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ComEd Cost-Effectiveness Analysis CY2021 Report

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

Prepared for:

ComEd

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1. Overview

As part of ComEd's energy efficiency program evaluation for CY2021, Guidehouse determined program- and portfolio-level cost-effectiveness using the utility cost test (UCT) and the Illinois total resource cost (TRC) test. This analysis included quantifying the program, measure, and portfolio costs for implementing the energy efficiency programs, along with the benefits derived from these investments. This report contains TRC values with and without societal non-energy impacts (Societal NEIs). The following sections include the results of the cost-effectiveness analysis for each program in ComEd's portfolio and a detailed breakdown of all the costs and benefits included in the analysis.

Guidehouse conducted the analysis using spreadsheet and Analytica tools. Summaries of the program level inputs are provided separately from this report. ComEd, the Illinois Commerce Commission, and other Illinois stakeholders provided comments on the methodologies and inputs used for the analysis and the resulting TRC values and UCT values.

The savings numbers and results included in this report are reflective of only ComEd's Energy Efficiency Portfolio Standard (EEPS) programs. For programs that are jointly implemented by ComEd and one or more Illinois gas utilities (including Nicor Gas, Peoples Gas [PG], and North Shore Gas [NSG]), only ComEd's portion of the program savings and costs are included in this report.[1] The combined joint TRC and UCT values for these programs will be shared in a forthcoming memo.

The Illinois TRC test is defined in the Illinois Power Agency Act (see 20 ILCS 3855/1-10) as follows:[2]

> *"Total resource cost test" or "TRC test" means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures and including avoided costs associated with reduced use of natural gas or other fuels, avoided costs associated with reduced water consumption, and avoided costs associated with reduced operation and maintenance costs, as well as other quantifiable societal benefits, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire; reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases. In discounting future societal costs and benefits for the purpose of calculating net present values, a societal discount rate based on actual, long-term Treasury bond yields should be used. Notwithstanding anything to the contrary, the*

[1] For programs that are jointly offered by ComEd and gas utilities, the therm savings claimed by ComEd are included in this analysis.

[2] See Section 1-10 Definitions of the Illinois Power Agency Act:
http://www.ilga.gov/legislation/ilcs/ilcs5.asp?ActID=2934&ChapterID=5

> *TRC test shall not include or consider a calculation of market price suppression effects or demand reduction induced price effects.*

The Illinois TRC test differs from traditional TRC tests due to its requirement to include a reasonable estimate of the financial costs associated with future regulations and legislation on the emissions of greenhouse gases (GHG) and the use of the societal discount rate. These differences add an additional benefit to investments in efficiency programs that are typically included in the societal cost test in other jurisdictions.

Two factors contributed to an overall increase in the portfolio's calendar year 2021 (CY2021) TRC values as compared to CY2020 TRC values:

- The portfolio benefits in CY2021 are significantly higher than in CY2020, which is primarily attributable to higher participation in ComEd's energy efficiency programs in CY2021. The impacts of the coronavirus pandemic had led to lower participation in some programs in CY2020, and as the pandemic eased up in the following year, participation in many of the programs increased significantly.

- While the CY2021 portfolio costs are also slightly higher than in CY2020, the fixed program costs are similar.

Table 1-1 summarizes the CY2021 TRC and UCT values for all EEPS programs in ComEd's CY2021 portfolio. Overall, the CY2021 portfolio aggregate TRCs and UCTs show the portfolio was cost-effective, with aggregate TRC values of 3.89 (with Societal NEIs) and 2.62 (without Societal NEIs), and a UCT value of 1.94.

Table 1-1. Summary of CY2021 TRC and UCT Values for ComEd Programs

Program	Illinois TRC Test (With Societal NEIs)	Illinois TRC Test (Without Societal NEIs)	UCT
Appliance Rebates	3.16	2.35	2.18
Elementary Energy Education	8.74	6.52	2.56
Residential HVAC	5.55	4.00	1.47
Single-Family Assessment	3.80	2.64	0.74
Residential Behavior	11.51	6.52	4.57
Lighting Discount	7.99	5.27	2.73
Multi-Family Assessments	2.08	1.37	0.56
Residential Total*	**5.82**	**3.87**	**2.31**
Agriculture	4.16	2.72	1.24
Business Grocery	7.71	6.59	1.45
Business Instant Discounts	6.06	3.88	7.43
Business Telecomm	2.98	1.73	1.56
Facility Assessments†	0.55	0.26	0.14
Incentives - Custom + Standard†	2.45	1.66	2.29
Industrial Systems + Industrial Energy Management	2.42	1.38	1.26
LED Streetlighting	3.57	2.14	1.83
Non-Profit Retrofits	2.25	1.38	1.12
Non-residential New Construction	3.20	2.07	2.32
Public Buildings in Distressed Communities	1.65	1.18	6.05
RetroCommissioning + VCx	7.98	4.36	1.23
Small Business	4.19	3.25	1.58
Small Business Kits	4.79	3.77	1.31
Strategic Energy Management	5.12	2.47	1.33
Business Total*	**3.56**	**2.45**	**2.19**
Affordable Housing New Construction	1.23	0.81	0.45
Food Bank-LED Distribution	13.02	8.54	5.61
Product Discounts - [Lighting Discounts +Appliance Rebates - IE]	10.13	6.54	3.33
Multi-Family Retrofits - IEMS + IHWAP	1.07	0.84	0.58
Public Housing Retrofits	0.93	0.61	0.35
Single Family Retrofits - CBA + IHWAP	0.95	0.76	0.53
UIC-ERC Income Eligible Kits	11.14	7.99	2.64
Income Eligible Total*	**6.28**	**4.22**	**2.00**
Voltage Optimization	3.99	2.57	1.77
Building Operator Certification	4.60	2.66	2.48
Efficient Choice	1.53	0.99	1.32
Electric Homes New Construction	1.00	0.63	0.31
ENERGY STAR Retail Products Platform	0.17	0.10	0.66
SEM Water Savings	13.83	13.83	0.00
Upstream Commercial Food Service Equipment	2.29	1.39	0.94
Pilot and VO Total*‡	**3.66**	**2.37**	**1.76**
Res and Business Total*	**3.69**	**2.52**	**2.00**
Portfolio Total (w / IE, Pilot and VO)*	**3.89**	**2.62**	**1.94**

**The TRC and UCT values are calculated using the sum of all the offerings' benefits and costs.*
† Guidehouse also developed the overall TRC and UCT values for the Facility Assessments, Incentives – Custom and Incentives – Standard programs combined, as there is likely some cost overlap among these programs. The overall TRC both with and without the Societal NEIs for the three programs combined are 2.42 and 1.64, respectively, and the overall UCT is 2.21.

Source: Guidehouse analysis
‡ The TRC analysis was not conducted for the Water Infrastructure Leak Reduction pilot due to lack of cost data.

1.1 Illinois TRC Equation

Guidehouse used Equation 1 to calculate the Illinois TRC.

Equation 1. Illinois TRC

$$BCR_{ILTRC} = B_{ILTRC} / C_{ILTRC}$$

Where,

BCR_{ILTRC} = Benefit-cost ratio of the Illinois TRC test
B_{ILTRC} = Present value of benefits of an Illinois program or portfolio
C_{ILTRC} = Present value of costs of an Illinois program or portfolio

We calculated the benefits of the Illinois TRC using Equation 2:

Equation 2. Illinois TRC Benefits

$$B_{ILTRC} = \sum_{t=1}^{N} \frac{UAEP_t + UATD_t + UAA_t + EB_t + RC + \text{S NEI}}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at}}{(1+d)^{t-1}}$$

We calculated the costs of the Illinois TRC using Equation 3:

Equation 3. Illinois TRC Costs

$$C_{ILTRC} = \sum_{t=1}^{N} \frac{PNIC_t + IMCN_t + UIC_t}{(1+d)^{t-1}}$$

Where benefits are defined as:

UAEPt = Utility avoided electric and capacity production costs in year t
UATDt = Utility avoided transmission and distribution costs in year t
UAAt = Utility avoided ancillary costs in year t
EBt = Environmental benefits in year t
UACat = Utility avoided supply costs for the alternate fuel in year t
RC = Net present value (NPV) of replacement costs of baseline bulbs
S NEI = NPV societal NEI benefit

And costs are defined as:

PNICt = Program non-incentive costs in year t
IMCNt = Net incremental costs in year t
UICt = Utility increased supply costs in year t

And:

d = Societal discount rate

The Illinois TRC test allows for utilities to account for the NPV of the avoided cost of purchasing shorter lifetime bulbs, which accrue to program participants because of the significantly longer lifetimes of efficient LED light bulbs. In general, the avoided cost per bulb is determined by comparing the estimated useful life of efficient and baseline bulbs to determine the number of baseline bulb purchases that are avoided. Based on the average purchase price of baseline bulbs, an NPV is determined by discounting the value of these avoided purchases over the course of the lifetime of the efficient bulb. Illinois Technical Reference Manual v9.0 (TRM v9.0) provides deemed NPVs per bulb based on efficient bulb type, socket type (commercial or residential), and lumen range. These benefits were included in the program calculations.

1.2 UCT Equation

The UCT approaches cost-effectiveness from the perspective of the utility, in this case ComEd. The UCT determines whether the energy supply and capacity costs avoided by the utility exceed the overhead and cost outlays that the utility incurred to implement energy efficiency programs. The structure of the calculation is similar to the Illinois TRC with a few key changes. Since the UCT is primarily focused on utility outlays, incentives paid by the utility to either participants or third-party implementers are included in the calculation in place of incremental or participant costs. Additionally, since non-energy benefits accrue to society rather than to the utility implementing energy efficiency programs, these benefits are not included in the UCT formula.

Using the equation terms previously defined for the Illinois TRC equation, the UCT equation is defined as:

Equation 4. UCT

$$BCR_{UCT} = B_{UCT} / C_{UCT}$$

Where,

BCR_{UCT}	=	Benefit-cost ratio of the UCT
B_{UCT}	=	Present value of benefits to a utility of a program or portfolio
C_{UCT}	=	Present value of costs to a utility of a program or portfolio

The benefits of the UCT are calculated using Equation 5:

Equation 5. UCT Benefits

$$B_{UCT} = \sum_{t=1}^{N} \frac{UAEP_t + UATD_t + UAA_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at}}{(1+d)^{t-1}}$$

The costs of the UCT are calculated using Equation 6:

Equation 6. UCT Costs

$$C_{UCT} = \sum_{t=1}^{N} \frac{PNIC_t + UIC_t + PIN_t}{(1+d)^{t-1}}$$

Where the new term, PIN_t, is defined as the program incentives provided by the utility in year t.

1.3 Cost-Effectiveness Data Requirements

Table 1-2 outlines the data points collected from different stakeholders to conduct cost-effectiveness. The data is categorized into generic and program-specific categories.

Table 1-2. Data Points Needed to Conduct EEPS Cost-Effectiveness

Category	Data Point	Source
Generic	• Avoided Energy Costs ($/kWh) • Avoided Capacity Costs ($/kW) • Avoided T&D Electric ($/kWh) • Avoided Gas Production ($/Therm)[3] • Avoided Water Costs ($/gallon) • Escalation Rates • Environmental Damages (GHG Adders) • Discount Rate	ComEd
Program Specific	• Participants/Measure Count • Verified Ex Post Energy and Demand Savings • Realization Rate • Net-to-Gross Ratio • Measure Life • Incremental Measure Costs[4] • NPV Replacement Costs • Societal NEIs	Guidehouse
	• Non-Incentive Costs • Utility Incentive Costs • Direct Install Costs • Incremental Measure Costs	ComEd

Source: Guidehouse analysis

This report summarizes the results for the total ComEd EEPS portfolio at the program level and includes the program-specific inputs and range of assumptions, a description of each of the data points, and the basis of their determination and their reasonableness.

[3] From Nicor Gas.

[4] Incremental measure costs come from program tracking data, program contractor invoices, and deemed value sources such as the TRM.

2. Summary of Results and Portfolio-Level Data Inputs

Table 2-1 summarizes the CY2021 cost-effectiveness results by benefit and cost components relevant to each cost test. The results indicate that ComEd's CY2021 EEPS portfolio is cost-effective under both the UCT and the TRC tests.

Table 2-1. Summary of ComEd CY2021 Residential and Business Sectors' Cost-Effectiveness Test Values ($ Thousands)*

Data Point	UCT Test		IL TRC Test	
	UCT Benefits	UCT Costs	IL TRC Benefits	IL TRC Costs
Avoided Electric Production w/ GHG adder			$573,154	
Avoided Electric Production w/o GHG adder	$297,623			
Avoided Electric Capacity	$278,243		$278,243	
Avoided Gas Production	$947		$947	
Avoided Water			$9,593	
Societal NEI Benefit			$547,343	
NPV Replacement costs			$315,828	
Non-Incentive Costs		$99,118		$99,118
Incentive Costs		$188,622		
Net Participant Costs				$368,542
Present Value Totals (with Societal NEI)	$576,813	$287,740	$1,725,109	$467,660
Present Value Totals (without Societal NEI)	$576,813	$287,740	$1,177,766	$467,660
Ratio (with Societal NEI)	NA		3.69	
Ratio (without Societal NEI)	2.00		2.52	

*Excludes income eligible, pilots, and Voltage Optimization

Source: Guidehouse analysis

On the cost side, net participant costs represent the largest component followed by the incentive costs of program implementation. For the UCT, the sum of all incentives provided is used in place of net participant costs. The sum of all incentives is less than the sum of all incremental costs.

2.1 Avoided Costs

As discussed in Section 1.3, avoided cost data is provided by ComEd and is typically updated annually. The definitions of each avoided cost data point used in the analysis and their respective sources are as follows:

- **Avoided Energy Costs ($/kWh):** Avoided electric production costs are those associated with purchasing energy from PJM.

- **Avoided Electric Capacity Costs ($/kW):** Avoided electric capacity costs are those associated with the construction of additional electricity generation facilities to meet peak demand. Incremental reductions in the amount of electricity demand during peak hours can delay or eliminate the need to build additional generation. ComEd is a participant in the Reliability Pricing Model, which is PJM's forward capacity market.

- **Avoided Transmission and Distribution (T&D) Electric ($/kW):** Avoided T&D costs are a benefit associated with not needing to build T&D infrastructure to meet demand at peak times.

- **Avoided Electric Ancillary ($/kWh):** Avoided ancillary is a benefit associated with avoided costs attributable to the Open Access Transmission Tariff that utilities participate in the PJM market.

- **Avoided Gas Costs ($/therm):** This value is from Nicor Gas and used to account for gas interactive effects due to lighting.

- **Avoided Water Costs ($/gal):** This is to account for savings associated with efficient water fixtures and clothes washers. The avoided water costs of $8.32/1,000 gallons (as provided by ComEd) was used for the analysis.

2.2 Non-Incentive Costs

Non-incentive costs are program administrator costs (related to energy efficiency) that are not otherwise classified as financial incentives paid to customers or incentives paid to third parties. In other words, non-incentive costs are equal to all program administrator costs minus incentives.

Examples of non-incentive costs include:

- Costs for overhead, labor, and materials required to develop, deliver, and administer functions related to the implementation of energy efficiency programs or portfolio such as rebate processing, measurement and verification, quality assurance, advertising and marketing, and customer relations.

- Program administrator payment to a third party whose principal purpose is not to reduce the cost of the efficient measure to the customer.

- Program administrator payment to a third party to cover the cost of services that are principally intended to be a form of marketing, as opposed to being truly necessary for any customer implementation of efficient measures.

- SPIFFs paid out to a third party.

There are currently some performance-based programs where the third-party program implementer is paid an amount per kilowatt-hour that includes incentives and non-incentives. Guidehouse worked with ComEd to separate out the costs appropriately.

2.3 Incentives

Incentives[5] include financial incentives paid to customers plus incentives paid to third parties. Financial incentives paid to customers are payments[6] made by a program administrator directly to an end-use customer to encourage the customer to participate in an efficiency program and offset some or all of the customer's costs to purchase and install a qualifying efficient measure, ultimately resulting in a reduction in the net price paid by the customer for the efficient measure. This rebate type of incentive is often referred to as a downstream incentive, which has the result that the net price to the customer of an energy efficiency program-sponsored measure is reduced by the amount of the incentive.

Incentives paid to third parties are payments made by a program administrator to a third party that is principally intended to reduce the net price to the customer of purchasing and installing a qualifying efficient measure. These incentives include payments made by a program administrator to service providers, manufacturers, wholesalers, distributors, contractors, builders, retailers, implementation contractors, or other non-customer stakeholders that are principally intended to defray the incremental cost to the customer of purchasing and installing an efficient measure. They also include payments made by a program administrator to an implementation contractor to cover the full cost of direct installation measures (materials and labor), for the portion not covered by the customer. Incentives paid to third parties also include payment made by a program administrator to a third party to cover the full cost of study-based services (e.g., facility energy audits, energy surveys, energy assessments, retro-commissioning) that are truly necessary for a customer to implement efficient measures, as opposed to being principally a form of marketing. Incentives paid to third parties also include payment made by a program administrator to an implementation contractor to cover the cost of pickup and recycling of duplicative functioning equipment before its expected life is over (e.g., appliance recycling programs). The portion of the payments covered by the customers aren't included in the incentives paid to third parties.

2.4 Incremental Costs

Incremental costs are the difference between the cost of the efficient measure and the cost of the most relevant baseline measure that would have been installed (if any) in the absence of the efficiency program. Installation costs (material and labor) and operations and maintenance (O&M) costs are included if there is a difference between the efficient measure and the baseline measure. In cases where the efficient measure has a significantly shorter or longer life than the relevant baseline measure (e.g., LEDs versus halogens), the avoided baseline replacement

[5] Incentive definitions can be found in Section 8.4 TRC Costs of the Illinois Energy Efficiency Policy Manual Version 1.1. The Illinois TRC test requires that "all incremental costs of end use measures (including both utility and participant contributions)" should be reflected as costs in the TRC test calculation. As long as "all incremental costs of end-use measures" are included in the TRC test calculation, there is no need to add Program Administrator Contribution costs (i.e., Incentives) and Participant Contribution costs as separate components to the TRC test. However, Program Administrator Contribution costs (i.e., Incentives) are needed for purposes of calculating the Program Administrator Cost Test/Utility Cost Test (PACT/UCT) since those are a component of the Program Administrator expenses. Most TRC modeling software requires users to input the Incentives as a separate input in addition to providing all Incremental Costs such that the PACT/UCT can be calculated, for this reason, the separate Incentives input in the TRC model is not "used" when calculating the TRC test because these costs are already reflected in the Incremental Cost input, and if the model were to use both the Incentives input and the Incremental Cost input, it would result in double counting of costs in the TRC analysis.

[6] Payments include non-measure items of value that would be treated as transfer payments, e.g., gift cards.

measure costs are accounted for in the TRC analysis as a benefit. The incremental cost input in the TRC analysis is not reduced by the amount of any incentives.

Examples of incremental cost calculations include:

- The incremental cost for an efficient measure that is installed in new construction or is being purchased at the time of natural installation, investment, or replacement is the additional cost incurred to purchase an efficient measure over and above the cost of the baseline or standard (i.e., less efficient) measure (including any incremental installation, replacement, or O&M costs if there is a difference between the efficient measure and baseline measure).

- For a retrofit measure where the efficiency program caused the customer to update their existing equipment, facility, or processes, where the customer would not have otherwise made a purchase, the appropriate baseline is zero expenditure, and the incremental cost is the full cost of the new retrofit measure (including installation costs).

- For the early replacement of a functioning measure with a new efficient measure, where the customer would not have otherwise made a purchase for several years, the appropriate baseline is a dual baseline that begins as the existing measure and shifts to the new standard measure after the expected remaining useful life of the existing measure ends. The incremental cost is the full cost of the new efficient measure (including installation costs) being purchased to replace a still-functioning measure less the present value of the assumed deferred replacement cost of replacing the existing measure with a new baseline measure at the end of the existing measure's life.

- For study-based services that are truly necessary for a customer to implement efficient measures, as opposed to being principally intended to be a form of marketing, the incremental cost is the full cost of the study-based service.

2.5 Discount Rate

The discount rate was applied to determine the present value of the cumulative benefits (e.g., avoided electric production, capacity T&D, and ancillary) that accrue over the life of the measures included in each program. The discount rate should reflect the societal discount rate as defined in the legislation to be the actual, long-term treasury bond yields. The societal discount rate of 2.38% is used to calculate the TRC and UCT values.

2.6 Line Losses

Line losses were incorporated in the calculation of the benefits. The energy and demand savings calculated by the evaluation are estimated at the customer or meter level. The savings that accrue to ComEd ratepayers are those at the generator level and so the estimated savings are increased by the line losses within ComEd's T&D network. Guidehouse calculated total benefits using the energy line losses of 11.18% and the peak line losses of 11.41%.

2.7 Miscellaneous EEPS Portfolio Costs

In addition to costs allocated directly to energy efficiency programs, the cost-effectiveness analysis included portfolio-level costs that are not directly incurred by specific programs. These

costs may include administrative; R&D; outreach; advertising; evaluation, measurement, and verification; legal; and other expenses. Since statutory cost effectiveness is measured at the portfolio level, ComEd does not allocate these costs to individual programs. Table 2-2 outlines the portfolio-level costs included in the analysis.

Table 2-2. Breakdown of Portfolio-Level Costs

Portfolio-Level Cost Component	Value ($)
2021 M&V Incurred	5,492,489
R&D	7,588,014
Market Research	3,100
Legal	368,225
Tracking System	901,765
Labor (Non-Program Specific)	6,420,805
General Program Costs	4,485,108
Business Outreach	4,386,717
Income Eligible Outreach	338,617
General Education & Awareness	2,290,885
Total	**27,550,391**

Source: Guidehouse analysis of ComEd data

2.8 Societal Non-Energy Impacts (Societal NEIs)

Societal NEIs occur when energy efficiency programs reduce electricity generated from fossil fuels, which reduces emissions including $PM_{2.5}$, SO_2, NO_x, and CO_2. This reduction in emissions causes reduced adverse health impacts, which are monetizable. The Societal NEIs were incorporated in the CY2021 analysis to the TRC values only. As discussed in previous sections, this report provides TRC results both with and without NEIs included.

Guidehouse quantified and monetized these Societal NEIs using the U.S. Environmental Protection Agency's (EPA) AVoided Emissions and geneRation Tool (AVERT) and CO–Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool.

3. Program-Specific Data

Table 3-1 and Table 3-2 summarize the CY2021 cost-effectiveness calculations and results for each program. These tables include the value of each benefit and cost component for each program and EEPS totals for each sector (e.g., residential, business, income eligible (IE)). For programs jointly implemented by ComEd and one or more Illinois gas utility(ies), the table only includes the electric portion of the program savings (unless ComEd claimed the gas savings) and cost-benefit calculations.

Table 3-1. ComEd Program-Level Benefits, Costs, and Illinois TRC without Gas Data from Joint Programs ($ Thousands)

Program	Benefits							Costs			Illinois Total Resource Cost (TRC) Test (NPV replacement cost as benefit)				
	Avoided Electric Production (with GHG adder)	Avoided Electric Production (without GHG adder)	Avoided Electric Capacity	Avoided Water Costs	Avoided Gas Production	Societal Non-Energy Impacts (NEIs)	NPV Replacement costs	Non-Incentive Costs	Incentive Costs	Incremental Costs (Net)	IL TRC Benefits (without Societal NEIs)	IL TRC Costs (without Societal NEIs)	IL TRC Test Net Benefits (without Societal NEIs)	IL TRC Test (with Societal NEIs)	IL TRC Test (without Societal NEIs)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l) = (b+d+e+f+h)	(m) = (i+k)	(n) = (l-m)	(o) = (l+g)/(m)	(p) = (l/m)
Appliance Rebates	$ 21,559	$ 11,307	$ 14,970	$ 3,449	$ 20,668	$ 21,181	$ -	$ 5,919	$ 15,572	$ 19,935	$ 60,645	$ 25,855	$ 34,791	3.16	2.35
Elementary Energy Education	$ 2,235	$ 1,180	$ 712	$ 2,067	$ 41	$ 2,256	$ 1,566	$ 454	$ 303	$ 562	$ 6,621	$ 1,016	$ 5,605	8.74	6.52
Residential HVAC	$ 2,261	$ 1,174	$ 2,427	$ -	$ 840	$ 2,147	$ -	$ 1,204	$ 1,826	$ 179	$ 5,528	$ 1,383	$ 4,145	5.55	4.00
Single-Family Assessment	$ 4,812	$ 2,559	$ 2,076	$ 76	$ (487)	$ 5,102	$ 5,223	$ 1,837	$ 3,771	$ 2,590	$ 11,700	$ 4,427	$ 7,273	3.80	2.64
Residential Behavior	$ 25,028	$ 13,588	$ 13,340	$ -	$ -	$ 29,383	$ -	$ 5,888	$ -	$ -	$ 38,368	$ 5,888	$ 32,479	11.51	6.52
Lighting Discount	$ 71,779	$ 37,733	$ 28,416	$ -	$ (11,182)	$ 72,279	$ 50,789	$ 4,428	$ 15,725	$ 22,100	$ 139,801	$ 26,529	$ 113,273	7.99	5.27
Multi-Family Assessments	$ 2,981	$ 1,577	$ 971	$ 1,141	$ (86)	$ 3,085	$ 931	$ 1,739	$ 2,627	$ 2,608	$ 5,939	$ 4,348	$ 1,591	2.08	1.37
Residential Total	**$ 130,654**	**$ 69,117**	**$ 62,911**	**$ 6,734**	**$ 9,794**	**$ 135,432**	**$ 58,508**	**$ 21,469**	**$ 39,823**	**$ 47,976**	**$ 268,602**	**$ 69,445**	**$ 199,157**	**5.82**	**3.87**
Agriculture	$ 3,617	$ 1,875	$ 2,110	$ -	$ (245)	$ 3,473	$ 1,071	$ 903	$ 2,121	$ 1,509	$ 6,552	$ 2,411	$ 4,141	4.16	2.72
Business Grocery	$ 4,189	$ 2,150	$ 1,458	$ -	$ (27)	$ 3,788	$ 16,618	$ 1,665	$ 797	$ 1,710	$ 22,239	$ 3,375	$ 18,864	7.71	6.59
Business Instant Discounts	$ 102,952	$ 53,384	$ 71,753	$ -	$ (9,698)	$ 97,605	$ 7,950	$ 2,489	$ 13,055	$ 42,139	$ 172,956	$ 44,628	$ 128,328	6.06	3.88
Business Telecomm	$ 5,129	$ 2,679	$ 1,767	$ -	$ 4	$ 4,950	$ -	$ 1,362	$ 1,485	$ 2,615	$ 6,900	$ 3,977	$ 2,923	2.98	1.73
Facility Assessments	$ 444	$ 242	$ -	$ -	$ 25	$ 536	$ -	$ 657	$ 1,246	$ 1,171	$ 469	$ 1,827	$ (1,358)	0.55	0.26
Incentives - Custom + Standard	$ 117,547	$ 60,449	$ 55,544	$ -	$ 7,610	$ 107,850	$ 47,356	$ 11,152	$ 42,937	$ 125,961	$ 228,057	$ 137,113	$ 90,944	2.45	1.66
Industrial Systems + Industrial Energy Management	$ 15,577	$ 8,143	$ 4,959	$ -	$ -	$ 15,385	$ -	$ 4,032	$ 6,393	$ 10,815	$ 20,536	$ 14,847	$ 5,689	2.42	1.38
LED Streetlighting	$ 43,179	$ 21,388	$ 33	$ -	$ -	$ 32,418	$ 5,243	$ 1,705	$ 9,983	$ 20,977	$ 48,455	$ 22,683	$ 25,772	3.57	2.14
Non-Profit Retrofits	$ 2,616	$ 1,343	$ 1,680	$ -	$ (529)	$ 2,376	$ 16	$ 952	$ 1,274	$ 1,781	$ 3,782	$ 2,732	$ 1,050	2.25	1.38
Non-residential New Construction	$ 13,695	$ 6,853	$ 6,008	$ 343	$ 4	$ 10,935	$ -	$ 1,465	$ 4,089	$ 8,230	$ 20,049	$ 9,695	$ 10,354	3.20	2.07
Public Buildings in Distressed Communities	$ 6,172	$ 3,147	$ 5,574	$ -	$ (815)	$ 5,424	$ 2,441	$ 879	$ 427	$ 10,494	$ 13,372	$ 11,373	$ 1,998	1.65	1.18
RetroCommissioning + VCx	$ 17,929	$ 9,540	$ 4,177	$ -	$ 189	$ 18,502	$ -	$ 3,636	$ 7,674	$ 1,475	$ 22,294	$ 5,112	$ 17,182	7.98	4.36
Small Business	$ 96,214	$ 50,203	$ 59,035	$ 47	$ (5,634)	$ 94,461	$ 175,092	$ 9,364	$ 56,263	$ 90,583	$ 324,755	$ 99,948	$ 224,807	4.19	3.25
Small Business Kits	$ 1,854	$ 993	$ 1,234	$ 2,469	$ 270	$ 2,006	$ 1,533	$ 1,706	$ 197	$ 247	$ 7,360	$ 1,953	$ 5,407	4.79	3.77
Strategic Energy Management	$ 11,388	$ 6,116	$ -	$ -	$ -	$ 12,201	$ -	$ 3,745	$ 859	$ 859	$ 11,388	$ 4,604	$ 6,784	5.12	2.47
Business Outreach	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,387	$ -	$ -	$ -	$ 4,387	$ -	-	-
Business Total	**$ 442,500**	**$ 228,506**	**$ 215,332**	**$ 2,859**	**$ (8,847)**	**$ 411,911**	**$ 257,320**	**$ 50,099**	**$ 148,799**	**$ 320,566**	**$ 909,164**	**$ 370,664**	**$ 538,499**	**3.56**	**2.45**
Affordable Housing New Construction	$ 994	$ 503	$ 414	$ 224	$ (37)	$ 840	$ -	$ 740	$ 1,236	$ 1,236	$ 1,595	$ 1,975	$ (381)	1.23	0.81
Food Bank-LED Distribution	$ 49,452	$ 26,072	$ 17,538	$ -	$ (1,576)	$ 49,429	$ 28,740	$ 3,774	$ 3,713	$ 7,251	$ 94,155	$ 11,025	$ 83,130	13.02	8.54
Product Discounts	$ 33,522	$ 17,687	$ 13,776	$ -	$ (4,506)	$ 33,727	$ 18,711	$ 1,186	$ 6,906	$ 8,216	$ 61,503	$ 9,403	$ 52,100	10.13	6.54
Multi-Family Retrofits - IEMS + IHWAP	$ 2,744	$ 1,398	$ 805	$ 639	$ 4,231	$ 2,383	$ 308	$ 3,280	$ 7,784	$ 7,064	$ 8,727	$ 10,344	$ (1,617)	1.07	0.84
Public Housing Retrofits	$ 554	$ 293	$ 213	$ 100	$ 93	$ 564	$ 122	$ 996	$ 733	$ 771	$ 1,083	$ 1,767	$ (684)	0.93	0.61
Single Family Retrofits - CBA + IHWAP	$ 2,607	$ 1,317	$ 3,047	$ 78	$ 2,357	$ 2,159	$ 343	$ 2,667	$ 10,064	$ 8,473	$ 8,432	$ 11,140	$ (2,708)	0.95	0.76
UIC-ERC Income Eligible Kits	$ 15,337	$ 8,118	$ 5,641	$ 11,706	$ 303	$ 15,568	$ 6,509	$ 2,242	$ 3,076	$ 2,700	$ 39,495	$ 4,942	$ 34,553	11.14	7.99
Income Eligible Outreach	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 339	$ -	$ -	$ -	$ 339	$ -	-	-
Income Eligible Total	**$ 105,210**	**$ 55,387**	**$ 41,434**	**$ 12,746**	**$ 864**	**$ 104,670**	**$ 54,734**	**$ 15,223**	**$ 33,513**	**$ 35,711**	**$ 214,989**	**$ 50,934**	**$ 164,054**	**6.28**	**4.22**
Voltage Optimization	$ 195,423	$ 99,555	$ 113,461	$ -	$ -	$ 170,896	$ 53	$ -	$ 120,140	$ 120,140	$ 308,937	$ 120,140	$ 188,796	3.99	2.57
Building Operator Certification	$ 320	$ 167	$ 107	$ -	$ -	$ 311	$ -	$ 96	$ 14	$ 64	$ 426	$ 160	$ 266	4.60	2.66
Efficient Choice	$ 132	$ 67	$ 65	$ -	$ 5	$ 111	$ -	$ 104	$ -	$ 101	$ 202	$ 204	$ (2)	1.53	0.99
Electric Homes New Construction	$ 118	$ 60	$ 28	$ 27	$ -	$ 100	$ -	$ 217	$ 62	$ 54	$ 173	$ 272	$ (99)	1.00	0.63
ENERGY STAR Retail Products Platform	$ 854	$ 438	$ 329	$ -	$ -	$ 768	$ -	$ 344	$ 817	$ 11,163	$ 1,183	$ 11,507	$ (10,324)	0.17	0.10
SEM Water Savings	$ -	$ -	$ -	$ 2,648	$ -	$ -	$ -	$ 173	$ 19	$ 19	$ 2,648	$ 191	$ 2,456	13.83	13.83
Upstream Commercial Food Service Equipment	$ 176	$ 90	$ 68	$ -	$ -	$ 159	$ -	$ 128	$ 41	$ 48	$ 244	$ 176	$ 68	2.29	1.39
Pilot and VO Total	**$ 197,022**	**$ 100,376**	**$ 114,058**	**$ 2,674**	**$ 5**	**$ 172,345**	**$ 53**	**$ 1,062**	**$ 121,093**	**$ 131,589**	**$ 313,812**	**$ 132,651**	**$ 181,161**	**3.66**	**2.37**
Portfolio Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 27,550	$ -	$ -	$ -	$ 27,550	$ -	-	-
Res and Business Total	**$ 573,154**	**$ 297,623**	**$ 278,243**	**$ 9,593**	**$ 947**	**$ 547,343**	**$ 315,828**	**$ 99,118**	**$ 188,622**	**$ 368,542**	**$ 1,177,766**	**$ 467,660**	**$ 710,106**	**3.69**	**2.52**
Portfolio Total (with IE, Pilot and VO)	**$ 875,386**	**$ 453,386**	**$ 433,736**	**$ 25,014**	**$ 1,816**	**$ 824,357**	**$ 370,615**	**$ 115,403**	**$ 343,227**	**$ 535,843**	**$ 1,706,567**	**$ 651,246**	**$ 1,055,321**	**3.89**	**2.62**

Note: For jointly implemented programs by ComEd and one or more Illinois gas utility, only the electric portion of the program savings and cost-benefit calculations are included here.

Source: Guidehouse analysis

Table 3-2. ComEd Program-Level Benefits, Costs, and UCT without Gas Data from Joint Programs ($ Thousands)

Program	Benefits							Costs			Illinois Utility Cost Test (UCT)			
	Avoided Electric Production (with GHG adder)	Avoided Electric Production (without GHG adder)	Avoided Electric Capacity	Avoided Water Costs	Avoided Gas Production	Societal Non-Energy Impacts (NEIs)	NPV Replacement costs	Non-Incentive Costs	Incentive Costs	Incremental Costs (Net)	IL UCT Benefits	IL UCT Costs	IL UCT Test Net Benefits	IL UCT Test
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(q) = (c+d+f)	(r) = (i + j)	(s) = (q-r)	(t) = (q/r)
Appliance Rebates	$ 21,559	$ 11,307	$ 14,970	$ 3,449	$ 20,668	$ 21,181	$ -	$ 5,919	$ 15,572	$ 19,935	$ 46,944	$ 21,491	$ 25,453	2.18
Elementary Energy Education	$ 2,235	$ 1,180	$ 712	$ 2,067	$ 41	$ 2,256	$ 1,566	$ 454	$ 303	$ 562	$ 1,933	$ 756	$ 1,177	2.56
Residential HVAC	$ 2,261	$ 1,174	$ 2,427	$ -	$ 840	$ 2,147	$ -	$ 1,204	$ 1,826	$ 179	$ 4,441	$ 3,030	$ 1,411	1.47
Single-Family Assessment	$ 4,812	$ 2,559	$ 2,076	$ 76	$ (487)	$ 5,102	$ 5,223	$ 1,837	$ 3,771	$ 2,590	$ 4,148	$ 5,607	$ (1,459)	0.74
Residential Behavior	$ 25,028	$ 13,588	$ 13,340	$ -	$ -	$ 29,383	$ -	$ 5,888	$ -	$ -	$ 26,928	$ 5,888	$ 21,040	4.57
Lighting Discount	$ 71,779	$ 37,733	$ 28,416	$ -	$ (11,182)	$ 72,279	$ 50,789	$ 4,428	$ 15,725	$ 22,100	$ 54,966	$ 20,153	$ 34,813	2.73
Multi-Family Assessments	$ 2,981	$ 1,577	$ 971	$ 1,141	$ (86)	$ 3,085	$ 931	$ 1,739	$ 2,627	$ 2,608	$ 2,462	$ 4,367	$ (1,905)	0.56
Residential Total	**$ 130,654**	**$ 69,117**	**$ 62,911**	**$ 6,734**	**$ 9,794**	**$ 135,432**	**$ 58,508**	**$ 21,469**	**$ 39,823**	**$ 47,976**	**$ 141,822**	**$ 61,292**	**$ 80,530**	**2.31**
Agriculture	$ 3,617	$ 1,875	$ 2,110	$ -	$ (245)	$ 3,473	$ 1,071	$ 903	$ 2,121	$ 1,509	$ 3,740	$ 3,023	$ 716	1.24
Business Grocery	$ 4,189	$ 2,150	$ 1,458	$ -	$ (27)	$ 3,788	$ 16,618	$ 1,665	$ 797	$ 1,710	$ 3,581	$ 2,462	$ 1,119	1.45
Business Instant Discounts	$ 102,952	$ 53,384	$ 71,753	$ -	$ (9,698)	$ 97,605	$ 7,950	$ 2,489	$ 13,055	$ 42,139	$ 115,439	$ 15,545	$ 99,894	7.43
Business Telecomm	$ 5,129	$ 2,679	$ 1,767	$ -	$ 4	$ 4,950	$ -	$ 1,362	$ 1,485	$ 2,615	$ 4,450	$ 2,847	$ 1,603	1.56
Facility Assessments	$ 444	$ 242	$ -	$ -	$ 25	$ 536	$ -	$ 657	$ 1,246	$ 1,171	$ 267	$ 1,902	$ (1,635)	0.14
Incentives - Custom + Standard	$ 117,547	$ 60,449	$ 55,544	$ -	$ 7,610	$ 107,850	$ 47,356	$ 11,152	$ 42,937	$ 125,961	$ 123,604	$ 54,088	$ 69,516	2.29
Industrial Systems + Industrial Energy Management	$ 15,577	$ 8,143	$ 4,959	$ -	$ -	$ 15,385	$ -	$ 4,032	$ 6,393	$ 10,815	$ 13,102	$ 10,424	$ 2,678	1.26
LED Streetlighting	$ 43,179	$ 21,388	$ 33	$ -	$ -	$ 32,418	$ 5,243	$ 1,705	$ 9,983	$ 20,977	$ 21,421	$ 11,688	$ 9,733	1.83
Non-Profit Retrofits	$ 2,616	$ 1,343	$ 1,680	$ -	$ (529)	$ 2,376	$ 16	$ 952	$ 1,274	$ 1,781	$ 2,494	$ 2,225	$ 269	1.12
Non-residential New Construction	$ 13,695	$ 6,853	$ 6,008	$ 343	$ 4	$ 10,935	$ -	$ 1,465	$ 4,089	$ 8,230	$ 12,864	$ 5,554	$ 7,310	2.32
Public Buildings in Distressed Communities	$ 6,172	$ 3,147	$ 5,574	$ -	$ (815)	$ 5,424	$ 2,441	$ 879	$ 427	$ 10,494	$ 7,906	$ 1,306	$ 6,599	6.05
RetroCommissioning + VCx	$ 17,929	$ 9,540	$ 4,177	$ -	$ 189	$ 18,502	$ -	$ 3,636	$ 7,674	$ 1,475	$ 13,906	$ 11,310	$ 2,595	1.23
Small Business	$ 96,214	$ 50,203	$ 59,035	$ 47	$ (5,634)	$ 94,461	$ 175,092	$ 9,364	$ 56,263	$ 90,583	$ 103,605	$ 65,628	$ 37,977	1.58
Small Business Kits	$ 1,854	$ 993	$ 1,234	$ 2,469	$ 270	$ 2,006	$ 1,533	$ 1,706	$ 197	$ 247	$ 2,497	$ 1,903	$ 594	1.31
Strategic Energy Management	$ 11,388	$ 6,116	$ -	$ -	$ -	$ 12,201	$ -	$ 3,745	$ 859	$ 859	$ 6,116	$ 4,604	$ 1,512	1.33
Business Outreach	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,387	$ -	$ -	$ -	$ 4,387	$ -	-
Business Total	**$ 442,500**	**$ 228,506**	**$ 215,332**	**$ 2,859**	**$ (8,847)**	**$ 411,911**	**$ 257,320**	**$ 50,099**	**$ 148,799**	**$ 320,566**	**$ 434,991**	**$ 198,897**	**$ 236,093**	**2.19**
Affordable Housing New Construction	$ 994	$ 503	$ 414	$ 224	$ (37)	$ 840	$ -	$ 740	$ 1,236	$ 1,236	$ 880	$ 1,975	$ (1,096)	0.45
Food Bank-LED Distribution	$ 49,452	$ 26,072	$ 17,538	$ -	$ (1,576)	$ 49,429	$ 28,740	$ 3,774	$ 3,713	$ 7,251	$ 42,034	$ 7,487	$ 34,547	5.61
Product Discounts	$ 33,522	$ 17,687	$ 13,776	$ -	$ (4,506)	$ 33,727	$ 18,711	$ 1,186	$ 6,906	$ 8,216	$ 26,956	$ 8,093	$ 18,864	3.33
Multi-Family Retrofits - IEMS + IHWAP	$ 2,744	$ 1,398	$ 805	$ 639	$ 4,231	$ 2,383	$ 308	$ 3,280	$ 7,784	$ 7,064	$ 6,434	$ 11,064	$ (4,630)	0.58
Public Housing Retrofits	$ 554	$ 293	$ 213	$ 100	$ 93	$ 564	$ 122	$ 996	$ 733	$ 771	$ 598	$ 1,730	$ (1,131)	0.35
Single Family Retrofits - CBA + IHWAP	$ 2,607	$ 1,317	$ 3,047	$ 78	$ 2,357	$ 2,159	$ 343	$ 2,667	$ 10,064	$ 8,473	$ 6,721	$ 12,731	$ (6,010)	0.53
UIC-ERC Income Eligible Kits	$ 15,337	$ 8,118	$ 5,641	$ 11,706	$ 303	$ 15,568	$ 6,509	$ 2,242	$ 3,076	$ 2,700	$ 14,061	$ 5,318	$ 8,744	2.64
Income Eligible Outreach	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 339	$ -	$ -	$ -	$ 339	$ -	-
Income Eligible Total	**$ 105,210**	**$ 55,387**	**$ 41,434**	**$ 12,746**	**$ 864**	**$ 104,670**	**$ 54,734**	**$ 15,223**	**$ 33,513**	**$ 35,711**	**$ 97,685**	**$ 48,736**	**$ 48,949**	**2.00**
Voltage Optimization	$ 195,423	$ 99,555	$ 113,461	$ -	$ -	$ 170,896	$ 53	$ -	$ 120,140	$ 120,140	$ 213,016	$ 120,140	$ 92,875	1.77
Building Operator Certification	$ 320	$ 167	$ 107	$ -	$ -	$ 311	$ -	$ 96	$ 14	$ 64	$ 274	$ 110	$ 163	2.48
Efficient Choice	$ 132	$ 67	$ 65	$ -	$ 5	$ 111	$ -	$ 104	$ -	$ 101	$ 137	$ 104	$ 33	1.32
Electric Homes New Construction	$ 118	$ 60	$ 28	$ 27	$ -	$ 100	$ -	$ 217	$ 62	$ 54	$ 88	$ 279	$ (191)	0.31
ENERGY STAR Retail Products Platform	$ 854	$ 438	$ 329	$ -	$ -	$ 768	$ -	$ 344	$ 817	$ 11,163	$ 767	$ 1,161	$ (394)	0.66
SEM Water Savings	$ -	$ -	$ -	$ 2,648	$ -	$ -	$ -	$ 173	$ 19	$ 19	$ -	$ 191	$ (191)	-
Upstream Commercial Food Service Equipment	$ 176	$ 90	$ 68	$ -	$ -	$ 159	$ -	$ 128	$ 41	$ 48	$ 158	$ 169	$ (11)	0.94
Pilot and VO Total	**$ 197,022**	**$ 100,376**	**$ 114,058**	**$ 2,674**	**$ 5**	**$ 172,345**	**$ 53**	**$ 1,062**	**$ 121,093**	**$ 131,589**	**$ 214,439**	**$ 122,154**	**$ 92,285**	**1.76**
Portfolio Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 27,550	$ -	$ -	$ -	$ 27,550	$ -	-
Res and Business Total	**$ 573,154**	**$ 297,623**	**$ 278,243**	**$ 9,593**	**$ 947**	**$ 547,343**	**$ 315,828**	**$ 99,118**	**$ 188,622**	**$ 368,542**	**$ 576,813**	**$ 287,740**	**$ 289,073**	**2.00**
Portfolio Total (with IE, Pilot and VO)	**$ 875,386**	**$ 453,386**	**$ 433,736**	**$ 25,014**	**$ 1,816**	**$ 824,357**	**$ 370,615**	**$ 115,403**	**$ 343,227**	**$ 535,843**	**$ 888,937**	**$ 458,630**	**$ 430,307**	**1.94**

Source: Guidehouse analysis

3.1 Incremental and Actual Measure Costs

Guidehouse reviewed program measures implemented in CY2021 and identified whether it was appropriate to use the incremental or actual measure cost for the analysis. The decision is measure-specific using the guidance provided in the TRM v9.0 and the Illinois Energy Efficiency Policy Manual.[7]

Guidehouse compiled the actual cost information from the implementer invoices and the program tracking data provided by ComEd and identified any missing information. The team sourced incremental measure costs from TRM v9.0 and different workpapers provided by the implementation contractor.

While conducting the cost review, Guidehouse found instances where the program tracking data and the incremental cost value from the reference sources do not align due to differing definitions of program unit and made appropriate assumptions to account for these differences. Guidehouse also included O&M costs when there was a difference between the efficient measure and the baseline measure based on the guidance provided in TRM v9.0. Where the efficient measure has a significantly shorter or longer life than the relevant baseline measure (e.g., LEDs versus halogens), Guidehouse used the avoided baseline replacement measure costs in the TRC analysis. The incremental cost input in the TRC analysis was not reduced by the amount of any incentives. Some of the methodologies used to estimate the measure costs for different programs are listed below:

- **RetroCommissioning:** Both the study and measure implementation costs are included.
- **Custom and Industrial Systems:** Guidehouse analyzed a sample of all the projects to determine if the actual measure cost or an incremental cost should be used for each measure. Based on this analysis, we developed a $/kWh value that we applied to the entire population of measures installed as a part of this program.
- **Prescriptive Programs (Small Business, Standard, Residential HVAC, etc.):** Guidehouse researched the incremental measure cost data from the TRM v9.0. For joint programs, only the ComEd portion of the costs were included.
- **Residential HVAC:** The early replacement HVAC measures installed as a part of this program were treated based on the guidance provided in TRM v9.0. The full installation cost subtracted by the NPV deferred future replacement costs was calculated for the analysis.
- **Elementary Energy Education Program (and other similar programs):** Guidehouse used the actual cost of each kit to perform the analysis.
- **Affordable Housing New Construction:** Guidehouse assumed that the measure costs were same as the incentive costs for direct install measures.

Measure cost data was not available for the Water Infrastructure Leak Reduction pilot. This is primarily because relevant data was collected by each respective participating jurisdiction and was not available to ComEd. As a result, the TRC analysis was not conducted for this pilot.

[7] https://ilsag.s3.amazonaws.com/IL_EE_Policy_Manual_Version_2.0_Final_9-19-19.pdf

3.2 Data Sources and Assumptions

The analysis used the following sources to compile the relevant data:

- **Program tracking data and evaluation reports**: used to compile measure level savings, quantity, and realization rate values.
- **TRM v9.0**: Used to compile measure life and incremental cost data.
- **Project invoices**: Used to compile actual cost data (if available)
- **Project-level costs**: Utility incentives and non-incentive costs provided by ComEd.

Table 3-3 provides the sources and assumptions for the measure costs by program.

Table 3-3. CY2021 Program Cost Data Sources and Assumptions

Program	Data Source	Note
Appliance Rebates	TRM v9.0	TRM v9.0 deemed values were used for the analysis.
Elementary Energy Education	Project Invoices	Actual cost per kit and per Portal Pick Bulb provided by ComEd were used.
Lighting Discounts	TRM v9.0	Incremental costs deemed in the TRM were used for the analysis.
Multi-Family Assessments	Tracking Data and Project Invoices	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Implementer invoices were used to obtain the ComEd allocated costs of joint and gas measures that were then applied to the tracking data incentive amounts.
Residential Behavior	NA	There are no incentives or measure costs, only program administration costs.
Residential HVAC	TRM v9.0	Used program tracking data to determine necessary details (SEER, tons, HSPF) for identifying the TRM v9.0 deemed cost value for each measure where applicable.
Single-Family Assessment	Project Invoices	Actual costs provided by ComEd were used.
Affordable Housing New Construction	ComEd	Guidehouse used an average of the Incremental Capital Cost per project.
Food Bank-LED Distribution	Project Invoices	Actual costs provided by the implementer.
UIC-ERC Income Eligible Kits	Project Invoices	Actual costs provided by ComEd were used.
Product Discounts	TRM v9.0	Guidehouse used the deemed measure costs provided in the TRM v9.0 measure sections, using an analysis of the mix of lamp types for applicable lighting measures.
Public Housing Retrofits	Tracking Data and Project Invoices	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Implementer invoices were used to obtain the ComEd allocated costs of joint and gas measures that were then applied to the tracking data incentive amounts.
Single-Family Retrofits - CBA	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs.
Single-Family Retrofits - IHWAP	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Guidehouse found these incentive amounts accounted for the ComEd allocated cost of joint and gas measures.
Multi-Family Retrofits - IEMS	Tracking Data and Project Invoices	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Implementer invoices were used to obtain the ComEd allocated cost percentages of joint and gas measures that were then applied to the tracking data incentive amounts.

Program	Data Source	Note
Multi-Family Retrofits - IHWAP	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Guidehouse found these incentive amounts accounted for the ComEd allocated cost of joint and gas measures.
Agriculture	TRM v9.0 and Project Files	Costs for custom measures were estimated using the project files and the costs for non-custom measures were from the corresponding TRM v9.0 section or were estimated using project files.
Business Grocery	TRM v9.0, CY2021 Workpapers, Project Files, CY2020 Data	Costs for most measures were from the corresponding TRM v9.0 section. Some lighting measures used 2021 workpapers, and New Refrigerator Case did not have costs in the CY2021 data so CY2020 was referenced.
Business Telecomm	Tracking Data and Project Files	Guidehouse obtained the total actual measure costs from the tracking data and project files.
Facility Assessments	Not Applicable	ComEd does not track the measure costs for this program. Guidehouse assumed that the implementation contractor and marketing costs are the only costs associated with this program and there is no measure cost.
Incentives – Custom and Data Centers	ComEd Project Files	Sample of project files, total $/kWh.
Incentives - Standard	DNV GL workpapers	The workpapers provided reference for incremental measure cost. Guidehouse made assumptions regarding unit definition based on program data.
Industrial Systems and Energy Management	ComEd Project Files	Sample of project files, total $/kWh.
Business Instant Discounts	TRM v9.0	TRM v9.0 deemed values were used for the analysis. The value for Linear Fluorescents was the same as CY2020.
LED Streetlighting	CY2020 Data	Guidehouse used the average fixture costs calculated using the information provided in the CY2020 tracking data. Guidehouse understands these values did not change between CY2020 and CY2021.
Non-Profit Retrofits	TRM v9.0	Incremental costs deemed in the TRM were used for the analysis.
Non-residential New Construction	CY2020 Data	Guidehouse used the same value as CY2020 as it was understood ComEd did not change the incremental cost between CY2020 and CY2021.
Public Buildings in Distressed Communities	TRM v9.0	TRM v9.0 deemed values were used, requiring some analysis of cost based on lamp type within each measure.
RetroCommissioning + VCx	ComEd Project Files	Sample of project files, total $/kWh.
Small Business	TRM v7.0, TRM v8.0, TRM v9.0, Michigan Energy Measure Database 2021, Tracking Data	TRM v9.0 deemed values were used, with some assumptions on unit definitions made using the tracking data. A few measures in this program were only in older versions of the TRM and had to use v7.0 or v8.0 cost information. Guidehouse used other documentation to determine cost of measures not in the TRM.
Small Business Kits	Project Invoices	Actual costs provided by ComEd were used.
Strategic Energy Management and SEM Water Savings Pilot	Tracking Data	Guidehouse assumed measure cost equals incentives.
Voltage Optimization	Project Files	Total costs obtained from ComEd provided documentation.
Building Operator Certification	TRM v10.0	Guidehouse used the participant cost as deemed in the TRM v10.0. The TRM v9.0 did not include this measure.
Upstream Commercial Food Service Equipment	TRM v9.0	Incremental costs deemed in the TRM were used for the analysis. Guidehouse made some assumptions regarding the measure specifications.
Efficient Choice	TRM v9.0, Michigan Energy Measure Database 2021, Measure Documentation	TRM v9.0 deemed values were used for the analysis. Measures not in the TRM used an assortment of supporting measure documentation.

Program	Data Source	Note
Electric Homes New Construction	TRM v9.0 and ComEd Project Files	Measure costs were obtained from the TRM v9.0 and summed together per home.
ENERGY STAR Retail Products Platform	TRM v9.0	An average of the deemed values provided in the TRM v9.0 for each measure was used in the analysis; each measure had different costs based on type.

Source: Guidehouse analysis

3.3 Findings

Guidehouse performed a bottom-up analysis for each program in ComEd's CY2021 portfolio and offers the following findings.

Finding 1. Compared to CY2020, the TRC values for CY2021 are higher across the portfolio. This is due to significantly higher participation in the programs that led to increased savings while program costs stayed similar. The impacts of the coronavirus pandemic had led to lower participation in some programs in CY2020, and as the pandemic eased up in the following year, participation in many of the programs increased significantly.

Finding 2. All the Residential and Business programs have TRC values greater than 1.0 except for Facility Assessments, which has a TRC value of 0.26 without Societal NEIs and 0.55 with Societal NEIs. The low TRC value is due to the high incremental costs associated with the relatively low number of no- to low-cost operational measures. While the program identifies both no- to low-cost operational and incentivized measures, savings from only the former are claimed as part of Facility Assessments. Other savings that may stem from Facility Assessments are claimed in other programs as appropriate (e.g., Incentives – Standard and Custom).

Finding 3. Two of the IE programs have TRCs less than 1.0 without Societal NEIs and greater than 1.0 with Societal NEIs.

Program	TRC with Societal NEIs	TRC without Societal NEIs
Affordable Housing New Construction	1.23	0.81
Multi-Family Retrofits	1.07	0.84

Finding 4. Two of the IE programs have TRCs less than 1.0 both with and without Societal NEIs.

Program	TRC with Societal NEIs	TRC without Societal NEIs
Public Housing Retrofits	0.93	0.61
Single Family Retrofits	0.95	0.76