



ComEd Cost-Effectiveness Analysis CY2022 Report

Energy Efficiency/Demand Response Plan:
Program Year 2022 (CY2022)
(1/1/2022-12/31/2022)

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1. Overview

As part of ComEd's energy efficiency program evaluation for CY2022, 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 and the Illinois Commerce Commission 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 term 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 decrease in the portfolio's calendar year 2022 (CY2022) TRC values as compared to CY2021 TRC values:

- The portfolio benefits in CY2022 are significantly lower than in CY2021, which is primarily attributable to losses within the electricity cost and NPV replacement cost benefit streams; in CY2021, the portfolio accrued nearly \$900MM in electric production and capacity benefits, while this number was closer \$650MM in CY2021. This decrease appears to be a product of reduced avoided costs in PY2022.
- While the CY2022 portfolio costs are also slightly lower than in CY2021, this decrease was not as significant as that seen within the benefits. Furthermore, the portfolio TRC and UCT remain above 1.0

Table 1-1 summarizes the CY2022 TRC and UCT values for all EEPS programs in ComEd's CY2022 portfolio. Overall, the CY2022 portfolio aggregate TRCs and UCTs show the portfolio was cost-effective, with aggregate TRC values of 2.99 (with Societal NEIs) and 2.03 (without Societal NEIs), and a UCT value of 1.40.

Table 1-1. Summary of CY2022 TRC and UCT Values for ComEd Programs

Program	Illinois TRC Test (With Societal NEIs)	Illinois TRC Test (Without Societal NEIs)	UCT
Retail/Online	6.20	4.44	2.40
Product Distribution	11.87	8.21	4.25
Multifamily Upgrades	1.05	0.78	0.47
Single-Family Upgrades	1.13	0.92	0.48
Contractor / Midstream Rebates	2.91	1.96	1.80
New Construction - IE	5.63	3.60	0.89
Behavior - Res/IE	14.66	8.51	4.54
Electric Home New Construction	2.11	1.33	0.85
Residential & Income Eligible Total*	4.92	3.41	1.74
Incentives	1.97	1.32	1.57
Small Business	3.11	2.12	1.48
Midstream/Upstream	6.09	4.26	4.90
Targeted Systems	2.68	1.63	0.91
Behavior - Bus/Pub	4.67	2.61	1.40
New Construction - Bus/Pub	2.64	1.80	2.05
Assessments	1.20	0.64	0.34
Business & Public Sector Total*	2.89	1.94	1.69
Upstream Commercial Food Service Equipment	4.76	3.04	1.41
VSHP as AC Replacement	0.79	0.49	0.34
Heat Pump Water Heater Pilot	0.10	0.06	0.03
ENERGY STAR Retail Products Platform	2.63	1.75	5.34
Pilot & Market Transformation Total*	2.48	1.64	2.98
Voltage Optimization	2.80	1.90	1.21

Portfolio Total without IE & with VO*†	2.87	1.94	1.43
Portfolio Total with IE & without VO*†	3.02	2.05	1.44
Portfolio Total without IE, VO, & Pilots*	2.89	1.95	1.49
Portfolio Total with IE & VO*†	2.99	2.03	1.40

*The TRC and UCT values are calculated using the sum of all the offerings' benefits and costs.

†Portfolio Total rows include Pilots & Market Transformation.

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

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

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 v10.0 (TRM v10.0) 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.

In CY2022, a final draft policy in Policy Manual Version 3.0 asserts that negative avoided costs (accrued through electrification or other impacts) be treated as increases in TRC costs rather than decreases in TRC benefits, as was previously treated. Additionally, electricity avoided cost impacts (energy and demand) are grouped together to create a net cost change due to electricity. These updates are reflected in the TRC ratios and report tables.

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 .

Similar cost test changes from the final draft policy in Policy Manual Version 3.0 apply to the UCT as described in Section 1.1.

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)	ComEd
	• 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	
Program Specific	• Participants/Measure Count	Guidehouse
	• Verified Ex Post Energy and Demand Savings	
	• Realization Rate	
	• Net-to-Gross Ratio	
	• Measure Life	
	• Incremental Measure Costs ⁴	
	• NPV Replacement Costs	ComEd
	• Societal NEI benefit	
	• Non-Incentive Costs	
	• Utility Incentive Costs	
	• Direct Install Costs	
• Incremental Measure Costs		

Source: Guidehouse analysis

³ From Nicor Gas.

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

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.

2. Summary of Results and Portfolio-Level Data Inputs

Table 2-1 summarizes the CY2022 cost-effectiveness results by benefit and cost components relevant to each cost test for the portfolio without the inclusion of income eligible components, pilots and market transformation, or voltage optimization. The results indicate that ComEd's CY2022 EEPS portfolio is cost-effective under both the UCT and the TRC tests for the Residential and Business sectors.

Table 2-1. Summary of ComEd CY2022 Residential and Business Sectors' Cost-Effectiveness Test Values (\$ Thousands)*

Data Point	UCT		Illinois TRC Test	
	UCT Benefits	UCT Costs	Illinois TRC Benefits	Illinois TRC Costs
Electricity Cost Changes	\$456,938	\$39	\$456,938	\$39
Fossil Fuel Cost Changes	\$33,461	\$0	\$33,461	\$0
Water Cost Changes	N/A	N/A	\$35	\$0
Environmental Adder (GHGs)	N/A	N/A	\$279,055	\$32
Societal NEI Benefit	N/A	N/A	\$411,936	\$50
NPV Replacement costs	N/A	N/A	\$78,613	\$0
Non-Incentive Costs	N/A	\$132,447	N/A	\$132,447
Incentive Costs	N/A	\$199,473	N/A	N/A
Net Participant Costs	N/A	N/A	\$259	\$302,734
Present Value Totals (with Societal NEI)	\$490,399	\$331,960	\$1,260,297	\$435,303
Present Value Totals (without Societal NEI)	\$490,399	\$331,960	\$848,361	\$435,253
Ratio (with Societal NEI)	1.48		2.90	
Ratio (without Societal NEI)	1.48		1.95	

Note: All categories exclude income eligible, pilots and market transformation, 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 \$8.42/1,000 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

Incentives⁵ include financial incentives paid to customers plus incentives paid to third parties. Financial incentives paid to customers are payments⁶ 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 2.40% 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 10.07% and the peak line losses of 10.66% as provided by ComEd.

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 (\$)
Measurement & Verification (M&V)	\$10,126,101
R&D	\$10,867,080
Market Development	\$1,133,182
Legal	\$141,513
Tracking System	\$2,041,873
Labor (Non-Program Specific)	\$5,163,442
General Program Costs	\$3,939,273
Residential Outreach	\$896,876
Business Outreach	\$13,686,239
Income Eligible Outreach	\$974,280
General Education & Awareness	\$5,903,798
Total	\$54,873,656

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}, SO₂, NO_x, and CO₂. This reduction in emissions causes reduced adverse health impacts, which are monetizable. The Societal NEIs were incorporated in the CY2022 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 CY2022 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), market transformation (MT), pilots). For programs jointly implemented by ComEd and one or more Illinois gas utility, the table only includes the electric portion of the program savings (unless ComEd claims the gas savings) and cost-benefit calculations.

Table 3-3 summarizes the CY22 ComEd Electrification Measures' energy consumption, savings, and costs (total cost, total utility cost, average cost, average utility cost) .

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

Program	Benefits							Costs							IL Total Resource Cost (TRC) Test (NPV replacement cost as benefit)						
	Electricity Cost Changes	Fossil Fuel Cost Changes	Water Cost Changes	Environmental Adder (GHGs)	Societal NEI	NPV Replacement costs	Incremental Costs (Net)	Electricity Cost Changes	Fossil Fuel Cost Changes	Water Cost Changes	Environmental Adder (GHGs)	Societal NEI	NPV Replacement Costs	Non-Incentive Costs	Incentive Costs	Incremental Costs (Net)	IL TRC Benefits (w/o NEI)	IL TRC Costs (w/o NEI)	IL TRC Test Net Benefits (w/o NEI)	IL TRC Test (w/NEI)	IL TRC Test (w/o NEI)
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	(q)=a+b+c+d+e+f+g+h	(r)=h+i+j+k+m+n+p	(s)=q-r	(t)=(q+e)/(r+l)	(u)=r/s
Retail/Online	\$78,647	\$19,314	\$9	\$45,178	\$72,172	\$38,571	\$0	\$3	\$0	\$0	\$0	\$0	\$0	\$12,451	\$28,307	\$28,489	\$181,719	\$40,944	\$140,775	6.20	4.44
Product Distribution	\$64,206	\$6,787	\$78	\$41,012	\$63,510	\$30,020	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,184	\$12,505	\$13,133	\$142,102	\$17,317	\$124,785	11.87	8.21
Multifamily Upgrades	\$8,725	\$7,467	\$11	\$5,623	\$8,210	\$2,258	\$0	\$0	\$1	\$0	\$0	\$0	\$0	\$9,370	\$24,938	\$21,332	\$24,084	\$30,703	(\$6,618)	1.05	0.78
Single-Family Upgrades	\$7,778	\$7,654	\$4	\$3,943	\$5,719	\$6,636	\$16	\$0	\$0	\$0	\$0	\$0	\$0	\$9,012	\$23,240	\$19,148	\$26,031	\$28,160	(\$2,129)	1.13	0.92
Contractor / Midstream Rebates	\$5,927	\$504	\$0	\$3,875	\$5,021	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,749	\$1,819	\$3,509	\$10,306	\$5,258	\$5,047	2.91	1.96
New Construction - IE	\$2,166	\$266	\$1	\$1,758	\$2,363	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,145	\$1,586	\$19	\$4,191	\$1,164	\$3,027	5.63	3.60
Behavior - Res/IE	\$29,203	\$0	\$0	\$25,878	\$40,506	\$0	\$0	\$36	\$0	\$0	\$32	\$50	\$0	\$6,402	\$0	\$0	\$55,081	\$6,471	\$48,610	14.66	8.51
Electric Home New Construction	\$214	\$0	\$0	\$187	\$242	\$8	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$202	\$51	\$106	\$409	\$308	\$101	2.11	1.33
Res & IE Total	\$196,867	\$41,992	\$104	\$127,453	\$197,744	\$77,493	\$16	\$39	\$1	\$0	\$32	\$50	\$0	\$59,099	\$92,444	\$85,736	\$443,923	\$130,324	\$313,598	4.92	3.41
Incentives	\$100,380	\$9,072	\$0	\$63,549	\$87,640	\$3,177	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13,336	\$56,323	\$120,331	\$176,178	\$133,667	\$42,511	1.97	1.32
Small Business	\$124,128	\$3,198	\$1	\$71,826	\$102,317	\$20,858	\$259	\$0	\$0	\$0	\$0	\$0	\$0	\$10,109	\$76,201	\$93,577	\$220,270	\$103,687	\$116,583	3.11	2.12
Midstream/Upstream	\$74,250	\$0	\$0	\$38,315	\$55,306	\$16,007	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,449	\$12,711	\$27,756	\$128,572	\$30,205	\$98,367	6.09	4.26
Targeted Systems	\$22,197	\$737	\$0	\$14,581	\$24,251	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9,132	\$16,169	\$13,880	\$37,514	\$23,012	\$14,502	2.68	1.63
Behavior - Bus/Pub	\$8,784	\$0	\$0	\$7,414	\$12,826	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,641	\$1,622	\$1,573	\$16,198	\$6,214	\$9,984	4.67	2.61
New Construction - Bus/Pub	\$7,185	\$28	\$4	\$4,627	\$5,519	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$974	\$2,551	\$5,594	\$11,844	\$6,567	\$5,277	2.64	1.80
Assessments	\$432	\$1	\$0	\$347	\$680	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$478	\$786	\$739	\$779	\$1,218	(\$438)	1.20	0.64
Business & Public Sector Total	\$337,355	\$13,035	\$5	\$200,659	\$288,537	\$40,042	\$259	\$0	\$0	\$0	\$0	\$0	\$0	\$54,806	\$166,364	\$263,450	\$591,356	\$304,570	\$286,786	2.89	1.94
Upstream Commercial Food Service Equipment	\$561	\$0	\$0	\$367	\$525	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$130	\$268	\$176	\$929	\$306	\$623	4.76	3.04
VSHR as AC Replacement	\$133	\$0	\$0	\$112	\$148	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$288	\$98	\$208	\$245	\$496	(\$251)	0.79	0.49
Heat Pump Water Heater Pilot	\$10	\$0	\$0	\$9	\$12	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$302	\$55	\$8	\$19	\$310	(\$291)	0.10	0.06
ENERGY STAR Retail Products Platform	\$6,108	\$0	\$20	\$3,840	\$4,994	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$225	\$918	\$5,466	\$9,967	\$5,691	\$4,276	2.63	1.75
Pilot and Market Transformation Total	\$6,812	\$0	\$21	\$4,328	\$5,679	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$946	\$1,339	\$5,857	\$11,161	\$6,803	\$4,358	2.48	1.64
Voltage Optimization	\$116,593	\$0	\$0	\$66,054	\$86,459	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$95,980	\$0	\$0	\$182,647	\$95,980	\$86,667	2.80	1.90
Portfolio Total without IE & with VO†	\$580,343	\$33,461	\$56	\$349,437	\$504,074	\$78,613	\$259	\$39	\$0	\$0	\$32	\$50	\$0	\$229,373	\$200,812	\$308,591	\$1,042,169	\$538,036	\$504,133	2.87	1.94
Portfolio Total with IE & without VO†	\$541,034	\$55,027	\$129	\$332,440	\$491,961	\$117,535	\$275	\$39	\$1	\$0	\$32	\$50	\$0	\$154,167	\$260,148	\$355,043	\$1,046,439	\$509,283	\$537,156	3.02	2.05
Portfolio Total without IE, VO, & Pilots*	\$463,046	\$33,461	\$55	\$282,895	\$416,930	\$78,613	\$259	\$39	\$0	\$0	\$32	\$50	\$0	\$132,672	\$200,391	\$308,200	\$858,328	\$440,944	\$417,385	2.89	1.95
Portfolio Total with IE & VO†	\$657,627	\$55,027	\$129	\$398,494	\$578,419	\$117,535	\$275	\$39	\$1	\$0	\$32	\$50	\$0	\$250,147	\$260,148	\$355,043	\$1,229,087	\$605,263	\$623,824	2.99	2.03

*The TRC and UCT values are calculated using the sum of all the offerings' benefits and costs.

†Portfolio Total rows include Pilots & Market Transformation.

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

Program	Benefits							Costs							IL Utility Cost Test (UCT)					
	Electricity Cost Changes	Fossil Fuel Cost Changes	Water Cost Changes	Environmental Adder (GHGs)	Societal NEI	NPV Replacement costs	Incremental Costs (Net)	Electricity Cost Changes	Fossil Fuel Cost Changes	Water Cost Changes	Environmental Adder (GHGs)	Societal NEI	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	l	m	n	o	p	(v) = a+b	(w) = h+i+n+q	(x) = v-w	(y) = v/w
Retail/Online	\$78,647	\$19,314	\$9	\$45,178	\$72,172	\$38,571	\$0	\$3	\$0	\$0	\$0	\$0	\$0	\$12,451	\$28,307	\$28,489	\$97,961	\$40,761	\$57,200	2.40
Product Distribution	\$64,206	\$6,787	\$78	\$41,012	\$63,510	\$30,020	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,184	\$12,505	\$13,133	\$70,992	\$16,689	\$54,303	4.25
Multifamily Upgrades	\$8,725	\$7,467	\$11	\$5,623	\$8,210	\$2,258	\$0	\$0	\$1	\$0	\$0	\$0	\$0	\$9,370	\$24,938	\$21,332	\$16,192	\$34,308	(\$18,116)	0.47
Single-Family Upgrades	\$7,778	\$7,654	\$4	\$3,943	\$5,719	\$6,636	\$16	\$0	\$0	\$0	\$0	\$0	\$0	\$9,012	\$23,240	\$19,148	\$15,433	\$32,253	(\$16,820)	0.48
Contractor / Midstream Rebates	\$5,927	\$504	\$0	\$3,875	\$5,021	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,749	\$1,819	\$3,509	\$6,431	\$3,568	\$2,863	1.80
New Construction - IE	\$2,166	\$266	\$1	\$1,758	\$2,363	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,145	\$1,586	\$19	\$2,432	\$2,732	(\$300)	0.89
Behavior - Res/IE	\$29,203	\$0	\$0	\$25,878	\$40,506	\$0	\$0	\$36	\$0	\$0	\$32	\$50	\$0	\$6,402	\$0	\$0	\$29,203	\$6,438	\$22,765	4.54
Electric Home New Construction	\$214	\$0	\$0	\$187	\$242	\$8	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$202	\$51	\$106	\$214	\$253	(\$38)	0.85
Res & IE Total	\$196,867	\$41,992	\$104	\$127,453	\$197,744	\$77,493	\$16	\$39	\$1	\$0	\$32	\$50	\$0	\$59,099	\$92,444	\$85,736	\$238,858	\$137,001	101,857.52	1.74
Incentives	\$100,380	\$9,072	\$0	\$63,549	\$87,640	\$3,177	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$13,336	\$56,323	\$120,331	\$109,452	\$69,660	\$39,792	1.57
Small Business	\$124,128	\$3,198	\$1	\$71,826	\$102,317	\$20,858	\$259	\$0	\$0	\$0	\$0	\$0	\$0	\$10,109	\$76,201	\$93,577	\$127,326	\$86,310	\$41,015	1.48
Midstream/Upstream	\$74,250	\$0	\$0	\$38,315	\$55,306	\$16,007	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,449	\$12,711	\$27,756	\$74,250	\$15,159	\$59,090	4.90
Targeted Systems	\$22,197	\$737	\$0	\$14,581	\$24,251	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9,132	\$16,169	\$13,880	\$22,934	\$25,301	(\$2,368)	0.91
Behavior - Bus/Pub	\$8,784	\$0	\$0	\$7,414	\$12,826	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$4,641	\$1,622	\$1,573	\$8,784	\$6,263	\$2,521	1.40
New Construction - Bus/Pub	\$7,185	\$28	\$4	\$4,627	\$5,519	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$974	\$2,551	\$5,594	\$7,213	\$3,525	\$3,688	2.05
Assessments	\$432	\$1	\$0	\$347	\$680	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$478	\$786	\$739	\$433	\$1,265	(\$832)	0.34
Business & Public Sector Total	\$337,355	\$13,035	\$5	\$200,659	\$288,537	\$40,042	\$259	\$0	\$0	\$0	\$0	\$0	\$0	\$54,806	\$166,364	\$263,450	\$350,391	\$207,483	142,907.09	1.69
Upstream Commercial Food Service Equipment	\$561	\$0	\$0	\$367	\$525	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$130	\$268	\$176	\$561	\$398	\$163	1.41
VSHW as AC Replacement	\$133	\$0	\$0	\$112	\$148	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$288	\$98	\$208	\$133	\$386	(\$253)	0.34
Heat Pump Water Heater Pilot	\$10	\$0	\$0	\$9	\$12	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$302	\$55	\$8	\$10	\$358	(\$347)	0.03
ENERGY STAR Retail Products Platform	\$6,108	\$0	\$20	\$3,840	\$4,994	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$225	\$918	\$5,466	\$6,108	\$1,143	\$4,965	5.34
Pilot and Market Transformation Total	\$6,812	\$0	\$21	\$4,328	\$5,679	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$946	\$1,339	\$5,857	\$6,812	\$2,285	4,526.59	2.98
Voltage Optimization	\$116,593	\$0	\$0	\$66,054	\$86,459	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$95,980	\$0	\$0	\$116,593	\$95,980	\$20,614	1.21
Portfolio Total without IE & with VO*†	\$580,343	\$33,461	\$56	\$349,437	\$504,074	\$78,613	\$259	\$39	\$0	\$0	\$32	\$50	\$0	\$229,373	\$200,812	\$308,591	\$613,805	\$430,225	\$183,580	1.43
Portfolio Total with IE & without VO*†	\$541,034	\$55,027	\$129	\$332,440	\$491,961	\$117,535	\$275	\$39	\$1	\$0	\$32	\$50	\$0	\$154,167	\$260,148	\$355,043	\$596,061	\$414,355	\$181,706	1.44
Portfolio Total without IE, VO, & Pilots*	\$463,046	\$33,461	\$55	\$282,895	\$416,930	\$78,613	\$259	\$39	\$0	\$0	\$32	\$50	\$0	\$132,672	\$200,391	\$308,200	\$496,507	\$333,103	\$163,404	1.49
Portfolio Total with IE & VO*†	\$657,627	\$55,027	\$129	\$398,494	\$578,419	\$117,535	\$275	\$39	\$1	\$0	\$32	\$50	\$0	\$250,147	\$260,148	\$355,043	\$712,654	\$510,335	\$202,319	1.40

*The TRC and UCT values are calculated using the sum of all the offerings' benefits and costs.

†Portfolio Total rows include Pilots & Market Transformation.

Table 3-3. ComEd Electrification Measure Costs

Program	Component	IE	End Use Type	Savings Category	Quantity	Increase in Electricity Consumption (kWh)	Average Increase in Electricity Consumption (kWh)	Decrease in Gas Consumption (therms)	Average Decrease in Gas Consumption (therms)	Decrease in Gas Consumption (kWh)	Net Change in Electricity Consumption (kWh)	Ex Ante Gross Savings (kWh)	Program Gross Realization Rate	Verified Gross Savings (kWh)	Program Net-to-Gross Ratio (NTG)	Verified Net Savings (kWh)	EUL	Total Cost	Total Utility Cost	Average Cost	Average Utility Cost
Contractor / Midstream Rebates	Contractor / Midstream Rebates	FALSE	HVAC	Midstream ASHP - Electrification	295.35	2,439,099	8,258	281,352	953	8,245,956	5,806,856	5,806,856	1.00	5,806,856	0.80	4,645,485	16.0	\$1,552,689	\$819,537	\$5,257	\$2,775
Contractor / Midstream Rebates	Contractor / Midstream Rebates	FALSE	HVAC	Midstream DMSHP - Electrification	342.65	1,015,924	2,965	145,366	424	4,260,425	3,244,502	3,244,833	1.00	3,244,502	0.80	2,595,601	15.0	\$1,119,339	\$506,699	\$3,267	\$1,479
Contractor / Midstream Rebates	Contractor / Midstream Rebates	FALSE	HVAC	Ground Source Heat Pump - Electrification	8.00	47,707	5,963	8,855	1,107	259,512	211,805	207,311	1.02	211,805	0.59	124,965	25.0	\$360,366	\$29,131	\$45,046	\$3,641
Electric Home New Construction	EHNC	FALSE	HVAC	High Performance HVAC Equipment-Electrification	25.00	118,943	4,758	18,521	741	542,672	423,728	593,171	0.71	423,728	0.80	338,982	15.3	\$139,400	\$137,007	\$5,576	\$5,480
Electric Home New Construction	EHNC	FALSE	Hot Water	High-Performance Water Heating Equipment-Electrification	28	18,993	678	4,642	166	136,004	117,011	111,098	1.05	117,011	0.80	93,609	15.0	\$65,436	\$38,483	\$2,337	\$1,374
Electric Home New Construction	EHNC	FALSE	Appliances	Efficient Appliances-Electrification	26	9,701	373	458	18	13,421	3,720	5,095	0.73	3,720	0.80	2,976	14.7	\$4,358	\$1,996	\$168	\$77
Heat Pump Water Heater Pilot	Heat Pump Water Heater Pilot	FALSE	Hot Water	Heat Pump Water Heater - Electrification	4	3,420	855	698	174	20,457	17,036	524	32.48	17,036	0.80	13,629	15.0	\$170,213	\$193,966	\$42,553	\$48,492
New Construction - IE	Affordable Housing New Construction	TRUE	HVAC	High Performance HVAC Equipment-Electrification	194	953,793	4,916	154,011	794	4,514,052	3,560,260	3,372,501	1.06	3,560,260	1.00	3,560,260	13.6	\$816,996	\$798,843	\$4,211	\$4,118
New Construction - IE	Affordable Housing New Construction	TRUE	Appliances	Efficient Appliances-Electrification	88	32,850	373	1,550	18	45,440	12,589	18,029	0.70	12,589	1.00	12,589	16.0	\$16,199	\$3,023	\$184	\$34
Single-Family Upgrades	IE Whole Home Electrification	TRUE	HVAC	Air source Heat Pump	28	184,552	6,591	23,195	828	679,858	495,307	496,711	1.00	495,307	1.00	495,307	15.0	\$550,472	\$252,105	\$19,660	\$9,004
Single-Family Upgrades	IE Whole Home Electrification	TRUE	Hot Water	HPWH	31	41,381	1,335	3,974	128	116,484	75,103	75,064	1.00	75,103	1.00	75,103	15.0	\$111,197	\$38,351	\$3,587	\$1,237
Single-Family Upgrades	IE Whole Home Electrification	TRUE	HVAC	Mini Split Heat Pump	6	32,391	5,399	5,420	903	158,850	126,459	126,405	1.00	126,459	1.00	126,459	16.0	\$172,772	\$64,361	\$28,795	\$10,727
Single-Family Upgrades	IE Whole Home Electrification	TRUE	Appliances	Induction Stove	8	3,115	389	214	27	6,282	3,168	3,165	1.00	3,168	1.00	3,168	16.0	\$7,134	\$1,649	\$892	\$206
Single-Family Upgrades	IE Whole Home Electrification	TRUE	HVAC	Ductless Mini Split Heat Pump	1	2,886	2,886	404	404	11,844	8,958	8,943	1.00	8,958	1.00	8,958	16.0	\$11,623	\$4,562	\$11,623	\$4,562
Single-Family Upgrades	IE Whole Home Electrification	TRUE	Appliances	HP Clothes Dryer	5	2,259	452	150	30	4,391	2,132	2,130	1.00	2,132	1.00	2,132	15.0	\$4,802	\$1,108	\$960	\$222
VHSP as AC Replacement	VSHR AS AC REPLACEMENT	FALSE	HVAC	High Performance HVAC Equipment - Electrification	24	123,467	5,144	17,311	721	507,350	383,883	859,856	0.45	383,883	0.80	307,107	16.0	\$459,709	\$314,936	\$19,155	\$13,122
Total	-	-	-	-	1,114.00	5,030,481		666,121		19,522,998	14,492,517	14,931,693		14,492,517		12,406,329		5,562,704	3,205,758	\$4,993	\$2,878

3.1 Incremental and Actual Measure Costs

Guidehouse reviewed program measures implemented in CY2022 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 v10.0 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 v10.0 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 v10.0. 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:

- **Retro Commissioning:** 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 project. 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, Single Family Upgrades, etc.):** Guidehouse researched the incremental measure cost data from the TRM v10.0, tracking data, and program invoices. For joint programs, only the ComEd portion of the costs were included.
- **Contractor/Midstream Rebates:** The early replacement HVAC measures installed as a part of this program were treated based on the guidance provided in TRM v10.0. The full installation cost subtracted by the NPV deferred future replacement costs was calculated for the analysis.
- **Product Distribution Program (and other similar programs):** Guidehouse used the per measure cost in each kit to perform the analysis.
- **New Construction – IE:** Guidehouse assumed that the measure costs were same as the incentive costs for direct install measures.

⁷ https://www.ilsag.info/wp-content/uploads/IL_EE_Policy_Manual_Version_2.1_Final_12-7-2021-1.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 v10.0:** 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 3-4. CY2022 Program Cost Data Sources and Assumptions

Program	Component	Data Source	Note
Multifamily Upgrades	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 costs of joint measures.
Multifamily Upgrades	MCA	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Guidehouse found these incentive amounts accounted for the ComEd allocated costs of joint measures.
Multifamily Upgrades	MFLI	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Guidehouse found these incentive amounts accounted for the ComEd allocated costs of joint measures.
PHA		Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs.
Product Distribution	Elementary Ed	Tracking Data and Project Invoices	Implementer invoices were used to obtain the ComEd allocated costs of joint measures, which were then applied against the percent breakout of utility kits.
Product Distribution	Food Bank	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs.
Product Distribution	IE Kits	Tracking Data and Project Invoices	Implementer invoices were used to obtain the ComEd allocated costs of joint measures, which were then applied against the percent breakout of utility kits.
Single-Family Upgrades	HEA IE	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Guidehouse found these incentive amounts accounted for the ComEd allocated costs of joint measures.
Single-Family Upgrades	HEA MR	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Guidehouse found these incentive amounts accounted for the ComEd allocated costs of joint measures.
Single-Family Upgrades	IE Whole Home Electrification	ComEd Provided Data Files	Guidehouse assumed the Total EEE Incentive Cost should equal the measure costs. Guidehouse brought out specific costs of measures grouped together using a percentage of savings.

Program	Component	Data Source	Note
Single-Family Upgrades	IHWAP IE	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Guidehouse found these incentive amounts accounted for the ComEd allocated costs of joint measures.
Single-Family Upgrades	SFLI IE	Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs. Guidehouse found these incentive amounts accounted for the ComEd allocated costs of joint measures.
Small Business		Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs.
Upstream Commercial Food Service Equipment		Tracking Data	Guidehouse assumed the program tracking data incentive amounts should equal measure costs.
Retail Discounts	Appliance Rebates	TRM v10.0	TRM v10.0 deemed values were used for the analysis.
Retail Discounts	Efficient Choice	TRM v10.0, Michigan Energy Measure Database 2022, Measure Documentation	TRM v10.0 deemed values were used for the analysis. Measures not in the TRM used an assortment of supporting measure documentation.
Retail Discounts	Lighting Discounts	TRM v10.0	Incremental costs deemed in the TRM were used for the analysis.
Residential Behavior	Residential Behavior	NA	There are no incentives or measure costs, only program administration costs.
Midstream/Upstream	Residential HVAC	TRM v10.0	Used program tracking data to determine necessary details (SEER, tons, HSPF) for identifying the TRM v10.0 deemed cost value for each measure where applicable.
New Construction - IE	Affordable Housing New Construction	ComEd	Guidehouse used an average of the Incremental Capital Cost per project.
Retail Discounts	Product Discounts	TRM v10.0	Guidehouse used the deemed measure costs provided in the TRM v10.0 measure sections, using an analysis of the mix of lamp types for applicable lighting measures.
Assessments	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	ComEd Project Files	Sample of project files, total \$/kWh.
Incentives	Standard	RI resource workpapers	The workpapers provided reference for incremental measure cost. Guidehouse made assumptions regarding unit definition based on program data.
Midstream/Upstream	Business Instant Discounts	TRM v10.0	TRM v10.0 deemed values were used for the analysis. The value for Linear Fluorescents was the same as CY2021.
Incentives	LED Streetlighting	CY2022 Data	Guidehouse used the average fixture costs calculated using the information provided in the CY2022 tracking data.
New Construction Business – Public	Non-residential New Construction	CY2022 Data	Guidehouse used the same value as CY2021 as it was understood ComEd did not change the incremental cost between CY2021 and CY2022.
Targeted Systems	RCx and VCx	ComEd Project Files	Sample of project files, total \$/kWh.
Behavior Business - Public	Strategic Energy Management and SEM Water Savings Pilot	Tracking Data	Guidehouse assumed measure cost equals incentives.
Voltage Optimization	Voltage Optimization	Project Files	Total costs obtained from ComEd provided documentation.

Program	Component	Data Source	Note
Targeted Systems	Building Operator Certification	TRM v10.0	Guidehouse used the participant cost as deemed in the TRM v10.0.
Electric Homes New Construction	Electric Homes New Construction	TRM v10.0 and ComEd Project Files	Measure costs were obtained from the TRM v10.0 for each of the measures installed.
ENERGY STAR Retail Products Platform	ENERGY STAR Retail Products Platform	TRM v10.0	An average of the deemed values provided in the TRM v10.0 for each measure was used in the analysis; each measure had different costs based on type.
Variable Speed AC as Heat Pump Replacement - Pilot	Variable Speed AC as Heat Pump Replacement - Pilot	ComEd Project Files	Actual installed system costs from the included project files. Future replacement costs were taken from TRM v10.0.
Heat Pump Water Heater Pilot	Heat Pump Water Heater Pilot	TRM v10.0	TRM v10.0 deemed values were used for the analysis.

Source: Guidehouse analysis

3.3 Findings

Guidehouse performed a bottom-up analysis for each program in ComEd's CY2022 portfolio and offers the following findings.

Finding 1. Compared to CY2021, the TRC values for CY2022 are lower for the portfolio. This is due to reduced benefits realized in CY2022, largely concentrated within the electricity cost and NPV replacement cost benefit streams; in CY2021, the portfolio accrued nearly \$900MM in electric production and capacity benefits, while this number was closer \$650MM in CY2021. Reduced demand avoided costs per kW in CY2022 contribute to this result. Although portfolio level cost test results are lower than in CY2021, the TRC and UCT remain above 1.0.

Finding 2. All the Residential and Business programs have TRC values greater than 1.0 with societal NEIs, while only Assessments, Multifamily Upgrades, and Single-Family Upgrades results in a TRC below 1.0 excluding societal NEIs. The lower TRC values are primarily due to high incremental costs when compared to similarly sized programs.

Program	TRC with Societal NEIs	TRC without Societal NEIs
Assessments	1.20	0.64
Single-Family Upgrades	1.13	0.92
Multifamily Upgrades	1.05	0.78

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

Program	TRC with Societal NEIs	TRC without Societal NEIs
VSHP as AC Replacement	0.79	0.49
Heat Pump Water Heater Pilot	0.10	0.06