents.

\* A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

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

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

§ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.

Source: Navigant analysis

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

End Use Type	Research Category	EUL	CY2018 Verified		LifETIME Net Savings†	Verified Net kWh Savings (Including Those Converted from Gas Savings)										
			Gross Savings	NTG*		2018	2019	2020	2021	2022	2023	2024	2025	2026		
Shell	Air Sealing	15.0	55,909.8	1.0	838,647	55,910	55,910	55,910	55,910	55,910	55,910	55,910	55,910	55,910		
HVAC	Heat Pump	15.0	7,043.4	1.0	105,651	7,043	7,043	7,043	7,043	7,043	7,043	7,043	7,043	7,043		
HVAC	PTAC/PTHP	15.0	13,319.4	1.0	89,237	13,319	13,319	13,319	13,319	13,319	2,264	2,264	2,264	2,264		
HVAC	Room Air Conditioner (CA)	9.0	3,195.9	1.0	28,763	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196		
HVAC	Bathroom Exhaust Fan	19.0	16,830.2	1.0	319,773	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830		
Appliance	Room Air Conditioner (IU)	12.0	22,316.3	1.0	119,672	22,316	22,316	22,316	22,316	3,801	3,801	3,801	3,801	3,801		
Appliance	Refrigerator	12.0	57,559.8	1.0	279,146	57,560	57,560	57,560	57,560	6,113	6,113	6,113	6,113	6,113		
Custom	Custom	15.0	196,610.1	1.0	2,949,152	196,610	196,610	196,610	196,610	196,610	196,610	196,610	196,610	196,610		
Shell	Attic Insulation	25.0	26,429.8	1.0	660,745	26,430	26,430	26,430	26,430	26,430	26,430	26,430	26,430	26,430		
Lighting	LED Indoor Specialty	10.0	9,089.5	1.0	90,895	9,089	9,089	9,089	9,089	9,089	9,089	9,089	9,089	9,089		
Lighting	LED Indoor Standard	10.0	4,441.0	1.0	44,410	4,441	4,441	4,441	4,441	4,441	4,441	4,441	4,441	4,441		
Lighting	LED Indoor Standard (Incandescent)	10.0	132,527.9	1.0	648,989	132,528	132,528	132,528	35,915	35,915	35,915	35,915	35,915	35,915		
Lighting	LED Outdoor Standard	6	4,749	1.0	28,966	4,749	4,749	4,749	4,749	4,749	4,749	475				
<b>CY2018 Program Total CPAS</b>			<b>550,021</b>		<b>6,204,045</b>	<b>550,021</b>	<b>550,021</b>	<b>550,021</b>	<b>453,409</b>	<b>383,447</b>	<b>372,391</b>	<b>368,118</b>	<b>367,643</b>	<b>367,643</b>		
<b>CY2018 Program Expiring Savings‡</b>									<b>96,613</b>	<b>166,575</b>	<b>177,630</b>	<b>181,904</b>	<b>182,379</b>	<b>182,379</b>		

End Use Type	Research Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Shell	Air Sealing	55,910	55,910	55,910	55,910	55,910	55,910						
HVAC	Heat Pump	7,043	7,043	7,043	7,043	7,043	7,043						
HVAC	PTAC/PTHP	2,264	2,264	2,264	2,264	2,264	2,264						
HVAC	Room Air Conditioner (CA)												
HVAC	Bathroom Exhaust Fan	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830	16,830		
Appliance	Room Air Conditioner (IU)	3,801	3,801	3,801									
Appliance	Refrigerator	6,113	6,113	6,113									
Custom	Custom	196,610	196,610	196,610	196,610	196,610	196,610						
Shell	Attic Insulation	26,430	26,430	26,430	26,430	26,430	26,430	26,430	26,430	26,430	26,430	26,430	26,430
Lighting	LED Indoor Specialty	9,089											
Lighting	LED Indoor Standard	4,441											
Lighting	LED Indoor Standard (Incandescent)	35,915											
Lighting	LED Outdoor Standard												
<b>CY2018 Program Total CPAS</b>		<b>364,447</b>	<b>315,002</b>	<b>315,002</b>	<b>305,087</b>	<b>305,087</b>	<b>305,087</b>	<b>43,260</b>	<b>43,260</b>	<b>43,260</b>	<b>43,260</b>	<b>26,430</b>	<b>26,430</b>
<b>CY2018 Program Expiring Savings‡</b>		<b>185,574</b>	<b>235,020</b>	<b>235,020</b>	<b>244,934</b>	<b>244,934</b>	<b>244,934</b>	<b>506,762</b>	<b>506,762</b>	<b>506,762</b>	<b>506,762</b>	<b>523,592</b>	<b>523,592</b>

End Use Type	Research Category	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Shell	Air Sealing												
HVAC	Heat Pump												
HVAC	PTAC/PTHP												
HVAC	Room Air Conditioner (CA)												
HVAC	Bathroom Exhaust Fan												
Appliance	Room Air Conditioner (IU)												
Appliance	Refrigerator												
Custom	Custom												
Shell	Attic Insulation	26,430	26,430	26,430	26,430								
Lighting	LED Indoor Specialty												
Lighting	LED Indoor Standard												
Lighting	LED Indoor Standard (Incandescent)												
Lighting	LED Outdoor Standard												
<b>CY2018 Program Total CPAS</b>		<b>26,430</b>	<b>26,430</b>	<b>26,430</b>	<b>26,430</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>CY2018 Program Expiring Savings‡</b>		<b>523,592</b>	<b>523,592</b>	<b>523,592</b>	<b>523,592</b>	<b>550,021</b>	<b>550,021</b>	<b>550,021</b>	<b>550,021</b>	<b>550,021</b>	<b>550,021</b>	<b>550,021</b>	<b>550,021</b>

Note: The green highlighted cell shows program total first year electric savings (including direct electric savings and those converted from gas).

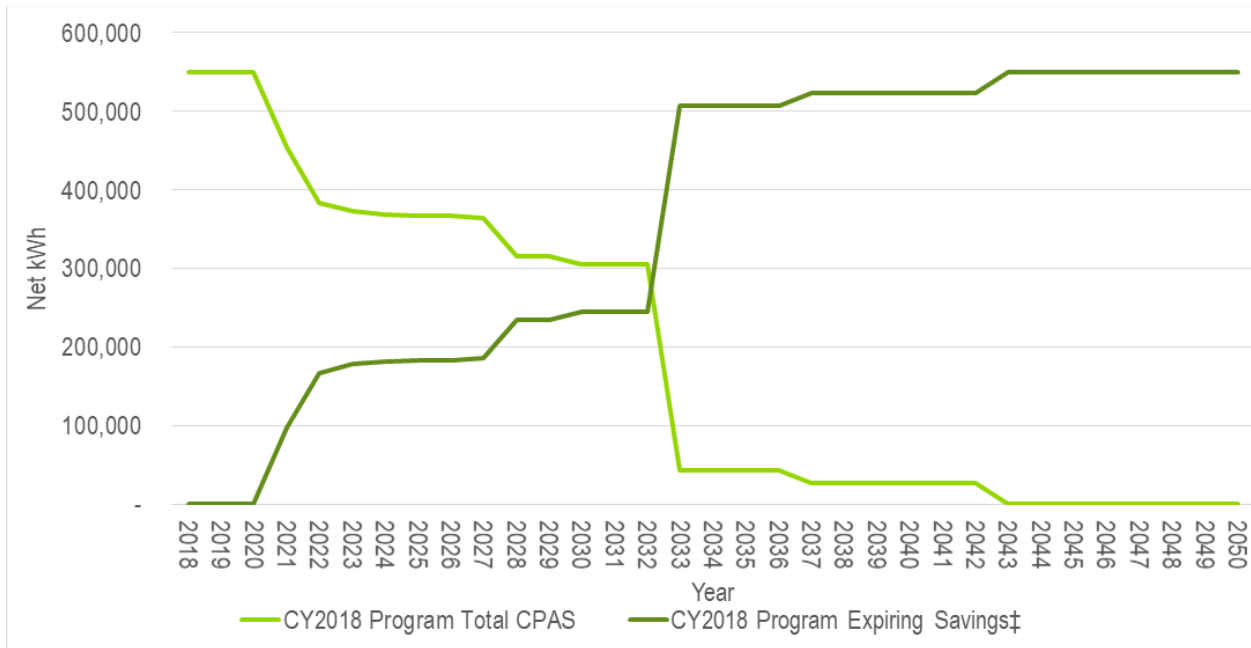
\* A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

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

‡ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.

Source: Navigant analysis

Figure 4-1. Cumulative Persisting Annual Savings



‡ Expiring savings are equal to CPAS Yn-1 - CPAS Yn + Expiring Savings Yn-1.  
Source: Navigant analysis

## 5. PROGRAM SAVINGS BY MEASURE

The energy and demand savings for each measure installed as a part of the program are shown in Table 5-1 through Table 5-5.

The program includes 13 measures as shown in the following tables. The two custom projects that included installation of Variable Speed Drives for HVAC Pumps in a multifamily building complex contributed the most savings, representing 42% of the verified gross energy savings, followed by the LED indoor standard measure, which represents 28% of the verified gross energy savings. The rest of the savings come from the refrigerator, room air conditioner, PTAC/PTHP and other measures.

**Table 5-1. CY2018 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)	Effective Useful Life
Shell	Air Sealing	0	NA	0	1.00	0	15.0
HVAC	Heat Pump	8,226	0.86	7,043	1.00	7,043	15.0
HVAC	PTAC/PTHP	13,319	1.00	13,319	1.00	13,319	15.0
HVAC	Room Air Conditioner (CA)	3,741	0.85	3,196	1.00	3,196	9.0
HVAC	Bathroom Exhaust Fan	16,830	1.00	16,830	1.00	16,830	19.0
Appliance	Room Air Conditioner (IU)	22,316	1.00	22,316	1.00	22,316	12.0
Appliance	Refrigerator	57,560	1.00	57,560	1.00	57,560	12.0
Custom	Custom	200,586	0.98	196,610	1.00	196,610	15.0
Shell	Attic Insulation	1,904	1.02	1,934	1.00	1,934	25.0
Lighting	LED Indoor Specialty	9,089	1.00	9,089	1.00	9,089	10.0
Lighting	LED Indoor Standard	4,441	1.00	4,441	1.00	4,441	10.0
Lighting	LED Indoor Standard (Incandescent)	132,528	1.00	132,528	1.00	132,528	10.0
Lighting	LED Outdoor Standard	4,749	1.00	4,749	1.00	4,749	6.1
<b>Total</b>		<b>475,290</b>		<b>469,616</b>		<b>469,616</b>	

\* A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

Source: ComEd tracking data and Navigant team analysis.

**Table 5-2. CY2018 Demand Savings by Measure**

End Use Type	Research Category	Ex Ante Gross Demand Reduction (kW)	Verified Gross Realization Rate	Verified Gross Demand Reduction (kW)	NTG*	Verified Net Demand Reduction (kW)
Shell	Air Sealing	NA	NA	0.00	1.00	0.00
HVAC	Heat Pump	NA	NA	1.94	1.00	1.94
HVAC	PTAC/PTHP	NA	NA	1.50	1.00	1.50
HVAC	Room Air Conditioner (CA)	NA	NA	12.58	1.00	12.58
HVAC	Bathroom Exhaust Fan	NA	NA	1.92	1.00	1.92
Appliance	Room Air Conditioner (IU)	NA	NA	105.22	1.00	105.22
Appliance	Refrigerator	NA	NA	6.57	1.00	6.57
Custom	Custom	NA	NA	0.00	1.00	0.00
Shell	Attic Insulation	NA	NA	2.30	1.00	2.30
Lighting	LED Indoor Specialty	NA	NA	14.63	1.00	14.63
Lighting	LED Indoor Standard	NA	NA	6.02	1.00	6.02
Lighting	LED Indoor Standard (Incandescent)	NA	NA	179.65	1.00	179.65
Lighting	LED Outdoor Standard	NA	NA	1.92	1.00	1.92
<b>Total</b>				<b>334.24</b>		<b>334.24</b>

\* A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

NA = Not Available

Source: ComEd tracking data and Navigant team analysis.

**Table 5-3. CY2018 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)
Shell	Air Sealing	0.00	NA	0.00	1.00	0.00
HVAC	Heat Pump	0.92	100%	0.93	1.00	0.93
HVAC	PTAC/PTHP	0.72	100%	0.72	1.00	0.72
HVAC	Room Air Conditioner (CA)	7.04	85%	6.01	1.00	6.01
HVAC	Bathroom Exhaust Fan	1.92	100%	1.92	1.00	1.92
Appliance	Room Air Conditioner (IU)	31.56	100%	31.56	1.00	31.56
Appliance	Refrigerator	8.68	100%	8.68	1.00	8.68
Custom	Custom	0.00	NA	0.00	1.00	0.00
Shell	Attic Insulation	1.13	138%	1.57	1.00	1.57
Lighting	LED Indoor Specialty	1.10	100%	1.10	1.00	1.10
Lighting	LED Indoor Standard	0.43	100%	0.43	1.00	0.43
Lighting	LED Indoor Standard (Incandescent)	12.75	100%	12.75	1.00	12.75
Lighting	LED Outdoor Standard	0.52	100%	0.52	1.00	0.52
<b>Total</b>		<b>66.78</b>		<b>66.19</b>		<b>66.19</b>

\* A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

NA = Not Available

Source: ComEd tracking data and Navigant team analysis.



**Table 5-4. CY2018 Energy Savings by Measure – Gas**

End Use Type	Research Category	Ex Ante Gross Savings	Verified Gross Realization Rate	Verified Gross Savings	NTG*	Verified Net Savings	Effective Useful Life
Shell	Air Sealing	2,195	0.87	1,908	1.00	1,908	15.0
HVAC	Heat Pump	0	NA	0	1.00	0	15.0
HVAC	PTAC/PTHP	0	NA	0	1.00	0	15.0
HVAC	Room Air Conditioner (CA)	0	NA	0	1.00	0	9.0
HVAC	Bathroom Exhaust Fan	0	NA	0	1.00	0	19.0
Appliance	Room Air Conditioner (IU)	0	NA	0	1.00	0	12.0
Appliance	Refrigerator	0	NA	0	1.00	0	12.0
Custom	Custom	0	NA	0	1.00	0	15.0
Shell	Attic Insulation	836	1.00	836	1.00	836	25.0
Lighting	LED Indoor Specialty	0	NA	0	1.00	0	10.0
Lighting	LED Indoor Standard	0	NA	0	1.00	0	10.0
Lighting	LED Indoor Standard (Incandescent)	0	NA	0	1.00	0	10.0
Lighting	LED Outdoor Standard	0	NA	0	1.00	0	6.1
<b>Total Therms</b>		<b>3,031</b>		<b>2,743</b>		<b>2,743</b>	
<b>Total kWh Converted From Therms†</b>		<b>88,835</b>		<b>80,405</b>		<b>80,405</b>	

\* A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

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

NA = Not Available

Source: ComEd tracking data and Navigant team analysis.

**Table 5-5. CY2018 Energy Savings by Measure – Total Combining Electricity and Gas**

End Use Type	Research Category	Ex Ante Gross Savings (kWh)	Verified Gross Realization Rate	Verified Gross Savings (kWh)	NTG*	Verified Net Savings (kWh)
Shell	Air Sealing	64,339	0.87	55,910	1.00	55,910
HVAC	Heat Pump	8,226	0.86	7,043	1.00	7,043
HVAC	PTAC/PTHP	13,319	1.00	13,319	1.00	13,319
HVAC	Room Air Conditioner (CA)	3,741	0.85	3,196	1.00	3,196
HVAC	Bathroom Exhaust Fan	16,830	1.00	16,830	1.00	16,830
Appliance	Room Air Conditioner (IU)	22,316	1.00	22,316	1.00	22,316
Appliance	Refrigerator	57,560	1.00	57,560	1.00	57,560
Custom	Custom	200,586	0.98	196,610	1.00	196,610
Shell	Attic Insulation	26,399	1.00	26,430	1.00	26,430
Lighting	LED Indoor Specialty	9,089	1.00	9,089	1.00	9,089
Lighting	LED Indoor Standard	4,441	1.00	4,441	1.00	4,441
Lighting	LED Indoor Standard (Incandescent)	132,528	1.00	132,528	1.00	132,528
Lighting	LED Outdoor Standard	4,749	1.00	4,749	1.00	4,749
<b>Total†</b>		<b>564,124</b>		<b>550,021</b>		<b>550,021</b>

\* A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

† The total includes the electric equivalent of the total therms.  
Source: ComEd tracking data and Navigant team analysis.

## 6. IMPACT ANALYSIS FINDINGS AND RECOMMENDATIONS

### 6.1 Impact Parameter Estimates

Navigant used the savings algorithms and inputs deemed by the IL TRM v6.0 and IL TRM v6.0 Errata, where applicable, to calculate the energy and demand savings for each measure installed as a part of the program in CY2018. Table 6-1 lists all the inputs used to calculate the savings, along with its source. A more detailed breakdown of the unit energy and demand savings for each measure can be found in Appendix 2. The lifetime energy savings are estimated by multiplying the verified savings by the effective useful life for each measure.

**Table 6-1. Savings Parameters**

Measure	Custom Input Parameters	Deemed Input Parameters	Deemed* Input Data Source
Air Sealing	N_gasket, N_sweep, LF_sealing, LF_wx	ΔTherms_gasket, ΔTherms_sweep, ΔTherms_sealing, ΔTherms_wx, ADJ_RXAirsealing	IL TRM v6.0 – Section 5.6.1
Heat Pump	kBtu/hr_cool, SEER_ee, HSPF_ee, EER_ee, kBtu/hr_heat, COP_ee	SEER_base, EER_base, COP_base, HSPF_base, EFLH_cool, EFLH_heat, CF	IL TRM v6.0 – Section 4.4.9
PTAC/PTHP	kBtu/hr_cool, kBtu/hr_heat, EER_ee, COP_ee	EFLH_cool, EFLH_heat, EER_exist, EER_base, COP_exist, COP_base, CF	IL TRM v6.0 – Section 4.4.13
Room Air Conditioner (CA)	Btu/hr, EER_ee	FLH_roomAC, CF, EER_base	IL TRM v6.0 – Section 4.4.7
Room Air Conditioner (IU)	Btu.hr, CEER_ee, CEER_base	FLH_roomAC, EER_exist, CF	IL TRM v6.0 – Section 5.1.7
Refrigerator	None	UEC_exist, UEC_base, UEC_ee, TAF, LSAF, Hours	IL TRM v6.0 – Section 5.1.6
Attic Insulation	R_old, R_attic, A_attic, Eff_cool, Eff_heat	Framing Factor_attic, CDD, DUA, HDD, ADJ_WallAtticCool, F_e, CF, FLH_cooling, ADJ_WallAtticHeat	IL TRM v6.0 – Section 5.6.4
LED Lighting	Watts_ee, Watts_base	ISR, Leakage, Hours, WHF_e, WHF_d, CF	IL TRM v6.0 – Section 5.5.6, Section 5.5.8 and Errata
Bathroom Exhaust Fan	None	CFM, Eff_baseline, Eff_efficient, Hours, CF	IL TRM v6.0 – Section 5.3.9

\* State of Illinois Technical Reference Manual version 6.0 from <http://www.ilsag.info/technical-reference-manual.html>.

† A deemed value. Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

## 6.2 Other Impact Findings and Recommendations

The evaluation team has developed several recommendations based on findings from the CY2018 evaluation, as follows:

**Finding 1.** For the Mini Split Heat Pump measure installed in the community room as a part of the Saratoga tower project, the ex ante savings are calculated using a HSPF<sub>BASE</sub> value of 7.4. The IL TRM v 6.0 recommends using the value of 7.7 per the IECC 2015 standard. For the Mini Split Heat Pump measure installed in the kitchen as a part of the Saratoga tower project, the ex ante savings are calculated using a capacity of 34 kBtu/hr, though the specification sheet for the measure indicates that the actual capacity is 34.4 kBtu/hr.

**Recommendation 1.** The implementer should update the HSPF<sub>BASE</sub> value for this measure per the IECC 2015 standard as recommended by the IL TRM v6.0 and update the capacity of the unit for this measure per the specification sheet.

**Finding 2.** For the Room Air Conditioner measure installed as a part of the Saratoga tower project, the capacity and the EER<sub>EE</sub> values used to calculate the ex ante energy and demand

savings do not match the values in the specification sheets of the equipment model number provided in the tracking data.

**Recommendation 2.** Navigant recommends the implementer update the capacity and the EER<sub>EE</sub> values to match the equipment model number.

**Finding 3.** For the Air Sealing measure installed as a part of the North Lake Farms project, the ex ante savings for window weather-stripping were calculated using the linear feet for window caulking installed. Navigant calculated verified savings using the linear feet for the weather-stripping installed on window bottoms.

**Recommendation 3.** The savings for window weather-stripping should be calculated using the linear feet of window bottoms that were weather stripped and not the linear feet of window caulking installed, which is already a part of the weather sealing component of the savings calculations.

**Finding 4.** For the Attic Insulation measure, the ex ante savings provided in the tracking data do not match the values provided in the ex ante calculator.

**Recommendation 4.** Navigant requests the source of the energy and demand savings in the tracking data be provided.

**Finding 5.** For the Custom Variable Speed Drive Pumps measures installed as a part of the Wentworth Gardens project, the ex ante calculations convert the Horse Power (HP) of the motor to kW before applying the Energy Savings Factor (ESF) deemed in the IL TRM v6.0. The ESF deemed in the IL TRM v6.0 can only be applied to HP values. Additionally, the proposed replacement pump kWh consumption calculations should also be updated from  $kWh = New\ kW\ input * Operating\ Hours * (ESF)$  to  $kWh = New\ kW\ input * Operating\ Hours * (1 - ESF)$ , because a direct multiplication of the ESF can only be used while calculating the energy savings and not the energy consumption

**Recommendation 5.** The implementer should not convert HP to kW before applying the ESF. The implementer should use the energy savings factor correctly when calculating the savings for this measure.

## 7. APPENDIX 1. IMPACT ANALYSIS METHODOLOGY

Navigant determined verified gross savings for each program measure by:

1. Reviewing the savings algorithm inputs in the measure workbook for agreement with the TRM v6.0 and the IL TRM v6.0 Errata, where applicable.
2. Validating that the savings algorithm was applied correctly.
3. Cross-checking per-unit savings values in the tracking data with the verified values in the measure workbook or in Navigant's calculations if the workbook did not agree with the TRM.
4. Multiplying the verified per-unit savings value by the quantity reported in the tracking data.

Navigant calculated verified net energy and demand (coincident peak and overall) savings by multiplying the verified gross savings estimates by a net-to-gross ratio (NTG). In CY2018, the NTG estimates used to calculate the net verified savings were deemed as one, based on a consensus process through the Illinois Stakeholder Advisory Group (SAG), as documented in a spreadsheet.<sup>3</sup>

## 8. APPENDIX 2. IMPACT ANALYSIS DETAIL

Navigant used the following documents to verify the per-unit savings for each program measure:

<sup>3</sup> Source: ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

- Final CY2018 tracking data: "IHWAP-MF\_2018\_EOY\_Data\_Rev0\_01302019"
- Final CY2018 tracking data: "RI\_ComEd\_IER\_MF\_Saratoga Towers Detail 2018"
- Final CY2018 tracking data: "RI\_ComEd\_NSNG\_MF\_NLF Detail 2018"
- Final CY2018 tracking data: "CEDA Wentworth Gardens Engineering Review Document 9418\_EOY"
- Illinois Technical Reference Manual (TRM v6.0) for deemed input parameters or secondary evaluation research to verify any custom inputs used in the ex ante calculations
- Implementer Savings Calculations: "Income Eligible Retrofits\_Resource Innovations Savings Calcs\_Revised 07102018"

**Table 8-1. Verified Measure Per Unit Impact Detail (Electricity)**

End Use Type	Research Category	Ex Ante Gross kWh/Unit Savings	Ex Ante Gross kW/Unit Savings	Verified Gross kWh/Unit Savings	Verified Gross kW/Unit Savings	kWh Savings RR	kW Savings RR	Source
Lighting	LED Indoor Standard (28W to 8W)	15.30	0.00	15.30	0.00	100%	100%	5.5.8
Lighting	LED Indoor Standard (26W to 8W)	13.77	0.00	13.77	0.00	100%	100%	5.5.8
Lighting	LED Indoor Standard (60W to 8W)	39.77	0.00	39.77	0.00	100%	100%	5.5.8
Lighting	LED Outdoor Standard (28W to 8W)	47.97	0.01	47.97	0.01	100%	100%	5.5.8
Lighting	LED Indoor Specialty (52W to 7W)	28.98	0.00	28.98	0.00	100%	100%	5.5.6
Lighting	LED Indoor Specialty (60W to 10W)	32.20	0.00	32.20	0.00	100%	100%	5.5.6
HVAC	Bathroom Exhaust Fan	88.58	0.01	88.58	0.01	100%	100%	5.3.9
Appliance	Room Air Conditioner (IU)	101.90	0.14	101.90	0.14	100%	100%	5.1.7
Appliance	Refrigerator	417.10	0.06	417.10	0.06	100%	100%	5.1.6
Custom	Custom - Heating and Domestic Hot Water Pumps	141,798.00	0.00	139,810.63	0.00	99%	NA	
Custom	Custom - Pressure Booster Pumps	58,788.00	0.00	56,799.48	0.00	97%	NA	
Shell	Attic Insulation	0.29	0.00	0.29	0.00	102%	138%	5.6.4
HVAC	Room Air Conditioner (CA)	39.38	0.07	33.64	0.06	85%	85%	4.4.7
HVAC	PTAC - Front West Office	2,891.13	0.17	2,891.13	0.17	100%	100%	4.4.13
HVAC	Mini Split Heat Pump - Community Room	1,971.74	0.23	1,695.81	0.23	86%	100%	4.4.9
HVAC	Mini Split Heat Pump - Kitchen	1,836.52	0.18	1,555.82	0.18	85%	101%	4.4.9
HVAC	Mini Split Heat Pump - Front East Office	474.68	0.06	400.15	0.06	84%	100%	4.4.9

HVAC	PTAC - Front East Office	3,768.55	0.19	3,768.55	0.19	100%	100%	4.4.13
HVAC	PTAC - Library	3,768.55	0.19	3,768.55	0.19	100%	100%	4.4.13
HVAC	PTAC - Laundry Room	2,891.13	0.17	2,891.13	0.17	100%	100%	4.4.13
Shell	Air Sealing (First Floor)	0.00	0.00	0.00	0.00	NA	NA	5.6.1
Shell	Air Sealing (Second Floor)	0.00	0.00	0.00	0.00	NA	NA	5.6.1

Source: ComEd Tracking Data and Navigant Analysis

**Table 8-2. Verified Measure per-Unit Impact Detail (Gas)**

End Use Type	Research Category	Ex Ante Gross Therms/Unit Savings	Verified Gross Therms/Unit Savings	Therms Savings RR	Source
Lighting	LED Indoor Standard (28W to 8W)	0.00	0.00	NA	5.5.8
Lighting	LED Indoor Standard (26W to 8W)	0.00	0.00	NA	5.5.8
Lighting	LED Indoor Standard (60W to 8W)	0.00	0.00	NA	5.5.8
Lighting	LED Outdoor Standard (28W to 8W)	0.00	0.00	NA	5.5.8
Lighting	LED Indoor Specialty (52W to 7W)	0.00	0.00	NA	5.5.6
Lighting	LED Indoor Specialty (60W to 10W)	0.00	0.00	NA	5.5.6
HVAC	Bathroom Exhaust Fan	0.00	0.00	NA	5.3.9
Appliance	Room Air Conditioner (IU)	0.00	0.00	NA	5.1.7
Appliance	Refrigerator	0.00	0.00	NA	5.1.6
Custom	Custom - Heating and Domestic Hot Water Pumps	0.00	0.00	NA	
Custom	Custom - Pressure Booster Pumps	0.00	0.00	NA	
Shell	Attic Insulation	0.13	0.13	100%	5.6.4
HVAC	Room Air Conditioner (CA)	0.00	0.00	NA	4.4.7
HVAC	PTAC - Front West Office	0.00	0.00	NA	4.4.13
HVAC	Mini Split Heat Pump - Community Room	0.00	0.00	NA	4.4.9
HVAC	Mini Split Heat Pump - Kitchen	0.00	0.00	NA	4.4.9
HVAC	Mini Split Heat Pump - Front East Office	0.00	0.00	NA	4.4.9
HVAC	PTAC - Front East Office	0.00	0.00	NA	4.4.13
HVAC	PTAC - Library	0.00	0.00	NA	4.4.13
HVAC	PTAC - Laundry Room	0.00	0.00	NA	4.4.13
Shell	Air Sealing (First Floor)	159.64	137.52	86%	5.6.1
Shell	Air Sealing (Second Floor)	172.95	150.83	87%	5.6.1

Source: ComEd Tracking Data and Navigant Analysis

### 9. APPENDIX 3. TOTAL RESOURCE COST DETAIL

Table 9-1, below, shows the Total Resource Cost (TRC) table. It includes only the cost-effectiveness analysis inputs available at the time of finalizing this impact evaluation report. Additional required cost data (e.g., measure costs, program level incentive and non-incentive costs) are not included in this table and will be provided to evaluation later.

**Table 9-1. Total Resource Cost Savings Summary**

End Use Type	Research Category	Units	Quantity	Effective Useful Life	Ex Ante Gross Savings (kWh)	Ex Ante Gross Peak Demand Reduction (kW)	Verified Gross Savings (kWh)	Verified Gross Peak Demand Reduction (kW)
Shell	Air Sealing	Project	13	15.0	0	0.00	0	0.00
HVAC	Heat Pump	Lamp	5	15.0	8,226	0.92	7,043	0.93
HVAC	PTAC/PTHP	Each	4	15.0	13,319	0.72	13,319	0.72
HVAC	Room Air Conditioner (CA)	Each	95	9.0	3,741	7.04	3,196	6.01
HVAC	Bathroom Exhaust Fan	Each	190	19.0	16,830	1.92	16,830	1.92
Appliance	Room Air Conditioner (IU)	Each	219	12.0	22,316	31.56	22,316	31.56
Appliance	Refrigerator	Each	138	12.0	57,560	8.68	57,560	8.68
Custom	Custom	Project	2	15.0	200,586	0.00	196,610	0.00
Shell	Attic Insulation	Square Feet	6,650	25.0	1,904	1.13	1,934	1.07
Lighting	LED Indoor Specialty	Lamp	299	10.0	9,089	1.10	9,089	1.10
Lighting	LED Indoor Standard	Lamp	307	10.0	4,441	0.43	4,441	0.43
Lighting	LED Indoor Standard (Incandescent)	Lamp	3,332	10.0	132,528	12.75	132,528	12.75
Lighting	LED Outdoor Standard	Lamp	99	6.1	4,749	0.52	4,749	0.52

Source: ComEd tracking data and Navigant team analysis.