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| **ComEd** **Heat Pump Water Heater Pilot Program Impact Evaluation Report**  Energy Efficiency/Demand Response Plan:  Program Year 2023 (CY2023)  (1/1/2023-12/31/2023) | | | | | | | |
| Prepared for:  ComEd  DRAFT  March 4, 2024 | | | | | | | |
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# Introduction

This report presents the results of the impact evaluation of the Heat Pump Water Heater pilot from the program year from January 1 to December 31, 2023 (CY2023). The program was designed to examine heat pump water heater (HPWH) technology and market to better understand potential energy savings, customer experiences and supply chain implications. The pilot looks to install 50 HPWHs across various income levels and fuel types for residential customers. Energy savings goal are not the main focus for this pilot. ComEd seeks to understand the market actors and customer experience when installing HPWHs.

# Program Savings Detail

Table 1 summarizes the incremental energy and demand savings the Heat Pump Water Heater pilot achieved in CY2023. The gas or other fuel savings are only those that ComEd may be able to claim, which excludes savings the gas utilities claim, either via joint or non-joint programs.[[1]](#footnote-2) The electrification savings are those resulting from fuel switching measures.[[2]](#footnote-3)

Table 1. Total Annual Incremental Electric Savings - Total

| Savings Category | Units | Ex Ante Gross Savings\* | Program Gross Realization Rate | Verified Gross Savings\* | Program Net-to-Gross Ratio (NTG) | CY2021 Net Carryover Savings | CY2022 Net Carryover Savings | Verified Net Savings† |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Electric Energy Savings - Direct‡ | kWh | 23,465 | 1.09 | 25,545 | 0.8 |  |  | 20,436 |
| Electric Energy Savings -  Converted from Other Fuel§ | kWh |  |  | -631 | 0.8 |  |  | -505 |
| Electric Energy Savings - Indirect from Fuel Switching (through Electrification)|| | kWh | 117,356 |  | 110,386 | 0.8/1.0 |  |  | 90,682 |
| Total Electric Energy Savings# | kWh | 140,821 | 0.96 | 135,300 | 0.8 |  |  | 110,614 |
| Total Electric Energy Savings  Including Carryover# | kWh |  |  | 0 | 0.8 |  |  | 0 |
| Summer Peak\*† Demand Savings | kW | 7 | 0.16 | 1 | 0.8 |  |  | 1 |
| Summer Peak\*† Demand Savings   Including Carryover | kW |  |  | 0 | 0.8 |  |  | 0 |

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

\* The “Ex Ante Gross Savings" and “Verified Gross Savings" in row one (Electric Energy Savings - Direct) and row six (Summer Peak Demand Savings) exclude gross carryover savings from CY2021 and CY2022.

† The “Verified Net Savings” in row one and row six include net carryover savings from CY2021 and CY2022 (excludes carryover savings as they don’t apply to this program).

‡ The Electric Energy Savings - Direct includes primary kWh savings from efficient measures (includes efficiency savings from fuel switching measures but excludes the fuel switching savings), secondary kWh savings from wastewater treatment, and electric heating penalties.

§ Gas savings converted to kWh by multiplying Therms \* 29.31 (which is based on 100,000 Btu/Therm and 3,412 Btu/kWh) and/or propane savings converted to kWh by multiplying Gallons \* 26.77 (which is based on 91,333 Btu/Gallon and 3,412 Btu/kWh). The evaluation team will determine which other fuel savings will be converted to kWh and counted toward ComEd's electric savings goal while producing the portfolio-wide Summary Report.

|| Electrification savings from fuel switching measures excluding direct efficiency savings. Calculated from net electric savings from increase in kWh consumption and decrease in gas consumption from fuel switching (kWh equivalent).

# Total Electric Energy Savings is the sum of the Electric Energy Savings - Direct, the Electric Energy Savings Converted from Other Fuel, and the Electrification Savings from fuel switching. Note: This row does not include carryover gross savings, but the next one includes carryover verified gross savings, for the purpose of recalculating the gross realization rate resulting from including carryover savings (same for the peak demand savings).

\*† The Peak Demand Savings are savings occurring at coincident Summer Peak period, defined as 1:00-5:00 PM Central Prevailing Time on non-holiday weekdays, June through August. This definition is in accordance with PJM requirement.

- The program-level NTG values are calculated as Verified Net/Verified Gross. The program-level analysis typically used measure-level deemed NTG values, which are listed here: https://www.ilsag.info/evaluator-ntg-recommendations-for-2023.

Source: Evaluation team analysis

# Cumulative Persisting Annual Savings

Table 2 to Table 4 show the cumulative persisting annual savings (CPAS) for the measures installed in CY2023. The electric CPAS across all measures installed in 2023 is shown in Table 2. The gas and other fuel contribution to CPAS (converted to equivalent electricity) are shown in Table 3. The combined savings are shown in Table 4.

Table 2. CPAS – Electric

|  | | | CPAS Verified Net kWh Savings | | | |  | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Savings Category | Verified Gross Savings (kWh) | Lifetime Net Savings (kWh)† | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| CY2023 Program Total Contribution to CPAS | 135,931 | 1,666,781 |  |  |  |  |  | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 |
| Historic Program Total Contribution to CPAS‡ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total CPAS | 135,931 | 1,666,781 | 0 | 0 | 0 | 0 | 0 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 |
| CY2023 Program Incremental Expiring Savings§ |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 |
| Historic Program Incremental Expiring Savings|| |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Savings# |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 | 0 |

| Savings Category | Verified Gross Savings (kWh) | Lifetime Net Savings (kWh)† | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CY2023 Program Total Contribution to CPAS | 135,931 | 1,666,781 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 0 | 0 |
| Historic Program Total Contribution to CPAS‡ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total CPAS | 135,931 | 1,666,781 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 111,119 | 0 | 0 |
| CY2023 Program Incremental Expiring Savings§ |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 111,119 | 0 |
| Historic Program Incremental Expiring Savings|| |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Savings# |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 111,119 | 0 |

| Savings Category | Verified Gross Savings (kWh) | Lifetime Net Savings (kWh)† | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CY2023 Program Total Contribution to CPAS | 135,931 | 1,666,781 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic Program Total Contribution to CPAS‡ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total CPAS | 135,931 | 1,666,781 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CY2023 Program Incremental Expiring Savings§ |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic Program Incremental Expiring Savings|| |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Savings# |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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

‡ Historical savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Yn-1 - CPAS Yn.

|| Historic incremental expiring savings are equal to Historic CPAS Yn-1 – Historic CPAS Yn.

# Program total incremental expiring savings are equal to current year total incremental expiring savings plus historic total incremental expiring savings.

Source: Evaluation team analysis

Table 3. CPAS – Other Fuel (Gas + Propane)

|  | | | CPAS Verified Net Therms Savings | | | |  | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Savings Category | Verified Gross Savings (Therms) | Lifetime Net Savings† | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| CY2023 Program Total Other Fuel Contribution to CPAS (Therms) | -22 | -258 |  |  |  |  |  | -17 | -17 | -17 | -17 | -17 | -17 |
| CY2023 Program Total Other Fuel Contribution to CPAS (kWh Equivalent)‡ | -631 |  |  |  |  |  |  | -505 | -505 | -505 | -505 | -505 | -505 |
| Historic Program Total Other Fuel Contribution to CPAS (kWh Equivalent)§ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total Other Fuel CPAS (kWh Equivalent) | -631 | 0 | 0 | 0 | 0 | 0 | 0 | -505 | -505 | -505 | -505 | -505 | -505 |
| CY2023 Program Incremental Expiring Other Fuel Savings (Therms) |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 |
| CY2023 Program Incremental Expiring Other Fuel Savings (kWh Equivalent)|| |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 |
| Historic Program Incremental Expiring Other Fuel Savings (kWh Equivalent)# |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Other Fuel Savings (kWh Equivalent)\*† |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 | 0 |

| Savings Category | Verified Gross Savings (Therms) | Lifetime Net Savings† | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CY2023 Program Total Other Fuel Contribution to CPAS (Therms) | -22 | -258 | -17 | -17 | -17 | -17 | -17 | -17 | -17 | -17 | -17 | 0 | 0 |
| CY2023 Program Total Other Fuel Contribution to CPAS (kWh Equivalent)‡ | -631 |  | -505 | -505 | -505 | -505 | -505 | -505 | -505 | -505 | -505 | 0 | 0 |
| Historic Program Total Other Fuel Contribution to CPAS (kWh Equivalent)§ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total Other Fuel CPAS (kWh Equivalent) | -631 | 0 | -505 | -505 | -505 | -505 | -505 | -505 | -505 | -505 | -505 | 0 | 0 |
| CY2023 Program Incremental Expiring Other Fuel Savings (Therms) |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -17 | 0 |
| CY2023 Program Incremental Expiring Other Fuel Savings (kWh Equivalent)|| |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -505 | 0 |
| Historic Program Incremental Expiring Other Fuel Savings (kWh Equivalent)# |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Other Fuel Savings (kWh Equivalent)\*† |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -505 | 0 |

| Savings Category | Verified Gross Savings (Therms) | Lifetime Net Savings† | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CY2023 Program Total Other Fuel Contribution to CPAS (Therms) | -22 | -258 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CY2023 Program Total Other Fuel Contribution to CPAS (kWh Equivalent)‡ | -631 |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic Program Total Other Fuel Contribution to CPAS (kWh Equivalent)§ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total Other Fuel CPAS (kWh Equivalent) | -631 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CY2023 Program Incremental Expiring Other Fuel Savings (Therms) |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CY2023 Program Incremental Expiring Other Fuel Savings (kWh Equivalent)|| |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic Program Incremental Expiring Other Fuel Savings (kWh Equivalent)# |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Other Fuel Savings (kWh Equivalent)\*† |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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

‡ Fossil fuel savings (from natural gas, propane, etc.) are reported in therms. kWh equivalent savings are calculated by multiplying therms savings by 29.31.

§ Historical savings go back to CY2018.

|| Incremental expiring savings are equal to CPAS Yn-1 - CPAS Yn.

# Historic incremental expiring savings are equal to Historic CPAS Yn-1 – Historic CPAS Yn.

\*† Program total incremental expiring savings are equal to current year total incremental expiring savings plus historic total incremental expiring savings.

Source: Evaluation team analysis

Table 4. CPAS – Total

|  | | | CPAS Verified Net kWh Savings | | | |  | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Savings Category | Verified Gross Savings (kWh) | Lifetime Net Savings (kWh)† | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| CY2023 Program Total Contribution to CPAS | 135,300 | 1,659,205 |  |  |  |  |  | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 |
| Historic Program Total Contribution to CPAS‡ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total CPAS | 135,300 | 1,659,205 | 0 | 0 | 0 | 0 | 0 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 |
| CY2023 Program Incremental Expiring Savings§ |  |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 |
| Historic Program Incremental Expiring Savings|| |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Savings# |  |  |  |  |  |  |  | 0 | 0 | 0 | 0 | 0 | 0 |

| Savings Category | Verified Gross Savings (kWh) | Lifetime Net Savings (kWh)† | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CY2023 Program Total Contribution to CPAS | 135,300 | 1,659,205 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 0 | 0 |
| Historic Program Total Contribution to CPAS‡ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total CPAS | 135,300 | 1,659,205 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 110,614 | 0 | 0 |
| CY2023 Program Incremental Expiring Savings§ |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 110,614 | 0 |
| Historic Program Incremental Expiring Savings|| |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Savings# |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 110,614 | 0 |

| Savings Category | Verified Gross Savings (kWh) | Lifetime Net Savings (kWh)† | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CY2023 Program Total Contribution to CPAS | 135,300 | 1,659,205 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic Program Total Contribution to CPAS‡ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Program Total CPAS | 135,300 | 1,659,205 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CY2023 Program Incremental Expiring Savings§ |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Historic Program Incremental Expiring Savings|| |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Program Total Incremental Expiring Savings# |  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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

‡ Historical savings go back to CY2018.

§ Incremental expiring savings are equal to CPAS Yn-1 - CPAS Yn.

|| Historic incremental expiring savings are equal to Historic CPAS Yn-1 – Historic CPAS Yn.

# Program total incremental expiring savings are equal to current year total incremental expiring savings plus historic total incremental expiring savings.

Source: Evaluation team analysis

1. The evaluation will determine which other fuel savings will be counted toward goal while producing the portfolio-wide Summary Report. According to Section 8-103B(b-25) of the Illinois Public Utilities Act, “In no event shall more than 10% of each year's applicable annual total savings requirement as defined in paragraph (7.5) of subsection (g) of this Section be met through savings of fuels other than electricity.” [↑](#footnote-ref-2)
2. The evaluation team will determine which electrification savings from fuel switching will be counted toward ComEd's electric savings goal while producing the portfolio-wide Summary Report. According to Section 8-103B(b-27) of the Illinois Public Utilities Act, “In no event shall electrification savings counted toward each year's applicable annual total savings requirement, as defined in paragraph (7.5) of subsection (g) of this Section, be greater than 5% per year for each year from 2022 through 2025." [↑](#footnote-ref-3)