



ComEd Societal Non-Energy Impacts Research Report

Presented to

ComEd

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1. Introduction

Guidehouse, on behalf of ComEd, conducted research to quantify and monetize societal, utility, and participant Non-Energy Impacts (NEIs) associated with ComEd's energy efficiency programs. This report presents research conducted by the Guidehouse team to develop monetized societal NEI values for use in ComEd's programs' cost-effectiveness tests.

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. We used U.S. Environmental Protection Agency's (EPA) AVoided Emissions and geneRation Tool (AVERT)¹ and CO–Benefits Risk Assessment (COBRA)² Health Impacts Screening and Mapping Tool to quantify and monetize these health impacts. At a high level, Societal NEIs associated with a ComEd energy efficiency program are represented by the total monetary value of illnesses and deaths avoided³ due to program-induced reduced emissions over 20 years, discounted to the year of implementation.

In this report, Guidehouse provides some background on NEIs in Illinois per the Future Energy Jobs Act (FEJA). Following this, Guidehouse presents the research and methodology used to quantify and monetize societal NEI values for use in ComEd's programs' cost-effectiveness tests. This report also includes recommendations for using societal NEI values in ComEd's cost-effectiveness tests.

2. Background

In December 2016, the Illinois General Assembly passed FEJA, which contains language on including additional non-energy benefits (now described as NEIs) in energy efficiency programs' cost-effectiveness tests⁴.

"A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and 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 social benefits..."

¹ U.S. EPA's AVERT web site: <https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert#what%20AVERT> Accessed: December 23, 2020.

² U.S. EPA's COBRA tool web site: <https://www.epa.gov/statelocalenergy/co-benefits-risk-assessment-cobra-health-impacts-screening-and-mapping-tool> Accessed: December 23, 2020.

³ U.S. EPA's COBRA tool web site: https://www.epa.gov/sites/production/files/2017-10/documents/how_cobra_works_september2017_508.pdf Accessed: December 23, 2020.

⁴ FEJA (Illinois Future Energy Jobs Act). Public Act 099-0906. www.ilga.gov/legislation/publicacts/99/PDF/099-0906.pdf. (Passed December 7, 2016).

Currently, the Illinois Technical Reference Manual⁵ (TRM) includes several deemed monetized values for societal NEIs. The NEI values were derived from various state and federal sources and were added to the TRM via a stakeholder vetting process. The TRM quantifies the following societal NEIs to include in TRC tests:

- **Societal: Avoided use of water (water savings) from energy efficiency programs:** Water savings are based on measurements consistent with federal standards. The value of the savings is determined by what Illinois customers would have paid for the water saved.

Following FEJA's passage, ComEd and the Illinois Stakeholder Advisory Group (SAG) prioritized researching NEIs associated with the income eligible energy efficiency programs because substantial NEIs are typically associated with these programs. This prioritization is captured in the ComEd 2018–2021 Energy Efficiency and Demand Response Plan Settlement Stipulation⁶.

“ComEd agrees to work in good faith to consult and reach consensus with the Income-Qualified Advisory Committee on issues of importance to the Committee, including but not limited to the following: Development of program information and practices for Income-Qualified programs, including the identification and reflection of non-energy benefits (“NEBs”) such as comfort, health and safety, reduced tenant turnover, reduced shut-offs, reduction in revenue collection costs, and lower energy burden in Income-Qualified measures and programs.”

Prior to FEJA's passage, the SAG considered expanding the number of NEIs included in the TRM but did not reach consensus. Stakeholders provided the following feedback on including additional NEIs in the TRM:

- Base calculations for NEIs on reputable studies
- Ensure NEIs quantities are reproducible
- Establish a logical connection between the NEIs and the related energy efficiency measures
- Quantify both negative and positive NEIs
- Use Illinois-specific data rather than a generic adder⁷
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In 2017, Guidehouse, on behalf of ComEd, conducted research to quantify and monetize societal, utility, and participant NEIs associated with ComEd's energy efficiency programs. At

⁵ IL SAG. Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 8.0. Illinois Commerce Commission. Springfield: IL. s3.amazonaws.com/ilsag/2020_IL-TRM_Version_8.0_dated_October-17-2019_Final_Volumes_1-4_Compiled.pdf.

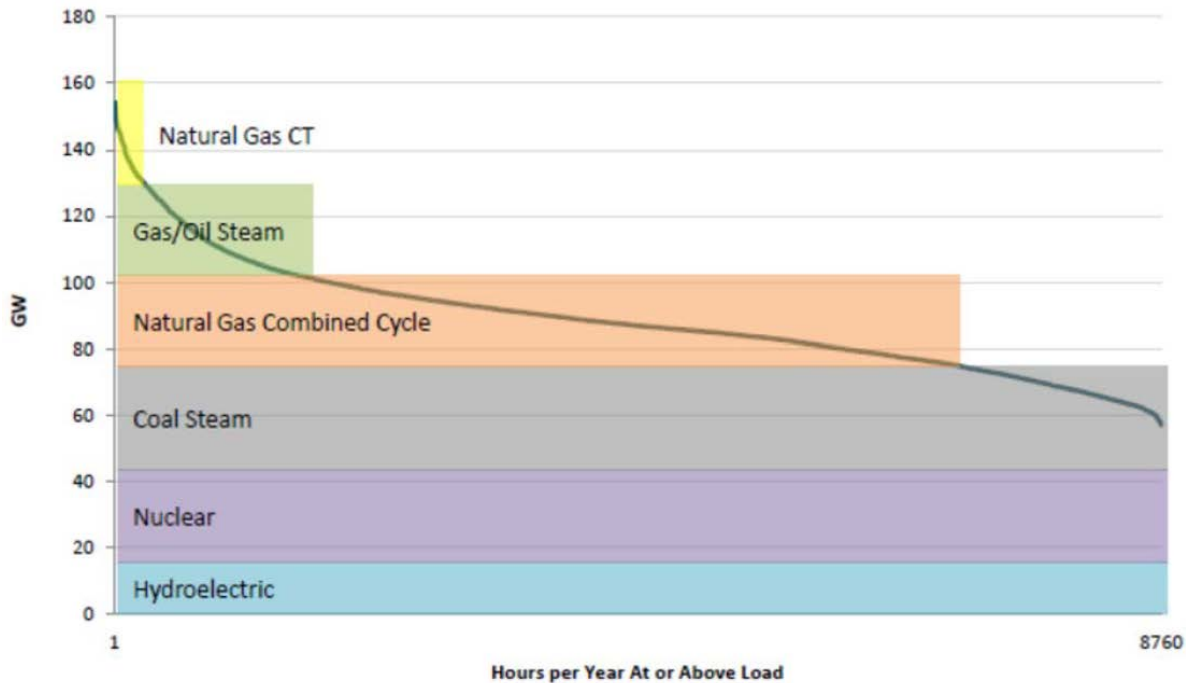
⁶ ComEd. 2017. Commonwealth Edison Company's 2018-2021 Energy Efficiency and Demand Response Plan. Docket No. 17-0312, June 30. Springfield, IL: Illinois Commerce Commission (ICC). www.icc.illinois.gov/docket/files.aspx?no=17-0312&docId=254601.

⁷ IL SAG (Illinois Stakeholder Advisory Group). 2016. Documentation of TAC Review of Non-Energy Benefits - Memorandum to Technical Advisory Committee. Springfield, IL: s3.amazonaws.com/ilsag/IL-TAC_Documentation-of-TAC-Review-of-Non-Energy-Benefits_Memo_02-09-2016.pdf.

the May 5, 2020 SAG NEI Working Group meeting, we presented our early findings from our societal and utility NEI research and provided an update on the planned participant NEI research. We presented an updated methodology for our societal NEI research at the July 15 and October 6, 2020, SAG NEI Working Group meetings. We provided further findings from our utility and participant NEI research. This report focuses on the methodology we developed to estimate Societal NEIs associated with ComEd's energy efficiency programs.

3. Energy Efficiency's Impacts on Emissions and Human Health

Energy efficiency programs reduce demand for electricity generated by fossil fuels by implementing energy efficiency measures. The corresponding emissions reductions are from the electric generation facilities operating at the margin (i.e. not providing baseload) that have the most flexibility to add generation to the grid quickly. The reduction in air emissions causes a reduction in adverse human health outcomes and deaths. Our research focuses on calculating the emissions from the marginal generators and then estimating the health benefits from those emissions. As we describe below, Guidehouse used tools that EPA develops and maintains to estimate the health benefits of reductions in exposure to emissions. The first tool estimates energy efficiency impacts on demand at the operating margin to quantify displaced emissions that can be attributed to demand savings. Displaced emissions are then used in a second tool informed by population health, epidemiology, and economics research to quantify the economic benefits of reduced adverse health outcomes. The reduced demand for electricity caused by energy efficiency programs occurs at the marginal generation facilities. Demand reductions are achieved at the operating margin of electric generation, reducing electric generation activity amongst marginal generation units. Specific electric generating units impacted by these demand reductions depend on the load shape of the impacted customers, the hour of day, and time of year, among other factors. As Figure 3-1 shows below, electric generating units are dispatched in the order of their operating costs. Least-cost electric generating units tend to operate for the greatest portion of the year, and higher-cost electric generating units are reserved for periods of greater demand. Higher-cost, marginal generation units are often fueled by oil, coal, and natural gas combustion.

Figure 3-1. Least-Cost Merit Order Dispatch


Source: Synapse Energy Economics, 2015⁸

Energy efficiency programs reduce demand at the operating margin, therefore demand reductions attributed to energy efficiency programs displace electric generation amongst higher-cost marginal generation sources. In the PJM territory, marginal sources supply energy via combustion of natural gas (69.4% of marginal sources) and coal (24.4%).⁹ Therefore, electric demand reductions due to ComEd energy efficiency programs can be linked to reductions in generation among natural gas and coal-fired electric generating units.

Reducing generation from PJM's marginal generators causes substantial reductions in emissions of PM_{2.5}, SO₂, NO_x, and CO₂, since these pollutants are byproducts of coal and natural gas fuel combustion. The populations' exposure to these four pollutants increases the prevalence of numerous adverse health outcomes. For instance, premature infant and adult mortality have been linked to increased exposure to ambient air pollution. On an annual basis, the World Health Organization (WHO) estimates around 4.2 million premature deaths globally are linked to ambient air pollution exposure, with the most harmful pollutants being PM_{2.5}, SO₂, NO₂, and ozone.¹⁰ Increased exposure to these pollutants also leads to the development or exacerbation of respiratory and cardiovascular conditions. Each of the adverse health effects from ambient pollution exposure, particularly exposure to PM_{2.5},¹¹ represents a substantial economic cost.¹²

⁸ Synapse Energy Economics, 2015. "Air Emissions Displacement by Energy Efficiency and Renewable Energy: A Survey of Data, Methods, and Results"

⁹ 2019 PJM State of the Market Report, Table 3-52.

https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2019/2019-som-pjm-sec3.pdf

¹⁰ <https://www.who.int/airpollution/ambient/health-impacts/en/> Accessed: August 17, 2020.

¹¹ <https://www.epa.gov/clean-air-act-overview/air-pollution-current-and-future-challenges> Accessed: August 17, 2020.

¹² <https://www.epa.gov/environmental-economics/mortality-risk-valuation> Accessed: August 17, 2020.

4. Methodology

This section presents the following methodologies:

- Using EPA tools to estimate the Societal NEIs associated with ComEd's CY2019 programs
- Modifying results from the CY2019 analysis to use as proxies for programs ComEd will implement in CY2022-2025.

Guidehouse first provides a summary of the two tools developed by EPA that are essential to this analysis. This is followed by a summary of Guidehouse's methodology to quantify the health benefits attributed to CY2019 energy efficiency programs and how we modified those results to create proxy values for the 2022-2025 planned portfolio cost-effectiveness tests.

4.1 AVERT and COBRA Tools

EPA developed the Avoided Emissions and generation Tool (AVERT) tool to estimate the emissions benefits of energy efficiency and renewable energy policies and programs.¹³ EPA also developed the CO-Benefits Risk Assessment (COBRA) tool to estimate the health and economic benefits associated with energy efficiency and renewable energy policies and programs.¹⁴

AVERT translates the impacts of energy efficiency programs into county-level reductions in PM_{2.5}, SO₂, NO_x, and CO₂ from reduced electricity generation across fossil-fueled electricity generating units. AVERT was first released in 2014 and has been reviewed, well-documented, and tested across multiple scenarios. More specifically, since the AVERT's inception, EPA has:

- Conducted external and internal peer reviews
- Benchmarked AVERT against an industry-standard electric power sector model, PROSYM
- Worked with states to beta-test the tool for functionality, appropriate uses, and clarity of the user manual.¹⁵

COBRA is a peer-reviewed screening tool that establishes the air quality, human health, and associated economic impacts of various state- and county-level emission reduction scenarios.¹⁶ The COBRA model was updated in 2017 to use the county-level emissions reduction results from AVERT to estimate health outcomes changes. Using information from AVERT on county-level changes in emissions, COBRA quantifies county-level air quality changes, estimates the resulting changes in health outcomes, and then calculates monetary values associated with

¹³ <https://www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert> Accessed: December 17, 2020.

¹⁴ <https://www.epa.gov/statelocalenergy/co-benefits-risk-assessment-cobra-health-impacts-screening-and-mapping-tool> Accessed: December 17, 2020.

¹⁵ https://www.epa.gov/sites/production/files/2019-05/documents/avert_overview_and_training_05-20-19_508.pdf. Accessed: April 30, 2020.

¹⁶ <https://www.epa.gov/statelocalenergy/how-cobra-works>. Accessed: April 30, 2020.

these changes in health outcomes. COBRA estimates the number of health incidents avoided and the corresponding economic values for the following conditions:

- Infant and Adult Mortality
- Non-fatal Heart Attacks
- Hospital Admissions related to Respiratory and Cardiovascular Conditions
- Acute Bronchitis
- Upper and Lower Respiratory Symptoms,
- Asthma Exacerbations (attacks, shortness of breath, & wheezing)
- Asthma Emergency Room visits
- Minor Restricted Activity Days
- Work Loss Days

4.2 Estimation of Societal NEIs

Guidehouse generated four sets of Societal NEI estimates for ComEd's CY2022-2025 programs, using CY2019 programs to represent the CY2022-CY2025 programs. Since ComEd programs cover a variety of measures with measure lives ranging from one to 25 years, Guidehouse included all cumulative persisting annual savings (CPAS) from CY2019 programs. This ensures that Guidehouse estimates can be associated with the full extent of CY2019 programs' energy savings.

To generate Societal NEI estimates, Guidehouse adopted an annual modeling approach. For each selected implementation year (i.e. CY2022) Guidehouse used CPAS values for CY2019 programs, which spanned 2019 through 2043, as proxies for savings that began in the selected implementation year. Portfolio-level CPAS values for select years between 2022 and 2046 are illustrated in Table 4-1 below. Similar CPAS tables were constructed for CY2023, 2024, and 2025 Societal NEI estimation, each with benefits beginning in their respective implementation years.

Table 4-1. Example of Portfolio-Level CPAS of CY2019 Programs Applied in CY2022

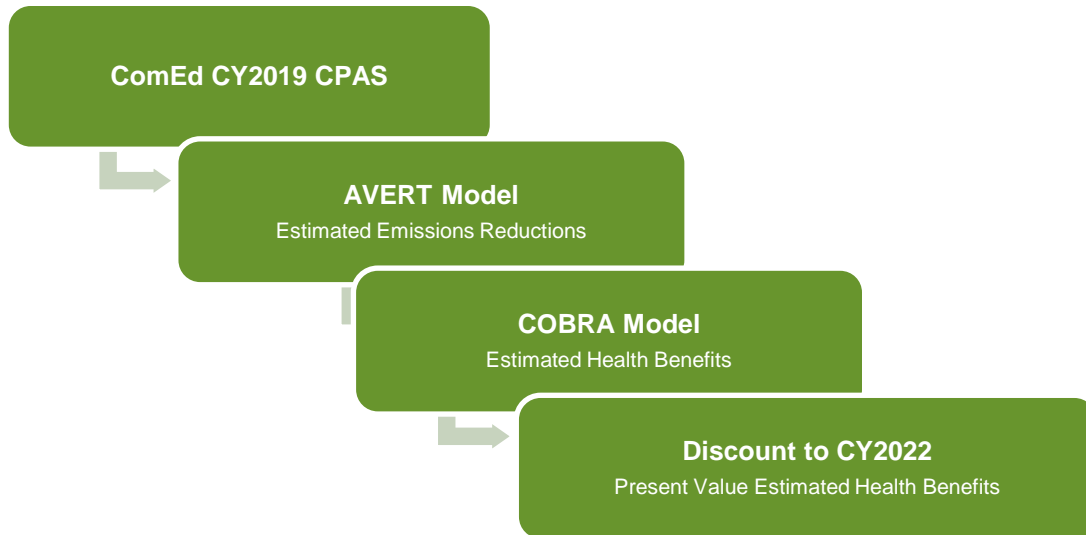
Year	CPAS (MWh)	Year	CPAS (MWh)
2022	1,597,696	2043	10,961
2023	1,566,716	2044	10,919
2024	1,389,808	2045	536
2025	1,358,036	2046	536

Source: Guidehouse analysis

Using CPAS values constructed for each implementation year during CY2022-2025, Guidehouse executed an annual approach illustrated in Figure 4-1 below. Analyzing on an annual basis ensures that (1) each year's emissions impacts are consistent with generation activity expected in that year and (2) each year's health benefits estimates reflect the baseline

population in that year. Additional detail providing context for each step in the analysis is provided in the following paragraphs.

Figure 4-1. Flowchart of Annual Estimation of CY2022 Health Benefits



Source: Guidehouse analysis

Step 1: Gather ComEd CY2019 Portfolio-Level CPAS Values

For this methodological summary, we focus on the annual estimation of societal health benefits for one program using that program's CY2019 CPAS values beginning in CY2022. In this first step, we gathered and aggregated ComEd CY2019 programs' CPAS data to construct one 25-year portfolio-level CPAS curve.

Step 2: Execute AVERT Model

For each year, execute AVERT using portfolio-level CPAS values. AVERT uses a forecast¹⁷ of patterns of dispatching electric generating units to estimate marginal emissions rates (lbs/MWh) for PM_{2.5}, SO₂, NO_x, and CO₂, then applies these emissions rates to energy efficiency savings (MWh) to determine a county-level reduction (lbs.) in each of the four pollutants.

EPA currently maintains a 2019 baseline forecast of patterns of dispatching electric generating units for AVERT. This forecast is based on historical data through 2018, and EPA warns that this forecast is static and is only recommended for use for up to five years. Therefore, Guidehouse can only be reasonably confident in AVERT's county-level estimates of emissions reductions for the years 2019 through 2023.¹⁸

Guidehouse considered the use of county-level estimates of emissions reductions from AVERT beyond 2023 without any adjustments. However, historical trends in marginal emissions rates

¹⁷ This forecast is updated by the EPA once annually and is based on historic patterns of dispatch of electric generating units and resource mix within the Mid-Atlantic region.

¹⁸ The EPA recommends that AVERT's emissions estimates using 2019 baseline forecasts are only used when estimating emissions changes from 2019 through 2023. This is because the model provides a representation of the dynamics of electricity dispatch in a historical base year, and because AVERT cannot currently control for changes in dispatch due to transmission resources, fuel prices, demand for electricity, variable costs, and other factors.

do not support this approach. For ComEd and PJM, marginal emissions rates have dropped considerably over the past four years.¹⁹ In PJM’s territory, the share of coal marginal generation sources dropped from 51.7% in 2015 to 24.4% in 2019. Transformations in the mix of electric generation sources, particularly marginal generation sources, can be expected to continue through 2050, as the use of renewables in electricity generation is forecasted to grow.²⁰ Marginal emissions rates are expected to continue to decline as the energy mix becomes cleaner. Failing to adjust the AVERT analysis approach to accommodate trends in marginal emissions rates beyond 2022 will, therefore, overstate county-level emissions reductions. In turn, this will overstate health benefits for these years.

To generate more reasonable bounds on emissions estimates for years beyond 2023, Guidehouse researched how marginal generation sources may change over time. Using this research, Guidehouse determined how emissions rates may be expected to decline between 2024 and 2049. Guidehouse then constructed a set of adjustment factors for each year from 2024 to 2049 based on this research. Resulting emissions rate estimates for 2022 through 2049 are presented in below for SO₂, NO_x, and PM_{2.5}.

Table 4-2. Expected Marginal Emissions Rates, 2022 – 2049

Year	PM2.5 (lbs/MWh)	Nox (lbs/MWh)	SO2 (lbs/MWh)
2022	116.00	617.00	832.00
2023	116.00	617.00	832.00
2024	99.97	505.02	717.06
2025	83.95	393.04	602.12
2026	83.17	376.73	596.51
2027	82.39	360.41	590.90
2028	81.60	344.10	585.30
2029	80.82	327.78	579.69
2030	80.04	311.47	574.08
2031	73.40	278.84	526.46
2032	66.76	246.21	478.84
2033	60.12	213.58	431.22
2034	53.48	180.95	383.60
2035	46.84	148.32	335.98
2036	46.94	145.35	336.68
2037	47.04	142.38	337.37
2038	47.13	139.42	338.07
2039	47.23	136.45	338.77
2040-2049*	47.33	133.49	339.47

* Emissions rates assumed to be constant in 2040 through 2049, as future emissions rates are too uncertain beyond 2040.

¹⁹ PJM 2015 – 2019 CO₂, SO₂, and NO_x Emission Rates Report. April 2020. <https://www.pjm.com/-/media/library/reports-notice/special-reports/2019/2019-emissions-report.ashx?la=en>

²⁰ Annual Energy Outlook 2020 (AEO2020) <https://www.eia.gov/outlooks/aeo/pdf/AEO2020%20Electricity.pdf>

Step 3: Execute COBRA Model

Guidehouse used the AVERT outputs in COBRA to estimate health impacts of reduced pollution exposure over a 20-year period. Reduced exposure to emissions in one year reduces acute morbidity in the year of analysis and reduces the incidence of premature mortality for up to 20 years.²¹ COBRA includes adjustments for inflation throughout the 20 years, then discounts this stream of health benefits back to the year in which the energy savings are realized.²² EPA provided Guidehouse a custom valuation file using the 2.40% discount rate from the Illinois Technical Reference Manual (TRM) v9.0²³.

For each year of COBRA analysis, we used the mean of national low- and high-sensitivity estimates for the health benefit estimate. Low- and high-sensitivity estimates of health benefits are based on two peer-reviewed studies estimating the link between ambient air pollution exposure and increases in premature mortality. Each study assessed premature mortality using a robust sample pool intended to represent the United States population, paying special attention to urban and rural populations and age brackets. Since both studies are credible, Guidehouse does not believe that either estimate is more representative than the other of the United States population and resulting population health impacts. Therefore, we used the mean of national low- and high-sensitivity estimates to construct annual health benefits estimates. In addition, since emission reductions and health benefits due to ComEd's energy efficiency programs accrue both without and outside of Illinois, we used national societal NEIs in our analyses. See Appendix 3, Rationale for National Societal Health Benefits Estimates, for additional information on our decision to use national health benefit estimates.

Step 4: Discount Results to CY2022

Health benefits estimates are expressed using dollars in the analysis year of interest. For example, the benefit estimates from Step 3 are expressed in 2042 dollars to estimate benefits in 2042. For the cost-effectiveness test on a CY2022 program, we used the CY2019 program's Societal NEI value adjusted to 2022 dollars. To remain consistent with other inputs to TRC tests, Guidehouse discounted each year's county-level COBRA results back to 2022 using a 0.42% real discount rate.

5. Analysis Findings and Recommendations

5.1 Analysis Findings

Figure 5-1 shows the estimates of Societal NEIs for ComEd's CY2019 programs as if they were implemented in CY2022. The CPAS curve shown below is diminishing year-over-year from 2022 through 2046 as measures begin to reach their effective useful lives. Following

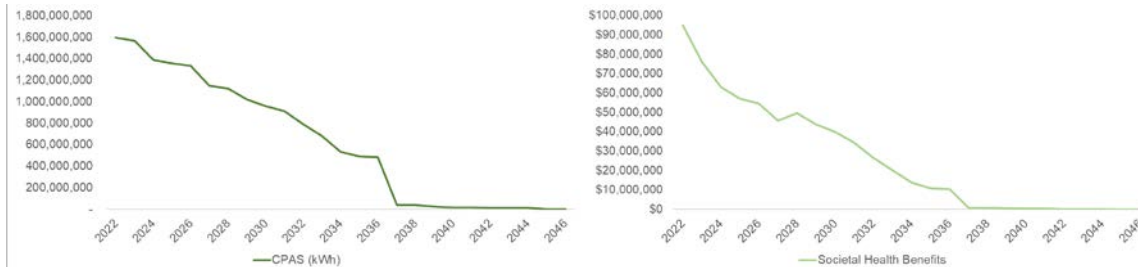
²¹ COBRA assumes that the incidences of premature mortality attributed to pollution exposure occurs over a 20 year period following exposure. COBRA currently assumes that 30% of premature deaths occur in the first year, 50% of deaths occur in years two through five, and the remaining 20% of deaths occur in years six through twenty. For more information, see page F-8 of the COBRA user manual: https://www.epa.gov/sites/production/files/2020-06/documents/cobra_user_manual_june_2020.pdf

²² In the case of analysis of emissions reductions in the year 2032, COBRA models the associated reductions in morbidity and mortality that can be expected to occur over a 20 year period between 2032 and 2051. This 20 year stream of health benefits is then discounted back to the analysis year, which in this case is 2032.

²³ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 9.0, draft available at: <http://www.ilsag.info/technical-reference-manual.html>

Guidehouse's annual analysis methodology, the Societal NEI curve follows a similar trend as the program-level CPAS, diminishing more quickly than CPAS due to predicted improvements in the efficiency of marginal generation.

Figure 5-1. ComEd CY2022 CPAS and Societal NEI Estimates: 2022 – 2046



Source: Guidehouse analysis

Table 5-1 below presents the final societal health benefits estimates for ComEd's CY2019 programs implemented in CY2022-2025. Societal health benefits are discounted to the program year of interest (i.e., CY2022 total health benefits are presented in 2022 dollars). Appendix 1 shows program-level Societal NEI estimates.

Table 5-1. Total Discounted Societal NEI Estimates, CY2019 Programs

Program Year	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Total Health Benefits per kWh (Average)
CY2022	15,561,383,503	\$550,205,004	\$0.0354
CY2023		\$498,598,504	\$0.0320
CY2024		\$464,217,916	\$0.0298
CY2025		\$431,787,025	\$0.0277

5.2 Recommendations

Based on our review of the current practices that other states use to include monetized NEIs in cost-effectiveness tests, we submit the following recommendations for consideration:

Recommendation 1: Guidehouse recommends that ComEd incorporate Societal NEI values in the annual “Evaluation of ComEd’s Total Resource Cost Test” report, due in June each year. Guidehouse would develop Societal NEI values using the program year’s final “ComEd Summary Impact Evaluation Report” savings values.

Recommendation 2: ComEd should use program-level monetized Societal NEIs results in the cost-effectiveness tests for ComEd 2022-2025 programs for the programs that did not significantly change from the CY2019 program design. Table A-1 through Table A-4 provides these results.

Recommendation #3: For new or revised ComEd 2022-2025 programs, ComEd should estimate the resulting new or revised programs' CPAS based on the measure mix.

This program-level CPAS should then be applied to annual portfolio-level benefit per kWh estimates provided in Table B-1 through Table B-4 to generate an annual Societal NEI estimate. ComEd should then take the summation of all years' estimates to generate a total Societal NEI estimate for the new or revised program. Guidehouse has not provided a levelized benefit per kWh, which would allow for ComEd to multiply each year's predicted savings by a single benefit per kWh factor. This was not calculated since, if calculated and used under a redesigned program with a new CPAS curve, the resulting Societal NEI calculation would not be correct. This is because levelized cost per kWh estimates would be reliant on a CY2019 kWh savings trajectory, which is not representative of new or redesigned programs.

Appendix A. Program-Level Societal NEI Estimates

The following tables provide Societal NEI estimates for ComEd CY2019 programs, expressed in both absolute dollars and dollars per kWh. Note that program-level dollar per kWh values are leveled to each program's CPAS. Each table assumes that CY2019 savings begin in the program year of interest, and societal health benefit estimates are expressed in the program year's dollars. In the case of CY2022, CY2019 savings are assumed to begin in 2022, with CPAS spanning 2022 through 2046. Societal NEI estimates for each year are then estimated using the annual approach highlighted in the Methodology section, discounted back to 2022, then summed. The result is a lifetime Societal NEI estimate expressed in 2022 dollars. This process was repeated for CY2023, CY2024, and CY2025, with estimates provided in 2023, 2024, and 2025 dollars, respectively.

Table A-1. CY2022 Societal NEI Estimates by Program in 2022 Dollars

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Business	Business Instant Discounts	2,349,286,754	\$84,385,003	\$0.0359
Business	Incentives - Standard	2,523,306,236	\$86,999,697	\$0.0345
Business	Small Business - Private	2,060,833,826	\$68,869,551	\$0.0334
Business	LED Streetlighting	1,085,008,536	\$38,474,211	\$0.0355
Business	Incentives - Custom	392,043,313	\$12,528,977	\$0.0320
Business	Industrial Systems	204,197,559	\$7,790,296	\$0.0382
Business	RetroCommissioning (Coordinated w/Nicor Gas & PGL/NSG)	264,270,255	\$10,313,769	\$0.0390
Business	Non-residential New Construction (Coordinated w/Nicor Gas & PGL/NSG)	326,020,928	\$9,761,754	\$0.0299
Business	Strategic Energy Management (Joint w/Nicor Gas & PGL/NSG)	116,483,031	\$5,039,299	\$0.0433
Business	Virtual Commissioning	138,458,643	\$5,255,952	\$0.0380
Business	Small Business - Public	101,985,150	\$3,821,905	\$0.0375
Business	Small Business Kits	40,331,185	\$1,591,450	\$0.0395
Business	Business Grocery	77,386,496	\$2,507,143	\$0.0324
Business	Business Telecomm	36,115,724	\$1,349,234	\$0.0374
Business	Facility Assessments	15,351,676	\$678,001	\$0.0442
Business	Nonprofit Retrofits	28,483,445	\$1,094,610	\$0.0384

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Business	Agriculture	5,968,397	\$192,786	\$0.0323
Residential	Lighting Discounts	894,620,160	\$37,058,953	\$0.0414
Residential	Fridge & Freezer Recycling	131,815,805	\$5,391,610	\$0.0409
Residential	Appliance Rebates	380,811,814	\$13,772,434	\$0.0362
Residential	Single-Family Assessment (Joint w/Nicor Gas & PGL/NSG)	154,186,907	\$6,386,892	\$0.0414
Residential	Multi-Family Assessments (Joint w/Nicor Gas & PGL/NSG)	96,644,176	\$3,844,857	\$0.0398
Residential	Residential HVAC	141,986,555	\$4,519,866	\$0.0318
Residential	Elementary Education Kits (Joint w/Nicor Gas & PGL/NSG)	65,606,467	\$2,569,454	\$0.0392
Residential	Weatherization	11,756,935	\$336,039	\$0.0286
Residential	Residential New Construction (Joint w/Nicor Gas)	4,632,592	\$136,743	\$0.0295
Residential	Residential Behavior	136,820,857	\$6,714,519	\$0.0491
Income Eligible	Food Bank-LED Distribution	342,830,665	\$14,579,420	\$0.0425
Income Eligible	Lighting Discounts - IE [Combined with Appliance Rebates - IE]	352,743,099	\$14,037,588	\$0.0398
Income Eligible	UIC-ERC Income Eligible Kits	125,141,693	\$5,013,533	\$0.0401
Income Eligible	Appliance Rebates - IE [Combined with Lighting Discounts - IE]	53,474,216	\$2,152,825	\$0.0403
Income Eligible	Multi-Family Retrofits - IE (Joint w/Nicor Gas & PGL/NSG)	27,837,171	\$1,056,525	\$0.0380
Income Eligible	Public Housing Retrofits (Joint w/Nicor Gas & PGL/NSG)	20,103,572	\$794,397	\$0.0395

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Income Eligible	Affordable Housing New Construction (Joint w/Nicor Gas)	33,433,046	\$1,044,634	\$0.0312
Income Eligible	Single-Family Retrofits - CBA (Joint w/Nicor Gas & PGL/NSG)	30,182,989	\$937,904	\$0.0311
Income Eligible	Single-Family Retrofits - IHWAP (Joint w/Nicor Gas & PGL/NSG)	20,842,705	\$689,686	\$0.0331
Income Eligible	Multi-Family Retrofits - IHWAP (Joint w/Nicor Gas & PGL/NSG)	6,888,251	\$232,686	\$0.0338
Income Eligible	Manufactured Housing Retrofit	2,870,129	\$103,380	\$0.0360
NA	Voltage Optimization	2,760,622,546	\$88,177,422	\$0.0319
All Programs		15,561,383,503	\$550,205,004	

Source: Guidehouse analysis using ComEd CY2019 programs' savings

Table A-2. CY2023 Societal NEI Estimates by Program in 2023 Dollars

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Business	Business Instant Discounts	2,349,286,754	\$76,649,350	\$0.0326
Business	Incentives - Standard	2,523,306,236	\$79,288,149	\$0.0314
Business	Small Business - Private	2,060,833,826	\$62,615,414	\$0.0304
Business	LED Streetlighting	1,085,008,536	\$34,955,836	\$0.0322
Business	Incentives - Custom	392,043,313	\$11,435,563	\$0.0292
Business	Industrial Systems	204,197,559	\$6,901,829	\$0.0338
Business	RetroCommissioning (Coordinated w/Nicor Gas & PGL/NSG)	264,270,255	\$9,424,410	\$0.0357
Business	Non-residential New Construction (Coordinated w/Nicor Gas & PGL/NSG)	326,020,928	\$8,973,823	\$0.0275
Business	Strategic Energy Management (Joint w/Nicor Gas & PGL/NSG)	116,483,031	\$4,413,316	\$0.0379
Business	Virtual Commissioning	138,458,643	\$4,797,832	\$0.0347
Business	Small Business - Public	101,985,150	\$3,472,674	\$0.0341
Business	Small Business Kits	40,331,185	\$1,416,866	\$0.0351
Business	Business Grocery	77,386,496	\$2,284,021	\$0.0295
Business	Business Telecomm	36,115,724	\$1,230,237	\$0.0341
Business	Facility Assessments	15,351,676	\$589,784	\$0.0384
Business	Nonprofit Retrofits	28,483,445	\$998,380	\$0.0351
Business	Agriculture	5,968,397	\$175,963	\$0.0295
Residential	Lighting Discounts	894,620,160	\$32,851,879	\$0.0367
Residential	Fridge & Freezer Recycling	131,815,805	\$4,865,985	\$0.0369
Residential	Appliance Rebates	380,811,814	\$12,548,851	\$0.0330
Residential	Single-Family Assessment (Joint w/Nicor Gas & PGL/NSG)	154,186,907	\$5,691,550	\$0.0369

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Residential	Multi-Family Assessments (Joint w/Nicor Gas & PGL/NSG)	96,644,176	\$3,458,662	\$0.0358
Residential	Residential HVAC	141,986,555	\$4,133,209	\$0.0291
Residential	Elementary Education Kits (Joint w/Nicor Gas & PGL/NSG)	65,606,467	\$2,324,621	\$0.0354
Residential	Weatherization	11,756,935	\$310,804	\$0.0264
Residential	Residential New Construction (Joint w/Nicor Gas)	4,632,592	\$125,901	\$0.0272
Residential	Residential Behavior	136,820,857	\$5,770,230	\$0.0422
Income Eligible	Food Bank-LED Distribution	342,830,665	\$12,966,184	\$0.0378
Income Eligible	Lighting Discounts - IE [Combined with Appliance Rebates - IE]	352,743,099	\$12,537,733	\$0.0355
Income Eligible	UIC-ERC Income Eligible Kits	125,141,693	\$4,525,921	\$0.0362
Income Eligible	Appliance Rebates - IE [Combined with Lighting Discounts - IE]	53,474,216	\$1,953,399	\$0.0365
Income Eligible	Multi-Family Retrofits - IE (Joint w/Nicor Gas & PGL/NSG)	27,837,171	\$949,655	\$0.0341
Income Eligible	Public Housing Retrofits (Joint w/Nicor Gas & PGL/NSG)	20,103,572	\$713,628	\$0.0355
Income Eligible	Affordable Housing New Construction (Joint w/Nicor Gas)	33,433,046	\$960,902	\$0.0287
Income Eligible	Single-Family Retrofits - CBA (Joint w/Nicor Gas & PGL/NSG)	30,182,989	\$860,360	\$0.0285
Income Eligible	Single-Family Retrofits - IHWAP (Joint w/Nicor Gas & PGL/NSG)	20,842,705	\$627,728	\$0.0301

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Income Eligible	Multi-Family Retrofits - IHWAP (Joint w/Nicor Gas & PGL/NSG)	6,888,251	\$211,375	\$0.0307
Income Eligible	Manufactured Housing Retrofit	2,870,129	\$93,739	\$0.0327
NA	Voltage Optimization	2,760,622,546	\$80,492,742	\$0.0292
All Programs		15,561,383,503	\$498,598,504	

Source: Guidehouse analysis using ComEd CY2019 programs' savings

Table A-3. CY2024 Societal NEI Estimates by Program in 2024 Dollars

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Business	Business Instant Discounts	2,349,286,754	\$71,722,608	\$0.0305
Business	Incentives - Standard	2,523,306,236	\$73,941,786	\$0.0293
Business	Small Business - Private	2,060,833,826	\$58,494,861	\$0.0284
Business	LED Streetlighting	1,085,008,536	\$32,387,671	\$0.0299
Business	Incentives - Custom	392,043,313	\$10,691,328	\$0.0273
Business	Industrial Systems	204,197,559	\$6,343,492	\$0.0311
Business	RetroCommissioning (Coordinated w/Nicor Gas & PGL/NSG)	264,270,255	\$8,860,015	\$0.0335
Business	Non-residential New Construction (Coordinated w/Nicor Gas & PGL/NSG)	326,020,928	\$8,432,862	\$0.0259
Business	Strategic Energy Management (Joint w/Nicor Gas & PGL/NSG)	116,483,031	\$4,132,200	\$0.0355
Business	Virtual Commissioning	138,458,643	\$4,489,220	\$0.0324
Business	Small Business - Public	101,985,150	\$3,234,163	\$0.0317
Business	Small Business Kits	40,331,185	\$1,318,080	\$0.0327
Business	Business Grocery	77,386,496	\$2,134,385	\$0.0276
Business	Business Telecomm	36,115,724	\$1,150,004	\$0.0318
Business	Facility Assessments	15,351,676	\$547,746	\$0.0357
Business	Nonprofit Retrofits	28,483,445	\$935,521	\$0.0328
Business	Agriculture	5,968,397	\$164,420	\$0.0275
Residential	Lighting Discounts	894,620,160	\$30,247,675	\$0.0338
Residential	Fridge & Freezer Recycling	131,815,805	\$4,592,852	\$0.0348
Residential	Appliance Rebates	380,811,814	\$11,694,416	\$0.0307
Residential	Single-Family Assessment (Joint w/Nicor Gas & PGL/NSG)	154,186,907	\$5,279,453	\$0.0342

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Residential	Multi-Family Assessments (Joint w/Nicor Gas & PGL/NSG)	96,644,176	\$3,222,780	\$0.0333
Residential	Residential HVAC	141,986,555	\$3,868,526	\$0.0272
Residential	Elementary Education Kits (Joint w/Nicor Gas & PGL/NSG)	65,606,467	\$2,145,620	\$0.0327
Residential	Weatherization	11,756,935	\$293,509	\$0.0250
Residential	Residential New Construction (Joint w/Nicor Gas)	4,632,592	\$118,471	\$0.0256
Residential	Residential Behavior	136,820,857	\$5,119,476	\$0.0374
Income Eligible	Food Bank-LED Distribution	342,830,665	\$11,718,576	\$0.0342
Income Eligible	Lighting Discounts - IE [Combined with Appliance Rebates - IE]	352,743,099	\$11,551,817	\$0.0327
Income Eligible	UIC-ERC Income Eligible Kits	125,141,693	\$4,183,397	\$0.0334
Income Eligible	Appliance Rebates - IE [Combined with Lighting Discounts - IE]	53,474,216	\$1,847,146	\$0.0345
Income Eligible	Multi-Family Retrofits - IE (Joint w/Nicor Gas & PGL/NSG)	27,837,171	\$884,272	\$0.0318
Income Eligible	Public Housing Retrofits (Joint w/Nicor Gas & PGL/NSG)	20,103,572	\$661,793	\$0.0329
Income Eligible	Affordable Housing New Construction (Joint w/Nicor Gas)	33,433,046	\$903,909	\$0.0270
Income Eligible	Single-Family Retrofits - CBA (Joint w/Nicor Gas & PGL/NSG)	30,182,989	\$808,407	\$0.0268
Income Eligible	Single-Family Retrofits - IHWAP (Joint w/Nicor Gas & PGL/NSG)	20,842,705	\$585,740	\$0.0281

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Income Eligible	Multi-Family Retrofits - IHWAP (Joint w/Nicor Gas & PGL/NSG)	6,888,251	\$197,627	\$0.0287
Income Eligible	Manufactured Housing Retrofit	2,870,129	\$87,270	\$0.0304
NA	Voltage Optimization	2,760,622,546	\$75,224,821	\$0.0272
All Programs		15,561,383,503	\$464,217,916	

Source: Guidehouse analysis using ComEd CY2019 programs' savings

Table A-4. CY2025 Societal NEI Estimates by Program in 2025 Dollars

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Business	Business Instant Discounts	2,349,286,754	\$66,887,879	\$0.0285
Business	Incentives - Standard	2,523,306,236	\$68,749,433	\$0.0272
Business	Small Business - Private	2,060,833,826	\$54,613,195	\$0.0265
Business	LED Streetlighting	1,085,008,536	\$29,996,566	\$0.0276
Business	Incentives - Custom	392,043,313	\$9,997,105	\$0.0255
Business	Industrial Systems	204,197,559	\$5,841,867	\$0.0286
Business	RetroCommissioning (Coordinated w/Nicor Gas & PGL/NSG)	264,270,255	\$8,268,066	\$0.0313
Business	Non-residential New Construction (Coordinated w/Nicor Gas & PGL/NSG)	326,020,928	\$7,929,664	\$0.0243
Business	Strategic Energy Management (Joint w/Nicor Gas & PGL/NSG)	116,483,031	\$3,878,292	\$0.0333
Business	Virtual Commissioning	138,458,643	\$4,167,931	\$0.0301
Business	Small Business - Public	101,985,150	\$2,996,181	\$0.0294
Business	Small Business Kits	40,331,185	\$1,228,222	\$0.0305
Business	Business Grocery	77,386,496	\$1,994,871	\$0.0258
Business	Business Telecomm	36,115,724	\$1,067,275	\$0.0296
Business	Facility Assessments	15,351,676	\$510,617	\$0.0333
Business	Nonprofit Retrofits	28,483,445	\$870,189	\$0.0306
Business	Agriculture	5,968,397	\$153,541	\$0.0257
Residential	Lighting Discounts	894,620,160	\$27,966,954	\$0.0313
Residential	Fridge & Freezer Recycling	131,815,805	\$4,323,722	\$0.0328
Residential	Appliance Rebates	380,811,814	\$10,827,380	\$0.0284
Residential	Single-Family Assessment (Joint w/Nicor Gas & PGL/NSG)	154,186,907	\$4,898,945	\$0.0318

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Residential	Multi-Family Assessments (Joint w/Nicor Gas & PGL/NSG)	96,644,176	\$2,997,966	\$0.0310
Residential	Residential HVAC	141,986,555	\$3,618,310	\$0.0255
Residential	Elementary Education Kits (Joint w/Nicor Gas & PGL/NSG)	65,606,467	\$1,974,077	\$0.0301
Residential	Weatherization	11,756,935	\$277,324	\$0.0236
Residential	Residential New Construction (Joint w/Nicor Gas)	4,632,592	\$111,559	\$0.0241
Residential	Residential Behavior	136,820,857	\$4,566,701	\$0.0334
Income Eligible	Food Bank-LED Distribution	342,830,665	\$10,648,765	\$0.0311
Income Eligible	Lighting Discounts - IE [Combined with Appliance Rebates - IE]	352,743,099	\$10,665,854	\$0.0302
Income Eligible	UIC-ERC Income Eligible Kits	125,141,693	\$3,857,921	\$0.0308
Income Eligible	Appliance Rebates - IE [Combined with Lighting Discounts - IE]	53,474,216	\$1,734,330	\$0.0324
Income Eligible	Multi-Family Retrofits - IE (Joint w/Nicor Gas & PGL/NSG)	27,837,171	\$824,185	\$0.0296
Income Eligible	Public Housing Retrofits (Joint w/Nicor Gas & PGL/NSG)	20,103,572	\$614,337	\$0.0306
Income Eligible	Affordable Housing New Construction (Joint w/Nicor Gas)	33,433,046	\$848,821	\$0.0254
Income Eligible	Single-Family Retrofits - CBA (Joint w/Nicor Gas & PGL/NSG)	30,182,989	\$759,516	\$0.0252
Income Eligible	Single-Family Retrofits - IHWAP (Joint w/Nicor Gas & PGL/NSG)	20,842,705	\$548,138	\$0.0263

Sector	Program	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
Income Eligible	Multi-Family Retrofits - IHWAP (Joint w/Nicor Gas & PGL/NSG)	6,888,251	\$185,108	\$0.0269
Income Eligible	Manufactured Housing Retrofit	2,870,129	\$81,155	\$0.0283
NA	Voltage Optimization	2,760,622,546	\$70,305,064	\$0.0255
All Programs		15,561,383,503	\$431,787,025	

Source: Guidehouse analysis using ComEd CY2019 programs' savings

Appendix B. Portfolio-Level Societal NEI Estimates

The following tables highlight the annual portfolio-level Societal NEI estimates for CY2022-2025. For new or redesigned energy efficiency programs, ComEd should estimate the new or redesigned programs' CPAS based on the new measure mix. This program-level CPAS should then be applied to annual portfolio-level benefit per kWh estimates provided in Table B-1 through Table B-4 to generate an annual Societal NEI estimate. ComEd should then take the summation of all years' estimates to generate a total Societal NEI estimate for the new or redesigned program.

Table B-1. CY2022 Annual Portfolio-Level Societal NEI Estimates in 2022 Dollars

Year	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
2022	1,597,696,386	\$89,579,662	\$0.0561
2023	1,566,716,445	\$78,663,443	\$0.0502
2024	1,389,807,574	\$58,921,228	\$0.0424
2025	1,358,035,961	\$46,586,439	\$0.0343
2026	1,335,034,183	\$44,501,769	\$0.0333
2027	1,149,499,241	\$37,259,958	\$0.0324
2028	1,122,770,993	\$37,940,336	\$0.0338
2029	1,020,778,528	\$33,485,520	\$0.0328
2030	961,079,483	\$30,576,809	\$0.0318
2031	913,497,925	\$26,316,467	\$0.0288
2032	791,645,761	\$20,472,678	\$0.0259
2033	680,719,872	\$15,618,866	\$0.0229
2034	535,810,633	\$10,774,901	\$0.0201
2035	491,453,305	\$8,458,891	\$0.0172
2036	482,521,942	\$8,225,229	\$0.0170
2037	38,168,193	\$671,253	\$0.0176
2038	37,705,096	\$656,289	\$0.0174
2039	25,118,710	\$432,235	\$0.0172
2040	14,951,220	\$254,613	\$0.0170
2041	14,458,724	\$245,615	\$0.0170
2042	10,960,726	\$183,664	\$0.0168
2043	10,960,726	\$182,896	\$0.0167
2044	10,919,463	\$181,359	\$0.0166
2045	536,207	\$7,457	\$0.0139
2046	536,207	\$7,426	\$0.0138
Total	15,561,383,503	\$550,205,004	

Source: Guidehouse analysis using ComEd CY2019 programs' savings

Table B-2. CY2023 Annual Portfolio-Level Societal NEI Estimates in 2023 Dollars

Year	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
2023	1,597,696,386	\$78,927,610	\$0.0494
2024	1,566,716,445	\$65,155,506	\$0.0416
2025	1,389,807,574	\$46,933,123	\$0.0338
2026	1,358,035,961	\$44,564,476	\$0.0328
2027	1,335,034,183	\$42,543,818	\$0.0319
2028	1,149,499,241	\$38,998,059	\$0.0339
2029	1,122,770,993	\$36,949,319	\$0.0329
2030	1,020,778,528	\$32,588,024	\$0.0319
2031	961,079,483	\$27,783,338	\$0.0289
2032	913,497,925	\$23,671,817	\$0.0259
2033	791,645,761	\$18,189,413	\$0.0230
2034	680,719,872	\$13,662,198	\$0.0201
2035	535,810,633	\$9,237,479	\$0.0172
2036	491,453,305	\$8,408,282	\$0.0171
2037	482,521,942	\$8,175,746	\$0.0169
2038	38,168,193	\$666,510	\$0.0175
2039	37,705,096	\$651,624	\$0.0173
2040	25,118,710	\$429,134	\$0.0171
2041	14,951,220	\$254,613	\$0.0170
2042	14,458,724	\$245,615	\$0.0170
2043	10,960,726	\$183,664	\$0.0168
2044	10,960,726	\$182,896	\$0.0167
2045	10,919,463	\$181,359	\$0.0166
2046	536,207	\$7,457	\$0.0139
2047	536,207	\$7,426	\$0.0138
Total	15,561,383,503	\$498,598,504	

Source: Guidehouse analysis using ComEd CY2019 programs 'savings

Table B-3. CY2024 Annual Portfolio-Level Societal NEI Estimates in 2024 Dollars

Year	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
2024	1,597,696,386	\$68,007,436	\$0.0426
2025	1,566,716,445	\$54,129,210	\$0.0345
2026	1,389,807,574	\$46,701,863	\$0.0336
2027	1,358,035,961	\$44,317,326	\$0.0326
2028	1,335,034,183	\$45,419,953	\$0.0340
2029	1,149,499,241	\$37,979,248	\$0.0330
2030	1,122,770,993	\$35,958,302	\$0.0320
2031	1,020,778,528	\$29,609,305	\$0.0290
2032	961,079,483	\$24,989,865	\$0.0260
2033	913,497,925	\$21,027,167	\$0.0230
2034	791,645,761	\$15,906,001	\$0.0201
2035	680,719,872	\$11,705,334	\$0.0172
2036	535,810,633	\$9,182,080	\$0.0171
2037	491,453,305	\$8,357,672	\$0.0170
2038	482,521,942	\$8,126,264	\$0.0168
2039	38,168,193	\$661,767	\$0.0173
2040	37,705,096	\$646,960	\$0.0172
2041	25,118,710	\$429,134	\$0.0171
2042	14,951,220	\$254,613	\$0.0170
2043	14,458,724	\$245,615	\$0.0170
2044	10,960,726	\$183,664	\$0.0168
2045	10,960,726	\$182,896	\$0.0167
2046	10,919,463	\$181,359	\$0.0166
2047	536,207	\$7,457	\$0.0139
2048	536,207	\$7,426	\$0.0138
Total	15,561,383,503	\$464,217,916	

Source: Guidehouse analysis using ComEd CY2019 programs' savings

Table B-4. CY2025 Annual Portfolio-Level Societal NEI Estimates in 2025 Dollars

Year	CY2019 Verified Net Lifetime Savings (kWh)	\$ Total Health Benefits	\$ Health Benefits per kWh
2025	1,597,696,386	\$54,335,589	\$0.0340
2026	1,566,716,445	\$51,778,487	\$0.0330
2027	1,389,807,574	\$44,646,820	\$0.0321
2028	1,358,035,961	\$46,390,196	\$0.0342
2029	1,335,034,183	\$44,233,076	\$0.0331
2030	1,149,499,241	\$36,960,438	\$0.0322
2031	1,122,770,993	\$32,669,131	\$0.0291
2032	1,020,778,528	\$26,630,586	\$0.0261
2033	961,079,483	\$22,196,392	\$0.0231
2034	913,497,925	\$18,382,515	\$0.0201
2035	791,645,761	\$13,622,277	\$0.0172
2036	680,719,872	\$11,634,847	\$0.0171
2037	535,810,633	\$9,126,680	\$0.0170
2038	491,453,305	\$8,307,062	\$0.0169
2039	482,521,942	\$8,076,782	\$0.0167
2040	38,168,193	\$657,023	\$0.0172
2041	37,705,096	\$646,960	\$0.0172
2042	25,118,710	\$429,134	\$0.0171
2043	14,951,220	\$254,613	\$0.0170
2044	14,458,724	\$245,615	\$0.0170
2045	10,960,726	\$183,664	\$0.0168
2046	10,960,726	\$182,896	\$0.0167
2047	10,919,463	\$181,359	\$0.0166
2048	536,207	\$7,457	\$0.0139
2049	536,207	\$7,426	\$0.0138
Total	15,561,383,503	\$431,787,025	

Source: Guidehouse analysis using ComEd CY2019 programs' savings

Appendix C. Rationale for National Societal Health Benefits Estimates

EPA's COBRA model generates estimates of health benefits at the county level. Since PJM generation sources are in a large area of the U.S. between Illinois and Pennsylvania, emissions reductions and health benefits due to ComEd's programs accrue both within and outside of Illinois. Guidehouse presented findings at the May 2020 and July 2020 SAG NEI Working Group meetings on national and Illinois-specific estimates of societal health benefits stemming from ComEd programs' CPAS. We determined that using the national estimates of societal health benefits is more representative of the benefits resulting from ComEd's program.

To inform our decision to use national societal health benefits estimates, the Guidehouse team closely examined the language in FEJA. In December 2016, the Illinois General Assembly passed FEJA, which contains language on including additional non-energy benefits (now described as non-energy impacts (NEIs)) in energy efficiency programs' total resource cost (TRC) tests.²⁴

Electric

*"The total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and 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...**"*

Natural Gas

*"The total resource cost test compares the sum of avoided natural gas utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, **as well as other quantifiable societal benefits, including avoided electric utility costs...**"*

Guidehouse also researched the industry definition of societal benefits. In the realm of utility cost-effectiveness tests, societal benefits are defined by the National Standards Practice Manual (NSPM) for Assessing Cost-Effectiveness of Energy Efficiency Resources as:

*"All of the benefits that result from the EE resource. This includes all benefits described for the TRC test plus any benefits experienced by society, including: low-income community benefits, environmental benefits, economic development benefits, **and reduced health care costs.**"²⁵*

Since PJM generation sources affected by ComEd's energy efficiency programs are found within and outside of Illinois, and since emissions travel across state lines, reduced health care

²⁴ FEJA (Illinois Future Energy Jobs Act). Public Act 099-0906. www.ilga.gov/legislation/publicacts/99/PDF/099-0906.pdf

²⁵ National Energy Screening Project, May 18, 2017. <https://www.nationalenergyscreeningproject.org/the-national-standard-practice-manual-for-energy-efficiency/>

costs associated with reduced emissions occur at a national level. Figure C-1 and Figure C-2 show the results of Guidehouse's COBRA analysis indicating that the majority of emissions reductions and health benefits are found east of the Mississippi River, with the largest effects observed within the PJM region.

Figure C-1. COBRA-Estimated Reduction in PM2.5 – Year 2022

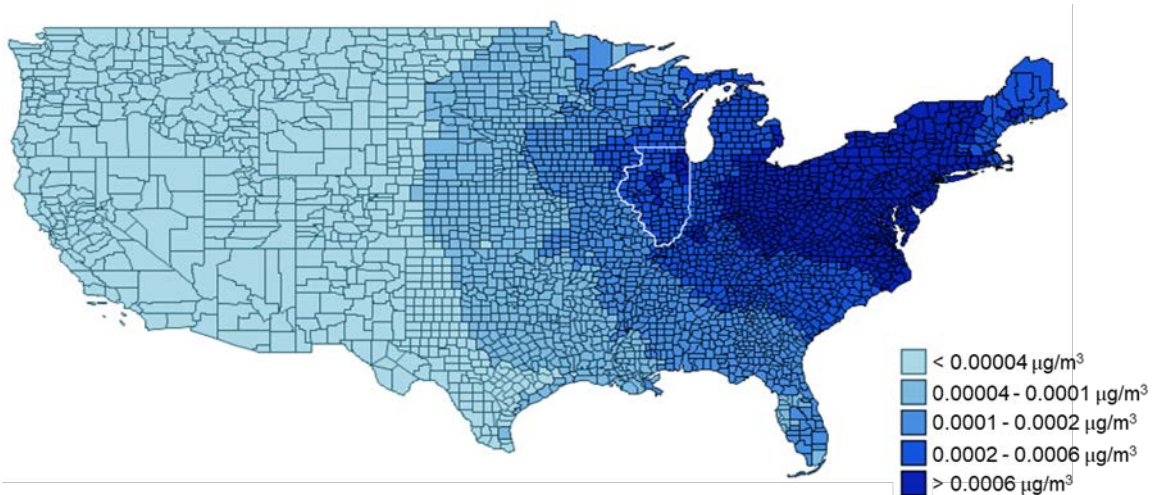
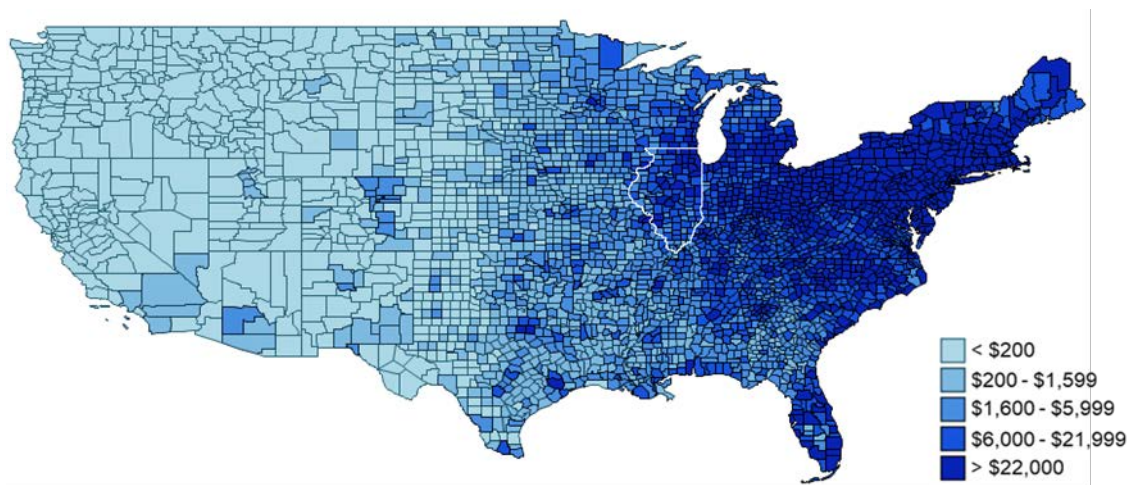


Figure C-2. COBRA-Estimated Health Benefits from Reductions in PM2.5 – Year 2022



Based on the language in FEJA, the NSPM, and the findings from COBRA analysis, Guidehouse believes that using health benefits at the national level is appropriate. Therefore, Guidehouse recommends using the national health benefit values produced by the COBRA model in ComEd's energy efficiency programs' cost-effectiveness tests.