Guidehouse

Economic & Societal NEI Research Update

Presented to SAG NEI Working Group

Charles Ampong
Associate Director

outwit complexity™

NOVEMBER 5, 2025

Guidehouse

NEI Research Updates

Framework for Non-Energy Impacts (NEIs)

CEJA requires electric and gas utilities to include quantifiable societal NEIs in cost effectiveness test and additionally report economic NEIs. Policy Manual 3.0, Sections 6.7 and 8 outline the requirements for the job and macroeconomic impact reporting, and the cost effectiveness test.

Societal Health NEIs

- Reduction in emissions from fossil-fueled electricity generation and onsite natural gas usage reduces adverse health impacts that can be monetized from the value of illnesses and deaths avoided.

Participant NEIs

- Monetizing multi-family and single family participant improved health, thermal comfort, and productivity from EE upgrades (e.g. HVAC and building envelops).

Economic NEIs

Direct impacts

- Jobs created to manage and implement programs
- Program implementation contractor incentives
- Participant rebates
- Bill savings

Indirect impacts

- Contractors buying equipment from suppliers
- Suppliers increasing their own production

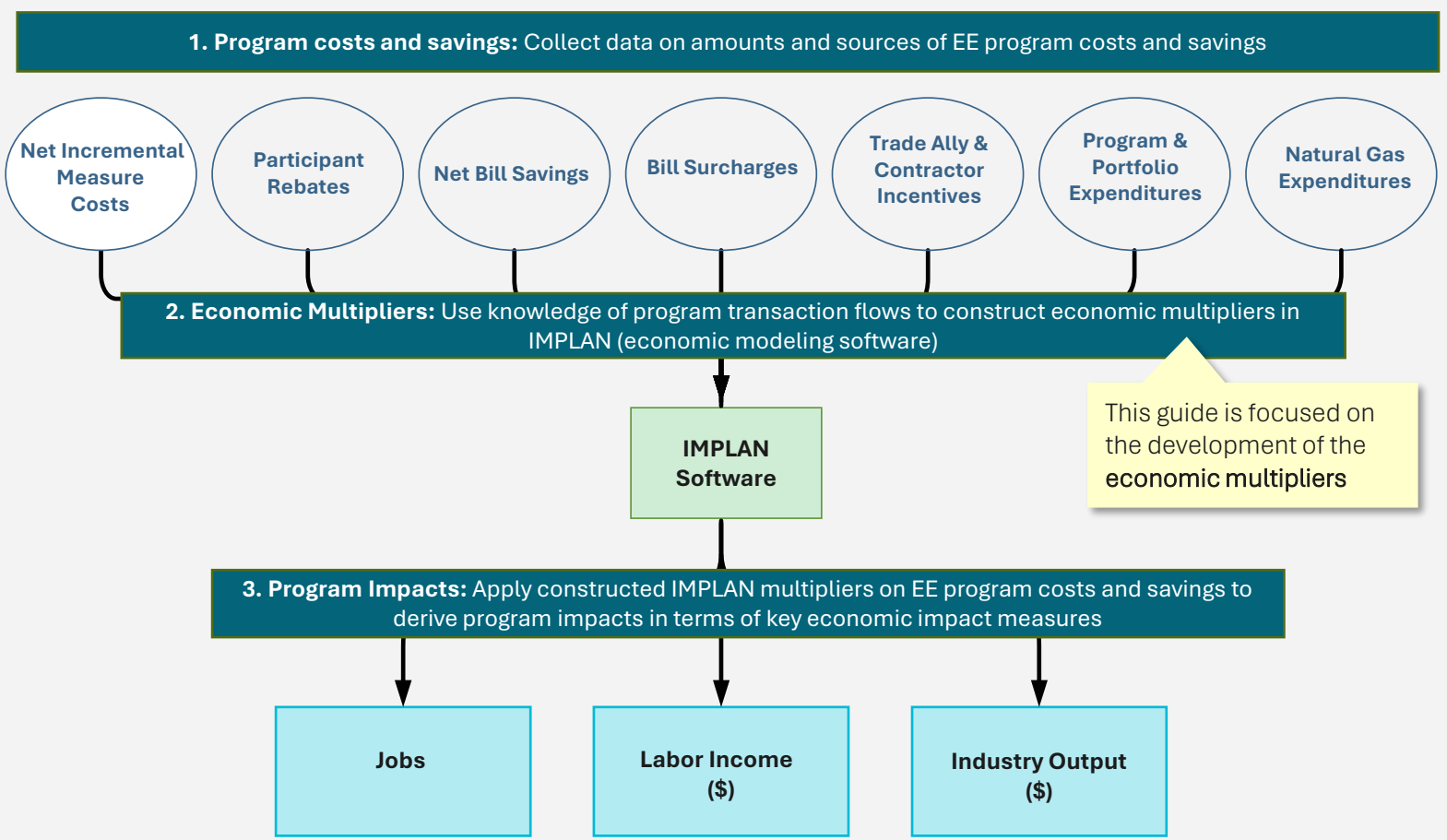
Induced impacts

- Household spending due to increase in income from lower bills and an increase in jobs

Economic NEI: Methodology

Analyzing these transaction flows for economic NEIs takes place in three parts

High-level steps to estimating ComEd EE Program Economic NEIs



Core calculation

1. Program Costs and Savings **X** 2. Economic Multipliers

= 3. Program Impacts

Multipliers are constructed for eight impact categories derived from sources of costs/savings in ComEd's EE portfolio

Multipliers for impacts of net ratepayer savings

Residential
EE programs that increase residential customer bill savings

Income Qualified
EE programs that increase income qualified customer bill savings

Commercial/Public
EE programs that increase commercial and public sector customer bill savings

Multipliers for impacts of program costs

Net Incremental Costs (IMC)
Year-over-year increases in costs to provide programs

Program Administration Costs
Costs incurred by ComEd to administer programs

Voltage Optimization (CapEx)
Capital expenditure costs associated with voltage optimization program

Multipliers for impacts of program intermediate inputs

Lost Electric Utility Fuel Expenditures
ComEd reduced spend on fuels used to generate electricity

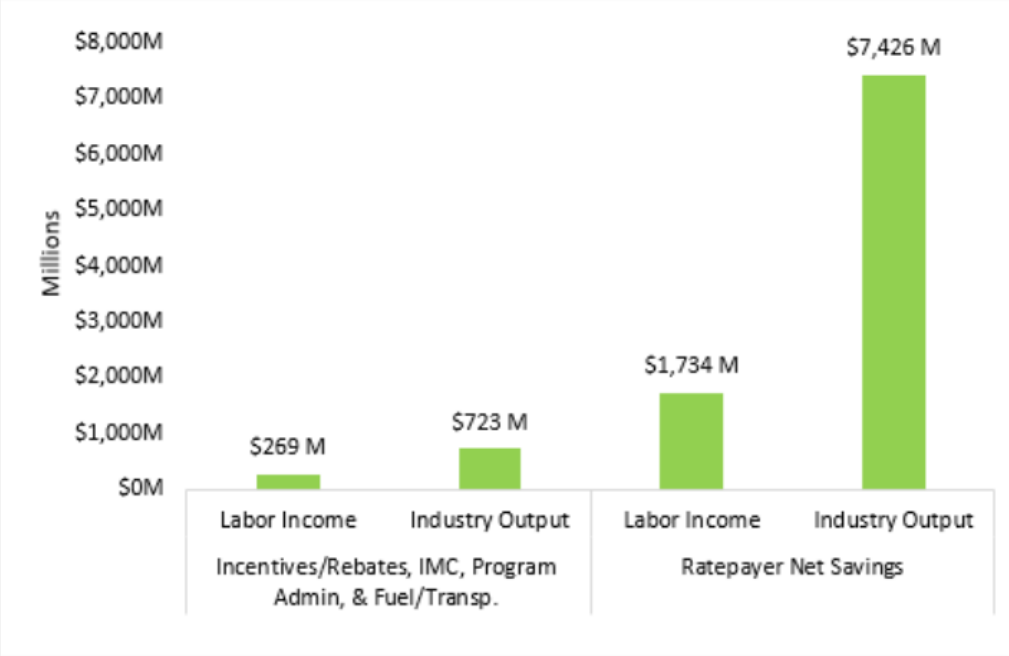
Lost Gas Utility Fuel Expenditures
ComEd reduced spend on fuels used to generate gas

Economic NEI: Impact

Impact Category (CY2024)	ComEd
Job Years	29,179 Job Years
Labor Income	$2,003 M
Industry Output	$8,149 M

- Economic impacts in 2024 result from initial spending triggered by the implementation of the utilities' 2024 EE programs

- The impacts beyond 2024 are derived from the persisting effects (CPAS) of 2024 EE programs in the form of net ratepayer bill savings



ComEd CY2024 Labor Income and Industry Output Impacts (2024-2048)

- There's no anticipated changes to the current methodology for CY2026 economic NEI analysis. However, Guidehouse will conduct a review of the IMPLAN inputs to develop new multipliers for CY2026 analysis.

Societal NEI: Methodology

Ongoing research marked with a green star

1. Portfolio-Level Annual Saving (ComEd CPAS)
2. Avoided Emissions and geneRation Tool (**AVERT**)
   - Emissions avoided from electric savings
   - Adjusted past 5 years
     - CY2026 Forecast Research
3. Co-Benefits Risk Assessment (**COBRA**)
   - Health Impacts Screening & Mapping Tool
   - Adjusted AVERT Output
   - Updated **COBRA** Model
4. Apply Discount Rate to Program Year
   - IL TRM v 14 Update to discount rates

Emission Forecast and AVERT Model

Societal NEI

- Guidehouse used PJM data to run production cost modeling at individual generator level through 2050, using 5-year intervals and interpolates the annual emission trends as AVERT adjustment factors, to account for the impact on marginal generation and emissions rates.

- The adjusted AVERT model output was designed for a 25-year lifetime of savings. Adjusted AVERT model are used as input to COBRA modeling.

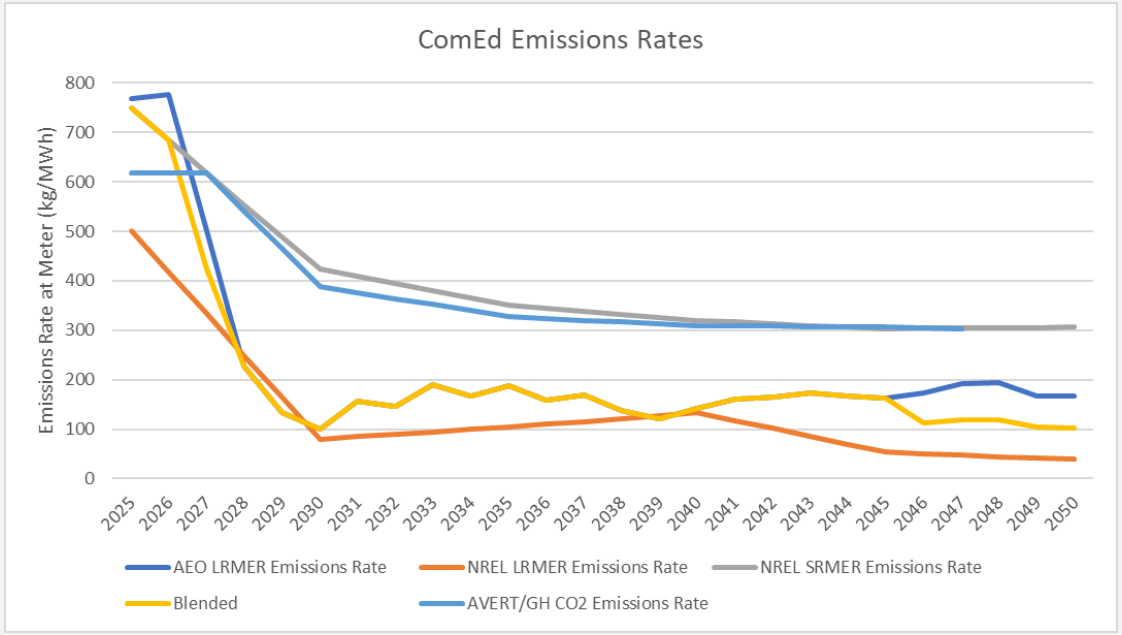
- CY2024 programs had some measures with 30-year effective useful life, which triggered the analytics team to use 2040-2050 emission trends to extrapolate emission rates up to 2053.

- For CY2025-26, more measures could have 30-50 years EUL, which warrants additional forecast research.

Emission Forecast Adjustment

CY2026 Forecast Research

- In 2024, Guidehouse reviewed the NEI Working Group proposed NREL Cambium Model and DOE's Annual Energy Outlook (AEO) emission profiles against EPA's AVERT Model for future grid changes.
- We adjusted AVERT forecast after 5 years through 2030, using recent emission rates. The adjusted model closely represented NREL SRMER forecast but did not compensate for long-range emissions forecast.
- We recommended "**Blended**" model. It's the combination of AEO and NREL SRMER & LRMER rates. Blended model is then applied to Guidehouse AVERT's model to better adjust for long-term forecasting.



Updated Real Discount Rate for CY2026-2029

Societal NEI

Program Year	Nominal Discount Rate	Real Discount Rate	Inflation Rate
2026-2029	4.33%	2.0% (EPA's Social Cost of Carbon Report)	2.28% (US EIA/AEO Inflation Forecast)
2022-2025	2.40%	0.42% (10yr Treasury Bond Rates)	1.98%

Source: IL TRM v14 (vol 1)

- IL TRM updated inflation rate and real discount rate that will apply for CY2026
- To study the effect of moving the real discount rate to 2.0%, Guidehouse ran 2024-2053 simulation in COBRA using a 4.33% nominal discount rate, which is based on the 2.0% real discount rate and the 2.28% inflation
- Results are presented after the COBRA modeling updates section

Guidehouse

Updated COBRA Model

COBRA v4.1

EPA COBRA v4.1 estimates the number of health incidents avoided and the corresponding economic (monetary) 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

COBRA Revision History - https://www.epa.gov/cobra/cobra-revision-history
Updated $PM_{2.5}$ Health Impact Model Functions - https://www.epa.gov/system/files/documents/2024-02/naaqs_pm_reconsideration_ria_final.pdf

2024 COBRA Model Changes

Comparing EPA COBRA Model v4.1 to COBRA Model v5.1

Inclusion of Health Impacts of O_3 Formation

Added health impacts of O_3 Formation because of changes in NO_X and VOC emissions.

Revised Health Impact from $PM_{2.5}$

Revised existing annual standard to provide increased public health protection. Updated $PM_{2.5}$ health impact model to use new health impact functions.

Additional Health Impact Updates

Added health impact from hospital admissions for Alzheimer's disease and Parkinson's Disease, incidence of stroke and lung cancer, asthma onset, and incidence of hay fever/rhinitis.

COBRA Revision History - https://www.epa.gov/cobra/cobra-revision-history
Updated $PM_{2.5}$ Health Impact Model Functions - https://www.epa.gov/system/files/documents/2024-02/naaqs_pm_reconsideration_ria_final.pdf

COBRA Modeling Results - ComEd

ComEd Societal NEI Estimates								
Sector	0.42% RDR, COBRA v4.1, Unblended AVERT		0.42% RDR, COBRA v5.1, Unblended AVERT		2% RDR, COBRA v5.1, Unblended AVERT		2% RDR, COBRA v5.1, Blended AVERT	
	Lifetime Health Benefits	Lifetime Health Benefits per kWh	Lifetime Health Benefits	Lifetime Health Benefits per kWh	Lifetime Health Benefits	Lifetime Health Benefits per kWh	Lifetime Health Benefits	Lifetime Health Benefits per kWh
Business	$ 256,417,468	$ 0.0310	$ 622,136,378	$ 0.0649	$ 536,462,744	$ 0.0561	$ 266,294,876	$ 0.0278
Residential + IE	$ 181,766,610	$ 0.0317	$ 604,797,391	$ 0.0645	$ 525,453,216	$ 0.0569	$ 277,318,956	$ 0.0296
Voltage Optimization	$ 31,330,740	$ 0.0303	$ 95,542,419	$ 0.0637	$ 81,793,793	$ 0.0546	$ 38,675,780	$ 0.0258
Total Lifetime Health Benefits	**$ 469,514,818**	**$ 0.0311**	**$ 1,322,476,188**	**$ 0.0646**	**$ 1,143,709,753**	**$ 0.0559**	**$ 582,289,611**	**$ 0.0285**

We analyzed the ComEd data under four scenarios

- Table 1 - Original AVERT with old COBRA 4.1, 0.42% Real Discount Rate. The resulted health benefit is 0.0311 $/kWh
- Table 2 - Original AVERT with new COBRA 5.1, 0.42% Real Discount Rate. The benefit is 0.0646 $/kWh
- Table 3 - Original AVERT with new COBRA 5.1, 2% Real Discount Rate. The benefit is 0.0559 $/kWh
- Table 4 - Blended AVERT with new COBRA 5.1, 2% Real Discount Rate. The benefit is 0.0285 $/kWh

COBRA Modeling Results - ComEd

- Under the same 0.42% real discount rate, CY2024 COBRA 5.1 modeling results in significantly more savings per kWh due to the additional health impacts compared to CY2023 analysis from COBRA 4.1.
- The CY2024 unblended AVERT results using 2% RDR with COBRA v5.1 produces only 13.5% less than the 0.42% RDR results. For gas utilities (see next slides), there's an average of 15.5% decrease when switching to the 2% RDR, which is not far off from the ComEd results without blended adjustment (note the gas utilities don't use AVERT).
- However, with the blended adjusted AVERT Model and updated 2% real discount rate with COBRA v5.1, CY2026 results could be calibrated back to similar levels as CY2023.
- Blended AVERT adjustment for ComEd has significantly reduced future savings starting in 2027. On average, blended adjustment discounted savings by 48.6% when compared to the unblended AVERT model.
- Blended AVERT adjustment assume future estimation of more electricity being generated aside from fossil fuel generations (e.g. renewables), resulting in significantly decreased emission, which lead to less health savings per kWh.

Gas Utility Benefits Forecast

- The blended AVERT adjustment factor was specific to electric utilities (ComEd). Such adjustment do not need to be applied to gas utilities
- COBRA modeling changes would still apply to gas utilities, resulting in significantly more health benefits
- Guidehouse ran 3 different gas health benefit models based on CY2022 and CY2023 data to show impact of COBRA modeling and real discount rate changes:
  - First model is based on CY2022 data with 0.42% discount rate and the original COBRA v4.1
  - Second model based on CY2023 data with 0.42% discount rate but updated COBRA v5.1
  - Third model based on CY2023 data with updated 2% discount rate and COBRA v5.1
- Note that for gas utilities, an average of 15.5% decrease when switching to the 2% RDR, which is not far off from the ComEd results (13.5%) without blended adjustment.

COBRA Modeling Results – Nicor Gas

COBRA modeling changes resulted in significantly more health benefits in 2024 ($0.71/therm) compared to $0.16/therm from previous years.

Nicor Gas Societal NEI Estimates						
Sector	0.42% RDR, COBRA v4.1		0.42% RDR, COBRA v5.1		2% RDR, COBRA v5.1	
	Lifetime Health Benefits	Lifetime Health Benefits per therm	Lifetime Health Benefits	Lifetime Health Benefits per therm	Lifetime Health Benefits	Lifetime Health Benefits per therm
Business	$ 10,268,983	$ 0.1676	$ 57,387,697	$ 0.7281	$ 48,646,115	$ 0.6172
Residential + IE	$ 15,461,480	$ 0.1581	$ 89,056,934	$ 0.7011	$ 74,215,706	$ 0.5843
Total Lifetime Health Benefits	**$ 25,730,463**	**$ 0.1618**	**$ 146,444,631**	**$ 0.7114**	**$ 122,861,821**	**$ 0.5968**

COBRA Modeling Results – PGL & NSG

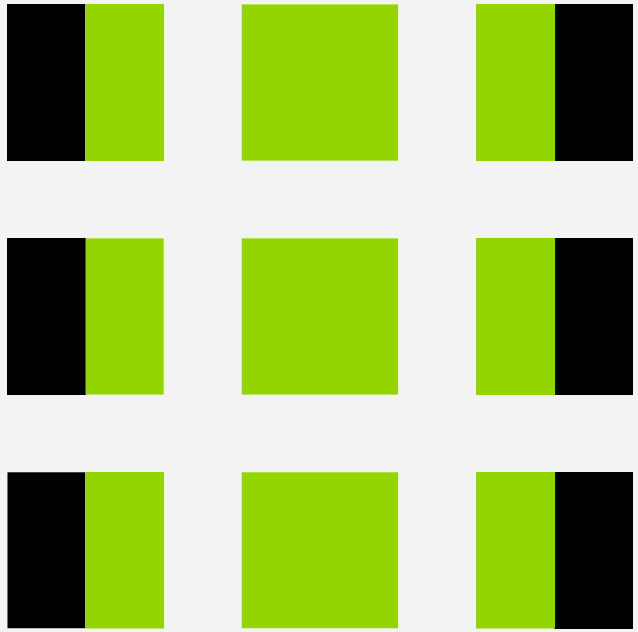
COBRA modeling changes resulted in significantly more health benefits in 2024 ($0.72/therm) compared to $0.20/therm from previous years.

NSG Societal NEI Estimates						
Sector	0.42% RDR, COBRA v4.1		0.42% RDR, COBRA v5.1		2% RDR, COBRA v5.1	
	Lifetime Health Benefits	Lifetime Health Benefits per therm	Lifetime Health Benefits	Lifetime Health Benefits per therm	Lifetime Health Benefits	Lifetime Health Benefits per therm
Business	$ 1,759,151	$ 0.1986	$ 6,073,029	$ 0.7244	$ 5,295,369	$ 0.6317
Residential + IE	$ 1,039,553	$ 0.1940	$ 10,003,590	$ 0.7192	$ 8,226,258	$ 0.5914
Total Lifetime Health Benefits	**$ 2,798,704**	**$ 0.1968**	**$ 16,076,620**	**$ 0.7212**	**$ 13,521,628**	**$ 0.6066**

PGL Societal NEI Estimates						
Sector	0.42% RDR, COBRA v4.1		0.42% RDR, COBRA v5.1		2% RDR, COBRA v5.1	
	Lifetime Health Benefits	Lifetime Health Benefits per therm	Lifetime Health Benefits	Lifetime Health Benefits per therm	Lifetime Health Benefits	Lifetime Health Benefits per therm
Business	$ 9,122,389	$ 0.2050	$ 32,048,955	$ 0.7278	$ 28,110,958	$ 0.6384
Residential + IE	$ 9,597,989	$ 0.2002	$ 38,981,293	$ 0.7215	$ 32,534,584	$ 0.6022
Total Lifetime Health Benefits	**$ 18,720,379**	**$ 0.2025**	**$ 71,030,249**	**$ 0.7244**	**$ 60,645,542**	**$ 0.6185**

Guidehouse

Thank You



outwit complexity™