



ComEd Income Eligible Multi-Family Savings Impact Evaluation Report

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

Presented to
ComEd

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1. INTRODUCTION

This report presents the results of the impact evaluation of ComEd’s CY2018 Income Eligible Multi-Family Retrofits 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 Multi-Family Savings (IEMS) 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 IEMS Program is jointly administered by ComEd, and Peoples Gas (PGL) and North Shore Gas (NSG) companies. The program is implemented by Elevate Energy (Elevate) and 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 treated 4,094 individual units in CY2018 and distributed 33,309 measures as shown in the following table and graph. LED lights comprised of 65% of the measure mix, followed by aerators, which were 11% of all the measures installed. Steam trap repair or replacement represented 8% of the total measures installed, followed by showerheads with 6%, and the remaining 10% comprised of steam averaging controls, advanced power strip (Tier 1), smart thermostat, programmable thermostat and other measures.

Table 2-1. CY2018 Volumetric Findings Detail

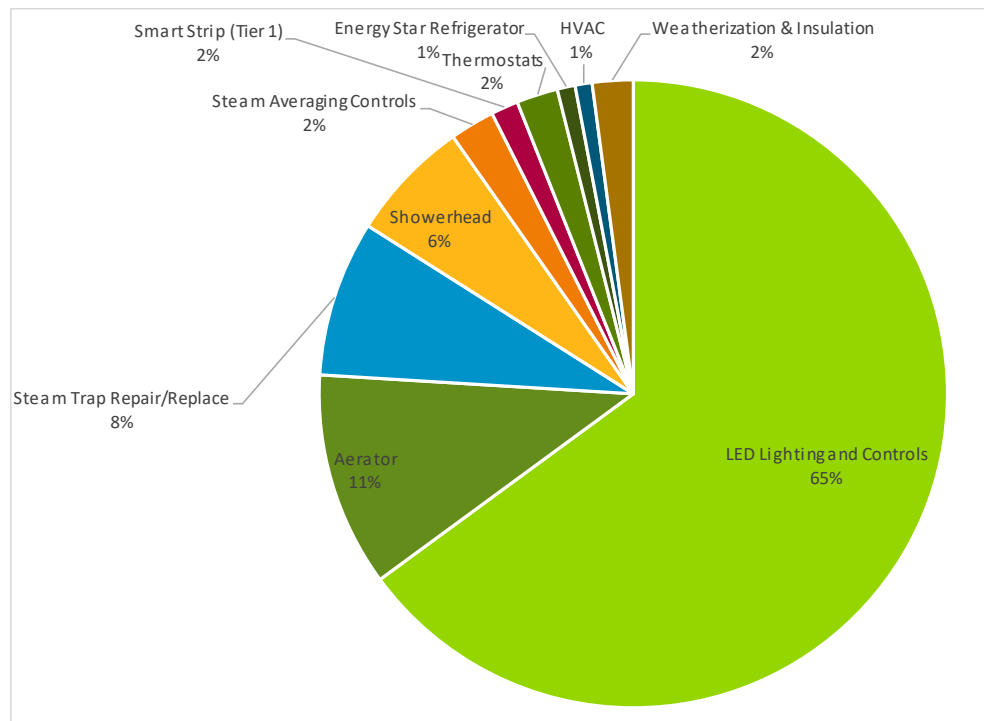
| Participation | Quantity |
|---------------------|----------|
| Participants* | 4,094 |
| Total Measures | 33,309 |
| Installed Projects† | 565 |

*Participants are comprised of distinct properties, counting each separate apartment

† Number of Unique Project IDs in the tracking data

Source: ComEd tracking data and Navigant team analysis.

Figure 2-1. Percentage of Measures Installed by Type



3. PROGRAM SAVINGS DETAIL

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

¹ 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) |
|----------------------------------|----------------------|---------------------|---------------------------------|
| Electricity | | | |
| Ex Ante Gross Savings | 3,885,398 | NA | 315.93 |
| Program Gross Realization Rate | 0.98 | NA | 1.09 |
| Verified Gross Savings | 3,824,064 | 921.47 | 345.02 |
| Program Net-to-Gross Ratio (NTG) | 1.00 | 1.00 | 1.00 |
| Verified Net Savings | 3,824,064 | 921.47 | 345.02 |
| Converted from Gas* | | | |
| Ex Ante Gross Savings | 13,247,967 | NA | NA |
| Program Gross Realization Rate | 0.97 | NA | NA |
| Verified Gross Savings | 12,834,959 | NA | NA |
| Program Net-to-Gross Ratio (NTG) | 1.00 | NA | NA |
| Verified Net Savings | 12,834,959 | NA | NA |
| Total Electric Plus Gas | | | |
| Ex Ante Gross Savings | 17,133,364 | NA | 315.93 |
| Program Gross Realization Rate | 0.97 | NA | 1.09 |
| Verified Gross Savings | 16,659,024 | 921.47 | 345.02 |
| Program Net-to-Gross Ratio (NTG) | 1.00 | 1.00 | 1.00 |
| Verified Net Savings | 16,659,024 | 921.47 | 345.02 |

* 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 applicable

Note: Demand is defined as the difference in kW in the baseline and energy efficient period for the measures installed in CY2018. 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 ex post gross savings for the IEMS Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 are shown in the following tables and figure. The total CPAS across all measures is 3,824,064 kWh. The program achieved 12,834,959 kWh CPAS equivalent of gas savings converted to electricity that might be counted toward ComEd's goal² (the middle table in the following set of tables). Adding the savings converted from gas savings to the electric savings produces 16,659,024 kWh of total CPAS.

² 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 | |
| Hot Water | Aerator | 9.0 | 5,213 | 1.00 | 46,913 | 5,213 | 5,213 | 5,213 | 5,213 | 5,213 | 5,213 | 5,213 | 5,213 | 5,213 | |
| Shell | Air Sealing | 15.0 | 223,182 | 1.00 | 3,347,725 | 223,182 | 223,182 | 223,182 | 223,182 | 223,182 | 223,182 | 223,182 | 223,182 | 223,182 | |
| Shell | Attic Insulation | 25.0 | 224,116 | 1.00 | 5,602,905 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | |
| HVAC | Boiler Tune-up | 3.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| HVAC | Central AC | 18.0 | 4,064 | 1.00 | 73,144 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | |
| Hot Water | DHW Boiler | 20.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| Shell | Door Sweep | 15.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| Shell | Door Weatherstrip | 15.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| Appliances | Energy Star Refrigerator | 12.0 | 23,909 | 1.00 | 192,156 | 23,909 | 23,909 | 23,909 | 23,909 | 12,065 | 12,065 | 12,065 | 12,065 | 12,065 | |
| HVAC | Furnace | 20.0 | 19,032 | 1.00 | 380,640 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | |
| HVAC | Hydronic Boiler | 20.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| Lighting | LED Exit Sign | 16.0 | 215,734 | 1.00 | 3,451,745 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | |
| Lighting | LED Lighting (CA Exterior) | 10.2 | 370,827 | 1.00 | 3,781,957 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | 5.7 | 326,537 | 1.00 | 1,862,503 | 326,537 | 326,537 | 326,537 | 326,537 | 326,537 | 229,817 | - | - | - | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | 5.7 | 324,605 | 1.00 | 1,851,484 | 324,605 | 324,605 | 324,605 | 324,605 | 324,605 | 228,457 | - | - | - | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | 5.7 | 202,326 | 1.00 | 655,382 | 202,326 | 96,317 | 96,317 | 96,317 | 96,317 | 67,788 | - | - | - | |
| Lighting | LED Lighting (CA Interior T8) | 8.1 | 449,426 | 1.00 | 3,660,977 | 449,426 | 449,426 | 449,426 | 449,426 | 449,426 | 449,426 | 449,426 | 449,426 | 65,571 | |
| Lighting | LED Lighting (CA Interior T12) | 8.1 | 307,386 | 1.00 | 1,434,013 | 307,386 | 157,661 | 157,661 | 157,661 | 157,661 | 157,661 | 157,661 | 157,661 | 23,003 | |
| Lighting | LED Lighting (IU Specialty) | 10.1 | 109,775 | 1.00 | 1,104,469 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | |
| Lighting | Occupancy Sensor | 8.0 | 10,312 | 1.00 | 82,497 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | |
| HVAC | Pipe Insulation | 15.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| HVAC | Programmable Thermostat | 5.0 | 171,143 | 1.00 | 855,716 | 171,143 | 171,143 | 171,143 | 171,143 | 171,143 | - | - | - | - | |
| HVAC | PTHP | 15.0 | 469,986 | 1.00 | 7,049,787 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | |
| Hot Water | Showerhead (CA) | 10.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| Hot Water | Showerhead (IU) | 10.0 | 13,645 | 1.00 | 136,448 | 13,645 | 13,645 | 13,645 | 13,645 | 13,645 | 13,645 | 13,645 | 13,645 | 13,645 | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | 7.0 | 48,101 | 1.00 | 336,707 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | |
| HVAC | Smart Thermostat | 10.0 | 32,079 | 1.00 | 320,788 | 32,079 | 32,079 | 32,079 | 32,079 | 32,079 | 32,079 | 32,079 | 32,079 | 32,079 | |
| HVAC | Steam Averaging Controls | 20.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| HVAC | Steam Boiler | 20.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| HVAC | Steam Trap Repair/Replace | 6.0 | 0 | 1.00 | - | - | - | - | - | - | - | - | - | - | |
| Lighting | LED Lighting (CA Interior) | 8.4 | 60,902 | 1.00 | 511,775 | 60,902 | 60,902 | 60,902 | 60,902 | 60,902 | 60,902 | 60,902 | 60,902 | 24,562 | |
| Lighting | LED Lighting (IU Standard, 60W) | 10.0 | 130,083 | 1.00 | 637,018 | 130,083 | 130,083 | 130,083 | 35,253 | 35,253 | 35,253 | 35,253 | 35,253 | 35,253 | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | 10.2 | 802 | 1.00 | 4,850 | 802 | 802 | 802 | 339 | 339 | 339 | 339 | 339 | 339 | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | 8.4 | 52,528 | 1.00 | 234,500 | 52,528 | 52,528 | 52,528 | 14,235 | 14,235 | 14,235 | 14,235 | 14,235 | 5,741 | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | 10.2 | 9,732 | 1.00 | 48,177 | 9,732 | 9,732 | 9,732 | 2,637 | 2,637 | 2,637 | 2,637 | 2,637 | 2,637 | |
| Lighting | LED Lighting (IU Standard, 75W) | 10.0 | 4,530 | 1.00 | 23,989 | 4,530 | 4,530 | 4,530 | 1,486 | 1,486 | 1,486 | 1,486 | 1,486 | 1,486 | |
| Lighting | LED Lighting (IU Standard, 40W) | 10.0 | 10,344 | 1.00 | 47,398 | 10,344 | 10,344 | 10,344 | 2,338 | 2,338 | 2,338 | 2,338 | 2,338 | 2,338 | |
| Lighting | LED Lighting (CA Interior, 40W Incandescent) | 8.4 | 2,090 | 1.00 | 8,823 | 2,090 | 2,090 | 2,090 | 472 | 472 | 472 | 472 | 472 | 191 | |
| Lighting | LED Lighting (IU Standard, 100W) | 10.0 | 1,657 | 1.00 | 9,876 | 1,657 | 1,657 | 1,657 | 701 | 701 | 701 | 701 | 701 | 701 | |
| CY2018 Program Total Electric CPAS | | | 3,824,064 | | 37,754,362 | 3,824,064 | 3,568,331 | 3,568,331 | 3,414,026 | 3,402,182 | 3,009,641 | 2,483,579 | 2,435,478 | 1,861,538 | |
| CY2018 Program Expiring Electric Savings† | | | | | | | 255,734 | 255,734 | 410,039 | 421,882 | 814,423 | 1,340,485 | 1,388,586 | 1,962,527 | |



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| End Use Type | Research Category | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Hot Water | Aerator | | | | | | | | | | | | |
| Shell | Air Sealing | 223,182 | 223,182 | 223,182 | 223,182 | 223,182 | 223,182 | | | | | | |
| Shell | Attic Insulation | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 | 224,116 |
| HVAC | Boiler Tune-up | | | | | | | | | | | | |
| HVAC | Central AC | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | | | |
| Hot Water | DHW Boiler | | | | | | | | | | | | |
| Shell | Door Sweep | | | | | | | | | | | | |
| Shell | Door Weatherstrip | | | | | | | | | | | | |
| Appliances | Energy Star Refrigerator | 12,065 | 12,065 | 12,065 | | | | | | | | | |
| HVAC | Furnace | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 | 19,032 |
| HVAC | Hydronic Boiler | | | | | | | | | | | | |
| Lighting | LED Exit Sign | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | | | | | |
| Lighting | LED Lighting (CA Exterior) | 370,827 | 73,683 | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Specialty) | 109,775 | 6,718 | | | | | | | | | | |
| Lighting | Occupancy Sensor | | | | | | | | | | | | |
| HVAC | Pipe Insulation | | | | | | | | | | | | |
| HVAC | Programmable Thermostat | | | | | | | | | | | | |
| HVAC | PTHP | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | | | | | | |
| Hot Water | Showerhead (CA) | | | | | | | | | | | | |
| Hot Water | Showerhead (IU) | 13,645 | | | | | | | | | | | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | | | | | | | | | | | | |
| HVAC | Smart Thermostat | 32,079 | | | | | | | | | | | |
| HVAC | Steam Averaging Controls | | | | | | | | | | | | |
| HVAC | Steam Boiler | | | | | | | | | | | | |
| HVAC | Steam Trap Repair/Replace | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 60W) | 35,253 | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | 339 | 67 | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | 2,637 | 522 | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 75W) | 1,486 | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 40W) | 2,338 | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 40W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 100W) | 701 | | | | | | | | | | | |
| CY2018 Program Total Electric CPAS | | 1,737,258 | 1,249,169 | 1,168,178 | 1,156,113 | 1,156,113 | 1,156,113 | 462,946 | 247,212 | 247,212 | 243,148 | 243,148 | 224,116 |
| CY2018 Program Expiring Electric Savings† | | 2,086,806 | 2,574,895 | 2,655,886 | 2,667,951 | 2,667,951 | 2,667,951 | 3,361,118 | 3,576,853 | 3,576,853 | 3,580,916 | 3,580,916 | 3,599,948 |



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| End Use Type | Research Category | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|--|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Hot Water | Aerator | | | | | | | | | | | | |
| Shell | Air Sealing | | | | | | | | | | | | |
| Shell | Attic Insulation | 224,116 | 224,116 | 224,116 | 224,116 | | | | | | | | |
| HVAC | Boiler Tune-up | | | | | | | | | | | | |
| HVAC | Central AC | | | | | | | | | | | | |
| Hot Water | DHW Boiler | | | | | | | | | | | | |
| Shell | Door Sweep | | | | | | | | | | | | |
| Shell | Door Weatherstrip | | | | | | | | | | | | |
| Appliances | Energy Star Refrigerator | | | | | | | | | | | | |
| HVAC | Furnace | | | | | | | | | | | | |
| HVAC | Hydronic Boiler | | | | | | | | | | | | |
| Lighting | LED Exit Sign | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Specialty) | | | | | | | | | | | | |
| Lighting | Occupancy Sensor | | | | | | | | | | | | |
| HVAC | Pipe Insulation | | | | | | | | | | | | |
| HVAC | Programmable Thermostat | | | | | | | | | | | | |
| HVAC | PTHP | | | | | | | | | | | | |
| Hot Water | Showerhead (CA) | | | | | | | | | | | | |
| Hot Water | Showerhead (IU) | | | | | | | | | | | | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | | | | | | | | | | | | |
| HVAC | Smart Thermostat | | | | | | | | | | | | |
| HVAC | Steam Averaging Controls | | | | | | | | | | | | |
| HVAC | Steam Boiler | | | | | | | | | | | | |
| HVAC | Steam Trap Repair/Replace | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 60W) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 75W) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 40W) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 40W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 100W) | | | | | | | | | | | | |
| CY2018 Program Total Electric CPAS | | 224,116 | 224,116 | 224,116 | 224,116 | - | - | - | - | - | - | - | - |
| CY2018 Program Expiring Electric Savings† | | 3,599,948 | 3,599,948 | 3,599,948 | 3,599,948 | 3,824,064 | 3,824,064 | 3,824,064 | 3,824,064 | 3,824,064 | 3,824,064 | 3,824,064 | 3,824,064 |

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 Illinois Stakeholder Advisory Group (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 | |
| Hot Water | Aerabr | 9.0 | 9,647 | 1.0 | 86,823 | 9,647 | 9,647 | 9,647 | 9,647 | 9,647 | 9,647 | 9,647 | 9,647 | 9,647 | |
| Shell | Air Sealing | 15.0 | 84,015 | 1.0 | 1,260,227 | 84,015 | 84,015 | 84,015 | 84,015 | 84,015 | 84,015 | 84,015 | 84,015 | 84,015 | |
| Shell | Attic Insulation | 25.0 | 69,687 | 1.0 | 1,742,185 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | |
| HVAC | Boiler Tune-up | 3.0 | 4,779 | 1.0 | 14,338 | 4,779 | 4,779 | 4,779 | | | | | | | |
| HVAC | Central AC | 18.0 | - | 1.0 | - | | | | | | | | | | |
| Hot Water | DHW Boiler | 20.0 | 35 | 1.0 | 701 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | |
| Shell | Door Sweep | 15.0 | 1,001 | 1.0 | 15,014 | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 | |
| Shell | Door Weatherstrip | 15.0 | 1,170 | 1.0 | 17,549 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | |
| Appliances | Energy Star Refrigerator | 12.0 | - | 1.0 | - | | | | | | | | | | |
| HVAC | Furnace | 20.0 | 2,473 | 1.0 | 49,454 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | |
| HVAC | Hydronic Boiler | 20.0 | 1,842 | 1.0 | 36,844 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | |
| Lighting | LED Exit Sign | 16.0 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior) | 10.2 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | 5.7 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | 5.7 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | 5.7 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T8) | 8.1 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T12) | 8.1 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (IU Specialty) | 10.1 | - | 1.0 | - | | | | | | | | | | |
| Lighting | Occupancy Sensor | 8.0 | - | 1.0 | - | | | | | | | | | | |
| HVAC | Pipe Insulation | 15.0 | 47,226 | 1.0 | 708,387 | 47,226 | 47,226 | 47,226 | 47,226 | 47,226 | 47,226 | 47,226 | 47,226 | 47,226 | |
| HVAC | Programmable Thermostat | 5.0 | 5,128 | 1.0 | 25,641 | 5,128 | 5,128 | 5,128 | 5,128 | | | | | | |
| HVAC | PTHP | 15.0 | - | 1.0 | - | | | | | | | | | | |
| Hot Water | Showerhead (CA) | 10.0 | 130 | 1.0 | 1,298 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | |
| Hot Water | Showerhead (IU) | 10.0 | 31,494 | 1.0 | 314,943 | 31,494 | 31,494 | 31,494 | 31,494 | 31,494 | 31,494 | 31,494 | 31,494 | 31,494 | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | 7.0 | - | 1.0 | - | | | | | | | | | | |
| HVAC | Smart Thermostat | 10.0 | 15,557 | 1.0 | 155,571 | 15,557 | 15,557 | 15,557 | 15,557 | 15,557 | 15,557 | 15,557 | 15,557 | 15,557 | |
| HVAC | Steam Averaging Controls | 20.0 | 16,698 | 1.0 | 333,967 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | |
| HVAC | Steam Boiler | 20.0 | 56,745 | 1.0 | 1,134,905 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | |
| HVAC | Steam Trap Repair/Replace | 6.0 | 90,275 | 1.0 | 541,650 | 90,275 | 90,275 | 90,275 | 90,275 | 90,275 | | | | | |
| Lighting | LED Lighting (CA Interior) | 8.4 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 60W) | 10.0 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | 10.2 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | 8.4 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | 10.2 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 75W) | 10.0 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 40W) | 10.0 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | 10.2 | - | 1.0 | - | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 100W) | 10.0 | - | 1.0 | - | | | | | | | | | | |
| CY2018 Program Total Gas CPAS (Therms) | | | 437,904 | | 6,439,498 | 437,904 | 437,904 | 437,904 | 433,124 | 433,124 | 427,996 | 337,721 | 337,721 | 337,721 | |
| CY2018 Program Total Gas CPAS (kWh Equivalent)‡ | | | | | 188,741,696 | 12,834,959 | 12,834,959 | 12,834,959 | 12,694,875 | 12,694,875 | 12,544,564 | 9,898,602 | 9,898,602 | 9,898,602 | |
| CY2018 Program Expiring Gas Savings (Therms)§ | | | | | | | | | 4,779 | 4,779 | 9,908 | 100,183 | 100,183 | 100,183 | |
| CY2018 Program Expiring Gas Savings (kWh Equivalent)‡§ | | | | | | | | | 140,085 | 140,085 | 290,395 | 2,936,358 | 2,936,358 | 2,936,358 | |

| End Use Type | Research Category | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| Hot Water | Aerator | | | | | | | | | | | | |
| Shell | Air Sealing | 84,015 | 84,015 | 84,015 | 84,015 | 84,015 | 84,015 | | | | | | |
| Shell | Attic Insulation | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 | 69,687 |
| HVAC | Boiler Tune-up | | | | | | | | | | | | |
| HVAC | Central AC | | | | | | | | | | | | |
| Hot Water | DHW Boiler | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| Shell | Door Sweep | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 | 1,001 | | | | | | |
| Shell | Door Weatherstrip | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | | | | | | |
| Appliances | Energy Star Refrigerator | | | | | | | | | | | | |
| HVAC | Furnace | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 | 2,473 |
| HVAC | Hydronic Boiler | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 | 1,842 |
| Lighting | LED Exit Sign | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Specialty) | | | | | | | | | | | | |
| Lighting | Occupancy Sensor | | | | | | | | | | | | |
| HVAC | Pipe Insulation | 47,226 | 47,226 | 47,226 | 47,226 | 47,226 | 47,226 | | | | | | |
| HVAC | Programmable Thermostat | | | | | | | | | | | | |
| HVAC | PTHP | | | | | | | | | | | | |
| Hot Water | Showerhead (CA) | 130 | | | | | | | | | | | |
| Hot Water | Showerhead (IU) | 31,494 | | | | | | | | | | | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | | | | | | | | | | | | |
| HVAC | Smart Thermostat | 15,557 | | | | | | | | | | | |
| HVAC | Steam Averaging Controls | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 | 16,698 |
| HVAC | Steam Boiler | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 | 56,745 |
| HVAC | Steam Trap Repair/Replace | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 60W) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 75W) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 40W) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 100W) | | | | | | | | | | | | |
| CY2018 Program Total Gas CPAS (Therms) | | 328,074 | 280,893 | 280,893 | 280,893 | 280,893 | 280,893 | 147,481 | 147,481 | 147,481 | 147,481 | 147,481 | 69,687 |
| CY2018 Program Total Gas CPAS (kWh Equivalent)† | | 9,615,847 | 8,232,966 | 8,232,966 | 8,232,966 | 8,232,966 | 8,232,966 | 4,322,666 | 4,322,666 | 4,322,666 | 4,322,666 | 4,322,666 | 2,042,538 |
| CY2018 Program Expiring Gas Savings (Therms)‡ | | 109,830 | 157,011 | 157,011 | 157,011 | 157,011 | 157,011 | 290,423 | 290,423 | 290,423 | 290,423 | 290,423 | 368,216 |
| CY2018 Program Expiring Gas Savings (kWh Equivalent)†‡ | | 3,219,112 | 4,601,993 | 4,601,993 | 4,601,993 | 4,601,993 | 4,601,993 | 8,512,293 | 8,512,293 | 8,512,293 | 8,512,293 | 8,512,293 | 10,792,421 |

| End Use Type | Research Category | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|--|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Hot Water | Aeratr | | | | | | | | | | | | |
| Shell | Air Sealing | | | | | | | | | | | | |
| Shell | Attic Insulation | 69,687 | 69,687 | 69,687 | 69,687 | | | | | | | | |
| HVAC | Boiler Tune-up | | | | | | | | | | | | |
| HVAC | Central AC | | | | | | | | | | | | |
| Hot Water | DHW Boiler | | | | | | | | | | | | |
| Shell | Door Sweep | | | | | | | | | | | | |
| Shell | Door Weatherstrip | | | | | | | | | | | | |
| Appliances | Energy Star Refrigerator | | | | | | | | | | | | |
| HVAC | Furnace | | | | | | | | | | | | |
| HVAC | Hydronic Boiler | | | | | | | | | | | | |
| Lighting | LED Exit Sign | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Specialty) | | | | | | | | | | | | |
| Lighting | Occupancy Sensor | | | | | | | | | | | | |
| HVAC | Pipe Insulation | | | | | | | | | | | | |
| HVAC | Programmable Thermostat | | | | | | | | | | | | |
| HVAC | PTHP | | | | | | | | | | | | |
| Hot Water | Showerhead (CA) | | | | | | | | | | | | |
| Hot Water | Showerhead (IU) | | | | | | | | | | | | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | | | | | | | | | | | | |
| HVAC | Smart Thermostat | | | | | | | | | | | | |
| HVAC | Steam Averaging Controls | | | | | | | | | | | | |
| HVAC | Steam Boiler | | | | | | | | | | | | |
| HVAC | Steam Trap Repair/Replace | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 60W) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 75W) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 40W) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 100W) | | | | | | | | | | | | |
| CY2018 Program Total Gas CPAS (Therms) | | 69,687 | 69,687 | 69,687 | 69,687 | - | - | - | - | - | - | - | - |
| CY2018 Program Total Gas CPAS (kWh Equivalent) ‡ | | 2,042,538 | 2,042,538 | 2,042,538 | 2,042,538 | - | - | - | - | - | - | - | - |
| CY2018 Program Expiring Gas Savings (Therms) § | | 368,216 | 368,216 | 368,216 | 368,216 | 437,904 | 437,904 | 437,904 | 437,904 | 437,904 | 437,904 | 437,904 | 437,904 |
| CY2018 Program Expiring Gas Savings (kWh Equivalent) ‡§ | | 10,792,421 | 10,792,421 | 10,792,421 | 10,792,421 | 12,834,959 | 12,834,959 | 12,834,959 | 12,834,959 | 12,834,959 | 12,834,959 | 12,834,959 | 12,834,959 |

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 Gross Savings | NTG* | Lifetime Net Savings† | Verified Net kWh Savings (Including Those Converted from Gas Savings) | | | | | | | | | |
|---|---|------|-------------------------------|------|-----------------------|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--|
| | | | | | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | |
| Hot Water | Aerator | 9.0 | 287,967 | 1.0 | 2,591,706 | 287,967 | 287,967 | 287,967 | 287,967 | 287,967 | 287,967 | 287,967 | 287,967 | 287,967 | |
| Shell | Air Sealing | 15.0 | 2,685,665 | 1.0 | 40,284,973 | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | |
| Shell | Attic Insulation | 25.0 | 2,266,654 | 1.0 | 56,666,362 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | |
| HVAC | Boiler Tune-up | 3.0 | 140,085 | 1.0 | 420,254 | 140,085 | 140,085 | 140,085 | | | | | | | |
| HVAC | Central AC | 18.0 | 4,064 | 1.0 | 73,144 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | |
| Hot Water | DHW Boiler | 20.0 | 1,027 | 1.0 | 20,534 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | |
| Shell | Door Sweep | 15.0 | 29,338 | 1.0 | 440,063 | 29,338 | 29,338 | 29,338 | 29,338 | 29,338 | 29,338 | 29,338 | 29,338 | 29,338 | |
| Shell | Door Weatherstrip | 15.0 | 34,290 | 1.0 | 514,356 | 34,290 | 34,290 | 34,290 | 34,290 | 34,290 | 34,290 | 34,290 | 34,290 | 34,290 | |
| Appliances | Energy Star Refrigerator | 12.0 | 23,909 | 1.0 | 192,156 | 23,909 | 23,909 | 23,909 | 23,909 | 12,065 | 12,065 | 12,065 | 12,065 | 12,065 | |
| HVAC | Furnace | 20.0 | 91,506 | 1.0 | 1,830,127 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | |
| HVAC | Hydronic Boiler | 20.0 | 53,995 | 1.0 | 1,079,893 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | |
| Lighting | LED Exit Sign | 16.0 | 215,734 | 1.0 | 3,451,745 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | |
| Lighting | LED Lighting (CA Exterior) | 10.2 | 370,827 | 1.0 | 3,781,957 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | 370,827 | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | 5.7 | 326,537 | 1.0 | 1,862,503 | 326,537 | 326,537 | 326,537 | 326,537 | 326,537 | 229,817 | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | 5.7 | 324,605 | 1.0 | 1,851,484 | 324,605 | 324,605 | 324,605 | 324,605 | 324,605 | 228,457 | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | 5.7 | 202,326 | 1.0 | 655,382 | 202,326 | 96,317 | 96,317 | 96,317 | 96,317 | 67,788 | | | | |
| Lighting | LED Lighting (CA Interior T8) | 8.1 | 449,426 | 1.0 | 3,660,977 | 449,426 | 449,426 | 449,426 | 449,426 | 449,426 | 449,426 | 449,426 | 449,426 | 65,571 | |
| Lighting | LED Lighting (CA Interior T12) | 8.1 | 307,386 | 1.0 | 1,434,013 | 307,386 | 157,661 | 157,661 | 157,661 | 157,661 | 157,661 | 157,661 | 157,661 | 23,003 | |
| Lighting | LED Lighting (IU Specialty) | 10.1 | 109,775 | 1.0 | 1,104,469 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | 109,775 | |
| Lighting | Occupancy Sensor | 8.0 | 10,312 | 1.0 | 82,497 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | 10,312 | |
| HVAC | Pipe Insulation | 15.0 | 1,384,189 | 1.0 | 20,762,834 | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | |
| HVAC | Programmable Thermostat | 5.0 | 321,453 | 1.0 | 1,607,267 | 321,453 | 321,453 | 321,453 | 321,453 | 321,453 | | | | | |
| HVAC | PTHP | 15.0 | 469,986 | 1.0 | 7,049,787 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | |
| Hot Water | Showerhead (CA) | 10.0 | 3,805 | 1.0 | 38,047 | 3,805 | 3,805 | 3,805 | 3,805 | 3,805 | 3,805 | 3,805 | 3,805 | 3,805 | |
| Hot Water | Showerhead (IU) | 10.0 | 936,743 | 1.0 | 9,367,432 | 936,743 | 936,743 | 936,743 | 936,743 | 936,743 | 936,743 | 936,743 | 936,743 | 936,743 | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | 7.0 | 48,101 | 1.0 | 336,707 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | 48,101 | |
| HVAC | Smart Thermostat | 10.0 | 488,057 | 1.0 | 4,880,566 | 488,057 | 488,057 | 488,057 | 488,057 | 488,057 | 488,057 | 488,057 | 488,057 | 488,057 | |
| HVAC | Steam Averaging Controls | 20.0 | 489,428 | 1.0 | 9,788,567 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | |
| HVAC | Steam Boiler | 20.0 | 1,663,204 | 1.0 | 33,264,074 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | |
| HVAC | Steam Trap Repair/Replace | 6.0 | 2,645,963 | 1.0 | 15,875,776 | 2,645,963 | 2,645,963 | 2,645,963 | 2,645,963 | 2,645,963 | 2,645,963 | | | | |
| Lighting | LED Lighting (CA Interior) | 8.4 | 60,902 | 1.0 | 511,775 | 60,902 | 60,902 | 60,902 | 60,902 | 60,902 | 60,902 | 60,902 | 60,902 | 24,562 | |
| Lighting | LED Lighting (IU Standard, 60W) | 10.0 | 130,083 | 1.0 | 637,018 | 130,083 | 130,083 | 130,083 | 35,253 | 35,253 | 35,253 | 35,253 | 35,253 | 35,253 | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | 10.2 | 802 | 1.0 | 4,850 | 802 | 802 | 802 | 339 | 339 | 339 | 339 | 339 | 339 | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | 8.4 | 52,528 | 1.0 | 234,500 | 52,528 | 52,528 | 52,528 | 14,235 | 14,235 | 14,235 | 14,235 | 14,235 | 5,741 | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | 10.2 | 9,732 | 1.0 | 48,177 | 9,732 | 9,732 | 9,732 | 2,637 | 2,637 | 2,637 | 2,637 | 2,637 | 2,637 | |
| Lighting | LED Lighting (IU Standard, 75W) | 10.0 | 4,530 | 1.0 | 23,989 | 4,530 | 4,530 | 4,530 | 1,486 | 1,486 | 1,486 | 1,486 | 1,486 | 1,486 | |
| Lighting | LED Lighting (IU Standard, 40W) | 10.0 | 10,344 | 1.0 | 47,398 | 10,344 | 10,344 | 10,344 | 2,338 | 2,338 | 2,338 | 2,338 | 2,338 | 2,338 | |
| Lighting | LED Lighting (CA Interior, 40W Incandescent) | 10.2 | 2,090 | 1.0 | 8,823 | 2,090 | 2,090 | 2,090 | 472 | 472 | 472 | 472 | 472 | 191 | |
| Lighting | LED Lighting (IU Standard, 100W) | 10 | 1,657 | 1.0 | 9,876 | 1,657 | 1,657 | 1,657 | 701 | 701 | 701 | 701 | 701 | 701 | |
| CY2018 Program Total CPAS | | | 16,659,024 | | 226,496,058 | 16,659,024 | 16,403,290 | 16,403,290 | 16,108,900 | 16,097,057 | 15,554,206 | 12,382,181 | 12,334,080 | 11,760,139 | |
| CY2018 Program Expiring Savings‡ | | | | | | | 255,734 | 255,734 | 550,123 | 561,967 | 1,104,818 | 4,276,843 | 4,324,944 | 4,898,884 | |



ComEd Income Eligible Multi-Family Savings Program Impact Evaluation Report

| End Use Type | Research Category | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 |
|---|---|-------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Hot Water | Aerator | | | | | | | | | | | | |
| Shell | Air Sealing | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | 2,685,665 | | | | | | |
| Shell | Attic Insulation | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 |
| HVAC | Boiler Tune-up | | | | | | | | | | | | |
| HVAC | Central AC | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | 4,064 | | | |
| Hot Water | DHW Boiler | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | 1,027 | |
| Shell | Door Sweep | 29,338 | 29,338 | 29,338 | 29,338 | 29,338 | 29,338 | | | | | | |
| Shell | Door Weatherstrip | 34,290 | 34,290 | 34,290 | 34,290 | 34,290 | 34,290 | | | | | | |
| Appliances | Energy Star Refrigerator | 12,065 | 12,065 | 12,065 | | | | | | | | | |
| HVAC | Furnace | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 | 91,506 |
| HVAC | Hydronic Boiler | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 | 53,995 |
| Lighting | LED Exit Sign | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | 215,734 | | | | | |
| Lighting | LED Lighting (CA Exterior) | 370,827 | 73,683 | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Specialty) | 109,775 | 6,718 | | | | | | | | | | |
| Lighting | Occupancy Sensor | | | | | | | | | | | | |
| HVAC | Pipe Insulation | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | 1,384,189 | | | | | | |
| HVAC | Programmable Thermostat | | | | | | | | | | | | |
| HVAC | PTHP | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | 469,986 | | | | | | |
| Hot Water | Showerhead (CA) | 3,805 | | | | | | | | | | | |
| Hot Water | Showerhead (IU) | 936,743 | | | | | | | | | | | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | | | | | | | | | | | | |
| HVAC | Smart Thermostat | 488,057 | | | | | | | | | | | |
| HVAC | Steam Averaging Controls | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 | 489,428 |
| HVAC | Steam Boiler | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 | 1,663,204 |
| HVAC | Steam Trap Repair/Replace | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 60W) | 35,253 | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | 339 | 67 | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | 2,637 | 522 | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 75W) | 1,486 | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 40W) | 2,338 | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 40W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 100W) | 701 | | | | | | | | | | | |
| CY2018 Program Total CPAS | | 11,353,105 | 9,482,135 | 9,401,145 | 9,389,079 | 9,389,079 | 9,389,079 | 4,785,612 | 4,569,878 | 4,569,878 | 4,565,814 | 4,565,814 | 2,266,654 |
| CY2018 Program Expiring Savings† | | 5,305,919 | 7,176,889 | 7,257,879 | 7,269,944 | 7,269,944 | 7,269,944 | 11,873,412 | 12,089,146 | 12,089,146 | 12,093,209 | 12,093,209 | 14,392,369 |

| End Use Type | Research Category | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
|---|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Hot Water | Aerator | | | | | | | | | | | | |
| Shell | Air Sealing | | | | | | | | | | | | |
| Shell | Attic Insulation | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | | | | | | | | |
| HVAC | Boiler Tune-up | | | | | | | | | | | | |
| HVAC | Central AC | | | | | | | | | | | | |
| Hot Water | DHW Boiler | | | | | | | | | | | | |
| Shell | Door Sweep | | | | | | | | | | | | |
| Shell | Door Weatherstrip | | | | | | | | | | | | |
| Appliances | Energy Star Refrigerator | | | | | | | | | | | | |
| HVAC | Furnace | | | | | | | | | | | | |
| HVAC | Hydronic Boiler | | | | | | | | | | | | |
| Lighting | LED Exit Sign | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 CFL) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior 24/7 T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T8) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior T12) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Specialty) | | | | | | | | | | | | |
| Lighting | Occupancy Sensor | | | | | | | | | | | | |
| HVAC | Pipe Insulation | | | | | | | | | | | | |
| HVAC | Programmable Thermostat | | | | | | | | | | | | |
| HVAC | PTHP | | | | | | | | | | | | |
| Hot Water | Showerhead (CA) | | | | | | | | | | | | |
| Hot Water | Showerhead (IU) | | | | | | | | | | | | |
| Consumer Electronics | Advanced Power Strip (Tier 1) | | | | | | | | | | | | |
| HVAC | Smart Thermostat | | | | | | | | | | | | |
| HVAC | Steam Averaging Controls | | | | | | | | | | | | |
| HVAC | Steam Boiler | | | | | | | | | | | | |
| HVAC | Steam Trap Repair/Replace | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 60W) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 100W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Exterior, 60W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 75W) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 40W) | | | | | | | | | | | | |
| Lighting | LED Lighting (CA Interior, 40W Incandescent) | | | | | | | | | | | | |
| Lighting | LED Lighting (IU Standard, 100W) | | | | | | | | | | | | |
| CY2018 Program Total CPAS | | 2,266,654 | 2,266,654 | 2,266,654 | 2,266,654 | - | - | - | - | - | - | - | - |
| CY2018 Program Expiring Savings‡ | | 14,392,369 | 14,392,369 | 14,392,369 | 14,392,369 | 16,659,024 | 16,659,024 | 16,659,024 | 16,659,024 | 16,659,024 | 16,659,024 | 16,659,024 | 16,659,024 |

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

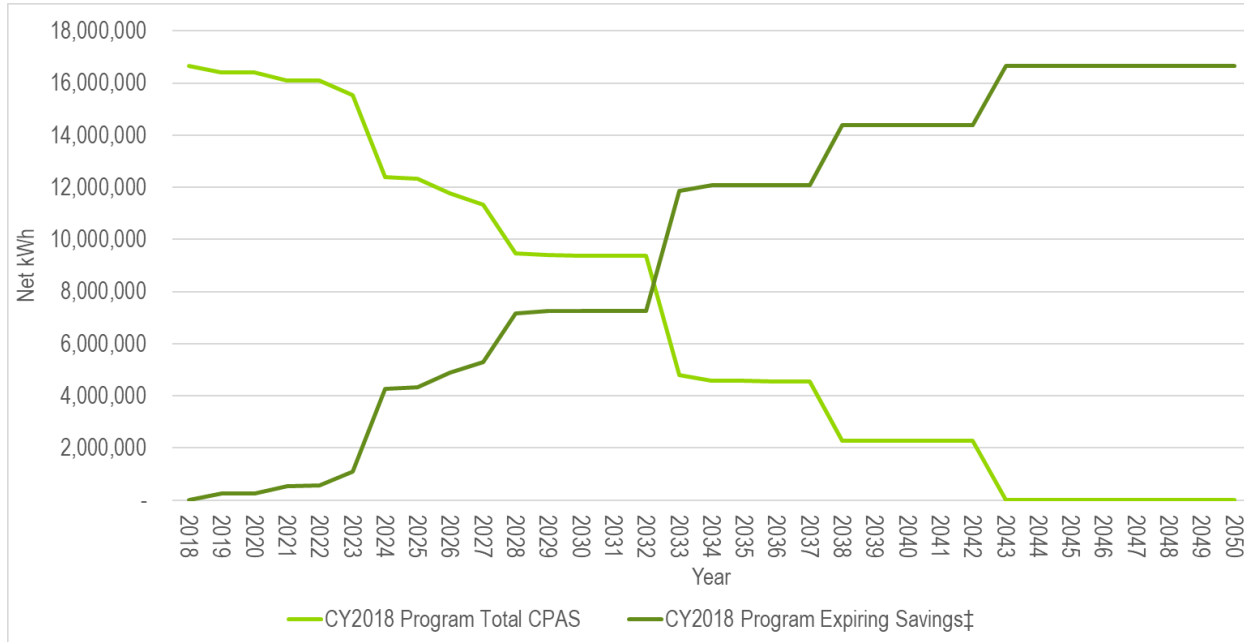
* A deemed value. Source: ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.xlsx, which is to be found on the IL SAG web site here: <http://ilsag.info/net-to-gross-framework.html>.

†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 22 measures as shown in the following tables. The LED lighting measure contributed the most savings, representing 67% of the verified gross kWh savings, followed by packaged terminal heat pump (PTHP) which represents 12% of the verified gross kWh savings. The rest of the savings come from attic insulation, air sealing, programmable thermostats and the other remaining 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 |
|----------------------|-------------------------------|-----------------------------|---------------------------------|------------------------------|------|----------------------------|-----------------------|
| Hot Water | Aerator | 5,213 | 1.00 | 5,213 | 1.00 | 5,213 | 9.0 |
| Shell | Air Sealing | 180,113 | 1.24 | 223,182 | 1.00 | 223,182 | 15.0 |
| Shell | Attic Insulation | 203,768 | 1.10 | 224,116 | 1.00 | 224,116 | 25.0 |
| HVAC | Boiler Tune-up | 0 | NA | 0 | 1.00 | 0 | 3.0 |
| HVAC | Central AC | 4,064 | 1.00 | 4,064 | 1.00 | 4,064 | 18.0 |
| Hot Water | DHW Boiler | 0 | NA | 0 | 1.00 | 0 | 20.0 |
| Shell | Door Sweep | 0 | NA | 0 | 1.00 | 0 | 15.0 |
| Shell | Door Weatherstrip | 0 | NA | 0 | 1.00 | 0 | 15.0 |
| Appliances | Energy Star Refrigerator | 23,914 | 1.00 | 23,909 | 1.00 | 23,909 | 12.0 |
| HVAC | Furnace | 19,032 | 1.00 | 19,032 | 1.00 | 19,032 | 20.0 |
| HVAC | Hydronic Boiler | 0 | NA | 0 | 1.00 | 0 | 20.0 |
| Lighting | LED Lighting | 2,665,835 | 0.97 | 2,579,284 | 1.00 | 2,579,284 | 8.5 |
| Lighting | Occupancy Sensor | 10,312 | 1.00 | 10,312 | 1.00 | 10,312 | 8.0 |
| HVAC | Pipe Insulation | 0 | NA | 0 | 1.00 | 0 | 15.0 |
| HVAC | Programmable Thermostat | 174,124 | 0.98 | 171,143 | 1.00 | 171,143 | 5.0 |
| HVAC | PTHP | 523,858 | 0.90 | 469,986 | 1.00 | 469,986 | 15.0 |
| Hot Water | Showerhead | 13,646 | 1.00 | 13,645 | 1.00 | 13,645 | 10.0 |
| Consumer Electronics | Advanced Power Strip (Tier 1) | 33,157 | 1.45 | 48,101 | 1.00 | 48,101 | 7.0 |
| HVAC | Smart Thermostat | 28,363 | 1.13 | 32,079 | 1.00 | 32,079 | 10.0 |
| HVAC | Steam Averaging Controls | 0 | NA | 0 | 1.00 | 0 | 20.0 |
| HVAC | Steam Boiler | 0 | NA | 0 | 1.00 | 0 | 20.0 |
| HVAC | Steam Trap Repair/Replace | 0 | NA | 0 | 1.00 | 0 | 6.0 |
| Total | | 3,885,398 | 0.98 | 3,824,064 | | 3,824,064 | |

* 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 applicable

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) |
|----------------------|-------------------------------|-------------------------------------|---------------------------------|--------------------------------------|------|------------------------------------|
| Hot Water | Aerator | NA | NA | 100.20 | 1.00 | 100.20 |
| Shell | Air Sealing | NA | NA | 0.00 | 1.00 | 0.00 |
| Shell | Attic Insulation | NA | NA | 35.51 | 1.00 | 35.51 |
| HVAC | Boiler Tune-up | NA | NA | 0.00 | 1.00 | 0.00 |
| HVAC | Central AC | NA | NA | 1.76 | 1.00 | 1.76 |
| Hot Water | DHW Boiler | NA | NA | 0.00 | 1.00 | 0.00 |
| Shell | Door Sweep | NA | NA | 0.00 | 1.00 | 0.00 |
| Shell | Door Weatherstrip | NA | NA | 0.00 | 1.00 | 0.00 |
| Appliances | Energy Star Refrigerator | NA | NA | 2.73 | 1.00 | 2.73 |
| HVAC | Furnace | NA | NA | 12.00 | 1.00 | 12.00 |
| HVAC | Hydronic Boiler | NA | NA | 0.00 | 1.00 | 0.00 |
| Lighting | LED Lighting | NA | NA | 658.82 | 1.00 | 658.82 |
| Lighting | Occupancy Sensor | NA | NA | 6.21 | 1.00 | 6.21 |
| HVAC | Pipe Insulation | NA | NA | 0.00 | 1.00 | 0.00 |
| HVAC | Programmable Thermostat | NA | NA | 0.00 | 1.00 | 0.00 |
| HVAC | PTHP | NA | NA | 11.15 | 1.00 | 11.15 |
| Hot Water | Showerhead | NA | NA | 55.02 | 1.00 | 55.02 |
| Consumer Electronics | Advanced Power Strip (Tier 1) | NA | NA | 6.75 | 1.00 | 6.75 |
| HVAC | Smart Thermostat | NA | NA | 31.34 | 1.00 | 31.34 |
| HVAC | Steam Averaging Controls | NA | NA | 0.00 | 1.00 | 0.00 |
| HVAC | Steam Boiler | NA | NA | 0.00 | 1.00 | 0.00 |
| HVAC | Steam Trap Repair/Replace | NA | NA | 0.00 | 1.00 | 0.00 |
| Total | | | | 921.47 | | 921.47 |

* 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 applicable

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) |
|----------------------|-------------------------------|--|---------------------------------|---|------|---|
| Hot Water | Aerator | 2.20 | 1.00 | 2.20 | 1.00 | 2.20 |
| Shell | Air Sealing | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| Shell | Attic Insulation | 0.00 | NA | 24.14 | 1.00 | 24.14 |
| HVAC | Boiler Tune-up | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| HVAC | Central AC | 0.00 | NA | 1.20 | 1.00 | 1.20 |
| Hot Water | DHW Boiler | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| Shell | Door Sweep | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| Shell | Door Weatherstrip | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| Appliances | Energy Star Refrigerator | 0.00 | NA | 3.60 | 1.00 | 3.60 |
| HVAC | Furnace | 0.00 | NA | 8.16 | 1.00 | 8.16 |
| HVAC | Hydronic Boiler | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| Lighting | LED Lighting | 282.71 | 0.97 | 273.85 | 1.00 | 273.85 |
| Lighting | Occupancy Sensor | 3.97 | 1.00 | 3.97 | 1.00 | 3.97 |
| HVAC | Pipe Insulation | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| HVAC | Programmable Thermostat | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| HVAC | PTHP | 0.00 | NA | 10.18 | 1.00 | 10.18 |
| Hot Water | Showerhead | 1.53 | 1.00 | 1.53 | 1.00 | 1.53 |
| Consumer Electronics | Advanced Power Strip (Tier 1) | 5.42 | 1.00 | 5.40 | 1.00 | 5.40 |
| HVAC | Smart Thermostat | 20.10 | 0.54 | 10.79 | 1.00 | 10.79 |
| HVAC | Steam Averaging Controls | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| HVAC | Steam Boiler | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| HVAC | Steam Trap Repair/Replace | 0.00 | NA | 0.00 | 1.00 | 0.00 |
| Total | | 315.93 | 1.09 | 345.02 | | 345.02 |

* 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 applicable

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 |
|---|-------------------------------|-----------------------|---------------------------------|------------------------|------|----------------------|-----------------------|
| Hot Water | Aerator | 9,647 | 1.00 | 9,647 | 1.00 | 9,647 | 9.0 |
| Shell | Air Sealing | 84,043 | 1.00 | 84,015 | 1.00 | 84,015 | 15.0 |
| Shell | Attic Insulation | 69,842 | 1.00 | 69,687 | 1.00 | 69,687 | 25.0 |
| HVAC | Boiler Tune-up | 5,929 | 0.81 | 4,779 | 1.00 | 4,779 | 3.0 |
| HVAC | Central AC | 0 | NA | 0 | 1.00 | 0 | 18.0 |
| Hot Water | DHW Boiler | 35 | 1.00 | 35 | 1.00 | 35 | 20.0 |
| Shell | Door Sweep | 1,001 | 1.00 | 1,001 | 1.00 | 1,001 | 15.0 |
| Shell | Door Weatherstrip | 1,182 | 0.99 | 1,170 | 1.00 | 1,170 | 15.0 |
| Appliances | Energy Star Refrigerator | 0 | NA | 0 | 1.00 | 0 | 12.0 |
| HVAC | Furnace | 2,607 | 0.95 | 2,473 | 1.00 | 2,473 | 20.0 |
| HVAC | Hydronic Boiler | 1,842 | 1.00 | 1,842 | 1.00 | 1,842 | 20.0 |
| Lighting | LED Lighting | 0 | NA | 0 | 1.00 | 0 | 8.5 |
| Lighting | Occupancy Sensor | 0 | NA | 0 | 1.00 | 0 | 8.0 |
| HVAC | Pipe Insulation | 52,945 | 0.89 | 47,226 | 1.00 | 47,226 | 15.0 |
| HVAC | Programmable Thermostat | 7,785 | 0.66 | 5,128 | 1.00 | 5,128 | 5.0 |
| HVAC | PTHP | 0 | NA | 0 | 1.00 | 0 | 15.0 |
| Hot Water | Showerhead | 31,530 | 1.00 | 31,624 | 1.00 | 31,624 | 10.0 |
| Consumer Electronics | Advanced Power Strip (Tier 1) | 0 | NA | 0 | 1.00 | 0 | 7.0 |
| HVAC | Smart Thermostat | 18,339 | 0.85 | 15,557 | 1.00 | 15,557 | 10.0 |
| HVAC | Steam Averaging Controls | 17,829 | 0.94 | 16,698 | 1.00 | 16,698 | 20.0 |
| HVAC | Steam Boiler | 57,165 | 0.99 | 56,745 | 1.00 | 56,745 | 20.0 |
| HVAC | Steam Trap Repair/Replace | 90,273 | 1.00 | 90,275 | 1.00 | 90,275 | 6.0 |
| Total Therms | | 451,995 | 0.97 | 437,904 | | 437,904 | |
| Total kWh Converted From Therms† | | 13,247,967 | 0.97 | 12,834,959 | | 12,834,959 | |

* 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 applicable

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

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) |
|----------------------|-------------------------------|-----------------------------|---------------------------------|------------------------------|------|----------------------------|
| Hot Water | Aerator | 287,966 | 1.00 | 287,967 | 1.00 | 287,967 |
| Shell | Air Sealing | 2,643,408 | 1.02 | 2,685,665 | 1.00 | 2,685,665 |
| Shell | Attic Insulation | 2,250,832 | 1.01 | 2,266,654 | 1.00 | 2,266,654 |
| HVAC | Boiler Tune-up | 173,773 | 0.81 | 140,085 | 1.00 | 140,085 |
| HVAC | Central AC | 4,064 | 1.00 | 4,064 | 1.00 | 4,064 |
| Hot Water | DHW Boiler | 1,027 | 1.00 | 1,027 | 1.00 | 1,027 |
| Shell | Door Sweep | 29,336 | 1.00 | 29,338 | 1.00 | 29,338 |
| Shell | Door Weatherstrip | 34,652 | 0.99 | 34,290 | 1.00 | 34,290 |
| Appliances | Energy Star Refrigerator | 23,914 | 1.00 | 23,909 | 1.00 | 23,909 |
| HVAC | Furnace | 95,456 | 0.96 | 91,506 | 1.00 | 91,506 |
| HVAC | Hydronic Boiler | 53,995 | 1.00 | 53,995 | 1.00 | 53,995 |
| Lighting | LED Lighting | 2,665,835 | 0.97 | 2,579,284 | 1.00 | 2,579,284 |
| Lighting | Occupancy Sensor | 10,312 | 1.00 | 10,312 | 1.00 | 10,312 |
| HVAC | Pipe Insulation | 1,551,824 | 0.89 | 1,384,189 | 1.00 | 1,384,189 |
| HVAC | Programmable Thermostat | 402,308 | 0.80 | 321,453 | 1.00 | 321,453 |
| HVAC | PTHP | 523,858 | 0.90 | 469,986 | 1.00 | 469,986 |
| Hot Water | Showerhead | 937,794 | 1.00 | 940,548 | 1.00 | 940,548 |
| Consumer Electronics | Advanced Power Strip (Tier 1) | 33,157 | 1.45 | 48,101 | 1.00 | 48,101 |
| HVAC | Smart Thermostat | 565,879 | 0.86 | 488,057 | 1.00 | 488,057 |
| HVAC | Steam Averaging Controls | 522,576 | 0.94 | 489,428 | 1.00 | 489,428 |
| HVAC | Steam Boiler | 1,675,499 | 0.99 | 1,663,204 | 1.00 | 1,663,204 |
| HVAC | Steam Trap Repair/Replace | 2,645,900 | 1.00 | 2,645,963 | 1.00 | 2,645,963 |
| Total† | | 17,133,364 | 0.97 | 16,659,024 | | 16,659,024 |

* 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. Navigant also conducted research to validate the parameters that were not specified in the TRM.

Table 6-1. Savings Parameters

| Measure | Custom Input Parameters | Deemed Input Parameters | Deemed* Input Data Source |
|--------------------------|--|---|---|
| Aerator | None | %Electric_DHW, GPM_base, GPM_low, L_base, L_low, Household, DF, FPH, EPG_electric, ISR, Hours, %Fossil_DHW, EPG_gas | IL TRM v6.0 – Section 5.4.4 |
| Air Sealing | LF_sealing | Δ Therms_sealing, ADJ_RXAirsealing | IL TRM v6.0 – Section 5.6.1 |
| 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 |
| Boiler Tune-up | Capacity, Eff_actual, Eff_base | EFLH | IL TRM v6.0 – Section 4.4.10 |
| Central AC | Capacity, SEER_ee, EER_ee, SEER_base, EER_base | FLH_cool | IL TRM v6.0 – Section 5.3.3 |
| DHW Boiler | Eff_ee, Eff_base, Household | T_out, T_in, GPD, Specific Heat of Water, Specific Weight of Water | IL TRM v6.0 – Section 4.3.10 |
| Door Sweep | N_sweep | Δ Therms_sweep, ADJ_RXAirsealing | IL TRM v6.0 – Section 5.6.1 |
| Door Weatherstrip | LF_weatherstripping | Δ Therms_wx, ADJ_RXAirsealing | IL TRM v6.0 – Section 5.6.1 |
| Energy Star Refrigerator | UEC_exist, UEC_base, UEC_ee, | TAF, LSAF, Hours | IL TRM v6.0 – Section 5.1.6 |
| Furnace | AFUE_ee | Heating Savings_kWh, Cooling Savings_kWh, Shoulder Season Savings_kWh, FLH_cooling, CF, Gas Furnace Heating Load, HF, AFUE_base, Derating_base, Derating_ee | IL TRM v6.0 – Section 5.3.7 |
| Hydronic Boiler | Capacity, Eff_actual, Eff_base | EFLH | IL TRM v6.0 – Section 4.4.10 |
| 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 |
| Occupancy Sensor | kW_controlled | Hours, ESF, WHF_e, WHF_d, CF_baseline, CF_os | IL TRM v6.0 – Section 4.5.10 |
| Pipe Insulation | (Q_base – Q_eff), R_new, L, C | EFLH, Eff_boiler, TRF, R_exist, Eff_DHW, Δ T | IL TRM v6.0 – Section 4.4.14, Section 5.4.1 |
| Programmable Thermostat | None | %Electric Heat, Elec_Heating_Consumption, Heating Reduction, HF, ISR, Δ Therms, F_e, %Fossil Heat, Gas_Heating_Consumption | IL TRM v6.0 – Section 5.3.11 |
| 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 |
| Showerhead | None | %Fossil_DHW, GPM_base, GPM_low, L_base, L_low, NSPD, EPG_gas, ISR, %Electric_DHW, SPCD, Household, SPH, EPG_electric, ISR, Hours, CF | IL TRM v6.0 – Section 5.4.5, Section 4.3.3 |
| Smart Strip (Tier 1) | None | kWh, ISR, Hours, CF | IL TRM v6.0 – Section 5.2.1 |
| Smart Thermostat | None | %AC, FLH, Btu/hr, SEER, Cooling_Reduction, ISR, F_e, CF, %Fossil_Heat, Gas_Heating_Consumption, Heating Reduction | IL TRM v6.0 – Section 5.3.16 |

| Measure | Custom Input Parameters | Deemed Input Parameters | Deemed* Input Data Source |
|-------------------------------|--------------------------------|-------------------------|------------------------------|
| Steam Averaging Controls | Capacity | SF, EFLH | IL TRM v6.0 – Section 4.4.36 |
| Steam Boiler | Capacity, Eff_actual, Eff_base | EFLH | IL TRM v6.0 – Section 4.4.10 |
| Steam Trap Repair/Replacement | Total Heating Load, %Cap | S_a, H_v, B, Hours, L | IL TRM v6.0 – Section 4.4.16 |

* 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 Pipe Insulation (Common Area [CA], Domestic Hot Water [DHW]) measure, the ex ante savings are calculated using a boiler efficiency of 0.67, while the section 4.4.14 of the IL TRM v6.0 deems an efficiency value of 0.819 for water boilers.

Recommendation 1. Navigant recommends updating the boiler efficiency for this measure to 0.819 as per the IL TRM v6.0.

Finding 2. For the Advanced Power Strip Tier 1 (APS) measure, the ex ante savings are calculated using an ISR of 0.69, while the section 5.2.1 of the IL TRM v6.0 deems and ISR of 1.0 for direct install APS measures.

Recommendation 2. Navigant recommends updating the ISR for this measure to 1 as per the IL TRM v6.0.

Finding 3. For the Gas Showerhead (CA) measure, the ex ante savings are calculated using the algorithm deemed in section 5.4.5 of the IL TRM v6.0, which only applied to measures installed inside apartment units.

Recommendation 3. Navigant recommends calculating the energy savings using section 4.3.3 of the IL TRM v6.0, which applies to measures installed in common areas of a multi-family building.

Finding 4. For the Steam Boiler, PTHP, Steam Pipe Averaging Controls and Boiler Tune-up measures, the ex ante savings are calculated using the IL TRM v6.0 deemed Equivalent Full Load Hours (EFLH) for Multi-family Mid-Rise building type even though the tracking data indicates that some of the buildings are Multi-family High-Rise buildings.

Recommendation 4. Navigant recommends using the appropriate IL TRM v6.0 deemed EFLH for heating and cooling for each building type.

Finding 5. For the Attic Insulation measure, the ex ante calculations do not consider the cooling system demand savings for centrally cooled buildings and cooling system energy savings for some of the centrally cooled buildings. Additionally, the ex ante calculations do not consider heating system energy savings for some buildings that are heated using a furnace.

Recommendation 5. Navigant recommends updating the ex ante calculations to include energy and demand savings for centrally cooled buildings and energy savings for buildings that are heated using a furnace.

Finding 6. The demand savings provided in the tracking data for the Smart Thermostat and therm savings for the Attic Insulation measure (Project ID: 10001019) respectively do not align with the corresponding inputs provided in the tracking data.

Recommendation 6. Navigant recommends providing the source of the ex ante demand savings provided in the tracking data.

Finding 7. For the Smart Thermostat (Programmable, Gas Furnace and AC) measure, the ex ante energy savings are calculated using a Heating Reduction (HR) factor of 8.8%, which is the IL TRM v6.0 deemed value for smart thermostat measures replacing Manual Thermostats.

Recommendation 7. Navigant recommends using the HR factor of 5.6% instead, which is the IL TRM v6.0 deemed value for smart thermostats replacing Programmable Thermostats.

Finding 8.

The ex ante savings for the LED Common Area (CA) measures are calculated using an In-Service Rate (ISR) of 1.00, while the verified savings are calculated using an ISR of 0.957 as per the measure section 4.5.4 of the IL TRM v6.0.

The ex ante savings for the 15W LED Flood (CA Exterior, 23W CFL) measure are calculated using 2475 as the hours of use, while the verified savings are calculated using 4903 as the hours of use as per the IL TRM v6.0 for exterior space type.

The ex ante savings for the 2ft by 2ft LED Troffer (CA Interior, 2L 2ft T8/T12U) measure are not consistent with the deemed inputs for this measure in the implementer's calculator.

The ex ante savings for the 4W LED Candelabra (CA Interior, 40W Incandescent) measure are not included in the implementer's calculator.

The ex ante savings for the 5W LED Candelabra (IU Exterior, 40W) and the 6/12/19W LED 3-Way (IU Interior, 50/100/150W) measures are calculated using an ISR of 1.00, while the verified savings are calculated using an ISR of 0.969 as per the measure section 5.5.6 of the IL TRM v6.0.

The ex ante savings for the 2ft by 2ft LED Troffer and 2ft by 4ft LED Troffer measures are calculated using a blended baseline of 80% T12s and 20% T8s.

Recommendation 8.

Update the ISR for the LED Common Area measures to 0.957 as per the IL TRM v6.0.

Update the hours of use for the 15W LED Flood (CA Exterior, 23W CFL) measure to 4903 as per the IL TRM v6.0.

Navigant would like to request the algorithm used to calculate the ex ante savings for the 2ft by 2ft LED Troffer (CA Interior, 2L 2ft T8/T12U) measure.

Navigant would like to request the algorithm and the deemed inputs used to calculate the ex ante savings for the 4W LED Candelabra (CA Interior, 40W Incandescent) measure.

Update the ISR for the 5W LED Candelabra (IU Exterior, 40W) and the 6/12/19W LED 3-Way (IU Interior, 50/100/150W) measures to 0.969 as per the IL TRM v6.0.

Track the actual baseline lamp type for the 2ft by 2ft LED Troffer and 2ft by 4ft LED Troffer measures and use the corresponding Watts base to calculate the energy and demand savings.

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.
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 (NTG) ratio. In CY2018, the NTG ratio estimates used to calculate the net verified savings were based on past evaluation research and defined by a consensus process through Illinois Stakeholder Advisory Group (IL:SAG), as documented in a spreadsheet.³

Navigant downloaded the final tracking data and measure workbook for the CY2018 impact evaluation from the ComEd eTRACK file site. We relied on the following documents to verify the per-unit savings for each program measure:

- Final CY2018 tracking data: "MFIE_2018_EOY_Data_Rev1_02012019"
- 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: "2018_IEMS_PHES_Variable Documentation_112318"
- Implementer Savings Calculations: "corrected_measures_comed_111218"
- Implementer Savings Calculations: "Sample for Elevate_03082019_resubmission"

8. APPENDIX 3. TOTAL RESOURCE COST DETAIL

Table 8-1, 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 8-1. Total Resource Cost Savings Summary

| End Use Type | Research Category | Units | Quantity | Effective Useful Life | Verified Gross Savings (kWh) | Verified Gross Peak Demand Reduction (kW) | Verified Gross Savings Therms | Gross Heating Penalty (kWh) | Gross Heating Penalty (Therms) | NTG Ratio | Verified Net Savings (kWh) | Verified Net Peak Demand Reduction (kW) | Verified Net Savings Therms | Net Heating Penalty (kWh) | Net Heating Penalty (Therms) |
|----------------------|-------------------------------|-------------|----------|-----------------------|------------------------------|---|-------------------------------|-----------------------------|--------------------------------|-----------|----------------------------|---|-----------------------------|---------------------------|------------------------------|
| Hot Water | Aerator | Each | 3,676 | 9.0 | 5,213 | 2.20 | 9,647 | 0 | 0 | 1.00 | 5,213 | 2.20 | 9,647 | 0 | 0 |
| Shell | Air Sealing | Linear Feet | 249,667 | 15.0 | 223,182 | 0.00 | 84,015 | 0 | 0 | 1.00 | 223,182 | 0.00 | 84,015 | 0 | 0 |
| Shell | Attic Insulation | Square Feet | 724,431 | 25.0 | 224,116 | 24.14 | 69,687 | 0 | 0 | 1.00 | 224,116 | 24.14 | 69,687 | 0 | 0 |
| HVAC | Boiler Tune-up | kBtu/hr | 25,771 | 3.0 | 0 | 0.00 | 4,779 | 0 | 0 | 1.00 | 0 | 0.00 | 4,779 | 0 | 0 |
| HVAC | Central AC | Each | 26 | 18.0 | 4,064 | 1.20 | 0 | 0 | 0 | 1.00 | 4,064 | 1.20 | 0 | 0 | 0 |
| Hot Water | DHW Boiler | Each | 2 | 20.0 | 0 | 0.00 | 35 | 0 | 0 | 1.00 | 0 | 0.00 | 35 | 0 | 0 |
| Shell | Door Sweep | Each | 159 | 15.0 | 0 | 0.00 | 1,001 | 0 | 0 | 1.00 | 0 | 0.00 | 1,001 | 0 | 0 |
| Shell | Door Weatherstrip | Each | 169 | 15.0 | 0 | 0.00 | 1,170 | 0 | 0 | 1.00 | 0 | 0.00 | 1,170 | 0 | 0 |
| Appliances | Energy Star Refrigerator* | Each | 307 | 12.0 | 23,909 | 3.60 | 0 | 0 | 0 | 1.00 | 23,909 | 3.60 | 0 | 0 | 0 |
| HVAC | Furnace | Each | 26 | 20.0 | 19,032 | 8.16 | 2,473 | 0 | 0 | 1.00 | 19,032 | 8.16 | 2,473 | 0 | 0 |
| HVAC | Hydronic Boiler | kBtu/hr | 958 | 20.0 | 0 | 0.00 | 1,842 | 0 | 0 | 1.00 | 0 | 0.00 | 1,842 | 0 | 0 |
| Lighting | LED Lighting* | Lamp | 21,582 | 8.5 | 2,579,284 | 273.85 | 0 | 149,561 | 40,243 | 1.00 | 2,579,284 | 273.85 | 0 | 149,561 | 40,243 |
| Lighting | Occupancy Sensor | Each | 45 | 8.0 | 10,312 | 3.97 | 0 | 0 | 226 | 1.00 | 10,312 | 3.97 | 0 | 0 | 226 |
| HVAC | Pipe Insulation | Linear Feet | 22,820 | 15.0 | 0 | 0.00 | 47,226 | 0 | 0 | 1.00 | 0 | 0.00 | 47,226 | 0 | 0 |
| HVAC | Programmable Thermostat | Each | 350 | 5.0 | 171,143 | 0.00 | 5,128 | 0 | 0 | 1.00 | 171,143 | 0.00 | 5,128 | 0 | 0 |
| HVAC | PTHP | Each | 240 | 15.0 | 469,986 | 10.18 | 0 | 0 | 0 | 1.00 | 469,986 | 10.18 | 0 | 0 | 0 |
| Hot Water | Showerhead | Each | 2,092 | 10.0 | 13,645 | 1.53 | 31,624 | 0 | 0 | 1.00 | 13,645 | 1.53 | 31,624 | 0 | 0 |
| Consumer Electronics | Advanced Power Strip (Tier 1) | Each | 467 | 7.0 | 48,101 | 5.40 | 0 | 0 | 0 | 1.00 | 48,101 | 5.40 | 0 | 0 | 0 |
| HVAC | Smart Thermostat | Each | 359 | 10.0 | 32,079 | 10.79 | 15,557 | 0 | 0 | 1.00 | 32,079 | 10.79 | 15,557 | 0 | 0 |
| HVAC | Steam Averaging Controls | Each | 768 | 20.0 | 0 | 0.00 | 16,698 | 0 | 0 | 1.00 | 0 | 0.00 | 16,698 | 0 | 0 |
| HVAC | Steam Boiler | kBtu/hr | 56,823 | 20.0 | 0 | 0.00 | 56,745 | 0 | 0 | 1.00 | 0 | 0.00 | 56,745 | 0 | 0 |
| HVAC | Steam Trap Repair/Replace | Each | 2,673 | 6.0 | 0 | 0.00 | 90,275 | 0 | 0 | 1.00 | 0 | 0.00 | 90,275 | 0 | 0 |

Source: ComEd tracking data and Navigant team analysis.

*The CY2018 contribution to CPAS for these measures varies over time. See CPAS tables in section 4.

³ 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>.