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|  | ComEd Non-Energy Impacts CY2021 Evaluation Research Plan | | | |
|  | Prepared for:  ComEd Energy Efficiency Program  DRAFT  April 15, 2021 | | | |
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# Introduction

Guidehouse’s non-energy impacts (NEIs) research plan to quantify and monetize NEIs describes ongoing research and new and optional research that will occur in CY2021. This plan contains research for both Income Eligible programs and Non-Income Eligible programs. Our research activities are based on the 2017 Stipulation, Future Energy Jobs Act (FEJA) legislation, and we coordinated these activities with the Opinion Dynamics (ODC) evaluation team for Ameren Illinois.

ComEd and the Illinois Energy Efficiency Stakeholder Advisory Group (SAG) are primarily interested in researching NEIs associated with ComEd’s Income Eligible programs, since substantial NEIs are typically associated with these programs. This decision is based on the *Commonwealth Edison Company 2018 – 2021 Energy Efficiency and Demand Response Plan Settlement Stipulation:*[[1]](#footnote-2)

*“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.”*

FEJA legislation broadly recognizes there may be NEIs associated with all energy efficiency programs, not only income eligible. FEJA states:[[2]](#footnote-3)

*“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…”*

This plan also includes NEI quantifying activities with selected Business and Residential programs. ODC, the evaluation team for Ameren Illinois, is conducting similar research.

## Overall Research Goals

The Illinois Technical Reference Manual (IL TRM) currently includes NEIs related to the avoided use of water[[3]](#footnote-4) and a deemed operations and maintenance cost adjustment calculation.[[4]](#footnote-5) ComEd’s total resource cost tests (TRCs) consider avoided water consumption and CO2 emissions, and beginning in Plan 6, societal NEIs.

The CY2021 NEI research efforts are either ongoing (a continuation from CY2020) or new and optional (proposed research to occur in CY2021 if approved). The key objectives of this research include:

* **Quantify NEIs associated with Income Eligible and Non-Income Eligible programs**
  + Estimate societal NEIs at the program level for all programs (ongoing)
  + Estimate economic NEIs at the portfolio level (ongoing)
  + Estimate participant NEIs at the program level for five Income Eligible programs[[5]](#footnote-6) (ongoing)
  + Estimate participant NEIs at the program level for selected Business and Residential programs (new and optional for CY2021)
* **Monetize NEIs associated with Income Eligible and Non-Income Eligible programs as proposed updates to the IL TRM**
  + Monetize societal NEIs for inclusion in TRC calculations (ongoing)
  + Monetize participant NEIs for five Income Eligible program (ongoing)
  + Monetize participant NEIs for selected Business and Residential programs (new and optional for CY2021)

## Research Questions

This research will seek to answer the following questions:

Ongoing Research

* What is the best way to quantify the NEI (i.e., at the measure, program, or portfolio level)?
* What are the economic NEIs? Specifically, how will the job market respond to decreased electricity generation? How many jobs will be created or lost?What observable changes in labor income and economic output will be associated with decreased electricity generation?
* What are the societal NEIs? How many deaths, hospital admissions, non-fatal heart attacks, and cases of acute bronchitis will be avoided due to reduced air emissions from fossil fuel generated electricity? How much work loss will be avoided? What is the dollar value of associated costs avoided by society?
* Which participant NEIs are associated with the five Income Eligible programs that install weatherization and HVAC energy improvements? Do household members experience benefits associated with reduced symptoms from asthma, arthritis, and thermal stress? Benefits could include reductions in medical visits, fewer missed days of school or work, and financial benefits.

New and Optional Research

* Which participant NEIs are associated with selected Business programs?

This research will provide value to ComEd and its customers by identifying, quantifying, and monetizing NEIs to include in ComEd’s programs’ TRC tests. In addition, our research results will allow ComEd to better represent the impacts of energy efficiency programs in outreach efforts.

Guidehouse will publish the final reports from this research on the Illinois SAG website, and, where applicable, propose content for the next iteration of the Illinois Energy Efficiency Policy Manual.

# Societal NEIs

Guidehouse will use the US Environmental Protection Agency’s (EPA’s) CO-Benefits Risk Assessment (COBRA) and AVoided Emissions and geneRation Tool (AVERT) models to quantify the effects of avoided emissions and monetize the health benefits of ComEd’s CY2021 programs. Guidehouse will use energy efficiency program evaluation megawatt (MW) and megawatt-hour (MWh) savings results as inputs for AVERT. AVERT produces an estimate of PM2.5, SO2, NOX, and CO2 avoided emissions within a given region. For ComEd, that region is the Mid-Atlantic Region, which corresponds with the PJM regional transmission organization.

The avoided emissions estimates will be adjusted for generation mix and input to the COBRA tool, which calculates the changes in ambient particulate matter in the region. Then, COBRA calculates the societal avoided cost of chronic and acute bronchitis, non-fatal heart attacks, respiratory or cardiovascular hospital admissions, work loss days, and other impacts associated with improved ambient particulate matter.

Guidehouse chose the AVERT and COBRA tools for the following reasons:

* These tools were built by a trusted source (e.g., EPA)
* These tools are commonly used in state energy efficiency and renewable energy analyses
* The monetized impacts align with other impacts calculated at the participant level of this study

Guidehouse will use AVERT and COBRA to monetize health impacts from reduced emissions in the following categories:

* Avoided death
* Hospital admissions
* Non-fatal heart attacks
* Acute bronchitis
* Upper and lower respiratory symptoms
* Emergency room visits
* Minor restricted activities
* Work loss
* Asthma exacerbation

Guidehouse will conduct the following core analysis tasks to quantify societal NEIs:

Table . Core Analysis Tasks – Societal Non-Energy Impacts

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Task | Timeline | Notes |
| Research | Collect Cumulative Persisting Annual Savings from ComEd | April 2021–May 2021 | Collection of lifetime savings for ComEd |
| Research | Conduct AVERT Analysis | May 2021–August 2022 | Estimation of emissions reductions associated with energy efficiency programs |
| Research | Conduct COBRA Analysis | May 2021–August 2021 | Estimation of health benefits associated with energy efficiency programs |
| Research | Verification | August 2021–September 2021 | Verification of Societal Non-Energy Impact estimates provided to ComEd |

Table 2 provides the schedule for key deliverables and data transfer activities. Adjustments will be made as needed as evaluation activities progress.

Table . Schedule – Key Deadlines – Societal Non-Energy Impacts

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Draft Report to ComEd and SAG | Evaluation | August 20, 2021 |
| Comments on Draft | ComEd and SAG | September 13, 2021 |
| Revised Draft | Evaluation | October 4, 2021 |
| Comments on Revised Draft | ComEd and SAG | October 11, 2021 |
| Final Report to ComEd and SAG | Evaluation | October 18, 2021 |

# Economic NEIs

During 2018 and 2019, Guidehouse collaborated with ODC and developed a methodology using IMPLAN, which was approved by the Illinois SAG. The economic analysis estimates impacts such as jobs created by ComEd’s energy efficiency programs. Guidehouse will use IMPLAN model results and the CY2021 Evaluation of ComEd’s TRC test to estimate CY2021 economic impacts.

Table . Core Analysis Tasks – Economic Non-Energy Impacts

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Task | Timeline | Notes |
| Research | Estimate CY2021 economic NEIs | May 2022–October 2022 | Research is contingent on timing of IMPLAN model results and CY2021 evaluation of ComEd’s Total Resource Cost Test |

Table 4 provides the schedule for key deliverables and data transfer activities. Adjustments will be made as needed as evaluation activities progress.

Table . Schedule – Key Deadlines – Economic Non-Energy Impacts

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Final CY2021 Evaluation of ComEd’s Total Resource Cost Test Report | Evaluation | June 30, 2022 |
| Draft CY2021 Economic Analysis Report to ComEd and SAG | Evaluation | July 29, 2022 |
| Comments on Draft | ComEd and SAG | August 19, 2022 |
| Revised Draft | Evaluation | September 19, 2022 |
| Comments on Revised Draft | ComEd and SAG | September 26, 2022 |
| Final CY2021 Economic Analysis Report to ComEd and SAG | Evaluation | October 3, 2022 |

# Participant NEIs Associated with Five Income Eligible Programs

In 2021, Guidehouse is conducting research to estimate NEIs associated with five Income Eligible programs:

* Multi-Family Retrofits
* Multi-Family Retrofits - IHWAP
* Public Housing Retrofits
* Single Family Retrofits
* Single Family Retrofits - IHWAP

This participant NEI research includes participant surveys and building owner and manager interviews.

## Participant Surveys

Guidehouse will conduct online and telephone surveys with residents living in multi-family units or single-family homes that received upgrades from the Income Eligible programs. Activities include:

* Developing appropriate survey instruments and scripts
* Using a third-party contractor to conduct the telephone surveys
* Using an in-house platform for the online surveys
* Distributing leave behind cards with survey links to multi-family building tenants and single-family homeowners
* Providing weekly updates to ComEd regarding survey completes and progress toward quotas to achieve statistical significance
* Conducting analysis
* Presenting early findings at the SAG NEI Working Group meeting in September 2021
* Providing 12-month research results to ComEd

Guidehouse began collecting survey responses starting in March 2021 and then request the same respondent to take the survey again 12 months later to quantify NEIs including:

* Reduced medical visits due to reduced symptoms of asthma and arthritis
* Reduced medical visits due to thermal stress
* Reduced missed days of school
* Reduced missed days of work

This participant NEI research will answer the following key questions:

1. What are the impacts of ComEd’s Energy Efficiency Programs on household members’ physical health?
   1. *Other than a routine visit, has anyone in your household had to see a doctor, visit an emergency room, or be admitted to a hospital in the past 12 months for symptoms related to asthma?*
   2. *Other than a routine visit, has anyone in your household had to see a doctor, visit an emergency room, or be admitted to a hospital in the past 12 months for symptoms related to arthritis?*
2. What are the impacts of ComEd’s Energy Efficiency Programs on household financial health?
   1. *In the past year, how often was paying medical bills including health insurance, prescriptions, and others a struggle?*
   2. *In the past year, have you used any loans to assist with paying your energy bill?*
3. What are the impacts of ComEd’s Energy Efficiency Programs on household members’ comfort?
   1. *Which of the following statements best describes the indoor temperature of your apartment during the winter or summer?*

## Multi-Family Building Owner and Property Manager Interviews

Guidehouse is developing an interview guide to quantify NEIs associated with Income Eligible program participation for multi-family building owners and property managers participating in the Multi-Family Retrofits and Multi-Family IHWAP program components.

Guidehouse will conduct telephone interviews with building owners and property managers for multi-family properties that received weatherization and HVAC upgrades from the above programs. Guidehouse will use a census approach to interview all participating building owners and managers. Activities include:

* Developing an appropriate interview guide
* Communicating monthly with implementers to track upcoming projects
* Collecting building owner and property manager contact information from implementers at least 1 week before their weatherization and HVAC upgrades
* Using Guidehouse employees to conduct the telephone interviews
* Providing monthly updates to ComEd regarding interview completes and progress
* Conducting analysis
* Presenting early findings at the SAG NEI Working Group meeting in September 2021
* Providing 12-month research results to ComEd

Guidehouse will interview multi-family building owners and property managers at the time of participation and 12 months later to quantify:

* Reduced equipment maintenance
* Increased building resilience to extreme weather events
* Reduced tenant thermal comfort complaints

The CY2021 multi-family building owners and managers NEI research will answer the following key research question:

1. What are the impacts of ComEd’s Energy Efficiency programs on building owners and property owners?
   1. *During the last 12 months, approximately how much was spent on preventive maintenance or maintenance cost due to HVAC equipment failure on this property?*
   2. *During the last 12 months, approximately how much was spent responding to tenant thermal comfort complaints?*

Table . Core Data Collection Activities, Sample, and Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2021 | Timeline | Notes |
| Participant NEI Survey | Participants of Income Eligible programs with weatherization and HVAC incentives | Census until quotas achieved | Mar 2021–TBD | Income Eligible Single-Family, Multi-Family, and Public Housing Retrofit programs starting in March 2021, and second survey effort starting in March 2022 until quotas for statistical significance are reached |
| Multi-Family Building Owner and Property Manager NEI Interviews | Participants of the Multi-Family Retrofits and Multi-Family IHWAP Program Components | Census | May 2021–TBD | Real-time interviews throughout the calendar year and 12 months following first interview |

Participant NEI data collection started in March 2021 and will continue for 12 months or until we hit our quotas (as Table 6 notes) for health complications known to be impacted by weatherization and HVAC home improvements.

Table . Participant Research Quotas

|  |  |
| --- | --- |
| Health Impact | Quota |
| Asthma | 80 incidences |
| Thermal stress – heat | 80 incidences |
| Thermal stress – cold | 80 incidences |
| Arthritis | 80 incidences |

Table 7 provides the schedule for key deliverables and data transfer activities. Adjustments will be made as needed as evaluation activities progress.

Table . Schedule – Key Deadlines – Participant Non-Energy Impacts with Income Eligible Programs

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Participant NEI Survey results – weekly update during ComEd Residential and Income Eligible check-in call | Evaluation | Weekly |
| Participant NEI Survey Preliminary Results to SAG NEI Working Group | Evaluation | September 2021 |
| Multi-Family NEI Building Owner/Manager Interviews – Early Findings | Evaluation | December 2021 |
| Participant NEI Survey Final Results to SAG NEI Working Group | Evaluation | TBD |
| Multi-Family NEI Building Owner/Manager Interviews – Final Results | Evaluation | TBD |

# Participant NEIs Associated with Selected Business Programs (New and Optional for CY2021)

In 2021, Guidehouse proposes research to provide a proof of concept of NEIs associated with four Business programs:[[6]](#footnote-7)

* Custom
* Standard
* Instant Discounts
* Small Business

As a first step toward developing a thorough set of NEIs, Guidehouse will conduct the research activities described in the following section to provide a proof of concept for a possible larger study that would produce more thorough, statistically valid, and reliable NEI estimates.

## Business Program Surveys

The goal of this research is estimate NEIs resulting from several ComEd Business programs. In addition to the monetized NEIs, ComEd can incorporate information about NEIs in marketing collateral to improve the value proposition of investment in energy efficiency technologies and so increase participation. Specific research objectives include:

* Estimating NEIs associated with operational and production changes based on in-depth interviews with program participants
* Preparing industry-specific case studies that can be used by ComEd in their program marketing and outreach efforts

Guidehouse will conduct online and telephone surveys with participants in the four listed Business programs. Research activities include:

* Developing appropriate survey instruments and scripts
* Using a third-party contractor to conduct the telephone surveys
* Using an in-house platform for the online surveys
* Developing appropriate samples to maintain quotas and avoid survey fatigue across evaluation activities
* Surveying participants in 2021 and conducting follow up surveys with the same respondents in 2022
* Presenting early findings at a SAG NEI Working Group meeting in 2022
* Providing 12-month research results to ComEd

The CY2021 business NEI research will answer the following key research question:

1. How has participating in ComEd’s Energy Efficiency program impacted the operation of your facilities and business?
   1. *During the last 12 months, approximately how much was spent on preventive maintenance or maintenance cost due to HVAC equipment failure on this property?*

Table 8 summarizes the evaluation tasks for CY2021 including data collection methods, data sources, timing, and targeted sizes that will be used to answer the evaluation research questions.

Table . Core Data Collection Activities, Sample, and Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2021 | Timeline | Notes |
| Business Program Surveys | Participants of business Energy Efficiency programs | Census | May–Dec 2021 | Custom, Standard, Instant Discounts, Small Business |

Table 9 provides the schedule for key deliverables and data transfer activities. Adjustments will be made as needed as evaluation activities progress.

Table . Schedule – Key Deadlines – Participant Non-Energy Impacts from Business Programs

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Business Program NEI Survey Results – Early Findings | Evaluation | December 2021 |

1. Page 7: http://ilsagfiles.org/SAG\_files/Landing\_Page/ComEd\_EE\_Plan\_5\_Stipulation\_Final.pdf [↑](#footnote-ref-2)
2. Page 33: http://www.ilga.gov/legislation/publicacts/99/PDF/099-0906.pdf [↑](#footnote-ref-3)
3. Illinois TRM v 9.0 Section 1.4 <https://www.ilsag.info/technical-reference-manual/il-trm-version-9/>

   “To support cost-effectiveness calculations, parameter values are also included for:

   • Incremental costs ($)

   • Measure life (years)

   • Operation and maintenance costs ($)

   • Water (gal) and other resource savings where appropriate.” [↑](#footnote-ref-4)
4. Illinois TRM v 9.0 Section 3.10 <https://www.ilsag.info/technical-reference-manual/il-trm-version-9/>

   “Some measures specify an operations and maintenance (O&M) parameter that describes the incremental O&M cost savings that can be expected over the measure’s lifetime. For most measures the TRM does not specify the NPV of the O&M costs. Instead, the necessary information required to calculate the NPV is included. An example is provided below:

   Given this information, the incremental O&M costs can be determined by discounting the cash flows in the Baseline Case and the Efficient Case separately using the real discount rate.

   For a select few measures that include baseline shifts that result in multiple component costs and lifetimes over the lifetime of the measure, this standard method cannot be used. In only these cases, the O&M costs are presented both as Annual Levelized equivalent cost (i.e., the annual payment that results in an equivalent NPV to the actual stream of O&M costs) and as NPVs using a real societal discount rate of 0.42%.

   When discounting nominal data that was adjusted to nominal from original real data using an inflation rate that is different than the IL-TRM inflation rate value, the analyst should first adjust for inflation using the original (non-IL-TRM) value to convert the data back to the appropriate year’s real dollars and then use the real discount rate as specified in the IL-TRM.” [↑](#footnote-ref-5)
5. Multi-Family Retrofits, Multi-Family IHWAP, Public Housing Retrofits, Single Family Retrofits, Single Family IHWAP. [↑](#footnote-ref-6)
6. Guidehouse presented a plan to conduct non-income eligible research to the Non-Energy Impact SAG Working Group in December 2020. [↑](#footnote-ref-7)