Guidehouse

Evaluation of ComEd's CY2020 Total Resource Cost Test

Energy Efficiency / Demand Response Plan:
Calendar Year 2020 (CY2020)
(1/1/2020-12/31/2020)

Prepared for:

ComEd

FINAL

June 29, 2021

Prepared by:

Sagar Deo
Guidehouse

Nneomma Nwosu
Guidehouse

Karen Maoz
Guidehouse

Submitted to:

ComEd
2011 Swift Drive
Oak Brook, IL 60523

Submitted by:

Guidehouse
150 N. Riverside, Suite 2100
Chicago, IL 60606

Contact:

Charles Maglione, Partner	Jeff Erickson, Director	Patricia Plympton, Associate Director
703.431.1983	608-206-6011	202.253.9356
cmaglion@guidehouse.com	jeff.erickson@guidehouse.com	patricia.plympton@guidehouse.com

Table of Contents

List of Tables and Equations

1. Overview

As part of ComEd's energy efficiency program evaluation for CY2020, 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. In addition, 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 our 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 take into account 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. Guidehouse included avoided GHG costs and the societal discount rate in our TRC calculations. The UCT calculations do not include avoided GHG costs and use the social discount rate instead of the weighted average cost of capital.

Two factors contributed to an overall increase in the portfolio's calendar year 2020 (CY2020) TRC values as compared to CY2019 TRC values:

- ComEd updated the methodology used to calculate the avoided GHG costs based on guidance provided in the Future Energy Jobs Act (FEJA).
- This is the first year societal NEIs are included as benefits in the TRC calculations.

The following section details the TRC and UCT values for each program. Guidehouse calculated TRC values with and without the societal NEI benefits.

Summary

Table 1-1 summarizes the CY2020 TRC and UCT values for all the EEPS programs in ComEd's CY2020 portfolio. TRC values with and without societal NEIs are shown in the table below. Overall, the CY2020 portfolio aggregate TRCs and UCTs show the portfolio was cost-effective, with aggregate TRC values of 3.36 (with Societal NEIs) and 2.30 (without Societal NEIs), and a UCT value of 1.93.

Table 1-1. Summary of ComEd Programs' CY2020 TRC and UCT Values

Program	Illinois TRC Test (with Societal NEIs)	Illinois TRC Test (without Societal NEIs)	UCT
Appliance Rebates	4.01	3.14	2.70
Elementary Education Kits	6.57	4.56	2.91
Fridge & Freezer Recycling	1.43	0.84	0.50
Residential HVAC	2.21	1.80	2.31
Single-Family Assessment	1.99	1.26	0.46
Residential Behavior	7.78	4.57	3.18
Lighting Discount	6.00	3.62	1.37
Multi-Family Assessments	1.44	0.98	0.41
Residential Total*	**4.62**	**3.01**	**1.75**
Agriculture	4.71	3.62	3.19
Business Grocery	5.40	4.83	0.96
Business Instant Discounts	5.02	3.18	5.84
Business Telecomm	2.56	1.52	1.21
Facility Assessments†	1.12	0.56	0.32
Incentives - Custom	3.93	2.56	2.98
Incentives - Standard	2.39	1.76	2.62
Industrial Systems and Industrial EM	2.40	1.47	1.81
LED Streetlighting	2.29	1.36	1.72
Nonprofit Retrofits	1.04	0.65	0.60
Non-residential New Construction	3.20	2.19	2.35
Public Buildings in Distressed Communities	5.07	3.52	1.70
RCx and VCx	5.12	2.86	1.07
Small Business - Private and Public	3.76	2.80	2.04
Small Business Kits	5.07	3.82	1.74
Strategic Energy Management	3.92	1.93	1.08
Business Total*	**3.27**	**2.27**	**2.40**
Affordable Housing New Construction	1.06	0.67	0.44
Food Bank-LED Distribution	3.39	2.16	3.30
IE Product Discounts - LD and AR	10.61	6.49	2.82
Manufactured Housing Retrofits	0.17	0.13	0.11
Multi-Family Retrofits - IEMS and IHWAP	0.84	0.73	0.70
Public Housing Retrofits	0.58	0.33	0.22
Single-Family Retrofits - CBA and IHWAP	0.82	0.69	0.64
University of Illinois at Chicago Energy Resources Center (UIC-ERC) Income Eligible Kits	9.08	6.74	2.38
Income Eligible Total*	**3.21**	**2.14**	**1.46**
Building Operator Certification Training	2.39	1.47	0.89
Savings for IE Seniors Pilot	2.27	1.93	1.74
Retail Products Platform	0.22	0.14	0.09
Upstream Commercial Food Service Equipment	0.54	0.35	0.19
Voltage Optimization (VO)	4.71	3.19	2.22
Pilots and VO Total*	**4.64**	**3.14**	**2.18**
Residential and Business Total*	**3.19**	**2.19**	**1.94**
Portfolio Total (with IE, Pilot, and VO)*	**3.36**	**2.30**	**1.93**

**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 2.51 and 1.82 respectively, and the overall UCT is 2.61.
Source: Guidehouse analysis

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 incandescent equivalents
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 incandescent 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 v8.0 (TRM v8.0) 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

Section 2 presents the results of the UCT. 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 provides the data points needed to conduct the Illinois TRC and divides them into generic and program-specific categories. The program-specific data points are further subdivided into those categories that are provided by ComEd versus those that are a result of Guidehouse's evaluation activities.

Table 1-2. Data Points Needed to Conduct EEPS TRC

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 ($/gallon) • Escalation Rates • Environmental Damages (GHG Adders)	ComEd
	• Discount Rate	Policy
Program Specific	• Participants/Measure Count • Verified Ex Post Energy and Demand Savings • Realization Rate • Net-to-Gross Ratio • Measure Life • Incremental Measure Costs[4] • NPV Replacement Costs • Societal NEI benefit ($/kWh)	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 ComEd EEPS results, separated by benefits and cost components. The results show ComEd's CY2020 EEPS portfolio is cost-effective under all scenarios.

Table 2-1. Summary of ComEd CY2020 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
Avoided Electric Production with GHG adder			$588,810	
Avoided Electric Production without GHG adder	$317,738			
Avoided Electric Capacity	$250,170		$250,170	
Avoided Gas Production	-$11,503		-$11,503	
Avoided Water			$9,402	
Societal NEI Benefit			$491,850	
NPV Replacement costs			$245,941	
Non-Incentive Costs		$103,698		$103,698
Incentive Costs		$183,228		
Net Participant Costs				$390,458
Present Value Totals (with Societal NEI)	$556,406	$286,926	$1,574,670	$494,157
Present Value Totals (without Societal NEI)	$556,406	$286,926	$1,082,821	$494,157
Ratio (with Societal NEI)	NA		3.19	
Ratio (without Societal NEI)	1.94		2.19	

*Excluding 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

Table 1-2 shows the data used for the cost-benefit calculations. These values are typically updated annually. The definitions of each data point and their sources follows:

- **Avoided Electric Production Costs ($/MWh):** Avoided electric production costs are those associated with purchasing energy from PJM.
- **Avoided Electric Capacity Costs ($/kW-year):** 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 Ancillary ($/kWh):** Avoided ancillary is a benefit associated with avoided costs attributable to the Open Access Transmission Tariff that utilities participating 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 $8.16/1,000 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] Incentives 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 we ensure that "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.
cards.

[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 a number of 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.

- For the early retirement of duplicative functioning equipment before its expected life is over (e.g., appliance recycling programs), the incremental costs are composed of the customer's value placed on their lost amenity, any customer transaction costs, and the pickup and recycling cost. The incremental costs include the actual cost of the pickup and recycling of the equipment because this is assumed to be the cost of recycling the equipment that the customer would have incurred if they were to recycle the equipment on their own in the absence of the efficiency program. The payment a program administrator makes to the customer serves as a proxy for the value the customer places on their lost amenity and any customer transaction costs.

2.5 Discount Rate

The discount rate is important to overall cost-effectiveness. The avoided electric production, capacity T&D, and ancillary benefits accrue over the life of the measures included in each program. These benefits are discounted to determine the present value of the cumulative benefits. 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 are important to incorporate in the calculation of total benefits. The energy and demand savings calculated by the evaluation are estimated at the customer or meter level. The savings that accrue to ComEd rate payers 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% as provided by ComEd.

2.7 Miscellaneous EEPS Portfolio Costs

In addition to costs allocated directly to energy efficiency programs, there are portfolio-level costs 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 details all the portfolio-level costs included in the analysis.

Table 2-2. Breakdown of Portfolio-Level Costs

Portfolio-Level Cost Component	Value ($)
2019 Measurement & Verification (M&V) Incurred	$2,206,717
2020 M&V Incurred	$5,244,808
2021 M&V Incurred	$309,201
R&D	$8,701,387
Market Research	$5,396
Legal	$332,969
Tracking System	$808,553
Labor (Non-Program Specific)	$14,137,209
General Program Costs	$5,604,235
Residential Outreach	$0
Business Outreach	$574,699
Income Eligible Outreach	$6,247,538
General Education & Awareness	$2,207,832
Total	$46,380,544

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.

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.

Guidehouse conducted societal NEI analysis to develop monetized benefits for inclusion in ComEd's Plan 6 TRCs (CY2022 – CY2025).[7] Guidehouse used the CY2019 portfolio CPAS values in our societal NEI analysis, which was completed in early 2021. To generate societal NEI values for the CY2020 cost-effectiveness analysis, Guidehouse adjusted the societal NEIs estimates for Plan 6 to reflect the values in 2020 dollars. This approach yields a conservative estimate of societal NEIs associated with CY2020 programs.[8]

The societal NEI research using CY2020 program information finalized in April 2020 is still in progress and the results will be included in the Joint CY2020 TRC analysis memo.

3. Program-Specific Data

Table 3-1 summarizes the components of the cost-effectiveness calculations for each program. The table includes the value of each benefit and cost component for each program and EEPS totals for each sector. 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.

[7] https://ilsag.s3.amazonaws.com/ComEd-CY2020-Societal-NEI-Report-2021-03-10-Final.pdf

[8] This is a conservative estimate of societal NEIs, as emissions improvements from energy efficiency programs' 25 years of CPAS were adjusted downwards year-over-year to account for the growing efficiency of the marginal generation mix year-over-year. Because the CY2022 societal NEI estimate assumes CPAS began in 2022, the result is emissions improvements that are adjusted downwards more aggressively than if the CPAS began in 2020.

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	NPV Replacement costs	Non-Incentive Costs	Incentive Costs	Incremental Costs (Net)	IL TRC Benefits (without Societal NEI)	IL TRC Costs (without Societal NEI)	IL TRC Test Net Benefits (without Societal NEI)	IL TRC Test (with Societal NEI)	IL TRC Test (without Societal NEI)
(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	$17,180	$9,309	$9,027	$3,651	$23,444	$14,758	$0	$5,564	$9,934	$11,397	$53,302	$16,961	$36,341	4.01	3.14
Elementary Education Kits	$2,090	$1,138	$635	$1,367	$150	$1,868	$0	$410	$250	$520	$4,242	$930	$3,311	6.57	4.56
Fridge & Freezer Recycling	$728	$401	$254	$0	$0	$694	$0	$1,082	$239	$91	$983	$1,173	-$190	1.43	0.84
Residential HVAC	$2,302	$1,223	$3,061	$0	$2,353	$1,737	$0	$1,206	$1,662	$3,080	$7,716	$4,286	$3,430	2.21	1.80
Single-Family Assessment	$4,119	$2,262	$1,502	$95	-$916	$3,889	$1,928	$3,064	$3,183	$2,280	$6,727	$5,344	$1,383	1.99	1.26
Residential Behavior	$18,538	$10,339	$8,503	$0	$0	$19,001	$0	$5,921	$0	$0	$27,040	$5,921	$21,119	7.78	4.57
Lighting Discount	$71,195	$38,682	$24,610	$0	-$35,889	$62,448	$35,030	$4,378	$15,682	$21,833	$94,946	$26,211	$68,735	6.00	3.62
Multi-Family Assessments	$2,881	$1,582	$959	$897	-$151	$2,689	$1,042	$2,006	$3,852	$3,764	$5,628	$5,770	-$142	1.44	0.98
Residential Total	**$119,033**	**$64,936**	**$48,550**	**$6,010**	**-$11,008**	**$107,084**	**$37,999**	**$23,632**	**$34,804**	**$42,964**	**$200,583**	**$66,595**	**$133,988**	**4.62**	**3.01**
Agriculture	$1,975	$1,052	$2,949	$0	$0	$1,484	$45	$680	$574	$691	$4,969	$1,371	$3,598	4.71	3.62
Business Grocery	$3,552	$1,932	$987	$0	-$316	$3,146	$22,188	$1,540	$1,169	$3,934	$26,410	$5,473	$20,937	5.40	4.83
Business Instant Discounts	$106,238	$57,228	$62,747	$0	-$19,403	$87,201	$325	$3,594	$13,618	$43,605	$149,906	$47,199	$102,707	5.02	3.18
Business Telecomm	$3,141	$1,707	$932	$0	$0	$2,772	$0	$1,168	$1,022	$1,509	$4,074	$2,677	$1,397	2.56	1.52
Facility Assessments	$694	$387	$0	$0	$22	$726	$0	$1,225	$67	$63	$716	$1,288	-$572	1.12	0.56
Incentives - Custom	$25,344	$13,227	$6,841	$0	$9	$17,292	$0	$2,352	$4,390	$10,243	$32,194	$12,595	$19,599	3.93	2.56
Incentives - Standard	$100,600	$54,311	$38,716	$0	$31,173	$84,429	$67,873	$7,626	$39,847	$127,648	$238,362	$135,274	$103,088	2.39	1.76
Industrial Systems and Industrial EM	$17,243	$9,319	$6,182	$0	-$79	$14,671	$0	$2,358	$6,172	$13,506	$23,346	$15,865	$7,481	2.40	1.47
LED Streetlighting	$38,274	$20,632	$78	$0	$0	$31,439	$8,100	$1,309	$10,752	$32,750	$46,452	$34,059	$12,393	2.29	1.36
Nonprofit Retrofits	$1,268	$687	$648	$0	-$206	$1,084	$58	$863	$1,029	$1,876	$1,768	$2,739	-$971	1.04	0.65
Non-residential New Construction	$15,227	$7,971	$5,864	$1,108	$135	$10,282	$0	$1,140	$4,793	$9,052	$22,334	$10,192	$12,142	3.20	2.19
Public Buildings in Distressed Communities	$3,919	$2,115	$2,743	$0	$0	$3,264	$728	$922	$1,930	$1,177	$7,390	$2,100	$5,291	5.07	3.52
RCx and VCx	$18,486	$10,092	$2,277	$0	$629	$16,861	$0	$2,027	$10,094	$5,447	$21,391	$7,474	$13,917	5.12	2.86
Small Business - Private and Public	$123,973	$66,670	$69,457	$75	-$12,779	$100,179	$108,624	$8,276	$52,251	$95,199	$289,351	$103,475	$185,875	3.76	2.80
Small Business Kits	$1,965	$1,079	$1,201	$2,209	$321	$1,859	$0	$1,328	$164	$163	$5,696	$1,491	$4,205	5.07	3.82
Strategic Energy Management	$7,879	$4,394	$0	$0	$0	$8,075	$0	$3,524	$551	$551	$7,879	$4,075	$3,804	3.92	1.93
Business Outreach	$0	$0	$0	$0	$0	$0	$0	$575	$0	$0	$0	$575	$0	$0	0.00
Business Total	**$469,778**	**$252,802**	**$201,621**	**$3,392**	**-$495**	**$384,765**	**$207,942**	**$40,508**	**$148,424**	**$347,414**	**$882,237**	**$387,922**	**$494,315**	**3.27**	**2.27**
Affordable Housing New Construction	$1,015	$540	$347	$0	$0	$776	$0	$789	$1,237	$1,237	$1,362	$2,026	-$663	1.06	0.67
Food Bank-LED Distribution	$45,677	$24,885	$14,335	$0	-$11,398	$40,879	$23,216	$4,894	$3,529	$28,310	$71,829	$33,204	$38,626	3.39	2.16
IE Product Discounts - LD and AR	$29,033	$15,798	$9,636	$0	-$7,834	$25,695	$9,651	$1,180	$5,058	$5,056	$40,486	$6,236	$34,250	10.61	6.49
Manufactured Housing Retrofits	$33	$18	$10	$12	$21	$27	$5	$352	$87	$275	$81	$627	-$546	0.17	0.13

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	NPV Replacement costs	Non-Incentive Costs	Incentive Costs	Incremental Costs (Net)	IL TRC Benefits (without Societal NEI)	IL TRC Costs (without Societal NEI)	IL TRC Test Net Benefits (without Societal NEI)	IL TRC Test (with Societal NEI)	IL TRC Test (without Societal NEI)
Multi-Family Retrofits - IEMS and IHWAP	$1,303	$686	$188	$343	$4,412	$938	$82	$2,265	$5,328	$6,368	$6,329	$8,633	-$2,305	0.84	0.73
Public Housing Retrofits	$428	$234	$91	$0	-$28	$388	$36	$787	$586	$803	$527	$1,590	-$1,063	0.58	0.33
Single-Family Retrofits - CBA and IHWAP	$2,417	$1,272	$2,298	$104	$3,824	$1,690	$185	$2,050	$9,496	$10,707	$8,827	$12,757	-$3,930	0.82	0.69
UIC-ERC Income Eligible Kits	$12,850	$7,015	$4,106	$12,521	$1,157	$11,661	$2,917	$2,490	$2,665	$2,490	$33,550	$4,980	$28,570	9.08	6.74
Income Eligible Outreach	$0	$0	$0	$0	$0	$0	$0	$6,248	$0	$0	$0	$6,248	$0	0.00	0.00
Income Eligible Total	**$92,755**	**$50,448**	**$31,012**	**$12,980**	**-$9,847**	**$82,054**	**$36,092**	**$21,054**	**$27,987**	**$55,245**	**$162,992**	**$76,299**	**$86,692**	**3.21**	**2.14**
Voltage Optimization	$156,879	$83,292	$84,381	$0	$0	$115,052	$43	$0	$75,639	$75,639	$241,303	$75,639	$165,664	4.71	3.19
Building Operator Certification Training	$923	$499	$324	$0	$0	$782	$0	$556	$367	$293	$1,247	$850	$397	2.39	1.47
Savings for IE Seniors Pilot	$10	$5	$4	$0	$34	$8	$0	$6	$19	$19	$47	$25	$23	2.27	1.93
Retail Products Platform	$66	$35	$21	$0	$0	$50	$0	$248	$367	$367	$87	$614	-$527	0.22	0.14
Upstream Commercial Food Service Equipment	$38	$20	$14	$9	$0	$31	$0	$165	$15	$6	$61	$171	-$111	0.54	0.35
Pilot and VO Total	**$157,916**	**$83,852**	**$84,743**	**$9**	**$34**	**$115,923**	**$43**	**$975**	**$76,406**	**$76,324**	**$242,745**	**$77,299**	**$165,446**	**4.64**	**3.14**
Portfolio Costs	$0	$0	$0	$0	$0	$0	$0	$39,558	$0	$0	$0	$39,558	$0	0.00	0.00
Res and Business Total	**$588,810**	**$317,738**	**$250,170**	**$9,402**	**-$11,503**	**$491,850**	**$245,941**	**$103,698**	**$183,228**	**$390,378**	**$1,082,821**	**$494,076**	**$588,745**	**3.19**	**2.19**
Portfolio Total (with IE and VO)	**$839,481**	**$452,038**	**$365,926**	**$22,390**	**-$21,316**	**$689,826**	**$282,076**	**$125,727**	**$287,621**	**$521,947**	**$1,488,557**	**$647,674**	**$840,883**	**3.36**	**2.30**

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.

* Table 2-2 includes a detailed breakdown of the overall portfolio costs.

Source: Guidehouse analysis

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

	Benefits								Costs		Illinois Utility Cost Test (UCT)			
Program	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	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	$17,180	$9,309	$9,027	$3,651	$23,444	$14,758	$0	$5,564	$9,934	$11,397	$41,780	$15,498	$26,281	2.70
Elementary Education Kits	$2,090	$1,138	$635	$1,367	$150	$1,868	$0	$410	$250	$520	$1,923	$661	$1,262	2.91
Fridge & Freezer Recycling	$728	$401	$254	$0	$0	$694	$0	$1,082	$239	$91	$655	$1,321	-$665	0.50
Residential HVAC	$2,302	$1,223	$3,061	$0	$2,353	$1,737	$0	$1,206	$1,662	$3,080	$6,637	$2,868	$3,769	2.31
Single-Family Assessment	$4,119	$2,262	$1,502	$95	-$916	$3,889	$1,928	$3,064	$3,183	$2,280	$2,847	$6,248	-$3,401	0.46
Residential Behavior	$18,538	$10,339	$8,503	$0	$0	$19,001	$0	$5,921	$0	$0	$18,842	$5,921	$12,921	3.18
Lighting Discount	$71,195	$38,682	$24,610	$0	-$35,889	$62,448	$35,030	$4,378	$15,682	$21,833	$27,404	$20,060	$7,344	1.37
Multi-Family Assessments	$2,881	$1,582	$959	$897	-$151	$2,689	$1,042	$2,006	$3,852	$3,764	$2,390	$5,858	-$3,468	0.41
Residential Total	**$119,033**	**$64,936**	**$48,550**	**$6,010**	**-$11,008**	**$107,084**	**$37,999**	**$23,632**	**$34,804**	**$42,964**	**$102,477**	**$58,435**	**$44,042**	**1.75**
Agriculture	$1,975	$1,052	$2,949	$0	$0	$1,484	$45	$680	$574	$691	$4,000	$1,254	$2,746	3.19
Business Grocery	$3,552	$1,932	$987	$0	-$316	$3,146	$22,188	$1,540	$1,169	$3,934	$2,602	$2,709	-$107	0.96
Business Instant Discounts	$106,238	$57,228	$62,747	$0	-$19,403	$87,201	$325	$3,594	$13,618	$43,605	$100,571	$17,212	$83,359	5.84
Business Telecomm	$3,141	$1,707	$932	$0	$0	$2,772	$0	$1,168	$1,022	$1,509	$2,639	$2,190	$450	1.21
Facility Assessments	$694	$387	$0	$0	$22	$726	$0	$1,225	$67	$63	$409	$1,292	-$883	0.32
Incentives - Custom	$25,344	$13,227	$6,841	$0	$9	$17,292	$0	$2,352	$4,390	$10,243	$20,077	$6,742	$13,336	2.98
Incentives - Standard	$100,600	$54,311	$38,716	$0	$31,173	$84,429	$67,873	$7,626	$39,847	$127,648	$124,199	$47,472	$76,727	2.62
Industrial Systems and Industrial EM	$17,243	$9,319	$6,182	$0	-$79	$14,671	$0	$2,358	$6,172	$13,506	$15,422	$8,531	$6,891	1.81
LED Streetlighting	$38,274	$20,632	$78	$0	$0	$31,439	$8,100	$1,309	$10,752	$32,750	$20,709	$12,061	$8,648	1.72
Nonprofit Retrofits	$1,268	$687	$648	$0	-$206	$1,084	$58	$863	$1,029	$1,876	$1,129	$1,892	-$763	0.60
Non-residential New Construction	$15,227	$7,971	$5,864	$1,108	$135	$10,282	$0	$1,140	$4,793	$9,052	$13,970	$5,933	$8,037	2.35
Public Buildings in Distressed Communities	$3,919	$2,115	$2,743	$0	$0	$3,264	$728	$922	$1,930	$1,177	$4,858	$2,853	$2,005	1.70
RCx and VCx	$18,486	$10,092	$2,277	$0	$629	$16,861	$0	$2,027	$10,094	$5,447	$12,997	$12,121	$876	1.07
Small Business - Private and Public	$123,973	$66,670	$69,457	$75	-$12,779	$100,179	$108,624	$8,276	$52,251	$95,199	$123,348	$60,527	$62,821	2.04
Small Business Kits	$1,965	$1,079	$1,201	$2,209	$321	$1,859	$0	$1,328	$164	$163	$2,601	$1,492	$1,109	1.74
Strategic Energy Management	$7,879	$4,394	$0	$0	$0	$8,075	$0	$3,524	$551	$551	$4,394	$4,075	$319	1.08
Business Outreach	$0	$0	$0	$0	$0	$0	$0	$575	$0	$0	$0	$575	$0	0.00
Business Total	**$469,778**	**$252,802**	**$201,621**	**$3,392**	**-$495**	**$384,765**	**$207,942**	**$40,508**	**$148,424**	**$347,414**	**$453,928**	**$188,932**	**$264,996**	**2.40**
Affordable Housing New Construction	$1,015	$540	$347	$0	$0	$776	$0	$789	$1,237	$1,237	$887	$2,026	-$1,138	0.44
Food Bank-LED Distribution	$45,677	$24,885	$14,335	$0	-$11,398	$40,879	$23,216	$4,894	$3,529	$28,310	$27,822	$8,423	$19,399	3.30
IE Product Discounts - LD and AR	$29,033	$15,798	$9,636	$0	-$7,834	$25,695	$9,651	$1,180	$5,058	$5,056	$17,600	$6,238	$11,362	2.82
Manufactured Housing Retrofits	$33	$18	$10	$12	$21	$27	$5	$352	$87	$275	$49	$439	-$390	0.11

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	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
Multi-Family Retrofits - IEMS and IHWAP	$1,303	$686	$188	$343	$4,412	$938	$82	$2,265	$5,328	$6,368	$5,286	$7,593	-$2,307	0.70
Public Housing Retrofits	$428	$234	$91	$0	-$28	$388	$36	$787	$586	$803	$297	$1,373	-$1,076	0.22
Single-Family Retrofits - CBA and IHWAP	$2,417	$1,272	$2,298	$104	$3,824	$1,690	$185	$2,050	$9,496	$10,707	$7,394	$11,546	-$4,152	0.64
UIC-ERC Income Eligible Kits	$12,850	$7,015	$4,106	$12,521	$1,157	$11,661	$2,917	$2,490	$2,665	$2,490	$12,278	$5,155	$7,123	2.38
Income Eligible Outreach	$0	$0	$0	$0	$0	$0	$0	$6,248	$0	$0	$0	$6,248	$0	0.00
Income Eligible Total	**$92,755**	**$50,448**	**$31,012**	**$12,980**	**-$9,847**	**$82,054**	**$36,092**	**$21,054**	**$27,987**	**$55,245**	**$71,613**	**$49,041**	**$22,573**	**1.46**
Voltage Optimization	$156,879	$83,292	$84,381	$0	$0	$115,052	$43	$0	$75,639	$75,639	$167,673	$75,639	$92,034	2.22
Building Operator Certification Training	$923	$499	$324	$0	$0	$782	$0	$556	$367	$293	$823	$923	-$100	0.89
Savings for IE Seniors Pilot	$10	$5	$4	$0	$34	$8	$0	$6	$19	$19	$43	$25	$18	1.74
Retail Products Platform	$66	$35	$21	$0	$0	$50	$0	$248	$367	$367	$56	$614	-$558	0.09
Upstream Commercial Food Service Equipment	$38	$20	$14	$9	$0	$31	$0	$165	$15	$6	$35	$181	-$146	0.19
Pilot and VO Total	**$157,916**	**$83,852**	**$84,743**	**$9**	**$34**	**$115,923**	**$43**	**$975**	**$76,406**	**$76,324**	**$168,629**	**$77,382**	**$91,248**	**2.18**
Portfolio Costs	$0	$0	$0	$0	$0	$0	$0	$39,558	$0	$0	$0	$39,558	$0	0.00
Res and Business Total	**$588,810**	**$317,738**	**$250,170**	**$9,402**	**-$11,503**	**$491,850**	**$245,941**	**$103,698**	**$183,228**	**$390,378**	**$556,406**	**$286,926**	**$269,480**	**1.94**
Portfolio Total (with IE and VO)	**$839,481**	**$452,038**	**$365,926**	**$22,390**	**-$21,316**	**$689,826**	**$282,076**	**$125,727**	**$287,621**	**$521,947**	**$796,648**	**$413,348**	**$383,300**	**1.93**

*Table 2-2 includes a detailed breakdown of the overall portfolio costs.

Source: Guidehouse analysis

3.1 Incremental and Actual Measure Costs

Guidehouse reviewed program measures implemented in CY2020 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 v8.0 and the Illinois Energy Efficiency Policy Manual.[9]

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 v8.0 and different workpapers provided by the implementation contractor. Table 3-3 details the source of cost information for each program included in the analysis.

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 v8.0. 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:

- **Business New Construction:** Guidehouse used the implementation contractor's analysis to determine the $/kWh and $/therm costs for meeting and exceeding the building code requirements.
- **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 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, HVAC, Multi-Family, etc.):** Guidehouse researched the incremental measure cost data from the TRM v8.0 and the DNV GL workpapers to calculate the program measure costs. For any direct install programs, ComEd provided the measure costs by measure. 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 v8.0. 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.

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

- **Income Eligible Comprehensive Programs:** Guidehouse assumed that the measure costs were same as the incentive costs for direct install measures.
- **Income Eligible Illinois Home Weatherization Assistance Program IHWAP Programs:** Since ComEd only incentivizes half the total measure costs for projects that are jointly implemented with IHWAP, Guidehouse assumed that the measure costs were double the incentive amount provided by ComEd.

3.2 Data Sources and Assumptions

The evaluation used the following program-specific data:

- Program tracking data and evaluation reports: Used to compile measure level savings, quantity, and realization rate values.
- TRM v8.0: Used to compile measure life and incremental cost data.
- Utility incentives costs, non-incentive costs, and actual measure costs.

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

Table 3-3. CY2020 Program Cost Data Sources and Assumptions

Program	Data Source	Note
Appliance Rebates	TRM v8.0	TRM deemed values were used for the analysis.
Elementary Education Kits	ComEd	Actual cost per kit used
Fridge and Freezer Recycling	Project Invoices	Actual costs provided by ComEd were used.
Residential HVAC	TRM v8.0	Used average tons from the tracking data as the assumed unit capacity of all the units installed in 2020 to align the savings and cost units (tons vs. per unit).
Single-Family Assessment	Project Invoices	Actual costs provided by ComEd were used.
Residential Behavior	NA	There are no incentives or measure costs and only program administration costs.
Lighting Discounts	TRM v8.0	Included analysis of the mix of lamps and the NPV replacement costs.
Multi-Family Assessments	Project Invoices	Actual costs provided by ComEd were used.
Agriculture	TRM 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 section.
Business Telecomm	Project Files	Actual costs from the project files were used for the analysis.
Incentives - Custom	ComEd	Sample of project files, total $/kWh.
Industrial Systems and Industrial EM	ComEd	Sample of project files, total $/kWh.
Business Instant Discounts	TRM v8.0	Included analysis of the mix of lamps and the NPV replacement costs.
Non-residential New Construction	ComEd	The program implementer analyzed project costs of construction meeting code versus exceeding code to calculate a $/kWh and a $/therm saved cost.
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.
RCx and VCx	ComEd	Sample of project files, total $/kWh.
Small Business - Private and Public	TRM v8.0, Nexant workpaper, assumptions	Had to make certain assumptions on unit definition.

Program	Data Source	Note
Incentives - Standard	TRM v8.0, ICF and DNV GL workpaper, assumptions	Guidehouse made assumptions regarding unit definition.
Strategic Energy Management	Incentives	Guidehouse assumed measure cost equals incentives.
LED Streetlighting	Program tracking data	Average fixture costs were calculated using the cost information provided in the tracking data.
Affordable Housing New Construction	Incentive	Guidehouse assumed that the measure costs should equal net incentives.
Food Bank-LED Distribution	Implementer provided costs	Implementer provided costs.
IE Product Discounts - LD and AR	TRM v8.0	Includes analysis of the mix of lamps and the NPV replacement costs.
Multi-Family Retrofits - IEMS and IHWAP	Tracking Data and Project Invoices	The tracking data provided cost per measure. ComEd also provided invoices.
Single-Family Retrofits - CBA and IHWAP	Tracking Data and Project Invoices	The tracking data provided cost per measure. ComEd also provided invoices.
Manufactured Housing Retrofits	Tracking Data and Project Invoices	The tracking data provided cost per measure. ComEd also provided invoices.
UIC-ERC Income Eligible Kits	Incentives	Actual cost per kit used.
Building Operator Certification Training	Incentive	Guidehouse assumes that the measure costs should equal net incentives.
Savings for IE Seniors Pilot	Incentive	Guidehouse assumed that the measure costs should equal net incentives. The costs provided in the tracking data were lower than the incentives.
Retail Products Platform	Incentive	Guidehouse assumed that the measure costs should equal net incentives.
Upstream Commercial Food Service Equipment	TRM v8.0	Incremental costs deemed in the TRM were used for the analysis. Guidehouse made some assumptions regarding the measure specifications.
Nonprofit Retrofits	TRM v8.0	Incremental costs and deemed in the TRM were used for the analysis along with actual costs for DI measures.

Source: Guidehouse analysis

3.3 Findings and Recommendations

Guidehouse performed a bottom-up analysis for each program in ComEd's CY2020 portfolio and offers the following findings and recommendations.

Finding 1. Compared to previous years, the TRC values are higher across the portfolio. This is largely due a higher GHG adder and the inclusion of societal NEIs. The GHG adder was provided by ComEd and calculated using the language in FEJA and the societal NEIs were calculated based on Guidehouse's research.

Finding 2. The tracking data for the Standard and Small Business programs do not contain the units of measure counts.

Recommendation 2. Guidehouse recommends that ComEd provide the units of measure counts in the tracking data, which will allow Guidehouse to calculate the total measure costs inputs more accurately.

Finding 3. The total measure costs calculated using the values provided in the program invoices, eTrack extract and IL TRM deemed incremental costs were lower than the total

program incentives for the programs listed below. The total program incentives for each program shouldn't be higher than the total measure costs.

- Public Buildings in Distressed Communities Program (the total measure cost was calculated using IL TRM deemed incremental measure costs.)
- UIC-ERC Income Eligible Kits Program (the total measure cost was calculated using program invoices.)
- Savings for IE Seniors Pilot (the total measure cost was calculated using eTrack extract.)
- Upstream Commercial Food Service Equipment Pilot (the total measure cost was calculated using IL TRM deemed incremental measure costs.)

Recommendation 3: Provide supporting documentation for cases where the incentives exceed either the actual or incremental measure costs. Two specific recommendations are:

- **Public Buildings in Distressed Communities Program and Savings for IE Seniors Pilot:** Actual costs for all direct install measures should be tracked separately.
- **UIC-ERC Income Eligible Kits Program:** Since ComEd covers the full cost of the kit, Guidehouse recommends confirming the total incentives paid for the program are less than the total cost of each kit distributed as a part of the program. The shipping costs should not be included as a part of the incentive.

Finding 4. The Admin costs of $0.26/kWh for the Nonprofit Retrofits program are relatively high compared to the average Admin costs of $0.09/kWh for other Business Programs. The CY2020 cost dataset did not include a separate column for the Study/Assessment costs, so there is a probability that the Study /Assessment costs could be included in the Admin costs instead of the incentive costs.

Recommendation 4. Guidehouse recommends tracking and providing the Study/Assessment costs separately for this program in the future.