ComEd CY2018-2021 Evaluation Plan

DRAFT

Presented to

Commonwealth Edison Company

**January 5, 2018**

[www.navigant.com](http://www.navigant.com)

**Submitted to:**

ComEd

Three Lincoln Centre

Oakbrook Terrace, IL 60181

**Submitted by:**

Navigant

150 N. Riverside, Suite 2100

Chicago, IL 60606

**Contact:**

|  |  |
| --- | --- |
| Randy Gunn, Managing Director  312.583.5714  [Randy.Gunn@Navigant.Com](mailto:randy.gunn@navigant.com) | Jeff Erickson, Director  608.497.2322  [Jeff.Erickson@Navigant.Com](mailto:jeff.erickson@navigant.com) |

Disclaimer: This report was prepared by Navigant Consulting, Inc. (“Navigant”) for ComEd based upon information provided by ComEd and from other sources. Use of this report by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the report’s contents. Neither Navigant nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

Table of Contents

[1. Introduction 1](#_Toc502933907)

[2. Cost-Effectiveness Research 3](#_Toc502933908)

[3. Cross-Cutting Research 8](#_Toc502933909)

[Exploring Savings 9](#_Toc502933910)

[Markets and Innovation 10](#_Toc502933911)

[Process and Customer Engagement 11](#_Toc502933912)

[Coordinating Future Evaluation Research 11](#_Toc502933913)

[Active and Future Evaluation Research 13](#_Toc502933914)

[4. Evaluating Pilot Programs 17](#_Toc502933915)

[Appendix A. C&I Programs Evaluation Plans 18](#_Toc502933916)

[ComEd AirCare Plus Program CY2018 to CY2021 Evaluation Plan 18](#_Toc502933917)

[ComEd Business Energy Analyzer Program CY2018 to CY2021 Evaluation Plan 24](#_Toc502933918)

[ComEd CHP Program CY2018 to CY2021 Evaluation Plan 28](#_Toc502933919)

[ComEd Custom Program CY2018 to CY2021 Evaluation Plan 36](#_Toc502933920)

[ComEd Data Centers Program CY2018 to CY2021 Evaluation Plan 46](#_Toc502933921)

[ComEd Industrial Systems Program CY2018 to CY2021 Evaluation Plan 56](#_Toc502933922)

[ComEd Instant Discount Program CY2018 to CY2021 Evaluation Plan 66](#_Toc502933923)

[ComEd LED Street Lighting Program CY2018 to CY2021 Evaluation Plan 76](#_Toc502933924)

[ComEd, Nicor Gas and Peoples Gas and North Shore Gas Retro-Commissioning Program CY2018 to CY2021 Evaluation Plan 81](#_Toc502933925)

[ComEd Non-Residential New Construction Program CY2018 to CY2021 Evaluation Plan 90](#_Toc502933926)

[ComEd Operational Efficiency Program CY2018 to CY2021 Evaluation Plan 97](#_Toc502933927)

[ComEd Public Housing Program CY2018 to CY2021 Evaluation Plan 101](#_Toc502933928)

[ComEd Rural Small Business Kits Program CY2018 to CY2021 Evaluation Plan 107](#_Toc502933929)

[ComEd Small Business Energy Savings Program CY2018 to CY2021 Evaluation Plan 112](#_Toc502933930)

[ComEd Small Business Monitoring-Based Commissioning Program CY2018 to CY2021 Evaluation Plan 119](#_Toc502933931)

[ComEd Standard Program CY2018 to CY2021 Evaluation Plan 124](#_Toc502933932)

[ComEd Strategic Energy Management Program CY2018 to CY2021 Evaluation Plan 131](#_Toc502933933)

[ComEd Voltage Optimization Program CY2018 to CY2021 Evaluation Plan 137](#_Toc502933934)

[Appendix B. Income Eligible Programs Evaluation Plans 142](#_Toc502933935)

[ComEd Affordable Housing New Construction Program CY2018 to CY2021 Evaluation Plan 142](#_Toc502933936)

[ComEd Food Bank LED Distribution Program CY2018 to CY2021 Evaluation Plan 146](#_Toc502933937)

[ComEd Income Eligible Lighting Discounts Program CY2018 to CY2021 Evaluation Plan 151](#_Toc502933938)

[ComEd Income-Eligible Multi-Family Retrofit Program CY2018 to CY2021 Evaluation Plan 156](#_Toc502933939)

[ComEd Income-Eligible Single-Family Retrofit Program CY2018 to CY2021 Evaluation Plan 160](#_Toc502933940)

[ComEd UIC ERC – Low Income Kit Program CY2018 to CY2021 Evaluation Plan 164](#_Toc502933941)

[Appendix C. Residential Programs Evaluation Plans 168](#_Toc502933942)

[ComEd Appliance Rebates Program CY2018 to CY2021 Evaluation Plan 168](#_Toc502933943)

[ComEd Elementary Energy Education Program CY2018 to CY2021 Evaluation Plan 173](#_Toc502933944)

[ComEd Fridge and Freezer Recycling Program CY2018 to CY2021 Evaluation Plan 178](#_Toc502933945)

[ComEd Home Energy Assessment Program CY2018 to CY2021 Evaluation Plan 185](#_Toc502933946)

[ComEd Home Energy Report (Opower) Program CY2018 to CY2021 Evaluation Plan 190](#_Toc502933947)

[ComEd HVAC Rebates Program CY2018 to CY2021 Evaluation Plan 195](#_Toc502933948)

[ComEd Lighting Discounts Program CY2018 to CY2021 Evaluation Plan 200](#_Toc502933949)

[ComEd Multi-Family Market Rate Program CY2018 to CY2021 Evaluation Plan 207](#_Toc502933950)

[ComEd NTC Middle School Kits Program CY2018 to CY2021 Evaluation Plan 213](#_Toc502933951)

[ComEd and Nicor Gas Residential New Construction Program CY2018 to CY2021 Evaluation Plan 218](#_Toc502933952)

[ComEd Weatherization Rebates Program CY2018 to CY2021 Evaluation Plan 223](#_Toc502933953)

1. Introduction

This document presents Navigant’s approach for conducting evaluation research for ComEd over the four-year period from 2018 to 2021. This document includes evaluation, measurement and verification (EM&V) plans for evaluating ComEd’s energy efficiency programs for program years 2018 through 2021 also known as the Energy Efficiency Plan 2018-2021 (EEP 2018-2021) plus a discussion of cross-cutting evaluation research.

Navigant proactively addresses evaluation research according to the Future Energy Jobs Act (FEJA, Public Act 99-0906) and ComEd’s 2018-2021 Energy Efficiency and Demand Response Plan (ComEd Plan 5) while continuing to collaborate with Illinois Stakeholder Advisory Group (IL SAG) and Illinois Commerce Commission (ICC) staff and contribute to the ongoing continuous improvement of the Illinois Technical Reference Manual (IL TRM). As the ComEd energy efficiency and demand response (DR) portfolio has evolved with Plan 5, so too will the methods and approaches for ComEd’s evaluation and evaluation research.

Several elements of FEJA drive the need for increased and changed evaluation research, as described below.

**Focus on CPAS.** Under the Future Energy Jobs Act, ComEd’s annual energy savings goals will be based on CPAS. As indicated in ComEd Plan 5, “the CPAS methodology is a new concept for energy efficiency in Illinois, and emphasizes a shift to valuing the lifetime savings of the measure versus only the first-year savings, which was the focus of the prior energy efficiency framework.”[[1]](#footnote-1) In the short term, one focus of evaluation research is to enable effective evaluation of CPAS. Key evaluation research initiatives include estimating measure effective useful life (EUL) and measure persistence, both of which are required to calculate CPAS. Concurrently, the team will be participating in continuous improvement efforts to update the IL TRM in conjunction with the IL SAG, such as researching and updating individual measure energy savings estimates to improve accuracy and reduce evaluation risk.

**New customer segments.** FEJA brought Income Eligible and Public Sector customers into ComEd’s portfolio for the first time. ComEd is rolling all Public Sector customers into its existing Business Programs portfolio (except for the Public Housing Authority program which is a standalone C&I program) and so we have no separate Public Sector evaluation plans. However, we do provide separate Income Eligible evaluation plans.

**New RFP Programs**. Under FEJA rules, ComEd will issue an RFP in 2018 to request new program ideas from external parties. Each of the efforts started under this process will need separate evaluation attention.

**Timeline.** FEJA changed the program year to be based on the calendar year. It specified that ComEd will deliver final program year data by January 30th each year and the evaluation reports will be finalized by April 30th each year. To meet that deadline (and to improve other aspects of the evaluation) we are separating reporting on energy impacts, which will be completed by the April 30th deadline, from reporting on process evaluation research and NTG results. NTG research will be completed by August 1 each year, so that reports can be reviewed and finalized in time for the September 1 initial evaluator NTG recommendations to SAG required by the Illinois NTG Policy. In 2020, NTG research will be completed one month earlier, by July 1, to inform development of the next EEP. Process evaluation research results will be reported as the research is completed so that it is available as soon as possible.

**Non-Energy Benefits**. Navigant will investigate a range of non-energy benefits (NEBs) for the first time for ComEd.

The remainder of this evaluation plan is organized as follows:

* Cost-Effectiveness Research – Navigant’s work will expand from the previous level of effort
* Cross-Cutting Research
* Evaluating Pilot Programs
* Appendices with individual program evaluation plans, organized by sector

1. Cost-Effectiveness Research

The primary objectives of the cost-effectiveness review are to: (1) develop a cost model reflecting Commonwealth Edison Company’s (ComEd) costs by program, (2) evaluate the assumptions provided by ComEd and included in Navigant’s cost model, (3) after agreement on the cost model and inputs, develop the Total Resource Costs (TRC) for each program, and (4) provide a report with any recommended improvements and comments on the costs and the resulting TRCs. As part of Navigant’s evaluation of ComEd energy efficiency and demand response programs, we will develop a cost model and resulting TRCs using an excel based tool and leverage Analytica for developing the final TRCs. Analytica is a tool that allows Navigant to analyze data at different levels (measure, program and portfolio) and provides greater data certainty in inputting program costs to run final TRCs.

We anticipate that the TRC assumptions review will support evaluation, measurement and verification and regulatory reporting objectives for ComEd and will also inform future ComEd planning efforts. The Navigant team will work with ComEd to ensure that the proper data is available for the modeling and evaluation. We will apply the most recent Illinois cost-effectiveness methodology and ICC rulings in reviewing the TRC test calculations.

The savings numbers and cost-benefit results included in Navigant’s report will be reflective of the Energy Efficiency Portfolio Standard (EEPS) portion of the ComEd energy efficiency and demand response programs. Any other programs determined to be included in the TRC analysis will also be included. Additionally, for programs that are jointly implemented by ComEd and one or more Illinois gas utilities (including Nicor Gas, Peoples Gas, and/or North Shore Gas), only the electric portion of the program savings and cost-benefit calculations are included here. The combined joint calculations for the joint programs will be included in a separate memo attached as an appendix to the report.

The Illinois TRC test is defined by the Illinois General Assembly as follows:

‘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 any to the contrary, the TRC test shall not include or take into account a calculation of market price suppression effects or demand reduction induced price effects.[[2]](#footnote-2)

The Illinois TRC test was modified by the Illinois General Assembly in December 2016 (for application starting in CY2018) to explicitly include a societal discount rate, avoided water and avoided operations and maintenance costs, and exclude market price suppression effects. The Illinois test makes it clear that the TRC requirement for plan approval is only at the portfolio level and excludes low income programs. Individual measures need not be cost effective. The Illinois TRC test differs from traditional TRC tests in its requirement to include a reasonable estimate of the financial costs associated with future regulations and legislation on the emissions of greenhouse gases (GHG). This difference adds an additional benefit to investments in efficiency programs that are typically included in the Societal Test in other jurisdictions.

#### Illinois TRC Equation used in the Assessment

The equation that will be used to calculate the Illinois TRC is presented below:

Equation 1 – Illinois TRC

*BCRILTRC = BILTRC / CILTRC*

Where,

**BCR*ILTRC*** = Benefit-cost ratio of the Illinois total resource cost test

**B*ILTRC***  = Present value of benefits of a Illinois program or portfolio

**C*ILTRC*** = Present value of costs of a Illinois program or portfolio

The benefits of the Illinois TRC are calculated using the following equation:

Equation 2 – IL TRC Benefits



The costs of the Illinois TRC are calculated using the following equation:

Equation 3 - IL TRC Costs



Where benefits are defined as:

UAEPt = Utility avoided electric 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

PACat = Participant avoided costs in year t for alternate fuel devices

RC = NPV of replacement costs of incandescent equivalents

And costs are defined as:

PRCt = Program Administrator program costs in year t

PICt = Program Implementation costs in year t

PEAMt = Program Evaluation, Measurement & Verification (EM&V), Advertising and Miscellaneous costs in year t

PCN = Net Participant costs

UICt = Utility increased supply costs in year t

d = Utility weighted average cost of capital, used as discount rate

The Illinois TRC test allows for utilities to claim as a benefit the net present value (NPV) of the avoided cost of purchasing incandescent bulbs that accrues to program participants because of the significantly longer lifetimes of efficient CFLs and 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 bubs, an NPV is determined by discounting the value of these avoided purchases over the course of the lifetime of the efficient bulb. The Illinois TRM provides deemed NPV values per bulb based on efficient bulb-type, socket type (commercial or residential), and lumen range. These benefits were included in the program calculations provided below.

#### UCT Equation used in the Assessment

The results of the Utility Cost Test are also presented in Section 2 of this report. The UCT (a subset of the Program Administrator Cost Test) approaches cost effectiveness from the perspective of the utility. It 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 IL 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 IL TRC equation, the UCT equation that will be used is defined as:

Equation 4 – UCT

*BCRUCT = BUCT / CUCT*

Where,

**BCR*UCT***  = Benefit-cost ratio of the Utility Cost Test

**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 the following equation:

Equation 5 – UCT Benefits



The costs of the UCT are calculated using the following equation:

Equation 6 - UCT Costs



Where the new term, *PINt*, is defined as the program incentives provided by the utility in year *t*.

#### Cost-Effectiveness Data Requirements

The data points needed to conduct the Illinois TRC test are provided in Table 1, below, and are divided into generic and program specific categories. The program specific data points are further subdivided into those that are provided by ComEd versus those that are a result of the Navigant’s evaluation activities.

**Table 1. Data points needed to conduct EEPS TRC**

|  |  |  |
| --- | --- | --- |
| Category | Data Point | Source |
| Generic | * Avoided Energy Costs ($/kWh) * Avoided Capacity Costs ($/kW-year) * Discount Rate * Escalation Rates * Line Losses * Avoided GHG Emission Costs | ComEd |
| Program Specific | * Participants / Measure Count * Verified Ex-Post Energy Savings (kWh) * Verified Ex-Post Capacity Savings (kW) * Realization Rate * Net to Gross Ratio | Navigant |
| * Measure life * Non-Incentive Costs * Utility Incentive Costs * Incremental Costs (Gross) * Incremental Costs (Net) | ComEd |

Source: Navigant analysis

Our cost model will build-up from the measure and project level, cost detail by program which will roll-up into a portfolio level cost analysis. That cost analysis will be used to run the TRCs for each program so to arrive at final program TRCs and finalize a portfolio-level TRC.

#### Evaluation Approach

This four-year evaluation plan summary identifies tasks by year on a preliminary basis for CY2018 - CY2021 (Table 2). Activities for CY2019 are subject to change based upon the demands of the portfolio and other factors, and during the program year as program circumstances are better known.

**Table 2. Four Year Evaluation Plan Summary for the Cost-Effectiveness Assessment**

|  |  |  |
| --- | --- | --- |
| Activity | CY2018 | CY2019-2021 |
| ComEd Provides Cost Data and Assumptions | ComEd | ComEd |
| Analysis of Cost Detail and Related Assumptions | Navigant Develops Cost Model | Navigant Develops Cost Model |
| Run Cost-Effectiveness Calculations Using Model | Navigant Runs TRC Calculations | Navigant Runs TRC Calculations |
| Draft Cost-Effectiveness Report | Navigant | Navigant |

#### Evaluation Schedule

Table 3 below provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as assessment and evaluation activities progress or changes in program delivery may be required.

Plan start and delivery dates will be the same in most cases for CY2018 and subsequent years, except for potential changes in the timelines and specific calendar dates in CY2019 and following years. Navigant will strive to provide timely delivery of the results outlined above, but all are contingent upon ComEd delivering timely cost detail and proper back-up assumption detail to Navigant.

**Table 3. Schedule – Key Deadlines in CY2018**

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered |
| Cost Assumptions and Detail | ComEd | May 15, 2019 (annually) \* |
| Navigant Develops Initial Cost Model | Navigant | July 1, 2019 (annually) |
| Iterative Cost and Assumptions Discussions w/ComEd | ComEd / Navigant | July-August 2019 |
| Finalize Cost Model | Navigant | August 20, 2019 (annually) |
| Navigant Develops Initial TRCs | Navigant | September 15, 2019 (annually) |
| Discussion of Initial TRCs | ComEd / Navigant | September 20, 2019 (annually) |
| Finalize TRCs | Navigant | September 30, 2019 (annually) |
| Navigant Draft TRC Report – Delivered (15 Bus Day R’vw) | Navigant | October 8, 2019 (annually) |
| Comments on Draft TRC Report due from Parties | ComEd / Navigant | October 29, 2019 (annually) |
| Navigant Redraft of TRC Report Based on Comments | Navigant | November 7, 2019 (annually) |
| Final Report to ComEd and SAG | Navigant | November 19, 2019 (annually) |

\*Note: Receipt of the initial assumption and cost data from ComEd is the initial step and without timely receipt of data and detail, the entire schedule shifts by an equal amount of time – each date will be delayed.

1. Cross-Cutting Research

Navigant will perform cross-cutting research to support improving the programs and improving the TRM. This research is geared toward three general topic areas: exploring savings, markets and innovation, and process and customer engagement. These three topic areas are designed to mirror priorities listed in the ComEd Plan 5 settlement stipulation. Figure 1 includes the evaluation research topic areas and several key evaluation research questions within each area.

**Figure 1 Evaluation Research Topic Areas**

*Source: Navigant*

**Coordinating Evaluation Research**

Navigant has identified several evaluation research tasks for the 2018-2021 period, many of which are currently in planning or underway. The team plans to continuously revisit current and planned evaluation research to ensure it aligns with ComEd’s evaluation as new programs, customer segments, and technologies emerge and require attention, while not losing sight of the core goals of evaluation research. Navigant plans to work with ComEd, the IL TRM administrator, and ICC staff to develop tools and processes for quickly identifying new priorities, reviewing them alongside existing evaluation research topics, and determining a path forward that meets the evolving evaluation research objectives.

Regular communication and clear processes for launching new evaluation research and modifying ongoing study objectives midstream will ensure the team addresses current and future evaluation research objectives efficiently. The second section of this plan outlines Navigant’s communication strategy, including weekly tracker updates, monthly telephone conference calls, periodic face-to-face meetings, and continued participation in the IL SAG and the Technical Advisory Committee (TAC).

Navigant has activated several high priority evaluation research initiatives, such as identifying opportunities to leverage AMI data and assessing the accuracy of current EUL estimates in the IL TRM given the transition to CPAS goals. Additionally, the team has initiated planning for other evaluation research activities in the next year, such as NEB studies and developing load profiles to update the IL TRM. Navigant expects to conduct other evaluation research during the ComEd Plan 5 timeframe. However, many factors could affect the scope and timing of these activities; therefore, they are not described in detail in this document.

Exploring Savings

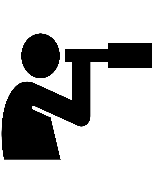
In this research topic area, key initiatives include evaluation research for EUL and measure persistence to support calculating CPAS and working with the IL SAG and the IL TRM administrator to contribute to the continuous improvement of the IL TRM. The team will conduct three types of technical research in keeping with ComEd’s commitment to evaluating energy efficiency impacts with high rigor: TRM measure research, non-TRM measure research, and cross-cutting technical research. Where applicable, the team will coordinate with ComEd’s R&D team to facilitate data sharing and avoid duplicating efforts.

|  |  |
| --- | --- |
| C:\Users\rbaron\Z Default Folders\Downloads\noun_16433.png | **TRM measure research:** Working with the IL SAG and the IL TRM administrator, Navigant will contribute to the continuous improvement of the IL TRM. The team will perform both primary and secondary research as needed, with the goal of increasing the accuracy of measure savings estimates in the TRM. The team will make research-based updates to TRM energy savings, non-electricity energy savings, EUL and persistence to inform CPAS, NEBs, and incremental costs, focusing on measures with high portfolio impact or outdated references. Navigant will use both engineering and econometric (i.e., consumption data) analyses depending on the research topic. Navigant’s impact research into advanced thermostat impacts exemplifies tasks in this research area. |
|  | **Non-TRM measure research:** Navigant will analyze measures that are not TRM-based. This will include research on behavioral measure savings and custom measure savings and evaluation approaches, such as persistence of impacts from home energy reports. |
| C:\Users\rbaron\Z Default Folders\Downloads\noun_33089 (1).png | **Cross-cutting technical research:** Navigant will investigate opportunities to conduct research that will inform multiple TRM measures and/or non-TRM measures, e.g., load shape research. |

Navigant will explore a variety of evaluation research questions in these areas, which are summarized in Figure 2.

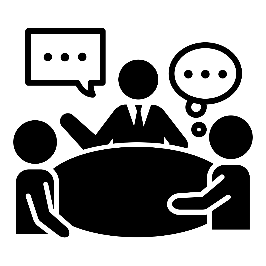
**Figure 2. Key Exploring Savings Evaluation Research Questions**

Markets and Innovation

The electric utility industry is rapidly changing and new ideas for program design, measure technology offerings, and policy are emerging. This area will include research into current utility innovations and innovations in parallel industries to illustrate how ComEd can best leverage these concepts for evaluation of the innovative market development proposed in ComEd Plan 5. Navigant’s work identifying research tasks that benefit from AMI is an example of the type of activity included in this research area. The team will monitor industry developments to identify promising opportunities for evaluation research related to emerging energy efficiency technologies, energy efficiency program delivery models, and innovative evaluation methods. Navigant will develop an evaluation framework to allow for potential impact savings estimates from R&D activities. To the extent practicable, the team will coordinate with ComEd’s R&D team to avoid duplication of efforts while still maintaining independence as ComEd’s evaluator. Figure 3 provides example evaluation research questions for this topic area.

**Figure 3. Key Markets and Innovation Evaluation Research Questions**

Process and Customer Engagement

According to ComEd Plan 5, a key component to success is education and outreach (E&O). This component has two specific goals: (1) educate and raise awareness about the value and benefits of energy efficiency among ComEd's customers, and (2) drive customers to participate in energy efficient activities to help them save money on their electric bills. Within E&O, ComEd's customer engagement process forms a basis for Navigant’s process and the customer engagement evaluation research approach. In addition, market research within cross-cutting activities forms another basis for Navigant's process and customer engagement evaluation research. The team has bucketed its proposed evaluation research activities into the same categories as in ComEd's plan: customer engagement process and market research (Attitude, Awareness & Stated Behavior Research and Program Assessment Research). The team will coordinate with ComEd’s staff to the extent they are researching similar customer engagement topics while maintaining independence as ComEd’s evaluator. Figure 4 provides example evaluation research questions for this topic area.

**Figure 4. Key Process and Customer Engagement Evaluation Research Questions**

Coordinating Future Evaluation Research

The key focus of evaluation research will always be to support the evaluation of energy savings for ComEd. However, changes in new measures and analytic tools, available technologies, and stakeholder input may shift evaluation priorities in the next four years. Navigant’s research for ComEd will adapt in this atmosphere of innovation to ensure emerging evaluation research objectives are met, while staying true to the core focus of supporting the evaluation of energy savings. The team plans to work with ComEd, IL SAG, and ICC staff to develop an evaluation framework with tools and processes for quickly identifying new energy savings opportunities, reviewing them alongside existing evaluation research topics, and determining an evaluation path forward that meets evolving priorities.

Three elements are critical to this planning strategy: the ability to quickly act on emerging opportunities that can create value for the evaluation, maintaining flexibility to shift focus to new topics and assess ideas, and consistently monitoring progress toward core high-level evaluation research goals. Regular communication and clear processes for launching new evaluation research and modifying ongoing study objectives midstream will allow the team to provide these three elements.

**Figure 5. Critical Elements to Driving Evaluation Research Innovation**

Source: Navigant

ComEd’s R&D team is focused on exploring new platforms and programs through which to engage with customers to promote energy efficiency. Many of these ideas will take the shape of pilot programs, which, as noted in ComEd Plan 5, Navigant’s evaluation team will evaluate to assess energy savings. For these pilot programs, the team will help ComEd to best structure these pilots to maximize the value of evaluation research. For example, the ComEd Plan 5 stipulation notes that pilots should use randomized control trials where practical. The Navigant research team will work with ComEd to ensure pilot offerings are structured to enable defensible evaluated savings.

Regular communication continues to be the cornerstone of Navigant’s approach to maintaining relevant evaluation research priorities with ComEd, IL SAG, and ICC staff. Figure 6 summarizes four formal communication channels that the team plans to use to manage ongoing research progress and priorities with descriptions following.

**Figure 6. Evaluation Research Communication Plan**

Source: Navigant

* **Weekly status tracker.** Navigant includes status updates on all active and upcoming research studies and tasks as part of an evaluation status tracker spreadsheet provided weekly to ComEd.
* **Monthly telephone conference calls.** Once per month, Navigant’s evaluation research management team meets with ComEd and ICC staff. These telephone conference calls provide an opportunity to discuss questions from both ComEd and Navigant on study and data request status. Each month, the team will also include time for discussing emerging topics to ensure prompt identification of new priorities. As time permits, the team will also present key research results findings as studies reach major milestones.
* **Periodic face-to-face meetings.** Members of the evaluation research team meet with ComEd to discuss a range of issues in greater detail. Attendees will vary based on subject matter. These meetings will allow the team to work through complex topics, discuss emerging topics and research priorities in more detail, and engage in thoughtful review of research portfolio progress.
* **IL SAG and TAC participation.** Navigant will continue to participate in IL SAG and TAC meetings to engage stakeholders at key stages of research plan development to ensure that objectives and methodology align with statewide and regional goals and other ongoing research.

Active and Future Evaluation Research

ComEd and Navigant have identified several areas for evaluation research based on past evaluation findings and the priorities of the IL SAG for TRM development. Evaluation research is underway in several areas previously identified by ComEd and Navigant as high priority. This section includes a summary of active and future evaluation research activities that are expected in the next year. Navigant will coordinate and plan future evaluation research with ComEd and IL SAG on an ongoing basis to accommodate new information and priorities.

Table 4 provides a high-level summary of the evaluation research Navigant has launched to date or is currently planning for calendar year 2018. The team has focused on key areas of ComEd’s Plan 5 including EUL and persistence research to support estimation of CPAS, estimating NEBs (particularly for income-eligible programs), and exploring more ways to use AMI data in evaluation research. For example, load shape research is one area where the team expects to be able to leverage AMI data. Table 4 includes several evaluation research topics for study beginning in calendar year 2018. The team plans to revisit this list on an ongoing basis as, for example, the IL SAG releases new updates on TRM research priorities and the ComEd portfolio measure mix shifts over time. This ongoing review will ensure Navigant’s research will focus on the most important topics for ComEd and IL SAG stakeholders.

**Table 4. Overview of Current and Future Evaluation Research**

|  |  |  |
| --- | --- | --- |
| Evaluation Research Topic Area | Activity | Status |
| **Exploring Savings** | Secondary research on TRM updates | In Progress |
| Primary research on TRM updates | Planning |
| EUL and persistence research | In Progress |
| Investigating NEBs | Planning |
| Load shape research | Planning |
| **Markets and Innovation** | Identifying new uses for AMI data | In Progress |
| **Process and Customer Engagement** | Identifying opportunities to support current process evaluation | Planning |

Source: Navigant

Tables 5 to 8 summarize evaluation research tasks currently underway.

**Table 5 Current Exploring Savings Tasks: TRM Measure Research**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Research Task | Description | Timeline | | | | |
| **2017** | **2018** | **2019** | **2020** | **2021** |
| TRM 5.2.2: Advanced Power Strip Tier 2 - ISR/Persistence | Metering study to determine the in-service rate and persistence of savings from Tier 2 Advanced Power Strips | ✓ | ✓ |  |  |  |
| TRM 5.3.16 Advanced Thermostats - Cooling Savings Factor | Billing analysis using AMI data to estimate cooling savings factors for advanced thermostats | ✓ | ✓ |  |  |  |
| TRM 5.6.1-5.6.4: Shell Measures - Savings Verification | Engineering and billing analysis to update de-rating factors for air sealing and insulation | ✓ | ✓ |  |  |  |
| TRM 6.1.1: Weather Normalization for Behavior Measures | Billing analysis to determine whether weather normalization is required for evaluating behavior measure savings | ✓ |  |  |  |  |
| TRM 6.1.1: Adjustments to Behavior Savings to Account for Persistence | Billing analysis to estimate decay rates for behavior measure savings | ✓ |  |  |  |  |
| LED Street Lighting O&M Cost Savings Research (separate municipal and ComEd) | Secondary research to determine avoided operations and maintenance costs from upgrading to LED street lighting | ✓ | ✓ |  |  |  |
| TRM 4.4.17: Variable Speed Drives for HVAC Pumps and Cooling Tower Fans - Measure Cost | Secondary research to update incremental cost estimates for VSDs | ✓ | ✓ |  |  |  |
| TRM 4.4.19: Demand Controlled Ventilation - Savings Factors | Secondary research to update savings factors for demand-controlled ventilation | ✓ | ✓ |  |  |  |
| TRM 4.5.4, 5.5.6, and 5.5.8: LED Bulbs and Fixtures - Incremental Costs | Web scraping and secondary research to update LED product incremental costs | ✓ | ✓ |  |  |  |

**Table 6. Current Exploring Savings Tasks: Non-TRM Measure Research**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Research Task | Description | Timeline | | | | |
| **2017** | **2018** | **2019** | **2020** | **2021** |
| Retro-commissioning Measure Persistence Study | Study to determine the persistence of savings from Retro-commissioning measures | ✓ | ✓ |  |  |  |

Source: Navigant

**Table 7. Current Exploring Savings Tasks: Cross-Cutting**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Research Task | Description | Timeline | | | | |
| **2017** | **2018** | **2019** | **2020** | **2021** |
| Load Shape and Coincident Peak Research | Metering, simulation modeling, and AMI data analysis to update load shapes and coincidence factors for high priority measures |  | ✓ | ✓ | ✓ | ✓ |
| Cross-Fuel Study for Home Energy Reports that Looks at Gas Savings from Electric Reports | Research to examine where the Home Energy Reports program produces gas savings. |  | ✓ |  |  |  |
| Low-Income Program NEBs | Research to estimate non-energy benefits from low-income program measures | ✓ | ✓ |  |  |  |
| EUL Research | Research to refine estimates of effective useful life for high priority measures | ✓ | ✓ |  |  |  |

Source: Navigant

**Table 8. Current Markets and Innovation Tasks**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Research Task | Description | Timeline | | | | |
| **2017** | **2018** | **2019** | **2020** | **2021** |
| Applicability of AMI for Individual Programs | Conduct secondary research and document in memorandum summarizing possible applications for using AMI data in evaluation | ✓ | ✓ |  |  |  |

Source: Navigant

1. Evaluating Pilot Programs

ComEd’s plan includes pilot projects to test feasibility for inclusion in ComEd’s portfolio. Although many of these pilot projects are currently in a nascent stage, Navigant plans to evaluate the pilots in a similar manner to other programs in the portfolio including:

* Determining data needed to conduct impact evaluations
* Tracking system review
* Engineering file review
* Assessing feasibility of measure added to a future TRM using primary and secondary research as needed
* Research on behavioral measure savings and custom measure savings and evaluation approaches
* Process evaluations (including program manager, implementation contractor and trade ally interviews)
* Other research (e.g. load shape) as needed

Navigant will produce separate evaluation reports for pilot programs, as needed.

##### C&I Programs Evaluation Plans

ComEd AirCare Plus Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The aim of the AirCare Plus Program is to optimize the energy performance of HVAC packaged rooftop units and split systems, including mechanical adjustments (tune-ups) and hardware retrofits. AirCare Plus is implemented by CLEAResult and was launched during PY7, though the program did not have attributable savings in PY7. The measures available through AirCare Plus are AC tune-up, thermostat replacement and adjustment, and cogged v-belt installation. The program also includes incentives for economizer repair, replacement and adjustment of economizer changeover sensor, digital economizer upgrade, replacement of damper assembly, and mechanical reduction of over-ventilation. The energy savings net planning targets are shown in Table 1.

**Table 1. AirCare Plus MWh Savings Goals**

|  |  |
| --- | --- |
| Savings Goal | CY2018 |
| Net MWh | 28,950 |

The primary objective of the CY2018 evaluation of the AirCare Plus program is to assess energy savings by (1) verification of quantities of measures installed and (2) review of impact parameters, algorithms and assumptions.

Notable program changes made from PY9 to CY2018 include:

* Previously, this program consisted of an IPA element for customers ≤ 100 kW and an EEPS element for customers >100 kW. This will now entirely be an EEPS program.
* Increasing the demand-controlled ventilation incentive to reduce the projects typically lost to the ComEd Standard program.
* The addition of RTU sealing measure that seeks to prevent air leakage in the condenser portion of the unit.

The CY2018 gross impact evaluation will not vary from the previous years, but adjustments will be made to reflect specific measure and project characterizations.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 2. Evaluation Approaches - Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys |  | X |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews |  | X |  | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Impact – Field Work (On-Site Metering) | X |  |  |  |
| Net-to-Gross – Customer Self-Report Surveys |  | X |  | X |
| Net-to-Gross – Trade Ally Interviews |  | X |  | X |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities across Illinois on issues relevant to this program. Other Illinois utilities have parallel programs (e.g., boiler tune-ups), but there does not appear to be other programs that are highly similar to AirCare Plus.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. Are the engineering work paper algorithms and inputs accurate and reasonable?
2. What are the program’s verified gross savings?
3. What are the program’s verified net savings?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. Are participants satisfied with the program? Should the implementer consider making process changes to increase satisfaction?
2. How can the program be improved?
3. How is the transition into CY2018 along with the public-sector programs impacting the program?

**Evaluation Approach**

This evaluation plan identifies tasks on a preliminary basis (Table 3). Program year and calendar year (PY and CY) refer to the year of participation that will be researched, not the time that the research will occur.

**Table 3. Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Engineering File Review |
| Gross Sampling Frequency | Twice (Wave 1 and Final) |
| Verified Net Impact Approach | Deemed value |
| Researched NTG Approach | Participant Surveys |
| Researched NTG Timing | One Time – Year End Participant Survey |
| Program Manager and Implementer Interviews/ Review Materials | Yes |
| Participant Survey | Yes (Process, NTG) |
| Additional Activities | Trade Ally Surveys and Field Work to be performed in CY2018 |

Table 4 summarizes data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 4. Core Data Collection Activities and Sample**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CY | What | Who | Target Completes CY2018 | When |
| 2018 | Engineering Review | Participating Customers | Based on participation | June 2018 – August 2018 and February - March 2019 |
| 2018 | Telephone Surveys | Participating Customers | Based on participation | January - February 2019 |
| 2018 | In-Depth Interviews | Program Management | 2 | December 2018 |

In line with program changes and accelerated evaluation schedule for delivering tracking data to the valuation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The first wave of M&V sampling is expected to cover about one half of the projects.

***Gross Impact Evaluation***

The impact evaluation will consist of two different components: (1) verification of quantity and type of measure installed using the tracking system database, and (2) engineering review of algorithms and inputs for each type of measure. The Illinois Technical Reference Manual (TRM) v6.0 deems algorithms for the major program measures. Through the course of the engineering review, Navigant may make recommendations for updates or changes to the program measure algorithms. These recommendations will be provided to the Illinois Stakeholders Advisory Group (SAG) for consideration in future TRMs.

Navigant will perform tracking system review and impact analysis in two waves in CY2018. The first wave of M&V sampling is expected to cover about one half of projects completed in CY2018. Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Waves

1. Wave 1 sample starts in June 2018 and completes August 2018.
2. Final Wave starts February 2018 (or projects completion date) and completes in 60 days.

Core data collection activities will include an engineering examination of ComEd workpapers and tracking system calculations of claimed savings.

The gross savings impact approach will review the ex ante measure type to determine whether it is covered by the Illinois TRM or whether it is a non-deemed measure that is subject to retrospective per unit savings adjustment of custom variables. The measure type, deemed or non-deemed, will dictate the savings verification approach.

Savings Verification

* Measures with per unit savings values deemed by the TRM, would have verified gross savings estimated by multiplying deemed per unit savings (kWh and kW) by the verified quantity of eligible measures installed. Eligible deemed measures must meet all physical, operational, and baseline characteristics required to be assigned to the deemed value as defined in the TRM.[[3]](#footnote-3)
* Measures with fully custom or partially-deemed ex ante savings will be subject to retrospective evaluation adjustments to gross savings on custom variables. For fully custom measures, Navigant will subject the algorithm and parameter values to evaluation adjustment, where necessary. For partially-deemed measures, TRM algorithms and deemed parameter values will be used where specified by the TRM, and evaluation research will be used to verify custom variables.

The measure-level realization rates will be determined using a census sampling method to yield ex post evaluation-adjusted gross energy savings. Gross realization rates will be developed for energy and demand savings.

The evaluation team will calculate gas savings achieved by the program and convert it to electric savings.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 5. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| All Measures | 0.90 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

The evaluation will conduct NTG research in CY2018 to inform NTG recommendations for the future. This NTG research will be done through participant interviews, trade ally interviews and will account for the different types of measures within the program.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The process evaluation will include program manager surveys and participant surveys. In addition to quantifying NTG, the participant surveys will assess program satisfaction. The process evaluation will also include a review of the tracking system. Project overviews for selected projects will be requested from the implementer.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

***CY2018 Impact Research***

The air conditioner tune-up measure uses pre-tune-up and post-tune-up field efficiency measurements to calculate savings, as allowed by the TRM. The TRM v6.0 also provides deemed savings values for this measure, when pre-post testing data is unavailable. The pre-post methodology consistently achieves higher savings than the deemed energy savings percentages prescribed in the TRM. On average, the pre-post testing methodology results in 21 percent energy savings, whereas the deemed methodology allows 15 percent savings as the highest savings estimate. Navigant believes the magnitude of savings claimed warrants further analysis. We recommend reviewing the protocols for measuring EER values, reviewing the measures involved in achieving the ex ante savings (e.g., coil cleaning, refrigerant charge correction), and conducting a field metering effort in 2018. Navigant will use the results from this additional research effort to provide recommendations for future revisions of the IL TRM.

**Evaluation Schedule**

Table 6 below provides the schedule for key deliverables and data transfer activities. (See Table 4 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 6. Schedule - Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | June 1, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | July 2, 2018 |
| CY2018 participating customer survey design | Evaluation | May 15, 2018 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | September 15, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | August 1, 2018 |
| Wave 1 participating customer NTG and process survey fielding | Evaluation | September 28, 2018 |
| CY2018 Program tracking data for sampling Final Wave | ComEd | January 30, 2019 |
| Final Wave project documentation, engineering reviews, schedule, feedback | Evaluation | February 28, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 4, 2019 |
| Process Analysis Findings | Evaluation | March 4, 2019 |
| NTG Analysis Findings | Evaluation | March 4, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 4, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 8, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2019 |
| Revised Draft by Navigant | Evaluation | April 5, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 12, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 23, 2019 |

ComEd Business Energy Analyzer Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The ComEd Business Energy Analyzer (BEA) Program is a free, opt-in program for ComEd commercial and industrial (C&I) customers consisting of a suite of self-serve tools they can access by logging into an integrated online platform. The tools at the site enable users to leverage the energy usage data collected by their interval (AMI or AMR) meters to gain greater insight and control over their energy use, improve their energy efficiency, and reduce their utility bills. Participating customers can use the BEA web platform at any time, and as frequently as they wish. To participate, customers need only navigate to the BEA page on the ComEd website and provide their ComEd account ID, a valid email address, and the zip code for their business premise. No further actions are required.[[4]](#footnote-4) Customers can use the BEA platform to review their recent energy consumption and compare it to their consumption in previous years, as well as to that of similar businesses in their area. They can also research possible energy efficiency projects to improve their energy efficiency and save money, and identify other ComEd programs they may qualify for. The current BEA platform and application were designed for ComEd by Agentis Energy (Agentis). During CY2018 ComEd will transition the program to a new platform which will be designed and run by FirstFuel, but the intent is to have it continue to provide an equivalent customer experience.

Since BEA is an opt-in program, Navigant will use matching methods to obtain a comparison group to measure the program savings of new enrollees in CY2018. The evaluation in CY2018 will mirror the approach we took in evaluating the program in PY6-PY8, which is described in the PY8 evaluation report.[[5]](#footnote-5)

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those shown in Table 1.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Regression Analysis | X | X | X | X |
| Midyear Comparison Legacy Savings: Agentis and FirstFuel | X |  |  |  |

***Coordination***

At this time there does not appear to be an equivalent program at other Illinois utilities. We will continue to monitor that situation.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings?
2. What are the program’s verified net savings?

**Evaluation Approach**

Table 2 summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

We have prepared an evaluation plan summary to identify tasks on a preliminary basis (Table 2). Final activities will be determined annually as program detail and requirements become known.

**Table 2: Evaluation Plan Summary for BEA**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross, Net\* Impacts Evaluation | Regression Analysis |
| Uplift Savings Adjustment | Difference-in-Difference |
| Sampling Frequency | Annual |
| Program Manager and Implementer Interviews / Review Materials | Yes |

\*The regression analysis produces impact estimates that are intrinsically net of free-ridership and most spill-over bias, although not of uplift savings.

***Gross Impact Evaluation***

As in previous evaluations, Navigant will measure the BEA Program’s CY2018 energy savings using a regression with pre-program matching (RPPM) approach. The matching method relies on energy usage data obtained from the meters of program participants, as well as from a set of non-participating customers, to estimate program savings. The pool of non-participants from which the matches are drawn will consist of a large sample of eligible non-participant ComEd C&I customers. For each BEA participant, Navigant will compare the average daily energy consumption in each month during the pre-enrollment year to that of all customers in the pool of potential matches over the same period. The quality of the potential match is indicated by the Euclidean distance between their usage and that of the participant calculated over the matching period. The non-participant whose energy usage minimizes this distance during the pre-enrollment year will be chosen as the match for that participant. Once matches are drawn Navigant will run a lagged dependent variable (LDV) model[[6]](#footnote-6) comparing participants and their matched controls to determine energy usage. A full description of this method is provided in the PY8 evaluation report.[[7]](#footnote-7)

Navigant will estimate savings due to the uplift in enrollment in other ComEd EE programs caused by the BEA program using the same approach we used to evaluate the program in previous years. We will report BEA Program energy savings net of uplift savings to avoid double-counting of savings. Savings from enrollment uplift in both CY2018 and PY6-PY9 will be considered.

The evaluation team will calculate gas savings achieved by the program and convert it to electric savings.

***Verified Net Impact Evaluation***

Program savings calculated using the RPPM approach are inherently net savings, due to the use of a matched control group. As long as the participant and control groups are similar with respect to the distribution of factors driving spillover and free-ridership, the nature of the savings calculation ensures that the effects will be differenced out. Therefore, no further net-to-gross (NTG) adjustment is necessary.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The process evaluation for this program will be limited to interviews with the program manager and implementation contractor.

***Comparison of Legacy Savings on New, Old BEA Platforms***

To verify that the new BEA platform developed by FirstFuel is providing participants with a level of service comparable to those available on the previous platform developed by Agentis, Navigant will draw a random, one-in-three sample from the set of approximately 1,500 legacy BEA participants that enrolled between PY6 and PY9. ComEd will actively encourage these customers to continue using BEA on the Agentis-designed platform for several months; the remaining legacy BEA participants will be asked to shift to the new FirstFuel platform.[[8]](#footnote-8) Navigant will compare the savings of these two random subsets of legacy participants over the first five months of CY2018, testing the hypothesis that there is no statistically meaningful difference between the two.

**Data Requirements**

Table 3 shows the data Navigant will need for the CY2018 evaluation.

**Table 3. Data Requirements for CY2018 BEA Evaluation**

| Required Data | Relevant Information Requested |
| --- | --- |
| **Tracking Data** | **For all BEA participants:** |
| * Account ID |
| * Date participant was enrolled in BEA |
| * Move-out date (if relevant) |
| * Type of Business or Segment |
| **Customer Usage Data** | **For Legacy Waves 1-4\* BEA participants:** |
| * Account ID |
| * Daily energy usage values† for CY2018 (Jan 1, 2018 – Dec 31, 2018) |
| **For all Wave 5\* BEA participants and a suitable sample of non-participants:** |
| * Account ID |
| * Daily energy usage values† from at least one year prior to enrollment date through the end of CY2018 (Dec 31, 2018) |

\* Waves 1-4 comprise participants who enrolled in PY6, PY7, PY8 and PY9, respectively. Wave 5 comprises participants who enrolled during CY2018 (Jan 1 – Dec 31, 2018).

† Daily values rolled up from 30-minute interval AMI/AMR meter data obtained from Agentis and FirstFuel.

**Evaluation Schedule**

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

**Table 4. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Interim evaluation data request sent to ComEd / ICs\* | Navigant | May 31, 2018 |
| Interim evaluation data delivered to Navigant | ComEd / ICs | June 30, 2018 |
| Interim comparison findings sent to ComEd | Navigant | July 31, 2018 |
| Final evaluation data request sent to ComEd / ICs | Navigant | December 31, 2018 |
| Final evaluation data delivered to Navigant | ComEd / ICs | January 30, 2019 |
| Draft Report to ComEd and SAG | Navigant | March 15, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 5, 2019 |
| Revised Draft by Navigant | Navigant | April 12, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 19, 2019 |
| Final Report to ComEd and SAG | Navigant | April 27, 2019 |

\* Data required for the interim savings comparison include daily usage values for Jan 1 – May 31, 2018 for both legacy enrollees and potential matched controls.

ComEd CHP Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The ComEd Energy Efficiency Program includes a CHP program for business customers. This program provides a deemed or custom incentive, based on eligibility requirements outlined in TRM v.6, for CHP installations incentivized under Retrofit, New Construction, or Custom programs. CHP incentives are available based on the project’s kWh savings, provided the project meets all program eligibility requirements.

Notable program considerations in CY2018 include:

* The program will report lifetime savings instead of first year savings.
* CHP Program savings will be reported separate from other ComEd Business projects.

The objective of the evaluation is to quantify net savings impacts from the Combined Heat and Power (CHP) Program for each Calendar Year in the four‑year plan (CY2018 - CY2021). Key evaluation activities for CY2018 will take place from January 2018 through March 2019. For the CY2018 evaluation, the evaluation team will work towards real time verification and analysis, and parallel impact evaluation per ComEd. The main purpose of this is that it allows earlier engineering review and M&V work, ensuring that critical impact issues are resolved in early stages. Since large projects are likely to be selected in the sample, the evaluation team will review them in early stages of the project and provide feedback to ComEd as needed. This is to ensure that the calculation methodology and M&V plans align with the expectations of the evaluation team.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Modeling (as needed) | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X |  | X |  |
| Net-to-Gross – Trade Ally Interviews | X |  | X |  |
| Process Analysis (as needed) | X | X | X | X |

Process evaluation will be performed as needed and it will be triggered based on the changes to the program scope, goals or to the implementation team.

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Specifically, Ameren Illinois currently incentivizes CHP projects under their custom program provided they are below the 10 MW statewide maximum threshold. The small number of Ameren pipeline projects in recent years exceeded the10 MW limit and therefore will not be completed under an Ameren program. Other CHP system improvements for existing CHP systems are being incentivized under the Ameren custom program. Ameren hopes to have a small number of CHP projects near the end of the four‑year plan.

The ComEd evaluation team will coordinate with the Ameren evaluators to ensure that the two CHP evaluations use similar approaches, following the guidance in the TRM where applicable, and to identify and report on any substantive differences.[[9]](#footnote-9) The ComEd evaluation team will coordinate with the Ameren team on data collection and survey instrument design to ensure consistency and appropriate questions in the customer surveys.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual and total lifetime verified gross savings?
2. What is the research estimate of gross electric and gas savings (energy, peak demand, and total demand) for the program?
3. What are the program’s lifetime verified net savings?
4. Secondary questions include:
   * Are the ex ante per-unit gross impact savings correctly implemented by the tracking system and reasonable for this program?
   * What updates are recommended for the Illinois Technical Reference Manual (TRM)?
   * What are the results of field data collection?
   * Are the measure life assumptions valid and up-to-date?
5. Identify opportunities for improvement to the program impact calculations and estimates.
6. Assess whether the program has met its energy savings goals. If not, explain why.
7. Provide real-time evaluation for a sample of large projects to provide evaluation input, starting as early as the pre-application phase while M&V plans and baseline are being established. Feedback from the evaluation team will be provided before each application is finalized and paid by the program.

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. What are effective marketing strategies to inform customers of the CHP program?
3. How can the program be improved?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

We have prepared an evaluation plan summary to identify tasks on a preliminary basis (Table 2). Final activities will be determined annually as program detail and requirements become known.

**Table 2 Evaluation Plan Summary for CHP Program**

|  |  |  |
| --- | --- | --- |
| Activity | CY2018 |  |
| Gross Impact Approach | Engineering File Review/ On-site M&V |  |
| Gross Sampling Frequency | Quarterly Census Sample & Early Feedback for Pipeline Projects |  |
| Verified Net Impact Approach | Deemed Value |  |
| Researched NTG Approach | Participant Survey |  |
| Researched NTG Timing | CY2018 Participants |  |
| Program Manager and Implementer Interviews/ Review Materials | Yes |  |
| Decision Maker Survey[[10]](#footnote-10) | FR, SO |  |
| NTG Trade Ally Interviews | As needed |  |

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity. At the time of this plan, three known CHP projects are in the pipeline, with possible savings for two expected to occur in Q4 2018 and Q4 2019.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Quarterly |  |
| In Depth Interviews | Program Management and Implementers | 2 | April 2018 | Augment with monthly calls |
| Onsite M&V Audit | Participating Customers | TBD | June 2018 – Feb 2019 |  |
| Gross Impact | Early Feedback File Review | TBD | June 2018– Feb 2019 | Early Feedback for Pipeline Projects |
| Gross Impact | Engineering File Review | TBD | April 2018 – Feb 2019 | Quarterly |
| Gross Impact | On-site M&V | TBD | April 2018 – Feb 2019 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| EUL Research | Develop EUL from secondary research | NA | Jan 2018 onwards | Ongoing effort |
| Use of AMI | Leverage AMI data to confirm savings as needed | TBD | June 2018 – March 2019 |  |
| Researched NTG and Process | Telephone Survey with Participating Customers | TBD | June 2018 – March 2019 | FR & SO, Process, as needed |
| Researched NTG and Process ‡ | Telephone Interviews with Influential Trade Allies Triggered by Customer Responses | TBD | June 2018 – March 2019 | FR & SO, Process, as needed |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | TBD | April 2018 – Feb 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

† Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts.

‡ Trade ally surveys are triggered by high importance ratings by participating customers to the trade ally or vendor. Therefore, the number of trade ally or vendor surveys is dependent on the results of the participating customer surveys.

***Gross Impact Evaluation***

The evaluation will analyze program-level savings data for all CHP projects (census sample). In the event that more than 35 CHP projects are completed in a single evaluation year, the sampling approach will change to a random sampling approach targeting 90 percent confidence and 10 percent relative precision (90/10). Final annual program gross and net impact results will be based upon evaluation results for each entire program year (e.g., CY2018). A census sample approach will comply with the PJM verification requirements outlined in Manual 18B.

Regarding core data collection methodologies, ComEd will have an opportunity to review and comment on the M&V plans as they are drafted, prior to conducting a site visit. Any comments provided by ComEd will be reviewed and addressed accordingly before finalizing the M&V plan. However, because of the tight timeline, the evaluation team expects to receive the comments on these M&V plans within five business days after the draft plans are completed.

Pre-metering and post-installation interval metering data will be collected from the program implementers for all projects. The evaluators will also request all available production data and other pertinent records and files from the implementers for all projects.

On-site M&V audits will be performed for all projects above 5 MW.[[11]](#footnote-11) Out of these projects, the evaluation team will select projects for metering from stratum one and stratum two sample points. These projects will be selected based on the verified conditions and available ex ante project documentation so that evaluation metering efforts can contribute significantly to developing ex post analysis.

Additionally, on-site audits will also include collecting information from dedicated facility meters for the system power usage or load profile (e.g., air-flow profile), when available. Production data and spot measurements will be collected to support ex post savings calculations.

Engineering desk reviews will be performed for all projects to complete ex post analysis. Desk reviews do not incorporate on-site audits. Desk reviews involve review of project documentation provided by the program, an engineering review of the algorithms and auditing ex ante calculation models used by the program to estimate energy savings. The engineering audit of program calculations determines if the inputs that feed the program calculations are reasonable and acceptable or need revision based on evaluation findings. Additionally, telephone interviews with the site contact(s) will be conducted in support of these desk reviews and information obtained from the interviews will be used to verify savings. Also, site contact(s) will be requested to provide production data electronically for measure(s) installation detail. The savings will be adjusted based on all the available information.

In addition to these data collection methods highlighted above, Navigant staff responsible for CHP program evaluation will attend standing monthly Custom program calls with ComEd to discuss CHP project status, evaluation updates, and project-specific issues. This will allow for early discussion and feedback on project findings, as well as provide a setting for early feedback and real-time evaluation discussions. ComEd will also have an opportunity to review and comment on the M&V plans as they are drafted, prior to conducting a site visit. Any comments provided by ComEd will be reviewed and addressed accordingly before finalizing the M&V plans for a project.

A site-specific engineering analysis will be performed for all projects. The engineering analysis methods will vary from project-to-project, depending on the complexity of the measures installed, the size of the associated savings and the availability and reliability of existing data. Gross impact calculation methodologies are generally based on IPMVP protocols, options A through D. We will communicate the evaluation M&V approach to the implementation team before conducting the site visit.

Navigant will utilize the guidance in the TRM v.6 CHP measure to assess the appropriate evaluation methodology, whether deemed or custom. Based on the TRM, a deemed or prescriptive evaluation method will be used depending on the deemed eligibility requirements in TRM v. 6. Where not eligible for deemed savings, the evaluation will follow a custom methodology. Per the TRM, custom calculations may be used subject to agreement between the participant, the program administrator, and the independent evaluator (Navigant), however this does not eliminate ex post evaluation risk (retro‑active adjustments), and CHP custom projects custom will be evaluated using custom methods.

The measure-level engineering review will verify documentation and installed measure inventory and characteristics, hours of operation, modes of operation, and characteristics of replaced equipment. Any measured values obtained during on-site M&V audits will also be used to revise algorithm assumptions as appropriate.

The gross realization rate will be calculated for each site. For each site in the sample, a site-specific report detailing evaluation findings will be prepared. ComEd will have an opportunity to review and comment on the site-specific reports prior to each being finalized.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the Net-to-Gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| kWh | 0.58 |
| KW | 0.70 |

*Source: Based on NTG for the Custom Program - http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

NTG evaluations have not been performed for this program since this is a new program. The evaluation will analyze NTG starting in CY2018. Note that the NTG approach will be fully compliant with the Illinois NTG framework for CHP programs that has been adopted by the SAG and is part of the Illinois statewide TRM.

***Data Collection Methods***

1. Telephone surveys with participant decision makers
2. Trade ally interviews – with participating equipment vendors (suppliers and/or installers).

***Content***

**Net-to-gross ratio:** The telephone surveys will provide all inputs needed for the calculation of the program’s net-to-gross ratio. We will use the Self Report method which assigns sampled projects to one of three levels of rigor, based on the size and complexity of the project:

* Basic – small or medium sized projects,
* Standard – larger projects and smaller projects representing those measure categories that comprise the highest percentage of program savings impacts, or
* Enhanced – approximately 10-20% of the largest projects.

Participating customers will be interviewed in all cases. Standard and enhanced cases will also include interviews with program representatives and participating equipment vendors or influential opportunity assessment or facility assessment representatives. The vendor interviews will be conducted before the customer interviews. Enhanced cases may also include secondary research on standard industry practices.

NTG survey questions will address both free ridership and participant spillover. For enhanced cases, NTG summaries detailing all the findings from the interview performed by senior consultant will be provided.

***Sample***

The sampling approach for the participant surveys will attempt to survey all customers.

All telephone sample points selected will be submitted to ComEd to obtain Project Overview documents which provide information on the primary decision maker (name/phone/email address), program staff’s role in project implementation and any additional data related to program influence. The evaluation team will review the Project Overview documents before conducting NTG interviews

A net-to-gross ratio will be calculated in CY2018 using CY2018 participant surveys. The telephone surveys will provide all inputs needed for the calculation of the program’s net-to-gross ratio. Free ridership will be assessed using an algorithm approach which relies on survey self-report measure level data. Where there are multiple data sources, a result will be determined using triangulation between participant surveys, service provider surveys, implementation staff, and program staff interviews. Enhanced cases will include input from any relevant secondary research.

The existence of spillover will be examined using participant surveys self-report data. We will quantify spillover where (1) significant program influence is indicated and (2) significant spillover is revealed by the customer.

Information will be collected so to keep interviews a reasonable length. The self-reported data is based on the level of program influence as reported by the customer and service provider. This could be at either the whole project level or at the individual measure level, if sufficient sample is available and depending on the project.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated for each measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated, if possible.

***Process Evaluation***

An abbreviated process evaluation is planned. The process evaluation will: (1) determine participant satisfaction with the program overall, and key program elements; and, (2) assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. A battery of process questions will be added to the planned surveys with participating customers. The process findings will be summarized in detail and a set of key findings and recommendations will be developed for ComEd’s consideration.

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the end-user customer surveys in CY2018. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program incentive offerings and changes to program application requirements.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines (typical year)**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 15, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | Quarterly as available |
| CY2018 program tracking data (ongoing) | ComEd | Quarterly as available |
| CY2018 participating customer survey design | Evaluation | June 30, 2018 |
| Parallel impact evaluation: project documentation, engineering reviews, schedule, conduct on-site M&V, feedback for pipeline projects (all projects) | Evaluation | July 30, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations for paid projects (all projects) | Evaluation | July 30, 2018 |
| Participating customer NTG and process survey fielding | Evaluation | September 30, 2018 – February 28, 2019 |
| Project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 30, 2018 – February 28, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| NTG Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 26, 2019 |
| Revised Draft by Navigant | Evaluation | April 4, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 11, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 18, 2019 |

ComEd Custom Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The ComEd Custom Incentive Program provides a custom incentive, based on a formula, for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects for commercial and industrial customers. Custom incentives are available based on the project’s kWh savings, provided the project meets all program eligibility requirements. For eligible projects, the program pays an incentive of $0.07 per first-year kWh saved. Incentives cannot exceed 100% of the total project cost and 100% of the incremental project cost, up to $2 million through a combination of electric and gas incentives.

The Custom Program also provides an early commitment incentive option to the customers. The early commitment option provides incentive funding certainty once an application is approved. Incentives are paid after successful completion of the project has been verified and will not be subject to change based on actual kWh savings. To qualify for this option, projects must reduce energy consumption by a minimum of 500,000 kWh. For qualifying early commitment projects, the program pays an incentive of $0.06 first-year kWh saved. Incentives cannot exceed 100% of the total project cost and 100% of the incremental project cost.

Notable program changes made from PY9 to CY2018 include the incorporation of public sector customers.

The objective of the CY2018 evaluation is to quantify net savings impacts from the Custom Program. Evaluation activities for CY2018 will be similar to PY9. For the CY2018 evaluation, the evaluation team will work towards real time verification and analysis. The main purpose of this is that it allows earlier engineering review and M&V work, ensuring that critical impact issues are resolved in early stages. Since large projects are likely to be selected in the sample, the evaluation team will review them in early stages of the project and provide feedback to ComEd as needed. This is to ensure that the calculation methodology and M&V plans align with the expectations of the evaluation team.

The CY2018 gross impact evaluation will not vary from previous years, but adjustments will be made to reflect specific measure and project characterizations. The evaluation will include a participating customer free ridership and spillover study in CY2019. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, the energy assessment services and incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Modeling (as needed) | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | X \* |  | X |
| Net-to-Gross – Trade Ally Interviews |  | X |  | X |
| Process Analysis (as needed) | X | X | X | X |

\* A net-to-gross ratio will be calculated in CY2019 using a combination of CY2018 and CY2019 participant surveys for use in future evaluations.

Process evaluation will be performed as needed and it will be triggered based on the changes to the program scope, goals or to the implementation team.

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Note that coordination with other utilities has not typically been needed for this program, but if issues arise, the evaluation team will coordinate needed discussion and evaluation.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total lifetime verified gross savings?
2. What is the research estimate of gross savings (energy, peak demand, and total demand) for the program?
3. What are the program’s lifetime verified net savings?
4. What are the gas savings created by the program?
5. What is the estimated free-ridership and spillover for CY2018 participating customers? What is the research estimate for participant spillover for this program?
6. Secondary questions include:
   * Are the ex ante per-unit gross impact savings correctly implemented by the tracking system and reasonable for this program?
   * Are the measure life assumptions valid and up-to-date?
7. Estimate the lifetime gross impacts from the program.
8. Identify opportunities for improvement to the program impact calculations and estimates.
9. Assess whether the program has met its energy savings goals. If not, explain why.
10. Estimate net impacts for CY2018. This will include an assessment of of ComEd’s program influence versus other factors in installing energy efficiency equipment.
11. Provide real-time evaluation for a sample of large projects to provide evaluation input, starting as early as the pre-application phase while M&V plans and baseline are being established. Feedback from the evaluation team will be provided before each application is finalized and paid by the program.
12. Analyze effective useful life (EUL) of typical measures to report lifetime savings in the CY2018 program.
13. Assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. Determine customer satisfaction with the program and various program elements.

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. What are effective marketing strategies to inform customers of the Comprehensive Energy Savings Offers?
3. What are the effective marketing strategies to inform customers of the Energy Management Assistance Offer?
4. What are the effective marketing strategies to inform customers of the Made in Illinois Bonus and the Office Space incentive offering?
5. How can the program be improved?
6. How is the transition into CY2018 along with the public-sector programs impacting the program?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Evaluation Plan Summary**

|  |  |  |
| --- | --- | --- |
| Activity | CY2018 |  |
| Gross Impact Approach | Engineering File Review and On-site M&V |  |
| Gross Sampling Frequency | Three Waves and Early Feedback for Large Projects |  |
| Verified Net Impact Approach | Deemed Value |  |
| Researched NTG Approach | Participant Survey |  |
| Researched NTG Timing | CY2018 Participants |  |
| Program Manager and Implementer Interviews, Review Materials | Yes |  |
| Decision Maker Survey | FR, SO \* |  |
| NTG Trade Ally Interviews | As needed |  |

FR = Free Ridership; SO = Spillover

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | April 2018 | Augment with monthly calls |
| Onsite M&V Audit | Participating Customers | TBD | June 2018 – Feb 2019 |  |
| Gross Impact | Early Feedback File Review | TBD | June 2018– Feb 2019 | Early Feedback for Large Projects |
| Gross Impact | Engineering File Review | TBD | April 2018 – Feb 2019 | Three Waves\* |
| Gross Impact | On-site M&V | TBD | April 2018 – Feb 2019 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| EUL Research | Develop EUL from secondary research | NA | Jan 2018 onwards | Ongoing effort |
| Use of AMI | Leverage AMI data to confirm savings as needed | TBD | June 2018 – March 2019 |  |
| Researched NTG and Process | Telephone Survey with Participating Customers | TBD | June 2018 – March 2019 | FR & SO, Process. Two Waves |
| Researched NTG and Process † | Telephone Interviews with Influential Trade Allies Triggered by Customer Responses | TBD | June 2018 – March 2019 | FR & SO, Process. Two Waves |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | TBD | April 2018 – Feb 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

† Trade ally surveys are triggered by high importance ratings by participating customers to the trade ally or vendor. Therefore, the number of trade ally or vendor surveys is dependent on the results of the participating customer surveys.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The first wave of M&V sampling is expected to cover about one-third of the projects.

***Gross Impact Evaluation***

The evaluation will analyze program-level savings data by project size to inform the sample design for this population of heterogeneous measures. Using the tracking data extract provided by ComEd, we will sort the projects from largest to smallest ex ante kWh claim and place them into one of three strata such that each stratum contains about one-third of the program total kWh claim.

The sample size will be calculated using the following equation:

Where:

n = Sample Size

ER = Error Ratio

RP = Relative Precision (10%)

N = Estimated CY2018 Project Population

1.282 = One-tailed Z-Value for 90% Confidence

The error ratio will be calculated from a combination of prior program year results. The evaluation team has capped the sample size at approximately 25 projects. When the number of CY2018 projects is known, an appropriate sample size will be determined to achieve 90/10 confidence and precision levels. This is consistent with PY8 and PY9 program evaluations which have seen larger program populations than the expected population for CY2018. If the population variability in CY2018 remains close to that in PY9, this cap will meet confidence and precision levels of 90/11. This will allow the evaluation team to meet the overall portfolio-level 90/10 requirements and still stay within budget while increasing the scope to include analysis of lifetime savings and effective useful life of measures in preparation for the 2018 program reporting.

We will perform sampling in three phases during the CY2018 evaluation period. We will draw the sample for the first wave in April 2018 expecting that a significant number of projects have been finalized and paid. We will draw the sample for the second wave in October 2018 after most of the projects have been finalized. The final sample will be drawn after the program participation closes at the end of January 2018 and projects have had a chance to be finalized and paid. Final program gross and net impact results will be based upon the three waves combined.

Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Sampling Waves

1. First wave sample drawn in April 2018 and completed July 2018
2. Second wave sample drawn in August 2018 and completed November 2018
3. Final wave starts February 2019 (or projects completion date)

Regarding core data collection methodologies, ComEd will have an opportunity to review and comment on the M&V plans as they are drafted, prior to conducting a site visit. Any comments provided by ComEd will be reviewed and addressed accordingly before finalizing the M&V plan. However, because of the tight timeline, the evaluation team expects to receive the comments on these M&V plans within five business days after the draft plans are completed.

Pre-metering and post-installation interval metering data will be collected from the program implementers for all the sampled projects. The evaluators will also request all available production data and other pertinent records and files from the implementers for all projects selected in the sample.

On-site M&V audits will be performed for approximately fifteen projects.[[12]](#footnote-12) Out of these projects, the evaluation team will select projects for metering from stratum one and stratum two sample points. These projects will be selected based on the verified conditions and available ex ante project documentation so that evaluation metering efforts can contribute significantly to developing ex post analysis.

Additionally, on-site audits will also include collecting information from dedicated facility meters for the system power usage or load profile (e.g., air-flow profile), when available. Production data and spot measurements will be collected to support ex post savings calculations.

Engineering desk reviews will be performed for approximately five projects to complete ex post analysis. Desk reviews do not incorporate on-site audits. Desk reviews involve review of project documentation provided by the program, an engineering review of the algorithms and auditing ex ante calculation models used by the program to estimate energy savings. The engineering audit of program calculations determines if the inputs that feed the program calculations are reasonable and acceptable or need revision based on evaluation findings. Additionally, telephone interviews with the site contact(s) will be conducted in support of these desk reviews and information obtained from the interviews will be used to verify savings. Also, site contact(s) will be requested to provide production data electronically for measure(s) installation detail. The savings will be adjusted based on all the available information.

In addition to these data collection methods highlighted above, monthly calls will be held between the evaluation team and ComEd to discuss program status, evaluation updates, and project-specific issues. This will allow for early discussion and feedback on project findings, as well as provide a setting for early feedback and real-time evaluation discussions. ComEd will also have an opportunity to review and comment on the M&V plans as they are drafted, prior to conducting a site visit. Any comments provided by ComEd will be reviewed and addressed accordingly before finalizing the M&V plans for a project.

A site-specific engineering analysis will be performed for the sampled CY2018 projects. The engineering analysis methods will vary from project to project, depending on the complexity of the measures installed, the size of the associated savings and the availability and reliability of existing data. Gross impact calculation methodologies are generally based on IPMVP protocols, options A through D. We will communicate the evaluation M&V approach to the implementation team before conducting the site visit. The measure-level engineering review will verify documentation and installed measure inventory and characteristics, hours of operation, modes of operation, and characteristics of replaced equipment. Any measured values obtained during on-site M&V audits will also be used to revise algorithm assumptions as appropriate.

The gross realization rate will be calculated for each site, and for the sample. For each site in the sample, a site-specific report detailing evaluation findings will be prepared. ComEd will have an opportunity to review and comment on the site-specific reports prior to each being finalized. Site-level gross impact realization rates from the sample will then be extrapolated to the program population using a ratio estimation approach to calculate CY2018 program level gross impact estimates

The measure type will dictate the savings verification approach. We will also make a research estimate of gross savings based entirely on site-collected data and evaluation engineering analysis of savings. The two methods are described below:

1. Savings Verification

* Measures with fully custom or partially-deemed ex ante savings will be subject to retrospective evaluation adjustments to gross savings on custom variables. For fully custom measures, Navigant will subject the algorithm and parameter values to evaluation adjustment, where necessary. For partially-deemed measures, TRM algorithms and deemed parameter values will be used where specified by the TRM, and evaluation research will be used to verify custom variables.

1. Evaluation Research Savings Estimate

* The evaluation will also include an analysis of on-site collected verification data for a subset of projects. The engineering analysis methods and degree of monitoring will vary from project to project, depending on whether the measure has deemed savings or not, the complexity of the measures, the size of the associated savings, the potential to revise input assumptions, and the availability and reliability of existing data. The evaluators will contact the implementers prior to conducting site visits to ensure that the evaluation team has all correct and relevant information.

The measure-level realization rates will be extrapolated to the program population using a ratio estimation method to yield ex post evaluation-adjusted gross energy savings. Gross realization rates will be developed for energy and demand savings. The sample design will provide 90/10 statistical validity for the overall program. The sample of 15 on-site audits drawn is also expected to achieve a 90/10 confidence/relative precision level (one-tailed test) to comply with the PJM verification requirements outlined in Manual 18B.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| kWh | 0.58 |
| kW | 0.70 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

Previous NTG evaluations have performed a NTG analysis for each program year. Due to the relatively stable results year to year, the evaluation team has scaled back the NTG research. The evaluation is currently analyzing the combined NTG analysis for PY8 and PY9. The evaluation will continue similar two-year cycles going forward. The evaluation team will perform the NTG interviews for CY2018 but the data will not be analyzed. After completing the NTG interviews for the CY2019 period, NTG analysis will be performed for both program years at the end of CY2019 and will be reported in the CY2019 Evaluation Report. The research plan net-to-gross ratios are based on primary data collected as described below. Note that the method described is fully compliant with the framework for Custom programs that has been adopted by the SAG and is part of the Illinois statewide TRM v 4.0.

***Data Collection Methods***

1. Telephone surveys with participant decision makers.
2. Trade ally interviews – with participating equipment vendors (suppliers and/or installers).

***Content***

**Net-to-gross ratio:** The telephone surveys will provide all inputs needed for the calculation of the program’s net-to-gross ratio. We will use the self-report method which assigns sampled projects to one of three levels of rigor, based on the size and complexity of the project:

* Basic – small or medium sized projects.
* Standard – larger projects and smaller projects representing those measure categories that comprise the highest percentage of program savings impacts.
* Enhanced – approximately 10-20% of the largest projects - this generally includes those with rebates of $100,000 or greater.

Participating customers will be interviewed in all cases. Standard and enhanced cases will also include interviews with program representatives and participating equipment vendors or influential opportunity assessment or facility assessment representatives. The vendor interviews will be conducted before the customer interviews. Enhanced cases may also include secondary research on standard industry practices.

NTG survey questions will address both free ridership and participant spillover. For enhanced cases, NTG summaries detailing all the findings from the interview performed by senior consultant will be provided.

***Sample***

The sampling approach for the participant surveys will attempt to survey a sample of CY2018 customers to achieve one-tailed 90/10 confidence/precision level at the program level over the two years, and will ensure that the sample points are representative of the program population over the two years.

All telephone sample points selected will be submitted to ComEd to obtain project overview documents which provide information on the primary decision maker (name/phone/email address), program staff’s role in project implementation and any additional data related to program influence. The evaluation team will review the project overview documents before conducting NTG interviews

A net-to-gross ratio will be calculated in CY2018 using the combination of CY2018 and CY2019 participant surveys for use in future evaluations. The telephone surveys will provide all inputs needed for the calculation of the program’s net-to-gross ratio. Free ridership will be assessed using an algorithm approach which relies on survey self-report measure level data. Where there are multiple data sources, a result will be determined using triangulation between participant surveys, service provider surveys, implementation staff, and program staff interviews. Enhanced cases will include input from any relevant secondary research.

The existence of spillover will be examined using participant surveys self-report data. We will quantify spillover where (1) significant program influence is indicated and (2) significant spillover is revealed by the customer.

The measure level information will be collected for the three largest measures to keep the interview to a reasonable length. However, this is only possible if there are sufficient findings differentiated by measure. The self-reported data is based on the level of program influence as reported by the customer and service provider. This could be at either the whole project level or at the individual measure level, if sufficient sample is available and depending on the project.

***Process Evaluation***

An abbreviated process evaluation is planned. The process evaluation will: (1) determine participant satisfaction with the program overall and key program elements; and, (2) assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. A battery of process questions will be added to the planned surveys with participating customers. The process findings will be summarized in detail and a set of key findings and recommendations will be developed for ComEd’s consideration.

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the end-user customer surveys in CY2018. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program incentive offerings and changes to program application requirements.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 15, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| CY2018 participating customer survey design | Evaluation | June 30, 2018 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 30, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 program tracking data for sampling Wave 2 | ComEd | August 30, 2018 |
| Wave 1 participating customer NTG and process survey fielding | Evaluation | September 30, 2018 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 30, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| CY2018 Program tracking data for sampling Wave 3 | ComEd | January 30, 2019 |
| Wave 2 participating customer NTG and process survey fielding | Evaluation | February 28, 2019 |
| Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 28, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| NTG Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 26, 2019 |
| Revised Draft by Navigant | Evaluation | April 4, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 11, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 18, 2019 |

ComEd Data Centers Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Data Centers Efficiency Program provides incentives for installing energy efficiency measures in both new and existing data centers. The program pays an incentive of $0.07 per first-year kWh saved for eligible efficiency projects, and an incentive of $0.05 per first-year kWh saved for both eligible relocations to colocation facilities and virtualization/IT measures.

The program also provides an early commitment incentive option to the customers. The early commitment option provides incentive funding certainty once an application is approved. Incentives are paid after successful completion of the project has been verified and will not be subject to change based on actual kWh savings. To qualify for this option, projects must reduce energy consumption by a minimum of 500,000 kWh. For qualifying early commitment projects, the program pays an incentive of $0.06 per first-year kWh saved. Incentives for the program cannot exceed 100% of the total project cost and 100% of the incremental project cost.

Notable program changes made from PY9 to CY2018 include the incorporation of public sector customers.

The objective of the evaluation is to quantify net savings impacts for the Data Center Efficiency Program. Unlike previous years, key evaluation activities for CY2018 will take place from January 2018 through March 2019. The data analysis and reporting will occur in Q4 2018 and Q1 of 2019. Since large projects are likely to be selected in the sample, the evaluation team will review them in early stages of the project and provide feedback to ComEd as needed. This is done to ensure that the calculation methodology and M&V plans align with the expectations of the evaluation team.

The CY2018 gross impact evaluation will not vary from previous years, but adjustments will be made to reflect specific measure and project characterizations. The evaluation will include a participating customer free ridership and spillover study in CY2018. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application in CY2019. A net-to-gross ratio will be calculated in CY2019 using a combination of CY2018 and CY2019 participant surveys for use in future evaluations. The CY2019 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, the energy assessment services and incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Modeling (as needed) | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | X \* |  | X |
| Net-to-Gross – Trade Ally Interviews |  | X |  | X |
| Process Analysis (as needed) | X | X | X | X |

\* A net-to-gross ratio will be calculated in CY2019 using a combination of CY2018 and CY2019 participant surveys for use in future evaluations.

Process evaluation will be performed as needed and it will be triggered based on the changes to the program scope, goals or to the implementation team.

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Note that coordination with other utilities has not typically been needed for this program, but if issues arise, the evaluation team will coordinate needed discussion and evaluation.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

* Estimate the CY2018 total lifetime gross impacts from the program.
* Identify opportunities for improvement to the within-program impact calculations and estimates.
* Assess whether the program has met its energy and demand savings goals. If not, explain why.
* Estimate any gas savings created by the program.
* What is the estimated free-ridership and spillover for CY2018 participating customers? What is the research estimate for participant spillover for this program?
* Provide real-time evaluation for large projects, upon request from ComEd, to provide evaluation input before each application is finalized and paid by the program.
* Analyze effective useful life (EUL) of typical data center measures to update the Illinois TRM and to calculate lifetime savings.
* Assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. Determine customer satisfaction with the program and various program elements.

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

* What are participants’ perspectives and overall satisfaction with the program?
* How can the program be improved?
* How is the transition into CY2018 along with the public-sector programs impacting the program?

Program manager interviews at the beginning of the program year may uncover other areas of research to explore during the process evaluation.

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Evaluation Plan Summary for Data Centers Efficiency Program**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Engineering File Review and On-site M&V |
| Gross Sampling Frequency | Three Waves and Early Feedback for Large Projects |
| Verified Net Impact Approach | Deemed Value |
| Researched NTG Approach | Participant Survey |
| Researched NTG Timing | CY2018 Participants |
| Program Manager and Implementer Interviews/ Review Materials | Yes |
| Decision Maker Survey\* | FR, SO \* |
| NTG Trade Ally Interviews | As needed |

\*FR = Free Ridership; SO = Spillover

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking System | Census | Three waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | April 2018 | Augment with monthly calls |
| Onsite M&V Audit | Participating Customers | TBD | June 2018 – Feb 2019 |  |
| Gross Impact | Early Feedback File Review | TBD | June 2018 – Feb 2019 | Early Feedback for Large Projects |
| Gross Impact | Engineering File Review | TBD | April 2018 – Feb 2019 | Three Waves\* |
| Gross Impact | On-site M&V | TBD | April 2018 – Feb 2019 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| EUL Research | Develop EUL from secondary research | NA | Jan 2018 onwards | Ongoing effort |
| Researched NTG and Process | Telephone Survey with Participating Customers | TBD | June 2018 – March 2019 | FR & SO, Process. Two Waves |
| Researched NTG and Process † | Telephone Interviews with Influential Trade Allies Triggered by Customer Responses | TBD | June 2018 – March 2019 | FR & SO, Process. Two Waves |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | TBD | April 2018 – March 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

† Trade ally surveys are triggered by high importance ratings by participating customers to the trade ally or vendor. Therefore, the number of trade ally or vendor surveys is dependent on the results of the participating customer surveys.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the valuation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The first wave of M&V sampling is expected to cover about one-third of the projects.

***Gross Impact Evaluation***

Navigant will perform tracking system review and M&V project sampling in three waves in CY2018. The first wave of M&V sampling is expected to cover about one-third of projects completed in CY2018. Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Sampling Waves

1. First wave sample drawn in April 2018 and completed in July 2018
2. Second wave sample drawn in August 2018 and completed November 2018
3. Final wave starts February 2019 (or project completion date)

***Sample***

The evaluation will analyze program-level data center savings data by project size to inform the sample design for this population of heterogeneous measures. Using the tracking data extract provided by ComEd, we will sort the projects from largest to smallest ex-ante kWh claim and place them into one of three strata such that each stratum contains about one-third of the program total kWh claim.

The sample size will be calculated using the following equation:

Where:

n = Sample Size

ER = Error Ratio

RP = Relative Precision (5%)

N = Estimated PY9 Project Population

1.282 = One-tailed Z-Value for 90% Confidence

The error ratio will be calculated from a combination of prior program year results. When the population of CY2018 projects is known, we will use the appropriate sample size to achieve 90/10 confidence and precision levels, as we have done in previous program years.

***Data Collection Methods***

1. The gross impact evaluation approach is a combination of on-site M&V audits, desk reviews and in-depth telephone interviews.
2. We will perform on-site M&V audits.
3. We will request all available metering data (and other pertinent records and files) from the implementers for all the sampled projects and use the implementer’s pre- and post- metered data, as applicable, for developing ex post results.
4. On-site M&V audits will include spot measurements, run-time hour data logging and post-installation interval metering. The data collected during the on-site visits will serve to verify measure installation, determine installed measure characteristics, assess hours and relevant modes of operation and identify the characteristics of the replaced equipment and any equipment baselines; and
5. For sites selected for desk reviews, we will collect data through telephone interviews with the site contact to verify the installed measure operating characteristics. We will ask the site contact to provide production data or EMS data electronically. We will collect utility meter data for billing analysis from ComEd, if needed. Also, we will ensure the project invoices are verified to confirm the installed measure specifications. Sites selected for desk reviews will not include on-site audits.
6. Early feedback will be provided by the evaluation team for large sites, where requested.
7. AMI data will be used on various projects to confirm savings.
8. ComEd will have an opportunity to review and comment on the M&V plans as they are drafted, prior to conducting a site visit. Any comments provided by ComEd will be reviewed and addressed accordingly before finalizing the M&V plan. The evaluation team expects to receive the comments on these M&V plans within 10 business days.
9. EULs will be analyzed for measures individually for CY2018 to support updates to the Illinois TRM and calculate final evaluated lifetime savings.

In addition to these data collection methods highlighted above, monthly calls will be held between the evaluation team and ComEd to discuss program status, evaluation updates, and project-specific issues. This will allow for early discussion and feedback on project findings, as well as provide a setting for early feedback and real-time evaluation discussions.

***Analysis***

We will perform a site-specific analysis for each of the data center projects in the onsite sample. The engineering analysis methods and degree of monitoring will vary from project to project, depending on the complexity of the measures installed, the size of the associated savings and the availability and reliability of existing data. Gross impact calculation methodologies are generally based on IPMVP protocols, options A through D.

Through the engineering review of the algorithms used by the program to calculate energy savings and the review assumptions that feed into those algorithms, we will seek to classify the program’s impact calculation approach into one of two categories: 1) reasonable and acceptable, or 2) needs revision based on evaluation findings. We will also make a preliminary judgment to identify those assumptions with higher uncertainty or potential to influence the program savings estimate. Through the measure-level engineering review we will verify documentation and installed measure inventory and characteristics, hours of operation, modes of operation, and characteristics of replaced equipment. We will use any measured values obtained during on-site verification audits to revise algorithm assumptions as appropriate.

We will calculate a gross realization rate for each site and prepare a site-specific report detailing evaluation findings. ComEd will have an opportunity to review and comment on the site-specific reports prior to each being finalized.

We will extrapolate site-level gross impact realization rates from the sample to the program population using a ratio estimation approach to calculate CY2018 program level gross impact estimates.

***Evaluation Baseline Selection Approach***

Baseline selection seeks to optimize the following:

* Selection of the predominant baseline condition over the EUL of the installed measure.
* Selection of baseline using a consistent approach across all evaluated projects.
* Thorough review of the pre-existing conditions to support baseline selection.
* The selected baseline should support savings estimates that represent actual grid-level impacts.

The gross savings impact approach will review the ex ante measure type to determine whether it is covered by the Illinois TRM or whether it is a non-deemed measure that is subject to retrospective per unit savings adjustment of custom variables. The measure type, deemed or non-deemed, will dictate the savings verification approach. We will also make a research estimate of gross savings based entirely on site-collected data and evaluation engineering analysis of savings. The two methods are described below:

1. Savings Verification

* Measures with per unit savings values deemed by the TRM would have verified gross savings estimated by multiplying deemed per unit savings (kWh and kW) by the verified quantity of eligible measures installed. Eligible deemed measures must meet all physical, operational, and baseline characteristics required to be assigned to the deemed value as defined in the TRM.[[13]](#footnote-13)
* Measures with fully custom or partially-deemed ex ante savings will be subject to retrospective evaluation adjustments to gross savings on custom variables. For fully custom measures, Navigant will subject the algorithm and parameter values to evaluation adjustment, where necessary. For partially-deemed measures, TRM algorithms and deemed parameter values will be used where specified by the TRM, and evaluation research will be used to verify custom variables.

1. Evaluation Research Savings Estimate

* The evaluation will also include an analysis of on-site collected verification data for a subset of projects. The engineering analysis methods and degree of monitoring will vary from project to project, depending on whether the measure has deemed savings or not, the complexity of the measures, the size of the associated savings, the potential to revise input assumptions, and the availability and reliability of existing data. The evaluators will contact the implementers prior to conducting site visits to ensure that the evaluation team has all correct and relevant information.

The measure-level realization rates will be extrapolated to the program population using a ratio estimation method to yield ex post evaluation-adjusted gross energy savings. Gross realization rates will be developed for energy and demand savings. The sample design will provide 90/10 statistical validity for the program overall. The sample for on-sites will be drawn to achieve a 90/10 confidence/relative precision level (one-tailed test) to comply with the PJM verification requirements outlined in Manual 18B.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Data Centers | 0.68 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

Previous NTG evaluations have performed a NTG analysis for each program year. Due to the relatively stable results year to year, the evaluation team has scaled back the NTG research. The evaluation team is currently analyzing the combined NTG analysis for PY8 and PY9. The evaluation will continue similar two-year cycles going forward. The evaluation team will perform the NTG interviews for CY2018 but the data will not be analyzed. After completing the NTG interviews for the CY2019 period, NTG analysis will be performed for both program years at the end of CY2019 and will be reported in the CY2019 Evaluation Report. The research plan NTG ratios are based on primary data collected as described below. Note that the method described is fully compliant with the framework for study–based programs that has been adopted by the SAG and is part of the Illinois statewide TRM v6.0.

***Data Collection Methods***

1. Telephone surveys with participant decision makers
2. Project detail from ComEd

***Trade ally interviews – with participating equipment vendors (suppliers or installers)***

**Net-to-gross ratio:** The telephone surveys will provide all inputs needed for the calculation of the program’s net-to-gross ratio. We will use the self report method which assigns sampled projects to one of three levels of rigor, based on the size and complexity of the project:

* Basic – small or medium sized projects.
* Standard – larger projects and smaller projects representing those measure categories that comprise the highest percentage of program savings impacts.
* Enhanced – approximately 10-20% of the largest projects, generally those with rebates of $100,000+.

Participating customers will be interviewed in all cases. Standard and enhanced cases will also include interviews with program representatives and participating equipment vendors or influential opportunity assessment or facility assessment representatives. The vendor interviews will be conducted before the customer interviews. Enhanced cases may also include secondary research on standard industry practices.

NTG survey questions will address both free ridership and participant spillover. For enhanced cases, NTG summaries detailing all the findings from the interview performed by senior consultant will be provided.

***Sample***

The sampling approach for the participant surveys will attempt to survey a sample of CY2018 customers to achieve one-tailed 90/10 confidence/precision level at the program level over the two years, and will ensure that the sample points are representative of the program population over the two years.

All telephone sample points selected will be submitted to ComEd to obtain project overview documents which provide information on the primary decision maker (name, phone, email address), program staff’s role in project implementation and any additional data related to program influence. The evaluation team will review the project overview documents before conducting NTG interviews.

***Analysis***

A net-to-gross ratio will be calculated in CY2019 using the combination of CY2018 and CY2019 participant surveys for use in future evaluations. The telephone surveys will provide all inputs needed for the calculation of the program’s NTG ratio. Free ridership will be assessed using an algorithm approach which relies on survey self-report measure level data. Where there are multiple data sources, a result will be determined using triangulation between participant surveys, service provider surveys, implementation staff, and program staff interviews. Enhanced cases will include input from any relevant secondary research.

The existence of spillover will be examined using participant surveys self-report data. We will quantify spillover where (1) significant program influence is indicated and (2) significant spillover is revealed by the customer.

A key goal will be to analyze and report NTG findings at the measure level. The measure level information will be collected for the three largest measures to keep the interview to a reasonable length. However, this is only possible if there are sufficient findings differentiated by measure. The self-reported data is based on the level of program influence as reported by the customer and service provider. This could be at either the whole project level or at the individual measure level, if sufficient sample is available, and depending on the project.

***Process Evaluation***

The process evaluation objectives are to determine (1) program strengths and weaknesses, (2) participant satisfaction with program elements, and (3) ways to improve the program. Process questions will be added to all the surveys conducted by the evaluation team. The findings and recommendations will be based on data collected from the surveys. The analysis is likely to include an assessment of the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. Determine customer satisfaction with the program and various program elements. These questions will be refined prior to deploying any process survey.

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the end-user customer surveys in CY2018. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program incentive offerings and changes to program application requirements.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 15, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| CY2018 participating customer survey design | Evaluation | June 30, 2018 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 30, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 program tracking data for sampling Wave 2 | ComEd | August 30, 2018 |
| Wave 1 participating customer NTG and process survey fielding | Evaluation | September 30, 2018 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 30, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| CY2018 Program tracking data for sampling Wave 3 | ComEd | January 30, 2019 |
| Wave 2 participating customer NTG and process survey fielding | Evaluation | February 28, 2019 |
| Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 28, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| NTG Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 26, 2019 |
| Revised Draft by Navigant | Evaluation | April 3, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 11, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 20, 2019 |

ComEd Industrial Systems Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Industrial Systems Program offers a combination of technical assistance and financial incentives. Technical assistance includes an industrial systems study which assesses the performance of the facility's industrial compressed air system, process cooling system or refrigeration system to ensure efficient, economical operation. This service examines the system's operating characteristics to help identify energy saving measures, using a combination of capital investments and low or no cost measures. In addition to the study, ComEd provides a one-time incentive payment of $0.07 per annual kWh saved after proper implementation of recommendations identified through the Industrial Systems Program. Recommendations from the study that are implemented and incentivized by the program are not eligible for any other ComEd incentive. Eligible annual kWh and kW savings are determined through measurement and verification activities. The total incentive cannot exceed 100% of the total implementation costs and 100% of the total incremental costs for improvements recommended in the study.

Notable program changes made from PY9 to CY2018 include the incorporation of public sector customers.

The objective of the evaluation is to quantify CY2018 net savings impacts for the Industrial Systems Optimization Program (Industrial Systems Program). Unlike previous years, key evaluation activities for CY2018 will take place from January 2018 through March 2019. Evaluation activities for CY2018 will be similar to PY9. For the CY2018 evaluation, the evaluation team will work towards earlier engineering review and M&V work, to help ensure that critical impact issues are resolved early. Since large projects are likely to be selected in the sample, the evaluation team will review them in early stages of the project and provide feedback to ComEd as needed. This is to ensure that the calculation methodology and M&V plans align with the expectations of the evaluation team.

The CY2018 gross impact evaluation will not vary from previous years, but adjustments will be made to reflect specific measure and project characterizations. The evaluation will include a participating customer free ridership and spillover study in CY2018. A net-to-gross ratio will be calculated in CY2019 using a combination of CY2018 and CY2019 participant surveys for use in future evaluations. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, the energy assessment services and incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Modeling (as needed) | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | X |  | X |
| Net-to-Gross – Trade Ally Interviews |  | X\* |  | X |
| Net-to-Gross – Technical Service Provide Interviews | X | X | X | X |
| Process Analysis (as needed) | X | X | X | X |

\* A net-to-gross ratio will be calculated in CY2019 using a combination of CY2018 and CY2019 participant surveys for use in future evaluations.

Process evaluation will be performed as needed and it will be triggered based on the changes to the program scope, goals or to the implementation team.

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Note that coordination with other utilities has not typically been needed for this program, if issues arise, the evaluation team will coordinate needed discussion and evaluation.

**Evaluation Research Topics**

The evaluation will seek to meet and report on the following objectives:

* Estimate the lifetime gross impacts from the program.
* Identify opportunities for improvement to the program impact calculations and estimates.
* Assess whether the program has met its energy savings goals. If not, explain why not.
* Estimate net impacts for CY2018 and subsequent years.
* Estimate any gas savings created by the program.
* Perform concurrent evaluation based upon requests from ComEd for a sample of large projects to provide evaluation input before each application is finalized and paid by the program. For these projects, the evaluation team will review the baseline, pre-and post M&V Plan and analysis approach. The evaluation team will also consider the potential issues with these large projects.
* Analyze effective useful life (EUL) of typical measures to support updates to the TRM and the calculation of lifetime savings.
* Assess the effectiveness of various program elements, such as incentive levels, payments and structure for technical assistance, marketing procedures, application processes, and participation procedures. Determine customer satisfaction with the program and various program elements.

**Evaluation Approach**

Table 2 shows a summary of the evaluation plan.

**Table 2. Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY 2018 |
| Gross Impact Approach | Engineering File Review and On-site M&V |
| Gross Sampling Frequency | Three Waves and Early Feedback for Large Projects. |
| Verified Net Impact Approach | Deemed Value |
| Researched NTG Approach | Participant Survey |
| Researched NTG Timing | CY2018 Participants |
| Program Manager and Implementer Interviews/ Review Materials | Yes |
| Decision Maker Survey | Free-ridership and Spillover |
| NTG Trade Ally Interviews | As needed |
| Technical Service Provider Survey | As needed |

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In-Depth Interviews | Program Management and Implementers | TBD | April 2018 | Augment with monthly calls |
| Onsite M&V Audit | Participating Customers | TBD | June 2018 – Feb 2019 |  |
| Gross Impact | Early Feedback File Review | TBD | June 2018 – Feb 2019 | Early Feedback for Large Projects |
| Gross Impact | Engineering File Review | TBD | April 2018 – Feb 2019 | Three Waves\* |
| Gross Impact | On-site M&V | TBD | April 2018 – Feb 2019 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| EUL Research | Develop EUL from secondary research | NA | Jan 2018 Onwards | Ongoing effort |
| Researched NTG and Process | Telephone Survey with Participating Customers | TBD | June 2018 – March 2019 | FR & SO, Process. Two Waves |
| Researched NTG and Process † | Telephone Interviews with Influential Trade Allies Triggered by Customer Responses | TBD | June 2018 – March 2019 | FR & SO, Process. Two Waves |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | TBD | April 2018 – March 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

†Trade ally surveys are triggered by high importance ratings by participating customers to the trade ally or vendor. Therefore, the number of trade ally or vendor surveys is dependent on the results of the participating customer surveys.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The first wave of M&V sampling is expected to cover about one-third of the projects. Proposed gross impact sampling timelines are shown below.

***Gross Impact Evaluation***

The gross impact evaluation is a combination of desk reviews and on-site audits.

On-site audits consist of two types of activities: Measurement and Verification (M&V). On-site metering (full M&V) activity is expected to be performed for a third of the selected sample (approximately three sites). Note that the evaluation team will not perform metering if facility owned meters are already installed for data collection.

Desk reviews will be performed for the rest of the sample (estimated to be seven sites). The ex ante data, including metering data, will be the primary data source for ex post analysis. This desk review approach is like the RCx program’s desk review approach--auditing ex ante calculations and adjusting, if needed, based on any additional customer provided data, such as production data.

These evaluation approaches will provide the evaluation team sufficient detail and information to verify program achievements and provide recommendations to improve program performance. Also, these activities will allow the evaluation team to adjust the CY2018 evaluation approach (by reducing or increasing on-site activity) based on PY9 findings. Since the program involves industrial facilities, where conditions may vary more than commercial facilities, the evaluation team believes the proposed approach will help verify the conditions and allow for informed adjustments to savings estimates for such sites. This will also help the evaluation team provide actionable recommendations to improve program M&V guidelines.

Navigant will perform tracking system review and M&V project sampling in three waves in CY2018. The first wave of M&V sampling is expected to cover about one-third of projects completed in CY2018. Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Sampling Waves

1. First wave sample drawn in April 2018 and completed in July 2018
2. Second wave sample drawn in August 2018 and completed November 2018
3. Final wave starts February 2019 (or projects completion date)

The evaluation will analyze program-level savings data by project size to inform the sample design for this population of heterogeneous measures. Using the tracking data extract provided by ComEd, we will sort the projects from largest to smallest ex ante kWh claim and place them into one of three strata such that each stratum contains about one-third of the program total kWh claim.

The sample size will be calculated using the following equation:

Where:

n = Sample Size

ER = Error Ratio

RP = Relative Precision (10%)

N = Estimated PY9 Project Population

1.282 = One-tailed Z-Value for 90% Confidence

The error ratio will be calculated from a combination of prior program results. Given the projected CY2018 project population, the sample size will be determined to achieve 90/10 confidence and precision levels. The sample size for CY2018 is estimated to be approximately 10 projects, similar to PY8 and PY9 program evaluations.

Core data collection activities will include the following:

Pre-metering and post-installation interval metering data will be collected from the program implementers for all the sampled projects. The evaluators will also request all available production data and other pertinent records and files from the implementers for all projects selected in the sample.

On-site M&V audits will be performed for approximately three projects.[[14]](#footnote-14) Evaluators will select these projects for metering from stratum one and stratum two sample points based on the verified conditions and available ex ante project documentation so that evaluation metering efforts can contribute significantly to developing ex post analysis.

Additionally, on-site audits will also include collecting information from dedicated facility meters for the system power usage or load profile (e.g., air-flow profile), when available. Production data and spot measurements will be collected to support ex post savings calculations.

Engineering desk reviews will be performed for approximately seven projects to complete ex post analysis. Desk reviews do not incorporate on-site audits. Desk reviews involve review of project documentation provided by the program, an engineering review of the algorithms and auditing ex ante calculation models used by the program to estimate energy savings. The engineering audit of program calculations determines if the inputs that feed the program calculations are reasonable and acceptable or need revision based on evaluation findings. Additionally, telephone interviews with the site contact(s) will be conducted in support of these desk reviews and information obtained from the interviews will be used to verify savings. Also, site contact(s) will be requested to provide production data electronically for measure(s) installation detail. The savings will be adjusted as needed based on all the available information.

In addition to these data collection methods highlighted above, monthly calls will be held between the evaluation team and ComEd to discuss program status, evaluation updates, and project-specific issues. This will allow for early discussion and feedback on project findings, as well as provide a setting for early feedback and concurrent evaluation discussions. ComEd will also have five business days to review and comment on the M&V plans as they are drafted, prior to conducting a site visit. Any comments provided by ComEd will be reviewed and addressed accordingly before finalizing the M&V plans for a project.

The gross savings impact approach will review the ex ante measure type to determine whether it is covered by the Illinois TRM or whether it is a non-deemed measure that is subject to retrospective per unit savings adjustment of custom variables. The measure type, deemed or non-deemed, will dictate the savings verification approach. We will also make a research estimate of gross savings based entirely on site-collected data and evaluation engineering analysis of savings. The two methods are described below:

A site-specific engineering analysis will be performed for the sampled CY2018 projects. The engineering analysis methods will vary from project to project, depending on the complexity of the measures installed, the size of the associated savings and the availability and reliability of existing data.

Engineering calculations will be performed to derive gross kWh and kW savings. These calculations will start with an engineering audit of the algorithms used by the program to calculate energy savings and the inputs used for the algorithms. The engineering review will also include preliminary judgment to identify the assumptions with higher uncertainty or potential to influence the program savings estimate. The focus of the data collection will be to verify or update the assumptions that are used in the engineering algorithms for measure level savings. Data obtained for the sampled sites will serve to verify measure installation, determine installed measure characteristics, assess operating hours and relevant modes of operation, identify the characteristics of the replaced equipment and support the selection of baseline conditions and to perform ex post savings calculations. If needed, the evaluation team will use the data obtained from the sampled sites to model calculations using AIRMaster+[[15]](#footnote-15) for compressed air projects, when the evaluators determine that the facility conditions have changed significantly and the ex ante data or calculation model is no longer representative for estimating savings. The evaluation team will notify the implementation team when AIRMaster+ is being used for ex post analysis and the evaluation team will communicate any issues identified in the ex ante calculation models to the implementation team. The peak kW savings calculation methodology will be consistent with PJM requirements for each project.

A gross realization rate will be calculated for each site. Site-level gross impact realization rates from the sample will then be extrapolated to the program population using a ratio estimation approach. ComEd will have an opportunity to review and comment on the site-specific reports prior to each being finalized.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Industrial kWh | 0.80 |
| Industrial kW | 0.81 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

Previous NTG evaluations have performed a NTG analysis for each program year. Due to the relatively stable results year to year, the evaluation team has scaled back the NTG research. The evaluation team is currently analyzing the combined NTG analysis for PY8 and PY9. The evaluation will continue similar two-year cycles going forward. The evaluation team will perform the NTG interviews for CY2018 but the data will not be analyzed. After completing the NTG interviews for the CY2019 period, NTG analysis will be performed for both program years at the end of CY2019 and will be reported in the CY2019 Evaluation Report. The research plan net-to-gross ratios are based on primary data collected as described below. Note that the method described is fully compliant with the framework for Industrial Systems programs that has been adopted by the SAG and is part of the Illinois statewide TRM v6.0.

***Data Collection Methods***

1. Telephone surveys with participant decision makers
2. Service provider interviews with participating compressed air, process cooling and refrigeration service providers who completed projects in CY2018.

***Content***

**Net-to-gross ratio:** The telephone surveys will provide all inputs needed for the calculation of the program’s net-to-gross ratio. We will use the self-report method which assigns sampled projects to one of three levels of rigor, based on the size and complexity of the project:

* Basic – small or medium sized projects.
* Standard – larger projects and smaller projects representing those measure categories that comprise the highest percentage of program savings impacts.
* Enhanced – approximately 10-20% of the largest projects - this generally includes those with rebates of $100,000 or greater.

Participating customers will be interviewed in all cases. For study-driven programs, the NTG approach is consistent with the TRM. Standard and enhanced cases will also include interviews with program representatives and participating equipment vendors or influential opportunity assessment or facility assessment representatives. Further, for those projects that received a program-sponsored study, an interview with the service provider will be completed. Enhanced cases may also include secondary research on standard industry practices. NTG survey questions will address both free ridership and participant spillover. For enhanced cases, NTG summaries detailing all the findings from the interview performed by senior consultant will be provided.

***Sample***

The sampling approach for the participant surveys will attempt to survey a sample of CY2018 customers to achieve one-tailed 90/10 confidence/precision level at the program level over the two years, and will ensure that the sample points are representative of the program population over the two years.

All telephone sample points selected will be submitted to ComEd to obtain project overview documents which provide information on the primary decision maker (name, phone, email address), program staff’s role in project implementation and any additional data related to program influence. The evaluation team will review the project overview documents before conducting NTG interviews.

***Analysis***

A net-to-gross ratio will be calculated in CY2019 using the combination of CY2018 and CY2019 participant surveys for use in future evaluations. The telephone surveys will provide all inputs needed for the calculation of the program’s net-to-gross ratio. Free ridership will be assessed using an algorithm approach which relies on survey self-report measure level data. Where there are multiple data sources, a result will be determined using triangulation between participant surveys, service provider surveys, implementation staff, and program staff interviews. Enhanced cases will include input from any relevant secondary research.

The existence of spillover will be examined using participant survey self-report data. We will quantify spillover where (1) significant program influence is indicated[[16]](#footnote-16) and (2) significant spillover is revealed by the customer.

A key goal will be to analyze and report NTG findings at the measure level. The measure level information will be collected for the three largest measures to keep the interview to a reasonable length. However, this is only possible if there are sufficient findings differentiated by measure type. The self-reported data is based on the level of program influence as reported by the customer and service provider. This could be at either the whole project level or at the individual measure level, if sufficient sample is available and depending on the project.

***Process Evaluation***

The process evaluation objectives are to determine (1) program strengths and weaknesses and (2) participant satisfaction with program elements. Process questions will be added to all the surveys conducted by the evaluation team. The findings and recommendations will be based on data collected from the surveys. The analysis is likely to include an assessment of the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. It will also determine customer satisfaction with the program and various program elements. These questions will be refined prior to deploying any process survey.

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the end-user customer surveys in CY2018. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program incentive offerings and changes to program application requirements.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 15, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| CY2018 participating customer survey design | Evaluation | June 30, 2018 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 30, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 program tracking data for sampling Wave 2 | ComEd | August 30, 2018 |
| Wave 1 participating customer NTG and process survey fielding | Evaluation | September 30, 2018 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 30, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| CY2018 Program tracking data for sampling Wave 3 | ComEd | January 30, 2019 |
| Wave 2 participating customer NTG and process survey fielding | Evaluation | February 28, 2019 |
| Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 28, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| NTG Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 6, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 27, 2019 |
| Revised Draft by Navigant | Evaluation | April 7, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 15, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 22, 2019 |

ComEd Instant Discount Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The non-residential Instant Discounts Program is designed to provide an expedited, simple solution to business customers interested in purchasing high efficiency products by providing instant discounts at the point of sale. The Instant Discounts Program provides incentives to increase the market share of energy efficient LED lamps (screw based, pin based, and tubular), trim kits, and exit signs, as well as reduced wattage Linear Fluorescent (LF) lamps. Three-phase, high-frequency battery chargers are also offered through the Instant Discounts Program. The CY2018 program energy savings goal is 294,397 gross and 230,514 net MWh, and the capacity goal is 60 gross and 47 net MW.

The CY2018 incentives vary by technology as follows:

* LED lamps and trim kits range from $2 to $9
* Reduced wattage linear fluorescents $1
* LED exit signs range from $5 to $20
* LED tube lamps (TLEDs) $3
* LED HID replacements $55
* 3-Phase High-Frequency battery chargers $184

The CY2018 program did not change significantly from PY9, in terms of measure mix and end-use.

Notable program changes made from PY9 to CY2018 include:

* Addition of LED HID replacements and pin-based LED lamps.
* Removal of dimming requirement for TLEDs to increase sales volume.
* A distinct effort by ComEd to increase participation among mid-size distributors and to incorporate distributor feedback on an ongoing basis.

Additionally, the Instant Discounts Program administrators are considering the addition of more non-lighting measures such as HVAC and motor measures, but these will not be included in CY2018.

The CY2018 gross impact evaluation will not vary from the previous years, but adjustments will be made to reflect specific measure and project characterizations. The evaluation will include a participating customer free ridership and spillover study in CY2018. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 NTG study will include surveys with participating customers and distributors to learn about their perspectives and satisfaction with the program, the incentive offerings, and how to improve the program in the future.

The primary objectives of the evaluation of the CY2018 Instant Discounts Program are to: (1) quantify gross and net program impacts; and (2) identify ways in which the program can be improved.[[17]](#footnote-17) The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table. Given that new product classes are being added to the Instant Discounts Program and the overall rate of change of the lighting market (e.g. rapidly decreasing costs, increasing uptake of TLEDs, etc.), we currently recommend that the majority of evaluation activities occur annually. General population surveys and impact modeling are noted as potential one-time activities. General population surveys have not been used in the Instant Discounts program before, but could be a good compliment to participant surveys and identify reasons for non-participation. This approach is under consideration for CY2018. An impact modeling component is also marked as tentative in CY2018 to examine potential savings from lamps with dimming. A true examination of these savings would require an extensive lighting logger study. Lacking that, a combination of secondary research, modeling, and primary data collection through surveys would provide an initial assessment to inform future research.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X |  | X |  |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews | X |  | X |  |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X |  | X |  |
| Net-to-Gross – Trade Ally Interviews | X |  | X |  |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program.

**Evaluation Research Topics**

For the Instant Discount Program, there are three primary areas of evaluation activity: 1) a savings verification analysis that utilizes program tracking data, deemed parameters from the Illinois Technical Reference Manual (TRM), and recommended net-to-gross (NTG) values from the Illinois Energy Efficiency Stakeholder Advisory Group (SAG); 2) evaluation research, which consists of web and telephone surveys of program trade allies[[18]](#footnote-18) and program participants to gather data on key evaluation parameters such as installation rate, residential and non-residential split, and net-to-gross; and 3) process research.

The evaluation research portion serves two functions. First, it allows a comparison of the verified program savings estimates (using deemed values) to evaluation research program savings estimates.[[19]](#footnote-19) Second, it provides key parameter values for deeming in future updates to the IL TRM as well as SAG recommended NTG. These updates are typically done on a two-year cycle (i.e., CY2018 evaluation research results would be used as deemed values for the CY2020 evaluation cycle).

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What is the level of gross annual energy (kWh) and gross peak demand (kW) savings induced by the program?
2. What are the net impacts from the program? What is the level of free ridership and spillover associated with this program? What is the researched value for net-to-gross (NTG) ratio?
3. Did the program meet its energy and demand savings goals? If not, why not?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. How burdensome is the rebate application and submission process for distributors? What elements of the program could be improved from the distributor perspective?
2. How aware are customers of the ComEd-sourced bulb discounts? How effective are the promotional materials supplied by ComEd?
3. What is the distributor experience with selling LEDs and TLEDs in the program in terms of incentive levels and the quality and diversity of approved products?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

**Evaluation Approach**

We have updated our evaluation plan summary (from the 3-year plan submitted in August of 2015) to identify tasks specific to CY2018 (Table 2).

As described in further detail below, the evaluation team has begun testing and implementing data collection strategies that will assist in ComEd’s goal of receiving more real-time feedback on an ongoing basis. The evaluation will continue using a primarily web-based survey approach that can be fielded at regular intervals throughout the program year. The web-based approach has proven successful in recent program years for both distributors and participants. Also, the evaluation team will verify the application of TRM parameters in the tracking data on a regular basis throughout the program year. Through close coordination with the ComEd Instant Discounts program manager and program implementer, the evaluation team strives to provide more timely and accurate feedback that can help to increase the effectiveness of the Instant Discounts Program.

Table 2 below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Tracking system verification |
| Gross Sampling Frequency | Regular Interval (2 to 4x) |
| Verified Net Impact Approach | Deemed Value |
| Researched NTG Approach | Participant, Distributor, and GenPop(?) Surveys |
| Researched NTG Frequency | Regular Interval, CY2018 Participants (2 to 4x) |
| EUL Research | Secondary Research |
| Process | Program Manager, Implementer, Participant and Distributor Interviews / Review Materials |

In line with program changes and accelerated evaluation schedule for delivering tracking data to the valuation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. Proposed gross impact sampling timelines are shown below.

***Gross Impact Evaluation***

At regular intervals throughout the program cycle (every three to four months), the program tracking data will be reviewed for application of TRM v6.0 parameters. The evaluation team will provide a memorandum of findings to ComEd at each interval.

After the program year, a thorough review of savings calculations will be performed. Gross kWh, kW and Peak kW savings will be calculated across all program bulbs using the following equations:

Annual kWh Savings = Program bulbs \* Delta Watts/1000 \* Annual HOU \* Realization Rate

Annual kW Savings = Program bulbs \* Delta Watts/1,000 \* Realization Rate

Annual Coincident Peak kW Savings = Annual kW Savings \* Peak Load Coincidence Factor[[20]](#footnote-20)

Where Realization Rate = Installation Rate \* (1-Leakage Rate) \* Interactive Effects

Navigant will perform tracking system review and M&V project sampling in three waves in CY2018. The first wave of M&V sampling is expected to cover about one-third of the projects.

Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Sampling Waves

1. First wave sample drawn in April 2018 and completed June 2018
2. Second wave sample drawn in August 2018 and completed October 2018
3. Final wave starts December 2018 (or projects completion date)

For the verification analysis in CY2018, the evaluation team will calculate gross savings using the following parameter estimates:

* **Program Bulb Sales** data will be obtained from the CY2018 Instant Discounts tracking database.
* **Program Bulb Installation Rates** (both current program year and delayed program year installations) will come from the IL TRM v6.0.
* **Delta Watts** will be calculated using the lumen-equivalence mapping in the IL TRM v6.0.
* **Non-Residential HOU and Summer Peak CF** estimates will come from the IL TRM v6.0.
* **Residential/Non-Residential Bulb Installation** estimates will come from the IL TRM v6.0.[[21]](#footnote-21)
* **Energy and Demand Interactive Effects** will be estimated using the algorithms presented in the IL TRM v6.0.

The calculation of carryover savings will be broken out by measure and based on the following parameter estimates:

* **Delta Watts** – Verified savings estimate from the year of installation (source: IL TRM v6.0).
* **Res/NonRes Split** - Evaluation research from the year of purchase (PY9 Report and IL TRM v4.0).[[22]](#footnote-22)
* **HOU and Peak CF** – Verified savings estimate from the year of installation (source: IL TRM v6.0).
* **Energy and Demand IE** – Verified savings estimate from the year of installation (source: IL TRM v6.0)
* **Installation Rate** - Verified savings estimate from the year of purchase (source: PY9 report and IL TRM v4.0).6
* **NTGR** – Evaluation research from the year of purchase (source: PY9 report and SAG recommended NTGR for PY8)6.

Core data collection activities will include the following:

Table 3 below summarizes data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions in CY2018.

**Table 3. Core Data Collection Activities and Sample**

|  |  |  |  |
| --- | --- | --- | --- |
| What | Who | Target Completes CY2018 | When |
| Purchaser CATI Surveys | Program Participants | 500 | Jun, Oct, Jan |
| Purchaser Web Surveys | Program Participants | Jun, Oct, Jan |
| Distributor Web Surveys | Non-Residential Lighting Distributors | Census | December |
| In-depth Distributor Telephone Interviews | Non-Residential Lighting Distributors | As needed | January |
| Program Manager and Program Implementer Interviews | Program Manager and Program Implementers | NA | Ongoing |

The **Program Tracking Data** collected for the CY2018 gross impact analysis will allow us to verify rebated measure sales and understand the characteristics of the installed measures that drive savings (such as bulb type and wattage).

**Web-Based Purchaser Surveys** will be used as the primary data collection technique for end users in CY2018. Web surveys are distributed via purchaser email addresses collected by the trade allies at the time of purchase. These web surveys will be used to verify measure receipt and installation of program bulbs, collect data on the characteristics of the facility (such as business type and room location where program bulbs are being installed, which are related to hours-of-use [HOU] and Peak Coincidence Factor [CF] estimates), and gather other information that will help inform other key lighting parameter estimates (Delta Watts, Installation Rate) for the gross impact analysis. Additionally, as part of this research we will quantify the leakage of program bulbs outside of ComEd service territory and the proportion of program bulbs that are installed in residential locations. Finally, data to support NTGR estimation, including customers’ awareness of program-discounted lamps, and key considerations when purchasing bulbs (price, energy usage, bill savings, etc.) will be gathered.

**CATI (Computer-Assisted Telephone Interviewing) Participant Telephone Surveys** in CY2018 will be used as a supplementary[[23]](#footnote-23) source of data to estimate several gross and net impact parameters, such as leakage, spillover, and free ridership. In prior evaluations, some customers did not provide email addresses or were unresponsive. CATI surveys will be used as a supplement to the web-based survey to achieve the desired number of completes.

**Web-Based Distributor Surveys** will also be used as a supplementary[[24]](#footnote-24) source of data to estimate several gross and net impact parameters, such as leakage, spillover, and free ridership in CY2018. Distributor surveys will also be used to explore process-related issues such as their experience with the rebate application and submission process, availability of approved products and incentive levels, and any recommendations for improving and streamlining the program. A web-based survey will be administered to all program distributors (via email) near the end of the program year. The evaluation team does not anticipate that all distributors will complete the survey, but, with the assistance of ComEd program staff, will make every effort to ensure responses are representative of all types of program distributors. This effort was highly successful in PY7, PY8, and PY9, and we anticipate a high completion rate again in CY2018.

**In-depth Distributor Interviews** will be conducted on an as-needed basis to clarify responses received in the web-based distributor survey and to probe specific issues that are of high interest to ComEd. The content and focus of these interviews will be refined over the course of the program year during the monthly evaluation calls with the Instant Discounts program manager and implementers.

**Program Manager and Program Implementer Interviews** will be conducted with the ComEd Instant Discounts program manager as well as DNV GL staff, who manage the implementation of the Instant Discounts Program. These interviews will focus on program design, data collection, program participation, challenges and changes to the program. Interviews with the program manager and program implementer will be informally conducted on an ongoing basis through monthly evaluation calls.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| BILD Measure Type | CY2018 Deemed NTG Value[[25]](#footnote-25) |
| BILD - LEDs | 0.78 |
| BILD - Linear Fluorescents | 0.75 |
| BILD – LED Exit Signs | 0.80 |
| BILD – Battery Chargers | 0.80 |
| BILD – Linear LED | 0.80 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

The evaluation team will conduct NTG research in CY2018 that will support the calculation of a NTG ratio that can be used for deeming purposes for future years. To estimate the Instant Discounts Program NTGR in CY2018, two primary methods will be pursued: (1) Customer self-report (based on End-User Web and Telephone Surveys), and (2) Supplier self-report (based on the Distributor Web Surveys). Both methods will focus on estimating free-ridership and participant and nonparticipant spillover. Use of multiple methods for NTGR determination is appropriate, given the dynamic nature of the lighting market and the fact that no single method can definitively capture the extent of program influence. The two methods used will approach net-to-gross estimation using information unique to each data collection method:

* Customer Self-report – Influence of the program on lighting technology purchased, the number of program bulbs purchased, the timing of program bulb purchases, and the purchase of additional non-rebated high efficiency bulbs.
* Distributor Self-report – Estimates of program bulb sales with and without the program rebates. Whether the program has any impact on program distributors’ decision to carry any additional high efficiency lighting products will also be explored.

The evaluation team and ComEd have expressed concern about using a self-report method for purchases made many months prior to evaluation activities. To address this concern, the evaluation team began deploying surveys at regular intervals (every four to five months) throughout the program year, beginning in PY9. This will continue in CY2018 as outlined in Table 5 below.

Navigant will conduct a NTG study in CY2018 to provide NTG values for potential deeming in future program years through surveys with CY2018 participating customers. We will complete web and CATI surveys with a minimum of 350 contacts who participated in the CY2018 program to quantify participant free-ridership and spillover. We will attempt contact with all participants in the population (for which contact information is available). Surveys will be distributed to all program participants to counteract historically low response rates for this midstream program (<10%), with the goal of providing a 90/10 confidence/precision level of NTG ratios for each major technology grouping (LED lamps, TLEDs, and linear fluorescents) and program-level savings.

***Lifecycle Savings Estimation – Effective Useful Life Research***

The CY2018 evaluation will continue to examine and refine EULs for measures in the Instant Discounts Program as part of a cross-cutting activity across all programs.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible.

***Process Evaluation***

The process evaluation will include a brief synthesis of both qualitative and quantitative data collected during the program participant surveys and the distributor surveys. There are several process-related topics that can be explored using the data collected for NTG and other researched parameters including:

* Awareness of the discount provided by ComEd
* Importance of distributor recommendations for efficient lamps
* Importance of ComEd supplied informational materials
* Importance of company or industry standard practice
* Business-type distribution

Additionally, the distributor surveys will be used to explore additional process questions. As indicated previously, the focus of this process research will be refined over the course of the program year with input from ComEd. Potential topics may include:

* Distributor experience with the newly added TLEDs in terms of product diversity, product quality, incentive amounts, and sales outside the program.
* Distributor experience with program incentive levels and co-pays for LEDs given widespread customer adoption and rapidly changing prices.

Monthly Evaluation Calls:

As in the PY9 evaluation cycle, the evaluation team will be conducting monthly calls with the ComEd program lead to improve communication and to better tailor evaluation activities to suit ComEd’s objectives. The general discussion items for these 30-minute calls will include:

* Planned evaluation tasks
* Data requirements
* Planned project or data reviews
* Setting expectations for the next month

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018. Possible topics may include, but will not be limited to, research on impact of public sector projects introduced into the program, and investigation of the popularity of T12 retrofit lightings in the market to understand the viability of continuous use of T12s as a baseline measure in Illinois.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | February 9, 2018 |
| CY2018 Wave 1 program tracking data for verification and sampling | ComEd | April 30, 2018 |
| CY2018 Wave 1 early impact verification memo | Evaluation | May 31, 2018 |
| CY2018 Wave 1 participating customer survey | Evaluation | June 30, 2018 |
| CY2018 Wave 2 program tracking data for verification and sampling | ComEd | August 30, 2018 |
| CY2018 Wave 2 early impact verification memo | Evaluation | September 30, 2018 |
| CY2018 Wave 2 participating customer survey | Evaluation | October 30, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| CY2018 Program tracking data for sampling Wave 3 | ComEd | December 15, 2018 |
| CY2018 Distributor survey | Evaluation | December 30, 2018 |
| CY2018 Wave 3 participating customer survey | Evaluation | January 31, 2019 |
| CY2018 Final program tracking data for verification | Evaluation | January 31, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| NTG Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 7, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 28, 2019 |
| Revised Draft by Navigant | Evaluation | April 8, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 15, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 29, 2019 |

ComEd LED Street Lighting Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The LED Street Lighting Program seeks to secure energy savings through targeting municipalities with municipal and/or ComEd-owned high-intensity discharge (HID) street lights to replace mercury vapor (MV) and high-pressure sodium (HPS) fixtures with light-emitting diode (LED) fixtures. The program incentivizes early retirement of HID street lights. There are approximately 600,000 municipal-owned and 150,000 ComEd-owned street light fixtures in the ComEd service territory. Assuming that 85% of these street lights are HID lighting fixtures, that leaves approximately 510,000 municipal and 125,000 ComEd-owned fixtures serving municipal customers. The cost savings analysis for municipal-owned fixtures is the energy and maintenance savings. For ComEd-owned fixtures serving a municipality, the municipalities pay a monthly fee that recovers installed capital cost, maintenance cost and electricity cost based on a fixture included street lighting tariff. Municipalities seeking to exchange a ComEd-owned fixture for a more efficient LED fixture prior to the existing fixture’s failure would pay a fee (including compensation for ComEd’s stranded asset) of approximately $350 per fixture. Incentives offered under this proposed program would cover this fee, promoting early retirement of the existing HID fixtures for more efficient LED fixtures.

In CY2018, ComEd’s target is to replace a total of 142,975 (private and public sector combined) fixtures and produce 95,020[[26]](#footnote-26) MWh of net energy savings.

Notable program changes made from PY9 to CY2018 include:

* In PY9, both the municipality-owned and the ComEd-owned fixtures will be managed by the same ComEd program manager.
* The municipality-owned incentive will be significantly less (less than 50%) after the PY9 program year.

The evaluation will assess ComEd’s LED Street Lighting tracking data for consistency and accuracy of use of values and proper application of Illinois Technical Resource Manual (TRM) LED savings values. The hours of use agreed to by ComEd and the Illinois Commerce Commission for LED Street Lights is 4,303 hours per year.

***Coordination***

Navigant will coordinate with the Ameren evaluation team on issues relevant to this program.

**Evaluation Research Topics**

The primary objectives of the evaluation of the LED Street Lighting Program are to: (1) quantify gross and net savings impacts from the program, and (2) as the program evolves, make recommendations to enhance the program.

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. What updates are recommended for the Illinois Technical Reference Manual, including hours of operation?

**Process Evaluation and Other Research Topics**

The evaluation team will conduct a limited process evaluation by interviewing the program manager to explore opportunities to enhance the program. Additionally, the evaluation team would interview municipalities to determine and deem the net-to-gross (NTG) value for municipality-owned fixtures. The process research will address the following questions:

1. Does the municipality determine the type of fixture to be installed?
2. Are the installed fixtures eligible for incentives?
3. What are the marketing strategies for this program, and are they effective?
4. How can the program be improved?
5. How is the transition into CY2018 along with the public-sector programs impacting the program?

**Operations and Maintenance Cost Research**

Navigant will comprehensively investigate avoided operations and maintenance (O&M) costs for both ComEd-owned and municipality-owned fixtures. The primary objectives of this investigation are to identify the types of maintenance that are avoided by LED retrofits, and quantify the O&M cost savings resulting from installing LED street lighting in lieu of traditional HID street lighting.

The evaluation team will complete a literature review to understand and synthesize the existing research on the installation of LED street lighting in lieu of traditional street lighting. This review will primarily focus on O&M cost savings attributable to LED street lighting and other relevant measure characteristics. Navigant will compile and review relevant reports and studies from reputable sources including, but not limited to, Illuminating Engineering Society of North America, DesignLights Consortium, the Lighting Design Lab and national laboratories.

Navigant will research best practices in utility program offerings pertaining to LED street light replacement at two-three peer utilities. This research will focus primarily on examining implementation methodology employed by the peer utility to work with local municipalities to ensure the success of their LED street lighting program. As a part of this task, Navigant will also review the current ComEd LED street lighting program using available information to determine the programmatic baseline to which other peer programs can be compared. If possible, Navigant will seek to interview local municipalities that have undergone LED street lighting projects to gather O&M cost data and other relevant measure characterization data.

Based on collected data and information, Navigant will evaluate the avoided O&M costs and other relevant measure characteristics associated with LED street lights. The results of this analysis will be tabulated and included in the final deliverable memorandum. The evaluation team will draft a memorandum to ComEd detailing the results of its study and data evaluation. All external sources will be carefully documented. All data regarding O&M costs or other relevant measure characteristics will be tabulated, and any analysis used will be thoroughly detailed.

**Evaluation Approach**

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in Table 1.

**Table1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Verification and Gross Realization Rate | X | X | X | X |
| Process Analysis[[27]](#footnote-27) | X | X | X | X |
| NTG Review | X |  | X |  |

Table 2 below outlines the evaluation activities to be completed for CY2018.

**Table 2. Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Engineering File Review and Tracking Data Review |
| Program Manager and Implementer Interviews and Review Materials | Yes |

The CY2018 net-to-gross (NTG) study will include in-depth interviews with participating customers to learn about participant perspectives and satisfaction with the program, the energy assessment services and incentive offerings, and how to improve the program in the future.

Table 3 summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In-Depth Interviews | Program Management and Implementers | 1 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | Engineering File Review | All | April 2018 – Feb 2019 | Three Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| Researched NTG and Process | Telephone Survey with Participating Municipalities | ~10-15 | June 2018 – March 2019 | Various† |
| National Electrical Manufacturers Association (O&M) Cost Research | Literature review, secondary research | Census | April 2018 – March 2019 | Research |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

† The evaluation team will seek ComEd’s guidance to reach out to municipalities for process interviews.

The proposed gross impact sampling timelines are shown below.

***Gross Impact Evaluation***

The program key gross impact evaluation activities for CY2018 will be based on (1) reviewing the tracking system to determine whether all fields are appropriately populated, (2) reviewing the hours of use information in the tracking system for competitive and non-competitive customers and provide recommendations based on research, if necessary, and (3) cross-checking measure totals and savings recorded in the tracking database.

***Verified Net Impact Evaluation***

NTG is deemed at 1.0 for ComEd-owned fixtures while Navigant needs to determine NTG values for municipality-owned fixtures through process interviews.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| ComEd-owned fixtures | 1.0 |
| Municipality-owned fixtures | TBD |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

Navigant will conduct a participating customer NTG study in CY2018 to provide NTG values for municipality-owned fixtures for potential deeming in future program years through surveys with CY2018 participating municipalities.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated, if possible.

***Process Evaluation***

In CY2018, Navigant will interview the program manager to understand changes in the program, and to make recommendations on program enhancements.

Navigant will perform additional process research and interview municipalities to determine and deem the NTG value for municipality-owned fixtures.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 Wave 1 program tracking data | ComEd | June 1, 2018 |
| Wave 1 project documentation, engineering review and memo | Evaluation | August 15, 2018 |
| Wave 1 O&M Cost Research Data | ComEd | July 2, 2018 |
| CY2018 program tracking data | ComEd | January 30, 2019 |
| O&M Cost Research Findings | Evaluation | December 28, 2018 |
| Process Analysis Findings (municipality-owned fixtures) | Evaluation | December 28, 2018 |
| Internal Report Draft by Navigant | Evaluation | March 2, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 11, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 4, 2019 |
| Revised Draft by Navigant | Evaluation | April 12, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 19, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 28, 2019 |

ComEd, Nicor Gas and Peoples Gas and North Shore Gas Retro-Commissioning Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Retro-Commissioning Program seeks to realize energy saving through the retro-commissioning process where the emphasis is on restoring building systems or optimizing controls to meet the needs of the current building occupants and save energy. Retro-commissioning is a study-based process that generates saving through an improved understanding and operation of the existing equipment, rather than capital outlay for installing new equipment.

The Retro-Commissioning Program is managed by ComEd, and ComEd coordinates with Nicor Gas and Peoples Gas (PGL) and North Shore Gas (NSG) companies to account for gas savings generated through the program. The program continues to evolve to serve more diverse customer segments. To reach smaller customers and market segments, the utilities began expanding the program to support additional offerings in the fifth electric and second gas program years (PY5/GPY2) and in the seventh electric and fourth gas program years (PY7/GPY4).

Traditional retro-commissioning (RCx) represents the original retro-commissioning program offering for large commercial buildings and completes a four-phase retro-commissioning process (Planning, Investigation, Implementation, and Verification). Projects are unique and savings are determined using custom calculations developed by service providers, implementation contractors, and the evaluators.

Monitoring Based Commissioning (MBCx) is a long-term engagement between the retro-commissioning service provider (RSP) and customer to identify, implement, and monitor measures over time. MBCx features the integration of monitoring software into the building automation system to assist in the identification of deeper energy saving opportunities than found in traditional RCx. It can also be used as a process to continue and augment prior projects that will help ensure measure persistence and improve building operations over time.

RCxpress is an offering targeted to mid-sized commercial buildings or buildings interested in a shorter project timeline. RCxpress is differentiated by a more streamlined approach, without a planning phase, to retro-commissioning with a targeted list of measures and use of program calculators in addition to custom calculations for savings estimates.

RCx Building Tune-Up (Tune-Up) is for commercial and retail customers less than about 150,000 ft2 but with more than 100 kW of peak demand. This offering is more prescriptive and offers an implementation incentive.

Grocery RCx is for full service and convenience grocery stores and retail refrigeration systems. It is in the progress of being incorporated into the Tune-Up offering.

Table 1 shows the Nexant estimated participation and ComEd savings goals as of March 2017.

**Table 1. Anticipated Participation and Savings Goals by Program Offering**

|  |  |  |
| --- | --- | --- |
| Program Offering | Estimated Participants CY2018 | Gross GWh Savings  Goals – CY2018 |
| RCx | 14 | 11 |
| MBCx | 13 | 5 |
| RCxpress | 42 | 8 |
| Tune-Up[[28]](#footnote-28) | 90 | 9 |
| All Offerings | 149 | 33 |

*Source: Nexant estimates and ComEd goals*

Notable program changes made from PY9 to CY2018 include:

* Integration of the grocery pilot program offering into the Tune-Up offering.
* Increased RSP fee and implementation incentives for Tune-Up.
* Integration of Public Sector customers with the current program offerings.

The program process evaluation and NTG research will interview service providers and participants in alternating years. This schedule is consistent with the planned every-other-year process/NTG research for ComEd.

The primary objectives of Retro-Commissioning Program evaluation are: (1) to quantify net savings impacts in therms, kWh, and kW from the program during CY2018 and identify any systemic problems with calculators; (2) to update net-to-gross parameters for program offerings for both gas and electric savings in 2019 and 2021; and (3) to determine key process-related program strengths and weaknesses and identify ways in which the program can be improved. The process evaluation will include program management and the experiences of active retro-commissioning service providers (RSPs) and participants.

The CY2018 gross impact evaluation will not vary significantly from the previous years, but adjustments will be made to reflect specific measure and project characterizations.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 2. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys |  | X |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews |  | X |  | X |
| Impact – Project-specific Billing Analysis | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | X |  | X |
| Net-to-Gross – Trade Ally Interviews |  | X |  | X |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams and other utilities on any issues relevant to this program. Specifically, all offerings are administered by Nexant on behalf of ComEd. A collaborative agreement between ComEd and the gas utilities promotes estimating complementary gas savings at ComEd customer sites for all program offerings. The ComEd Retro-commissioning Program evaluation plan parallels the planned work for the Ameren Illinois (AIC) Retro-commissioning Program. Both programs will conduct annual impact evaluations. Depending on the number of completed projects the AIC impact analysis may include a sample or census of participants. Approximately 30% of sampled projects will also receive on-site verification. Ameren expects a shift toward smaller projects and more public-sector projects in CY2018-CY2021. They currently do not plan on changing their general offering.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable topics:

**Impact Evaluation**

1. What are the program’s first year verified gross savings?
2. What are the program’s first year verified net savings?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 may focus on persistence, channeling and program delivery, and may address the following questions:

1. How do participants impact persistence?
2. Why do Tune-Up customers drop out of the program?
3. How can controls contractor bottlenecks be alleviated?
4. How can channeling be increased across the portfolio?
5. How can reports be made more valuable to the customers and offer next steps that are easier to follow?

**Evaluation Approach**

Navigant has prepared a plan to identify evaluation tasks for each program offering (Table 3). We propose a full impact evaluation and reduced process evaluation research in CY2018. In keeping with the historic pattern, we will conduct full process evaluations in alternate years CY2019 and CY2021.

Navigant conducted impact research in each of the years the program has been offered. Due to the custom analysis for each project, we anticipate continued impact research for each program year.

Navigant will use impact methodologies from the International Performance Measurement and Verification Protocols (IPMVP), as appropriate for the market segment we are researching. As in prior years, we expect to use engineering file review and follow-up monitoring (IPMVP – Option A or B) for comprehensive, MBCx, and RCxpress projects in the on-site sample; however, evaluation methods may differ based on the participant channels and individual site circumstances.

Depending on the measure mix (anticipated dominance of scheduling measures), Navigant may opt to use regression methods with meter data (IPMVP – Option C) for Tune-Ups or select measures in other offerings – matching lower-cost evaluation methods with a lower-savings per project program offering. If the measure-mix assumption does not bear out on a project-by-project basis, Tune-Up will be evaluated with IPMVP – Option A or B. For Grocery RCx projects submitted through the Tune Up offering, Navigant will review the refrigeration system simulation used for ex ante estimates and we anticipate the evaluation using regression methods with available data for evaluation.

Navigant will conduct primary or secondary research into effective useful life of key retro-commissioning measures, to support updates to the TRM and other persistence study efforts.

We anticipate conducting NTG research in CY2019 and CY2021.

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Preliminary of planned and ongoing | Three waves |
| In Depth Interviews | Program Management and Implementers | 4 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | Early Feedback File Review | 20 | June 2018 – Feb 2019 | Early Feedback for Large Projects |
| Gross Impact | Engineering File Review | 57 | April 2018 – Feb 2019 | Three Waves\* |
| Gross Impact | On-site M&V | 28 | May 2018 – Feb 2019 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | 57 | March 2019 |  |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | TBD | April 2017 – March 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

† Trade ally surveys are triggered by high importance ratings by participating customers to the trade ally or vendor. Therefore, the number of trade ally or vendor surveys is dependent on the results of the participating customer surveys.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The two waves of M&V sampling are expected to cover about half of the projects.

Proposed gross impact sampling timelines are shown below.

***Gross Impact Evaluation***

RCx, MBCx, and RCxpress offerings enroll similar participants and use an overlapping pool of service providers. As such, these projects will be sampled by size-based strata and analyzed together. The RCxpress offering participants may form its own stratum(a) in the sampling protocol to ensure adequate representation in the sampling. All the sampled projects will be subject to engineering file review and on-site inspection and verification of installed measures. Navigant will employ IPMVP – option A or B. Gross impact estimates will mimic ex ante methods to the extent they are reasonable and accurate per data collected during verification steps. The evaluation team will modify calculations if methods are not reasonable or if verified operation differs from what was reported.

The sampling plan for these three offerings will target overall 10 percent precision at 90 percent confidence using the stratified ratio estimation technique to optimize sample size and control evaluation costs. The strata will be defined by project size and offering type.

The Tune Up impacts will be verified by engineering file review and determined with regression analysis of trend or utility billing data and weather or other independent variables that affect energy use (for example, days of operation), as appropriate. This approach parallels IPMVP Option B or C, depending on which data are used. On-site verification will attempt to confirm that measures implemented for the program persist until evaluation verification. If implemented measures are not amenable to regression analysis, the engineering review will form the basis of evaluated savings using IPMVP Option A. This review process may point to special needs of this market segment. Navigant will sample Tune Up projects to report an offering-specific realization rate at 90/10 confidence and precision.

Natural gas impacts will be sampled and evaluated in a similar fashion to ensure 90/10 confidence and precision for each gas utility. All projects with gas savings will be organized in a single sampling frame and stratified for sampling by savings magnitude. To avoid over-sampling of electric savings participants, Navigant will sample gas projects first and then sample the appropriate number of electric-only projects to complete the sample.

Navigant will perform tracking system review and M&V project sampling in three waves in CY2018. The first wave of M&V sampling is expected to cover about one-quarter of the projects.

Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Sampling Waves

1. First wave sample drawn in April 2018 and completed in July 2018
2. Second wave sample drawn in August 2018 and completed November 2018
3. Final wave starts January 2019 (or project’s completion date).

Table 4 below summarizes data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions for each program offering. For planning purposes, Navigant assumes CY2018 participation based on March 2017 estimates: RCx (14), MBCx (13), RCxpress (42), and Tune-Up[[29]](#footnote-29) (90)[[30]](#footnote-30). Participation by gas utility customers is unknown now, but we anticipate relatively low counts necessitating attempted census or near-census sampling of gas participants for process and impact research, respectively.

**Table 4. CY2018 Core Data Collection Activities and Sample\***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| What | Who | RCx, MBCx, and RCxpress Target Completes (approx.) | RCx Tune-Up Target Completes (approx.) | When |
| Engineering Review | Participating Customers | 27 | 30 | February 2018 – February 2019 (concurrent) |
| Onsite M&V Audit† | Participating Customers (nested among engineering review sample | 13 | 15 | May 2018 – February 2019 |
| In Depth Interviews | Program Management‡ | 4 | 2 | May 2018 |

\* Final sample sizes may change based on actual participation and stratification

† Onsite M&V Audits are a subset of Engineering Reviews, not a unique sample

‡ Includes interviews with implementation contractor management as well as utility program management. Interviews across offerings may be combined if management teams are shared. Due to the length of the program year, Navigant plans to interview some managers twice.

Navigant will analyze Tune-Up impacts with billing analysis utilizing appropriate meter interval data.

The gross savings impact approach will review the ex ante measure type to determine whether it is covered by the Illinois TRM or whether it is a non-deemed measure that is subject to retrospective per unit savings adjustment of custom variables. The measure type, deemed or non-deemed, will dictate the savings verification approach. We will also make a research estimate of gross savings based entirely on site-collected data and evaluation engineering analysis of savings. The two methods are described below:

1. Savings Verification

* Any measures with per unit savings values deemed by the TRM, or otherwise directed by the TRM, would have verified gross savings estimated by multiplying deemed per unit savings (kWh and kW) by the verified quantity of eligible measures installed. Eligible deemed measures must meet all physical, operational, and baseline characteristics required to be assigned to the deemed value as defined in the TRM.[[31]](#footnote-31)
* Measures with fully custom or partially-deemed ex ante savings will be subject to retrospective evaluation adjustments to gross savings on custom variables. For fully custom measures, Navigant will subject the algorithm and parameter values to evaluation adjustment, where necessary. For partially-deemed measures, TRM algorithms and deemed parameter values will be used where specified by the TRM, and evaluation research will be used to verify custom variables.

1. Evaluation Research Savings Estimate

* The evaluation will also include an analysis of on-site collected verification data for a subset of projects. The engineering analysis methods and degree of monitoring will vary from project to project, depending on whether the measure has deemed savings or not, the complexity of the measures, the size of the associated savings, the potential to revise input assumptions, and the availability and reliability of existing data. The evaluators will contact the implementers prior to conducting site visits to ensure that the evaluation team has all correct and relevant information.

The measure-level realization rates will be extrapolated to the program population using a ratio estimation method to yield ex post evaluation-adjusted gross energy savings. Gross realization rates will be developed for energy and demand savings. The sample design will provide 90/10 statistical validity for non-lighting savings and program savings overall. The sample of 28 on-site visits drawn is also expected to achieve an approximate 90/10 confidence/relative precision level (one-tailed test) to comply with the PJM verification requirements outlined in Manual 18B.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 5. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Offering | CY2018 Deemed NTG Value |
| Comprehensive | 0.95 |
| Monitoring-Based | 0.95 |
| RCx Tune Up | 0.95 |
| RCxpress | 0.95 |
| All Natural Gas | 1.02 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

Navigant is applying the overall values for the other Retro-Commissioning Program offerings to each of the newer offerings (i.e., RCx Tune-Up, and RCxpress). Given that these participants tend to be smaller and have fewer resources, Navigant proposes a NTG value of 0.95 will be appropriate for these offerings until we can apply PY9 research to participants.

***Research NTG Impact Evaluation***

The evaluation team will conduct NTG research to inform NTG recommendations for the future for each program offering. Evaluators will collect NTG data for all program offerings in CY2019 and CY2021. All NTG research will address free-ridership and participant spillover using survey protocols developed by the Illinois EM&V NTG Working Group and incorporated into the TRM.

Our NTG research sampling will attempt a census of service providers participating in each offering. The participant surveys will target a 90/10 sample by program offering. For natural gas NTG research, we will attempt a census of all gas projects. Each gas participant data point will also constitute an electric participant data point.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA) for electric energy efficiency, the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the electric measures installed in CY2018 will be calculated along with the total CPAS across all electric measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

While the core Retro-Commissioning Program has remained stable in design and implementation for several years, repeated issues and new challenges have come to light. Navigant will conduct research into these issues during the years that they are not researching NTG. These issues may include: the role that facility staff and their behavior have in impacting persistence; the impact of controls contractors on project time lines; making reports more valuable to customers and encouraging the next steps; enhancing channeling throughout the portfolio and across different implementers; reducing the number of Tune-Up drop-outs.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018. Possible topics may include, but will not be limited to, research on impact of public sector projects introduced into the program, and effective useful life.

**Evaluation Schedule**

Table 6 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 6. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 6, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | April 30, 2018 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 27, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 27, 2018 |
| CY2018 program tracking data for sampling Wave 2 | ComEd | August 30, 2018 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 30, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| CY2018 Program tracking data for sampling Wave 3 | ComEd | January 18, 2019 |
| Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | January 31, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd, Gas Utilities, and SAG | Evaluation | March 8, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2019 |
| Revised Draft by Navigant | Evaluation | April 11, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 18, 2019 |
| Final Report to ComEd, Gas Utilities, and SAG | Evaluation | April 25, 2019 |

ComEd Non-Residential New Construction Program CY2018 to CY2021 Evaluation Plan

**Introduction**

This plan covers the ninth program year for the Non-Residential New Construction (C&I New Construction) Program. Specifically, this is the tenth program year of ComEd’s energy efficiency savings portfolio (CY2018) and the seventh program year for energy efficiency gas savings (January 1, 2018 to December 31, 2018). Seventhwave implements the program for ComEd, Nicor Gas, Peoples Gas, and North Shore Gas.

This evaluation plan reflects evaluation approaches designed for the unique characteristics of this program and which originated in discussions between the implementation and evaluation teams over the course of the past several years. The primary objectives of this evaluation are as follows:

* Provide adjusted gross impacts for all completed projects using a researched realization rate.
* Provide verified net savings for all electric and gas projects completed in CY2018.
* Use a “real time” approach for the eventual derivation of NTGR, interviewing project representatives as they enter the reservation stage.

The CY2018 program did not change significantly from PY9. The program has continued to develop and offer different program tracks to cater to different types of participants. These include the legacy Comprehensive Track, the Expedited Assistance Track, the Design Replication Track, and the Accelerate Performance Track. The tracks vary in the incentives and technical assistance offered by the program based on the type of project and the point at which the project enters the program.

C&I New Construction Program is coordinated between ComEd, Nicor Gas, People Gas and North Shore Gas Companies. The evaluation activities and timing for each utility evaluation are the same as this is one evaluation effort for all four utilities. Desk reviews and participant interviews are done without respect to which gas utility it is associated. In PY8, there were no gas projects completed in Peoples Gas or North Shore Gas territories. NTG are deemed prospectively with separate NTG values for electric and for gas. Beyond these points, the ComEd evaluation team will coordinate on any relevant evaluation issue on an as needed basis.

***Joint Evaluation Approach***

This plan outlines the evaluation objectives and activities for the program and how results pertain to each utility. To recognize the singular nature of the program, the evaluation team will synthesize process findings from each fuel type into a single set of findings. The impact evaluation work will be slightly more fuel-specific: the electric impact evaluation will focus on a sample of projects with electric savings (75 projects expected in CY2018), while the gas impact evaluation will focus on a sample of projects claiming gas savings (30 projects expected in CY2018).

The CY2018 gross impact evaluation will not vary from the previous years, and will rely on engineering desk reviews. As in past years, the CY2018 evaluation will include rolling customer free ridership research. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 free ridership research will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, the energy assessment services and incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Interviews | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Modeling | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Free Ridership Self-Report Surveys |  | X |  | X |
| Net-to-Gross – Spillover Research |  |  | X |  |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program.

**Evaluation Research Topics**

The objectives of the CY2018 evaluation are as follows:

1. Provide adjusted gross impacts for all completed projects using a researched realization rate.
2. Provide verified net savings for all projects completed in CY2018.
3. Update the verification, due diligence, and tracking system review from CY2018, if needed.
4. Continue the existing approach for NTG derivation. This includes:
   1. Review of program documentation for projects that have recently reached the reservation stage, including:
      1. Project narratives and technical assistance summaries
      2. Design documents collected throughout the customer’s participation process and final design and engineering plans, and building models to help guide in-depth interview questioning. If needed, coordinate with the implementation team to discuss their understanding of the project’s participation prior to the evaluation team interviewing the project contacts.
   2. Collection of NTGR data from an interview conducted within 30 days of, or as soon as possible after the reservation date to minimize possible measurement issues associated with respondent recollection.

The CY2018 evaluation will seek to answer the following key researchable questions:

***Impact Evaluation***

* What are the researched gross energy and demand impacts?
* What are the verified net impacts from the program using SAG-approved NTGRs?
* Did the program meet its energy and demand savings goals? If not, why not?
* What are the free ridership values to be used prospectively in future program years?

***Process Evaluation***

* What design or implementation changes, including changes to the gas portion of the program, occurred in CY2018, and how has this, if at all, changed the way the program is offered?
* What is the level of participation for the different program tracks?
* How do participants’ experience with the program differ for the different program tracks?
* What challenges did the program face over the course of the program year and how did the program respond to them?

**Evaluation Approach**

The table below summarizes the surveys, interviews, and other primary data sources that will be used to answer these research questions in CY2018. We anticipate employing similar sources and data collection activities in the evaluation of future program years, though quantities of projects reviewed will differ.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| In Depth Interviews | Program Management and Implementers | 2 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | Early Feedback File Review | 5 | June 2018 – Feb 2019 | Early Feedback for Large Projects, As Needed |
| Gross Impact | Engineering Desk Review | 30† | June 2018 – Feb 2019 | Two Waves\*† |
| Verified Net Impact | Calculation using deemed NTG ratio | n/a | March 2019 |  |
| Researched NTG and Process | Telephone Interview with Participating Customers | ~50 | April 2018 – March 2019 | FR, Process, Targeting Projects Currently in Reservation Phase |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | n/a | April 2017 – March 2019 | Process, Impact |

Note: FR = Free Ridership

\* The total number of projects receiving engineering desk reviews for each year may change based on the final list of projects and their savings. Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

† Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

Other secondary data sources that will be referenced to answer the research questions include:

**Table 3. Secondary Data Sources**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reference Source | Author | Gross Impacts | Net Impacts | Process |
| Program Tracking Database | Program Administrator | X | X | X |
| Email Correspondence | Program Administrator |  | X |  |
| Building Plans | Program Administrator | X | X |  |
| Program Marketing and Outreach Materials | Program Administrator |  |  | X |
| International Energy Conservation Code (IECC) 2012 | International Code Council | X |  |  |
| ASHRAE Building Standards and Guidelines | ASHRAE | X |  |  |

In line with program changes and accelerated evaluation schedule for delivering tracking data to the valuation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The first wave of M&V sampling is expected to cover about two-thirds of the projects.

Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Sampling Waves

1. First wave sample drawn in July 2018 and completed September 2018
2. Final wave starts January 2018 (or projects completion date)

***Gross Impact Evaluation***

The evaluation team will conduct gross savings research on a sample of approximately 30 projects to determine CY2018 savings and calculate realization rates. This research will include an engineering desk review of each project in our sample. The evaluation team will also develop a summary sheet for each project reviewed that outlines the evaluation activities completed, the resulting changes to the model (as applicable), and the effect on the electric and therm savings claimed.

Per the program design, the baseline for all projects (when not using deemed values) will typically be based on the appropriate Illinois Energy Conservation Code for Commercial Buildings. As in prior evaluations, the evaluation team will use the project’s application date to determine which version of the Illinois Energy Conservation Code, which references the International Energy Conservation Code (IECC), is the most appropriate to use as baseline.

The evaluation team will also calculate interactive savings associated with projects for each utility to be used within the cost-effectiveness analysis by each fuel type. We include all interactive effects for projects the program database indicates are within participating gas companies’ service territories (e.g., the project receives natural gas service from Nicor Gas and electric service from ComEd, but may or may not have received a gas incentive). We will also present researched savings without interactive effects for comparison to utility goals.

Some new construction projects have high uncertainty surrounding the baseline selection (e.g., major renovations with HVAC reconfiguration), resulting in higher risk for downward evaluation savings adjustment. In such cases, a review of the baseline by the evaluation team prior to incentive commitment may reduce savings uncertainty. As a part of monthly evaluation update calls, there will be an opportunity for the program staff to identify projects where they perceive higher uncertainty. After discussion, the program staff and evaluation team may agree to have the evaluation team follow-up with a brief but deeper review of project details, and provide feedback on baseline selection within 10 days. The evaluation follow-up review will be optional, advisory and non-binding, but may serve to reduce downward savings adjustments.

***Gross Impact Evaluation Sampling Approach***

The evaluation team plans to create two sample frames, one focused on electric projects and the other focused on gas projects. The electric sample frame will be composed only of projects with electric savings. These projects may or may not have gas savings and may or may not be in any of the participating gas utilities’ service territories. The gas sample frame will consist of all gas projects with positive therm savings before interactive effects from electric measures, regardless of whether the project received a gas incentive.[[32]](#footnote-32) Within each of the sample frames, we plan to use a stratified random sample design. Each sample will be designed to reach 90% confidence and 10% precision two tailed for MWh and therms, respectively. The overall sample will include 30 projects, approximately 12 of which will have received gas incentives.[[33]](#footnote-33)

**Table 4. Estimated Number of Projects in Sample**

|  |  |
| --- | --- |
| Fuel-Type | Estimate of Projects in Sample (Approximate) |
| Electric | 18 |
| Gas | 12 |
| **Total** | **30** |

Navigant will perform tracking system review and M&V project sampling in three waves in CY2018. The first wave of M&V sampling is expected to cover about one-third of projects completed in CY2018. Proposed gross impact sampling timelines are shown below.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 5. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Utility | CY2018 Deemed NTG Value |
| ComEd (MW and MWh) | 0.60 |
| Gas Utilities (therms) | 0.77 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, PGL\_and\_NSG\_GPY7\_NTG\_Values\_2017-03-01\_Final.xlsx, and Nicor Gas GPY7 NTG Values 2017-03-01 Final.xlsx*

***Research NTG Impact Evaluation***

The team will implement a real-time approach for deriving the NTGRs, which captures data as projects progress through the stages of participation. This methodology will include the following:

1. **Documentation Review.** The evaluation team will begin by reviewing the documentation on each sampled project provided by Seventhwave to identify potential points of influence. This component will include:
   1. Reviewing project narratives for indications of program influence.
   2. Reviewing building plans from throughout the project’s participation to identify changes in efficiency throughout the construction process.
   3. If needed, discussing the project with Seventhwave to confirm areas where Seventhwave believes the program was influential.
2. **Post-Reservation Interview.** Once a sampled project reaches the reservation stage, Seventhwave will provide the evaluation team contact information for key decision makers and the team will conduct a post-reservation interview within 30 days or as soon as possible. We will also incorporate customized questions for each project linked to the points of influence identified in the documentation review. During these interviews, the team will also collect process data.

To fully implement the real time NTGR approach, we will conduct interviews with all projects currently in the reservation stage, regardless of program year, to best capture the program’s early influence. Because we will attempt to interview a census of projects, no sampling of projects or differentiation between electric and gas savings is needed. While we will attempt a census of all such projects, based on past evaluations, we expect to complete about 50 interviews.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA) for electric energy efficiency, the electric measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The program instituted several new participation tracks to the program in EPY9/GPY6 and these are fully rolling out in CY2018. The process evaluation explores participants’ characteristics, satisfaction, and experiences, as well as other program implementation changes—such as changes to the program’s marketing and outreach strategy, and program challenges. We will collect this information through program manager interviews program participant interviews, and a review of program materials. In program participant interviews, we will ask about their experience with elements of the specific program tracks, as applicable, to provide the program with actionable information about the different tracks.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018. Possible topics may include, but will not be limited to, research on impact of public sector and affordable housing projects introduced into the program and investigation of the effects of codes and standards on the baseline of new construction in the ComEd service territory.

**Evaluation Schedule**

Table 6 below provides the schedule for key deliverables and data transfer activities. (See Table 2 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 6. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Monthly calls with program/implementation staff | Evaluation Team, ComEd | Ongoing |
| CY2018 program tracking data for participant interviews | ComEd | April 1, 2018 |
| Post-reservation phase participant interviews | Evaluation | April 1, 2018 through November 30, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| Wave 1 engineering desk reviews | Evaluation | September 30, 2018 |
| Process Analysis Findings | Evaluation | December 15, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| CY2018 program tracking data for sampling Wave 2 | ComEd | January 30, 2019 |
| Wave 2 engineering desk reviews | Evaluation | February 28, 2019 |
| NTG Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd, Gas Utilities, and SAG | Evaluation | March 8, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2019 |
| Revised Draft by Navigant | Evaluation | April 9, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 16, 2019 |
| Final Report to ComEd, Gas Utilities, and SAG | Evaluation | April 24, 2019 |

ComEd Operational Efficiency Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Operational Efficiency Program (OEP) is made up of several, specific low-cost and operational measures that are identified as a part of a ComEd engineering commercial & industrial facility assessments. OEP measures are not covered by the Custom or Standard Programs due to their no cost or low-cost nature. OEP measures are identified in the custom and standard audits and included within the OEP Program. These measures focus on taking advantage of equipment already installed at the site or applying maintenance or operational best practices to realize energy savings for little or no investment by the customer. During the audit, OEP measures are identified and then placed in the OEP tracking system. Implementation may or may not occur at the time of the audit. If it does not occur during the audit, outreach follows up with the customer to see if the operational measures were implemented.

To calculate the savings for measures included in this program, the utility staff has developed a calculator for each measure. The measures identified through this program include, for example, turning off lighting and equipment when not needed, addressing air compressor issues such as leaks and high-pressure adjustments, adjusting space temperatures with pre-existing controls and simple HVAC maintenance.

In year one, Navigant’s evaluation of this program focused on suggesting adding more measures to the program, reviewing the calculation workbook used for the program and completing a detailed survey with the program manager. This year Navigant will focus on site savings through desk reviews of individual projects. Through this process Navigant hopes to calculate a realization rate of program savings based on a sampled number of projects and look for inefficiencies in measure documentation.

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

***Impact Evaluation***

1. How was site information used within the calculators?
2. Do the calculators reflect considerations for standard practice while also accurately reflecting site practice?
3. Do certain measures or groups of measures have fundamental errors that need to be corrected to prevent incorrect estimates of savings?

***Process Evaluation and Other Research Topics***

1. How is measure information collected during and after the initial audit?
2. How is measure information recorded?
3. Is the collected information stored in such a way that it can be easily reviewed and what gaps of information collection exist in current practice?

**Evaluation Approach**

***Overview***

In CY2018, Navigant will focus on site specific savings calculations and processes around the collection and recording of individual site data. Navigant will use telephone supported desk reviews to review individual site savings. These reviews will involve:

* Reviewing each calculation method for each site
* Checking all assumptions and inputs against site information
* Identifying any potential discrepancies and following up with sites as needed

Navigant will complete a process survey with the program management team focused on data collection and recording for individual site projects. This interview will focus on how information is currently collected and how these practices could be improved.

**Table 1. Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY20182018 |
| Gross Impact Approach | Engineering Calculation Desk Review |
| Gross Sampling Frequency | One Time |
| Verified Net Impact Approach | Engineering Calculation Desk Review |
| Researched NTG Approach | None in CY2018; NTG in CY2019 |
| Program Manager and Implementer Interviews/ Review Materials | Yes |
| Participant Interview | As needed during desk review |
| Effective Useful Life Determination | None |

Gross savings will be calculated through a detailed desk review of the sampled projects. Any resulting changes to savings will be rolled up to the sample and a program level realization rate will be calculated. No primary NTG research has been done for this program at this point. If the program continues to grow substantially, then we expect that it will be important to measure NTG in CY2019.

Due to the wide range of measures included in the program, it is difficult to calculate a program measure life. Instead, the program should consider calculating measure life for each of its individual measures and apply this measure life on a site-by-site basis. If requested, Navigant will provide input on individual measure life based upon secondary research in CY2018.

***Data Collection, Methods, and Sample Sizes***

For CY2018, Navigant will be completing several site-specific calculation reviews. The sampling plan for this review will target overall 10 percent precision at 90 percent confidence using the stratified ratio estimation technique to optimize sample size and control evaluation costs. The strata will be defined by project size and offering type. Depending on the need of the program, Navigant may review a sample of projects in 2018, but the size of this sample will be determined later.

**Table 2. Core Data Collection Activities and Sample**

|  |  |  |  |
| --- | --- | --- | --- |
| What | Who/What | Target Completes 2018 | When |
| Engineering Calculation Desk Review | Implementer Tool | \* | April – August 2017 |
| Program Manager Interview | Implementer | 1 | April – August 2017 |

\*The size of the sample will be determined later once full program data is available.

***Gross Impact Evaluation***

The impact evaluation will be grounded in site-specific desk reviews. Navigant will collect individual site calculation data, review all calculation assumptions and follow up with sites as needed to update any inputs within the calculations.

***Verified Net Savings Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program. For CY2018 that ratio is 0.91.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated for each measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The process evaluation research will be informed by a Navigant staff site-by-site measure review, as well as an in-depth program manager interview.

**Evaluation Schedule**

Table 3 below provides the schedule for key deliverables and data transfer activities for 2018.

**Table 3. Evaluation Schedule**

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered |
| CY2018 Site Calculations are available to Navigant | ComEd | Q2/Q3 2018 |
| Sample of sites determined and approved | Evaluation | Q3/Q4 2018 |
| Project review | Evaluation | Q3/Q4 2018 |
| Program manager interview | Evaluation | Q2/Q3 2018 |
| Internal Navigant Draft Report Review | Evaluation | March 5, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 12, 2019 |
| Comments on draft (15 Business Days) | ComEd | April 2, 2019 |
| Redraft of Report | Evaluation | April 9, 2019 |
| Comments on Redraft (5 Business Days) | ComEd | April 18, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 26, 2019 |

ComEd Public Housing Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Public Housing Authorities (PHA) Program provides standard and custom incentives for federally assisted low-income and public housing, residential and common areas.

The purpose of this program is: 1) to work with 84 Illinois Public Housing Authorities and their portfolios of 51,693 housing units and other buildings, to achieve electric savings and 2) to support the energy reduction goals established for ComEd in the Future Energy Jobs Bill.[[34]](#footnote-34) This market segment is considered hard to reach and is comprised of the extremely low to very low-income groups, including seniors, disabled, and households on federal assistance. The residents are renters with incomes at or below 30% to 80% of the area median income poverty levels. The program provides outreach, education, and incentives to management of eligible buildings to upgrade old inefficient energy using equipment in residential units, common areas, maintenance and community buildings, and any other buildings they own and manage in ComEd’s territory. In addition, the program partners with Public Housing Authorities, their selected Energy Performance Contractors (EPC), and other funding entities to leverage funds to implement comprehensive energy savings retrofit projects.

Eligibility is limited to applicants who receive electric delivery services from ComEd, and manage a public housing authority located in the State of Illinois or manage one of the four federally-assisted housing programs for the very low to moderately low-income Illinois residents. The program provides incentives for upgrades in electric or natural gas using equipment for both common areas and residential units. Incentives will be awarded in amounts up to, but not exceeding, the cost of the measure for interior lighting improvements, vending machine sensors, ENERGY STAR® rated appliances, high efficiency HVAC equipment and building shell measures.

Franklin Energy Group is the program implementation contractor for this program.

The primary objectives of the CY2018 evaluation of the ComEd Illinois Public Housing Authority Energy (PHA) Program are to: (1) quantify the gross and net savings impacts of the program; (2) conduct research to support the program’s transition in response to the Future Energy Jobs Act (FEJA); (3) investigate potential gas savings (therms conversion) counted as kWh, and (4) determine key process-related program strengths and weaknesses and identify ways in which the program can be improved.

Navigant will research effective methods to reach the Public Housing managers and buildings. This research may include a review of marketing, promotion and operational materials; investigation into why eligible Public Housing buildings are not participating or drop out; and research into trusted sources of EE information for Public Housing.

The CY2018 process study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X |  |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Stakeholder Interviews | X |  | X |  |
| Data Collection – Trade Ally Interviews | X | X |  | X |
| Impact – Billing Analysis | X |  | X |  |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Specifically, Navigant will coordinate impact and process research with the Ameren Illinois Public Housing program evaluation team. Navigant will coordinate with the Ameren team on data collection and survey instrument design to ensure consistency and appropriate questions in the customer and trade ally surveys. Navigant will also coordinate with the Ameren team on recommended updates for the Illinois Technical Reference Manual (TRM), informed by the results of field data collection.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings? What are the verified gross savings from lighting measures? What are the verified gross savings from non-lighting measures?
2. What is the research estimate of gross savings (energy, peak demand, and total demand) for the program?
3. What are the program’s verified net savings?
4. Secondary questions include:
   * Are the ex ante per-unit gross impact savings correctly implemented by the tracking system and reasonable for this program?
   * What updates are recommended for the Illinois Technical Reference Manual (TRM)? What are the results of field data collection?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. Navigant will work with ComEd to determine top priority process research areas. The process research is likely to address methods and approaches to reduce free ridership in lighting and non-lighting measures. This will likely be done in the Fall and Winter of CY2018.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 24. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In Depth Interviews | Program Management and Implementers | 4 | April – Dec 2018 | Augment with monthly calls |
| Onsite M&V Audit | Participating Customers | 40 | June 2018 – Feb 2019 |  |
| Gross Impact | Early Feedback File Review | N | June 2018 – Feb 2019 | Early Feedback for Large Projects |
| Gross Impact | Engineering File Review | 85 | April 2018 – Feb 2019 | Three Waves\* |
| Gross Impact | On-site M&V | x | April 2018 – Feb 2019 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 | NTG deemed at 1.0 |
| Process | Telephone Survey with Participating Customers | 125 | June 2018 – March 2019 | Process. Two Waves |
| Process | Telephone Interviews Trade Allies | ~25 | June 2018 – March 2019 | Process. Two Waves |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | Census | March 2018 – March 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The first wave of M&V sampling is expected to cover about one-third of the projects. Proposed gross impact sampling timelines are shown below.

***Gross Impact Evaluation***

Navigant will perform tracking system review and M&V project sampling in three waves in CY2018. As noted, the first wave of M&V sampling is expected to cover about -third of projects completed in CY2018. Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Sampling Waves

1. First wave sample drawn in April 2018 and completed in July 2018
2. Second wave sample drawn in August 2018 and complete November 2018
3. Final wave starts February 2019 (or projects completion dates)

Core data collection activities will include the following:

1. Engineering examination of ComEd workpapers and tracking system calculations of claimed savings.
2. Engineering review of project documentation at the measure-level for a sample of projects to verify participation and tracking system entries, check documentation of invoiced quantities and installed measure characteristics, confirm compliance with eligibility, and deemed input values.
3. On-site M&V of measure-level savings on a subset of project sites selected from the engineering review sample to estimate site-specific savings. On-site measurement and verification includes participant interviews, baseline assessment, installed equipment verification, and performance measurement. Measurement may include spot measurements, run-time hour data logging, review of participant energy management system trend data, and post-installation interval metering. Our approach to selecting M&V strategies follows the International Performance Measurement and Verification Protocol (IPMVP); Option A or Option B are typically selected.
4. Computer assisted telephone interviews (CATI) with a sample of Public Housing Program participants, including in-depth interviews with trade allies and account managers to research methods and approaches to reduce free ridership.
5. Interviews with program management and key staff with the implementation contractor (IC). Hold regular monthly meetings by telephone with ComEd program staff and the IC staff.
6. The evaluation team will collect PJM demand savings estimates and program and measure-specific cost detail to further ComEd’s PJM auction and TRC analysis.

The gross savings impact approach will review the ex ante measure type to determine whether it is covered by the Illinois TRM or whether it is a non-deemed measure that is subject to retrospective per unit savings adjustment of custom variables. The measure type, deemed or non-deemed, will dictate the savings verification approach. We will also make a research estimate of gross savings based entirely on site-collected data and evaluation engineering analysis of savings. The two methods are described below:

1. Savings Verification

* Measures with per unit savings values deemed by the TRM, would have verified gross savings estimated by multiplying deemed per unit savings (kWh and kW) by the verified quantity of eligible measures installed. Eligible deemed measures must meet all physical, operational, and baseline characteristics required to be assigned to the deemed value as defined in the TRM.[[35]](#footnote-35)
* Measures with fully custom or partially-deemed ex ante savings will be subject to retrospective evaluation adjustments to gross savings on custom variables. For fully custom measures, Navigant will subject the algorithm and parameter values to evaluation adjustment, where necessary. For partially-deemed measures, TRM algorithms and deemed parameter values will be used where specified by the TRM, and evaluation research will be used to verify custom variables.

1. Evaluation Research Savings Estimate

* The evaluation will also include an analysis of on-site collected verification data for a subset of projects. The engineering analysis methods and degree of monitoring will vary from project to project, depending on whether the measure has deemed savings or not, the complexity of the measures, the size of the associated savings, the potential to revise input assumptions, and the availability and reliability of existing data. The evaluators will contact the implementers prior to conducting site visits to ensure that the evaluation team has all correct and relevant information.

The measure-level realization rates will be extrapolated to the program population using a ratio estimation method to yield ex post evaluation-adjusted gross energy savings. Gross realization rates will be developed for energy and demand savings. The sample design will provide 90/10 statistical validity for lighting savings, non-lighting savings, and the program overall. The sample of 40 on-sites drawn is also expected to achieve a 90/10 confidence/relative precision level (one-tailed test) to comply with the PJM verification requirements outlined in Manual 18B.

***Verified Net Impact Evaluation***

The TRM deems NTG at 1.0 for Income Eligible programs.

***Research NTG Impact Evaluation***

The program has historically seen a deemed NTG ratio of 1.0 because the program targeted the income-eligible sector. However, because the income-eligible customers are not typically the decision makers for this program, Navigant believes the TRM NTG working group should consider whether the Affordable Housing New Construction Program should have NTG research performed.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the end-user customer surveys in CY2018. The CY2018 research will consider methods and approaches to reduce free ridership in lighting and non-lighting measures.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018. Possible topics may include, but will not be limited to research on impact of public sector projects introduced into the program and impact of any new offerings and measures.

**Evaluation Schedule**

Table 3 below provides the schedule for key deliverables and data transfer activities. (See Table 2 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 3. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| CY2018 participating customer survey design | Evaluation | June 30, 2018 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 30, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 program tracking data for sampling Wave 2 | ComEd | August 30, 2018 |
| Wave 1 participating customer process survey fielding | Evaluation | Fall 2018 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 30, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| CY2018 Program tracking data for sampling Wave 3 | ComEd | January 30, 2019 |
| Wave 2 participating customer process survey fielding | Evaluation | February 28, 2019 |
| Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 28, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 8, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2019 |
| Revised Draft by Navigant | Evaluation | April 8, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 15, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 24, 2019 |

ComEd Rural Small Business Kits Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The ComEd Rural Small Business Kits (Rural Small Business Kits) Program aims to cost-effectively capture electric savings in small commercial facilities located in ComEd’s rural counties by targeting customers that operate office, restaurant, or other retail facilities with electric hot water and building heating. This is an opt-in program where customers must request to receive an energy efficiency kit that includes self-install measures. The measures included in the energy efficiency kit depend on the type of facility the customer ordering the kit operates, as seen in Table 1 below.

To participate in the program, the ComEd customer must have a peak electric load of 100 kW or below and take delivery from ComEd regardless of their choice of electric supplier, and cannot have participated in the current ComEd Small Business Energy Savings Program. Franklin Energy (Franklin) is responsible for implementing the program and kits are delivered by direct mail. Customers can order a kit via telephone call, mailed reply card, or email request. Resource Action Programs (RAP), a Franklin Energy company, creates and ships the small business energy efficiency kits directly to customer facilities. The kits contain products particularly selected for the specific business types, as well as detailed installation instructions. A customer service representative follows up with a statistically representative random sample of customers within three weeks of energy kit receipt to verify the customer received the kit, confirm what measures have been installed or the customers’ plans, answer any questions the customer may have about the measures or program, and determine customer satisfaction with the program.

**Table 1. Energy Efficiency Kit Measures for Each Customer Segment**

|  |  |  |
| --- | --- | --- |
| Offices | Restaurants | Other Retail |
| 3 LEDs: 8-12W | 3 LEDs: 8-12W | 1 LED: 8-12W |
| Exit Sign Retrofit Kit | Exit Sign Retrofit Kit | Exit Sign Retrofit Kit |
| Bathroom Aerator | Bathroom Aerator | 3 LEDs: BR30 Track |
| Kitchen Aerator | Pre-Rinse Spray Valve | Bathroom Aerator |
| Smart Strip | Installation Guide DVD | Installation Guide DVD |
| Installation Guide DVD | Marketing Materials | Marketing Materials |
| Marketing Materials |  |  |

ComEd’s net savings planning target is 931 MWh for CY2018.

Notable program changes made from PY9 to CY2018 include:

* No longer including CFL bulbs in kits
* Addition of exit sign retrofit kit in the kits
* Replacing MR16 LED bulb with BR30 LED bulb in kits

The primary objectives of the evaluation of the Rural Small Business Kits Program are to: (1) quantify gross and net savings impacts from the program, and (2) make recommendations to enhance the program focused on the current priorities as determined by the program manager for this program or similar future programs.

The CY2018 gross impact evaluation will not vary significantly from the previous years. The evaluation will include a participating customer free ridership and spillover study in CY2020. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2020 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 2. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  |  | X |  |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams from other utilities on any issues relevant to this program.

**Evaluation Research Topics**

The evaluation in CY2018 will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. Did the program meet its energy and demand savings targets? If not, why?
4. What updates (if any) are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

Navigant will conduct limited process research for the program in CY2018 based on program manager and implementation contractor interviews.

**Evaluation Approach**

This evaluation plan identifies tasks on a preliminary basis for CY2018 (Table 3). Activities are subject to change based upon the demands of the portfolio and other factors, and during the program year as program circumstances are better known.

For CY2018, the primary method to determine net and gross savings will be a program tracking system review and applying program-level net-to-gross ratio (NTGR) that is deemed through a consensus process by the Illinois Stakeholder Advisory Group (IL SAG).

The table below summarizes the evaluation tasks for CY2018.

**Table 3. Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Tracking System Review |
| Verified Net Impact Approach | Deemed Value |
| Program Manager and Implementer Interviews/ Review Materials | Yes |

Table 4 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 4. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves |  |
| In Depth Interviews | Program Management and Implementers | ~2 | April – Dec 2018 |  |
| Gross Impact | Tracking System Review | All | June 2018– Feb 2019 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the valuation team, Navigant will a perform tracking system review in waves in 2018. The first wave of the tracking system review is expected to cover about half to two-thirds of the projects.

***Gross Impact Evaluation***

Since almost all the program’s savings are derived based on the Illinois Technical Reference Manual (TRM), the evaluation team will conduct a limited gross impact evaluation in CY2018. For this impact evaluation, gross savings will be evaluated by (1) reviewing the tracking system to be assured that all fields are appropriately populated and (2) cross-checking totals.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply a program-level NTGR of 0.90 deemed through a consensus process by the IL SAG to estimate the verified net savings for the program in CY2018, as shown in the table below.

**Table 5. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Rural SB Kits Program | 0.90 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated for each measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

We will conduct in-depth telephone interviews with program managers and implementation contractors to make recommendations for potential program enhancements for future programs.

Navigant can perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Schedule**

Table 6 below provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress.

**Table 6. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 4, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 31, 2018 |
| CY2018 Program tracking data for sampling Wave 2 | ComEd | January 30, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | February 15, 2019 |
| Draft Report to ComEd and SAG | Evaluation | February 25, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 18, 2019 |
| Revised Draft by Navigant | Evaluation | March 26, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 2, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 13, 2019 |

ComEd Small Business Energy Savings Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Small Business Energy Savings (SBES) Program is designed to assist qualified ComEd non-residential customers[[36]](#footnote-36) to achieve electric energy savings by educating them about energy efficiency opportunities through no-cost on-site energy assessments conducted by preapproved, specially-trained trade allies (TAs) and installation of no-cost direct-install (DI) measures.[[37]](#footnote-37) Further savings are available to participating customers through incentives of thirty to seventy five percent offered for select contractor-installed measures.[[38]](#footnote-38) Trade allies are the primary means of promoting the SBES Program and obtaining participants.

Notable program changes made from PY9 to CY2018 include:

* Public sector and DCEO facilities under 400kW are integrated into the SBES Program
* A second implementation contractor has been added to operate the public-sector branch of the program

The program will continue in CY2018, with the new program promotions introduced during the PY9 bridge period. These include lighting retrofit and indoor or outdoor LED and controls promotions, a past customer promotion, an RTU promotion, and an AC replacement promotion. Starting January 1, 2018, all trade allies or service providers are required to obtain Illinois Commerce Commission (ICC) certification, to qualify for participation in the SBES Program.

ComEd’s CY2018 net planning target is 172,007 MWh for both first year and cumulative persisting annual energy savings.[[39]](#footnote-39) This is expected to be achieved through the installation of 38,566,274 measures, of which 36,954,435 will be installed in qualifying private sector small businesses and 1,611,839 in qualifying public sector premises.[[40]](#footnote-40) Nexant, Inc. (Nexant) is the implementation contractor for the SBES Program’s private sector participants throughout ComEd’s service territory, while Wildan will serve public sector SBES customers.

The primary objectives of the CY2018 evaluation of the SBES Program will be to: (1) quantify the gross and net savings impacts of the program; (2) investigate potential gas savings counted as kWh (therms conversion); (3) conduct research to support the program’s transition in response to the Future Energy Jobs Act (FEJA)[[41]](#footnote-41); and (4) determine key process-related program strengths and weaknesses to aid in program improvement.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – General Population Surveys | X |  | X |  |
| Data Collection – Participant Surveys | X | X | X |  |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Stakeholder Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews | X | X | X |  |
| Impact – Billing Analysis (as needed) | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Modeling (as needed) | X |  | X |  |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X | X\* | X |  |
| Net-to-Gross – Trade Ally Interviews | X | X\* | X |  |
| Process Analysis | X | X | X | X |

\* CY2019 NTG research for public sector only.

***Coordination***

Ameren Illinois’s Small Business Incentives Program is like ComEd’s SBES Program.[[42]](#footnote-42) The ComEd evaluation team will coordinate with the independent evaluator of the Ameren program to ensure that the two evaluations use similar approaches, and to identify and report on any substantive differences.[[43]](#footnote-43)

Navigant will coordinate any NTG or process research with the Ameren Illinois Small Business Program evaluation team. Navigant will coordinate with the Ameren team on data collection and survey instrument design to ensure consistency and appropriate questions in the customer surveys.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. What are the program’s demand savings?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?
5. What are the effective useful lives (EUL) of measures within the program?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following topics:

1. What are effective methods to reach small business owners amidst varying demands and calls for their attention?
2. What is the program’s cumulative penetration by region and business segment?
3. What prevents former participants from re-enrolling, from two perspectives: the TAs business model on customer relationship management, and the former participants’ interest, ability and barriers?
4. What is the TA experience, reach, and operation, focusing on comprehensive measures, impact of cumulative savings, and prior research on regional and business segment penetration?
5. Other research upon request to support the program manager and implementer in transitioning to the revised Illinois regulatory requirements starting in Calendar Year 2018 (CY2018).

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018  (approx.) | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves |  |
| In Depth Interviews | Program Management and Implementers | 6 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | Early Feedback File Review | Census | June 2018 – Feb 2019 | Two Waves\* |
| Gross Impact | Engineering File Review | 30 | September 2018 | Early Feedback for Sampled Projects (One Wave) |
| Verified Net Impact | Calculation using deemed NTG ratio | Census | March 2019 |  |
| Researched NTG and Process | Telephone Survey with Participating Customers | Up to 120† | June 2018 – May 2019 | FR & SO, Process. Three Waves |
| Researched NTG and Process | Telephone Interviews with Trade Allies | Up to 30† | June 2018 – May 2019 | FR & SO, Process. Three Waves |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research |  | April 2018 – March 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

† Navigant will complete an appropriate number of surveys with participants and interviews with trade allies achieve to research NTG.

Navigant will perform tracking system review and engineering file reviews on a sample of participant projects in three waves in CY2018. Navigant will have interviews with program management and key staff with the implementation contractor (IC) in CY2018 for impact or process and NTG research related issues (three waves of data collection). Navigant will use the SAG approved net-to-gross ratios for CY2018 to calculate program net savings in CY2018.

***Gross Impact Evaluation***

Since most SBES Program savings are derived from deemed values contained in the TRM, gross savings will continue to be evaluated primarily by (1) reviewing the tracking system data and savings workbook to ensure that all fields are appropriately populated and savings are consistent with the implementation contractor workbook that feed into the tracking system; (2) reviewing new measures’ algorithms and values in the tracking system and savings workbook to assure that they are appropriately applied; and (3) cross-checking totals. This approach will be supplemented where possible with a review of project documentation on a random sample of both private sector small businesses and public-sector projects to verify participation, installed measure quantities, and associated savings. Findings from the impact files will be reviewed to provide an opportunity for improving the tracking system and data collection.

Proposed CY2018 gross impact and sampling timelines are shown below.

1. Mid-year early impact review of Wave 1 data in June 2018 and completed in July 2018. This will include developing a memorandum of findings from early impact review.
2. Wave 2 sample of project files and documentation drawn in September 2018 and completed November 2018.
3. Final and third wave of tracking data in February 2019 and completed by March 31, 2019.

Core data collection activities will include the following:

1. Engineering examination of ComEd workpapers, tracking system and measure workbook calculations of claimed savings.
2. Engineering review of project documentation at the measure-level for a sample of projects to verify participation and tracking system entries, check documentation of invoiced quantities and installed measure characteristics, confirm compliance with eligibility, and deemed input values.
3. Computer assisted telephone interviews (CATI) with a sample of SBES Program project contacts completed to quantify participating customer free-ridership and spillover, and trade ally free ridership and spillover.
4. Hold regular monthly meetings by telephone with ComEd program staff and the IC staff to discuss specific impact issues that need to be addressed during program implementation.
5. The evaluation team will collect PJM demand savings estimates and program and measure-specific cost detail to further ComEd’s PJM auction and TRC analysis.
6. Investigate potential gas measures with KWh savings, and review the parameters ComEd used to estimate potential kWh savings (therms conversion).

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 3. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| SBES (all private sector measures) | 0.91 |
| SBES (public sector measures) | 0.91 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_*

*History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

Navigant will conduct a participating customer NTG study in CY2018 to provide NTG values for potential deeming in future program years through surveys with CY2018 participating customers. We will complete computer assisted telephone interviews (CATI) with a minimum of 120 contacts who participated in the CY2018 program to quantify participant free-ridership and spillover. We will interview up to 30 participating trade allies to quantify free ridership and spillover, and average the results with customer participants results, to estimate program level NTG. Sample design will attempt to achieve a 90/10 confidence/precision level of NTG ratios for lighting and non-lighting, and a roll up at the program-level, through a weighted average of lighting and non-lighting energy savings in the program.

Proposed CY2018 NTG and process research sampling timelines are shown below.

1. Wave 1 data collection and sampling in May 2018 and completed in August 2018.
2. Wave 2 data collection and sampling in October 2018 and completed in January 2019.
3. Third and final wave of CY2018 tracking data in February 2019 and completed in May 2019.
4. Results from the NTG analysis will be used in the SAG NTG deeming process.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated by measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the end-user customer surveys in CY2018. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program incentive offerings and changes to program application requirements.

Navigant will research effective methods to reach small business owners amidst varying demands and calls for their attention. This research may include a review of customer-facing marketing, promotion and operational materials; investigation into why eligible businesses refuse to engage or drop out; and research into trusted sources of energy efficiency information within the community.

Navigant will measure program penetration geographically, by business segment, measure type and trade ally saturation to aid in developing a strategy to expand the program and recruit TAs by underserved measure type.

Navigant will investigate why the re-enrollment rate is low among participants, including research on TA business models, customer relationship management (CRM) efforts, and former participants’ experience, interest and barriers to participating again in the program.

Navigant will research the TA experience and operations, focusing on the impact of delivering cumulative savings, offering comprehensive measures.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018. Possible topics may include, but will not be limited to research on impact of public sector projects introduced into the program.

**Evaluation Schedule**

Tables 4 and 5 below provide the schedule for key deliverables and data transfer activities (see Table 2 for other schedule details.) The April 30th deadline in Table 4 is for the impact report. The process and NTG findings will be delivered in different documents and on a different schedule as shown in Table 5. Adjustments will be made, as needed, as evaluation activities progress.

**Table 4. Schedule – Key Impact Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered\* |
| Monthly Impact/Process Meetings | ComEd/Navigant & IC Staff | Every month as needed |
| Program Operations Manual and Workpapers/Workbook Review | ComEd/Nexant | March 15 – April 15, 2018 |
| CY2018 Wave 1 Tracking Data | ComEd | June 30, 2018 |
| Early impacts findings memo | Evaluation Team | July 31, 2018 |
| Sample Projects Documentation for Review | ComEd | September 30, 2018 |
| Wave 2 and Final CY2018 Tracking Data to Navigant | ComEd | January 30, 2019 |
| Internal Report Draft by Navigant | Evaluation Team | March 2, 2019 |
| Draft Report to ComEd and SAG | Evaluation Team | March 11, 2019 |
| Comments on draft (15 Bus. Days) | ComEd / SAG | April 1, 2019 |
| Revised Draft by Navigant | Evaluation Team | April 9, 2019 |
| Comments on redraft (5 Bus. Days) | ComEd / SAG | April 16, 2019 |
| Final Report to ComEd and SAG | Evaluation Team | April 26, 2019 |

**Table 5. Schedule – Key NTG & Process Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered[[44]](#footnote-44) |
| Monthly Impact/Process Meetings | ComEd/Navigant & IC Staff | Every month as needed |
| Develop Process and NTG Survey, Interview Guides | Evaluation Team | March 15, 2018 – April 15, 2018 |
| CY2018 Wave 1 Tracking Data | ComEd | June 30, 2018 |
| CY2018 Wave 2 Tracking Data | ComEd | September 30, 2018 |
| Draft Process Research Findings | Evaluation Team | December 30, 2018 |
| CY2018 Wave 3 & Final Tracking Data | ComEd | January 30, 2019 |
| Final Process Research Findings | Evaluation Team | March 30, 2019 |
| Internal NTG Report Draft by Navigant | Evaluation Team | July 30, 2019 |
| Draft NTG Report to ComEd and SAG | Evaluation Team | September 1, 2019 |
| Comments on draft (10 Bus. Days) | ComEd / SAG | September 15, 2019 |
| Final NTG Recommendation to ComEd and SAG | Evaluation Team | October 1, 2019 |

ComEd Small Business Monitoring-Based Commissioning Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The ComEd Small Business Monitoring-Based Commissioning (MBCx) Program is a third-party energy efficiency program designed and operated for ComEd by Power TakeOff (PTO) that provides qualified ComEd commercial and industrial (C&I) customers[[45]](#footnote-45) with energy management and information system (EMIS) services to better manage their energy usage, identify energy savings opportunities, and achieve energy savings through low or no-cost energy-saving measures. The MBCx Program follows a step-by-step process to identify customers with significant potential for low or no-cost energy savings, work with them to understand their energy usage and identify savings opportunities, enroll them in the MBCx program, and monitor their progress through the program. All energy savings actions taken by each participant are documented as part of the program, and resulting energy savings claimed for each action are estimated by PTO using a regression analysis of the participant’s pre- and post-enrollment energy usage data.

Unlike behavioral energy efficiency (EE) programs that provide participating customers with generic energy savings recommendations, where little or nothing is known about the specific actions taken by individual participants, the MBCx Program collects a substantial amount of information about each participant, including a detailed log of each contact PTO had with the customer, the behavioral actions each participant agreed to take, and the date each action was undertaken.[[46]](#footnote-46) Additionally, the program collects at least one year of pre-enrollment and three to six months of post-enrollment interval usage data from each meter. Navigant will employ regression analysis to model the responses of individual participants’ energy usage to measure the program’s savings in CY2018.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Net-to-Gross Research – Customer Surveys | X |  |  |  |
| Impact – Regression Analysis (Customer Specific) | X | X | X | X |

***Coordination***

At this time there does not appear to be an equivalent program at other Illinois utilities. We will continue to monitor that situation.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings?
2. What are the program’s verified net savings?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

We have prepared an evaluation plan summary to identify tasks on a preliminary basis (Table 2). Final activities will be determined annually as program detail and requirements become known.

**Table 2: Evaluation Plan Summary for MCBx**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impacts Evaluation | Regression Analysis |
| Uplift Savings Adjustment | Difference-in-Difference |
| Net to Gross Research | Customer Surveys |
| Sampling Frequency | Annual |
| Program Manager and Implementer Interviews / Review Materials | Yes |

***Gross Impact Evaluation***

Navigant will measure the MBCx Program’s CY2018 annualized energy savings by developing baseline daily energy usage models for each CY2018 program participant, *calibrated to their year of pre-enrollment daily usage data* using regression analysis, of the form shown in Equation 1 and use the model to estimate each participant’s gross energy savings attributable to the program. Net CY2018 program savings will be the sum of the individual participants’ gross annualized savings.

**Equation 1. MBCx Load Model**



where:

 is energy usage during day *t*

 equals 1 when *t* is a weekday and 0 otherwise[[47]](#footnote-47)

 equals 1 when *t* falls within month *i* and 0 otherwise

 is the cooling degree-hours during day *t*[[48]](#footnote-48)

 is the heating degree-hours during day *t*4

 is a binary indicator that equals 1 when day *t* falls after agreed-upon behavior change *j* and 0 otherwise

The are unknown parameters to be estimated

 is a white-noise disturbance

Firm-specific parameter values will be obtained by fitting the above model to each participant’s actual daily usage data and weather data using all available (pre- and post-enrollment) data. The parameter values will then be used, together with normal (TMY3) weather data[[49]](#footnote-49), to forecast annualized usage baselines for the post-install period for all participating customers. Annualized savings will be calculated by simulating each participant’s predicted usage *twice:* once with the change variable(s) set to zero (to simulate their baseline usage) and once with the change variable(s) set to one (to simulate their usage with the changes in place), and subtracting the post-change profile from the baseline profile.

***Verified Net Impact Evaluation***

The Illinois Stakeholders Advisory Group (SAG) consensus process agreed to a net-to-gross (NTG) value of 1.0 for this program for PY9 (Table 3). Navigant will apply that NTG ratio to the adjusted gross savings to estimate the verified net savings for the program in CY2018.

The regression analysis described in the previous section does not produce net savings, however.[[50]](#footnote-50) We therefore propose to pursue net-to-gross research for this program during CY2018 to apply in future program years.

**Table 3. Deemed NTG Value for PY9**

|  |  |
| --- | --- |
| Program Path/Measure | PY9 Deemed NTG Value |
| MBCx | 1.00 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2016\_NTG\_Meetings/Final\_Documents/ComEd\_NTG\_History\_and\_PY9\_ Recommendations\_2016-02-26\_Final.xlsx*

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The process evaluation for this program will be limited to interviews with the program manager and implementation contractor.

**Data Requirements**

Table 4 shows the data Navigant will need for the CY2018 evaluation. We intend to receive the full customer usage dataset from PTO but will request a subset of customer usage data from ComEd to ensure that the PTO data is complete and accurate.

**Table 4. Data Requirements for CY2018 MBCx Evaluation**

| Required Data | Relevant Information Requested |
| --- | --- |
| **Tracking Data** | **For all MBCx participants:** |
| * Account ID |
| * Date participant was enrolled in MBCx |
| * Date participant began each agreed-upon MBCx energy-saving action |
| * Opt-out/move-out date (if relevant) |
| * Type of Business or Segment |
| **Customer Usage Data** | **For all MBCx participants:** |
| * Account ID |
| * Daily energy usage values\* for CY2018 (Jan 1, 2018 – Dec 31, 2018) and at least 1 year prior to enrollment * Corresponding 30-minute interval usage data for equivalent period† |

\* Daily values rolled up from 30-minute interval AMI/AMR meter data obtained from PTO.

† Navigant will request 30-minute interval AMI/AMR meter data for a random sample of CY2018 participants to ensure that the PTO data is complete and accurate.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities (see Table 2 for other schedule details). Adjustments will be made, as needed, as evaluation activities progress.

**Table5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Manager and Implementer Interviews | Navigant | October 30, 2018 |
| Final evaluation data request sent to ComEd / PTO | Navigant | December 31, 2018 |
| Final evaluation data delivered to Navigant | ComEd | January 31, 2019 |
| Draft Report to ComEd and SAG | Navigant | March 8, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2019 |
| Revised Draft by Navigant | Navigant | April 5, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 12, 2019 |
| Final Report to ComEd and SAG | Navigant | April 19, 2019 |
| Draft NTG Analysis Findings | Navigant | September 1, 2019 |
| Final NTG Recommendations | Navigant | October 1, 2019 |

ComEd Standard Program CY2018 to CY2021 Evaluation Plan

**Introduction**

As part of the Business Incentives Program[[51]](#footnote-51) the Standard Program offers prescriptive financial incentives and a streamlined application to facilitate the implementation of cost-effective energy efficiency improvements for non-residential (commercial and industrial) customers and market segments, with a program network of trade allies and service providers. Eligible measures include energy-efficient indoor and outdoor lighting, HVAC equipment, refrigeration, Energy Management Systems (EMS), commercial kitchen equipment, variable speed drives, compressed air equipment and other qualifying products. The program also targets new system installation opportunities (e.g., lighting systems) by offering incentives that “bundle” equipment and controls technologies.

Notable program changes made from PY9 to CY2018 include:

* Changed incentives (several reduced, some increased) for some refrigeration and commercial kitchen end-use measures, and some lighting offerings.
* The addition of eight incentive offerings and three measures (offerings include bonus for public sector, VSD and chillers, retail space, waste water treatment plant, and dark sky lighting).
* Public sector facilities over 400kW are integrated into the Standard Program.
* Changes to comprehensive package to one tier, and include custom offerings
* Introducing new tracking system (eTRACK), with capabilities of online-entry for customers and contractors from project start, and also allow measure savings calculations in the system (based on TRM and program workpapers).

In addition, the CY2018 program will continue with the Office Space and Made in Illinois promotions introduced during PY9 bridge period. ComEd continued the marketing strategy of presenting its overall portfolio to customers in the marketplace. Streamlined incentive application and verification and quality control processes are expected to facilitate ease of participation and minimize the time required for incentive payment.

ComEd’s CY2018 net planning target for the Business Incentives Program[[52]](#footnote-52) is 313,333 MWh for both first year and cumulative persisting annual energy savings.[[53]](#footnote-53) This is expected to be achieved through the installation of 104,291,123 measures, of which 77 percent are installed in qualifying private sector commercial and industrial facilities, and 23 percent are installed in qualifying public sector premises.[[54]](#footnote-54) ICF International Inc. is the program implementation contractor for the Standard Program. ICF collaborates with DNV-GL for the program day-to-day operations of both the private sector and public-sector customers.

Starting January 1, 2018, all contractors and service providers are required to obtain Illinois Commerce Commission (ICC) certification, to qualify for participation in the Standard Program.

The primary objectives of the CY2018 evaluation of the ComEd Standard Incentives (Standard) Program are to: (1) quantify the gross and net savings impacts of the program; (2) conduct research to support the program’s transition in response to the Future Energy Jobs Act (FEJA) [[55]](#footnote-55); (3) investigate potential gas savings (therms conversion) counted as kWh, and (4) determine key process-related program strengths and weaknesses and identify ways in which the program can be improved.

The CY2018 gross impact evaluation will not vary significantly from the previous years, but adjustments will be made to reflect specific measure and project characterizations. Navigant will research effective methods to reach business owners amidst varying demands and calls for their attention. This research may include a review of customer-facing marketing, promotion and operational materials; investigation into why eligible businesses refuse to engage or drop out; and research into trusted sources of energy efficiency information within the community.

Navigant will measure program penetration geographically, by business segment, measure type and trade ally saturation to aid in developing a strategy to expand the program and recruit TAs by underserved measure type-free ridership and spillover study in CY2018. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, the energy assessment services and incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – General Population Surveys |  |  | X |  |
| Data Collection – Participant Surveys | X | X | X |  |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Stakeholder Interviews | X |  | X |  |
| Data Collection – Trade Ally Interviews | X | X |  | X |
| Impact – Billing Analysis | X |  | X |  |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | X | X |  |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Specifically, Navigant will coordinate planned NTG or process research with the Ameren Illinois Standard program evaluation team. Navigant will coordinate with the Ameren team on data collection and survey instrument design to ensure consistency and appropriate questions in the customer and trade ally surveys.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings? What are the verified gross savings from lighting measures? What are the verified gross savings from non-lighting measures?
2. What is the research estimate of gross savings (energy, peak demand, and total demand) for the program?
3. What are the program’s verified net savings?
4. What is the estimated free-ridership and spillover for CY2018 participating customers? What is the research estimate for participant spillover for this program?
5. Secondary questions include:
   * Are the ex ante per-unit gross impact savings correctly implemented by the tracking system and reasonable for this program?
   * What updates are recommended for the Illinois Technical Reference Manual (TRM)? What are the results of field data collection?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address methods and approaches to reduce free ridership for lighting and non-lighting measures.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018. Possible topics may include, but will not be limited to research on impact of public sector projects introduced into the program, impact of the new offerings and measures, trade ally perspectives and impact of the changed incentives.

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In Depth Interviews | Program Management and Implementers | 4 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | Early Feedback Concurrent File Review | ~20 | June 2018 – Feb 2019 | Early Feedback for Large Projects |
| Gross Impact | Engineering File Review | 85 | April 2018 – Feb 2019 | Three Waves\* |
| Gross Impact | On-site M&V | 40 | April 2018 – Feb 2019 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| Process | Telephone Survey with Participating Customers | 125 | June 2018 – March 2019 | Process. Two Waves |
| Process | Telephone Interviews Trade Allies | ~25 | June 2017 – March 2019 | Process. Two Waves |
| Process and Impact Research on PY10 Operations | Literature review, secondary research | Census | April 2017 – March 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the valuation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The first wave of M&V sampling is expected to cover about one-third of the projects.

***Gross Impact Evaluation***

Navigant will perform tracking system review and M&V project sampling in three waves in CY2018. The first wave of M&V sampling is expected to cover about one-third of projects completed in CY2018. Proposed gross impact sampling timelines are shown below.

CY2018 Gross Impact Sampling Waves

1. First wave sample drawn in April 2018 and completed in July 2018
2. Second wave sample drawn in August 2018 and completed in November 2018
3. Final wave starts February 2019 (or projects completion date)

Core data collection activities will include the following:

1. Engineering examination of ComEd workpapers and tracking system calculations of claimed savings.
2. Engineering review of project documentation at the measure-level for a sample of projects to verify participation and tracking system entries, check documentation of invoiced quantities and installed measure characteristics, confirm compliance with eligibility, and deemed input values.
3. On-site M&V of measure-level savings on a subset of project sites selected from the engineering review sample to estimate site-specific savings. On-site measurement and verification includes participant interviews, baseline assessment, installed equipment verification, and performance measurement. Measurement may include spot measurements, run-time hour data logging, review of participant energy management system trend data, and post-installation interval metering. Our approach to selecting M&V strategies follows the International Performance Measurement and Verification Protocol (IPMVP); Option A or Option B are typically selected.
4. Computer assisted telephone interviews (CATI) with a sample of Standard Program projects and in-depth interviews with trade allies and account managers to research methods and approaches to reduce free ridership.
5. Interviews with program management and key staff with the implementation contractor (IC). Hold regular monthly meetings by telephone with ComEd program staff and the IC staff.
6. The evaluation team will collect PJM demand savings estimates and program and measure-specific cost detail to further ComEd’s PJM auction and TRC analysis.
7. Screening of CY2018 participant data to identify customers beginning the Spring of 2018, do not meet the less than 10MW peak demand eligibility threshold to participate in the program. These customers are expected to be excluded from the program claimed energy and demand savings, and the evaluation team will exclude them from the impact M&V sample, and likely from the NTG survey sample.

The gross savings impact approach will review the ex ante measure type to determine whether it is covered by the Illinois TRM or whether it is a non-deemed measure that is subject to retrospective per unit savings adjustment of custom variables. The measure type, deemed or non-deemed, will dictate the savings verification approach. We will also make a research estimate of gross savings based entirely on site-collected data and evaluation engineering analysis of savings. The two methods are described below:

1. Savings Verification

* Measures with per unit savings values deemed by the TRM, would have verified gross savings estimated by multiplying deemed per unit savings (kWh and kW) by the verified quantity of eligible measures installed. Eligible deemed measures must meet all physical, operational, and baseline characteristics required to be assigned to the deemed value as defined in the TRM.[[56]](#footnote-56)
* Measures with fully custom or partially-deemed ex ante savings will be subject to retrospective evaluation adjustments to gross savings on custom variables. For fully custom measures, Navigant will subject the algorithm and parameter values to evaluation adjustment, where necessary. For partially-deemed measures, TRM algorithms and deemed parameter values will be used where specified by the TRM, and evaluation research will be used to verify custom variables.

1. Evaluation Research Savings Estimate

* The evaluation will also include an analysis of on-site collected verification data for a subset of projects. The engineering analysis methods and degree of monitoring will vary from project to project, depending on whether the measure has deemed savings or not, the complexity of the measures, the size of the associated savings, the potential to revise input assumptions, and the availability and reliability of existing data. The evaluators will contact the implementers prior to conducting site visits to ensure that the evaluation team has all correct and relevant information.

The measure-level realization rates will be extrapolated to the program population using a ratio estimation method to yield ex post evaluation-adjusted gross energy savings. Gross realization rates will be developed for energy and demand savings. The sample design will provide 90/10 statistical validity for lighting savings, non-lighting savings, and the program overall. The sample of 40 on-sites drawn is also expected to achieve a 90/10 confidence/relative precision level (one-tailed test) to comply with the PJM verification requirements outlined in Manual 18B.

***Verified Net Impact Evaluation***

The evaluation team will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 3. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Lighting | 0.71 |
| Non-Lighting | 0.70 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

Navigant will conduct a participating customer NTG study in CY2018 to provide NTG values for potential deeming in future program years through surveys with CY2018 participating customers. We will complete computer assisted telephone interviews (CATI) with a minimum of 125 contacts who participated in the CY2018 program to quantify participant free-ridership and spillover. We will attempt contact with all participants in the gross impact sample. Program influence on participating customers through interviews with trade allies and account managers will be conducted in CY2018 if triggered by customer NTG responses for the largest projects, or with contacts identified for multiple smaller projects. The sample design developed for gross impact research will be applied to the NTG interviews. This will provide a 90/10 confidence/precision level of NTG ratios for lighting and non-lighting, and program-level savings.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated by measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the end-user customer surveys in CY2018. The CY2018 research will consider methods and approaches to reduce free ridership in lighting and non-lighting measures.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018. Possible topics may include, but will not be limited to, research on impact of public sector projects introduced into the program, impact of the new offerings and measures, and impact of the changed incentives.

**Evaluation Schedule**

Table 4 below provides the schedule for key deliverables and data transfer activities. (See Table 2 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 4. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| CY2018 participating customer survey design | Evaluation | June 30, 2018 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 30, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 program tracking data for sampling Wave 2 | ComEd | August 30, 2018 |
| Wave 1 participating customer NTG and process survey fielding | Evaluation | September 30, 2018 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 30, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| CY2018 Program tracking data for sampling Wave 3 | ComEd | January 30, 2019 |
| Wave 2 participating customer NTG and process survey fielding | Evaluation | February 28, 2019 |
| Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 28, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| NTG Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 6, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 27, 2019 |
| Revised Draft by Navigant | Evaluation | April 4, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 11, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 24, 2019 |

ComEd Strategic Energy Management Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Strategic Energy Management (SEM) Pilot Program began in GPY4/EPY7 and is jointly managed by ComEd and Nicor Gas. The program is designed to provide training and guidance to participating customers at once, gathered in cohorts. Each cohort is a group of SEM participants that receive training together and work with each other to provide practical insight of how to implement energy efficiency measures at their sites. ComEd and Nicor Gas contracted with CLEAResult to implement the SEM Program.

The goal of the SEM Program is to implement a process of continuous energy management improvements which result in energy savings and reductions in energy intensity. Energy savings are expected to be achieved through operational and maintenance (O&M) improvements, incremental increases in capital energy efficiency projects, additional capital projects that would not otherwise have been considered (e.g., process changes, consideration of energy efficiency in all capital efforts), and improved persistence for O&M and capital projects. The program seeks to educate participants in the identification of low cost or no cost measures, improve process efficiency, and reduce energy usage through behavioral changes.

Navigant will evaluate the program for both utilities and will produce a single report for both utilities. As a part of the evaluation, Navigant will review the documentation and savings for the practitioner cohort with a focus on persistence of savings and SEM activities. As needed, site interview will be completed to support Navigant research into site persistence.

The impact evaluation of the SEM Program will characterize and quantify:

* Energy savings achieved through SEM improvements and behavior change beyond capital projects (prescriptive and custom).
* Demand savings achieved through SEM improvements and behavior change
* The persistence of achieved behavioral savings
* Persistence of SEM activities and practices

Notable program changes made from GPY6/EPY9 to CY2018 include:

* Demand savings model may be part of this year’s evaluation and the impact evaluation of these models may need to be considered based on the need of the program.
* Persistence of savings will be a focus of this year’s evaluation for the practitioner cohort. We will be focusing on persistence of both savings and SEM activities and processes.
* As sites transition into the practitioner cohort, the evaluation activities will change to meet the needs of the client and implementer without overburdening the site.

The CY2018 gross impact evaluation will not vary from the previous years. The evaluation of participating customer free ridership and spillover study will not occur in CY2018. Evaluation will continue to monitor net-to-gross (NTG) and will most likely perform NTG analysis in CY2019 and CY2021. The findings from the study will inform recommended NTG values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 process study will include program manager and implementer interviews to learn about their perspectives and satisfaction with the program, the energy assessment services and incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table. As noted above, a limited process evaluation will be completed with the practitioner cohort with a focus on persistence but not normal detailed evaluation. The sites in this cohort have received several years of process evaluation and we do not expect that much has changed within the last year.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys |  | X |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Stakeholder Interviews | X | X | X | X |
| Impact – Billing Analysis | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Modeling | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Impact – NTG Analysis |  | X |  | X |
| Process Analysis | X | X | X | X |

***Coordination***

SEM is a jointly managed program with Nicor Gas. ComEd will coordinate with Nicor Gas on issues relevant to the program. The SEM evaluation report is developed as a combined ComEd and Nicor evaluation report. Navigant leads the evaluation and will work with Nicor to finalize the report. There are special data collection issues with the SEM program and Navigant will manage those data issues with ComEd and Nicor.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the actual achieved energy behavior savings in this program?
2. What were the realization rates of the projects? [Defined as evaluation-verified (ex post) savings divided by program-reported (ex ante) savings].
3. Are there any major changes occurring during or after program implementation (production, size, hours etc.) which may have affected the results?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program persistence. The process research will address the following questions:

1. What SEM activities have the sites continued to implement after the first year of training?
2. What new activities have the sites incorporated into their operation?
3. What SEM activities have they stopped implementing since the training?
4. If their savings have increased over time, why?
5. If their savings have stopped or reversed over time, why?

**Evaluation Approach**

The following multiyear evaluation plan summary identifies tasks by year on a preliminary basis (Table 2). Final activities will be determined annually as program circumstances are better understood. Program Year (PY) refers to the year of participation that will be researched, not the research timeframe.

**Table 2. CY2018 Evaluation Plan Summary for SEM Program**

|  |  |  |
| --- | --- | --- |
| Activity | CY2018 |  |
| Gross Impact Approach | Billing meter data/regression and Survey (as needed) |  |
| Gross Sampling Frequency | One Time |  |
| Verified Net Impact Approach | Deemed Value  Electric (0.95)  Gas (1.00) |  |
| Researched NTG Approach | None |  |
| Program Manager and Implementer Interviews/ Review Materials | Yes |  |
| Participant Interview | Process and Impact |  |
| Effective Useful Life Determination | Secondary or Primary Research |  |

***Data Collection, Methods, and Sample Sizes***

Table 3 below summarizes data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions. Evaluation of the SEM Program is based upon availability of SEM cohorts, thus, evaluation for CY2018 will be completed by the end of 2018.

**Table 3. Core Data Collection Activities and Sample**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| What | Who | Target Completes CY2018 | When |  | Comment |
| Engineering Review- Practitioner Cohort | Participating Customers | \* | May – June 2018 |  |  |
| Telephone Survey- Practitioner Cohort | Participating Customers  Implementer  Program Staff | \* | June – July 2018 |  | Engineering review to provide guidance to surveys |
| Second Engineering Review- Practitioner Cohort | Participating Customers | \* | July- August 2018 |  | A second review based on survey results |

\*Sample size will be determined to achieve 90/10

The main impact review will be completed before conducting the surveys to identify any site-specific issues that could be addressed in the interviews. Prior to the interviews, both Nicor Gas and ComEd will review the surveys to ensure they meet the needs of the program. Once the surveys are complete, Navigant will complete the engineering review by making any additional changes identified by the surveys.

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 4. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In Depth Interviews | Program Management and Implementers | ~2 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | Engineering File Review \* | Census | April 2018 – Feb 2019 | Three Waves† |

\* This is a multi-regression model based upon whole-building data, production data and other key variables.

As participating sites complete their one year of activities within the SEM Program, Navigant will collect the information regarding these sites and begin the evaluation. Navigant expects that the timing of this information will be dependent on the timing of the cohort training.

***Gross Impact Evaluation***

The impact evaluation will be grounded in site-specific data using engineering models and analysis.

1. A site-specific analysis approach will be implemented. Because this program contains primarily behavioral-based changes, the International Performance Measurement and Verification Protocol (IPMVP) option C – billing/metered data regression, will be the main method of impact evaluation.
2. The data collection will focus on verifying or updating the assumptions that feed into the implementer’s energy model for each site. This data may include: program tracking data and supporting documentation (project specifications, invoices, etc.), utility billing and interval data, Navigant‑calibrated building automation system (BAS) trend logs and telephone conversations with onsite staff.

Energy models have been provided for all the sites within the SEM Program. This data will be used with other collected information from the site to identify operating characteristics of the site both pre-and post these activities. If major changes have occurred at the site during or after the SEM activities, it is expected the model will need to be adjusted to account for these changes. The changes that could affect the model savings include:

* Changes in hours of operation
* Changes in employees
* Changes in production
* Other measures installed at the site that were implemented through other Utility EE/DR programs or outside of the ComEd and Nicor Gas programs[[57]](#footnote-57)

Due to the small number of participating sites, Navigant will be performing the impact analysis on all participating customers.

***Verified Net Impact Evaluation***

The 2018 net impact evaluation will apply the net-to-gross ratio (NTGR) deemed through the Illinois Stakeholders Advisory Group (SAG) consensus process. The deemed NTGRs are provided in the following table.

**Table 5. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Channel | CY2018 Deemed NTG Value |
| Comprehensive | 0.95 |
| Monitoring-Based | 0.95 |
| All Natural Gas | 1.00 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, and*

*Nicor Gas GPY7 NTG Values 2017-03-01 Final.xlsx.*

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA) for electric energy efficiency, the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated for each electric measure along with the total CPAS for all electric measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews, and during the participant surveys in CY2018. The CY2018 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program.

**Evaluation Schedule**

Table 6 below provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress.

**Table 6. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2018 site reports and models are available to Navigant | ComEd/Nicor Gas | \* |
| Engineering review early findings | Evaluation | \* |
| Detailed Surveys | Evaluation | \* |
| Final engineering review completed | Evaluation | \* |
| Draft Report to ComEd, Nicor Gas and SAG | Evaluation \* | October 13, 2018 |
| Comments on draft (15 Business Days) | ComEd/Nicor Gas | November 3, 2018 |
| Redraft of Report | Evaluation | November 10, 2018 |
| Comments on Redraft | ComEd/Nicor Gas | December 1, 2018 |
| Final Report to ComEd, Nicor Gas and SAG | Evaluation | December 22, 2018 |

\* Timing of tasks depends on timing of data availability are to be determined later.

ComEd Voltage Optimization Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The ComEd Voltage Optimization (VO) Program comprises ComEd’s plan to install hardware and software systems on a significant fraction of its electric power distribution grid to achieve voltage and reactive power optimization (volt-var optimization, or VVO) over the 2018-2025 time frame. VVO is a smart grid technology that uses distributed sensors, two-way communications infrastructure, remote controls on substation transformer load-tap changers and capacitor banks, and integrating/ optimizing software to flatten voltage profiles and lower average voltage levels on an electric power distribution grid.

ComEd has selected a third-party implementation contractor to implement the VO Program on selected parts of its distribution grid over the 2018-2025 period. The anticipated 2018-2021 timeline for installing and commissioning the VO Program is shown in Table 1

**Table 1. Anticipated VO Program Time Line 2018-2021**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Planned VO Targets | CY2018 | CY2019 | CY2020 | CY2021 | Total\* |
| Incremental Participation (Distribution Feeders)*a* | 470b | 364 | 459 | 372 | 1,665 |
| Incremental Annual Savings (MWh)*c* | 82,500 | 200,000 | 210,000 | 260,000 | 752,500 |
| Cumulative Persistent Annual Savings (MWh)*c* | 82,500 | 282,500 | 492,500 | 752,500 | 752,500 |
| Incremental Demand Reduction (MW)*d* | 13 | 28 | 36 | 43 | 120 |
| Cumulative Demand Reduction (MW)*d* | 13 | 41 | 77 | 120 | 120 |

\* ComEd plans to install VO on 1,293 additional feeders in CY2022-CY2025 for a total of 2,958.

a Communication from ComEd distribution automation team.

b Includes 129 feeders on which VO controls were installed in 2017.

c ComEd 2018 – 2021 EE DR Plan, p. 52.

d Ibid., p. 195.

This Evaluation Plan covers the first four years (CY2018 to CY2021) portion of the VO Program, and is based on the program description provided in ComEd’s 2018-2021 Portfolio Plan.[[58]](#footnote-58) The evaluation of this program will include a variety of data collection and analysis activities, including those indicated in Table 2.

**Table 2. Evaluation Approach – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Sample Selection of Test Feeders | X |  |  |  |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – AMI and SCADA data from VO substations/feeders | X | X |  |  |
| Impacts – Regression and Simulation Analysis of Sample Feeders | X | X |  |  |

***Coordination***

Navigant has begun to coordinate with the evaluation teams of other Illinois utilities on issues relevant to this program. Specifically, we understand that Ameren Illinois is planning to implement a VVO program similar to ComEd’s VO Program. The ComEd VO evaluation team is coordinating with the independent evaluator of the Ameren VVO program as it unfolds, and will endeavor to ensure that the two evaluations use similar approaches.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s mean voltage reductions?
2. What are the program’s incremental and cumulative persistent annual verified energy savings?
3. What are the program’s incremental and cumulative peak demand reductions?
4. What are the effects of season, time of day, day-type, customer load type, feeder length, and distributed energy generation penetration on the program’s energy and demand savings?
5. What are the program’s impacts on reactive power (or alternatively, power factor)?

**Evaluation Approach**

Navigant will measure energy and demand impacts on a representative sample drawn from the population of feeders on which ComEd plans to install VO over the CY2018-CY2025 period. The sample results will be used to estimate impacts for the remaining VO feeders.

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 3: Evaluation Plan Summary for CY2018 VO**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Target Sample Size (# of Test Feeders) | tbd |
| Gross Impacts Evaluation | Regression Analysis |
| Program Manager and Implementer Interviews / Review Materials | Yes |

***Gross Impact Evaluation***

Navigant will employ robust statistical techniques to measure the VO Program’s annualized impacts. We will work with ComEd to develop a statistically valid representative sample of the distribution feeders on which VO will be installed during the CY2018-CY2025 period. The volt-var controls on the feeders in the sample will be operated on a pre-set alternating schedule, shifting periodically between the baseline (i.e., non-VO) and test (i.e., VO) control states, and 30-minute interval data collected on voltage, energy usage, and reactive power.[[59]](#footnote-59) We will analyze the impacts of VO on these variables using a regression model of the form shown in Equation 1, applied to the sample feeders during each test period (season), and use the fitted models to develop seasonal and annualized impact estimates.[[60]](#footnote-60)

**Equation 1. VO Load Model**



where:

* *i, t, p* and *j* index the feeder, time interval, test period, and day-type, respectively
*  is measured load – *MW* for real power and |*MVAR*| for reactive power – or measured voltage on feeder *i* at time *t* on day-type *j* in test period *p*
* The  variables are a set of 24 binary indicators, each of which equals 1 when observation *t* falls within the associated hour of the day, and 0 otherwise
*  is a set of binary variables indicating day-type (weekday or weekend)
*  is a variable that equals 1 when VO control on feeder *i* are fully enabled at time *t* in period *p*, 0 when VO controls are fully disabled, and ranges between 0 and 1 during step-in/step-out transitions between control states
*  is the cooling degree-hours accruing during time *t*
*  is the heating degree-hours accruing during time *t*
*  is a mean-zero random disturbance representing the variation in  that is not captured by the model
* Thes are unknown parameters that are estimated by fitting the model to the experimental data on each feeder in each test period (season)

The estimated VO impacts on the sample feeders will be derived by first fitting the regression model using all of the experimental data in each test period to obtain unbiased estimates of the model coefficients. With these in hand, the fitted models will then be used to simulate the load and voltage profiles for each sample feeder in each season under two scenarios: one assuming VO controls are fully engaged () and the other assuming baseline controls (). Differencing the two profiles will yield the impacts of VO on voltage and usage on the sample feeders during each season; aggregating the impacts across seasons will provide the annualized impacts. To express these impacts in percentage terms, the estimated impacts for each feeder will be divided by the corresponding simulated annualized usage or voltage value under the baseline () scenario. CVR factors for each sample feeder will be calculated as the ratio of the percentage usage reduction to the percentage voltage reduction.

Navigant expects to use the first year results from the analysis performed on the portion of the sample feeders that were operated on an alternating (VO-on/VO-off) schedule to develop estimates of the distribution of VO impacts in CY2018, and to refine these estimated results using the CY2019 portion of the sample. Following the completion of the CY2019 analysis, we expect to have enough information on VO impacts that such on/off cycling could cease for the remainder of ComEd’s feeders, but that will have to be determined findings from the results of the analysis.

***Verified Net Impact Evaluation***

Since the VO Program will require no actions by any affected ComEd customers, net and gross impacts are identical by definition.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated along with the total CPAS.

***Process Evaluation***

The process evaluation for this program will be limited to interviews with the program manager and implementation contractor.

**Data Requirements**

Table 4 shows the data Navigant will need for the CY2018 evaluation.

**Table 4. Data Requirements for CY2018 VO Evaluation**

|  |  |
| --- | --- |
| **Data Source** | **Information Required** |
| **AMI Meters of Customers on Each Sample VO Feeder** | • Account / Meter ID |
| • Feeder |
| • Substation |
| • Date / Time Stamp (30-minute intervals) |
| • Load-Weighted Service Voltage from all meters served by feeder |
| **Substation SCADA System** | • Feeder |
| • Substation |
| • Date / Time Stamp (30-minute intervals) |
| • Voltage (at substation bus) |
| • Real Power (MW or MWh) |
| • Reactive Power (Mvar) / Power Factor |
| **Other** | • Weather data (temperature, humidity, wind speed)\* |
| • VO Control Status |
| • Capacitor Status (for capacitor banks controlled by VO) |
| • Log of Substation / Feeder Status (outages, reconfigurations) |

\* Navigant will obtain required weather data from NOAA weather stations.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities for the work leading to the CY2018 results (see Table 3 for other schedule details). The CY2019 schedule will be defined at a later time. Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Final evaluation data request sent to ComEd | Navigant | December 31, 2018 |
| Final evaluation data delivered to Navigant | ComEd | January 31, 2019 |
| Draft Report to ComEd and SAG | Navigant | March 8, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2019 |
| Revised Draft by Navigant | Navigant | April 5, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 12, 2019 |
| Final Report to ComEd and SAG | Navigant | April 19, 2019 |

##### Income Eligible Programs Evaluation Plans

ComEd Affordable Housing New Construction Program CY2018 to CY2021 Evaluation Plan

## Introduction

The ComEd Affordable Housing New Construction Program provides incentives for energy-efficient construction and major renovation of affordable housing. The program offers technical assistance and incentive funding and serves both single-family and multi-family housing. The program targets income-eligible customers in ComEd’s service territory with incomes at or below 80% of the Area Median Income. An additional goal of the program is to educate housing developers on cost-effective energy efficient building practices.

The program has three participation levels: major renovation, new multi-family, and new single-family. Altogether, the CY2018 savings goal is 1,222 net MWh of cumulative persisting annual savings and the same for first year annual savings.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in Table 1.

**Table 1. Evaluation Approaches Over Time**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Retailer Interviews | X |  | X |  |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X | X | X | X |
| Process Analysis | X | X | X | X |

### Coordination

Navigant will coordinate with the evaluation teams from other utilities on any issues relevant to this program. Specifically, as this is a joint program with Nicor Gas and Peoples and North Shore Gas, the evaluation team will coordinate closely with these gas utilities on issues common to this program. Ameren Illinois has a suite of energy efficiency programs for income eligible customers and the evaluation team will coordinate with Ameren on an as needed basis.

## Evaluation Research Topics

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings? What are the verified gross savings from lighting measures? What are the verified gross savings from non-lighting measures?
2. What are the program’s verified net savings?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. How can the program be improved? Are there changes or improvements which could be made to the educational component of the program?
3. How is the transition into CY2018 impacting the program?

## Evaluation Approach

Table 2 summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – June 2018 | Augment with monthly calls |
| Gross Impact | Early Feedback Review | As Needed | June 2018 – Feb 2019 | Early Feedback for Large Projects |
| Gross Impact | Engineering Review | All | April 2018 – Feb 2019 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | Census | April 2018 – Feb 2019 | Process, Impact |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

### Gross Impact Evaluation

Since the Affordable Housing New Construction Program savings are derived from deemed values contained in the TRM[[61]](#footnote-61), gross savings will be evaluated primarily by (1) reviewing the tracking system data to ensure that all fields are appropriately populated; (2) reviewing measure algorithms and values in the tracking system to assure that they are appropriately applied; and (3) cross-checking totals. This approach will be supplemented, where possible, with a review of project documentation in each program year to verify participation, installed measure quantities, and associated savings.

Navigant will perform a tracking system review in two waves during the CY2018 evaluation period. Final program gross and net impact results will be based on the two waves combined. Proposed gross impact timelines for CY2018 are shown below:

1. First wave drawn in May 2018 and completed in August 2018
2. The final tracking data is provided by ComEd by January 30, 2019, with reporting finalized by April 30, 2019

### Gross Impact Evaluation Research

In CY2019, Navigant will conduct evaluation research to confirm TRM estimates of savings. Navigant will develop models and use actual consumption data to calibrate them in order to determine accuracy of TRM savings estimates.

### Verified Net Impact Evaluation

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 3. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Affordable Housing New Construction | 1.0 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx

### Research NTG Impact Evaluation

The program has historically seen a deemed NTG ratio of 1.0 because the program targeted the income-eligible sector. However, because the income-eligible customers are not typically the decision makers for this program, Navigant believes the TRM NTG working group should consider whether the Affordable Housing New Construction Program should have NTG research performed.

Potential NTG research activities and timeline will be coordinated with the other utilities. Navigant will coordinate the data collection and survey instruments design to capture the appropriate questions in the decision maker surveys. The joint program evaluation and reporting timelines will be the same.

### Calculation of CPAS and Annual Savings

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated for each measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

### Process Evaluation

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings. The focus of the interviews will be to understand the intent of program. Navigant will also interview other program stakeholders (affordable housing developers) to identify any gaps between how ComEd intends to have the program work and how stakeholders see it working. The process research will be coordinated with the gas utilities in the joint program implementation.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

## Evaluation Schedule

Table 4 provides the schedule for key deliverables and data transfer activities. (See Table 2 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 4. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 15, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | May 4, 2018 |
| Wave 1 project documentation and engineering review | Evaluation | August 31, 2018 |
| Tracking system ex ante review findings and recommendations | Evaluation | August 31, 2018 |
| Process Analysis Findings | Evaluation | October 31, 2018 |
| CY2018 program tracking data | ComEd | January 30, 2019 |
| CY2018 project documentation and engineering review | Evaluation | February 28, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 6, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 27, 2019 |
| Revised Draft by Navigant | Evaluation | April 5, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 12, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 26, 2019 |

ComEd Food Bank LED Distribution Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The LED Distribution Program provides packages of ENERGY STAR certified LEDs to select Feeding America food banks. The food banks use their network of local food pantries within ComEd’s service territory to distribute the bulbs to utility customers in need, who receive four LEDs per household. The LED products are distributed at no cost to the food banks, food pantries and their customers. The program is implemented by CLEAResult Consulting Inc. (“CLEAResult”), who coordinates program activities, including engaging with the food banks and their participating food pantries.

From PY9 to CY2018, the eligible measure changed from ENERGY STAR certified CFLs to ENERGY STAR certified 10W A-Line LED screw based omnidirectional bulbs. Additionally, the program is offering advanced power strips. The CY2018 net cumulative persisting annual savings (CPAS) forecast is 15,241 MWh and the net first tear annual savings forecast is 15,241 MWh. The program executed participation agreements with three Feeding America food banks, and the target participant level is 1,003,800 households in CY2018.

The primary objectives of the CY2018 evaluation of the Food Bank LED Distribution (LED Distribution) Program are to: (1) quantify gross and net electricity and demand savings impacts from the program, (2) estimate distributed LED installation and leakage rates by conducting phone surveys, (3) review program materials and processes and (4) investigate participants’ perspectives about the program and their satisfaction with the program.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | TBD[[62]](#footnote-62) | | |
| Data Collection – Participant Surveys | X |
| Data Collection – Program Manager and Implementer Interviews | X |
| Data Collection – Food Bank/Pantries Interviews | X |
| Impact – Engineering Review | X |
| Impact – Measure-Level Deemed Savings Review | X |
| Impact – Verification & Gross Realization Rate | X |
| Process Analysis | X |

***Coordination***

The other Illinois utilities do not currently have similar programs; thus, evaluation will coordinate with other Illinois utilities on issues common to this program.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s total cumulative persisting annual verified gross savings?
2. What are the program’s verified net savings?

**Process Evaluation and Other Research Topics**

The CY2018 process evaluation activities for LED Distribution Program will focus on interviews with program staff and the implementation contractor staff, to verify information included in the tracking database and review of project documentation and processes. The evaluation includes surveys to investigate what impacted customer participation and satisfaction with the program. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. How can the program be improved?
3. How is the transition into CY2018 impacting the program?
4. Are there additional ways to engage the income eligible population in energy efficiency through this program?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | February-March 2018 |  |
| Gross Impact | Engineering File Review | All | June 2018 – March 2019 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 – April 2019 |  |
| Process and Impact Research on CY2018 Operations | Food Banks, Food Pantries, and Participant Interview. Literature review | Census | Feb 2018 – Feb 2019 | Process, Impact |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

***Gross Impact Evaluation***

The program key gross impact evaluation activities will be based on (1) reviewing the tracking system to determine whether all data required to verify program participation and distribution of LED products are appropriately collected, (2) reviewing measure algorithms and savings values in the tracking system to assure that they are appropriately applied, and (3) cross-checking measure totals and savings recorded in the tracking database. The evaluation team will conduct gross impact verification for program savings using the applicable Illinois TRM (v6.0). Verified gross savings will be estimated by multiplying deemed per unit kWh savings by the verified quantity of eligible LEDs distributed at the food pantries.

Table 3 summarizes data input parameters for estimating the distributed LED savings in CY2018.

**Table 3. Savings Input Parameters**

|  |  |  |
| --- | --- | --- |
| IL TRM Version 5.0 | Assumption | Notes |
| ΔkWh = ((WattsBase - WattsEE) / 1000) \* ISR \* (1-Leakage) \* Hours \* WHFe | | |
| WattsBase | 43 | Lumen range 750-1049 |
| WattsEE | 11.4 | Actual LED wattage (deemed) |
| ISR | 59% | 1st year ISR for LED Distribution |
| Leakage | 0% | Navigant supports the use of a 0% leakage assumption |
| Hours | 847 | Assumes Unknown installation type |
| WHFe | 1.06 | Unknown location |
| ΔkWh | 16.74 | Gross kWh/bulb |
| ΔKW | 0.002 | Gross KW/bulb |
| NTGR | 1.00 | Recommended by Navigant, accepted by the SAG |

Impact research for future TRM review will include participant interviews to investigate installation rate and potential leakage of bulbs distributed.

***Verified Net Impact Evaluation***

The TRM deems NTG at 1.0 for Income Eligible programs.

***Research NTG Impact Evaluation***

Navigant will not be conducting NTG research for this program.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible. Navigant will consider baseline changes for the LED bulb in the CPAS calculation.

***Process Evaluation***

Navigant will interview the program staff and the implementation contractor staff, and further verify information about the tracking database and project documentation and processes to determine whether program eligibility rules were adhered to, and that the appropriate participant information was documented and readily available for evaluation.

Navigant will interview program staff at participating food banks at the beginning of the year to gather both qualitative and quantitative data. In addition, Navigant will collect contact information for the sample pool by sending pre‐stamped, fillable postcards to the implementer to be distributed with bulbs for distribution in Q1 of 2018. Participants will be asked to submit their name, address, telephone number and the name of their utility via the postcard and will be offered an incentive for completing the survey. Participants will be advised they might be contacted to participate in a telephone survey. Navigant will select a random sample of the postcards received and manually enter the customer information into a database to serve as a sample for the survey. As mentioned above, the research will include gathering data for estimating and reviewing leakage and installation rate parameters for the TRM review.

The evaluation telephone phone survey will cover the following topics:

* The number of bulbs received and installed
* Distribution timeline of bulbs
* Purchasing habits regarding efficient bulbs
* Satisfaction with the bulbs received
* Ideas to engage the population in energy efficiency
* Barriers (if any) to installing the bulbs
* Home heating and cooling equipment and household demographics
* Potential leakage

**Evaluation Schedule**

Table 4 below provides the schedule for key deliverables and data transfer activities. (See Table 2 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 4. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Postcard design and food bank/pantry and participating customer survey design | Evaluation | December 2017 - January 30, 2018 |
| Program Operations Manual Review | ComEd | January - March, 2018 |
| CY2018 program tracking data for Food Bank & Food Pantry Interview | ComEd | April 7, 2018 |
| CY2018 program tracking data for Wave 1 early impact review and process | ComEd | June 30, 2018 |
| Wave 1 participating customer process survey fielding | Evaluation | July 15, 2018 |
| Early impact findings memo | Evaluation | July 30, 2018 |
| CY2018 program tracking data for Wave 2 process | ComEd | September 30, 2018 |
| Wave 2 participating customer process survey fielding | Evaluation | October 28, 2018 |
| Process Analysis Findings | Evaluation | December 15, 2018 |
| Wave 3 and Final CY2018 Tracking Data to Navigant | ComEd | January 30, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 3, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 10, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 15, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 5, 2019 |
| Revised Draft by Navigant | Evaluation | April 12, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 19, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 28, 2019 |

ComEd Income Eligible Lighting Discounts Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The ComEd Income-Eligible Lighting Discounts Program provides incentives to increase the market share of ENERGY STAR® certified LED bulbs and fixtures sold through retail sales channels. The program includes instant discounts (at the time of sale) to decrease customer costs, and provides educational materials aimed at increasing customer awareness and acceptance of energy-efficient lighting technologies and promoting proper bulb disposal. The program will be targeted in retail sale channels that serve, in part or in full, ComEd residential customers with incomes at or below 80% of the Area Median Income. Regardless of their choice of supplier, all income eligible residential customers taking delivery service from ComEd are eligible.

The PY2018 program saving’s goal is 16,494 net MWh of cumulative persisting annual savings and the same for first year annual savings.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches Over Time**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Process Analysis | X | X | X | X |

### Coordination

Navigant will coordinate with the evaluation teams from other utilities on any issues relevant to this program. Specifically, Ameren Illinois has a residential energy-efficient lighting program offering time of sale discounts to residential electric customers, but does not have a similar program targeting income eligible participants. The program leads will collaborate with other utilities on issues common to this program.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings (kWh) and peak demand (kW) savings?
2. What are the program’s verified net savings? The NTG ratio for the Income Eligible Lighting Discounts Program is 1.0 for PY2018.
3. Did the program meet savings goals, and if not, why?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. How can the program be improved?
3. How is the transition into CY2018 impacting the program?
4. How aware are customers of the ComEd-sourced LED bulb discounts? How effective are the in-store displays and marketing materials?
5. How aware are customers of changes in available lighting products? How have customers’ lighting purchasing decisions been affected by the changes in the options available for purchase?
6. What are the key barriers to LED purchases and how can they be addressed by the program?
7. What is the current level of LED availability and pricing in ComEd territory for common retail channels? How does this compare to similar regions (with or without lighting programs) and how is this changing over time?
8. What are ComEd customers’ preferences, acceptance, and use of various efficient lighting technologies, and what are the primary factors influencing them?
9. What is the current LED market saturation (# of LEDs/ # of eligible sockets for an average home) in residential income eligible single family or multifamily homes in ComEd territory?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | One Wave |  |
| In Depth Interviews | Program Management and Implementers | 2 | Feb – May 2018 | Augment with monthly calls |
| Gross Impact | Early Feedback File Review | NA | June 2018 – Feb 2019 | Early Feedback for Large Projects |
| Gross Impact | Engineering File Review | 85 | April 2018 – Feb 2019 | Two Waves\* |
| Process and Impact Research on PY10 Operations | Literature review, secondary research | Census | April 2018 – Feb 2019 | Process, Impact |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

***Gross Impact Evaluation***

Navigant will perform an engineering review of savings calculations. We will calculate Gross kWh, kW and summer and winter peak kW savings across all program bulbs based on the following equations:

Annual kWh Savings = Program bulbs \* Delta Watts/1000 \* Annual HOU \* Realization Rate

Annual kW Savings = Program bulbs \* Delta Watts/1000 \* Realization Rate

Annual Summer Coincident Peak kW Savings = Annual kW Savings \* Summer Peak Load CF Factor[[63]](#footnote-63)

Annual Winter Coincident Peak kW Savings = Annual kW Savings \* Winter Peak Load CF[[64]](#footnote-64)

Where Realization Rate = Installation Rate \* (1-Leakage Rate) \* Interactive Effects

For the verification analysis in CY2018, the evaluation team will calculate gross savings using the following parameter estimates:

* **Program Bulb Sales** data will be obtained from the CY2018 EM&V tracking database analysis.
* **Program Bulb Installation Rates** will be obtained from the IL TRM v6.0.
* **Delta Watts** will be calculated using the bulb type lumen-equivalence mapping in the IL TRM v6.0.
* **HOU and Summer Peak CF** will be obtained from the IL TRM v6.0 .
* **Winter Peak CF** will be determined based upon analysis done by the evaluation team.
* **Residential Bulb Installation Rate** will be obtained from the IL TRM v6.0.
* **Interactive Effects** will be obtained from the IL TRM v6.0.
* **Leakage** will be obtained from the three-year rolling average evaluation research recommendation. Navigant will examine zip codes of the applicable stores to determine if there should be an update to the leakage rate.

For the evaluation research in CY2018, the evaluation team will calculate research gross savings using the following parameter estimates:

* **Program Bulb Sales** data will be obtained from the CY2018 EM&V tracking database analyses.
* **Program Bulb Installation, Leakage, and Residential versus Nonresidential Rates** will come from the CY2018 surveys conducted with LED purchasers.
* **Delta Watts** will be calculated using the bulb-type specific lumen mapping included in the IL TRM v6.0.
* **Residential HOU and Peak CF** will come from the PY9 LED Lighting Logger Study. Hours of use (HOU) and Peak CF for bulbs installed in non-residential locations will be determined based upon the business activities occurring in these non-residential locations (based on survey self-reported business types) and the HOU and Peak CF estimates for non-residential locations from the IL TRM v6.0.
* **Energy and Demand Interactive Effects** will come from the IL TRM v6.0.

***Verified Net Impact Evaluation***

The TRM deems NTG at 1.0 for Income Eligible programs.

***Research NTG Impact Evaluation***

Navigant will not conduct NTG research for this program.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated for each measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings. The CY2018 study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program incentive offerings and changes to program application requirements.

Additionally, geographic analysis will map income eligible census tracks, overlay with participating stores, and help identify underserved regions. The customer surveys will also determine if in-service rate (ISR) or other parameters are the same for the Income Eligible Lighting Discounts Program compared to the market rate Lighting Discounts Program.

There are several process-related topics and research parameters that can be explored through these methods, including:

* Awareness of the discount provided by ComEd
* Importance of retailer recommendations and in-store placement of program sponsored lamps
* Importance of ComEd supplied informational materials
* Timing of bulb installation
* Identification of underserved regions
* Confirmation of percentage of income eligible customers visiting selected stores

**Evaluation Schedule**

Table 3 below provides the schedule for key deliverables and data transfer activities. (See Table 2 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 3. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 participating customer survey design | Evaluation | March 1, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | May 31, 2018 |
| Participating customer and process survey fielding | Evaluation | June 30, 2018 |
| Wave 1 impact memo | Evaluation | July 30, 2018 |
| CY2018 Program tracking data for final wave | ComEd | January 30, 2019 |
| Process Analysis Findings | Evaluation | January 30, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 2, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 6, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 28, 2019 |
| Revised Draft by Navigant | Evaluation | April 6, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 135, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 27, 2019 |

ComEd Income-Eligible Multi-Family Retrofit Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Income-Eligible Multi-Family Retrofit Program (Multi-Family Retrofit) offers direct installation of energy efficiency measures and replacement of inefficient equipment as well as educational information to further save money on energy bills. Eligible measures include LED and energy efficient lighting retrofits, programmable thermostats, advanced power strips, water efficiency devices, weatherization measures, pipe insulation, and heating and cooling equipment.

The program is jointly implemented by: Commonwealth Edison Company (ComEd) and Nicor Gas Company, and ComEd and Peoples Gas (PGL) and North Shore Gas (NSG) companies. Elevate Energy is the main implementation contractor for the ComEd and PGL and NSG program, with UIC-ERC[[65]](#footnote-65) as the sub-contractor for implementing the Public Housing Authority (PHA) portion of the program. Resource Innovations is the implementation contractor for the Nicor Gas program.

ComEd’s CY2018 net composite savings target is 19,494 MWh of cumulative persisting annual savings (CPAS) outlined in Table 1. The target participant level is 5,694 property assessments in CY2018.

The Multi-Family Retrofit Program provides retrofits in common areas and tenant spaces to eligible multi-family properties in the ComEd service territory, and serve as a “one stop shop” to multi-family building owners and managers whose buildings are targeted to income-eligible residents.[[66]](#footnote-66)

The primary objectives of the CY2018 evaluation of the Multi-Family Retrofit are to: (1) quantify gross and net savings impacts from the program; (2) quantify gas savings counted as kWh (therms conversion); (3) conduct research to support the program’s transition in response to the Future Energy Jobs Act (FEJA)[[67]](#footnote-67); and (4) determine key process-related program strengths and weaknesses and identify ways in which the program can be improved.

**Table 1. CY2018 Cumulative Persisting Annual Savings (CPAS) Targets**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Program Period | Net CPAS Electric Savings (MWh) | Net CPAS Gas Savings (therms) | Net CPAS Gas Conversion Savings (MWh) | Net Composite Savings (MWh) |
| CY2018 | 4,877 | 498,868 | 14,617 | 19,494 |

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 2. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X |  | X |  |
| Data Collection – Property Manager Interviews | X |  | X |  |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Billing Analysis (as needed) | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Impact – Field Work | X |  | X |  |
| Net-to-Gross – Customer Self-Report Surveys (if needed) |  | X |  |  |
| Process Analysis | X | X | X | X |

***Coordination***

This is a joint program with Nicor Gas and Peoples and North Shore Gas, evaluation will coordinate closely with these gas utilities on issues common to this program. Ameren Illinois has a suite of energy efficiency programs for income eligible customers and evaluation will coordinate with Ameren on an as needed basis.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings? What are the verified gross savings from lighting measures? What are the verified gross savings from non-lighting measures?
2. What are the program’s verified net savings?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. How can the program be improved?
3. How is the transition into CY2018 along with the public-sector programs impacting the program?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – June 2018 |  |
| In Depth Interviews | Property Manager/Owner | 1 | May - July 2018 |  |
| Gross Impact | Engineering File Review | all | June 2018 – March 2019 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 – April 2019 |  |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | Census | April 2018 – Feb 2019 | Process, Impact |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

***Gross Impact Evaluation***

The Multi-Family Retrofit Program savings verification will be based on using the applicable Illinois TRM (v6.0), or secondary research for any measure with custom savings input. Gross savings will be evaluated primarily by: (1) reviewing the tracking system data to ensure that all fields are appropriately populated; (2) reviewing measure algorithms and values in the tracking system to assure that they are appropriately applied; and (3) cross-checking totals. This approach will be supplemented where possible with a review of project documentation in each program year to verify participation, installed measure quantities, and associated savings, and verification of installation of energy efficient measures through participant surveys or field work. Verified gross savings will be estimated by multiplying deemed per unit kWh savings by the verified quantity of eligible measures.

The impact evaluation will quantify gas measures eligible for kWh conversion, and review the parameters ComEd used to estimate eligible gas savings.

***Verified Net Impact Evaluation***

The TRM deems NTG at 1.0 for Income Eligible programs.

***Research NTG Impact Evaluation***

No NTG research will be done for the income-eligible program in CY2018. Navigant may consider NTG research in CY2019 or CY2020, depending on findings from CY2018 participant process surveys and feedback from the Illinois statewide NTG working group.

Potential NTG research activities and timeline will be coordinated with the joint implementation with the gas utilities. Navigant will coordinate the data collection and survey instruments design to capture the appropriate questions in the decision maker surveys. The joint program evaluation and reporting timelines will be the same.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the property owner or manager interview, or customer surveys in CY2018. The CY2018 study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program offerings. Interview questions will also seek to identify how to qualify properties and people for this program and the result will be a sector-level customer journey map to visualize customer satisfaction. The process research will be coordinated with the gas utilities in the joint program implementation.

**Evaluation Schedule**

Table 4 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 4. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual Review | ComEd | January - March, 2018 |
| Participating customer survey design | Evaluation | April 30, 2018 |
| CY2018 program tracking data for Wave 1 early impact review and process | ComEd | June 30, 2018 |
| Wave 1 participating customer process survey fielding | Evaluation | July 15, 2018 |
| Early impact findings memo | Evaluation | July 30, 2018 |
| CY2018 program tracking data for Wave 2 process | ComEd | November 15, 2018 |
| Wave 2 participating customer process survey fielding | Evaluation | November 30, 2018 |
| Wave 3 and Final CY2018 Tracking Data to Navigant | ComEd | January 30, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 2, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 7, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 28, 2019 |
| Revised Draft by Navigant | Evaluation | April 7, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 26, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 30, 2019 |

ComEd Income-Eligible Single-Family Retrofit Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Income-Eligible Single-Family Retrofit Program provides retrofits to single-family households in ComEd service areas with incomes at or below 80% of the Area Median Income. The program offers assessments, direct installation of energy efficiency measures, replacement of inefficient equipment, technical assistance, and educational information to further save money on energy bills. Eligible measures include:

* LED lighting
* Smart and programmable thermostats
* HVAC equipment such as boilers, furnaces, central and room air conditioners and ductless heat pumps
* Water heaters
* Low-flow faucet aerators and showerheads
* Attic and wall insulation
* Air sealing

The program is jointly implemented by: ComEd and Nicor Gas Company, and ComEd and Peoples Gas (PGL) and North Shore Gas (NSG) companies.

ComEd’s CY2018 cumulative persisting annual savings targets for this program are outlined in Table 1.

**Table 1. CY2018 Cumulative Persisting Annual Savings (CPAS) Targets**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Program Period | Net CPAS Electric Savings (MWh) | Net CPAS Gas Savings (therms) | Net CPAS Gas Conversion Savings (MWh) | Net Composite Savings (MWh) |
| CY2018 | 6,985 | 349,525 | 10,241 | 17,226 |

The primary objectives of the CY2018 evaluation of the Income-Eligible Single-Family Retrofit Program are to: (1) quantify gross and net savings impacts from the program, and (2) review program processes. This four-year evaluation plan includes activities scheduled to evaluate the program savings impact and process activities for CY2018 through CY2021.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 2. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X |  | X |  |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews | X |  | X |  |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Impact – Field Work | X |  | X |  |
| Process Analysis | X | X | X | X |

***Coordination***

This is a joint program with Nicor Gas and Peoples and North Shore Gas and so the evaluation team will coordinate closely with the gas utility evaluation teams on issues common to this program. Ameren Illinois has a suite of energy efficiency programs for income eligible customers and evaluation will coordinate with Ameren on an as needed basis.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings? What are the verified gross savings from lighting measures? What are the verified gross savings from non-lighting measures?
2. What is the research estimate of gross savings (energy, peak demand, and total demand) for the program?
3. What are the program’s verified net savings?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. How can the program be improved?
3. How did customers become aware of the program? What marketing strategies could boost program awareness?
4. Are there any geographical gaps in participation?
5. Are there any program pain points and if yes, what are ways to improve these points?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves | Wave 1,  Final Wave |
| In-Depth Interviews | Program Management and Implementers | 2 | March 2018 |  |
| Gross Impact | Engineering Impact Review | NA | July 2018 | Two Waves\* |
| Participant Survey | Participants | Census |  |  |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

***Gross Impact Evaluation***

Since the Income-Eligible Single-Family Retrofit Program savings are derived from deemed values contained in the TRM[[68]](#footnote-68), gross savings will continue to be evaluated primarily by (1) reviewing the tracking system data to ensure that all fields are appropriately populated; (2) reviewing measure algorithms and values in the tracking system to assure that they are appropriately applied; and (3) cross-checking totals.

This approach will be supplemented where possible (1) with a review of project documentation in each program year to verify participation, installed measure quantities, and associated savings and (2) verification of installation of energy efficient measures through participant surveys or field work.

***Verified Net Impact Evaluation***

The TRM deems NTG at 1.0 for Income Eligible programs.

***Research NTG Impact Evaluation***

No NTG research is planned for this income-eligible program.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the end-user customer surveys in CY2018. The CY2018 study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program incentive offerings and changes to program application requirements. The process research will be coordinated with the gas utilities in the joint program implementation.

Customer interview questions and geographic analysis will be used to map income-eligible census tracts and overlay income-eligible participation. The result will show any gaps in participation, underserved regions, and where the program could expand. Interviews will also help to discover pain points with the program and ways to improve. The results will inform future process research focused on developing a sector-level customer journey map to visualize customer satisfaction.

**Evaluation Schedule**

Table 4 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details) Adjustments will be made, as needed, as evaluation activities progress.

**Table 4 Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2018 program tracking data for sampling Wave 1 | ComEd | July 2, 2018 |
| CY2018 participating customer survey design | Evaluation | July 16, 2018 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 30, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | August 30, 2018 |
| Wave 1 participating customer process survey fielding | Evaluation | September 28, 2018 |
| CY2018 Program tracking data for sampling Final Wave | ComEd | January 30, 2019 |
| Final Wave participating customer process survey fielding | Evaluation | February 28, 2019 |
| Final Wave project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 28, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 3, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 11, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 16, 2019 |
| Revised Draft by Navigant | Evaluation | April 17, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 25, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 30, 2019 |

ComEd UIC ERC – Low Income Kit Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The University of Illinois at Chicago Energy Resources Center (UIC-ERC) implements the Low-Income Kit Energy (LIKE) Program and jointly delivers the program with the Illinois Association of Community Action Agencies (IACAA). The program provides qualified customers with a kit containing energy-saving devices such as advanced power strips and LEDs. Households with electric hot water will also include low flow faucet aerators and low flow showerheads. The kits also include educational information on additional energy-saving actions customer can do to reduce their energy bills. The target population is low income customers living in single-family and small multi-family housing (two to four units) that are currently underserved by existing energy efficiency programs. Eligibility will be limited to customers whose incomes are at or below 150% of the federal poverty line for their household size.

The UIC-ERC is responsible for the program implementation, including purchasing the kit materials, assembling the kits, delivering the kits to Community Action Agencies for distribution, and collecting the data required for proper evaluation, measurement and verification (EMV). The IACAA will be responsible for hand delivering the kits to eligible participants.

The IACAA is responsible for customer recruitment which takes place in the Community Action Agencies facilities. Customers go to these facilities to receive assistance from several programs available to them and among those programs is the Low-Income Home Energy Assistance Program (LIHEAP). The LIHEAP has the same income-qualification requirements as the LIKE Program (need to be at or below 150% of the federal poverty line). After a customer provides proof they are eligible to participate in the LIHEAP (proof of income eligibility AND receives electricity from ComEd), a Community Action Agency staff member will ask them if they would like to participate in the LIKE Program and receive a free energy efficiency kit. The customer will then fill out a form to receive the kit, receive a brochure explaining the kit contents, and have the kit hand-delivered to them on site.

ComEd’s net target in CY2018 is 9,012 net MWh in cumulative persisting annual savings and the same for first year annual savings.

The primary objectives of the evaluation of the LIKE Program are to: (1) quantify gross and net savings impacts from the program, and (2) make recommendations to enhance the program focused on the current priorities as determined by the program manager. The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches Over Time**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | TBD[[69]](#footnote-69) | | |
| Data Collection – Program Manager and Implementer Interviews | X |
| Impact – Engineering Review | X |
| Impact – Measure-Level Deemed Savings Review | X |
| Impact – Verification & Gross Realization Rate | X |
| Process Analysis | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. The other Illinois utilities do not currently have similar programs.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings? What are the verified gross savings from lighting measures? What are the verified gross savings from non-lighting measures?
2. What is the research estimate of gross savings (energy, peak demand, and total demand) for the Program?
3. What are the program’s verified net savings?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. How can the program be improved?
3. How is the transition into CY2018 impacting the program?
4. Based on program manager interviews, implementation contractor interviews, and reviewing program outreach and marketing materials and other program materials, recommend potential program enhancements.

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – June 2018 |  |
| Gross Impact | Tracking System Review | All | April 2017 – Feb Sept 2018 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| Process and Impact Research on CY2018 Operations | Literature review, secondary research | Census | April 2017 – Feb 2018 | Process, Impact |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

***Gross Impact Evaluation***

Since almost all the program’s savings are derived based on the Illinois Technical Reference Manual (TRM), the evaluation team will conduct a limited gross impact evaluation. For this impact evaluation, gross savings will be evaluated by (1) reviewing the tracking system to be assured that all fields are appropriately populated and (2) cross-checking totals.

***Verified Net Impact Evaluation***

The TRM deems NTG at 1.0 for Income Eligible programs.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) in CY2018 will be calculated for each measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

Navigant will conduct in-depth telephone interviews with program managers and implementation contractors and review program materials to make recommendations for potential program enhancements for this program or similar future programs. These interviews will be conducted with Community Action Agencies and center around ideas to better engage the population in energy efficiency. Interview questions will also help to quantity the in-service rate of kits.

Navigant will also conduct geographic analysis to analyze the target geography and determine if there are areas that do not currently receive kits but would benefit from being included. Finally, Navigant will conduct research around kit distribution methods to determine if there are any agencies that could be better for kit distribution.

This process research may be expanded or streamlined based on ComEd’s plans for additional programs of this type.

**Evaluation Schedule**

Table 3 below provides the schedule for key deliverables and data transfer activities. (See Table 2 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 3. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| Process Analysis Findings | Evaluation | January 11, 2019 |
| CY2018 Program tracking data for sampling Wave 2 | ComEd | January 30, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 7, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 28, 2019 |
| Revised Draft by Navigant | Evaluation | April 5, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 12, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 26, 2019 |

##### Residential Programs Evaluation Plans

ComEd Appliance Rebates Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Appliance Rebates Program is designed to increase the market share of ENERGY STAR® appliances sold through retail (in-store or online) sales channels by providing rebates to decrease customer costs as well as information and education to increase customer awareness and acceptance of energy efficient appliances. The program targets residential customers who purchase new or replacement ENERGY STAR® appliances including air purifiers, clothes washers, electric dryers, freezers, refrigerators, room air conditioners, ventilation fans, water dispensers, pool pumps, smart thermostats, and advanced power strips.

The primary objectives of the evaluation of the ComEd Appliance Rebates (AR) Program are to: (1) determine gross and net program savings and (2) examine the effectiveness of program processes in achieving savings.

The CY2018 gross impact evaluation will not vary from the previous years, but adjustments will be made to reflect specific measure and project characterizations. The evaluation will include a participating customer free ridership and spillover study in CY2018. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 NTG study will include surveys with participating customers to learn about their perspectives and satisfaction with the program, incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Retailer Interviews | X |  | X |  |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X | X | X | X |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. What is the researched value for net-to-gross (NTG) ratio?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. How did customers become aware of the program?
2. What is the level of participant satisfaction with the program?
3. What is the level of satisfaction with the program amongst participating retailers?
4. What marketing strategies could boost program awareness?
5. What opportunities exist for program improvement?

**Evaluation Approach**

The tables below summarize the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

We have prepared an evaluation plan summary to identify tasks on a preliminary basis (Table 2). Final activities will be determined annually as program detail and requirements become known.

**Table 2. Evaluation Plan Summary for Appliance Rebate Program**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Measure-Level Deemed Savings Review |
| Gross Sampling Frequency | One Interim Review & One Final Review -- Census |
| Verified Net Impact Approach | Deemed Value |
| Researched NTG Approach | Participant Survey\*: FR real time, SO end of year |
| Researched NTG Timing | CY2018 Participants |
| Program Manager and Implementer Interviews - Review Materials | Yes |

\*FR refers for Free Ridership and SO refers to Spillover

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | One interim and one final |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – Dec 2018 | Augment with monthly calls |
| In Depth Interviews | Program Retailers | 15 | January 2018 |  |
| Gross Impact | TRM Review | Census | One interim and one final |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| Researched NTG and Process--FR | Surveys with Participating Customers | Census | Real time, online | Online program application automatically redirects to online survey |
| Researched NTG and Process--SO | Surveys with Participating Customers | 100 | End of year | Telephone |

Note: FR = Free Ridership; SO = Spillover

The primary data collection activities for CY2018 will consist of two participant surveys to assess the effectiveness of the program processes and participant free ridership and spillover. Interviews of retailers will inform our process evaluation. We will continue to conduct NTG research on free ridership real time using the program’s online survey in CY2018.

In line with accelerated evaluation schedule for delivering tracking data to the valuation team, Navigant will perform an interim tracking system review in the summer of 2018.

***Gross Impact Evaluation***

This analysis will include a review of deemed savings estimates for all measures in the program.

The evaluation team will also calculate gas savings from the program.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the Net-to-Gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Clothes Washer | 0.58 |
| Refrigerator | 0.57 |
| Air Purifier | 0.74 |
| Learning Thermostat | NA |
| Freezers | 0.54 |
| Heat Pump Water Heater | 0.74 |
| Clothes Dryer | 0.62 |
| Dehumidifier | 0.78 |
| Dishwasher | 0.80 |
| Pool Pump | 0.80 |
| Bathroom Exhaust Fan | 0.66 |
| Water Cooler | 0.83 |
| Window AC | 0.63 |
| Advanced Power Strips | 0.86 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

The evaluation will conduct NTG research in CY2018 to inform NTG recommendations for future use with two surveys: one for free ridership and one for spillover. The free ridership survey will be online and real time throughout the program year in that it will be offered to every participant who submits a program application online (when the participant submits the application, the website automatically links the participant to the survey). This enables us to collect information on free ridership close to the time when the customer made the decision to participate in the program. We will provide quarterly preliminary reports on free ridership.

The spillover survey will be conducted by telephone at the end of CY2018 with CY2018 participants. This allows enough time to have passed for participants to make any improvements that would qualify as spillover. The survey will be conducted with a random sample of participants, targeting 100 completes.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible.

***Process Evaluation***

The process evaluation will include a synthesis of both qualitative and quantitative data collected during the program implementer interview, participant online surveys, and retailer interviews.

The process evaluation will (1) determine participant satisfaction with the program overall, and key program elements and (2) assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. A battery of process questions will be included in the surveys with participating customers. The process findings will be summarized in detail and a set of key findings and recommendations will be developed for ComEd’s consideration.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| Participating customer NTG-FR and process survey fielding | Evaluation | January 12, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for Interim Review | ComEd | June 1, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| Participating customer NTG-SO and process survey fielding | Evaluation | November 1, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| Final TRM review | Evaluation | February 28, 2019 |
| Process Analysis Findings | Evaluation | January 31, 2019 |
| NTG Analysis Findings | Evaluation | January 31, 2019 |
| Internal Report Draft by Navigant | Evaluation | February 15, 2019 |
| Draft Report to ComEd and SAG | Evaluation | February 25, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 18, 2019 |
| Revised Draft by Navigant | Evaluation | March 25, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 4, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 16, 2019 |

ComEd Elementary Energy Education Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Elementary Energy Education (EEE) Program’s primary focus is to produce electricity and natural gas savings in the residential sector by motivating students and their families to take steps through reducing energy consumption for water heating and lighting in their home. The program is offered in service areas for ComEd, Nicor Gas, Peoples Gas, and North Shore Gas.

ComEd’s net planning target is 4,650 MWh for CY2018.

Notable program changes made from PY9 to CY2018 include:

* Offering ComEd-only kits

The primary objectives of the CY2018 evaluation of the EEE Program are to: (1) quantify net and gross savings impacts from the program and (2) identify enhancements to the program.

The CY2018 gross impact evaluation will not vary significantly from the previous years. In debating PY9 net-to-gross (NTG) potential values for this program, the Illinois Stakeholder Advisory Group (SAG) considered the ComEd NTG results and results from other utilities and reached a consensus on a value of 1.0. We are not currently planning NTG research but will consider conducting NTG research in future years. If Navigant conducts NTG research, the evaluation would include a participating customer free ridership and spillover study. The findings from the study would inform recommended NTG values for the SAG approval and future program application. The NTG study would include take-home interviews with participating customers to learn about their perspectives and satisfaction with the program.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | TBD | TBD | TBD |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams from other utilities on any issues relevant to this program. Specifically, the EEE Program is jointly offered by ComEd, Nicor Gas, Peoples Gas and North Shore Gas Companies with Resource Action Programs as the implementation contractor.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. Did the program meet its energy and demand savings targets? If not, why?
4. Are there any updates recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

Navigant will conduct limited process research for the EEE Program in CY2018 based on program manager and implementation contractor interviews and the analysis of parent and teacher survey responses collected by RAP.

**Evaluation Approach**

This two-year evaluation plan summary identifies tasks by year on a preliminary basis for CY2018 and CY2019 (Table 2). Activities are subject to change based upon the demands of the portfolio and other factors, and during the program year as program circumstances are better known.

For CY2018 and CY2019, the primary method to determine net and gross savings will be a program tracking system review and applying program-level net-to-gross ratio (NTGR) that is deemed through a consensus process by the Illinois Stakeholder Advisory Group (IL SAG).

The table below summarizes the evaluation tasks for CY2018 and CY2019.

**Table 2. Evaluation Plan Summary**

|  |  |  |
| --- | --- | --- |
| Activity | CY2018 | CY2019 |
| Gross Impact Approach | Tracking System Review | Tracking System Review |
| Verified Net Impact Approach | Deemed Value | Deemed Value |
| Researched NTG Approach | None | TBD |
| Program Manager and Implementer Interviews/ Review Materials | Yes | Yes |
| Participant Survey | None | TBD pending decision whether to conduct NTG research |

Note: FR = Free Ridership; SO = Spillover

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking System | Census | Two Waves |  |
| In Depth Interviews | Program Management and Implementers | 4 | April – Dec 2018 |  |
| Gross Impact | Tracking System Review | All | April 2018 – Feb 2019 | Two Waves\* |
| Gross Impact | Student Survey Analysis | All | April 2018 – Feb 2019 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review in waves in 2018. The first wave of M&V sampling is expected to cover about a half to two-thirds of the projects.

***Gross Impact Evaluation***

Since most of the EEE Program’s savings are based on the Illinois Technical Resources Manual (IL TRM), the evaluation team will conduct a limited gross impact evaluation in CY2018. The gross impact evaluation’s foundation will be a review of program tracking data that substantiates the type and quantity of measures installed. Navigant will perform independent verification of the program tracking database and determine the level of input completeness, outliers, missing values, and potentially missing variables. If necessary, the Navigant team will include recommendations for additional fields to be added to the tracking system for use in the impact evaluation effort as well as program process monitoring.

For measures covered by the IL TRM, verified gross savings are calculated for each participant using appropriate IL TRM algorithms and customer-specific data collected in the tracking system. For custom input variables or measures not yet in the IL TRM, the evaluation analysis will be supplemented by additional research, and then summed across participants to calculate program totals. To be eligible, a measure must meet the physical, operational, and baseline characteristics as defined in the applicable version of the IL TRM.

For the behavioral shower timer measure (not currently deemed in the TRM), savings will be determined through data collected on the student survey.

Where possible, the evaluation team will calculate gas savings from the electric measures.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the program-level NTGR deemed through a consensus process by the IL SAG to estimate the verified net savings for the EEE program. The NTG value for CY2018 is shown in Table 4.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| EEE Program | 1.0 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

NTG research was last performed in PY7 and Navigant will consider conducting this research again in CY2019.

The NTG analysis would use the data collected from the participant take-home surveys intended to collect free-ridership and spillover information. Navigant would deliver take-home surveys to randomly selected classrooms in the ComEd service territory and instruct teachers to distribute them to their students. The students would be asked to take these surveys home and have their parents fill them out. Once their parents have completed the surveys, the students will return them to their teacher. Teachers would be incentivized to collect a certain percentage of surveys and once that is accomplished, they will return the surveys to Navigant.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible.

***Process Evaluation***

Navigant will conduct limited process research for the EEE Program in CY2018 and CY2019. The research for CY2018 will be based on program manager and implementation contractor interviews and the analysis of parent and teacher survey responses collected by RAP.

Navigant can perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5 Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 Program tracking data | ComEd | January 30, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 26, 2019 |
| Revised Draft by Navigant | Evaluation | April 2, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 9, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 17, 2019 |

ComEd Fridge and Freezer Recycling Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Fridge and Freezer Recycling (FFR) Program offers free pickup and recycling services for older, working refrigerators, freezers and room air conditioners that households no longer want. Program savings are based on the accelerated removal, dismantling and recycling of these older, inefficient units. To encourage participation during CY2018, the program is providing incentives for up to two recycled refrigerators or freezers at $50/unit during all months of the year. Operational room air conditioner (AC) units are also eligible for pick up and recycling but can only be picked up from sites where the program implementer was already collecting a refrigerator or freezer (so the room AC unit could “ride for free”). Participants contributing these working room AC units receive a $10 program incentive.

The FFR Program originally began operation in June 2008. During CY2018, the FFR Program is continuing its rebound from the program suspension which occurred in mid-year of PY8. At that time, the program operation was suspended for five months, then resumed operation during the last two months of the year. The program currently forecasts approximately 71,500 units will be collected and recycled in CY2018. The associated CY2018 ex ante net savings target is 33,375 MWh.

During CY2018, the full spectrum of traditional impact-related evaluation activities will be completed, including surveys of retailers associated with replacement unit purchases. In addition, the evaluation team may conduct a process evaluation to explore possible enhancements to the program, depending on the outcome of the PY9 process evaluation.

The objectives of the CY2018 evaluation are to quantify net energy and peak demand savings impacts from the program, and, from an impact perspective to assess program strengths and weaknesses and provide recommendations to improve program performance. In addition, the CY2018 evaluation includes an in-depth assessment of free ridership associated with recycled units that were reported to be replaced by participants. This assessment includes repeat surveys of the largest and most active retailers reported to have sold new replacement units to these participants.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table. As the following table shows, many of the evaluation activities planned will occur in each program evaluation cycle with the exception of the Metering Study conducted in CY2019, and the participant surveys in which the responses to free ridership and spillover questions will be used to update the net-to-gross ratio for the FFR program.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Retailer Interviews | X | X | X | X |
| Impact – Metering Study |  | X |  |  |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | TBD | TBD |  | TBD |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the other utility evaluation teams on any issues relevant to this program. The approaches used by both the ComEd and Ameren Illinois evaluation teams to evaluate the FFR programs are closely coordinated. The methods used in both evaluations are specified by the Illinois TRM and are generally consistent. The one exception is the approaches being used to compute Net-to-Gross ratios, which differ somewhat. The ComEd team calculates a Retailer-Based NTG ratio as its main method, which is consistent with the Enhanced method in the TRM. The Ameren team, with a more limited budget, calculates a Participating Customer-based NTG ratio as its main method and computes a Retailer-Based NTG ratio as a sensitivity case. The two teams then compare and discuss results at the end of the evaluation process.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. Did the program meet its energy and demand savings targets? If not, why?
4. Does spillover exist in the program? If so, how much spillover is occurring?
5. Should the program design be modified to reduce free ridership, and if so, how?
6. Are there any updates recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**[[70]](#footnote-70)

Navigant will conduct process research for the FFR Program in CY2018 based on changes to the program, and program manager and implementation contractor interviews. Navigant will consult with ComEd program leads on focused, key process questions to be answered to help improve and inform the program. Process research will also be conducted in the subsequent calendar years.

* Has the program, as implemented, changed from the prior year? If so, how, why, and was this an advantageous change?
* What are the strengths and weaknesses of the program? How can the program be improved?
* What are key barriers to participation by ComEd’s customers and how can they be addressed by the program? How do customers become aware of the program? What marketing strategies could be used to boost program awareness?
* What is the program satisfaction among participating customers?
* Is the program outreach to customers effective in increasing awareness of the program opportunities?
* Is the program incentive level sufficient to encourage participation?

**Evaluation Approach**

We have prepared a CY2018 evaluation plan summary to identify tasks by year on a preliminary basis (Table 2). Final activities will be determined annually as program circumstances are better known.

The CY2018 evaluation will include several impact and process evaluation activities.

**Table 2. CY2018 Evaluation Plan Summary for Fridge Freezer Recycling Program**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Verified Gross Impact Approach | Bottom-up regression-based estimation. Part-use factor from surveys. |
| Verified Net Impact Approach | Deemed Value |
| Researched NTG Approach | The timing of the CY2018 Analysis is to be determined depending on if the program changes significantly. If deferred, CY2018 data will be pooled with CY2019 data and analyzed in the CY2019 evaluation. |
| Researched NTG Timing | The timing of the CY2018 Analysis is to be determined depending on if the program changes significantly. If deferred, CY2018 data will be pooled with CY2019 data and analyzed in the CY2019 evaluation. |
| Program Manager and Implementer Interviews and Review Materials | Yes |
| Participant Survey | Yes |

For the CY2018 evaluation, traditional primary data collection activities will take place. Table 3 summarizes the CY2018 data collection methods, data sources, approximate timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 3. Core Data Collection Activities, Sample and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| In Depth Interviews | Program Management | 2 | May 2018 |  |
| Telephone and Web Surveys | Participating Customers | 300 | May – June 2018 | Focus on verification and net-to-gross assessment |
| In-Depth Interviews | Retailers Associated with Appliance Replacements | 5 - 7 | May - July 2018 |  |
| In-Depth Interviews | Non-Participating Retailers | Up to 7 | July-Dec 2018 | Determine used appliance disposal practices in the program’s absence |

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review in waves in 2018. The first wave of M&V sampling is expected to cover about half to two-thirds of the projects.

Proposed gross impact sampling timelines are shown In Table 5

***Gross Impact Evaluation***

The CY2018 ex-ante and evaluation-verified gross energy savings will be calculated directly using procedures specified in the Illinois Technical Reference Manual (TRM) version 6.0 (CY2018). The program tracking database and TRM v6 provide inputs needed to calculate verified gross savings. In addition to program tracking data, a telephone and web survey of program participants determines: (1) the unit’s location (when used) prior to removal by the program; and (2) a verification factor. The first term, the unit’s prior location, is used directly in the regression based calculation of unit energy savings. The second term, the verification factor, calculates the percentage of units that were verified as being recycled through the program. A mixed mode approach is being used, to achieve efficiencies in web-based survey data collection, while still obtaining results that mirror the characteristics of the population. Historically, telephone surveys have attracted older respondents, while web surveys attract younger respondents. Therefore, a mixed mode approach (50% web-based and 50% telephone-based) is planned to provide approximately the same balance between these two groups as is present in the program population.

The source of the part-use factor is the PY6 evaluation. Savings estimates will be developed for the full population of units collected in CY2018 to estimate CY2018 Unit Energy Consumption (UECs). The ex-post savings estimates of energy (kWh) savings will rely on regression equations as specified in the TRM v6. Gross energy savings are expressed in terms of full-year UECs. UEC estimates will be made using a regression-based approach that models full-year energy savings as a function of unit characteristics (i.e., age, size, configuration, defrost mode, and unit location prior to being recycled).

Gross peak demand (kW) savings will also be calculated according to the algorithm specified in the TRM v6. The coincidence factors in the TRM v6.0 were calculated using the regression equations to predict consumption on summer peak days. These values are based on the same peak period definitions as used by PJM.

Both energy (kWh) and peak demand (kW) savings estimates will be made based on the characteristics of the population of units collected by the program during CY2018. In addition, gross energy savings estimates will be adjusted for part-use, by applying part-use factors from the PY6 evaluation.

***Verified Net Impact Approach***

Evaluation verified net savings will be computed by applying the NTG ratio(s) approved by the Stakeholder Advisory Group (SAG) to the estimate of evaluation-verified Gross savings. Separate estimates will be made for each appliance type – refrigerators, freezers, and window AC units, as shown in the following table.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Refrigerator | 0.57 |
| Freezers | 0.54 |
| Window AC | 0.63 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

This program is functioning in a dynamic market where there are an increasing number of disposal options outside of the program. In addition to traditional methods (giving the unit away to a friend or relative, selling the unit to a used appliance dealer, or paying to have the unit taken away and permanently recycled or destroyed), there are other avenues for disposal, such as having an appliance retailer remove the unit after a new one is purchased, or using Craigslist.com to identify a purchaser or taker of the appliance.

In recognition of this, the PY7 evaluation included a set of interviews with the three retailers that participated in the FFR Program, and with two non-participating retailers that sold a high volume of replacement units to FFR Program participants. The purpose of these interviews was to further investigate these participating and non-participating retailers’ disposal practices in the absence of the program. Note that ComEd has eliminated the participating retailer component of the program. However, the need for interviews with retailers associated with unit replacements continues. Therefore, as in previous evaluation cycles, our plan is to use the existing participant survey to guide the analytical approach for the retailer associated units, as well as the non-replaced units picked up by Reclaim at customers’ homes. Specifically, for those participating customers surveyed that indicate they would otherwise had their appliance retailer remove the old unit after a new one is acquired, the NTGR is based on the results of the survey of the retailer that they bought the replacement unit from. This survey reflects the retailers’ self-reported disposal practices absent the program.

**Program Induced Replacements**. The final NTG ratio also includes a term for program-induced replacements (PIR). This term accounts for the role played by the FFR Program and incentive in inducing a customer to replace their unit after the old unit was removed by the program and recycled. Such inducement could result from the program incentive, the convenience of the home pickup, or some other factor named by the respondent. Savings from participants who indicate that the program caused them to replace their old unit are reduced by the estimated consumption of the replacement unit. We estimate the consumption of the replacement units using the Energy Star Appliance Savings Calculator[[71]](#footnote-71). The average characteristics of new units captured in the survey are used for inputs into the Appliance Savings Calculator.

If applied equally to all units, the program-induced replacement effect on the NTGR is a ***net reduction*** of savings for refrigerators and freezers. Equal application of the full PIR value could result in a negative NTGR and negative net savings for retailers with very low NTGRs. In the PY5 evaluation, a decision was made to apply the PIR in a way that it limited individual retailers to not less than zero savings. This same approach was used in PY6 and PY7, and will also be applied in the CY2018 evaluation.

***Research NTG Impact Evaluation***

The following data sources will be used:

1. *Telephone and web surveys with participating customers.* As in previous years, we will rely heavily on findings from telephone and web-based surveys of participating customers to determine how their units would have been disposed of if the program had not picked them up. For those that replaced their old units, the survey will include a question to probe on who they bought the new unit from. Also, for those that replaced their unit, new response categories and related consistency checking questions will be included to ensure the responses given to the critical question used to determine free ridership[[72]](#footnote-72) include the disposal options available to them via the retailer they bought it from. The survey will also include an extensive battery of process-related questions.
2. *In-depth interviews with retailers associated with unit replacements.* In addition, we will conduct interviews with a sample of the most active retailers who sold FFR participants a new unit to replace the old one that was picked up by the program. These interviews will focus on their disposal practices absent the program. These findings will be used to determine the disposition of used appliances absent the program for those that purchase a new unit from these non-participating retailers. The names of these retailers will be obtained from the participating customer telephone surveys, wherein participants that replaced their unit will be asked who they bought it from.

Data analysis will be conducted following completion of each year’s primary data collection via web and telephone surveys. Note that the analysis of NTG data for CY2018 may be deferred to the CY2019 evaluation cycle. The decision to defer will depend on if the CY2018 program changes significantly. If it is deferred, the CY2018 data will be pooled with CY2019 data and analyzed in the CY2019 evaluation. In either case, the free ridership calculation will be completed using the method described below.

**Free Ridership –** The NTG ratio will be computed using an algorithm approach which utilizes a blend of participating and nonparticipating retailer and participating customer survey self-report data. The initial NTG ratio is adjusted for the fraction of units that would have been kept but not used and those that would have been discarded through a method in which the unit was destroyed absent the program.

**Spillover** – Based on our understanding of the program design, we do not see a program theory that supports an expectation of significant spillover. However, we will include questions in the participating customer survey to assess whether spillover has occurred because of their experience with FFR Program participation. Any spillover reported that is associated with a high degree of program influence will be incorporated into the NTGR calculation.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible.

***Process Evaluation***

The process evaluation will include a synthesis of both qualitative and quantitative data collected during the program implementer interview, participant online surveys, and retailer interviews.

The process evaluation will (1) determine participant satisfaction with the program overall, and key program elements and (2) assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. A battery of process questions will be included in the surveys with participating customers. The process findings will be summarized in detail and a set of key findings and recommendations will be developed for ComEd’s consideration.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5 Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2018 program tracking data request | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 program tracking data | ComEd | January 30, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 7, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 28, 2019 |
| Revised Draft by Navigant | Evaluation | April 4, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 11, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 20, 2019 |

ComEd Home Energy Assessment Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Home Energy Assessment Program (HEA) seeks to: (1) secure energy savings through direct installation of low-cost efficiency measures, such as water efficient showerheads and faucet aerators, pipe insulation, programmable thermostats, LEDs and power strips at eligible single family residences, and install smart thermostats with co-pays and (2) perform a brief assessment of additional energy-efficiency opportunities (e.g., furnace, boiler, air conditioning, insulation, and air sealing) from the respective utility portfolios.

For CY2018, the program is being offered jointly between ComEd, Peoples Gas (PG) and North Shore Gas (NSG) and Nicor Gas. The program is marketed as the Home Energy Assessment Program for ComEd, Home Energy Jumpstart program for Peoples Gas and North Shore Gas, and Home Energy Savings Program for Nicor Gas. Franklin Energy Services LLC (Franklin Energy) is the implementation contractor for all the programs.

The ComEd CY2018 net savings forecast is 20,754 MWh.

Notable program changes made from PY9 to CY2018 include:

* Including leave-behind Advanced Power Strips
* Offering an Additional Smart Thermostat (a lower co-pay option)

The primary objectives of the evaluation of the Home Energy Assessment (HEA) Program are to: (1) quantify gross and net savings impacts from the program, and (2) as the program continues to evolve, make recommendations to enhance the program focused on the current priorities as determined by the program. Our evaluation report will capture the electric savings for ComEd, and the gas savings will be captured in separate reports for Peoples Gas and North Shore Gas and Nicor Gas. The CY2018 gross impact evaluation will not vary significantly from the previous years, but adjustments will be made to reflect specific measure and project characterizations. ComEd has asked Navigant to conduct research on advanced power strips that are left behind at a customer’s home rather than directly installed by a contractor. They are interested in learning if the in-service rate for leave-behind smart strips may differ from those directly installed. Navigant is currently in the process of doing this research, and it may continue into 2018. The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Impact – Research on “Leave Behind” Advanced Power Strips | X |  |  |  |
| Impact – NTG Research |  |  | X | X |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Specifically, the HEA Program is jointly offered by ComEd, Nicor Gas, Peoples Gas and North Shore Gas Companies with Franklin Energy as the implementation contractor. The evaluation tasks for this program over the next four years are similar for these utilities. The only difference is Navigant will develop a scope of work for a billing analysis on smart thermostats in CY2018 for the gas companies. We plan on conducting primary billing data research on the gross impact of smart thermostats to inform future updates to the TRM. If the study goes forward, this research is likely to begin in 2018 Q3 with Navigant developing the detailed scope of work, data requests and related methodology.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. What updates, if any, are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

Navigant will conduct limited process research for the HEA Program in CY2018 based on program manager and implementation contractor interviews. The process research will address the following questions:

1. What are participants’ overall satisfaction levels regarding the program?
2. How can the program be improved?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

We prepared an evaluation plan summary to identify tasks by year on a preliminary basis (Table 2). Calendar Year (CY) refers to the year of participation that will be researched, not the time that the research will occur. Activities are subject to change based upon the demands of the portfolio and other factors, and during the program year as program circumstances are better known.

For CY2018, the primary method to determine net and gross savings will be a program tracking system review and applying program-level net-to-gross ratio (NTGR) that is deemed through a consensus process by the Illinois Stakeholder Advisory Group (IL SAG).

**Table 2.: Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Tracking System Review |
| Verified Net Impact Approach | Deemed Value |
| Program Manager and Implementer Interviews/ Review Materials | Yes |

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – Dec 2018 |  |
| Gross Impact | Tracking System Review | All | April 2018 – Feb 2019 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| Research on Leave-Behind APS | Literature review, secondary research | Census | December 2017 – Early 2018 | Process, Impact |

Note: APS = Advanced Power Strips

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the valuation team, Navigant will perform tracking system review in waves in 2018. The first wave of M&V sampling is expected to cover about half to two-thirds of the projects.

Proposed gross impact sampling timelines are shown below.

***Gross Impact Evaluation***

The program key gross impact evaluation activities for CY2018 will be based on (1) reviewing the tracking system to determine whether all fields are appropriately populated, (2) reviewing measure algorithms and savings values in the tracking system to assure that the TRM are appropriately applied, and (3) cross-checking measure totals and savings recorded in the tracking database.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the NTGR accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program. Those NTG values are shown in the following table.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Measure | CY2018 Deemed NTG Value |
| Lighting | 0.80 |
| Bath Aerators | 0.80 |
| Kitchen Aerators | 0.80 |
| Showerheads | 0.80 |
| Programmable Thermostats | 0.90 |
| Pipe Wrap | 0.80 |
| Advanced Power Strips | 0.95 |
| Co-Pay Smart Thermostats | NA |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

Evaluation will conduct NTG research in CY2020 and CY2021.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible. The evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

Navigant will conduct limited process research for the HEA Program in CY2018 and CY2019 and will determine the level of effort for future years at a later time. The research for CY2018 will be based on program manager and implementation contractor interviews.

Navigant can perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | June 1, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 Program tracking data for sampling Wave 2 | ComEd | January 30, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 7, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 28, 2019 |
| Revised Draft by Navigant | Evaluation | April 4, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 11, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 20, 2019 |

ComEd Home Energy Report (Opower) Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Home Energy Report (HER) Program is a behavioral-based energy efficiency program implemented by Opower.

In CY2018[[73]](#footnote-73), ComEd’s HER Program consists of the following eleven waves:

* Wave 1: 50,000 customers started the pilot program in the summer of 2009
* Wave 2: 5,000 customers started in the fall of 2010 to fill in for inactive accounts
* Wave 3: 200,000 customers added in the spring of 2011
* Wave 4: 20,000 customers started in the winter of 2011-12 to fill in for inactive accounts
* Wave 5: 20,000 customers added in the summer of 2012[[74]](#footnote-74)
* Wave 6: 100,000 customers added in the summer of 2013
* Wave 7 Low: 630,000 low usage customers added in the summer of 2014
* Wave 7 High: 630,000 high usage customers added in the summer of 2014
* Wave 8: 75,000 customers added in the summer of 2015
* Wave 9: 350,000 customers added September 2016
* New Mover Wave: this wave was launched in September 2014 and consists of customers who just moved into their home. New customers stopped being added to this wave in the fall of 2016.

Waves 1, 3, and 5 are part of a persistence study to determine the degree to which savings persist after report termination. Waves 1 and 3 each have 10,000 randomly-chosen customers who stopped receiving reports in October 2012 and began receiving them again in August 2013; these customers are referred to as “lapsed report” (LR) customers. Waves 1, 3, and 5 each have 10,000 randomly-chosen customers who stopped receiving reports in October 2013 and did not receive reports through the duration of PY9; these customers are referred to as “terminated report” (TR) customers.

The HER Program also includes a High Usage Alert (HUA) component. HUAs notify customers when their usage is at least 30% higher than during the same billing period of the previous year. Customers for whom ComEd can model rates can also assign a dollar amount threshold that triggers an HUA. With this feature, customers receive an HUA when their projected bill trends above this threshold. Energy savings from HUAs will be included in the overall HER impact analysis.

The primary objective of the evaluation of ComEd’s Home Energy Report Program is to estimate energy savings generated by regularly mailing customers reports that provide information about energy use and conservation.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Regression Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Navigant has regular discussions with the lead evaluators for Ameren and People Gas and North Shore Gas to ensure consistency in our annual evaluations. As needed, we will continue to coordinate research for this program across the utilities, as we did for the weather normalization study.

**Evaluation Research Topics**

The evaluation will seek to answer the following questions:

**Impact Evaluation**

1. How much energy do customers in the program save during CY2018?
   1. What is the apparent long-run trend in program savings?
   2. Are CY2018 energy savings flat, increasing, or falling compared to prior program years?
2. What are savings for customers in the New Movers Wave?
3. What is the uplift in other ComEd EE programs due to the reports?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 that will be used to answer the evaluation research questions. Final activities will be determined annually as program detail and requirements become known.

**Table 2. Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross, Net Impact Approach | Regression analysis |
| NTG Approach\* | Uplift analysis |
| Program Manager and Implementer Interviews/ Review Materials | Yes |

*\*The billing analysis produces impacts which are intrinsically net savings, aside from uplift.*

***Gross Impact Evaluation***

For Waves 1 through 9, Navigant will measure CY2018 program impacts through billing analysis using lagged dependent variable (LDV)[[75]](#footnote-75) and linear fixed effects regression (LFER) models, both of which were used and described in the PY8 evaluation report.[[76]](#footnote-76) We run both models as a robustness check. Although the two models are structurally different, both generate similar and unbiased program savings estimates, assuming the randomized controlled trial (RCT) is well balanced with respect to the drivers of energy use. Billing analysis implicitly estimates net impacts so no net-to-gross adjustment is necessary.

The New Mover Wave evaluation will be slightly different because this wave does not have full year pre-program customer data. The New Mover Wave is created by randomly assigning customers who just moved into their home in ComEd’s service territory to participant (80% of customers) or non-participant (20% of customers) groups. Customers are placed into one of these two groups one month after they move into their home, meaning only one month of consumption data is available from before they were placed in the program. For this wave, pre-period data will come from the home’s previous occupant, as identified by the service point id, for one year before the new occupant was placed in the HER Program. Therefore, the twelve months of pre-program data will consist of eleven months of consumption data from the previous occupant and one month from the current occupant. Using data from the previous occupant as the pre-program data will act as a stand-in for the effects of fixed household characteristics on energy usage. Using this pre-program data, Navigant will run the same LDV and LFER models as for the other waves.

Enrollment uplift in other energy efficiency programs due to the HER Program will be estimated the same way as in previous evaluation. Uplift savings will be netted out of HER results to avoid double counting. Navigant will consider both uplift that occurs in CY2018 and legacy uplift from PY4 to PY9.

During CY2018, the evaluation team will calculate gas savings from one wave using Nicor Gas data and will engage ComEd and SAG in a discussion once the research is done to determine future use of the results.

***Verified Net Impact Evaluation***

A key feature of the RCT design of the HER Program is that the analysis inherently estimates net savings because there are no participants who would have received the individualized reports in the absence of the program. While some customers receiving reports may have taken energy-conserving actions or purchased high-efficiency equipment anyway, the random selection of program participants (as opposed to voluntary participation) implies that the control group of customers not receiving reports would be expected to exhibit the same degree of energy-conserving behavior and purchases. Therefore, this method estimates net savings and no further NTG adjustment is necessary.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for CY2018 will be calculated.

***Process Evaluation***

The process evaluation for this program will be limited to interviews with the program manager and implementation contractor.

**Data Requirements**

Table 3 shows the data Navigant will need for the CY2018 evaluation. We intend to receive all data from the program implementer, Oracle, as we have in years past.

**Table 3. Core Data Collection Activities and Sample**

| Required Data | Relevant Information Requested | |
| --- | --- | --- |
| **Customer Usage and Tracking Data** | **For all HER participants (treatment and control):** | |
| * Account ID | * Wave identifier |
| * Treatment indicator | * Lapsed report customer indicator |
| * Terminated report customer indicator | * Flag for customers to exclude |
| * Program start date | * Move out date (if applicable) |
| * Opt out date (if applicable) | * Bill end date |
| * Meter type | * Usage units |
| * Usage value | * Bill duration in days |
| * Estimate indicator | * Zip code |

**Evaluation Schedule**

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

**Table 4. CY2018 Evaluation Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered |
| Interviews with program manager and IC | Evaluation | Jun 29, 2018 |
| Mid-year data request | Evaluation | Jul 6, 2018 |
| Mid-year data delivery | Oracle | Jul 27, 2018 |
| Early data characterization memo | Evaluation | Aug 17, 2018 |
| Final data request | Evaluation | Dec 3, 2018 |
| Final data delivery[[77]](#footnote-77) | Oracle | Jan 30, 2019 |
| Draft report to ComEd and SAG | Evaluation | Mar 12, 2019 |
| Comments on draft (15 Business Days) | ComEd | Apr 2, 2019 |
| Revised draft by Navigant to ComEd and SAG | Evaluation | Apr 11, 2019 |
| Comments on redraft (5 Business Days) | ComEd/SAG | Apr 19, 2019 |
| Final report to ComEd and SAG | Evaluation | Apr 28, 2019 |

ComEd HVAC Rebates Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The HVAC Rebates Program offers incentives for the installation of qualifying, high efficiency equipment such as central air conditioning systems, heat pumps, furnace blower motors (ECMs), water heaters, and smart thermostats. The program is implemented as an “open network” trade ally program, meaning that any contractor can submit an application and attend a training and meet the eligibility requirements.

Notable program changes made from PY9 to CY2018 include dividing the Heating, Cooling, and Weatherization Rebates Program of PY9 into two programs for CY2018-21: Weatherization Rebates Program and HVAC Rebates Program.

The primary objectives of the evaluation of the HVAC Rebates Program are to: (1) determine gross and net program savings and (2) examine the effectiveness of program processes in achieving savings.

The CY2018 gross impact evaluation will not vary significantly from the previous years, but adjustments will be made to reflect specific measure and project characterizations. The evaluation will include a participating customer free ridership and spillover study in CY2018. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 NTG study will include surveys with participating customers to learn about their perspectives and satisfaction with the program, incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews | X |  | X |  |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X | X | X | X |
| Net-to-Gross – Trade Ally Interviews | X |  | X |  |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. What is the researched value for net-to-gross (NTG) ratio?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. How did customers become aware of the program?
2. What is the level of participant satisfaction with the program?
3. What is the level of satisfaction with the program amongst participating trade allies?
4. What marketing strategies could boost program awareness?
5. What opportunities exist for program improvement?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

Evaluation activities will include phone-based participant surveys intended to estimate spillover and to collect information to inform a process evaluation. The evaluation will also include participant and trade ally online surveys intended to inform a process evaluation and collect NTG information, including free ridership and spillover analysis questions.

We have prepared an evaluation plan summary to identify tasks on a preliminary basis (Table 2). Final activities will be determined annually as program detail and requirements become known.

**Table 2. Evaluation Plan Summary for HVAC Rebates Program**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Measure-Level Deemed Savings Review |
| Gross Sampling Frequency | One Interim Review & One Final Review -- Census |
| Verified Net Impact Approach | Deemed Value |
| Researched NTG Approach | Participant Survey\*: FR real time, SO end of year  Trade Ally Survey†: FR and NPSO end of year |
| Researched NTG Timing | CY2018 Participating customers and trade allies |
| Program Manager and Implementer Interviews/ Review Materials | Yes |

\* FR refers to free Ridership; SO refers to spillover

† NPSO refers to nonparticipant spillover

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | One interim and one final |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | TRM Review | Census | One interim and one final |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| Researched Free Ridership and Process | Surveys with Participating Customers | Census | Real time |  |
| Researched Spillover | Surveys with Participating Customers | ~100 | End of year |  |
| Researched NTG and Process | Surveys with Participating Trade Allies | 75 | End of year |  |

Note: FR = Free Ridership; SO = Spillover

Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

The primary data collection activities for CY2018 will consist of surveys with participating customers and trade allies to assess the effectiveness of the program processes as well as free ridership and spillover. We will conduct NTG research on free ridership in real time with an online survey of participants. The link to the online surveys will be delivered to all participants via email. Free ridership surveys will be done real-time and sent to participants soon after they submit the application.

Research on participant spillover will be conducted with a random sample of participating customers through a telephone survey at the end of the year. Research on nonparticipant spillover will be conducted with participating trade allies through an online survey (also at the end of the year).

Navigant will perform an interim tracking system review in the summer of 2018 in line with program changes and an accelerated evaluation schedule for delivering tracking data to the evaluation team.

***Gross Impact Evaluation***

The gross impact analysis will include a review of deemed savings estimates for all measures in the program. All program measures will be reviewed for compliance with the Illinois TRM. Navigant will document how the deemed measures differ from ComEd’s existing planning or ex ante tracking estimates and provide guidance as to how these differences will impact ComEd’s programs. For new measures, Navigant will perform a desk review of program calculations and compare savings to the Illinois TRM.

The evaluation team will calculate gas savings achieved by the program and convert it to electric savings.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Central AC | 0.69 |
| Smart Thermostat | NA |
| Air Source Heat Pump | 0.57 |
| Ductless Mini-Split | 0.68 |
| ECM Furnace Motor – with Furnace Upgrade | 0.68 |
| ECM Furnace Motor – without Furnace Upgrade | 0.80 |
| Geothermal Heat Pump | 0.59 |
| Heat Pump Water Heater | 0.76 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

The evaluation will conduct NTG research in CY2018 on free ridership, spillover, and nonparticipant spillover to inform NTG recommendations for future use. For free ridership, the NTG analysis will use data collected from participant online surveys conducted throughout the year. For participant spillover and nonparticipant spillover, the NTG analysis will use data collected from participant telephone surveys and participating trade ally online surveys, respectively, near the end of the year.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible.

***Process Evaluation***

The process evaluation research will include a synthesis of both qualitative and quantitative data collected from the program staff and implementer interviews and from the participating customer and trade ally surveys in CY2018.

The process evaluation will (1) determine participant satisfaction with the program overall and key program elements and (2) assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. A battery of process questions will be included in the surveys with participating customers. The process findings will be summarized in detail and a set of key findings and recommendations will be developed for ComEd’s consideration.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made as needed while evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| Participating customer NTG-FR and process survey fielding | Evaluation | January 26, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for Interim Review | ComEd | June 1, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| Participating customer and trade ally NTG-SO and process survey fielding | Evaluation | November 1, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| Final TRM review | Evaluation | February 28, 2019 |
| Process Analysis Findings | Evaluation | January 31, 2019 |
| NTG Analysis Findings | Evaluation | January 31, 2019 |
| Internal Report Draft by Navigant | Evaluation | February 15, 2019 |
| Draft Report to ComEd and SAG | Evaluation | February 25, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 19, 2019 |
| Revised Draft by Navigant | Evaluation | March 26, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 2, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 11, 2019 |

ComEd Lighting Discounts Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The ComEd Lighting Discounts (Lighting Discounts) Program provides incentives to increase the market share of qualified LED bulbs and fixtures sold through retail sales channels. The Lighting Discounts Program also provides educational materials aimed at increasing customer awareness and acceptance of energy-efficient lighting technologies and promoting proper bulb disposal. In CY2018, savings from the program will be included within the IPA portfolio.

The primary objectives of the evaluation of the Lighting Discounts Program are to: (1) quantify net savings impacts from the program, (2) identify ways the program can be improved, and (3) ascertain the impact of the significant market shift to LEDs has had on ComEd residential customers lighting purchasing decisions.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table. As the table below shows, most of the evaluation activities planned will occur in each program evaluation cycle. The exception to this is for the shelf surveys and trade ally interviews, which will only be conducted every other year (and were recently conducted as part of the PY9 evaluation).

**Table 1. Evaluation Approaches Over Time**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – In-store Intercept Participant Surveys | X | X | X | X |
| Data Collection – In-store Shelf Surveys |  | X |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews |  | X |  | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X | X | X | X |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Specifically, the intercept survey instrument used in CY2018 will be like the instrument used in previous ComEd evaluations, as well as the evaluation of the Ameren Illinois lighting program.

In CY2018 the ComEd and Ameren residential lighting program evaluations will continue to be closely aligned with respect to data collection activities and analysis methods. The in-store intercept data collection instrument, which is the primary source of participant data used to estimate the gross and net savings parameters, and the NTG methods are closely coordinated and follow the algorithms outlined in the NTG framework document for residential lighting.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What is the level of gross annual energy (kWh) and peak demand (kW) savings induced by the program?
2. Did the program meet its energy and demand savings goals? If not, why not?
3. What are the net impacts from the program? What is the level of free ridership associated with this program? What is the level of participant and nonparticipant spillover from the program? What is the researched value for net-to-gross (NTG) ratio?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following items:

1. How aware are customers of the ComEd-sourced LED bulb discounts? How effective are the in-store displays and marketing materials?
2. How have customers’ lighting purchasing decisions been affected by the changes in the options available for purchase?
3. Assessment of changes to the program in the face of rapid market changes and upcoming standard changes. Determinization of what areas (bulb types or market segments) are still in need of ComEd incentives to encourage efficient light bulb purchase.
4. What are the key barriers to LED purchases and how can they be addressed by the program?
5. What is the current level of LED availability and pricing in ComEd territory for common retail channels? How does this compare to similar regions (with or without lighting programs) and how is this changing over time?
6. What are ComEd customers’ preferences, acceptance, and use of various efficient lighting technologies, and what are the primary factors influencing them?
7. How has the market responded to the introduction of the Energy Star 2.0 LED lamps?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline |
| Upstream Tracking Data | All Program Sales | NA | Two waves\* |
| In-Store Intercept Surveys | Retail Lighting Purchasers | 800 | Sept - Oct 2018 |
| In Depth Interviews | Program Management | 2 | Ongoing |
| Gross Impact Assessment | Tracking system verification | NA | Dec – Feb 2018 |
| Verified Net Impacts | Calculation using deemed NTG ratio | NA | Nov – Feb 2018 |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

The CY2018 **Program Tracking Data** will allow for the verification of rebated measure sales and analysis of the characteristics of the installed measures that drive savings (such as bulb type and wattage). The results of the program tracking data analysis will drive CY2018 gross and net impacts.

The CY2018 **In-store Intercept surveys** will be used to estimate the following key residential lighting gross and net savings parameters: (1) first year installation rate (by bulb type), (2) leakage of program bulbs outside of ComEd service territory, (3) percentage of bulbs being installed in non-residential locations and the business type of these non-residential installations (used to determine the appropriate non-residential hours-of-use [HOU] and peak coincidence factor [CF] to estimate program savings), and (4) net-to-gross ratio (for standard, directional, and specialty LEDs). During the in-store intercept surveys, data will also be collected to gauge customers’ awareness of program-discounted LEDs, assess customers’ key considerations when purchasing bulbs (price, energy usage, bill savings, etc.) and ascertain how customers are responding to the changes in the lighting market. The intercept survey instrument used in CY2018 will be like the instrument used in previous ComEd evaluations, as well as the evaluation of the Ameren Illinois lighting program.

Each year, two conference calls will be conducted with theComEd program manager and CLEAResult program implementation staff. These calls will be focused on the current status of the Lighting Discounts Program, recent changes to the program, and changes likely to occur to the program in CY2018 and beyond.

***Gross Impact Evaluation***

Gross kWh, kW and summer and winter peak kW savings will be calculated across all program bulbs based on the following equations:

Annual kWh Savings = Program bulbs \* Delta Watts/1000 \* Annual HOU \* Realization Rate

Annual kW Savings = Program bulbs \* Delta Watts/1,000 \* Realization Rate

Annual Summer Coincident Peak kW Savings = Annual kW Savings \* Summer Peak Load CF Factor[[78]](#footnote-78)

Annual Winter Coincident Peak kW Savings = Annual kW Savings \* Winter Peak Load CF[[79]](#footnote-79)

Where Realization Rate = Installation Rate \* (1-Leakage Rate) \* Interactive Effects

For the verification analysis in CY2018, the evaluation team will calculate gross savings using the following parameter estimates:

* **Program Bulb Sales** data will be obtained from the CY2018 EM&V tracking database analysis.
* **Program Bulb Installation Rates** will be obtained from the IL TRM v6.0.
* **Delta Watts** will be calculated using the bulb type lumen-equivalence mapping in the IL TRM v6.0.
* **HOU and Summer Peak CF** will be obtained from both the residential and non-residential sections of the IL TRM v6.0. The non-residential HOU and Peak CF will be determined based upon the business activities conducted in the non-residential locations where program bulbs are reportedly installed.
* **Winter Peak CF** will be determined based upon analysis done by the evaluation team and presented to ComEd in a memorandum titled “Winter Peak Coincidence Factor Recommendation for Residential Lighting”, dated February 2nd, 2015.
* **Residential and Non-Residential Bulb Installation** will be obtained from the IL TRM v6.0.
* **Interactive Effects** will be obtained from the IL TRM v6.0.
* **Leakage** will be obtained from the IL TRM v6.0.

The calculation of carryover savings will be based on the following parameter estimates:

* **Delta Watts** – Verified Savings estimate from the year of installation (source: IL TRM v6.0)
* **Residential and Non-Residential Split** - Evaluation Research from the year of purchase (source: PY8/PY9 report)
* **HOU and Peak CF** – Verified Savings estimate from the year of installation (source: IL TRM v6.0)
* **Interactive Effects** – Verified Savings estimate from the year of installation (source: IL TRM v6.0)
* **Installation Rate** - Verified Savings estimate from the year of purchase (source: PY8/PY9 report)
* **NTG** – Evaluation Research from the year of purchase (source: PY8/PY9 report)

For the evaluation research in CY2018, the evaluation team will calculate gross savings using the following parameter estimates:

* **Program Bulb Sales** data will be obtained from the CY2018 EM&V tracking database analyses.
* **Program Bulb Installation, Leakage, and Residential versus Nonresidential Rates** will come from the CY2018 in-store intercept surveys conducted with LED purchasers.
* **Delta Watts** will be calculated using the bulb-type specific lumen mapping included in the IL TRM v6.0.
* **Residential HOU and Peak CF** will come from the PY9 LED Lighting Logger Study. HOU and Peak CF for bulbs installed in non-residential locations will be determined based upon the business activities occurring in these non-residential locations (based on intercept survey self-reported business types) and the HOU and Peak CF estimates for non-residential locations from the IL TRM v6.0
* **Energy and Demand Interactive Effects will come from the IL TRM v6.0.**

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program. The CY2018 EM&V NTG estimates are shown in the table below and available on the IL SAG Website: http://www.ilsag.info/net-to-gross-framework.html.

**Table 3. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Omni-Directional LED Bulbs | 0.58 |
| Directional/Other LED Bulbs | 0.58 |
| LED Fixtures | 0.73 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

The evaluation will conduct NTG research in CY2018 to inform NTG recommendations for the future. The CY2018 evaluation research NTG ratios will be estimated using a self-report methodology using data collected during in-store intercept surveys.

**In-Store Intercept Self-Report Methodology**

The in-store intercept self-report methodology employed in CY2018 will use data gathered directly from customers at the time of purchase (in-store intercepts) to assess the residential lighting NTG. The data collected during the surveys to estimate the NTG analysis includes items such as the influence of the program on the program bulb purchase (both in terms of monetary incentives and education materials provided), number of program LEDs purchased, the timing of purchase, and purchase of additional non-rebated LEDs (spillover) that were influenced by the program.

In CY2018 the evaluation team will aim to conduct 800 in-store intercept surveys (conducted in the Fall of 2018) at four of the participating program retailers (multiple storefronts per retailer). The CY2018 intercept surveys will be stratified by program retailer and retailer location (like previous ComEd evaluations the retail locations will be classified as Urban [Chicago], Suburban [i.e., Schaumberg] and Other [i.e. Rockford]). In-store intercepts in CY2018 will be conducted at The Home Depot, Lowe’s, Sam’s Club, and Wal-Mart. Cumulatively, these retailers typically account for about 50% of the program bulb sales.

***Lifecycle Savings Estimation – Effective Useful Life Research***

In addition to first year (annual) savings, ComEd will be reporting lifecycle savings in CY2018 and beyond. Lifecycle savings are calculated in the same manner as the gross and net impacts described above except that the annual savings value is then multiplied by the effective useful life (EUL) of the measure to account for savings that accrue over the lifetime of the product. In CY2018 and beyond, EULs will continue to be refined through a combination of primary or secondary research, as needed.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it is documented in the report.

***Process Evaluation***

The process analysis will include a brief synthesis of both qualitative and quantitative data collected during the program implementer interviews, the in-store intercept surveys, and the trade ally surveys (CY2019 and CY2021). While ComEd indicated that they did not have specific process-related issues that they wanted to explore directly with program participants, there are several process-related topics that can be explored using the data collected for NTG and other researched parameters including:

* Awareness of the discount provided by ComEd
* Importance of retailer recommendations and in-store placement of program sponsored lamps
* Importance of ComEd supplied informational materials
* Location (residential versus nonresidential) and timing of program bulb installation

**Evaluation Schedule**

The table below provides the schedule for key deliverables and data transfer activities. (See Table 2 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 4. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Wave 1 CY2018 Data Available for Ex Ante Review | ComEd | June 5, 2018 |
| Wave 1 CY2018 Ex Ante Review Assessment Memo | Evaluation | July 7, 2018 |
| CY2018 Program Bulb Data Needed for In-Store Intercepts | ComEd | August 1, 2018 |
| CY2018 In-Store Intercept Surveys | Evaluation | September 1, 2018 |
| In-Store Intercept Surveys Memo | Evaluation | November 15, 2018 |
| Develop CY2018 Self-Report NTG Estimates | Evaluation | November 30, 2018 |
| CY2018 Process Evaluation Memo | Evaluation | December 15, 2018 |
| Memo to ComEd/ICC with CY2020 NTG Recommendations | Evaluation | December 15, 2018 |
| CY2018 EUL Assessment Memo | Evaluation | January 15, 2019 |
| CY2018 Tracking system is final | ComEd | January 30, 2019 |
| Preliminary Impacts Memo | Evaluation | February 15, 2019 |
| CY2018 Draft Report to ComEd and SAG | Evaluation | February 28, 2019 |
| Comments on CY2018 Draft (15 Business Days) | ComEd | March 21, 2019 |
| CY2018 Revised Draft Report to ComEd and SAG | Evaluation | March 28, 2019 |
| Comments on Revised Draft (5 Business Days) | ComEd | April 4, 2019 |
| CY2018 Final Report to ComEd and SAG | Evaluation | April 14, 2019 |

ComEd Multi-Family Market Rate Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The program Multi-Family Market Rate Program is jointly implemented by ComEd and Nicor Gas Company, and ComEd and Peoples Gas (PGL) and North Shore Gas (NSG) companies. Franklin Energy is the implementation contractor for the joint program. Franklin Energy staff install various energy-saving measures, which may include LEDs in tenant units, water-saving devices, programmable thermostats, pipe insulation, and LEDs in common area screw-in fixtures. The program further provides trade ally installs in common area and exterior areas lighting retrofits and gas measures, such as pipe wrap. Measures not covered by the Multi-Family Market Rate Program are transferred as leads to other programs.

ComEd’s CY2018 net savings target is 9,197 MWh of cumulative persisting annual savings (CPAS). The target participant level is 19,000 residential units in CY2018.

The Multi-Family Market Rate Program is essentially a combination of offers from the PY9 Multi-Family Assessment Program and the Multi-Family Common Area Pilot Program. The Multi-Family Market Rate Program serves as a “one stop shop” to multi-family building owners and managers to generate electricity and natural gas savings throughout the property.

The electric and natural gas saving services include:

* Electric and gas energy assessments and provision of educational information.
* Tenant and common area spaces direct installation of electric and gas saving measures.
* ComEd Business Energy Analyzer (BEA) sign up assistance in buildings with Smart Meter data to continually monitor building performance.
* Partner Trade Ally (PTA) installation of electric and gas saving measures at no cost to customer, following agreed upon program pricing.

This four-year evaluation plan includes activities scheduled to evaluate the program savings impact and process activities for CY2018 through CY2021. The primary objectives of the CY2018 evaluation of ComEd’s Multi-Family Market Rate Program are to: (1) quantify gross and net savings impacts from the program; (2) investigate potential gas savings counted as kWh (therms conversion); (3) conduct research to support the program’s transition in response to the Future Energy Jobs Act (FEJA)[[80]](#footnote-80); and (4) determine key process-related program strengths and weaknesses and identify ways in which the program can be improved.The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X |  | X |  |
| Data Collection – Property Manager Interviews | X |  | X |  |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews | X |  | X |  |
| Impact – Billing Analysis (as needed) | X | X | X | X |
| Impact – Engineering Review | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X |  |  |  |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. Specifically, the ComEd NTG research activities and timeline will be coordinated with similar research to be conducted by the Peoples and North Shore Gas, and the Nicor Gas multi-family programs. Navigant will coordinate the data collection and survey instruments design for consistency and capture the appropriate questions in the decision maker surveys. The joint program evaluations and reporting timelines will be the same.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s annual total verified gross savings?
2. What are the program’s verified net savings?
3. What is the estimated free-ridership and spillover for CY2018 participating customers? What is the research estimate for participant spillover for this program?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. What are participants’ perspectives and overall satisfaction with the program?
2. How is the transition into CY2018 along with the public sector programs impacting the program?
3. What are trade allies’ perspectives, awareness and overall satisfaction with the program?
4. How can the program be improved?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

**Table 2. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018  (approx.) | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – Dec 2018 |  |
| In Depth Interviews | Property Manager/Owner | 1 | May - September 2018 |  |
| Gross Impact | Early Feedback File Review | Census | June 2018 – Feb 2019 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | Census | March 2019 |  |
| Researched NTG and Process | Telephone Survey with Participating Decision Makers | Up to 80† | June 2018 – May 2019 | FR & SO, Process. Three Waves |
| Process and Impact Research on CY2018 Operations | Literature review, process research with Property Decision Makers and Trade Allies |  | April 2018 – March 2019 | Process, Impact |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

† Navigant will complete an appropriate number of surveys with participants and interviews with trade allies achieve to research NTG.

***Gross Impact Evaluation***

The Multi-Family Market Rate Program savings verification will be based on using the applicable Illinois TRM (v6.0), or secondary research for any measure with custom savings input. Gross savings will be evaluated primarily by (1) reviewing the tracking system data to ensure that all fields are appropriately populated; (2) reviewing measure algorithms and values in the tracking system to assure that they are appropriately applied; and (3) cross-checking totals. This approach will be supplemented where possible with a review of project documentation in each program year to verify participation; installed measure quantities; and associated savings. Verified gross savings will be estimated by multiplying deemed per unit kWh savings by the verified quantity of eligible measures.

The impact evaluation will investigate potential gas measures with KWh savings, and review the parameters ComEd used to estimate potential and eligible kWh savings (therms conversion).

The evaluation team will calculate gas savings achieved by the program and convert it to electric savings.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 3. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Path/Measure | CY2018 Deemed NTG Value |
| Programmable Thermostat | 0.90 |
| LED Lighting | 0.95 |
| Showerhead | 0.92 |
| Bath Aerator | 0.94 |
| Kitchen Aerator | 1.00 |
| Insulation | 0.95 |
| Other Measures, Direct Installed in Units | 0.95 |
| Comprehensive Non-CFL | 0.95 |

Source: *http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

Navigant will conduct a participating decision maker NTG study in CY2018 to provide NTG values for potential deeming in future program years through surveys with CY2018 participating customers. We will complete computer assisted telephone interviews (CATI) with a minimum of 80 contacts who participated in the CY2018 program to quantify participant free-ridership and spillover. We will design the sample to achieve a 90/10 confidence/precision level of NTG ratios at the measure category level, and a roll up at the program-level, through a weighted average of measure energy savings in the program.

Proposed CY2018 NTG and process research sampling timelines are shown below.

1. Wave 1 data collection and sampling drawn in May 2018 and completed in August 2018
2. Wave 2 data collection and sampling drawn in October 2018 and completed in January 2019
3. Final and third wave of CY2018 tracking data in February 2019 and completed in May 2019

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the decision maker customer surveys in CY2018. The CY2018 study will include in-depth interviews with participating decision makers and trade allies to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program offerings and changes to program application requirements. Interview questions will also seek to identify how to qualify properties for this program and the result will be a sector-level customer journey map to visualize customer satisfaction. Navigant will coordinate process research in CY2018 with the gas utilities in joint implementation.

**Evaluation Schedule**

Table 4 and Table 5 below provide the schedule for key deliverables and data transfer activities (see Table 2 for other schedule details.) The April 30th deadline in Table 5 is for the impact report. The process and NTG findings will be delivered in different documents and on a different schedule as shown in Table 5. Adjustments will be made, as needed, as evaluation activities progress.

**Table 4. Schedule – Key Impact Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered\* |
| Program Operations Manual and Workbook Review | ComEd | March 15 – April 15, 2018 |
| CY2018 Wave 1 Tracking Data | ComEd | June 30, 2018 |
| Early impacts findings memo | Evaluation Team | July 31, 2018 |
| Sample Projects Documentation for Review | ComEd | September 30, 2018 |
| Wave 2 and Final CY2018 Tracking Data to Navigant | ComEd | January 30, 2019 |
| Internal Report Draft by Navigant | Evaluation Team | March 2, 2019 |
| Draft Report to ComEd and SAG | Evaluation Team | March 8, 2019 |
| Comments on draft (15 Bus. Days) | ComEd / SAG | March 29, 2019 |
| Revised Draft by Navigant | Evaluation Team | April 5, 2019 |
| Comments on redraft (5 Bus. Days) | ComEd / SAG | April 12, 2019 |
| Final Report to ComEd and SAG | Evaluation Team | April 22, 2019 |

**Table 5. Schedule – Key NTG & Process Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered[[81]](#footnote-81) |
| Develop Process and NTG Survey and Interview Guides | Evaluation Team | March 15, 2018 – April 15, 2018 |
| CY2018 Wave 1 Tracking Data | ComEd | June 30, 2018 |
| CY2018 Wave 2 Tracking Data | ComEd | September 30, 2018 |
| Draft Process Research Findings | Evaluation Team | December 30, 2018 |
| CY2018 Wave 3 & Final Tracking Data | ComEd | January 30, 2019 |
| Final Process Research Findings | Evaluation Team | March 30, 2019 |
| Internal NTG Report Draft by Navigant | Evaluation Team | July 30, 2019 |
| Draft NTG Report to ComEd and SAG | Evaluation Team | September 1, 2019 |
| Comments on draft (10 Bus. Days) | ComEd / SAG | September 15, 2019 |
| Final NTG Recommendation to ComEd and SAG | Evaluation Team | October 1, 2019 |

ComEd NTC Middle School Kits Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The National Theatre for Children’s (NTC) “The Resource Force Middle School Energy Education Campaign” (NTC Middle School Kits Program) targets sixth, seventh, and eighth grade schools throughout the ComEd service territory to deliver a multiplatform, behavior-driven, in-school program. The program features live, educational theatre performances to the entire school rather than one grade at a time. After students see the performance, they are sent home with workbooks to fill out. In addition to homework assignments, the workbooks contain an offer of a free energy efficiency kit that will be shipped to their door. Parents must request a kit and state whether they have a gas or electric water heater and based on their response, NTC will ship them one of two types of kits. Homes with gas water heaters are delivered a kit with different measures than those with electric water heaters.

The NTC Middle School Kits Program’s primary focus is to produce electricity savings in the residential sector by motivating students and their families to take steps through reducing energy consumption for electric water heating and lighting in their home.

ComEd’s net planning target is 1,267 MWh for CY2018.

Notable program changes made from PY9 to CY2018 include:

* No longer including CFL bulbs in the kits
* Addition of LED bulbs in the kits

The primary objectives of the evaluation of the NTC Middle School Kits Program are to: (1) quantify gross and net savings impacts from the program, and (2) make recommendations to enhance the program focused on the current priorities as determined by the program manager for this program or similar future programs.

The CY2018 gross impact evaluation will not vary significantly from the previous years. The evaluation will include a participating customer free ridership and spillover study in CY2019. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2019 NTG study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program and how to improve the program in the future.

The evaluation of this program over the coming years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | X |  |  |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams from other utilities on any issues relevant to this program.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. Did the program meet its energy and demand savings targets? If not, why?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

Navigant will conduct limited process research for the program in CY2018 based on program manager and implementation contractor interviews.

**Evaluation Approach**

This evaluation plan summary identifies tasks on a preliminary basis for CY2018 (Table 2). Calendar Year (CY) refers to the year of participation that will be researched, not the time that the research will occur. Activities are subject to change based upon the demands of the portfolio and other factors, and during the program year as program circumstances are better known.

For CY2018, the primary method to determine net and gross savings will be a program tracking system review and applying program-level net-to-gross ratio (NTGR) that is deemed through a consensus process by the Illinois Stakeholder Advisory Group (IL SAG).

The table below summarizes the evaluation tasks for CY2018.

**Table 2. Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Tracking System Review |
| Verified Net Impact Approach | Deemed Value |
| Program Manager and Implementer Interviews/ Review Materials | Yes |

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – Dec 2018 |  |
| Gross Impact | Tracking System Review | All | June 2018– Feb 2019 | Two Waves\* |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review and M&V project sampling in waves in 2018. The first wave of M&V sampling is expected to cover about half to two-thirds of the projects.

Proposed gross impact sampling timelines are shown below.

***Gross Impact Evaluation***

Since most of the program’s savings are derived based on the Illinois Technical Resources Manual (IL TRM), the evaluation team will conduct a limited gross impact evaluation in CY2018. The the foundation of the gross impact evaluation will be a review of program tracking data that substantiates the type and quantity of measures installed. Navigant will perform independent verification of the program tracking database and determine the level of input completeness, outliers, missing values, and potentially missing variables. If necessary, the Navigant team will include recommendations for additional fields to be added to the tracking system for use in the impact evaluation effort as well as program process monitoring.

For measures covered by the IL TRM, verified gross savings are calculated for each participant using appropriate IL TRM algorithms and customer-specific data collected in the tracking system. For custom input variables or measures not yet in the IL TRM, the evaluation analysis will be supplemented by additional research, and then summed across participants to calculate program totals. To be eligible, a measure must meet the physical, operational, and baseline characteristics as defined in the applicable version of the IL TRM.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply a program-level NTGR of 1.0 deemed through a consensus process by the IL SAG to estimate the verified net savings for the program in CY2018.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| NTC Middle School Kits Program | 1.0 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

We will conduct in-depth telephone interviews with program managers and implementation contractors to make recommendations for potential program enhancements for future programs.

Navigant can perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for sampling Wave 1 | ComEd | July 1, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | August 30, 2018 |
| CY2018 Program tracking data for sampling Wave 2 | ComEd | January 30, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to ComEd and SAG | Evaluation | March 6, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 27, 2019 |
| Revised Draft by Navigant | Evaluation | April 4, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 11, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 20, 2019 |

ComEd and Nicor Gas Residential New Construction Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Residential New Construction Program is jointly offered by Nicor Gas and ComEd. Nicor Gas is the lead utility as most of the avoided costs are from natural gas savings. Residential Science Resources (RSR) implements the program for both utilities. Program participation requires a minimum efficiency of 20 percent above code for each home, and program homes are ranked in tiers based on performance:

* Tier 1: 20.00-24.99 percent above code
* Tier 2: 25.00-29.99 percent above code
* Tier 3: 30 percent or more above code

RSR uses completed REM/Rate files for each home to calculate whole-house savings. The program relies on networks of builders and Home Energy Rating System (HERS) raters to garner participation and continues to attract raters and builders to the program.

Nicor Gas Company (Nicor Gas) and ComEd are implementing Calendar Year 2018 (CY2018) beginning January 1, 2018 and continuing through December 31, 2018. The target savings goals for CY2018 are shown in Table 1.

**Table 1. CY2018 Savings and Completed Homes Goals**

|  |  |
| --- | --- |
| Goal | Goal Value |
| Gas Savings | 249,750 Gross therms |
| Electric Savings | 878 Gross MWh |
| Total Homes | 800 homes |

*Source: ComEd 2018-2021 Energy Efficiency and Demand Response Plan and Nicor Gas Energy Efficiency Plan January 2018-December 2021*

This document presents the proposed evaluation activities for the CY2018 joint Nicor Gas and ComEd Residential New Construction Program. Navigant is the evaluator for both utilities’ programs. The objectives of the CY2018 evaluation are to (1) identify ways in which the program can be improved; (2) determine process-related program strengths and weaknesses; and (3) verify the gross and net kilowatt-hour (kWh), kilowatt (kW), and therm impacts of the program. To evaluate program gross impacts, the evaluation team will verify the quantity of homes incented in CY2018 and apply the GPY5/EPY8 researched realization rates for both gas and electric savings to verified ex ante savings.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in Table 2. Navigant will complete a tracking system review, interview program managers and implementers, calculate gross realization rates, and complete a process analysis for each program year. Navigant will perform simulation modeling for the gross impact analysis and trade ally interviews for net-to-gross (NTG) and process research in CY2019 when the residential energy code changes from IECC 2015 to IECC 2018. The trade ally interviews will include interviews with participating raters and builders to learn about their perspectives and satisfaction with the program, incentive offerings, and how to improve the program in the future. The NTG research will include in-depth interviews with both participating and non-participating builders to assess free ridership and spillover. The findings will inform recommended NTG values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application.

**Table 2. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Interviews |  | X |  |  |
| Impact – Modeling |  | X |  |  |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Trade Ally Interviews |  | X |  |  |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program.

**Evaluation Research Topics**

The CY2018 evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the gross annual energy and demand savings induced by the program?
2. Did the program meet its energy and demand savings goals? If not, why not?
3. What are the net impacts from the program?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. How can the program be improved?
2. Are builders and raters satisfied with the program? What improvements, if any, would builders and raters like to see implemented?
3. How is the transition into CY2018 along with the income-eligible programs impacting the program?

**Evaluation Approach**

Table 3 summarizes the evaluation plan for CY2018 and CY2019 including data collection methods and sources that will be used to answer the evaluation research questions. Final activities will be determined annually as program detail and requirements become known.

**Table 3. Evaluation Plan Summary**

|  |  |  |
| --- | --- | --- |
| Activity | CY2018 | CY2019 |
| Gross Impact Approach | Apply GPY5/EPY8 Realization Rates | Calibrated Energy Simulation |
| Verified Net Impact Approach | Deemed Value | Deemed Value |
| Researched NTG Approach | None | Interviews with Builders |
| Researched NTG Timing | None | Fall/Winter 2019 |
| Program Manager and Implementer Interviews/Review Materials | Yes | Yes |

Table 4 summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 4. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves: April 2018 and Jan 2019 |  |
| Program Material Review | Program manuals, marketing and educational materials | All | Jan – Feb 2019 | Process analysis |
| In Depth Interviews | Program Management and Implementers | 3 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | Use GPY5/EPY8 realization rate to adjust claimed savings for CY2018 homes | All | Feb 2019 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |

In line with program changes and the accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform an early tracking system review in April 2018. This includes a review of both the tracking system and the ex ante savings methodology to ensure that ex post building simulation models are representative of program homes and any program changes.

***Gross Impact Evaluation***

The GPY5/EPY8 evaluation used a rigorous approach of calibrated energy simulation to determine gross realization rates for gas and electric savings and to estimate gross electric demand savings. As the calculation method for determining ex ante savings has not changed for CY2018, the evaluation team plans to apply the GPY5/EPY8 realization rates to the ex ante savings to determine verified gross impacts for CY2018. Navigant will apply the GPY5/EPY8 realization rates by home tier level, as shown in Table 5.

**Table 5. GPY5/EPY8 Realization Rates by Home Tier Level**

|  |  |  |
| --- | --- | --- |
| Participation  Category | Verified Gross  Realization Rate (Gas) | Verified Gross  Realization Rate (Electric) |
| Tier 1 | 103% | 99% |
| Tier 2 | 89% | 98% |
| Tier 3 | 88% | 116% |
| Overall | 94% | 101% |

***Verified Net Impact Evaluation***

The evaluation will apply the NTG ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 6. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Residential New Construction | 0.65 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx, and Nicor Gas GPY7 NTG Values 2017-03-01 Final.xlsx.*

***Researched NTG Impact Evaluation***

Navigant will complete NTG research as part of the CY2019 evaluation. Navigant will conduct in-depth interviews with both participating and non-participating builders. The evaluation team will attempt to contact a census of builders and aim to complete interviews with as many as possible up to 20 participating builders and up to 20 non-participating builders. Navigant will target the top builders to obtain results for a large share of program homes.

Navigant will use a self-report approach to estimate the program’s NTGR following the statewide approach included in the TRM. The analysis will cover the following components:

* Free-ridership
* Participant Spillover
* Non-participant Spillover

Where participant spillover refers to spillover from participating builders in non-program homes and non-participant spillover refers to spillover from builders who are exposed to the program but are not participating. The builder interviews will also assess the current level of energy efficiency knowledge among participating builders to provide a “baseline” for any future spillover or market effects research.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA) for electric energy efficiency, the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the electric measures installed in CY2018 will be calculated along with the total CPAS across all electric measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The CY2018 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, as well as the review of program manuals and marketing and educational materials developed by the program. The CY2019 NTG study will include interviews with raters and builders to learn about their perspectives and satisfaction with the program.

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer in transitioning into the revised regulatory requirements starting in CY2018. Possible topics may include, but will not be limited to, cumulative persisting annual savings and effective useful life.

**Evaluation Schedule**

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

**Table 7. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Manuals, Marketing and Educational Materials | Nicor Gas and ComEd | January 2, 2018 |
| CY2018 Program Tracking Data for Wave 1 Review | Nicor Gas and ComEd | April 7, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| CY2018 Program Tracking Data | Nicor Gas and ComEd | January 30, 2019 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2019 |
| Process Analysis Findings | Evaluation | March 1, 2019 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2019 |
| Draft Report to Nicor Gas, ComEd, and SAG | Evaluation | March 5, 2019 |
| Comments on draft (15 Business Days) | Nicor Gas, ComEd, and SAG | March 26, 2019 |
| Revised Draft by Navigant | Evaluation | April 3, 2019 |
| Comments on redraft (5 Business Days) | Nicor Gas, ComEd, and SAG | April 10, 2019 |
| Final Report to Nicor Gas, ComEd, and SAG | Evaluation | April 19, 2019 |

ComEd Weatherization Rebates Program CY2018 to CY2021 Evaluation Plan

**Introduction**

The Weatherization Rebates Program offers incentives for the installation of qualifying weatherization improvements such as attic and wall insulation, and air and duct sealing. The weatherization rebates are instant rebates that are applied to the customer invoice by a participating contractor. Contractors must have certain credentials (for example, analyst or envelope professional certification from Building Performance Institute, specific insurance thresholds, and one-on-one training on program implementation with a program specialist) and a signed agreement with the implementer for their weatherization project to be eligible for a rebate.

Notable program changes made from PY9 to CY2018 include dividing the Heating, Cooling, and Weatherization Rebates program of PY9 into two programs for CY2018-21: Weatherization Rebates program and HVAC Rebates program.

The primary objectives of the evaluation of the ComEd Weatherization Rebates Program are to: (1) determine gross and net program savings and (2) examine the effectiveness of program processes in achieving savings.

The CY2018 gross impact evaluation will not vary significantly from the previous years, but adjustments will be made to reflect specific measure and project characterizations. The evaluation will include a participating customer free ridership and spillover study in CY2018. The findings from the study will inform recommended net-to-gross (NTG) values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The CY2018 NTG study will include surveys with participating customers to learn about their perspectives and satisfaction with the program, incentive offerings, and how to improve the program in the future.

The evaluation of this program over the coming four years will include a variety of data collection and analysis activities, including those indicated in the following table.

**Table 1. Evaluation Approaches – Four Year Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tasks | CY2018 | CY2019 | CY2020 | CY2021 |
| Tracking System Review | X | X | X | X |
| Data Collection – Participant Surveys | X |  |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Data Collection – Trade Ally Surveys | X |  |  | X |
| Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Impact – Verification & Gross Realization Rate | X | X | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X |  |  | X |
| Net-to-Gross – Trade Ally Surveys | X |  |  | X |
| Process Analysis | X | X | X | X |

***Coordination***

Navigant will coordinate with the evaluation teams from other utilities on any issues relevant to this program.

**Evaluation Research Topics**

The evaluation will seek to answer the following key researchable questions:

**Impact Evaluation**

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. What is the researched value for net-to-gross (NTG) ratio?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

The process evaluation effort for CY2018 will focus on program delivery. The process research will address the following questions:

1. How did customers become aware of the program?
2. What is the level of participant satisfaction with the program?
3. What is the level of satisfaction with the program amongst participating trade allies?
4. What marketing strategies could boost program awareness?
5. What opportunities exist for program improvement?

**Evaluation Approach**

The table below summarizes the evaluation tasks for CY2018 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

Evaluation activities will include phone-based participant surveys intended to estimate spillover (SO) and to collect information to inform a process evaluation. The evaluation will also consist of participant and trade ally online surveys intended to inform a process evaluation and collect NTG information, including free ridership and spillover analysis questions.

We have prepared an evaluation plan summary to identify tasks on a preliminary basis (Table 2). Final activities will be determined annually as program detail and requirements become known.

**Table 2. Evaluation Plan Summary**

|  |  |
| --- | --- |
| Activity | CY2018 |
| Gross Impact Approach | Measure-Level Deemed Savings Review |
| Gross Sampling Frequency | One Interim Review & One Final Review -- Census |
| Verified Net Impact Approach | Deemed Value |
| Researched NTG Approach | Participant Survey\*: FR real time, SO end of year  Trade Ally Survey†: FR and NPSO end of year |
| Researched NTG Timing | CY2018 Participating customers and trade allies |
| Program Manager and Implementer Interviews/ Review Materials | Yes |

\* FR refers to free ridership and SO refers to spillover

† NPSO refers to nonparticipant spillover

Table 3 below summarizes the proposed data collection activities for CY2018 including the sample sizes and timing of each activity.

**Table 3. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2018 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | One interim and one final\* |  |
| In Depth Interviews | Program Management and Implementers | 2 | April – Dec 2018 | Augment with monthly calls |
| Gross Impact | TRM Review | Census | One interim and one final |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2019 |  |
| Researched NTG and Process | Surveys with Participating Customers | Census for FR, 75 for SO | Real time for FR, end of year for SO |  |
| Researched NTG and Process | Survey with Participating Trade Allies | 75 | End of year |  |

Note: FR = Free Ridership; SO = Spillover

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave.

The primary data collection activities for CY2018 will consist of surveys with participating customers and trade allies to assess the effectiveness of the program processes as well as free ridership and spillover. We will conduct NTG research on free ridership in real time with an online survey of participants. Research on participant spillover will be conducted with participating customers through a telephone survey at the end of the year. Research on nonparticipant spillover will be conducted with participating trade allies through an online survey also at the end of the year.

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform an interim tracking system review in the summer of 2018.

***Gross Impact Evaluation***

The gross impact analysis will include a review of deemed savings estimates for all measures in the program. All program measures will be reviewed for compliance with the Illinois TRM and identify the changes necessary to meet TRM compliance. Navigant will document how the deemed measures differ from ComEd’s existing planning or ex ante tracking estimates and provide guidance as to how these differences will impact ComEd’s programs. For new measures, Navigant will perform a desk review of program calculations and compare savings to the Illinois TRM.

***Verified Net Impact Evaluation***

The verified net impact evaluation will apply the net-to-gross (NTG) ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program.

**Table 4. Deemed NTG Values for CY2018**

|  |  |
| --- | --- |
| Program Measure | CY2018 Deemed NTG Value |
| Weatherization | 1.01 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2017\_NTG\_Meetings/Final/ComEd\_NTG\_History\_and\_PY10\_Recommendations\_2017-03-01.xlsx*

***Research NTG Impact Evaluation***

The evaluation will conduct NTG research in CY2018 on free ridership, spillover, and nonparticipant spillover to inform NTG recommendations for future use. For free ridership, the NTG analysis will use data collected from participant online surveys conducted throughout the year. For participant spillover and nonparticipant spillover, the NTG analysis will use data collected from participant telephone surveys and participating trade ally online surveys, respectively, near the end of the year.

***Calculation of CPAS and Annual Savings***

As required by the Future Energy Jobs Act (FEJA), the measure-specific and total ex ante gross savings for the program and the cumulative persisting annual savings (CPAS) for the measures installed in CY2018 will be calculated along with the total CPAS across all measures. Additionally, the weighted average measure life will be estimated, if possible. Evaluation will also add the savings converted from gas savings to the electric savings so that it’s documented in the report.

***Process Evaluation***

The process evaluation research will include a synthesis of both qualitative and quantitative data collected from the program staff and implementer interviews and from the participating customer and trade ally surveys in CY2018.

The process evaluation will (1) determine participant satisfaction with the program overall and key program elements and (2) assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, and participation procedures. A battery of process questions will be included in the surveys with participating customers. The process findings will be summarized in detail and a set of key findings and recommendations will be developed for ComEd’s consideration.

**Evaluation Schedule**

Table 5 below provides the schedule for key deliverables and data transfer activities. (See Table 3 for other schedule details.) Adjustments will be made, as needed, as evaluation activities progress.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 2, 2018 |
| Participating customer NTG-FR and process survey fielding | Evaluation | January 26, 2018 |
| CY2018 program tracking data for QA/QC | ComEd | April 7, 2018 |
| CY2018 program tracking data for Interim Review | ComEd | June 1, 2018 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 30, 2018 |
| Participating customer and trade ally NTG-SO and process survey fielding | Evaluation | November 1, 2018 |
| EUL Research Memo | Evaluation | December 15, 2018 |
| Final TRM review | Evaluation | February 28, 2019 |
| Process Analysis Findings | Evaluation | January 31, 2019 |
| NTG Analysis Findings | Evaluation | January 31, 2019 |
| Internal Report Draft by Navigant | Evaluation | February 15, 2019 |
| Draft Report to ComEd and SAG | Evaluation | February 25, 2019 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 18, 2019 |
| Revised Draft by Navigant | Evaluation | March 26, 2019 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 2, 2019 |
| Final Report to ComEd and SAG | Evaluation | April 15, 2019 |

1. Commonwealth Edison Company’s 2018-2021 Energy Efficiency and Demand Response Plan dated June 30, 2017, page 6. [↑](#footnote-ref-1)
2. See <http://www.ilga.gov/legislation/publicacts/99/099-0906.htm> [↑](#footnote-ref-2)
3. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0, available at: http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-3)
4. See https://www.youtube.com/watch?v=dKX6FBKrALU for more information on the BEA Program. [↑](#footnote-ref-4)
5. Navigant Consulting, “ComEd Agentis Business Energy Analyzer Pilot Program Evaluation Report,” (March 20, 2017). http://ilsagfiles.org/SAG\_files/Evaluation\_Documents/ComEd/ComEd\_EPY8\_Evaluation\_Reports\_Final/ComEd-Agentis\_Business\_Energy\_Analyzer\_PY8\_Evaluation\_Report\_2017-03-20\_Final.pdf [↑](#footnote-ref-5)
6. The model is identical to the post-program regression (PPR) model used in previous evaluations. We have changed the nomenclature to better align with academic research and because LDV is more descriptive of the model structure than PPR. [↑](#footnote-ref-6)
7. *Ibid.* See also Daniel Ho, Kosuke Imai, Gary King, Elizabeth A. Stuart, “Matching as Nonparametric Preprocessing for Reducing Model Dependence in Parametric Causal Inference,” *Political Analysis* (2007) 15: 199-236 (downloadable at: http://gking.harvard.edu/files/matchp.pdf). [↑](#footnote-ref-7)
8. Any customers enrolling for the first time in PY9 will use the FirstFuel platform. [↑](#footnote-ref-8)
9. Opinion Dynamics is the lead evaluator for Ameren Illinois energy efficiency programs. [↑](#footnote-ref-9)
10. FR refers to Free-Ridership and SO refers to Spillover [↑](#footnote-ref-10)
11. The evaluation team may choose to perform additional onsite visits if there is uncertainty associated with the savings or if enough documentation was not provided for the desk review sites. [↑](#footnote-ref-11)
12. The evaluation team may choose to perform additional onsite visits if there is uncertainty associated with the savings or if enough documentation was not provided for the desk review sites. [↑](#footnote-ref-12)
13. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 5.0, available at: http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-13)
14. The evaluation team may choose to perform additional onsite visits if there is uncertainty associated with the savings or if enough documentation was not provided for the desk review sites. [↑](#footnote-ref-14)
15. AIRMaster+ is a Windows-based software tool used to analyze industrial compressed air systems. It is intended to enable users to model existing and future improved system operation, and evaluate savings from energy efficiency measures with relatively short payback periods. [↑](#footnote-ref-15)
16. Corresponding to a score of 8, 9 or 10 for the importance of the program on their decision to do the spillover. [↑](#footnote-ref-16)
17. Calendar Year (CY) refers to the year of participation that will be researched, not the time that the research will occur. [↑](#footnote-ref-17)
18. In this evaluation “trade allies” refer to the program distributors through which the program is delivered. [↑](#footnote-ref-18)
19. Because evaluation research provides the best estimates of installation rate, residential/non-residential split, installation location, and net-to-gross for that program year, evaluation research program savings are considered the most accurate representation of program accomplishments. [↑](#footnote-ref-19)
20. Summer Peak is calculated as the percentage of lighting turned on in each room during peak hours of the summer months (hour ending 15:00 – 18:00 EPT, June 1 through August 32). http://www.pjm.com/~/media/documents/manuals/m18.ashx (pg. 67). [↑](#footnote-ref-20)
21. Bulbs installed in residential locations will be assigned residential HOU and Peak CF estimates from the IL TRM v6.0. [↑](#footnote-ref-21)
22. Typically, carryover savings would use evaluation research findings from the prior two program years to estimate res/non-res split, installation rate, and NTGR. Evaluation research was not conducted in PY8 so deemed values from PY8 will be used. [↑](#footnote-ref-22)
23. This is supplementary to the purchaser web survey data, which is the primary data source used for the gross and net impact analysis. [↑](#footnote-ref-23)
24. This is supplementary to the purchaser phone and web survey data, which are the primary data sources used for the gross and net impact analysis. [↑](#footnote-ref-24)
25. LED Exit Signs and Battery Chargers have historically had very low associated savings and no dedicated NTG research has been done for these measures through the BILD program. Similarly, Linear LEDs are a new measure in PY9 and therefore there is no supporting NTG data. According to the Policy Manual, the default NTG value for measures without adequate supporting research is 0.80. [↑](#footnote-ref-25)
26. EE and Demand Response Plan 2018-2021.pdf [↑](#footnote-ref-26)
27. Interview municipalities to deem net-to-gross value for municipality owned fixtures. [↑](#footnote-ref-27)
28. RCx Tune-Up includes Grocery participants in the evaluation plan. [↑](#footnote-ref-28)
29. Including grocery participants. [↑](#footnote-ref-29)
30. The participation numbers are based on counts of participating sites so the total number of participating customers may be lower. [↑](#footnote-ref-30)
31. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 5.0, available at: http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-31)
32. Similarly, when estimating verified savings, the evaluation will include all therm savings in the gas utilities’ service territories with the interactive effects removed whether the project received a gas incentive. [↑](#footnote-ref-32)
33. The number of projects in the sample may change based on the final list of projects and their savings. [↑](#footnote-ref-33)
34. Illinois Public Act 099-0906 (http://www.ilga.gov/legislation/publicacts/99/099-0906.htm), passed December 2016. [↑](#footnote-ref-34)
35. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0, available at: http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-35)
36. To qualify, participants must be ComEd commercial or industrial customers with monthly peak demand levels up to 500 KW (The size of these customers has historically been between 0-100 kW in monthly peak demand. Going forward ComEd is considering expanding this program to customers with a monthly peak demand of up to 500 kW). [↑](#footnote-ref-36)
37. No-cost direct-install measures include low-flow showerheads and faucet aerators, pre-rinse spray valves, power strips, and controls for novelty coolers, beverage machines, and snack machines. [↑](#footnote-ref-37)
38. Incented measures may include upgrades to T8/T5 lighting, LED retrofits and fixtures, high bay fluorescents, lighting controls, HVAC system components, electric water heaters, refrigeration system components, commercial kitchen equipment, compressed air system measures, smart thermostats, and building envelope measures. [↑](#footnote-ref-38)
39. Per Section 8-103B of the Public Utility Act (as amended), beginning in CY2018 energy savings goals will based on, and verified energy savings measured as, cumulative persisting annual savings (CPAS). Since CY2018 is the first year of a new four-year plan, planned First Year Savings and planned CPAS are equal. See “Commonwealth Edison Company’s 2018 – 2021 Energy Efficiency and Demand Response Plan,” June 30, 2017, pp. 6-7, 51-52. [↑](#footnote-ref-39)
40. There are no project or customer engagement goals listed in the 2018-2021 ComEd Plan, just gross and net savings goals and numbers of measures installed. [↑](#footnote-ref-40)
41. Illinois Public Act 099-0906 (http://www.ilga.gov/legislation/publicacts/99/099-0906.htm). [↑](#footnote-ref-41)
42. See https://amerenillinoissavings.com/for-my-business/explore-incentives/small-business-incentives for more information. [↑](#footnote-ref-42)
43. Opinion Dynamics is the lead evaluator for Ameren Illinois energy efficiency programs. [↑](#footnote-ref-43)
44. Draft NTG recommendations are due to the SAG September 1st and final October 1st every year. The SBES private sector NTG research findings on CY2018 participants will be ready in CY2019, to meet the deadline for NTG recommendation in 2019, for future application. The NTG research on public sector will be conducted on CY2019 participants for future recommendation. Process analysis findings will be delivered as near to the data collection as possible (unless that falls during the impact reporting season). [↑](#footnote-ref-44)
45. To qualify, a participant must be a ComEd C&I customer with monthly peak demand of no more than 100 kW and have at least one year of 30-minute interval smart-meter data available. For more information, see: https://www.comed.com/WaysToSave/ForYourBusiness/Documents/EnergyAdvisorProgramFactSheet.pdf. [↑](#footnote-ref-45)
46. Recommended actions may include, but are not limited to, adjusting HVAC schedules to match occupancy, installing smart timers to turn off unneeded equipment during off hours, managing equipment start-up and shut-down schedules, and delamping. [↑](#footnote-ref-46)
47. The day-type granularity can be changed to daily increments (i.e., a Monday dummy, a Tuesday dummy, etc., rather than just a weekday/weekend dummy) if warranted by the customer-specific demand pattern or type of behavioral actions the customer agrees to undertake. [↑](#footnote-ref-47)
48. Navigant will use a grid search to solve for individual premise degree-day balance points. [↑](#footnote-ref-48)
49. See http://rredc.nrel.gov/solar/old\_data/nsrdb/1991-2005/tmy3/ for more information. [↑](#footnote-ref-49)
50. In the SAG NTG discussions for this program in PY9 it was assumed that any regression analysis would produce net savings. While the evaluation should capture spillover, it can’t remove free ridership bias. In future NTG deliberations for this program, this fact should be considered. [↑](#footnote-ref-50)
51. The Business Incentive Program comprise of the C&I Standard and Custom programs. Incentive structure is based either on a “standard,” per-unit basis, as with most lighting measures, or “custom,” with the incentive based on the calculated annual energy savings for the customer. [↑](#footnote-ref-51)
52. The ComEd 2018-2011 EE/DR Plan does not split the savings target of the Business Incentive Program for the Standard and Custom portions of the program. See “Commonwealth Edison Company’s 2018 – 2021 Energy Efficiency and Demand Response Plan,” June 30, 2017, pp. 6-7, 51-52. [↑](#footnote-ref-52)
53. Per Section 8-103B of the Public Utility Act (as amended), beginning in CY2018 energy savings goals will based on, and verified energy savings measured as, cumulative persisting annual savings (CPAS). Since CY2018 is the first year of a new four-year plan, planned First Year Savings and planned CPAS are equal. See “Commonwealth Edison Company’s 2018 – 2021 Energy Efficiency and Demand Response Plan,” June 30, 2017, pp. 6-7, 51-52. [↑](#footnote-ref-53)
54. There are no project or customer engagement goals listed in the 2018-2021 ComEd Plan, just gross and net savings goals and numbers of measures installed. [↑](#footnote-ref-54)
55. Illinois Public Act 099-0906 (http://www.ilga.gov/legislation/publicacts/99/099-0906.htm), passed in 2016. [↑](#footnote-ref-55)
56. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0, available at: http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-56)
57. These measures are rebated separately from SEM program and savings for these measures are not counted in the SEM savings [↑](#footnote-ref-57)
58. “Commonwealth Edison Company’s 2018-2021 Energy Efficiency and Demand Response Plan,” June 30, 2017. [↑](#footnote-ref-58)
59. We anticipate that the sample of feeders will be tested over a two-year period spanning CY2018 and CY2019, with each feeder being operated on an alternating VO-on/VO-off schedule for a period sufficient to generate test data covering at least three complete seasons (summer, winter, and either spring or autumn). Once sufficient test data has been generated for a given feeder, it would then remain continuously in VO mode. [↑](#footnote-ref-59)
60. Navigant may determine that other variables are needed, besides those shown in Equation 1, once we have inspected the data and reviewed the quality of the model fits. [↑](#footnote-ref-60)
61. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0 for 2018,

    available at: http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-61)
62. The ComEd 2018-2021 plan shows this program is currently planned for a duration of one year. [↑](#footnote-ref-62)
63. Summer Peak CF is calculated as the percentage of lighting turned on in each room during peak hours of the summer months (1-6 pm on summer weekdays). [↑](#footnote-ref-63)
64. Winter Peak CF is calculated as the percentage of lighting turned on in each room during peak hours of the winter months (6-8 am and 5-7pm, between January 1 and February 28). [↑](#footnote-ref-64)
65. UIC-ERC: University of Illinois Champaign – Energy Resource Center [↑](#footnote-ref-65)
66. Multi-family properties served by the IHWAP, nonprofits that manage HUD 811 and HUD 202 housing, other building owners/managers and tenants in qualified geographic areas (e.g., Census tracts). [↑](#footnote-ref-66)
67. Illinois Public Act 099-0906 (http://www.ilga.gov/legislation/publicacts/99/099-0906.htm). [↑](#footnote-ref-67)
68. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0,

    http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-68)
69. The ComEd 2018-2021 plan shows this program is currently planned for a duration of one year. [↑](#footnote-ref-69)
70. Process evaluation is TBD depending on if program changes significantly. [↑](#footnote-ref-70)
71. This calculator is available on the U.S. EPA Energy Star website. The URL for the refrigerator calculator is: http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator [↑](#footnote-ref-71)
72. [↑](#footnote-ref-72)
73. CY2018 spans January 1, 2018 to December 31, 2018. [↑](#footnote-ref-73)
74. In previous evaluations, Wave 5 has been split into AMI and Non-AMI portions. Wave 5 AMI was discontinued in August 2014, when all 60,000 customers stopped receiving reports, and will not be included in future evaluations. Therefore, going forward ‘Wave 5’ will reference the Non-AMI portion of the wave. [↑](#footnote-ref-74)
75. The model is identical to the post-program regression (PPR) model used in previous evaluations. We have changed the nomenclature to better align with academic research and because LDV is more descriptive of the model structure than PPR. [↑](#footnote-ref-75)
76. Navigant Consulting, Inc. 2016. *ComEd Home Energy Report Program PY8 Evaluation Report*. Presented to Commonwealth Edison Company. [↑](#footnote-ref-76)
77. This data will include all bills ending on or before December 31, 2018. [↑](#footnote-ref-77)
78. Summer Peak CF is calculated as the percentage of lighting turned on in each room during peak hours of the summer months (1-6 pm on summer weekdays). [↑](#footnote-ref-78)
79. Winter Peak CF is calculated as the percentage of lighting turned on in each room during peak hours of the winter months (6-8 am and 5-7pm, between January 1 and February 28). [↑](#footnote-ref-79)
80. Illinois Public Act 099-0906 (http://www.ilga.gov/legislation/publicacts/99/099-0906.htm). [↑](#footnote-ref-80)
81. Draft NTG recommendations are due to the SAG September 1st and final October 1st every year. The multi-family NTG research findings on CY2018 participants will be ready in CY2019, to meet the deadline for NTG recommendation in 2019, for future application. Process analysis findings will be delivered as near to the data collection as possible (unless that falls during the impact reporting season). [↑](#footnote-ref-81)