ComEd Public Buildings in Distressed Communities Impact Evaluation Report

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

Prepared for:
ComEd

FINAL

March 24, 2022

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1. Introduction

This report presents the results of the impact evaluation of the CY2021 Public Buildings in Distressed Communities (PBDC) Program.

It summarizes the total energy and demand impacts for the program broken out by relevant measure and program structure details. The appendices provide the impact analysis methodology and details of the total resource cost (TRC) analysis inputs. CY2021 covers January 1, 2021 through December 31, 2021. The PBDC Program was discontinued mid-year, so the tracking data does not include any participation data after October 8, 2021.
2. Program Description

The PBDC Program seeks to secure energy savings through the support of light-emitting diode (LED) lamp installations, lighting controls, and heating, ventilation, and air conditioning (HVAC) retrofits in public sector buildings in distressed communities. Distressed communities are defined using information provided by the Illinois Department of Commerce and Economic Opportunity and federal agencies. The City of Chicago is not eligible to participate as a whole; however, several specific ZIP codes and census tracts within the city are eligible. This program is a third-party program targeting the commercial sector and is implemented by Energy360 Solutions.

The CY2021 program had 28 participants (entities) spanning 180 separate account IDs (sites) and distributed 84,549 measures through 188 individual projects (see Table 2-1).

<table>
<thead>
<tr>
<th>Participation</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects</td>
<td>188</td>
</tr>
<tr>
<td>Participants</td>
<td>28</td>
</tr>
<tr>
<td>Total Measures</td>
<td>84,549</td>
</tr>
</tbody>
</table>

*Source: ComEd tracking data and evaluation team analysis*

The program included the measures shown in Table 2-2 and Figure 2-1. In CY2021, all measures installed were lighting fixtures, lamps, or controls. No HVAC retrofit measures were reported as part of the program in CY2021.

<table>
<thead>
<tr>
<th>End Use Type</th>
<th>Research Category</th>
<th>Quantity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>LED Tubes and Fixtures</td>
<td>80,939</td>
<td>Fixtures</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED with T12 Baseline</td>
<td>2,112</td>
<td>Fixtures</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Omnidirectional</td>
<td>1,235</td>
<td>Lamps</td>
</tr>
<tr>
<td>Lighting</td>
<td>Exterior Lighting</td>
<td>108</td>
<td>Fixtures</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Directional</td>
<td>126</td>
<td>Lamps</td>
</tr>
<tr>
<td>Lighting</td>
<td>Lighting Controls</td>
<td>29</td>
<td>Fixtures</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>84,549</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: ComEd tracking data and evaluation team analysis*

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1 A summary of US Code, Title 42 Section 3161 defining the criteria for qualifying as a distressed community is available here: [https://www.law.cornell.edu/uscode/text/42/3161](https://www.law.cornell.edu/uscode/text/42/3161).
Figure 2-1. Measures Installed by Type

- LED Tubes and Fixtures: 96%
- LED with T12 Baseline: 3%
- LED Screw-base Lamps: Omni directional: 1%
- Exterior Lighting: <1%
- Lighting Controls: <1%
- LED Screw-base Lamps: Directional: <1%

Source: ComEd tracking data and evaluation team analysis
3. Program Savings Detail

Table 3-1 summarizes the incremental energy and demand savings the PBDC Program achieved in CY2021. This program did not generate gas savings in CY2021.

### Table 3-1. Total Annual Incremental Electric Savings

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Energy Savings - Direct</td>
<td>kWh</td>
<td>10,916,482</td>
<td>0.83</td>
<td>9,091,363</td>
<td>0.97</td>
<td>N/A</td>
<td>N/A</td>
<td>8,818,622</td>
</tr>
<tr>
<td>Electric Energy Savings - Converted from Gas</td>
<td>kWh</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Total Electric Energy Savings</td>
<td>kWh</td>
<td>10,916,482</td>
<td>0.83</td>
<td>9,091,363</td>
<td>0.97</td>
<td>N/A</td>
<td>N/A</td>
<td>8,818,622</td>
</tr>
<tr>
<td>Summer Peak§ Demand Savings</td>
<td>kW</td>
<td>3,230</td>
<td>0.85</td>
<td>2,745</td>
<td>0.97</td>
<td>N/A</td>
<td>N/A</td>
<td>2,663</td>
</tr>
</tbody>
</table>

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

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

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

Source: ComEd tracking data and evaluation team analysis
4. Cumulative Persisting Annual Savings

Table 4-1 and Figure 4-1 show the measure-specific and total verified gross savings for the PBDC Program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2021. The electric CPAS across all measures installed in 2021 is shown in Table 4-1. The historic rows are the CPAS contribution back to CY2020. The Program Total Electric CPAS is the sum of the CY2021 contribution and the historic contribution. Figure 4-1 shows the savings across the effective useful life (EUL) of the measures.

This program did not generate gas savings in CY2021 so electric CPAS is equivalent to total CPAS.
Table 4-1. Cumulative Persisting Annual Savings – Electric

<table>
<thead>
<tr>
<th>End Use Type</th>
<th>Research Category</th>
<th>CY2021 Verified Gross Savings (kWh)</th>
<th>CY2021 Verified Net kWh Savings</th>
<th>CY2021 Program Total Electric Contribution to CPAS (kWh)</th>
<th>Historic Program Total Electric Contribution to CPAS‡ (kWh)</th>
<th>Program Total Electric CPAS (kWh)</th>
<th>CY2021 Program Incremental Expiring Electric Savings§ (kWh)</th>
<th>Historic Program Incremental Expiring Electric Savings (kWh)</th>
<th>Program Total Incremental Expiring Electric Saving (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>LED Tubes and Fixtures</td>
<td>14.9 6,400,650</td>
<td>0.97 121,682,723</td>
<td>8,148,630 8,148,630 8,148,630 8,148,630 8,148,630 8,148,630</td>
<td>8,148,630 8,148,630 8,148,630 8,148,630 8,148,630 8,148,630 8,148,630 8,148,630</td>
<td>8,817,878 8,817,878 8,817,878 8,817,878</td>
<td>- 24,744 30,774 4,772 1,506</td>
<td>- 195,949 - 9,508,659</td>
<td>- 10,059,091 7,856,464</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED with T12 Baseline</td>
<td>15.0 467,111</td>
<td>0.97 4,728,250</td>
<td>453,097 453,097 453,097 453,097 453,097 453,097 453,097 453,097</td>
<td>54,737 54,737 54,737 54,737 54,737 54,737 54,737 54,737</td>
<td>54,737 54,737 54,737 54,737</td>
<td>- - - - - - -</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Omnidirectional</td>
<td>6.5 148,501</td>
<td>0.97 715,651</td>
<td>144,046 144,046 144,046 144,046 144,046 144,046 144,046 144,046</td>
<td>50,170 50,170 50,170 50,170 50,170 50,170 50,170 50,170</td>
<td>50,170 50,170 50,170 50,170</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
</tr>
<tr>
<td>Lighting</td>
<td>Exterior Lighting</td>
<td>11.6 51,722</td>
<td>0.97 582,966</td>
<td>21,172 21,172 21,172 21,172 21,172 21,172 21,172 21,172</td>
<td>337,647 337,647 337,647 337,647 337,647 337,647 337,647 337,647</td>
<td>337,647 337,647 337,647 337,647</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Directional</td>
<td>8.1 21,827</td>
<td>0.97 136,433</td>
<td>21,172 21,172 21,172 21,172 21,172 21,172 21,172 21,172</td>
<td>258,265 258,265 258,265 258,265 258,265 258,265 258,265 258,265</td>
<td>258,265 258,265 258,265 258,265</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
</tr>
<tr>
<td>Lighting</td>
<td>Lighting Controls</td>
<td>10.0 1,553</td>
<td>0.97 15,062</td>
<td>1,506 1,506 1,506 1,506 1,506 1,506 1,506 1,506</td>
<td>1,506 1,506 1,506 1,506 1,506 1,506 1,506 1,506</td>
<td>1,506 1,506 1,506 1,506</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
<td>- - - - - -</td>
</tr>
</tbody>
</table>

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

† Lifetime savings are the sum of CPAS savings through the EUL.
‡ Historic savings go back to CY2020.
§ Incremental expiring savings are equal to CPAS Y_n-1 - CPAS Y_n.

Source: Evaluation team analysis
Figure 4-1. CumulativePersistingAnnualSavings

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

Source: Evaluation team analysis
5. Program Savings by Measure

The evaluation team analyzed savings for the PBDC Program at a strata level, using a statistically valid, stratified random sample. The verified savings for each measure are summed by project; projects are divided into strata based on the magnitude of ex ante gross kWh savings; and strata-level realization rates are extrapolated to determine the final program-level results.

The program achieved 99.98% of verified net program savings through lighting lamps and fixtures; the remaining 0.02% are attributed to lighting controls. Although the program can include HVAC measures, none were installed in CY2021.

The program included the measures shown in Table 5-1 and Figure 5-1.

**Table 5-1. Number of Measures by Type**

<table>
<thead>
<tr>
<th>End Use Type</th>
<th>Research Category</th>
<th>Quantity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>LED Tubes and Fixtures</td>
<td>80,939</td>
<td>Fixtures</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED with T12 Baseline</td>
<td>2,112</td>
<td>Fixtures</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Omnidirectional</td>
<td>1,235</td>
<td>Lamps</td>
</tr>
<tr>
<td>Lighting</td>
<td>Exterior Lighting</td>
<td>108</td>
<td>Fixtures</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Directional</td>
<td>126</td>
<td>Lamps</td>
</tr>
<tr>
<td>Lighting</td>
<td>Lighting Controls</td>
<td>29</td>
<td>Fixtures</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>84,549</strong></td>
<td></td>
</tr>
</tbody>
</table>

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

*Source: ComEd tracking data and evaluation team analysis*

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

*Source: ComEd tracking data and evaluation team analysis*
Measure-level energy and demand savings are provided in Table 5-2 and Table 5-3.

### Table 5-2. Energy Savings by Measure – Electric

<table>
<thead>
<tr>
<th>End Use Type</th>
<th>Research Category</th>
<th>Ex Ante Gross Savings (kWh)</th>
<th>Verified Gross Realization Rate</th>
<th>Verified Gross Savings (kWh)</th>
<th>NTG*</th>
<th>Verified Net Savings (kWh)</th>
<th>EUL (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>LED Tubes and Fixtures</td>
<td>10,117,577</td>
<td>0.83</td>
<td>8,400,650</td>
<td>0.97</td>
<td>8,148,630</td>
<td>14.9</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED with T12 Baseline</td>
<td>540,254</td>
<td>0.86</td>
<td>467,111</td>
<td>0.97</td>
<td>453,097</td>
<td>15.0</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Omnidirectional</td>
<td>158,223</td>
<td>0.94</td>
<td>148,501</td>
<td>0.97</td>
<td>144,046</td>
<td>6.5</td>
</tr>
<tr>
<td>Lighting</td>
<td>Exterior Lighting</td>
<td>70,845</td>
<td>0.73</td>
<td>51,722</td>
<td>0.97</td>
<td>50,170</td>
<td>11.6</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Directional</td>
<td>27,618</td>
<td>0.79</td>
<td>21,827</td>
<td>0.97</td>
<td>21,172</td>
<td>8.1</td>
</tr>
<tr>
<td>Lighting</td>
<td>Lighting Controls</td>
<td>1,965</td>
<td>0.79</td>
<td>1,553</td>
<td>0.97</td>
<td>1,506</td>
<td>10.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>10,916,482</td>
<td>0.83</td>
<td>9,091,363</td>
<td>0.97</td>
<td>8,818,622</td>
<td></td>
</tr>
</tbody>
</table>


Source: ComEd tracking data and evaluation team analysis

### Table 5-3. Summer Peak Demand Savings by Measure

<table>
<thead>
<tr>
<th>End Use Type</th>
<th>Research Category</th>
<th>Ex Ante Gross Peak Demand Reduction (kW)</th>
<th>Verified Gross Realization Rate</th>
<th>Verified Gross Peak Demand Reduction (kW)</th>
<th>NTG*</th>
<th>Verified Net Peak Demand Reduction (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>LED Tubes and Fixtures</td>
<td>3,000</td>
<td>0.85</td>
<td>2,540</td>
<td>0.97</td>
<td>2,463</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED with T12 Baseline</td>
<td>160</td>
<td>0.89</td>
<td>142</td>
<td>0.97</td>
<td>138</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Omnidirectional</td>
<td>58</td>
<td>0.94</td>
<td>54</td>
<td>0.97</td>
<td>52</td>
</tr>
<tr>
<td>Lighting</td>
<td>Exterior Lighting</td>
<td>0</td>
<td>N/A</td>
<td>0</td>
<td>0.97</td>
<td>0</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps: Directional</td>
<td>10</td>
<td>0.79</td>
<td>8</td>
<td>0.97</td>
<td>8</td>
</tr>
<tr>
<td>Lighting</td>
<td>Lighting Controls</td>
<td>2</td>
<td>0.79</td>
<td>2</td>
<td>0.97</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3,230</td>
<td>0.85</td>
<td>2,745</td>
<td>0.97</td>
<td>2,663</td>
</tr>
</tbody>
</table>

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


Source: ComEd tracking data and evaluation team analysis
6. Impact Analysis Findings and Recommendations

The PBDC Program was discontinued mid-way through 2021. The findings and recommendations in this section are set forth to document adjustments made to savings and in the hopes that they help improve any future work in this area.

The issues that had the largest effect on adjusting ex ante gross savings were missing project documentation and instances where the savings shown in the ex ante calculators do not align with the program tracking database delivered to Guidehouse.

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

6.1 Documentation Findings

Finding 1. Guidehouse consistently encountered missing files for entire phases of projects in the sample. For example, 10 out of 29 sampled projects had at least one verification (VER) phase without any documentation. Wherever possible, the evaluation team used more recent project phase documentation to validate measures installed in previous phases.

Recommendation 1. Adjust program procedures to ensure project documentation is complete. Having complete project documentation should improve the accuracy and verifiability of the program savings and reduce the potential for discrepancies.

Finding 2. Projects are often completed in multiple phases, however progress was not consistently tracked or documented across the various phases of a given project. This was particularly apparent in project calculators where tabs were mislabeled or contained measures from another phase (e.g., VER 1 tab had measures installed in VER 2). The calculator versions provided did not always align with the database, indicating savings may have been entered before the project was finalized or the final calculator was not included with the supporting documents.

Recommendation 2. Adopt a consistent project documentation approach. It would be helpful to have a properly labeled tab in project calculators to document any updates made to earlier VER phase calculators as additional measures are installed in following VER phases. Alternatively, maintain documentation from previous phases in subsequent versions (phases) of a project’s documentation so that the final workbook for any given site contains a complete record of all measures installed at that site within the given year, delineated by phase.

Finding 3. The reported efficient wattages of lighting fixtures and lamps were sourced from the product specification sheets. These sheets are often inconsistent with the product wattages determined through independent testing by DesignLights Consortium (DLC) and reported in the Reported Input Wattages field of the DLC Qualified Product List. Guidehouse used the fixture and lamp model numbers to confirm DLC-listed efficient wattages and used these wattages to calculate verified savings.

Recommendation 3. Use DLC-listed efficient wattages for lighting fixtures and lamps as savings inputs rather than the wattages reported in the name of the product model number or wattages found in manufacturer specification sheets.
Finding 4. Invoices of purchased fixtures and lamps often indicated additional equipment was purchased beyond what calculators and other supporting documentation support as installed. However, ComEd provided additional documentation accounting for the uninstalled equipment. Based on this additional supporting documentation, Guidehouse verified that the uninstalled equipment was not included in the reported measure quantity. Therefore, Guidehouse used an in-service rate of 1.0 for all reported fixtures for the PBDC Program.

Recommendation 4. Ensure each batch of fixtures is installed in a timely manner, perhaps using a direct install approach to program delivery. The implementer can then more easily track and maintain signed install verification forms from the participants on completion of each project phase. This will also reduce the likelihood of version control issues noted in Finding 2.

6.2 Project Detail Findings

Finding 5. Many sampled projects were missing a signature on one or more VER phase customer selection forms (CSF) used to confirm progress of the measures installed. For example, Project ID 221 had a signed CSF for Phase 1 VER 1; VER 2 files were missing; and VER 3, VER 4, and VER 5 CSF forms were unsigned.

Recommendation 5. Ensure that reviewing the VER CSF files with the customer is a consistent part of project administration.

Finding 6. Program tracking data does not include data on measure-level costs or total project costs. The program is designed such that material costs are covered and reported as the incentive. However, reported incentives are not always consistent with the invoiced material costs.

Recommendation 6. Track incremental measure cost separately from the incentive. Ensure total measure cost for each project aligns with the incentive.

6.3 Program Diversity Findings

Finding 7. 99.98% of savings from the PBDC program in CY2021 is attributed to an LED lighting fixture or lamp. Only 0.02% of program savings were attributed to lighting controls, and they represented an even smaller portion (less than 0.01%) of the quantity of measures installed.

Recommendation 7. Work with customers to identify non-lighting measures that would suit each customer site to achieve additional savings. More comprehensive projects also maximize the benefit to the participant without raising the administrative burden excessively.

Finding 8. The program was identified to be highly focused on facilities belonging to a single entity—77% of measures installed and 85% of the program’s total claimed electric savings (kWh) are attributed to a single participant. However, within that cluster of projects, 139 unique sites participated in CY2021.
Appendix A. Impact Analysis Methodology

Guidehouse initiated the impact evaluation process by designing a sample of the CY2021 PBDC Program participants. This method is used to increase sampling efficiency while maintaining a high degree of confidence in the overall results and representation across the full range of project sizes and participants with a distribution of measures that organically tracks with the overall representation in the overall program.

The team categorized measures into strata by annual gross ex ante energy savings, defined as follows:

- **Large:** More than 80,000 kWh
- **Mid:** 50,000 kWh-80,000 kWh
- **Small:** 13,500 kWh-50,000 kWh
- **Very Small:** Less than 13,500 kWh (cumulatively, smallest 2%)

To achieve the 85% confidence interval and 15% maximum relative precision, the evaluation team selected 29 projects according to the following distribution numbers:

- **Large:** 9
- **Mid:** 7
- **Small:** 13
- **Very Small:** 0

The team requested the documentation associated with the sampled projects for review. Guidehouse determined the final verified values through a detailed review of the sampled projects. The evaluation team developed realization rates for each stratum based on the verified savings for the projects sampled within that stratum (see further detail on this process below). These strata-level realization rates were then extrapolated to the remainder of projects within each stratum to determine the program realization rate. The final verified savings resulted in 85% confidence and 6% relative precision, which is within the 85/15 target.

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

- Reviewing the savings algorithm inputs in the implementation contractor's measure calculations for agreement with the Illinois Technical Reference Manual v.9.0² (TRM) and the TRM Errata, where applicable.
- Validating the savings algorithm was applied correctly.
- Where savings reported in the database do not agree with the verified values in Guidehouse's calculations, cross-checking IL-TRM deemed inputs with the implementation contractor's supporting calculations and the other project files.
- Verifying the reported measure quantity with invoices, as able.

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² In this report, unless stated otherwise, IL-TRM refers to version 9.0 (v9.0).
The team used the following documents to verify the per-unit savings for each program measure:

- Final ComEd CY2021 tracking data: PBDC_CY2021_Wave2_Data_Rev0_2021-10-08.xlsx.
- IL-TRM for deemed input parameters or secondary evaluation research to verify any custom inputs used in the ex ante calculations (e.g., participant interviews to confirm hours of use).
- Implementation contractor savings calculations (e.g., 2021-PBDC-Calculator V1.1 [site name] Phase 2.xlsm). The ex ante analysis used calculator versions 2020 V1.3.1, 2021 V1.0, and 2021 V1.1.
- Implementation contractor's W-9s, program applications, measure specifications, and measure invoices for each sample project.

The Change Log within the calculators indicates no differences in how lighting energy or demand savings are evaluated between the three versions in use for CY2021. The calculators are based on IL-TRM methodology and deemed inputs for hours of use, default wattages, and coincidence factors. The evaluation team reviewed the calculator template in the year preceding its active use for the program and found it to be accurate and consistent with the methodology outlined in the IL-TRM. Therefore, the ex ante and verified savings analysis used the same analysis format that the implementation contractor developed specifically for this program.

Net savings are determined by multiplying the verified gross savings estimates by the program-specific net-to-gross (NTG) ratio of 0.97 as approved by the Illinois SAG.³

Appendix B. Total Resource Cost Detail

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

Table B-1. Total Resource Cost Savings Summary

<table>
<thead>
<tr>
<th>End Use Type</th>
<th>Research Category</th>
<th>Units</th>
<th>Quantity</th>
<th>EUL (years)</th>
<th>ER Flag†</th>
<th>Gross Electric Energy Savings (kWh)</th>
<th>Gross Peak Demand Reduction (kW)</th>
<th>Gross Gas Savings (Therms)</th>
<th>Gross Secondary Savings due to Water Reduction (kWh)</th>
<th>Net Electric Energy Savings (kWh)</th>
<th>Net Peak Demand Reduction (kW)</th>
<th>Net Gas Savings (Therms)</th>
<th>Net Secondary Savings due to Water Reduction (kWh)</th>
<th>Net Heating Penalty (kWh)</th>
<th>Net Heating Penalty (Therms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>LED Tubes and Fixtures</td>
<td>Fixtures</td>
<td>80,939</td>
<td>14.9</td>
<td>NO</td>
<td>8,400,650</td>
<td>2,539.51</td>
<td>0</td>
<td>0</td>
<td>-162,857</td>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
<td>8,148,630</td>
<td>2,463.33</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED with T12 Baseline‡</td>
<td>Fixtures</td>
<td>2,112</td>
<td>15.0</td>
<td>YES</td>
<td>467,111</td>
<td>142.26</td>
<td>0</td>
<td>0</td>
<td>-8,649</td>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
<td>453,097</td>
<td>137.99</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps; Omnidirectional‡</td>
<td>Lamps</td>
<td>1,235</td>
<td>6.5</td>
<td>YES</td>
<td>148,501</td>
<td>53.89</td>
<td>0</td>
<td>0</td>
<td>-2,305</td>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
<td>146,046</td>
<td>52.27</td>
</tr>
<tr>
<td>Lighting</td>
<td>Exterior Lighting</td>
<td>Fixtures</td>
<td>108</td>
<td>11.6</td>
<td>NO</td>
<td>51,722</td>
<td>0.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
<td>50,170</td>
<td>0.00</td>
</tr>
<tr>
<td>Lighting</td>
<td>LED Screw-base Lamps; Directional‡</td>
<td>Lamps</td>
<td>126</td>
<td>8.1</td>
<td>YES</td>
<td>21,827</td>
<td>7.99</td>
<td>0</td>
<td>0</td>
<td>-573</td>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
<td>21,172</td>
<td>7.75</td>
</tr>
<tr>
<td>Lighting</td>
<td>Lighting Controls</td>
<td>Fixtures</td>
<td>29</td>
<td>10.0</td>
<td>NO</td>
<td>1,563</td>
<td>1.54</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.97</td>
<td>0.97</td>
<td>0.97</td>
<td>1,506</td>
<td>1.90</td>
</tr>
</tbody>
</table>

Total | | | | | | | | | | | | | | | | | |

Note: this program does not generate secondary energy savings from water reduction measures.

* The total of the EUL column is the weighted average measure life (WAML) and is calculated as the sum product of EUL and measure savings divided by total program savings.
† Early replacement (ER) measures are flagged as YES, otherwise a NO is indicated in the column.
‡ The EUL for this measure varies over time. See the CPAS table (Table 4-1)

Source: ComEd tracking data and evaluation team analysis