ComEd CY2020-2021 Evaluation Plan

DRAFT

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# 1. Introduction

This compendium of evaluation plans provides an overview of evaluation activities for the Calendar Year (CY) 2020-2021 cycle. This compendium amends last year’s evaluation plans[[1]](#footnote-1) with updates and additions. An overview of the evaluation’s goals includes:

* **Evaluation, measurement, and verification (EM&V) of energy efficiency programs.** These evaluations will meet the requirements of the Future Energy Jobs Act (FEJA) and Section 8-103B(fg(6) of the Illinois Public Utilities Act (PUA), which states that the utility shall provide for an annual independent evaluation of the performance of the cost-effectiveness of the utility’s portfolio of programs, as well as a full review of the four-year results of the broader net program impacts and for adjustment of the measures on a going forward basis as a result of the evaluations. Our general approach to this work for the 2020-2021 period will be to focus on programs that require deeper analysis. We will continue to conduct thorough, high-quality annual impact evaluations for ComEd’s largest energy efficiency (EE) programs and those undergoing significant changes. However, we will not over-evaluate any EE program. For example, for programs whose recent net-to-gross (NTG) ratios have been relatively consistent over time, we propose to conduct about two NTG evaluations over the four-year program cycle instead of doing NTG analysis every year. Using this approach more funds will be available for pressing evaluation research. Navigant plans to work with government and public interest parties, including the Illinois Stakeholder Advisory Group (SAG) and the Illinois Commerce Commission (ICC) Staff to ensure issues and topics relevant to EM&V are addressed in an efficient manner.
* **Reduce the cost of the CY2020 evaluation.** ComEd requested that the cost of evaluation for CY2020 be reduced significantly. The plans presented in this document reflects that reduction. Reductions include the following:
  + Reduced process evaluations, which will reduce the evaluations’ ability to identify potential program enhancements.
  + Reduced frequency of NTG analyses and eliminated some spillover and free ridership research.
  + Reduced sample sizes for some impact evaluations.
  + Not conducting desk reviews represents lost opportunity to increase evaluation rigor.
  + Reduced tests of evaluation approaches using AMI data.
  + Shifting more responsibility onto ComEd staff for preparing PJM submittals.
  + Fewer stakeholder meetings to support advanced thermostat and voltage optimization studies.
  + Fewer monthly program evaluation conference calls.
  + Converted annual face-to-face program evaluation planning meetings to conference calls
  + Reduced research into EULs.
  + Reduced scope for supporting new initiatives in Pilots, market transformation, and established programs.
* **EM&V oversight and support that provides continuous improvement of ComEd’s EE programs and processes**. As stated in ComEd’s Plan 5 filing, evaluation efforts will support the program administrator’s continuous improvement process by identifying the program’s actual performance, showing how this performance differs from the planned performance, and identifying opportunities to improve the program processes over time.

Several elements of Future Energy Jobs Act (FEJA) drive the specifics of our evaluation research, as described below.

**Focus on CPAS.** Under the Future Energy Jobs Act, ComEd’s annual energy savings goals will be based on cumulative persisting annual savings (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.”[[2]](#footnote-2) One focus of evaluation research is thus 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.

**Non-electric savings.** Up to 10 percent of ComEd’s annual energy savings goal can be derived from gas savings or savings from other fossil fuels. Priority for these savings must be given to income eligible programs. For joint programs, gas conversion does not start until the gas company discontinues funding for the program. For non-joint programs, any gas (or other fuel savings, such as propane or fuel oil) can be counted. Each therm of natural gas savings at the customer’s premise is equivalent to 29.3 kWh of electric savings.

**Voltage Optimization.** Voltage optimization (VO) is categorized as energy efficiency and must be evaluated as such. VO is estimated to contribute 12 percent to 15 percent of the savings each year, and has a measure life of 15 years, per the new legislation. Savings will be annualized based upon requirements of any ComEd stipulation agreements. Driven by ComEd’s stipulation, discussions are still ongoing about the CY2020 evaluation approach.

**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. Where possible, 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 Manual. Process evaluation research results will be reported as the research is completed so that it is available as soon as possible.

**Non-Energy Impacts**. Navigant is investigating a range of participant, utility, economic and societal non-energy impacts (NEIs) for ComEd. The initial focus for NEIs research has been quantifying NEIs associated with income eligible programs, since previous research has shown NEIs to often be particularly significant for these programs.[[3]](#footnote-3)[[4]](#footnote-4)[[5]](#footnote-5)[[6]](#footnote-6) In addition, we will analyze the results from our screening questions in our participant surveys to explore NEIs in other programs. Based on the responses to the screening questions, as well as secondary research, we will conduct primary NEIs research to quantify NEIs associated with additional programs.

Navigant will determine:

* Economic NEIs including job creation (direct, indirect, and induced)
* Utility NEIs including reduced collections, arrearages, and shut-off costs
* Societal NEIs including reduced particulates
* Participant NEIs including improved health and reduced missed work and school days. Beyond income eligible programs, which specific programs show evidence of NEIs based on participants’ responses to screening questions
* Which NEIs for non-income eligible program participants are good candidates for primary research

**Summary Report**

Navigant will produce a summary report providing a program-by-program and portfolio-level summary of the key results from the impact evaluations. The report will consist mostly of tables and figures to show the energy and demand impacts produced from the ComEd programs. The tables will include

* Ex post savings template tables agreed to by the SAG – those tables will be provided in the summary report as well as in an accompanying spreadsheet.
* Portfolio total and program-specific ex ante gross, verified gross, and verified net savings for energy, demand, and peak demand.
* Savings by sector (Residential, Business, Income Eligible, and Pilots)
* Savings spread over time based on measure-specific EULs and the calculation of CPAS.
* Calculation of the Weighted Average Measure Life (WAML).
* Gas savings converted to electricity in total and the amount that ComEd can claim.
* Savings by end use type (broad measure categories such as lighting, HVAC, refrigeration, etc.)
* A table of the high impact measures (those with the largest savings across the portfolio).
* Program costs.

**Schedule**: Navigant will deliver the first draft within days of the final first draft of the individual program impact evaluation reports. We will deliver the final report on April 30th after the last report is finalized.

**ComEd 4 Year Plan Savings**

Navigant will be evaluating the following 2018-2021 savings – this four-year detail was filed and approved by the Illinois Commerce Commission in ComEd’s four year plan (2018-2021), dated June 30, 2017.



# 2. Evaluating Programs

Business, Income Eligible, and Residential specific-evaluation tasks are shown in each program-specific evaluation plan attached in the Appendix and also shown in Appendix A. “Program-Specific Four-Year Tasks.” Navigant also develops evaluation plans for Pilot programs with energy savings. Navigant will approach each sector in a unique way given the needs of sector-specific needs. Below we discuss specific evaluation needs for the Business, Income Eligible, and Residential sectors, as well as our approach to Pilots.

### Business Sector

Our evaluation strategy for the business sector programs includes (1) impact analysis in each of the four years leveraging the IL TRM, when appropriate (e.g., Standard, Small Business and Instant Discounts) and custom evaluation for other business programs (e.g., Custom, Industrial, CHP, etc.), (2) NTG research at least twice during the four-year plan cycle corresponding with changes in program design, delivery, or market changes, (3) process analysis is planned with ComEd (conducted in conjunction with NTG research to reduce participant fatigue) to seek actionable recommendations for program enhancements no later than the end of September each year, (4) process and NTG reporting will be separate from impact reporting which will be completed every April 30th, (5) market effects research for programs that appear to be impacting market change (e.g., Instant Discounts), (6) screening questions in program participant surveys looking for evidence of non-energy impacts associated with these programs, (7) research of proper measure-level effective useful lives will be undertaken for various programs on an as-needed basis – this has been done for RCx, Custom, Industrial, SEM, and (8) evaluation of Public Sector savings as part of the relevant business program. We will also continue to focus on ways EISA 2007 influences bulb decisions and the implications for the Instant Discounts program.

### Income Eligible Sector

Navigant’s evaluation of income eligible programs will focus on (1) impact analyses, (2) evaluating program processes for potential enhancements, (3) identifying gaps in participation or underserved regions, (4) identifying potential updates to the IL TRM and (5) coordination with stakeholders, including the Income Qualified Energy Efficiency Advisory Committee.

In 2020, we will conduct strategic process research for the Income Eligible Multi-Family program. This process research will include building owner and property manager interviews as well as participant surveys. The findings from this effort will produce recommendations to enhance the Income Eligible Multi-Family program. In 2021, we will conduct strategic process research for the Affordable Housing New Construction Program including developer interviews and program materials review.

For each income eligible program, we will conduct program manager and implementer interviews focused on better understanding the implementation and goals of the program.

We will prioritize impact research that will result in updates to the IL TRM parameters for these programs. In addition to conducting an engineering review resulting in the prioritization of IL TRM measure updates, we plan to (1) conduct custom engineering analysis (site-specific billing analysis, metering, or modeling depending on program participation) for the Multi Family Retrofits program in 2020, and (2) conduct a billing analysis using a quasi-experimental design for the Single Family Retrofits program in 2021, and Navigant will use the results of this higher rigor impact research to update the applicable IL TRM measures and the results will inform both recommendations to enhance income eligible programs as well as additional impact related research efforts for the income eligible programs.

Finally, we will coordinate with Illinois stakeholders interested in income eligible programs and incorporate feedback from these stakeholders into our evaluation plans and research as applicable. The Illinois stakeholders will provide input to an NTG research strategy, if needed, for the income eligible programs.

### Residential Sector

Our evaluation strategy for the residential-sector programs includes (1) robust impact analysis based on the IL TRM and regression analysis for behavior based programs (2) episodic NTG research corresponding with changes in program design, delivery, or market changes (3) process analysis (often conducted in conjunction with NTG research to reduce participant fatigue) to seek actionable recommendations for program enhancements, which will be reported separately from impact reporting and (4) screening questions in program participant surveys looking for evidence of non-energy impacts associated with the program..

We plan to conduct process evaluation activities early in the program year and report results to ComEd as valuable information becomes available.

### Pilots

ComEd’s plan includes pilots to test feasibility for inclusion in ComEd’s portfolio as well as adding new measures to the IL TRM. For the pilots that require evaluation, Navigant conducts impact and process evaluations in a similar manner to the programs in the portfolio including:

* Determining the data needed to conduct impact evaluations
* Tracking system review
* Engineering file review
* Impact analyses
* Assessing feasibility of measure added to a future IL TRM using primary and secondary research as needed
* Research on behavioral measure savings and custom measure savings and evaluation approaches
* Process evaluations (including trade ally, participant and non-participant interviews)

Navigant will produce evaluation plans and reports for pilots, as needed.

### Market Transformation

ComEd’s plan also contains market transformation activities including: a Commercial Food Service Equipment pilot, Building Operator Certifications, and Residential and Business Building Codes. This compendium includes an evaluation plan for the Commercial Food Service Equipment pilot. Other evaluation plans are forthcoming in 2020 as ComEd informs Navigant of evaluation needs on market transformation activities.

# 3. Cost-Effectiveness Research

The primary objective of the cost-effectiveness research and calculations is to comply with the Illinois legislative requirement that all energy efficiency portfolios be shown to be cost-effective. The key tasks of the cost-effectiveness analysis are to: (1) develop a cost model reflecting ComEd‘s 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, as well as joint TRCs for programs that are jointly implemented by ComEd and one or both of Nicor and/or Peoples Gas / North Shore Gas Companies. The joint TRC calculations will be completed after each utility completes their relevant cost-effectiveness analysis – the joint analysis will focus on the joint programs between the companies.

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. 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.

Navigant will comply with the Illinois Energy Efficiency Policy Manual v2, Sections 8 or any other future relevant Policy Manual sections. 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.[[7]](#footnote-7)

The Illinois TRC test was modified by the Illinois General Assembly in December 2016 (for application starting in CY2019) 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 income eligible 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 benefit-cost formulas will include avoided water costs, avoided O&M costs and other quantifiable societal benefits. Consistent with the principles laid out in the new *National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources*, cost-effectiveness analyses other quantifiable benefits can include quantified participant NEIs and evaluation will make every attempt to quantify this in the cost effectiveness calculations.

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 an Illinois program or portfolio

**C*ILTRC***  = Present value of costs of an 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

Navigant will include all relevant costs outlined in Section 8.4 of the Illinois Energy Efficiency Policy Manual v 1.1 or any future relevant section, example costs are defined as:

RC = NPV of replacement costs of incandescent equivalents

PNICt = Program Non-Incentive costs in year t

IMCNt = Net Incremental costs in year t

UICt = Utility increased supply costs in year t

d = discounting future societal costs and benefits for the purpose of calculating net present values

The Illinois TRC test allows for utilities to account for the avoided baseline replacement measure costs that would accrue 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 bulbs, an NPV is determined by discounting the value of these avoided purchases over the course of the lifetime of the efficient bulb. The IL TRM provides deemed NPV values per bulb based on efficient bulb-type, socket type (commercial or residential), and lumen range.

### 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 impacts 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. Navigant drafted the “ComEd 2019 TRC Inc Meas Cost and Incentives Assumptions Memo 2019-11-08” (Memo) which was circulated and discussed with the parties – that Memo and its assumptions and cost requirements outlined in that Memo are incorporated herein by reference.

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 and Relevant Joint Program Gas Company Costs |
| Program Specific | * Participants / Measure Count * Verified Ex-Post Energy Savings (kWh) * Verified Ex-Post Capacity Savings (kW) * Realization Rate * Net to Gross Ratio | Navigant and Relevant Joint Program Gas Company Costs |
| * Measure life * Non-Incentive Costs * Utility Incentive Costs * Incremental Costs (Gross) * Incremental Costs (Net) | ComEd and Relevant Joint Program Gas Company Costs |

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.

TRM measures that require actual cost data is set forth in the following table.

Table 2. TRM Measures Requiring Actual Cost Data

|  | Measures | | |
| --- | --- | --- | --- |
| Commercial | Combination Oven | Faucet Aerators\* | Chiller |
| Ice maker\* | Showerheads\* | Other Types (non air-source) of Heat Pumps |
| Pre-rinse sprayer\* | Ozone Laundry\* | Variable Speed Drives Pumps and CT Fans, >20hp |
| Storage Water Heater | Heat Recovery Grease Trap Filter | Small Com Programmable Thermostat and Adjustment\* |
| VSD on HVAC Fans >75 HP | Combined Heat and Power | Economizer Repair |
| Covers and Gap Sealers for Room AC\* | Advanced Rooftop Controls | Com Advanced Thermostat |
| Packaged RTU Sealing\* | Com. Ground (and Ground Water) Source Heat Pump\* | Adsorbent Air Cleaning\* |
| LED Bulbs and Fixtures\* | Com LED Exit Signs\* | LED Traffic and Pedestrian Signals |
| Lighting Power Density | Miscellaneous Commercial/Industrial Lighting | Multi-Level Lighting Switch\* |
| Lighting Controls\* | Solar Light Tubes\* | T5 Fixtures and Lamps\* |
| Occupancy Controlled Bi-Level Lighting Fixtures\* | Com ENERGY STAR Specialty Compact Fluorescent Lamp (RET)\* | LED Open Sign |
| LED Streetlighting\* | Beverage and Snack Machine Controls\* | Q-Sync Motors for Reach-in Coolers/Freezers\* |
| Variable Frequency Drive for Condenser Fans\* | Pump Optimization | Roof Insulation for C&I Facilities\* |
| Advanced Power Strip – Tier 1 Com | High Efficiency Transformer | ENERGY STAR and CEE Tier 2 Refrigerator (ER)\* |
| Residential | ENERGY STAR Room Air Conditioner (ER)\* | Refrigerator and Freezer Recycling\* | Room Air Conditioner Recycling |
| Advanced Power Strip – Tier 1 (DI)\* | Tier 2 Advanced Power Strips (APS) – Residential Audio Visual | Air Source Heat Pump (ER)\* |
| Central Air Conditioning (ER)\* | Duct Insulation and Sealing | Ground Source Heat Pump\* |
| HVAC Tune Up (Central AC or Air Source Heat Pump)\* | Programmable Thermostats\* | Ductless Heat Pumps\* |
| Residential Furnace Tune-Up | Advanced Thermostats\* | Heat Pump Water Heaters\* |
| Low Flow Faucet Aerators\* | Low Flow Showerheads\* | Water Heater Wrap |
| Thermostatic Restrictor Shower Valve\* | Shower Timer | Compact Fluorescent Lamp (CFL)\* |
| ENERGY STAR Specialty Compact Fluorescent Lamp (CFL)\* | LED Specialty Lamps\* | LED Exit Signs\* |
| LED Screw Based Omnidirectional Bulbs\* | LED Fixtures\* | Holiday String Lighting\* |
| LED Nightlights\* | Air Sealing | Basement Sidewall Insulation |
| Floor Insulation Above Crawlspace | Wall Insulation | Celling/Attic Insulation |
| Rim/Band Joist Insulation |  |  |

\*Default values are available. When there is a reference to a DI, ER, or RET, then the actual value is preferred for the replacement type.

### Data Sources and Assumptions

Table 3 provides the sources and assumptions for the measure costs by program. This table provides the baseline of identifying gaps in data and recommendations to improve cost data in future TRC analyses.

Table 3. CY2018 Program Cost Data Sources and Assumptions

| Program | Data Source | Note |
| --- | --- | --- |
| Appliance Rebates | TRM | TRM deemed values are used for the analysis. |
| Elementary Education Kits | ComEd | Actual cost per kit used |
| Fridge and Freezer Recycling | Incentives | Net incentive[[8]](#footnote-8) costs equal measure costs. Program level Incentive costs provided by ComEd are prorated by energy savings for each measure. |
| Heating and Cooling (HVAC) Rebates | TRM | Used the average unit capacity of all the units installed in 2018 to align the savings and cost units (tons vs per unit). |
| Weatherization - Market Rate | Project Invoices | Navigant calculates the average cost of installing a sample of projects from ComEd provided implementer invoices. This average cost for each weatherization measure type is used to calculate the overall measure cost for the program. |
| Home Energy Assessment | Project Invoices | Since most of the measures are DI, Navigant calculates the average cost of installing a sample of projects from ComEd provided implementer invoices. This average cost for each measure type is used to calculate the overall measure cost for the program. |
| Home Energy Reports | NA | There are no incentives or measure costs and only program administration costs. |
| Lighting Discounts | TRM | Includes analysis of the mix of lamps and the NPV replacement costs |
| Middle School Take-Home Kits | Incentives | ComEd doesn’t track the cost of the kit as they only pay for the kWh savings.  Assumption made that net Incentive costs equal total measure (kit) costs. |
| Multi-Family Market Rate | Project Invoices | Since most of the measures are DI, Navigant calculates the average cost of installing a sample of projects from ComEd provided implementer invoices. This average cost for each measure type is used to calculate the overall measure cost for the program. |
| Residential New Construction | ComEd | Navigant used data analyzed by ComEd and Nicor Gas to calculate the incremental cost per the different qualifying tiers of efficiency, $/tier |
| Air Care Plus | TRM and Project Invoices | Custom projects use a value of $0.15/kWh based on the performance payment by ComEd.  Other measures use the TRM deemed cost. |
| Custom | ComEd | Sample of project files, average $/kWh |
| Data Centers | ComEd | Sample of project files, average $/kWh |
| Energy Advisor Monitoring-Based Commissioning | ComEd | Based on the average $/kWh from the RCx program |
| Industrial Systems Optimization | ComEd | Sample of project files, average $/kWh |
| Instant Discounts | TRM | Includes analysis of the mix of lamps and the NPV replacement costs |
| Business New Construction | ComEd | The program implementer analyzed project costs of construction meeting code versus exceeding code to calculate a $/kWh and a $/therm saved cost. |
| Operational Efficiency/Facility Assessments | Not Applicable | ComEd doesn’t track the measure costs for this program. Navigant makes the assumption that the implementation contractor and marketing costs are the only costs associated with this program and there is no measure cost. |
| Public Housing Authority | ComEd (Multi-Family Market Rate Program) and TRM | Measure costs weren’t tracked by ComEd. Navigant had to make the assumption that the measures costs for DI projects was similar to the DI measures installed in MF MR program.  TRM deemed incremental cost values were used for Non-DI measures. |
| Public Small Facilities | TRM | TRM deemed values are used for the analysis. |
| Retrocommissioning | ComEd | Sample of project files, average $/kWh |
| Small Business Kits | Incentives | ComEd doesn’t track the cost of the kit as they only pay for the kWh savings.  Assumption made that net Incentive costs equal measure (kit) costs. |
| Small Business | TRM, DNV GL workpaper, assumptions | Certain assumptions on unit definition |
| Standard | TRM, DNV GL workpaper, assumptions | Certain assumptions on unit definition |
| Strategic Energy Management | Incentives | Assume measure cost equals incentives |
| Street Lighting | Project Invoice | ComEd provides this value based on their internal calculations. |
| Affordable Housing New Construction | Res New Const | $/kWh ratio from the res NC program |
| Food Bank LED Distribution | Incentives | ComEd doesn’t track the measure costs for this program. Navigant makes the assumption that incentives are equal to the measure cost since this is a net payment program and ComEd pays for the energy savings. |
| Manufactured Housing - Retrofit | TBD | TBD |
| Product Discounts | TRM | Includes analysis of the mix of lamps and the NPV replacement costs |
| Multi-Family IHWAP | Incentive | ComEd Invoices aren’t setup to track the measure level costs for this program.  Navigant had to make the assumption that the total cost was twice the ComEd incentive since ComEd only covers half the cost of each installation. |
| Multi-Family Retrofits | TRM, ComEd (Weatherization – Market Rate Program, Multi-Family Market Rate Program) | ComEd Invoices aren’t setup to track the measure level costs for this program. Navigant had to make the assumption that the weatherization measure costs were similar to the costs from the Market Rate Weatherization program. The TRM deemed cost was used for other non-DI measures.  For DI measures Navigant made the assumption that the incentives were the same as the measure costs. |
| Single Family Retrofit - CBA | ComEd (MF IHWAP Program) | ComEd invoices aren’t setup to track the measure level costs for this program. Navigant had to make the assumption that the incentive amount is the same as the measure cost as ComEd covers all the measure costs for the program. |
| Single Family Retrofit - IHWAP | Incentive | ComEd Invoices aren’t setup to track the measure level costs for this program.  Navigant had to make the assumption that the total cost was twice the ComEd incentive since ComEd only covers half the cost of each installation. |
| Income Eligible Energy Savings Kits | Incentives | ComEd doesn’t track the measure costs for this program. Navigant makes the assumption that incentives are equal to the measure cost since this is a net payment program and ComEd pays for the energy savings. |

### Custom Program Cost Method

Custom programs may contain a mix of retrofit and replace on burnout type of measures in one project or across projects. In most cases, the project invoices will contain full costs of installations and maybe additional non-energy related costs. Since the program currently doesn’t require the implementer (or the installation contractor) to do a detailed incremental cost analysis for each measure installed or a detailed line-item invoice as a part of the program, the issue is that the fully encumbered project costs tracked for the program will not represent the true incremental cost.

The savings calculation, though, for replace on burnout type of measures will be incremental to the standard (industry standard practices or equipment code baseline efficiency). The incremental cost calculations will vary for each project as there is no common approach that can be applied to all custom projects. Navigant is recommending doing a preliminary TRC test using the actual project costs which would lead to a conservatively low TRC value since the actual project costs will either be equal or greater than the incremental measure costs. Navigant only recommends a detailed incremental cost analysis for a sample of projects in the program to develop a program level incremental costs estimate ($/kWh) only if the program fails the initial TRC test performed using the conservative cost assumptions.

Therefore, for the custom programs (i.e., Industrial Systems, Custom, RCx), Navigant recommends the following steps for assessing appropriate measure costs for a program:

1. Use the documented invoices for the program’s measure costs
2. Calculate the TRC
3. If the TRC is less than one, then:[[9]](#footnote-9)
   1. Sample project invoices and project measures, to reassess if the cost represents incremental or other services.
   2. Calculate the $/kWh saved for all projects and troubleshoot the high and low values for reasonableness

As a result, the overall documented measure costs should be aligned with the policy manual guidance and result in a more accurate assessment of the cost-effectiveness.

### Evaluation Schedule

Table 4 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. The SAG TRC template tables will be used for reporting purposes.

Plan start and delivery dates will be the same in most cases for CY2019 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 4. Schedule – Key Deadlines for the TRC Analysis

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered |
| Cost Assumptions and Detail | ComEd | Sept 1, 2020 (annually) \* |
| Navigant Develops Initial Cost Model | Navigant | Dec 15, 2020 (annually) |
| Iterative Cost and Assumptions Discussions w/ComEd | ComEd / Navigant | Jan-May 2021 |
| Finalize Cost Model | Navigant | Feb 1, 2021 (annually) |
| Navigant Develops Initial TRCs | Navigant | Feb 30, 2021 (annually) |
| Discussion of Initial TRCs | ComEd / Navigant | Feb-April 2021 (annually) |
| Navigant Draft TRC Report – Delivered (15 Bus Day R’vw) | ComEd/ICC | June 18, 2021 (annually) |
| Comments on Draft TRC Report due from Parties | ComEd / Navigant | July 9, 2021 (annually) |
| Navigant Redraft of TRC Report Based on Comments | Navigant | July 16, 2021 (annually) |
| Navigant Re-Draft TRC Report – Delivered (5 Bus Day R’vw) | ComEd/ICC | July 23, 2021 (annually) |
| Final TRC Report to ComEd and SAG | Navigant | July 29, 2021 (annually) |
| Navigant Draft Joint TRCs (15 Bus Day R’vw) | Navigant | November 15, 2021 (annually) |
| Comments on Navigant Draft of Joint TRC Report | ComEd / Navigant | Dec 6, 2021 (annually) |
| Navigant Re-Draft of Joint TRC Report (5 Bus Day R’vw) | ComEd | Dec 15, 2021 (annually) |
| Final Joint TRC Report | Navigant | Dec 23, 2021 (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. Dates above for Joint TRC analysis are also contingent on timely receipt of joint program cost detail from ComEd, Peoples Gas, North Shore Gas and Nicor Gas.

# 4. Cross-Cutting Research

Cross-cutting evaluation includes initiatives that contribute toward the calculating CPAS, such as EUL and measure persistence research, net-to-gross (NTG) research, non-energy impact (NEI) research, and working with the IL SAG and the IL TRM administrator to update the IL TRM. Evaluation research is coordinated statewide with the evaluators for Ameren Illinois, Nicor Gas, Peoples Gas and North Shore Gas. A list of current activities is included in the tables below with specific evaluation research plans following in Appendix F.

### Illinois TRM Measure Updates

The goal of IL TRM evaluation research is to improve IL TRM input parameter assumptions and formulas. All evaluators in Illinois, including Navigant, are part of the Illinois SAG Technical Advisory Committee (TAC) and are charged with providing materials to continually update and improve the IL TRM to provide the most accurate input parameter assumptions and impact evaluation methodology. Navigant will continue to produce IL TRM measure workpapers including primary and secondary research. Each year, Navigant reviews current IL TRM measures and priority recommendations from the TAC to develop evaluation research based on energy savings, historical realization rate, variability and uncertainty in measure impacts, feasibility to update, relative contributions of measures and planned future use, among others. Each year, we will develop research for high priority measures identified by the IL TRM subcommittee and measures with high portfolio impact or outdated references. The team plans to revisit this list on an ongoing basis as, for example, the IL SAG releases new updates on IL 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. Over the course of the next two years, we expect to continue updating IL TRM measures using the criteria above.

As new measures are proposed to the IL TRM, Navigant will conduct secondary research in coordination with the IL TRM administrator to determine whether the measure has been evaluated in other locations, such as TRMs from other states. Working with stakeholders, we will analyze a range of savings values for a particular measure, if such values are known.

In CY2020, we will participate in the lighting mid-life adjustment working group. This working group is focused on confirming and developing assumptions for mid-life adjustments to lighting savings. We are proposing in-store intercepts and shelf stocking surveys for the retail lighting programs, which may provide information which could be used in this working group.

### Non-Energy Impact Research

In CY2020, Navigant will continue non-energy impact (NEI) research to quantify and monetize NEIs associated with both income eligible and non-income eligible programs. We will complete the economic, utility and societal NEI research, and start to conduct participant and non-participant surveys. In addition, we will provide updates via SAG NEI Working Group meetings. We will also begin the process of including the monetized NEIs in the TRM or policy manual.

### Net-to-Gross Evaluation Research

In CY2020, Navigant will continue to lead the NTG working group as it seeks to improve the IL TRM net-to-gross (NTG) methodologies. We will present the results of our research and facilitate working meetings to deliberate on translating our research results into specific improvements to the methodology. As in previous years, we will also solicit other proposals for improvements from the Working Group and will facilitate discussions of these and will manage the proposed updates to the TRM.

This will involve focusing on several aspects of the methodologies:

* Exploring key concerns (about the current IL TRM methodologies) that were articulated in 2019 Illinois SAG NTG Working Group meetings
* Conducting sensitivity analyses of Navigant’s recent free ridership research results to identify problematic questions
* Analyzing the dynamics of recent research results where quantitative responses conflict with open ended responses
* Analyzing other problematic results of recent free ridership research

### Research Tasks

Tables 5 and 6 summarize evaluation research tasks currently underway and being planned. The research team plans to revisit this list on an ongoing basis as, for example, the IL SAG releases new updates on IL 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’s evaluation and IL SAG stakeholders. Updates to required and planned research will occur on an ongoing basis and the detail below will be updated on an ongoing basis.

Note, the check marks (✓) in Table 5 and Table 6 indicate the year in which the research is planned and will occur.

Table 5. Evaluation Research Tasks: IL TRM Measure Research

| Research Task | Description | 2017 | 2018 | 2019 | 2020 | 2021 |
| --- | --- | --- | --- | --- | --- | --- |
| IL TRM 5.2.2: Advanced Power Strip Tier 1 - ISR/Persistence | Research study to determine the in-service rate and persistence of savings from Tier 1 Advanced Power Strips | ✓ | ✓ | ✓ | ✓ |  |
| IL TRM 5.3.16 Advanced Thermostats - Cooling Savings Factor | Billing analysis to estimate cooling savings factors for advanced thermostats | ✓ | ✓ | ✓ | ✓ |  |
| IL 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 | ✓ | ✓ |  |  |  |
| IL TRM 6.1.1: Weather Normalization for Behavior Measures | Billing analysis to determine whether weather normalization is required for evaluating behavior measure savings | ✓ |  |  |  |  |
| IL 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 | ✓ | ✓ |  |  |  |
| IL 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 | ✓ | ✓ |  |  |  |
| IL TRM 4.4.19: Demand Controlled Ventilation - Savings Factors | Secondary research to update savings factors for demand-controlled ventilation | ✓ | ✓ |  |  |  |
| IL TRM 4.5.4, 5.5.6, and 5.5.8: LED Bulbs and Fixtures - Incremental Costs | Secondary research to determine need for an update to LED product incremental costs | ✓ | ✓ |  |  |  |
| Retro-commissioning Measure Persistence Study | Study to determine the persistence of savings from Retro-commissioning measures | ✓ | ✓ |  |  |  |
| IL TRM 4.4.17: Variable Speed Drives for HVAC Pumps and Cooling Tower Fans – Measure Impacts | Metering study to update TRM savings estimates and input parameters for VSDs |  | ✓ | ✓ |  |  |
| LED Streetlighting Impacts | Secondary research and metering study to update savings estimates for LED Streetlighting measures |  | ✓ | ✓ |  |  |
| IL TRM 4.4.1 Air Conditioner Tune-Up: Deemed Savings Percentages | Metering and AMI study to update deemed savings percentages for AC Tune-up measures |  | ✓ | ✓ |  |  |
| IL TRM 4.4.18: Small Commercial Programmable Thermostat - Savings Verification | Billing analysis to update deemed savings estimates |  | **✓** | **✓** | ✓ |  |
| Load Shape and Coincidence Peak Research | Secondary research to update TRM load shapes and determine need for additional primary research |  | ✓ | ✓ |  |  |
| IL TRM 5.1.8: Refrigerator and Freezer Recycling – Secondary Review | Secondary research to update incremental cost estimates for VSDs |  |  | ✓ |  |  |
| IL TRM Measures | Additional measures added each year, to be determined |  |  | ✓ | ✓ | ✓ |

Table 6. Cross-Cutting Evaluation Research

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Research Task | Description | 2017 | 2018 | 2019 | 2020 | 2021 |
| Income Eligible Program NEIs | Research to estimate non-energy impacts from income-eligible program measures | ✓ | ✓ |  |  |  |
| Business Program NEIs | Conduct primary research on selected programs based on results from screening questions |  |  | ✓ | ✓ | ✓ |
| Residential Program NEIs | Conduct primary research on selected programs based on results from screening questions |  |  | ✓ | ✓ | ✓ |
| EUL Research: Technical Measure Life | Research to refine estimates of effective useful life for high priority measures | ✓ | ✓ | ✓ |  |  |
| EUL Research: Persistence | Staged study to investigate persistence for high priority measures |  | ✓ | ✓ | ✓ | ✓ |
| Evaluating AMI for Individual Programs | Conduct secondary research and document in memorandum summarizing possible applications for using AMI data in evaluation | ✓ | ✓ | ✓ |  |  |
| Pilot M&V 2.0 approaches for select programs | Conduct pilot evaluations using innovative M&V 2.0 approaches |  | ✓ | ✓ | ✓ | ✓ |
| PJM Bid Support | Provide savings values for ComEd's PJM M&V Plan in March, and their PJM M&V Report in May. | ✓ | ✓ | ✓ | ✓ | ✓ |

# APPENDIX A. Program-Specific Four-Year Tasks

Table 1. Business Programs Four-Year Plan

| Program | Task | 2018 | 2019 | 2020 | 2021 |
| --- | --- | --- | --- | --- | --- |
| Agriculture Offering | Tracking System Review |  |  | X | X |
| Agriculture Offering | Process – Participant and Implementer Interviews |  |  | X | X |
| Agriculture Offering | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Agriculture Offering | Impact – Engineering Review |  |  | X | X |
| Agriculture Offering | Impact – Verification and Gross Realization Rate |  |  | X | X |
| Agriculture Offering | Impact – Net Verification and Evaluation Report |  |  |  |  |
| CHP | Tracking | X | X |  |  |
| CHP | Data Collection – Participant Surveys | X | X |  |  |
| CHP | Data Collection – Program Manager and Implementer Interviews | X | X |  |  |
| CHP | Impact – Engineering Review | X | X |  |  |
| CHP | Impact – Modeling (as needed) | X | X |  |  |
| CHP | Impact – Verification & Realization Rate | X | X |  |  |
| CHP | Net-to-Gross – Customer Self-Report Surveys |  | X |  |  |
| CHP | Net-to-Gross – EESP Interviews |  | X |  |  |
| Custom | Tracking System Review | X | X | X | X |
| Custom | Data Collection – Participant Surveys | X | X | X | X |
| Custom | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Custom | Impact – Engineering Review | X | X | X | X |
| Custom | Impact – Modeling (as needed) | X | X | X | X |
| Custom | Impact – Verification & Realization Rate | X | X | X | X |
| Custom | Net-to-Gross – Customer Self-Report Surveys |  | X | X | X |
| Custom | Net-to-Gross – EESP Interviews |  | X | X | X |
| Custom | Process Analysis | X | X |  |  |
| Grocery | Tracking System Review |  |  | X | X |
| Grocery | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Grocery | Impact – Measure-Level Savings Review |  |  | X | X |
| Grocery | Impact – Detailed Project-Level Desk Review |  |  | X | X |
| Grocery | Impact – Verification & Gross Realization Rate |  |  | X | X |
| Grocery | Process Evaluation |  |  | X |  |
| Industrial Systems Optimization | Tracking System Review | X | X | X | X |
| Industrial Systems Optimization | Data Collection – Participant Surveys | X | X | X | X |
| Industrial Systems Optimization | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Industrial Systems Optimization | Impact – Engineering Review | X | X | X | X |
| Industrial Systems Optimization | Impact – Modeling (as needed) | X | X | X | X |
| Industrial Systems Optimization | Impact – Verification & Realization Rate | X | X | X | X |
| Industrial Systems Optimization | Net-to-Gross – Customer Self-Report Surveys |  | X | X | X |
| Industrial Systems Optimization | Net-to-Gross – EESPs Interviews |  | X | X | X |
| Industrial Systems Optimization | Net-to-Gross – Technical Service Provider Interviews |  |  | X | X |
| Industrial Systems Optimization | Process Analysis | X | X |  | X |
| Instant Discounts | Tracking System Review | X | X | X | X |
| Instant Discounts | Data Collection – Participant Surveys | X | X | X | X |
| Instant Discounts | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Instant Discounts | Data Collection – EESPs Interviews/Roundtables | X | X |  | X |
| Instant Discounts | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Instant Discounts | Impact – Verification & Realization Rate | X | X | X | X |
| Instant Discounts | Net-to-Gross – Participant Self-Report Surveys | X |  |  | X |
| Instant Discounts | Net-to-Gross – EESPs Interviews | X |  |  | X |
| Instant Discounts | Process Analysis | X | X |  | X |
| LED Street Lighting | Tracking System Review | X | X | X | X |
| LED Street Lighting | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| LED Street Lighting | Data Collection – Stakeholder Interviews | X | X |  |  |
| LED Street Lighting | Impact – Engineering Review | X | X | X | X |
| LED Street Lighting | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| LED Street Lighting | Net-to-Gross – Customer Self-Report Surveys |  |  |  |  |
| LED Street Lighting | Process Analysis | X |  |  |  |
| Nonprofit Organizations | Tracking System and Data Flow Review |  |  | X | X |
| Nonprofit Organizations | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Nonprofit Organizations | Impact – Project Level Desk Reviews including Deemed Savings Review |  |  | X | X |
| Nonprofit Organizations | Impact – Project Level Site Visits and Installation Verification |  |  | X | X |
| Nonprofit Organizations | Impact – Verification & Gross Realization Rate |  |  | X | X |
| Nonprofit Organizations | Impact – Gross and Net Savings Verification |  |  | X | X |
| Non-Residential New Construction | Tracking System Review | X | X | X | X |
| Non-Residential New Construction | Data Collection – Materials Review |  |  | X | X |
| Non-Residential New Construction | Data Collection – Participant Surveys | X | X | X | X |
| Non-Residential New Construction | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Non-Residential New Construction | Impact – Engineering Review | X | X | X | X |
| Non-Residential New Construction | Impact – Building Energy Simulation Modeling | X | X | X | X |
| Non-Residential New Construction | Impact – Verification & Gross Realization Rate | X | X | X | X |
| Non-Residential New Construction | Net-to-Gross – Free Ridership Self-Report Surveys | X | X |  | X |
| Non-Residential New Construction | Net-to-Gross – Trade Ally Interviews |  | X |  |  |
| Non-Residential New Construction | Process Research | X | X |  | X |
| Operational Efficiency | Gross Impact Approach | X | X | X | X |
| Operational Efficiency | Gross Sampling Frequency | X | X | X | X |
| Operational Efficiency | Verified Net Impact Approach | X | X | X | X |
| Operational Efficiency | Researched NTG Approach |  | X |  | X |
| Operational Efficiency | Program Manager and Implementer Interviews/Review Materials | X | X | X | X |
| Operational Efficiency | Participant Interviews | X | X |  | X |
| Operational Efficiency | Effective Useful Life Determination | X | X | X | X |
| Operational Efficiency | Process Evaluation | X | X | X | X |
| Public Buildings in Distressed Communities | Tracking System Review |  |  | X | X |
| Public Buildings in Distressed Communities | Process – Participant surveys and implementer interviews |  |  | X | X |
| Public Buildings in Distressed Communities | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Public Buildings in Distressed Communities | Impact – Engineering Reviews |  |  | X | X |
| Public Buildings in Distressed Communities | Impact – Verification of Gross and Net Impacts |  |  | X | X |
| Public Buildings in Distressed Communities | Impact – Verification and Gross Realization Rate |  |  | X | X |
| Public Small Facilities | Tracking System Review |  |  | X | X |
| Public Small Facilities | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Public Small Facilities | Impact – Engineering Review |  |  | X | X |
| Public Small Facilities | Impact – Measure-Level Deemed Savings Review |  |  | X | X |
| Public Small Facilities | Impact – Verification & Gross Realization Rate |  |  | X | X |
| Public Small Facilities | Net-to-Gross – Customer Self-Report Surveys |  |  | X | X |
| Public Small Facilities | Net-to-Gross – EESP Interviews |  |  | X | X |
| Retrocommissioning | Tracking System Review | X | X | X | X |
| Retrocommissioning | Data Collection – Participant Surveys |  | X |  | X |
| Retrocommissioning | Data Collection – Program Manager and Implementer Interviews | X | X |  | X |
| Retrocommissioning | Data Collection – Service Provider Interviews |  | X |  | X |
| Retrocommissioning | Impact – Project-specific Billing Analysis | X | X | X | X |
| Retrocommissioning | Impact – Engineering Review | X | X | X | X |
| Retrocommissioning | Impact – Verification & Gross Realization Rate | X | X | X | X |
| Retrocommissioning | Net-to-Gross – CY2019 Customer Self-Report Surveys |  | X | X |  |
| Retrocommissioning | Net-to-Gross – CY2019 Service Provider Interviews |  | X | X |  |
| Retrocommissioning | Process Analysis | X | X |  | X |
| Small Business (private sector) | Tracking System Review | X | X | X | X |
| Small Business (private sector) | Data Collection – General Population Surveys | X | X |  |  |
|  |  |  |  |  |  |
| Small Business (private sector) | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Small Business (private sector) | Data Collection – Stakeholder Interviews | X | X |  |  |
|  |  |  |  |  |  |
| Small Business (private sector) | Impact – Billing Analysis | X | X | X | X |
| Small Business (private sector) | Impact – Engineering Review | X | X | X | X |
| Small Business (private sector) | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Small Business (private sector) | Impact – Modeling (as needed) | X |  | X |  |
| Small Business (private sector) | Impact – Verification & Realization Rate | X | X | X | X |
| Small Business (private sector) | Net-to-Gross – Customer Self-Report Surveys | X |  | X |  |
| Small Business (private sector) | Net-to-Gross – EESP Interviews | X |  | X |  |
| Small Business (private sector) | Process Analysis | X | X |  | X |
| Small Business Kits | Tracking System Review |  |  | X | X |
| Small Business Kits | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Small Business Kits | Impact – Measure-Level Deemed Savings Review |  |  | X | X |
| Small Business Kits | Impact – Verification & Gross Realization Rate |  |  | X | X |
| Small Business Kits | Net-to-Gross – Customer Self-Report Surveys |  |  |  | X |
| Small Business Kits | Process Analysis |  |  |  | X |
| Small Public Facilities (public sector) | Tracking System Review | X | X | X | X |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Small Public Facilities (public sector) | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Small Public Facilities (public sector) | Impact – Engineering Review | X | X | X | X |
| Small Public Facilities (public sector) | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
|  |  |  |  |  |  |
| Small Public Facilities (public sector) | Impact – Verification & Realization Rate | X | X | X | X |
| Small Public Facilities (public sector) | Net-to-Gross – Customer Self-Report Surveys |  | X |  | X |
| Small Public Facilities (public sector) | Net-to-Gross – Trade Ally Interviews |  | X |  | X |
| Small Public Facilities (public sector) | Process Analysis | X | X | X | X |
| Standard | Tracking System Review | X | X | X | X |
| Standard | Data Collection – Participant Surveys | X | X |  | X |
| Standard | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Standard | Data Collection – Stakeholder Interviews | X |  | X |  |
| Standard | Data Collection – EESP Interviews | X | X |  | X |
| Standard | Data Collection – Literature Review |  |  | X | X |
| Standard | Impact – Billing Analysis | X |  | X | X |
| Standard | Impact – Engineering Review | X | X | X | X |
| Standard | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Standard | Impact – Verification & Realization Rate | X |  | X | X |
| Standard | Net-to-Gross – Customer Self-Report Surveys |  | X |  | X |
| Standard | Net-to-Gross – EESP Spillover Research |  | X |  | X |
| Standard | Process Analysis | X | X |  |  |
| Strategic Energy Management | Tracking System Review | X | X | X | X |
| Strategic Energy Management | Data Collection – Participant Interviews |  | X |  | X |
| Strategic Energy Management | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Strategic Energy Management | Data Collection – Stakeholder Interviews | X | X |  |  |
| Strategic Energy Management | Impact – Billing Analysis | X | X | X | X |
| Strategic Energy Management | Impact – Engineering Review | X | X | X | X |
| Strategic Energy Management | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Strategic Energy Management | Impact – Modeling | X | X | X | X |
| Strategic Energy Management | Impact – Verification & Realization Rate | X | X | X | X |
| Strategic Energy Management | Process Analysis | X | X |  | X |
| Telecommunications Optimization | Tracking System Review |  |  | X | X |
| Telecommunications Optimization | Data Collection – Participant Interviews |  |  |  | X |
| Telecommunications Optimization | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Telecommunications Optimization | Impact – Billing Analysis |  |  | X | X |
| Telecommunications Optimization | Impact – Engineering Review |  |  | X | X |
| Telecommunications Optimization | Impact – Measure-Level Deemed Savings Review |  |  | X | X |
| Telecommunications Optimization | Impact – Modeling |  |  | X | X |
| Telecommunications Optimization | Impact – Verification & Gross Realization Rate |  |  | X | X |
| Telecommunications Optimization | Process Analysis |  |  |  | X |
| Virtual Commissioning | Tracking System Review | X | X |  |  |
| Virtual Commissioning | Data Collection – Program Manager and Implementer Interviews | X | X |  |  |
| Virtual Commissioning | Net-to-Gross – Customer Self-Report Surveys | X |  |  |  |
| Virtual Commissioning | Impact – Modeling | X | X |  |  |
| Voltage Optimization | Tracking System Review |  |  | X | X |
| Voltage Optimization | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Voltage Optimization | Data Collection – AMI and SCADA Data from VO Substations/feeders |  |  | X | X |
| Voltage Optimization | Impacts – Measure Net Savings Impact of VO in Affected Feeders |  |  | X | X |
| Voltage Optimization | TRM Research – Develop Method for Measuring Future VO Impacts |  |  | X |  |

Table 2. Income Eligible Programs Four-Year Plan

| Program | Task | 2018 | 2019 | 2020 | 2021 |
| --- | --- | --- | --- | --- | --- |
| Affordable Housing New Construction | Tracking System Review | X | X | X | X |
| Affordable Housing New Construction | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Affordable Housing New Construction | Data Collection – Stakeholder Interviews | X | X |  | X |
| Affordable Housing New Construction | Data Collection – Program Materials Review |  |  |  | X |
| Affordable Housing New Construction | Impact – Engineering Review | X | X | X | X |
| Affordable Housing New Construction | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Affordable Housing New Construction | Impact – Verification & Realization Rate | X | X | X | X |
| Affordable Housing New Construction | Impact Research – Calibrated Simulation Modeling |  | X |  |  |
| Affordable Housing New Construction | Process Analysis | X |  |  | X |
| Food Bank Distribution | Tracking System Review | X |  | X | X |
| Food Bank Distribution | Data Collection – Participant Surveys | X |  |  | X |
| Food Bank Distribution | Data Collection – Program Manager and Implementer Interviews | X |  | X | X |
| Food Bank Distribution | Impact – Engineering Review | X |  | X | X |
| Food Bank Distribution | Impact – Measure-Level Deemed Savings Review | X |  | X | X |
| Food Bank Distribution | Impact – Verification & Gross Realization Rate | X |  | X | X |
| Food Bank Distribution | Process Analysis | X |  |  | X |
| Income Eligible Multi-Family Energy Efficiency | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Income Eligible Multi-Family Energy Efficiency | Data Collection – Building Owners and Property Manager Surveys (Lead Lifecycle Analysis) | X |  | X |  |
| Income Eligible Multi-Family Energy Efficiency | Impact – Billing Analysis |  | X |  |  |
| Income Eligible Multi-Family Energy Efficiency | Impact – Engineering Review | X | X | X | X |
| Income Eligible Multi-Family Energy Efficiency | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Income Eligible Multi-Family Energy Efficiency | Impact – Verification & Realization Rate | X | X | X | X |
| Income Eligible Multi-Family Energy Efficiency | Impact – Field Work |  |  | X |  |
| Income Eligible Multi-Family Energy Efficiency | Impact – Custom Analysis to Confirm TRM Savings Estimates |  |  |  | X |
| Income Eligible Multi-Family Energy Efficiency | Net-to-Gross – Customer Self-Report Surveys |  | X |  |  |
| Income Eligible Multi-Family Energy Efficiency | Process Analysis | X | X | X | X |
| Income Eligible Product Discounts | Tracking System Review | X | X | X | X |
| Income Eligible Product Discounts | Data Collection – In-store Intercepts Participant Surveys | X | X | X |  |
| Income Eligible Product Discounts | Data Collection – In-store Shelf Surveys |  |  |  |  |
| Income Eligible Product Discounts | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Income Eligible Product Discounts | Data Collection – EESP Interviews |  |  |  |  |
| Income Eligible Product Discounts | Impact – Engineering Review | X | X | X | X |
| Income Eligible Product Discounts | Impact – Modeling | X | X | X | X |
| Income Eligible Product Discounts | Impact – Verification & Gross Realization Rate | X | X | X | X |
| Income Eligible Product Discounts | Net-to-Gross – Customer Self-Report Surveys |  |  |  |  |
| Income Eligible Product Discounts | Process Analysis | X | X |  |  |
| Income Eligible Single-Family Retrofit | Tracking System Review | X | X | X | X |
| Income Eligible Single-Family Retrofit | Data Collection – Participant Surveys | X |  |  |  |
| Income Eligible Single-Family Retrofit | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Income Eligible Single-Family Retrofit | Data Collection – EESP Interviews | X |  |  |  |
| Income Eligible Single-Family Retrofit | Impact – Billing Analysis |  | X |  | X |
| Income Eligible Single-Family Retrofit | Impact – Engineering Review | X | X | X | X |
| Income Eligible Single-Family Retrofit | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Income Eligible Single-Family Retrofit | Impact – Verification & Realization Rate | X | X | X | X |
| Income Eligible Single-Family Retrofit | Impact – Field Work | X |  |  |  |
|  |  |  |  |  |  |
| Income Eligible Single-Family Retrofit | Process Analysis | X | X |  |  |
| Manufactured Homes Energy Efficiency | Tracking System Review |  |  | X | X |
| Manufactured Homes Energy Efficiency | Impact – Measure-Level Deemed Savings Review |  |  | X | X |
| Manufactured Homes Energy Efficiency | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Manufactured Homes Energy Efficiency | Impact – Verification & Gross Realization Rate |  |  | X | X |
| Manufactured Homes Energy Efficiency | Impact – Field Work |  |  |  | X |
| Income Eligible Energy Savings Kit | Tracking System Review | X |  | X | X |
| Income Eligible Energy Savings Kit | Data Collection – Program Manager and Implementer Interviews | X |  | X | X |
| Income Eligible Energy Savings Kit | Impact – Engineering Review | X |  | X | X |
| Income Eligible Energy Savings Kit | Impact – Measure-Level Deemed Savings Review | X |  | X | X |
| Income Eligible Energy Savings Kit | Impact – Verification & Realization Rate | X |  | X | X |
| Income Eligible Energy Savings Kit | Process Analysis | X |  |  |  |
| Public Housing Retrofits Program | Tracking System Review |  |  | X | X |
| Public Housing Retrofits Program | Data Collection – Program Manager and Implementer Interviews |  |  | X | X |
| Public Housing Retrofits Program | Data Collection – Resident Interviews |  |  |  | X |
| Public Housing Retrofits Program | Data Collection – EESP and Stakeholder Interviews |  |  |  | X |
| Public Housing Retrofits Program | Impact – Measure-Level Deemed Savings Review |  |  | X | X |
| Public Housing Retrofits Program | Impact – Verification & Gross Realization Rate |  |  | X | X |
| Public Housing Retrofits Program | Process Analysis |  |  |  | X |

Table 3. Residential Programs Four-Year Plan

| Program | Task | 2018 | 2019 | 2020 | 2021 |
| --- | --- | --- | --- | --- | --- |
| Appliance Rebates | Tracking System Review | X | X | X | X |
| Appliance Rebates | Data Collection – Participant Surveys | X |  |  |  |
| Appliance Rebates | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Appliance Rebates | Data Collection – Retailer Interviews | X |  |  |  |
| Appliance Rebates | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Appliance Rebates | Impact – Verification & Realization Rate | X | X | X | X |
| Appliance Rebates | Net-to-Gross (Spillover) – Customer Self-Report Surveys | X |  |  |  |
| Appliance Rebates | Process Analysis | X | X |  | X |
| Elementary Education Kits | Tracking System Review | X | X | X | X |
| Elementary Education Kits | Data Collection – Parent, Teacher, and Student Surveys | X | X | X | X |
| Elementary Education Kits | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Elementary Education Kits | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Elementary Education Kits | Impact – Verification & Gross Realization Rate | X | X | X | X |
| Elementary Education Kits | Process Analysis – Analyze Teacher Surveys (collected by RAP) | X | X | X |  |
| Fridge/Freezer Recycling | Tracking System Review | X | X | X | X |
| Fridge/Freezer Recycling | Data Collection – Participant Surveys | X | X | X | X |
| Fridge/Freezer Recycling | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Fridge/Freezer Recycling | Data Collection – Retailer Interviews |  | X |  | X |
| Fridge/Freezer Recycling | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Fridge/Freezer Recycling | Impact – Verification & Gross Realization Rate | X | X | X | X |
| Fridge/Freezer Recycling | Net-to-Gross – Customer Self-Report Surveys | X | X | X | X |
| Fridge/Freezer Recycling | Net-to-Gross Analysis |  | X | X | X |
| Fridge/Freezer Recycling | Process Evaluation |  | X |  | X |
| Heating and Cooling Rebates | Tracking System Review | X | X | X | X |
| Heating and Cooling Rebates | Data Collection – Participant Surveys | X | X |  | X |
| Heating and Cooling Rebates | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Heating and Cooling Rebates | Data Collection – EESP Interviews | X |  |  | X |
| Heating and Cooling Rebates | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Heating and Cooling Rebates | Impact – Verification & Realization Rate | X | X | X | X |
| Heating and Cooling Rebates | Net-to-Gross – Customer Self-Report Surveys | X |  |  | X |
| Heating and Cooling Rebates | Net-to-Gross – EESP Interviews | X |  |  | X |
| Heating and Cooling Rebates | Process Analysis | X |  |  | X |
| HEA - Single Family | Tracking System Review | X | X | X | X |
| HEA - Single Family | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| HEA - Single Family | Data Collection – Participant Survey |  |  |  | X |
| HEA - Single Family | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| HEA - Single Family | Impact – Verification & Gross Realization Rate | X | X | X | X |
| HEA - Single Family | Net-to-Gross – Customer Self-Report Surveys |  |  |  | X |
| HEA - Single Family | Process Analysis | X |  |  | X |
| Home Energy Reports | Tracking System Review | X | X | X | X |
| Home Energy Reports | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Home Energy Reports | Impact – Regression Analysis | X | X | X | X |
| Lighting Discounts | Tracking System Review | X | X | X | X |
| Lighting Discounts | Data Collection – In-store Intercept Participant Surveys | X |  |  |  |
| Lighting Discounts | Data Collection – In-store Shelf Surveys | X |  |  |  |
| Lighting Discounts | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Lighting Discounts | Data Collection – EESP Interviews | X |  |  |  |
| Lighting Discounts | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Lighting Discounts | Impact – Verification & Gross Realization Rate | X | X | X | X |
| Lighting Discounts | Net-to-Gross – Customer Self-Report Surveys | X |  |  |  |
| Lighting Discounts | Process Analysis | X |  |  |  |
| Multi-Family Market Rate | Tracking System Review | X | X | X | X |
| Multi-Family Market Rate | Data Collection – Building Owner and Property Manager Surveys | X |  |  | X |
| Multi-Family Market Rate | Data Collection – Program Manager and Implementer Interviews | X | X | X | X |
| Multi-Family Market Rate | Data Collection – EESP Interviews | X |  |  |  |
| Multi-Family Market Rate | Impact – Engineering Review | X | X | X | X |
| Multi-Family Market Rate | Impact – Measure-Level Deemed Savings Review | X | X | X | X |
| Multi-Family Market Rate | Impact – Verification & Realization Rate | X | X | X | X |
| Multi-Family Market Rate | Net-to-Gross | X |  |  | X |
| Multi-Family Market Rate | Process Analysis | X |  |  | X |
| Residential New Construction | Tracking System Review | X | X |  |  |
| Residential New Construction | Data Collection – Program Manager and Implementer Interviews | X |  |  |  |
| Residential New Construction | Data Collection – Builder and Rater Interviews |  |  |  |  |
| Residential New Construction | Impact – Calibrated Simulation Modeling | X |  |  |  |
| Residential New Construction | Impact – Verification & Realization Rate | X | X |  |  |
| Weatherization – Market Rate | Tracking System Review | X | X |  |  |
| Weatherization – Market Rate | Data Collection – Participant Surveys | X |  |  |  |
| Weatherization – Market Rate | Data Collection – Program Manager and Implementer Interviews | X |  |  |  |
| Weatherization – Market Rate | Data Collection – EESP Interviews | X |  |  |  |
| Weatherization – Market Rate | Impact – Measure-Level Deemed Savings Review | X | X |  |  |
| Weatherization – Market Rate | Impact – Verification & Realization Rate | X | X |  |  |
| Weatherization – Market Rate | Net-to-Gross – Customer Self-Report Surveys | X |  |  |  |
| Weatherization – Market Rate | Literature Review – NTG Values for Wall Insulation |  | X |  |  |
| Weatherization – Market Rate | Process Analysis | X |  |  |  |

# APPENDIX B. Business Programs Evaluation Plans

## ComEd Agriculture Offering CY2020 to CY2021 Evaluation Plan

### Introduction

The Agriculture Offering targets the full vertical market including farms (dairy, poultry, hogs, cash crops, etc.), greenhouses, indoor agriculture facilities, supply houses, on-site processing facilities as well as farm facilities on residential properties (excluding the residence). It serves both existing facilities and new construction and offers standard and custom incentives.

The primary update to the Agriculture Offering for CY2020 is an updated approach to indoor agriculture measures targeting the cannabis industry in response to increased minimum efficiency requirements for agricultural equipment. The CY2020 net savings goal for the Agriculture Offering is 4,376 MWh. The implementation contractor for this offering is Franklin Energy.

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

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Process – Participant and Implementer interviews | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Engineering Review | X | X |
| Impact – Verification and Gross Realization Rate | X | X |
| Impact – Net Verification and Evaluation Report | X | X |

The evaluation of ComEd’s Agriculture Offering will entail a review of tracking data for consistency and accuracy, including verifying the proper application of the Illinois Technical Resource Manual (TRM). In addition, the evaluation will include a desk review of a sample of projects submitted through the Agriculture Offering to confirm completeness of project documentation, alignment with the tracking database, agreement with the savings assumptions in the IL TRM, and sound savings assumptions.

#### 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 programs are closely coordinated. The methods used in both evaluations are specified by the Illinois TRM and are generally consistent.

### Evaluation Research Topics

The primary objectives of the evaluation of the Agriculture Offering are to: (1) quantify gross and net savings impacts from the offering, and (2) as the offering evolves, make recommendations to enhance the offering.

The CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What is the program’s verified gross energy and demand savings?
2. What is the program’s verified net energy and demand 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

The evaluation team will conduct a process evaluation for the Agriculture Offering in CY2020. Navigant will conduct implementer interviews and deploy automated, web-based participant surveys to those involved in the program. Navigant recognizes that growers are typically unavailable for surveys during the growing season; uptake is also low during the holiday season. Therefore, survey deployment will occur in the winter of 2020-2021.

### Evaluation Approach

The evaluation team determined the evaluation approach for the CY2020-2021 period (see Table 2) based upon the current and expected near-term needs of the offering. However, Navigant realizes that the program is relatively new and will likely change as it matures over the next two years. Therefore, Navigant also notes that the evaluation approach may also change over the next two years in response to program updates and growth. Regardless of future shifts in evaluation focus, the evaluation approach will include the following in each of the next two years:

* Gross and net impact analyses,
* Program manager interviews.

Table 2, below, summarizes the evaluation tasks for CY2020 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions. NTG will not be researched in CY2020.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Nov 2020† | Tracking Data Review |
| PM and IC Interviews | Program Management and Implementers | 2 | May-June 2020 | Augment with bi-monthly calls |
| Gross Impact | Engineering File Review | Census | June 2020 - Feb 2021 | Engineering File Review; Three Waves‡ |

† Tracking data review will occur in Waves; starting preliminary review in June 2020, with primary update in Nov 2020, and a final confirmation including end of year updates in early 2021.

‡ Navigant will coordinate with ComEd to determine appropriate dates to pull tracking data extracts for each wave; with these dates expected to sync with the tracking data schedule outlined in the footnote above.

#### Tracking System Review

Navigant will review tracking system data and conduct project sampling activities in waves; with the first wave covering half of the year, a second wave in the Fall, and the last wave occurring only after all program data is finalized for the year.

#### Program Management and Implementer Interviews

The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Gross Impact Evaluation

The primary program gross impact evaluation activities for CY2020 are:

* Reviewing the tracking system to determine whether all fields are appropriately populated
* Reviewing savings methodology and, if necessary, providing recommendations for improvement
* Cross-checking measure totals and savings recorded in the tracking database

#### Verified Net Impact Evaluation

The evaluation team will apply the NTG ratios approved by the Stakeholder Advisory Group (SAG) to the estimate of evaluation-verified gross savings to compute verified net savings. These NTG values are provided in Table 3.

Table 3. Deemed NTG Values for CY2020

|  |  |
| --- | --- |
| Measure | NTG Value |
| Lighting Measures | 0.83 |
| Non-Lighting Measures | 0.78 |
| Custom Measures | 0.70 kWh,  0.63 kW |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Research NTG Impact Evaluation

NTG will not be researched in CY2020. The Standard and Custom Program NTG values deemed by the Illinois SAG will be applied to this program.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by FEJA, the measure-specific and total ex post gross and ex post net savings for the program and the CPAS in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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

|  |  |  |
| --- | --- | --- |
| Deliverable | Responsible Party | Date Delivered |
| Review initial project documentation, engineering review and memo | Evaluation | August 31, 2020 |
| Review entire program savings and complete engineering review | Evaluation | February 26, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 8, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2021 |
| Revised Draft by Navigant | Evaluation | April 5, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 12, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 19, 2021 |
| Draft Process Memo | Process Memo | June 25, 2021 |
| Final Process Memo | Process Memo | July 25, 2021 |

## ComEd Custom Program CY2020 to CY2021 Evaluation Plan

### Introduction

The ComEd Custom Incentive (Custom) Program provides a custom incentive to commercial, industrial and public sector customers, based on a formula, for less common or more complex energy-saving measures installed in qualified retrofit and equipment replacement projects. Custom incentives are available based on the project’s kWh savings, provided the project meets all program eligibility requirements. For eligible projects, ComEd pays an incentive between $0.07 and $0.21 per first-year kWh saved, depending on the technology, and caps the incentives at 100% of the incremental project cost. In CY2019, the Data Center Program and merged with the Custom Program and in CY2020 Combined Heat & Power (CHP) will be offered under the Custom Program.

The objective of the CY2020 evaluation is to quantify net savings impacts from the Custom Program. Evaluation activities for CY2020 will be like CY2019. The CY2020 gross impact evaluation will not vary from previous years, but adjustments will be made to reflect specific measure and project characterizations. For the CY2020 evaluation, the evaluation team will continue working 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 help ensure that the evaluation and implementation teams reach agreement on the calculation methodology and M&V plans before the project is finalized and documented in the tracking system.

The evaluation will include a participating customer free ridership and spillover study. The findings from the study will inform recommended net-to-gross (NTG) values for Illinois Stakeholder Advisory Group (SAG) approval and future program application.

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

Table 1. Evaluation Approaches – Two Year Plan

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

The evaluation team determined the evaluation approach for the 2020-2021 period based upon the needs of the program and the program’s prior history. As we did in CY2019, the evaluation will continue to evaluate any potential gas savings that may occur because of the program. The team will evaluate both first-year savings and savings over the lifetime of the equipment. Real-time (parallel) evaluation will also be conducted for the largest projects where requested, and early feedback provided for complex projects. Open communication between the evaluation team and the ComEd Custom team will continue to be key in successfully meeting evaluation requirements. The two-year evaluation approach for this program is based on the following:

* Gross and net impact analysis will be conducted each year
* Monthly review of completed and pipeline projects
* Multiple waves of sample pull throughout the year, based on completion rates of projects
* Site-specific M&V (SSMVP) plans provided to the ComEd team for all sampled points receiving an on-site survey
* Final Site Reports (FSRs) and detailed calculations for every sampled site
* Real-time evaluation for the largest sampled points or early feedback provided, upon request
* NTG analysis and reporting every other year when programs are stable and NTG results are consistent over time
* NTG analysis each year when markets or program designs are changing
* Cumulative Persisting Annual Savings (CPAS) will be calculated based upon the requirements of the Future Energy Jobs Act (FEJA)

#### 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 CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What is 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 is the program’s lifetime verified net savings? What is ComEd’s program influence versus other factors in installing energy efficient equipment?
4. What are the gas savings from the program?
5. What is the estimated free-ridership and spillover for participating customers?
6. What are the opportunities for improvement for program impact calculations?
7. Are the ex-ante per-unit gross impact savings correctly implemented by the tracking system and reasonable for this program?
8. Are the effective useful life (EUL) assumptions of typical measures to report lifetime savings in the CY2019 program valid and up-to-date?

#### Process Evaluation and Other Research Topics

There will be no process evaluation in CY2020.

Navigant might conduct process research for the program in CY2021. Navigant will consult with ComEd program leads on focused, key process questions to be answered to help improve and inform the program.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves | Three Waves and Early Feedback for Large Projects |
| PM and IC Interviews | Program Management and Implementers | 2 | Fall/Winter  2020 | Augment with monthly calls |
| Gross Impact | Early Feedback File Review | TBD | April 2020 – Sept 2020 | Early Feedback for Large Projects, Engineering File Review and On-site M&V |
| Gross Impact | Engineering File Review | TBD | April 2020 – February 2021 | Three Waves† |
| Gross Impact | On-site M&V | TBD | April 2020 – February 2021 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | June 2020 –  May 2021 | Deemed Value |
| Surveys: NTG and Process | Telephone Survey with Participating Customers | TBD | June 2020 – May 2021 | FR & SO, Process. Two Waves |
| Interviews: NTG ‡ | Telephone Interviews with Influential Trade Allies Triggered by Customer Responses | TBD | Fall/Winter 2020 – May 2021 | FR & SO, Process. Two Waves |

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 2020. The first wave of M&V sampling is expected to cover about one-third of the projects.

#### Tracking System Review

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 2020. Navigant will perform tracking system review and M&V project sampling in three waves in CY2020. The first wave of M&V sampling is expected to cover about one-third of projects completed in CY2020. Proposed gross impact sampling timelines are shown below.

1. First wave sample drawn in April 2020 and completed in July 2020
2. Second wave sample drawn in August 2020 and completed November 2020
3. Final wave starts February 2021 (or projects completion date)

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is consistent with the program’s data in eTRACK. This latter task will become increasingly important as eTRACK undergoes development and more closely reflects the tracking data Navigant receives.

#### Gross Impact Evaluation

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

* **On-site audits** On-site metering (full M&V) activity is expected to be performed for approximately half of the selected sample (approximately 14 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 14 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 Retro-Commissioning (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 CY2020 evaluation approach (by reducing or increasing on-site activity). 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.

The evaluation will analyze program-level savings data by project size 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 (based on CY2019 results)

RP = Relative Precision (10%)

N = Estimated CY2020 Project Population

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

The error ratio for each sample will be calculated from a combination of prior program year results. The evaluation team expects a sample size of approximately 20 custom projects and eight data centers projects but will increase the cap of sample size up to a total of 33 projects if necessary. The final number will be determined when the final count of the CY2020 population is known. Other than splitting the population into two categories, this approach is consistent with prior program evaluations. If the population variability in CY2020 remains close to that in CY2019, this cap will allow us to achieve the overall portfolio-level 90/10 requirements. We will conduct onsite M&V audits to confirm custom project savings and verify project details. We will perform onsite visits if there is uncertainty associated with the savings or if enough documentation was not provided for the desk review sites. These will be performed prior to January 2021.

We will perform sampling for both custom and data center categories in three phases during the CY2020 evaluation period. We will draw the sample for the first wave around May 2020 based on the number of paid projects completed. We will draw the sample for the second wave around October 2020 after most of the projects have been finalized. The final sample will be drawn after we receive final program data at the end of January 2021. Final program gross and net impact results will be based upon the three waves combined.

Core data collection activities will include the following:

* If available, we will collect pre-metering and post-installation interval data from the program implementers for 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.
* We will perform on-site M&V audits for approximately 10 Custom and four Data Center projects.[[10]](#footnote-10) 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. 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 ten Custom and four Data Center 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 the 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 within a five-day review period before finalizing the M&V plans for a project.

A site-specific engineering analysis will be performed for the sampled CY2020 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 based on kWh savings to the program population using a ratio estimation approach to calculate CY2020 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[[11]](#footnote-11) 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 based on the ex-ante kWh using a ratio estimation method to yield ex post evaluation-adjusted gross energy savings. Any therm savings identified will be converted to kWh 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 approximately fifteen on-site audits and five desk reviews for the custom sample, and five on-site audits and three desk reviews for the data center sample is 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 3. Deemed NTG Values for CY2020**

|  |  |  |
| --- | --- | --- |
| Program Measure | CY2020 Deemed NTG Value [kWh] | CY2020 Deemed NTG Value [kW] |
| Custom (Public & Private Sector) | 0.70 | 0.63 |
| Custom Public Sector - DCEO | 0.24 | 0.23 |
| Data Centers (New Construction) – Co-Location | 0.44 | 0.34 |
| Data Centers (Retrofit) – Co-Location | 0.78 | 0.82 |
| Data Centers (New Construction) – Non-Co-Location | 0.67 | 0.67 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### PM and IC Interviews

In CY2021, we might conduct in-depth interviews with program managers and implementation contractors. Interviews will focus on progress to goals, identifying program successes and challenges, identifying drivers of those successes and challenges, and retailer education and marketing tactics.

#### Program Management and Implementer Interviews

The evaluation team might interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Participant Surveys

Participant survey questions will address both free ridership and participant spillover; see the next section for a discussion of the free ridership and spillover approach.

We will attempt to survey a sample of CY2020 customers to achieve one-tailed 90/10 confidence and precision level at the program level and will ensure that the sample points are representative of the program population.

All telephone sample points selected will be submitted to ComEd to obtain project overview documents that 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 the surveys.

#### Research NTG Impact Evaluation

Previous NTG evaluations have performed an NTG analysis for each program year. The evaluation team plans to conduct NTG interviews in CY2020 and CY2021. To reduce the budget, the evaluation team will skip the NTG analysis for CY2020 and perform combined analysis for CY2020 and CY2021. 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 Custom programs that have been adopted by the SAG and is part of the most recent 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***

**NTG 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

Navigant will field two waves of free ridership and spillover surveys with participating customers. NTG survey questions will address both free ridership and participant spillover. Free-ridership questions will determine the value of energy savings coming from customers who would have installed the measures offered by the program in the absence of the program offering. Spillover questions will determine energy savings from measures installed outside of the program as a direct result of the program’s influence. Together, the free-ridership and spillover survey answers will be used to calculate NTG ratios for the program.

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 o facility assessment representatives. The vendor interviews will be conducted before the customer interviews. Enhanced cases may also include secondary research on standard industry practices.

For enhanced cases, NTG summaries detailing all the findings from the interview performed by a senior consultant will be provided.

***Analysis***

The telephone surveys will provide the inputs needed for the calculation of the program’s NTG ratio. Free ridership will be assessed using an algorithm approach that 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[[12]](#footnote-12) and (2) significant spillover is revealed by the customer.

Our goal is to measure and report NTG findings for categories of interest to ComEd, and corresponding to segments that exhibit high degrees of difference in NTG results.  Examples of these are Public versus Private Sector for Custom, and Co-location (New Construction, Retrofit) versus Non-Co-location (Retrofit only) for Data Centers.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Randomized Control Trial or Quasi-Experimental Design

The evaluation team will not use the Randomized Control Trial (RCT) or Quasi-Experimental Design for process evaluation because:

* There are not enough participants in this program to achieve statistically significant savings estimates using this method
* It is not possible to create a valid matched control group for the customers in this program
* This method estimates average savings across all program participants which is not the desired savings estimate for this program

### 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, 2020 |
| CY2020 program tracking data for QA/QC | ComEd | April 3, 2020 |
| CY2020 program tracking data for sampling Wave 1 | ComEd | June 1, 2020 |
| CY2020 participating customer survey design | Evaluation | June 26, 2020 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 31, 2020 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 31, 2020 |
| CY2020 program tracking data for sampling Wave 2 | ComEd | August 28, 2020 |
| Wave 1 participating customer NTG survey fielding | Evaluation | September 25, 2020 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 25, 2020 |
| CY2020 Program tracking data for sampling Wave 3 | ComEd | January 29, 2021 |
| Wave 2 participating customer NTG survey fielding | Evaluation | February 26, 2010 |
| Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 26, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 5, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 10, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 31, 2021 |
| Revised Draft by Navigant | Evaluation | April 8, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 15, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 24, 2021 |
|  |  |  |
|  |  |  |

## ComEd Grocery Program CY2020 to CY2021 Evaluation Plan

### Introduction

The ComEd Grocery Program aims to achieve cost-effective electricity savings for grocery and retail customers with refrigeration systems. The program provides an account manager working with the customer through an initial energy assessment, equipment selection and installation, incentive application and approval, and re-engagement to identify additional energy savings opportunities. The program engages with manufacturers, distributors, and installers of refrigeration and lighting equipment to offer the measures listed in Table 1 below.

To participate in the program, the ComEd customer must first undergo a no-cost energy assessment and interview completed by the program implementer, CLEAResult. CLEAResult prepares a savings report based on the findings of the assessment, and a CLEAResult account manager discusses the report with the customer. The savings report is generated using an energy savings model and measure analysis tool developed by CLEAResult. Each customer report presents possible efficiency measures for the customer to consider. Once the customer selects the measures to install, the account manager helps the customer select installers, complete incentive processing paperwork, and manage the projects to completion. Account managers will re-engage with customers after project completion to identify additional opportunities, providing the same level of management and assistance for subsequent projects the customer decides to undertake. ComEd’s net savings planning target for the Grocery program is 8,500MWh for CY2020.

Table 1. Grocery Program Measures by Type

|  |  |  |  |
| --- | --- | --- | --- |
| Deemed Refrigeration | Kitchen Measure | Custom Refrigeration | Lighting |
| Strip Curtains | ES Electric Steam Cooker | Adding Doors to Open Cases | Case Lighting |
| Anti-Sweat Heat Controls | ES Electric Combination Oven | High Efficiency Cases | Indoor Lighting |
| Night Covers | ES Electric Convection Oven | Floating Head Pressure Controls | Outdoor Lighting |
| Automatic Door Closer | ES Hot Food Holding | Floating Suction Pressure Controls | Lighting Controls |
| EC Motors | ES Electric Griddle |  | Case Lighting Controls |
| Evaporator Fan Controls | ES Electric Vat Fryer |  | Photocells |
| Q-Sync Motors | ES Ice Maker |  | Timeclocks |
| VFD for Condenser Fans | ES Freezer and Cooler |  |  |
| Special Doors with Low/No ASH | Kitchen Ventilation Controls |  |  |
| Open Case to Reach-In Case – Medium Temperature |  |  |  |
| Open Case to Reach-In Case – Low Temperature |  |  |  |
| Demand Defrost Controls |  |  |  |
| Vending Machine Controls |  |  |  |
| Advanced Rooftop Unit Controls |  |  |  |
| HVAC early replacement |  |  |  |
| Door Gaskets |  |  |  |

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

Table 2. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Measure-Level Savings Review | X | X |
| Impact – Detailed Project-Level Desk Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Process Evaluation |  | X |

#### Coordination

ComEd administers this program and other Illinois utilities do not offer similar programs. Therefore, no cross-utility coordination is required for the evaluation of this program.

### Evaluation Research Topics

The CY2020 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 (if any) are recommended for the Illinois Technical Reference Manual (TRM)?
5. How well does the GrocerSmart tool reflect the performance of grocery stores in ComEd territory?
6. How accurate are the GrocerSmart savings estimates, and what changes (if any) to the assessment process would improve accuracy?
7. Are interactions between measures which are analyzed using different approaches (e.g., deemed vs. custom) properly determined?

#### Process Evaluation and Other Research Topics

The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program. The Evaluation team will conduct a complete process evaluation in CY2020.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Wave 1† and Final data |  |
| Measure-Level Savings Review | Deemed measures  Custom measures | NA | Wave 1† and Final data | Deemed – TRM review  Custom – Methodology review |
| Project-Level Savings Review | Participating projects | 33 | Aug 2020 –  Feb 2021 | 90/20, 0.5 C.V |
| In-Depth Interviews | Program Management and Implementers | ~2 | July – Sept 2020 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2021 |  |

Note: FR = Free Ridership; SO = Spillover

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

#### Tracking System Review

Navigant will perform tracking system review in waves in CY2020, as well as reviewing the final tracking data. The Wave 1 of M&V sampling is expected to cover about half of the projects.

#### Gross Impact Evaluation

The Grocery Program includes savings derived from a collection of different sources. Deemed and standard refrigeration, HVAC and Kitchen Equipment measure savings are based on the Illinois Technical Reference Manual (TRM) and the ComEd Standard workpaper. Custom refrigeration savings are based on the GrocerSmart energy model, a building simulation package developed by CLEAResult. Lighting measure savings are calculated using a lighting calculator based on the IL TRM methodology. Given the diversity of savings sources, the evaluation team will take multiple approaches to determine verified gross impacts, performing both measure-level and project-level reviews.

The evaluation team will perform measure-level reviews to assess the validity of the various tools and approaches the program uses to quantify savings. For deemed and standard refrigeration measures, the evaluation team will ensure savings follow the methodology outlined in for the appropriate measure in the IL TRM. For custom refrigeration measures, the evaluation team will review the GrocerSmart energy model template to validate the model is consistent with engineering fundamentals. For lighting measures, the evaluation team will review the program’s lighting calculator to ensure that it properly follows the IL TRM methodology.

The evaluation team will also perform project-level desk reviews for a sample of completed projects. For projects selected for review, the evaluation team will review all savings calculations and compare analysis inputs to project-specific conditions, such as building weather location, hours of operation, and baseline conditions. The evaluation team will adjust as appropriate to tailor the analyses to site-specific conditions. The evaluation team will also investigate if any changes to the models are appropriate based on non-standard conditions such as large changes in refrigeration loads and will make these changes using available store energy trend data. Additionally, the evaluation team will examine interactive effects between measures to ensure they are properly quantified.

#### Verified Net Impact Evaluation

The verified net impact evaluation will apply a program-level NTG ratio of 0.92, aligning with the value for the Small Business Offering Program deemed through a consensus process by the IL SAG. Navigant believes that the Grocery Program participants are similar to Small Business Offering participants. Additionally, both programs offer direct customer support, including an onsite audit report and assistance choosing which efficient measures to pursue.

Navigant may conduct program specific NTG research in subsequent years if program participation or delivery factors deviate significantly from the Small Business Offering Program.

**Table 4. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Grocery | 0.92 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Program Management and Implementer Interviews

The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program. This will be done to understand the program and to make recommendations for potential program enhancements for future programs of a similar design.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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, 2020 |
| CY2020 program tracking data for sampling Wave 1 | ComEd | July 3, 2020 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | September 25, 2020 |
| CY2020 program tracking data for sampling Wave 2 | ComEd | January 30, 2021 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 26, 2021 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 5, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 12, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 2, 2021 |
| Revised Draft by Navigant | Evaluation | April 9, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 16, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 24, 2021 |

## ComEd Industrial Systems Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Industrial Systems Program offers a combination of technical assistance and financial incentives:

* **Technical assistance** offered includes an industrial systems study which assesses the performance of the facility's industrial compressed air system, process cooling system, refrigeration system, or waste-water treatment plant 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.
* ComEd offers a one-time **incentive** payment of $0.12 per annual kWh saved after proper implementation of recommendations identified through the Industrial Systems Program. The exception to this is waste-water treatment aeration blowers with controls projects where the customer receives $0.21 per annual kWh saved. 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 or 100% of the total incremental costs for improvements recommended in the study.

The objective of the evaluation is to quantify CY2020 net savings impacts for the Industrial Systems Program. Key evaluation activities for CY2020 will take place from January 2020 through March 2021. Evaluation activities for CY2020 will be like CY2019. For the CY2020 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 help ensure that the evaluation and implementation teams reach agreement on the calculation methodology and M&V plans before the project is finalized and documented in the tracking system. Due to reduced budget, evaluation will not conduct process evaluation in 2020 and impact sample sizes will be reduced during the 2020 impact evaluation.

The CY2020 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. The findings from the study will inform recommended net-to-gross (NTG) values for Illinois Stakeholder Advisory Group (SAG) approval and future program application.

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

Table 1. Evaluation Approaches – Two Year Plan

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

The evaluation team determined the evaluation approach for the 2020-2021 period based upon the needs of the program and program’s prior history. Like CY2019, the evaluation will continue to evaluate any potential gas savings that may occur because of the program. The team will evaluate both first-year savings and savings over the lifetime of the equipment. Real-time evaluation will also be conducted for the largest projects when requested by ComEd, and early feedback provided for complex projects. Open communication between the evaluation team and the ComEd Industrial Systems team will continue to be key in successfully meeting evaluation requirements. The two-year evaluation approach for this program is based on the following:

* Gross and net impact analysis will be conducted each year
* Monthly review of completed and pipeline projects
* Multiple waves of participant sample availability throughout the year, based on completion rates of projects
* Site-specific M&V (SSMVP) plans provided to the ComEd team for all sampled points receiving an on-site survey
* Final Site Reports (FSRs) and detailed calculations for every sampled site
* Real-time evaluation for the largest sampled points or early feedback provided, upon request
* Optimized timing on when to conduct NTG research
* NTG analysis and reporting each year until NTG results are consistent over time
* NTG analysis each year when markets or program designs are changing
* Cumulative Persisting Annual Savings (CPAS) will be calculated based upon the requirements of Future Energy Jobs Act (FEJA)

#### 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 CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What is 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 is the program’s lifetime verified net savings? What is ComEd’s program influence versus other factors in installing energy efficient equipment?
4. What are the gas savings from the program?
5. What is the estimated free-ridership and spillover for participating customers? What is the research estimate for participant spillover for this program?
6. What are the opportunities for improvement for program impact calculations?
7. Are the effective useful life (EUL) assumptions of typical measures to report lifetime savings in the CY2020 program valid and up-to-date?

#### Process Evaluation and Other Research Topics

There will be no process evaluation in CY2020.

Process evaluation effort for CY2021 will assess the effectiveness of various program elements, such as incentive levels, marketing procedures, application processes, participation procedures, and determine customer satisfaction with the program and various program elements as needed.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Three waves | Three Waves and Early Feedback for Large Projects |
| PM and IC Interviews | Program Management and Implementers | TBD | Fall/Winter  2020 | Augment with monthly calls |
| Gross Impact | Early Feedback File Review | TBD | April 2020 – Sept 2020 | Early Feedback for Large Projects, Engineering File Review and On-site M&V |
| Gross Impact | Engineering File Review | TBD | April 2020 – February 2021 | Three Waves† |
| Gross Impact | On-site M&V | TBD | April 2020 – February 2021 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | June 2020 –  May 2021 | Deemed Value |
| Surveys: NTG | Telephone Survey with Participating Customers | TBD | June 2020 – May 2021 | FR & SO, Process. Two Waves |
| Interviews: NTG ‡ | Telephone Interviews with Influential Trade Allies Triggered by Customer Responses | TBD | Fall/Winter 2020 – May 2021 | FR & SO, Process. Two Waves |
|  |  |  |  |  |

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.

#### Tracking System Review

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 2020. Navigant will perform tracking system review and M&V project sampling in three waves in CY2020. The first wave of M&V sampling is expected to cover about one-third of projects completed in CY2020. Proposed gross impact sampling timelines are shown below.

1. First wave sample drawn in April 2020 and completed in July 2020
2. Second wave sample drawn in August 2020 and completed November 2020
3. Final wave starts February 2021 (or projects completion date)

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is consistent with the program’s data in eTRACK. This latter task will become increasingly important as eTRACK undergoes development and more closely reflects the tracking data Navigant receives.

#### PM and IC Interviews

We will conduct in-depth interviews with program managers and implementation contractors. The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Gross Impact Evaluation

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

* **On-site audits** On-site metering (full M&V) activity is expected to be performed for two-thirds of the selected sample (approximately seven 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 three 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 CY2020 evaluation approach (by reducing or increasing on-site activity). 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.

The evaluation will analyze program-level savings data by project size 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 (based on CY2018 results)

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 CY2020 project population, the sample size will be determined to achieve 90/10 confidence and precision levels. The sample size for CY2020 is estimated to be approximately 10 projects, like the CY2019 program evaluation.

Core data collection activities will include the following:

* We will collect pre-metering and post-installation interval data from the program implementers for all 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.
* We will perform on-site M&V audits for approximately seven projects.[[13]](#footnote-13) 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. 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.
* We will perform engineering desk reviews for approximately three 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 the 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 CY2020 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+[[14]](#footnote-14) 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 3. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Industrial Systems kWh | 0.77 |
| Industrial Systems kW | 0.78 |

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

#### Participant Surveys

Participant survey questions will address both free ridership and participant spillover; see the next section for a discussion of the free ridership and spillover approach. We will attempt to survey a sample of CY2020 customers to achieve one-tailed 90/10 confidence and precision level at the program level and will ensure that the sample points are representative of the program population.

All telephone sample points selected will be submitted to ComEd to obtain project overview documents that 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 the surveys.

#### Research NTG Impact Evaluation

Due to the relatively stable results year to year, beginning in PY8, the evaluation team elected to conduct NTG surveys every year but perform the analysis every other year. The evaluation has produced NTG recommendations from PY8-PY9 sample and is underway on CY2018-CY2019 sample. The CY2020-CY2021 years will follow the same pattern with interviews in both years and the analysis in CY2021. Although findings are delayed considerably, which is an issue if the NTGRs have fluctuated significantly from year to year, the evaluation team has found that Industrial Program results have been relatively stable year after year.

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 have been adopted by the SAG and is part of the most recent Illinois statewide TRM.

***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 CY2020.

***Content***

Our NTG approach is consistent with the TRM and will address both free ridership and participant spillover. 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.

We will survey participating customers regardless of rigor. 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. For enhanced cases, NTG summaries detailing all the findings from the interview will be provided.

***Analysis***

The telephone surveys will provide the inputs needed for the calculation of the program’s NTG ratio. Free ridership will be assessed using an algorithm approach that 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[[15]](#footnote-15) and (2) significant spillover is revealed by the customer.

Our goal is 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 participant survey to a reasonable length. However, this is only possible if there are enough 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 enough sample is available and depending on the project.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Randomized Control Trial or Quasi-Experimental Design

The evaluation team will not use the Randomized Control Trial (RCT) or Quasi-Experimental Design for process evaluation because:

* There are not enough participants in this program to achieve statistically significant savings estimates using this method
* It is not possible to create a valid matched control group for the customers in this program
* This method estimates average savings across all program participants which is not the desired savings estimate for this program

### 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, 2020 |
| CY2020 program tracking data for QA/QC | ComEd | April 3, 2020 |
| CY2020 program tracking data for sampling Wave 1 | ComEd | June 1, 2020 |
| CY2020 participating customer survey design | Evaluation | June 26, 2020 |
| Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | July 31, 2020 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 31, 2020 |
| CY2020 program tracking data for sampling Wave 2 | ComEd | August 28, 2020 |
| Wave 1 participating customer NTG survey fielding | Evaluation | September 25, 2020 |
| Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | November 25, 2020 |
| CY2020 Program tracking data for sampling Wave 3 | ComEd | January 29, 2021 |
| Wave 2 participating customer NTG survey fielding | Evaluation | February 26, 2010 |
| Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback | Evaluation | February 26, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 2, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 6, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 27, 2021 |
| Revised Draft by Navigant | Evaluation | April 6, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 13, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 23, 2021 |
| NTG Research Memo – draft | Evaluation | July 30, 2021 |
| NTG Research Memo – Final | Evaluation | Sept 30, 2021 |

## ComEd Instant Discounts Program CY2020 to CY2021 Evaluation Plan

### Introduction

The non-residential Instant Discounts Program (formerly Business Instant Lighting Discounts, or BILD) 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 for energy efficient LED lamps (screw based, pin based, and tubular), trim kits, exit signs, and wall packs as well as reduced wattage Linear Fluorescent (LF) lamps. Three-phase, high-frequency battery chargers are also offered through the Instant Discounts Program.

The CY2020 program will not change significantly from CY2019, in terms of measure mix and end-uses.

Notable program changes made from CY2019 to CY2020 includes the introduction of HVAC measures and the removal of Omni-directional lamps as of June 30, 2019.

The primary objectives of the evaluation of the Instant Discounts Program are to: (1) quantify gross and net program impacts and (2) identify ways in which the program can be improved. The evaluation of this program over the coming two years will include a variety of data collection and analysis activities, including those indicated in Table 1.

The CY2020 gross impact evaluation approach will not vary from the previous years, but adjustments will be made to reflect specific measure and project characterizations. Free ridership and spillover research will occur in CY2021.

The evaluation of this program over the coming two years will include a variety of data collection and analysis activities, including those indicated in the following table. Due to reduced budget, evaluation will not conduct process evaluation in 2020, impact sample sizes will be reduced and there will be no NTG evaluation in 2020.

Table 1. Evaluation Approaches – Two Year Plan

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

#### Coordination

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. The Instant Discounts team is in close coordination with Ameren, which has an “Instant Incentives” program that also provides discounts at the point of sale through commercial lighting distributors. In CY2020, the ComEd and Ameren lighting program evaluations will continue to be closely aligned with respect to data collection activities and analysis methods.

### Evaluation Research Topics

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 online surveys with program EESPs 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 in CY2021.

The evaluation team determined the evaluation approach for 2020-2021 based upon the needs of the program and program history. Evaluation research serves two functions. First, it allows a comparison of the verified program savings estimates (using deemed values) to evaluation research program savings estimates. Second, it provides key parameter values for deeming in future updates to the IL TRM as well as SAG recommended NTG. Key evaluation approaches include:

* In CY2021, we will implement participant surveys to support installation rate, and residential and non-residential split parameter estimate updates.
* The evaluators, program implementers, and ComEd will have regular check-in calls to keep the evaluation team informed of any changes to program design or product availability. These calls will also include discussions of data needs, errors, omissions, etc., as well as updates on evaluation activities.
* Cumulative Persisting Annual Savings (CPAS), calculated based upon the requirements of Future Energy Jobs Act (FEJA).

The CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

* What is the level of gross annual energy (kWh) and gross peak demand (kW) savings induced by the program?
* What are the net impacts from the program? In CY2021, research into what is the level of free ridership and spillover associated with this program?
* Did the program meet its energy and demand savings goals? If not, why not?

#### Process Evaluation and Other Research Topics

There will be no process evaluation in CY2020.

### Evaluation Approach

Evaluation tasks will be conducted in 2020 through early 2021 and evaluation reporting will be concluded by April 30, 2021. Table 2 summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | April – December 2020 | Three Waves† |
| Program Management and Implementer Interviews | Program Management and Implementers | TBD | April – June 2020 | Augmented with monthly calls |
| Participant Surveys | 2020 Program Participants | Census | June 2020 – Feb 2021 | Three Waves† |
| Gross Impact | Engineering File Review | TBD | June 2020 – Feb 2021 | Three Waves† |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | Nov 2020 –  March 2021 | Deemed Value |

Note: FR = Free Ridership; SO = Spillover

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

#### Tracking System Review

At regular intervals throughout the program cycle (every three to four months), the evaluation team will review the program tracking data for application of IL TRM v8 parameters. The evaluation team will provide a memorandum of findings to ComEd at each interval. Proposed gross impact sampling timelines are shown below.

The Program Tracking Data collected for the CY2020 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).

#### Gross Impact Evaluation

The CY2020 gross impact evaluation approach will not vary from the previous years, but adjustments will be made to reflect specific measures. The evaluation will utilize the results of the PY9 NTG research and recommendations from the Illinois Stakeholder Advisory Group (SAG) for assessing net program impacts. Additional free ridership and spillover research will occur in CY2021.

***CY2020 Gross Impact Sampling Waves***

1. First wave sample drawn in April 2020 and completed June 2020
2. Second wave sample drawn in August 2020 and completed October 2020
3. Final wave drawn after January 30, 2021

After the conclusion of the program year, the evaluation will conduct a thorough review of savings calculations and calculate gross kWh, kW and Peak kW savings across all program bulbs using the following equations:

Annual kWh Savings = Program bulbs \* Delta Watts/1000 \* Annual HOU \* Installation Rate \* (1-Leakage Rate) \* Interactive Effects

Annual kW Savings = Program bulbs \* Delta Watts/1,000 \* Installation Rate \* (1-Leakage Rate) \* Interactive Effects

Annual Coincident Peak = Annual kW Savings \* Peak Load Coincidence Factor[[16]](#footnote-16) \* kW Savings

For the verification analysis in CY2020, the evaluation team will calculate gross savings using the following parameter estimates:

* **Program Bulb Sales** data will be obtained from the CY2020 Instant Discounts tracking database.
* **Program Bulb Installation Rates** (both current program year and delayed program year installations) will come from the IL TRM v8.0.
* **Delta Watts** will be calculated using the lumen-equivalence mapping in the IL TRM v8.0.
* **Non-Residential HOU and Summer Peak CF** estimates will come from the IL TRM v8.0.
* **Residential/Non-Residential Bulb Installation** estimates will come from the IL TRM v8.0.[[17]](#footnote-17)
* **Energy and Demand Interactive Effects** will be estimated using the algorithms presented in the IL TRM v8.0.

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 v8.0).
* **Residential and Non-Res Split** - Evaluation research from the year of purchase (CY2019/CY2020 Report and IL TRM v6.0/v7.0).[[18]](#footnote-18)
* **HOU and Peak CF** – Verified savings estimate from the year of installation (source: IL TRM v8.0).
* **Energy and Demand IE** – Verified savings estimate from the year of installation (source: IL TRM v8.0)
* **Installation Rate** - Verified savings estimate from the year of purchase (source: CY2019/CY2020 report and IL TRM v6.0/v7.0).
* **NTG** – Evaluation research from the year of purchase (source: CY2020/CY2019 report and SAG recommended NTG).

In 2020, we will conduct participant surveys[[19]](#footnote-19) 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 is installed in residential locations.

#### Verified Net Impact Evaluation

The verified net impact evaluation will apply the 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 CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| LED Lamp and Fixture | 0.83 |
| Linear Fluorescent | 0.67 |
| LED Exit Sign | 0.80 |
| Battery Charger | 0.80 |
| Linear LED | 0.80 |

Source: https://s3.amazonaws.com/ilsag/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Process Evaluation – Distributor, Program Manager and Implementer Interviews

No process research will occur in CY2020. Navigant will conduct process research in CY2021.

#### Program Management and Implementer Interviews

The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

Evaluation conference calls and face-to-face meetings will be conducted with the ComEd program manager and program implementation team. These calls will be focused on the status of the Instant Discounts Program, recent updates to the program, and changes likely to occur to the program in CY2020 and beyond.

#### Telephone and Web Surveys

Participant surveys in 2020 will service impact research. Impact-related questions will affect the evaluated part-use factor. Participants will be asked how their units would have been disposed of if the program had not picked them up.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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 21, 2020 |
| CY2020 program tracking data for QA/QC | ComEd | February 28, 2020 |
| CY2020 Wave 1 program tracking data for verification and sampling | ComEd | April 30, 2020 |
| CY2020 Wave 1 early impact verification memo | Evaluation | May 31, 2020 |
| CY2020 Wave 1 participating customer survey | Evaluation | July 26, 2020 |
| CY2020 Wave 2 program tracking data for verification and sampling | ComEd | August 30, 2020 |
| CY2020 Wave 2 early impact verification memo | Evaluation | September 30, 2020 |
| CY2020 Wave 2 participating customer survey | Evaluation | October 30, 2020 |
| CY2020 Program tracking data for sampling Wave 3 | ComEd | January 15, 2021 |
| CY2020 Final program tracking data for verification | Evaluation | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 6, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 27, 2021 |
| Revised Draft by Navigant | Evaluation | April 3, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 10, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 20, 2021 |

## ComEd LED Street Lighting Program CY2020 to CY2021 Evaluation Plan

### Introduction

The LED Street Lighting Program seeks to secure energy savings by replacing mercury vapor (MV) and high-pressure sodium (HPS) fixtures with light-emitting diode (LED) fixtures. The program assists municipalities with replacement upgrades to high-intensity discharge (HID) street lights, with participation open to equipment independent of ownership, municipally-owned or ComEd-owned.

The program participation goal for CY2020 is to replace over 151,600 fixtures. The target for first year gross energy savings resulting from these upgrades is 100,104 MWh; with 85 percent of the savings realized by public sector participants.

The evaluation of this program will review ComEd’s LED Street Lighting tracking data for consistency and accuracy of use of all 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 are outlined in the 2019 Illinois Statewide TRM version 8.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | 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 LED Street Lighting 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 hybrid participating customer and 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

### 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 CY2020 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, including hours of operation?

#### Process Evaluation and Other Research Topics

The evaluation team updated the NTG value for this program in CY2019. No further process or NTG evaluation is needed in CY2020.

### Evaluation Approach

The evaluation team recommends the evaluation priorities outlined in Table 1 based upon our understanding of the needs of the program and the program’s prior evaluation history. Navigant realizes that the program is relatively new and will likely change as it matures over the next two years. Navigant also notes that the current approach may change over the next two years as the program grows, but expects the following aspects of the evaluation approach will remain consistent:

* Gross and net impact analyses will be conducted each year.
* Annual program management and implementor interviews are recommended so that the evaluation team can track and respond to changes to the program design and delivery.
* NTG values for the program were assessed in 2019, and do not need further review until 2021.
* Cumulative Persistence Annual Savings (CPAS) will be calculated annually based upon the requirements of the Future Energy Jobs Act (FEJA). The CPAS calculated in any given year will remain the same once reported and is unlikely to fluctuate yearly because of the limited number and consistency of measures available through the program.

Table 2 summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | April 2020 – January 2021 | Three waves† |
| In Depth Interviews | Program Management and Implementers | 2 | June – July 2020 | Augment with monthly calls |
| Gross Impact | Engineering File Review | Census | May 2020 – February 2021 | Three Waves† |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | June 2020 –  March 2021 |  |

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

#### Tracking System Review

ComEd will upload program data on an on-going basis to the eTrack system for Navigant’s review. Navigant will review project documentation and conduct an engineering review of the initial data provided by ComEd of both municipality-owned and ComEd-owned fixtures approximately halfway through the calendar year. Navigant will then provide a memo outlining the initial program findings. The analysis will be revised with an updated data extract and Fall review. A final analysis update will occur in early 2021, once the CY2020 program data is finalized. Navigant will provide impact findings to ComEd in a memo and work with ComEd and the Illinois Stakeholder Advisory Group (SAG) to refine the memo until it has been finalized.

***Program Manager and Implementer Interviews***

In CY2020, Navigant will interview both the program manager and the program implementer. Both interviews will include similar questions and shared objective to identify opportunities for program improvement. These interviews are not a formal process evaluation, but a combination of structured time and open-ended discussion about the program objectives, successes, lessons learned, and strategy. These deep dive interviews will be further supported by bi-monthly team check-in calls that focus on annual progress to date, near-term planning, and team coordination.

#### Gross Impact Evaluation

The program key gross impact evaluation activities for CY2020 will be based on:

* Reviewing the tracking system to determine whether all fields are appropriately populated,
* Reviewing project supporting information for consistency with tracking data,
* Verifying measure totals and savings as recorded in the tracking database.

#### Verified Net Impact Evaluation

Navigant conducted NTG research for this program in 2019, with a focus on the municipally owned fixtures. This update was approved by the SAG in October of 2019 and will be applied in CY2020. For ComEd-owned fixtures, a NTG of 1.0 was previously approved by the SAG and remains applicable for CY2020.

Table 3. Deemed NTG Values for CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| ComEd-owned fixtures | 1.0 |
| Municipality-owned fixtures | 0.81 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx*

***Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings***

As required by FEJA, Navigant will report ex post gross and ex post net savings for the program as well as the CPAS generated by the program in CY2020. Additionally, Navigant will estimate average measure life for each of the unique LED fixtures in the program and generate a weighted (based on measure counts and energy savings) measure life at the program level.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

Navigant is not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### Evaluation Schedule

Table 4 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**

|  |  |  |
| --- | --- | --- |
| Deliverable | Responsible Party | Date Delivered |
| Update Program Operations Manual and Workpapers | ComEd | January 2, 2020 |
| Upload CY2020 program tracking data to eTrack | ComEd | Ongoing |
| Review initial project documentation, engineering review and memo | Evaluation | August 31, 2020 |
| ComEd to indicate when all CY2020 program tracking data has been uploaded to eTrack | ComEd | January 29, 2021 |
| Review final program savings and complete engineering review | Evaluation | February 26, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 2, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 9, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 30, 2021 |
| Revised Draft by Navigant | Evaluation | April 6, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 13, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 20, 2021 |

## ComEd Nonprofit Organizations Program CY2020 – CY2021 Evaluation Plan

### Introduction

The ComEd Nonprofit Organizations (NPO) Program aims to cost-effectively generate and capture savings from energy efficiency projects undertaken by ComEd’s nonprofit customers. The NPO Program aims to provide a single point of contact for

* Energy assessments
* Energy efficiency measure installation
* Construction oversight
* ‘Handholding’ and long term relationship building.

The measures included in the NPO Program (see Table 1) are prescriptive measures. The program approach to incentive levels and customer outreach closely mirrors the Small Business (SBO) program. The target population for the program includes churches, child care centers, transitional housing, community‑based organizations, and healthcare clinics.

To participate in the program, the ComEd customer must be a 501(c)3, located within ComEd’s service territory, with an account at least sixty days old. Elevate Energy (Elevate) is responsible for implementation of the program. Elevate engineers complete a free assessment of the customer facility and identify savings opportunities from the program measure list. Elevate then helps the participant identify installers and provides construction management oversight and inspection to ensure the measures are installed and generating savings as expected.

Table 1. NPO Program Measures by Type\*

|  |  |  |
| --- | --- | --- |
| Retrofit | Early Replacement | Direct Install |
| HVAC (VSD, advanced controls, thermostats, tune-up) | Chillers, AC units, Heat Pumps |  |
| Refrigeration (automatic door closers) |  | Vending machine controls |
| Lighting Measures (LED fixtures, DE lamping of fluorescent fixtures) |  | Screw based LEDs |

\* The measures noted in program documentation received to date from Elevate Energy. The program measures may change.

ComEd’s net savings planning target is 3,300 MWh net for CY2020.

The CY2020 gross impact evaluation will include a variety of data collection and analysis activities, including those indicated in Table 2.

Table 2. Evaluation Approaches

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System and Data Flow Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Project Level Desk Reviews including Deemed Savings Review | X | X |
| Impact – Project Level Site Visits and Installation Verification | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Impact – Gross and Net Savings Verification | X | X |

*Source: Navigant*

#### Coordination

The NPO Program is not offered jointly with the gas companies, and there is no similar offering for Ameren Illinois. The evaluation team does not anticipate cross utility coordination for the NPO Program Evaluation.

### Evaluation Research Topics

The evaluation in CY2020 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 based on the deemed NTG value for NPO?
3. Did the program meet its energy and demand savings targets? If not, why?
4. Are project baselines properly determined? If not, why not and what guidance can the evaluation team provide for future project?
5. What changes (if any) to the assessment process would improve accuracy of savings estimates?
6. Are interactions between measures properly determined per the TRM?
7. What updates (if any) are recommended for the Illinois Technical Reference Manual (TRM)?

**Process Evaluation and Other Research Topics**

Navigant will conduct process research in CY2020 based on program manager and implementation contractor interviews and review of the program data flowcharts. In addition, we will conduct participant interviews to determine program satisfaction, any issues participants had with the program and other important questions – this will be done via internet-based surveys.

### Evaluation Approach

This evaluation plan identifies tasks on a preliminary basis for CY2020 – CY2021 (Table 3). Activities are subject to change as program circumstances are better known.

For CY2020 – CY2021, the primary method to determine gross savings will be detailed project reviews of a random sample of completed projects. A program-level net-to-gross (NTG) ratio, deemed through consensus by the Illinois Stakeholder Advisory Group (IL SAG), will be applied to the program’s verified gross savings to determine net savings.

The table below summarizes the evaluation tasks for CY2020 – CY2021.

Table 3. Evaluation Plan Summary

|  |  |  |
| --- | --- | --- |
| Activity | CY2020 | CY2021 |
| Gross Impact Approach | Tracking System Review  Project-Level Desk Reviews including Measure‑Level Savings Review  Project-Level Installation Verification Site Visits | Tracking System Review  Project-Level Desk Reviews including Measure‑Level Savings Review  Project-Level Installation Verification Site Visits |
| Verified Net Impact Approach | Deemed Value | Deemed Value |
| Program Manager and Implementer Interviews/ Review Materials | Yes | Yes |

*Source: Navigant*

Table 4 summarizes the proposed data collection activities for CY2020, including the sample sizes and timing of each activity. During CY2020 Navigant will develop a sample design upon receipt of the first wave of project tracking data. Navigant will modify the CY2020 sample size targets in late CY2020 and after the final data wave in early CY2021 as warranted by program participation.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2019 | Timeline | Notes |
| Tracking System and Data Flow Review | Tracking system | Census | Wave 1\* and Final data | Two Waves |
| Project-Level Desk Reviews including Measure-Level Savings Review | Tracking System and Project Files | Census | Wave 1\* and Final data | Two Waves |
| Project-Level Installation Verification Site Visits – random sub‑sample | Customer Facilities | TBD after receipt of Wave 1 extract | August 2020 – February 2021 | Installation verification site visits will only be the largest, highest uncertainty projects as needed to satisfy the requirements of the IPMVP† |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2021 |  |

\* Navigant will coordinate with ComEd to determine appropriate dates to pull tracking Wave 1 data extract.

† IPMVP = International Performance Measurement and Verification Protocol

*Source: Navigant*

In line with program changes and an accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform a tracking system review in two waves during 2020.

#### Gross Impact Evaluation

The NPO program includes savings from standard lighting, HVAC, and refrigeration measures in the Illinois Technical Reference Manual (TRM). A majority of pipeline savings for CY2020 is expected to be lighting. Therefore, the evaluation team will initially adopt a prescriptive impact evaluation approach that includes installation verification site visits for a sub‑sample of projects to reduce uncertainty in the projects with the largest contribution to program savings, as required by the IPMVP.

The evaluation team will:

* Perform measure-level reviews to assess the validity of the various tools and approaches the program uses to quantify savings.
* Ensure savings follow the methodology outlined for the appropriate measure in the IL TRM.

The specific gross impact evaluation activities are as follows:

1. Develop a stratified random sample of completed projects
2. For each project the evaluation team will:
   1. Review all savings calculations and compare analysis inputs to project-specific conditions,[[20]](#footnote-20) such as building weather location, hours of operation, project type and associated baseline determination,[[21]](#footnote-21) project‑specific baseline conditions.
   2. Adjust analyses to site‑specific conditions as appropriate.
   3. Examine interactive effects between measures to ensure they are properly quantified.
   4. For projects receiving a site visit, the evaluation team may additionally collect operational information from the customer’s energy management system.

#### Verified Net Impact Evaluation

The verified net impact evaluation will apply a program-level NTG ratio of 0.97 deemed through consensus by the IL SAG.

Table 5. Deemed NTG Values for CY2019

|  |  |
| --- | --- |
| Program Measure | CY2019 Deemed NTG Value |
| Nonprofit Organization | 0.97 |

*Source: IL SAG ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx*

#### Calculation of CPAS and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated, if possible. The evaluation team will also add the savings converted from gas savings to the electric savings so that it’s documented in the report. Navigant will follow reporting rules for the Nonprofit Organizations program based on the measure types implemented for CY2020.

#### Process Evaluation

Navigant will perform process evaluation activities such as in depth telephone interviews with program managers and implementation contractors to allow the program to ramp up in CY2020. The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

Navigant is not using QED consumption data because this program contains many unique measures with significant cross-participation. In this case, QED consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### Evaluation Schedule

Table 6 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 | ComEd | May 29, 2020 |
| CY2020 program tracking data for sampling Wave 1 | ComEd | July 1, 2020 |
| Tracking System Wave 1 Ex Ante Preliminary Review Findings and Recommendations | Evaluation | September 30, 2020 |
| Fieldwork (installation verification only, no metering) | Evaluation | October 2020 |
| CY2020 final program tracking data | ComEd | January 30, 2021 |
| Internal Impact Report Draft by Navigant | Evaluation | February 15, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 6, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 27, 2021 |
| Revised Draft by Navigant | Evaluation | April 3, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 10, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 21, 2021 |

## ComEd Non-Residential New Construction Program CY2020 to CY2021 Evaluation Plan

### Introduction

This plan covers CY2020 to CY2021 for the Non-Residential New Construction Program. CY2020 (January 1, 2020 to December 31, 2020) is the 12th program year of ComEd’s energy efficiency savings portfolio and the ninth program year for energy efficiency gas savings. The Non-Residential New Construction Program is coordinated between ComEd, Nicor Gas, Peoples Gas and North Shore Gas Companies. Slipstream implements the program for ComEd, Nicor Gas, Peoples Gas, and North Shore Gas.

The CY2020 program will not change significantly from CY2019. The program has continued to develop and offer different program tracks to tailor program support to specific business segments. In the Best Practices track, program administrators will offer participants a set incentive per square foot for incorporating pre-selected packages of measures. The measures and incentives offered are tailored by business segment to meet the needs of those customers.

This evaluation plan reflects evaluation approaches designed for the unique characteristics of this program. The evaluation approaches have been developed through discussions between the implementation and evaluation teams as well as ComEd 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 CY2020.

The CY2020 gross impact evaluation will not vary substantially from the previous years and will be based on engineering desk reviews. The evaluation team will use the same general evaluation approach for all tracks of the program, including the public sector projects, but will account for the variations in the tracks (e.g., Expedited Assistance, Best Practices) and program offerings as needed. To the extent there are a sufficient number of projects to be meaningful, we will present results for each track as well as overall results for the program.

Given that net-to-gross (NTG) research was conducted in CY2019 and is planned for CY2021 the Navigant team will not be conducting NTG research in CY2020.

Table 1. Evaluation Approaches – Two Year Plan

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

Given that the program includes very large custom projects and that the program plans to roll out several new initiatives to better serve specific customer groups, we plan to conduct impact research activities - annually. This approach will ensure that any year-to-year variations due to individual projects will not affect future years.

#### Coordination

In this plan, Navigant outlines the evaluation objectives and activities for the program and how results pertain to each utility. The impact evaluation work will be fuel-specific: the electric impact evaluation will focus on a sample of projects with electric savings, while the gas impact evaluation will focus on a sample of projects claiming gas savings.

The evaluation activities and timing for each utility evaluation are the same, as this is one evaluation for all utilities. Participant interviews are done without respect to the associated gas utility. The team will work with the program implementer to determine if the differences in measures and buildings by gas service territory warrant updating the sampling strategy to support utility-specific realization rates. If not, sampling for desk reviews will be done without respect to the associated gas utility. NTG ratios are deemed prospectively with separate NTG values for electric and for gas. Beyond these points, the ComEd evaluation team will coordinate with the gas utilities on any relevant evaluation issues as needed.

### Evaluation Research Topics

The CY2020 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 (first year and lifetime)?
3. Did the program meet its energy and demand savings targets? If not, why?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Notes |
| Tracking System Review | Internal Tracking System | Entire System | Completed by January 30th each year |
| In-Depth Interviews | Program Management and Implementers | 2 | Augment with monthly calls |
| Material Review | Literature review, secondary research, program materials | n/a | Inform primary data collection activities |
| Gross Impact Evaluation | Early Feedback File Review | 5 | Early Feedback for Large Projects, As Needed |
| Gross Impact Evaluation | Engineering Desk Review | 30† | Two Waves† |
| Verified Net Impact Evaluation | Calculation using deemed NTG ratio | n/a |  |

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

#### Tracking System Review

Navigant will perform tracking system review in waves in CY2020, as well as reviewing the final tracking data. The Wave 1 of M&V sampling is expected to cover about half of the projects, depending on the expected distribution of CY2020 completed projects over the year.

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is consistent with the program’s data in eTRACK. This latter task will become increasingly important as eTRACK undergoes development and more closely reflects the tracking data Navigant receives.

Navigant will perform tracking system review and M&V project sampling in waves in 2020. The first wave of M&V sampling is expected to cover about one-half of the projects.

Proposed gross impact sampling timelines are shown below.

CY2020 Gross Impact Sampling Waves

* First wave sample drawn in June 2020 and completed September 2020
* Final (second) wave by January 30, 2021 or upon the completion of all CY2020 projects

#### Gross Impact Evaluation

The evaluation team will conduct gross savings research using building energy simulation models on a sample of approximately 30 projects to determine CY2020 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, any resulting changes to the building energy simulation model because of ex post review, and the net effect on the electric and therm savings relative to ex ante claimed savings.

Per the program design, the baseline for all projects typically will be based on the applicable Illinois Energy Conservation Code for Commercial Buildings. Determination of the applicable code version will be subject to requirements, if any, of the ICC approved version of the *Illinois Energy Efficiency Policy Manual* in place at the time of a project’s application to the program. At the time of drafting this plan, the policy will likely be for evaluation to estimate savings using the code in effect at the time of the issuance of the construction permit.

All projects accepted under the guidance of *Illinois Energy Efficiency Policy Manual Version 1.1* (or earlier versions), will continue the practice of using a project’s application date to determine which version of the Illinois Energy Conservation Code is the most appropriate to use as baseline. The Illinois Energy Conservation Code for Commercial Buildings references the *International Energy Conservation Code* (IECC), which also allows for use of *ASHRAE Standard 90.1* as an alternate compliance method.

The evaluation team will also calculate interactive effects 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 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 if the evaluation determines that the appropriate baseline is more efficient than what was assumed in the ex-ante savings calculations. To anticipate and reduce the incidence of such cases, a review of the baseline by the evaluation team prior to incentive commitment may be appropriate. 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 from the standpoint of updating ex ante savings claims but may serve to reduce downward savings adjustments in the ex post 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 has electric savings or received a gas incentive.[[22]](#footnote-23) 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.[[23]](#footnote-24)

Table 3. 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 two waves in CY2020. The first wave of M&V sampling is expected to cover about one-half of projects completed in CY2020.

#### Verified Net Impact Evaluation

The evaluation team will apply the NTG ratio(s) approved by the SAG to the estimate of evaluation-verified gross savings to compute verified net savings. Separate estimates will be made for electric and gas savings.

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

|  |  |
| --- | --- |
| Utility | CY2020 Deemed NTG Value |
| ComEd (MW and MWh) | 0.59 |
| Gas Utilities (therms) | 0.58 |

Source: <http://ilsagfiles.org/SAG_files/NTG/2020_NTG_Meetings/Final_NTG_Ratios/ComEd_NTG_History_and_CY2020_Recs_Final_2019-10-01.xlsx>

<http://ilsagfiles.org/SAG_files/NTG/2020_NTG_Meetings/Final_NTG_Ratios/Nicor_Gas_NTG_History_and_2020_Values_2019-10-01_Final.xlsx>

#### Program Management and Implementer Interviews

The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Calculation of Cumulative Persisting Annual Savings (CPAs) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be provided.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

The evaluation team will not use the Randomized Control Trials (RCT) or Quasi-Experimental Design for process evaluation because:

* There are not enough participants in this program to achieve statistically significant savings estimates using this method.
* It would not be possible to create a valid matched control group for the customers in this program.
* This method would estimate average savings across all program participants which is not the desired savings estimate for this program

### 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.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2020 program tracking data for sampling Wave 1 | ComEd | June 3, 2020 |
| Wave 1 engineering desk reviews | Evaluation | September 30, 2020 |
| CY2020 program tracking data for sampling Wave 2 | ComEd | January 30, 2021 |
| Wave 2 engineering desk reviews | Evaluation | February 28, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 6, 2021 |
| Draft Report to ComEd, Gas Utilities, and SAG | Evaluation | March 13, 2021 |
| Comments on draft (15 Business Days) | ComEd, Gas Utilities, and SAG | April 3, 2021 |
| Revised Draft by Navigant | Evaluation | April 10, 2021 |
| Comments on redraft (5 Business Days) | ComEd, Gas Utilities, and SAG | April 17, 2021 |
| Final Report to ComEd, Gas Utilities, and SAG | Evaluation | April 27, 2021 |

## ComEd Operational Efficiency Program CY2020 to CY2021 Evaluation Plan

### Introduction

Navigant anticipates the following evaluation activities will occur over the CY2020-2021 period:

* Gross savings will be calculated through a detailed desk review of the sampled projects.
* 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 program CY2020 NTG ratio is 0.94.
* Any resulting changes to savings will be rolled up to the sample and a program level realization rate will be calculated.
* We tentatively plan to conduct NTG research in 2021.
* Assist the ComEd OEP team as it revises and implements improved program calculators.

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 CY2020.

The evaluation of this program over the coming two years will include a variety of data collection and analysis activities, including those indicated in the following table. Due to reduced budget, evaluation will have reduced impact sample sizes, no NTG research and there will be no participant interviews during the 2020 evaluation.

Table1. CY2020-2021 Evaluation Plan Summary

|  |  |  |
| --- | --- | --- |
| Activity | CY2020 | CY2021 |
| Gross Impact Approach | X | X |
| Gross Sampling Frequency | X | X |
| Verified Net Impact Approach | X | X |
| Researched NTG Approach |  | X |
| Program Manager and Implementer Interviews/ Review Materials | X | X |
| Participant Interviews |  | X |
| Effective Useful Life Determination | X | X |
| Process Evaluation | 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 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 hybrid participating customer 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 for a 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 CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What are the actual achieved ex post energy savings in this program?
2. How did the achieved savings compare to the ex-ante estimates?

#### Process Evaluation and Other Research Topics

Process evaluation is needed in 2020 since the program is still under development and undergoing internal ComEd changes and integration. Navigant will conduct process research to provide needed program structure and market information to ComEd to assist the program in its growth and management. Also, Navigant will be conducting NTG research in 2021 and the process research will be done along with the NTG survey research and the incremental cost for process is small. Key process questions are:

1. How is measure information collected during and after the initial assessment? In what ways could this process be improved?
2. How is the collected information used within the calculators created for the program? In what ways could this process be improved?
3. Is there a need to market this program or could this program be used in the marketing of the other programs (e.g., marketing the facility assessments offering)?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline |
| Tracking System Review | Tracking system | Census | Jan-Feb 2021 |
| In Depth Interviews | Program Management, Implementers and Participant | 2 | Feb-April 2021 |
| Gross Impact | Engineering File Review | \* | April 2018 – Sept 2018 |

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

For CY2020, Navigant will complete 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 needs of the program, Navigant may review a sample of projects in 2020, but the size of this sample will be determined later.

#### Tracking System Review

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is consistent with the program’s data in eTRACK.

#### 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 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. For CY2018 that ratio was 0.94.[[24]](#footnote-25) Over the course of 2018 we examined the program theory and evaluation approach to inform discussions in the fall Illinois Stakeholder Advisory Group (SAG) net-to-gross (NTG) deliberations about the need for doing free ridership surveys with OEP participants in future years.

**Table 3. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| OEP Program | 0.94 |

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

#### Program Management and Implementer Interviews

Process analysis will be conducted in conjunction with the impact analysis. Program structure comments will be provided, as has been done in each of the previous evaluation years, by the impact team and documented in the report. The CY2020 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff interviews. Interviews will focus on progress to goals, identifying program successes and challenges, identifying drivers of those successes and challenges, and marketing tactics.

#### Research NTG Impact Evaluation

Navigant does not plan to conduct NTG research in CY2020 or CY2021.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated for each measure, along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated. Evaluation will also add the savings converted from gas savings to the electric savings so that it is documented in the report.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

The evaluation team will not evaluate this program via a randomized controlled trial (RCT) because the program was not designed with randomly assigned treatment and control groups.

The evaluation will not use quasi-experimental design (QED) because there are not enough participants for individual measures in this program to achieve statistically significant savings estimates.

### Evaluation Schedule

Table 3 below provides the schedule for key deliverables and data transfer activities for 2020. Process analysis will be completed after the April 30th impact date and will be reported in a timely manner by the 4th quarter.

**Table 4. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered |
| CY2019 Site Calculations are available to Navigant | ComEd | Q4/Q1 2020/2021 |
| Sample of sites determined and approved | Evaluation | Q4/Q1 2020/2021 |
| Project review | Evaluation | Q4/Q1 2020/2021 |
| Program manager interview | Evaluation | Q1 2021 |
| Internal Navigant Draft Report Review | Evaluation | March 5, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 14, 2021 |
| Comments on Draft (15 Business Days) | ComEd | April 6, 2021 |
| Navigant Redraft of Report | Evaluation | April 13, 2021 |
| Comments on Redraft (5 Business Days) | ComEd | April 20, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 27, 2021 |

## ComEd Public Buildings in Distressed Communities Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Public Buildings in Distressed Communities Program seeks to secure energy savings through support of HVAC and lighting retrofits in public sector buildings in distressed communities. Distressed communities are defined based on information provided by the Illinois Department of Commerce and Economic Opportunity (DCEO), Economic Innovation Group, and Elevate Energy.. This eligibility extends throughout the ComEd territory as determined though qualifying municipalities, zip codes, and census tracts.

Examples of market segments expected to participate in this program include:

* Schools
* Police Departments
* Fire Departments
* City & County offices
* State & federal buildings located within the distressed community

Measures offered will primarily target lighting and HVAC end-uses, with the program covering a portion of the retrofit and installation cost. Responsibility for installation activities is dependent on the measure type. Lighting projects are managed by the participant; with equipment installed using internal staff, or with the support of a contractor. HVAC measures can be customer installed or with all work completed by contractor. If self-installed, HVAC projects require the program implementer to conduct a preliminary evaluation and post-install verification.

This was a new program in CY2019 with a 2019 target of 1 GWh of net electric energy savings. With expected ramping-up of savings to approximately 19.5 GWh by 2021. At the time of Navigant’s introduction to the program plan, a project count goal was not specified.

The evaluation will assess ComEd’s Public Buildings in Distressed Communities Program tracking data to ensure:

* Sufficient data is collected to enable reporting and evaluation
* Savings and inputs are applied correctly
* The impacts are calculated correctly according to the Illinois Technical Resource Manual (IL TRM)

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

Table : Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Process – Participant surveys and Implementer interviews | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Engineering Review | X | X |
| Impact – Verification of Gross and Net Impacts | X | X |
| Impact – Verification and Gross Realization Rate | X | X |

#### Coordination

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program. The program team is in close coordination with Ameren, which has an “Instant Incentives” program that also provides discounts at the point of sale through commercial lighting distributors. In CY2020, the ComEd and Ameren lighting program evaluations will continue to be closely aligned with respect to data collection activities and analysis methods.

### Evaluation Research Topics

The primary objectives of the evaluation of the Public Buildings in Distressed Communities Program are to: (1) quantify gross and net savings impacts from the program, and (2) 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?

#### Process Evaluation and Other Research Topics

The evaluation team will conduct a process evaluation for the program in CY2020 and CY2021, if warranted. Navigant will conduct implementer interviews and deploy web-based participant surveys to those involved in the program.

### Evaluation Approach

The evaluation approach for the 2020-2021 period is outlined in Table 1. The evaluation team realizes that the program is young and will likely change as it matures over the next two years and will adjust the plan as needed as time goes along. The current evaluation approach includes:

* Gross and net impact analyses will be conducted each year
* Cumulative Persistence Annual Savings (CPAS) will be calculated annually based upon the requirements of Future Energy Jobs Act (FEJA)

Table 2 summarizes the evaluation tasks for CY2020 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions. NTG will not be researched in CY2020.

**Table 6. Core Data Collection Activities, Sample, and Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves† |  |
| PM and IC Interviews | Program Management and Implementers | 2 | May-June 2020 | Augment with quarterly status meetings |
| Process Web Surveys | Participants | Census | Jan-June 2021 |  |
| Program Status Meetings | Program Management and Implementers | 4 | 2020 | Quarterly calls to facilitate awareness of program progress |
| Gross Impact | Engineering File Review‡ | Census | Sept 220 – Feb 2021 | Two Waves† |
| Verified Net Impact | Net Savings Calculation | NA | March 2021 | NTG ratio provided in Table 3 |

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

#### Tracking System Review

Navigant will perform tracking system review in waves in CY2020, as well as reviewing the final tracking data. The Wave 1 of M&V sampling is expected to cover about half of the projects.

***Program Management and Implementer Interviews***

#### The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Gross Impact Evaluation

The program key gross impact evaluation activities for CY2020 will be based on (1) reviewing the tracking system to determine whether all fields are appropriately populated, (2) ensuring that TRM inputs are correctly applied, (3) cross-checking measure totals and savings recorded in the tracking database, and (4) checking for outliers.

#### Verified Net Impact Evaluation

The evaluation team will not research NTG in CY2020. Evaluation will apply the net-to-gross (NTG) ratios approved by the Stakeholder Advisory Group (SAG) on October 1, 2019 to the estimate of evaluation-verified gross savings to compute verified net savings. These NTG values are provided in Table .

Table 7. NTG Values for CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020  NTG Value |
| All measures | 0.97 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### Evaluation Schedule

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 8. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | November 2019 –  January 24, 2020 |
| CY2020 Program Tracking Data for Tracking System Review | ComEd | June 1, 2020 |
| CY2020 Wave 1 program tracking data and supporting documentation for individual projects | ComEd | July 1, 2020 |
| Wave 1 project documentation, engineering review and memo | Evaluation | August 31, 2020 |
| CY2020 program tracking data | ComEd | January 29, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 1, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 26, 2021 |
| Revised Draft by Navigant | Evaluation | April 2, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 9, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 16, 2021 |
| Draft Process Memo | Evaluation | July 15, 2021 |
| Final Process Memo | Evaluation | August 30, 2021 |

## ComEd Public Small Facilities Program CY2020 Evaluation Plan

### Introduction

The Public Small Facilities (PSF) Program is designed to assist qualified ComEd public sector non-residential customers[[25]](#footnote-26) to achieve electric energy savings by educating them about energy efficiency opportunities through no-cost on-site energy assessments conducted by preapproved, specially-trained Energy Efficiency Service Providers (EESPs).[[26]](#footnote-27) EESPs are the primary means of promoting the Public Small Facilities Program and obtaining participants.

Willdan Energy Solutions is the implementation contractor for the Public Small Facilities Program.

The PSF CY2020 measure mix will include lighting, compressed air and HVAC end-use measures. The HVAC measures are new to the PSF program.[[27]](#footnote-28)

The primary objectives of the CY2020 evaluation of the PSF Program will be to: (1) quantify the gross and net savings impacts of the program; and (2) investigate potential gas savings counted as kWh (therms conversion).

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

Table 1. Evaluation Approaches – Two Year Plan

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

The evaluation team determined the evaluation approach for the CY2020-2021 period based upon the needs of the program and the program’s history. The two-year evaluation approach for this program is based on the following:

* Gross and net impact analysis will be conducted each year
* Optimized timing on when to conduct net-to-gross (NTG) research
* Cumulative Persisting Annual Savings (CPAS) will be calculated based upon the requirements of the Future Energy Jobs Act (FEJA) [[28]](#footnote-29)

#### Coordination

Ameren Illinois does not currently have a program analogous to ComEd’s PSF Program, and instead will serve small public-sector customers through their existing Small Business Program. Navigant will coordinate with the Ameren Illinois Small Business Program evaluation team on data collection, analytical methods, and survey instrument design to ensure consistency in our evaluation approaches for small public-sector facilities.

**Evaluation Research Topics**

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

#### Impact Evaluation

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

#### Process Evaluation

There will be no process evaluation in 2020.

**Evaluation Approach**

Table 2 summarizes the evaluation tasks for CY2020 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 CY2020 (approx.) | Notes |
| Tracking System Review | Tracking system | Census |  |
| Gross Impact | Early Feedback File Review | Census | Two to Three Waves\* |
| Gross Impact | Engineering File Review | 10 | Early Feedback for Sampled Projects (One Wave) |
| Verified Net Impact | Calculation using deemed NTG ratio | Census |  |
| NTG Research | Participants Surveys and EESP Interviews |  | Free ridership and Spillover research |
|  |  |  |  |

\* 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 EESPs to achieve statistically significant NTG results.

Navigant will perform tracking system review and engineering file reviews on a sample of participant projects in two to three waves in CY2020. Navigant will use the SAG approved net-to-gross ratios for CY2020 to calculate program net savings in CY2020.

#### Gross Impact Evaluation

Since most PSF Program savings are derived from deemed values contained in the TRM, gross savings will 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’s workpapers and savings calculators 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 projects to verify participation, installed measure quantities, and associated savings. Findings from the impact analysis will be reviewed to provide an opportunity for improving the tracking system and data collection.

Proposed CY2020 gross impact and sampling timelines are shown below 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 PSF Program project to quantify participating customer free-ridership and spillover, and trade ally free ridership and spillover.
4. Attend 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 evaluation.
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 NTG ratio accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program (Table 3).

Table 3. Deemed NTG Values for CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Small Public Facilities (all public-sector measures) | 0.97 |

*Source:* [*http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_ Recs\_2019-10-01.pdf*](http://ilsagfiles.org/SAG_files/NTG/2020_NTG_Meetings/Final_NTG_Ratios/ComEd_NTG_History_and_CY2020_%20Recs_2019-10-01.pdf)

#### Research NTG Impact Evaluation

Navigant will conduct a participating customer NTG study in CY2020 to provide NTG values for potential deeming in future program years through surveys with CY2019 participating customers. We will complete computer assisted telephone (CATI) surveys of CY2019 participants to quantify participant free ridership. The spillover research will be conducted in CY2021 of participants implementing projects 12-24 months prior to allow time for spillover to develop. We will interview participating EESPs to quantify free ridership and spillover, and triangulate the results with customer participant results, to estimate program level NTG. The samples will be designed to achieve a 90/10 confidence/precision level of NTG ratios. .

#### Calculation of CPAS and Annual Savings

As required by FEJA, Navigant will report ex post gross and ex post net savings for the program and the CPAS in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated. Evaluation will also calculate gas savings from the program.

#### Use of Randomized Control Trial and Quasi-Experimental Design

Navigant is not evaluating the PSF Program via a randomized controlled trial (RCT) because the program was not designed with randomly assigned treatment and control groups. Navigant is not using quasi-experimental consumption data (QED) for the following reasons.

* It would not be possible to create a valid matched control group for the customers in this program.
* This method would estimate average savings across all program participants which is not the desired savings estimate for this program.
* This program delivers a unique mix of program measures to each participating customer. At best, a quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for all analysis.

### Evaluation Schedule

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

Table 4. Schedule – Key Impact Deadlines

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered\* |
| Monthly Evaluation Calls | ComEd/Navigant & IC Staff | Every six weeks as needed |
| Program Operations Manual and Workpapers/Workbook Review | ComEd/Nexant | October – December 2019 |
| CY2019 Wave 1 Tracking Data | ComEd | July 30, 2020 |
| Early impacts findings memo | Evaluation Team | August 30, 2020 |
| Sample Projects Documentation for Review | ComEd | September 30, 2020 |
| Wave 2 and Final CY2019 Tracking Data to Navigant | ComEd | January 30, 2021 |
| Internal Impact Report Draft by Navigant | Evaluation Team | March 5, 2021 |
| Draft Impact Report to ComEd and SAG | Evaluation Team | March 12, 2021 |
| Comments on draft (15 Bus. Days) | ComEd / SAG | April 2, 2021 |
| Revised Impact Draft by Navigant | Evaluation Team | April 9, 2021 |
| Comments on Impact Redraft (5 Bus. Days) | ComEd / SAG | April 16, 2021 |
| Final Impact Report to ComEd and SAG | Evaluation Team | April 23, 2021 |
| Draft NTG Memo to ComEd and SAG | Evaluation Team | June 12, 2021 |
| Comments on NTG Memo draft (15 Bus. Days) | ComEd / SAG | July 3, 2021 |
| Revised NTG Memo Draft by Navigant | Evaluation Team | July 24, 2021 |
| Comments on NTG Memo Redraft (5 Bus. Days) | ComEd / SAG | July 31, 2021 |
| Final NTG Memo to ComEd and SAG | Evaluation Team | August 14, 2021 |

## ComEd Coordinated Utility Retro-Commissioning Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Coordinated Utility Retro-Commissioning (RCx) Program seeks to realize energy savings by restoring building HVAC systems and optimizing controls to meet the needs of the current building occupants. RCx is a study-based process that generates savings through improved understanding and operation of the existing equipment, rather than capital outlays to install new equipment.

The RCx Program is managed by ComEd. ComEd coordinates with Nicor Gas, Peoples Gas and North Shore Gas to account for gas savings generated through the program. The RCx 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). Beginning in CY2018 public sector customers could participate in any of the RCx offerings from the utilities.

There are four RCx Program options to optimize energy performance:

* Traditional RCx represents the original offering for large commercial buildings and completes a four-phase RCx process (Planning, Investigation, Implementation, and Verification). Projects are unique, and savings are determined using program standard and custom calculations developed by service providers and implementation contractors with input from the evaluators.
* Monitoring-Based Commissioning (MBCx) is a long-term engagement between the Energy Efficiency service provider (EESP) 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 and documentation of deeper energy saving opportunities than those 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.
* Retro-Commissioning Express (RCxpress) is an offering targeted to mid-sized commercial buildings or buildings interested in a shorter project timeline. RCxpress uses program-standard calculators in addition to custom calculations for savings estimates.
* RCx Building Tune-Up (Tune-Up) is for customers less than about 150,000 ft2 but with more than 100 kW of peak demand. This offering offers an implementation incentive in addition to the RCx study incentive provided in the other offerings.

Navigant anticipates that the evaluation will pursue the following research areas for CY2020 to CY2021. Due to reduced budget, evaluation will not conduct process evaluation and impact sample sizes will be reduced in 2020.

Table 1. Evaluation Approaches – Two Year Plan

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

The evaluation team determined the evaluation approach for the CY2020-2021 period based upon the needs of the program and program’s prior history. The two-year evaluation approach for this program is based on the following:

* RCx measures are custom to respective applications and often use custom calculation tools to estimate savings. As a result, we will continue to review and estimate gross and net impacts each year over CY2020-2021.
* Cumulative Persistent Annual Savings (CPAS) will be calculated based upon the requirements of the Future Energy Jobs Act (FEJA).
* Following the pattern from past evaluations, Navigant will conduct Net-to-Gross (NTG) research in alternate years. NTG research with participants and EESPs will conform to statewide NTG methodologies described in the Illinois Technical Reference Manual.

The primary objectives of the CY2020 RCx evaluation is: (1) to quantify net savings impacts in therms, kWh, and kW from the program during CY2020 and identify any systemic problems with calculators; (2) to update net-to-gross for program offerings for both gas and electric savings; and (3) in CY2021 to determine key process-related program strengths and weaknesses and identify ways in which the program offering(s) can be improved. The process evaluation will include input from program management and the experiences of active EESPs and participants.

#### Coordination

Navigant will coordinate with the Ameren Illinois (AIC) evaluation team on any issues relevant to this program. The teams have worked in parallel over many years and the methods used in both evaluations are specified by the Illinois TRM and are generally consistent. Depending on the number of completed projects the AIC impact analysis may include a sample or census of participants.

**Gas savings.** A collaborative agreement between ComEd and the gas utilities promotes estimating complementary gas savings at ComEd customer sites for all RCx offerings. The RCx Program evaluation plan parallels the planned work for the AIC RCx Program.

### Evaluation Research Topics

The CY2020 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 (first year and lifetime)?
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?

#### Process Evaluation and Other Research Topics

Navigant will conduct process research for the program in CY2021. Navigant will consult with ComEd program leads on focused, key process questions to be answered to help improve and inform the program.

1. What are the strengths and weaknesses of the program? How can the program be improved?
2. 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?
3. How satisfied are participating customers?
4. Is the program outreach to customers effective at increasing awareness of the program?
5. Is the program incentive level sufficient to encourage participation such that net savings targets are attained?

### Evaluation Approach

Due to the custom analysis for each RCx project, we anticipate continuing to conduct impact research 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. In some cases, Navigant may opt to use regression methods with meter data (IPMVP – Option C) for Tune-Ups or select measures in other offerings which would be apparent on meter data seasonally or during select hours of the day.

Table 2 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 CY2020 participation will be similar to CY2019 participation. Participation by gas utility customers is unknown at the time of this Plan. The number of gas participants spread across three utilities may necessitate a near-census sampling of gas participants.

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

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Notes |
| Tracking System Review | Tracking system | Census | Quarterly |
|  |  |  |  |
| Service Provider NTG Interviews\* | Active retro-commissioning service providers (EESP) | 10 | Census sample frame |
| Participant NTG Interviews | 2020 Program Participants | 40 | Census sample frame |
| Gross Impact Evaluation | Engineering File Review | 50 | Quarterly† |
| Gross Impact Evaluation | On-site M&V | TBDǂ |  |
| Verified Net Impact Evaluation | Calculation using deemed NTG ratio | Census |  |

\* 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.

† Trade ally surveys are triggered by high importance ratings by participating customers to the trade ally or vendor.

ǂ Navigant will limit on‑site M&V on a case by case basis to reduce uncertainty for only the highest‑impact projects. Navigant expects most or all of the projects to be verified using a combination of electric and gas billing data, additional trend data requested from the customer, and telephone verification of key inputs by the customer. This approach is not expected to impact the final realization rates, however may limit the amount of site‑specific feedback available to ComEd to explain the realization rates.

#### Tracking System Review

In line with changes to the RCx offerings and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review and M&V project sampling approximately quarterly in 2020. Initial feedback on sampled project files will occur within 45 days of their posting as outlined in the “*CY2020 Gross Impact Research Waves”* section below. Navigant will report periodic preliminary evaluated impact findings.

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is consistent with the program’s data in eTRACK. This latter task will become increasingly important as eTRACK undergoes development and more closely reflects the tracking data Navigant receives.

#### Gross Impact Evaluation

The CY2020 gross impact evaluation sampling plan may be adjusted to reflect ComEd’s research goals.

***Sampling Strategy***

Our overarching goal is to research savings impacts sufficiently to report program-level savings at ±10% precision and 90% confidence for each utility. We will also accommodate secondary research objectives, such as analysis by offering and/or sector level (public vs. private) as requested by ComEd, but with relaxed precision and confidence,[[29]](#footnote-30) to fit research within budget constraints and as permitted by ComEd. The default strata will be defined by project size, offering type, and fuel type.

The impact research sample will be drawn quarterly based on the projects labeled ‘Final Wrap Up’ or ‘Complete’ in the Ops Report provided by the implementation contractor. After program ex ante results are final, the progressive quarterly sample will be compared to the year-end program participation and savings, and Navigant will adjust the sample to comply with sampling goals.

***CY2020 Gross Impact Research Waves***

Navigant will perform tracking system review and M&V project review quarterly in CY2020.

All sampled projects will be subject to engineering file review.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.

Wherever possible, ex post savings may be 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. 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.

Proposed gross impact timeline:

1. Navigant will communicate preliminary realization rates within four weeks of receiving all necessary project folders and tracking data for projects sampled quarterly that do not require a site visit.[[30]](#footnote-31)
2. Navigant will communicate results for projects requiring a Navigant site visit as soon as the site visit is complete and all data has been collected and analyzed.
3. Final analyses will be posted in March of 2021.

Retro‑commissioning program measures are not covered by the Illinois TRM, and are all non-deemed measures subject to retrospective per unit savings adjustment of custom variables. The non-deemed measure type dictates the savings verification approach. Navigant methods include (1) Savings Verification: an engineering analysis of savings using document review, telephone interview with participating customers, and supplemental data requests, and (2) Evaluation Research Savings Estimate: an independent research estimate of gross savings based entirely on site-collected data where necessary. The two methods are further described below:

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.

Evaluation Research Savings Estimate

* The evaluation may 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 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 program savings overall.

#### Verified Net Impact Evaluation

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

Table 3. Deemed NTG Values for CY2020

|  |  |
| --- | --- |
| Coordinated Energy Efficiency Program Offering | CY2020 Deemed NTG Value |
| RCx | 0.94 |
| MBCx | 0.94 |
| RCxTune-Up | 0.94 |
| RCxpress | 0.94 |
| All-Natural Gas | 0.94 |

Source:

<http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/ComEd_NTG_History_and_CY2019_Recommendations_2019-10-01.xlsx>

Navigant will apply overall values to all RCx Program offerings.

#### Research NTG Impact Evaluation

Navigant will conduct a participating customer NTG study in CY2020 to provide NTG values for potential deeming in future program years through surveys with CY2020 participating customers for each program offering. 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.

Program influence on participating customers through interviews with trade allies and account managers will be conducted in CY2021 if triggered by customer NTG responses for the largest projects, or with contacts identified for multiple smaller projects.

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 Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

When gas savings is not attributed to a gas utility, the evaluation will also add the savings converted from gas savings to the electric savings so that it is documented in the report.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the RCx Program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental consumption data because there are not enough participants in this program to achieve statistically significant savings estimates using this method and it would not be possible to create a valid matched control group for the customers in this program.

#### Program Management and Implementer Interviews

We will conduct in-depth interviews with program managers and implementation contractors in CY2021 (not in CY2020). Both interviews will focus on changes made in CY2021 in comparison to the CY2019 program year. Interviews will focus on progress to goals, identifying program successes and challenges, identifying drivers of those successes and challenges, as well as marketing tactics and EESP education.

***Service Provider Interviews***

The evaluation team will conduct interviews with RSPs to inform NTG recommendations for each program offering. Interviews will address free-ridership and participant spillover using protocols developed by the Illinois EM&V NTG Working Group and incorporated into the TRM.

We will sample a census of service providers participating in each offering.

***Participant Interviews***

We will interview a sample of participants to inform NTG recommendations for each program offering. Interviews will address free-ridership and participant spillover using protocols developed by the Illinois EM&V NTG Working Group and incorporated into the TRM.

We 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.

#### Telephone and Web Surveys

A multi-modal approach will be used to conduct participant surveys, relying on both telephone and web surveys. This approach reflects the transition to a changing industry survey research environment and improved survey data quality and coverage. The participant survey will service both impact-related areas and process research. Impact-related questions will affect the NTG ratio. Questions supporting the process evaluation in CY2021 will relate to sources of program awareness, program satisfaction, rebate satisfaction, and awareness of program features.

### Evaluation Schedule

Table 4 provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress. We plan to conduct process evaluation activities early in the program year and report results to ComEd as valuable information becomes available.

Table 4. Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | January 20, 2020 |
| CY2020 program tracking data for QA/QC | ComEd | Quarterly, beginning April 15, 2020 |
| Quarterly project documentation, engineering reviews, feedback | Evaluation | Quarterly, beginning June 1, 2020  Early feedback for on-site projects will be provide ongoing as results become available |
| CY2020 Program tracking data for final end of year sampling | ComEd | January 15, 2021 |
| Final project documentation, engineering reviews, feedback | Evaluation | February 26, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 12, 2021 |
| Draft Report to ComEd, Gas Utilities, and SAG | Evaluation | March 19, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 9, 2021 |
| Revised Draft by Navigant | Evaluation | April 16, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 23, 2020 |
| Final Report to ComEd, Gas Utilities, and SAG | Evaluation | April 28, 2020 |
| NTG Research Memo – draft | Evaluation | August 15, 2020 |
| NTG Research Memo – final | Evaluation | Sept 30, 2019 |

## ComEd Small Business Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Small Business Program is designed to assist qualified ComEd private-sector, non-residential customers[[31]](#footnote-32) to achieve electric energy savings by educating them about energy efficiency opportunities through no-cost on-site energy assessments conducted by preapproved, specially-trained energy efficiency service providers (EESPs) and installation of no-cost direct-install (DI) measures.[[32]](#footnote-33) Further savings are available to participating customers through incentives of 30-75 percent offered for select contractor-installed measures.[[33]](#footnote-34) EESPs are the primary means of promoting the Small Business Program and recruiting participants. Changes in the 2020 Small Business Offering (SBO) Program include promotion of RTU optimization measures for customers under 100 KW. These measures include cogged v-belts, coil cleaning, economizers, advanced controls, RTU replacement, and sealing.

ComEd’s CY2020 net planning target for the Small Business Program is 487,099 MWh for both first year savings[[34]](#footnote-35) and CPAS.[[35]](#footnote-36) Nexant, Inc. (Nexant) is the implementation contractor (IC) for the Small Business Program throughout ComEd’s service territory.

The primary objectives of the CY2020 evaluation of the Small Business Program will be to quantify the gross and net savings impacts of the program. The evaluation of this program over the remaining two years of the 2020-2021 cycle will include a variety of data collection and analysis activities, including those indicated in Table 1.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Engineering Review | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Modeling (as needed) | X |  |
| Impact – Verification & Gross Realization Rate | X | X |
| Net-to-Gross – Customer Self-Report Surveys | X |  |
| Net-to-Gross – EESP Interviews | X |  |
| Process Research |  | X |

The 4-year evaluation approach for this program is based on the following:

* Gross and net impact analysis will be conducted each year
* Optimized timing on when to conduct net-to-gross (NTG) research
* Cumulative Persisting Annual Savings (CPAS) will be calculated based upon the requirements of the Future Energy Jobs Act (FEJA)

### 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 annual 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 (EULs) of program measures that currently lack them?
6. The evaluation team will calculate the cumulative persistent annual savings.

#### Process Evaluation and Other Research Topics

There will be no process evaluation effort in CY2020.

**Evaluation Approach**

Table 2 summarizes the evaluation tasks for CY2020 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 CY2020  (approx.) | Notes |
| Tracking System Review | Tracking system | Census | Impacts. Three data waves |
| Gross Impact | Early Feedback File Review | Census | Wave 1 and Wave 2 data\* |
| Verified Net Impact | Calculation using deemed NTG ratio |  |  |
| In Depth Interviews | Program managers and implementers | 4 | Augment with periodic calls |

\* 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 EESPs to achieve statistically significant results.

Navigant will perform tracking system review and engineering file reviews on a sample of participant projects in two waves in CY2020. Navigant will have interviews with program manager (PM) and the implementation contractor (IC) in CY2020 for understand the program operations and related issues.

#### Tracking System Review

Navigant’s tracking system review will primarily ensure that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Also, our tracking system review helps ensure that the tracking data is consistent with the program’s data in eTRACK. This latter task will become increasingly important as eTRACK undergoes development and more closely reflects the tracking data Navigant receives.

#### Gross Impact Evaluation

Since most Small Business 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 workbooks to ensure that all fields are appropriately populated and savings are consistent with the implementation contractor workpapers and savings calculators 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 with a review of project documentation on a random sample of 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 CY2020 gross impact and sampling timelines are shown below.

1. Mid-year early impact review of Wave 1 data in July 2020 and completed in August 2020. This will include developing a memorandum of findings from early impact review.
2. Wave 2 sample of project files and documentation drawn in September 2020 and completed November 2020.
3. Final and third wave of tracking data by January 30, 2021 and completed by March 6, 2021.

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. Hold regular meetings (every 6 weeks) by telephone with ComEd program staff and the IC staff to discuss specific impact issues that need to be addressed during program implementation.
4. 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.
5. Investigate measures that may produce gas savings and review the parameters ComEd used to estimate potential kWh savings.

#### Use of Randomized Control Trial (RCT) and Quasi-Experimental Design (QED)

Navigant is not evaluating the Small Business Program via a randomized controlled trial (RCT) because the program was not designed with randomly-assigned treatment and control groups. Nor will we base the CY2020 impact analysis on a quasi-experimental design (QED), because the program targets a heterogeneous group of businesses and has many unique measures with significant cross-participation. While the evaluation will continue to be based primarily on deemed TRM values, Navigant will consider using a QED approach to prospectively update the TRM for certain measures or measure-business type combinations. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

#### 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 CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Small Business (all measures) | 0.97 |

Source:http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_ CY2020\_Recs\_2019-10-01.pdf

#### Research NTG Impact Evaluation

Navigant last conducted NTG research on the CY2018 participant and EESP populations. We will conduct NTG research in CY2020 to report in September 2021.

We will complete computer assisted telephone interviews (CATI) with a goal of up to 400 completed surveys for program participants to quantify participant free-ridership and spillover. The samples will be of CY2020 participating customers for free ridership and CY2019 participants for spillover.

We will research program influence on participating customers through interviews with EESPs active in CY2020. 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. EESP NTG recommendations will be triangulated with the participant self-report NTG as appropriate based on our findings.

#### Program Management and Implementer Interviews

The evaluation team will develop a thorough understanding of the program by interviewing program managers and implementers to understand current program design and status as well as the program’s future plans.

#### Coordination

Ameren Illinois’s Small Business Incentives program is like ComEd’s Small Business program.[[36]](#footnote-37) 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.[[37]](#footnote-38)

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

#### Calculation of CPAS and Annual Savings

As required by FEJA, Navigant will report ex post gross and ex post net savings for the program and the CPAS in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated. Evaluation will also add the savings converted from gas savings to the electric savings so that it is documented in the report.

### Evaluation Schedule

Table 4 provides the schedule for key deliverables and data transfer. 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 Workpapers/Workbook Review | ComEd/Nexant | September 2019 – January 30, 2020 |
| Monthly Team Meetings | ComEd/Navigant & IC Staff | Every 6 weeks, as needed |
| CY2020 Wave 1 Tracking Data | ComEd | July 1, 2020 |
| Early impacts findings memo | Evaluation Team | August 2019 |
| Sample Projects Documentation for Review | ComEd | September 30, 2020 |
| CY2020 Wave 2 Tracking Data | ComEd | September 30, 2020 |
| Wave 3 and Final CY2020 Tracking Data to Navigant | ComEd | January 30, 2021 |
| Internal Impact Report Draft by Navigant | Evaluation Team | March 6, 2021 |
| Draft Impact Report to ComEd and SAG | Evaluation Team | March 13, 2021 |
| Comments on draft (15 Bus. Days) | ComEd / SAG | April 3, 2021 |
| Revised Draft Impact Report by Navigant | Evaluation Team | April 10, 2021 |
| Comments on redraft (5 Bus. Days) | ComEd / SAG | April 17, 2021 |
| Final Impact Report to ComEd and SAG | Evaluation Team | April 24, 2021 |
| NTG Recommendations to ComEd and SAG | Evaluation | August 14, 2021 |
| NTG Research Memo | Evaluation | August 14, 2021 |
| NTG Research Memo – final | Evaluation | Sept 30, 2021 |

## ComEd Small Business Kits Program CY2020 to CY2021 Evaluation Plan

### Introduction

The ComEd Small Business Kits (Small Business Kits) Program aims to cost-effectively capture electric savings in small commercial facilities located in ComEd’s service territory by targeting customers that operate office, restaurant, and other facilities with electric hot water. 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.

Table 1. Energy Efficiency Kit Measures for Each Customer Segment

|  |  |  |
| --- | --- | --- |
| Offices | Restaurants | Other General |
| 2 LEDs: 9W | 3 LEDs: 9W | 2 LEDs: BR30 8 |
| 2 LED: BR30 | 2 LED: PAR30 | 2 LED: PAR30 |
| 2 Bathroom Aerators | 2 Bathroom Aerators | 2 LED: 9W |
| 1 Kitchen Aerator | 1 Pre-Rinse Spray Valve | 1 Bathroom Aerator |
| 1 Advanced Power Strip | 2 Kitchen Aerators | Installation Guide DVD |
| Installation Guide DVD | Installation Guide DVD | Marketing Materials |
| Marketing Materials | Marketing Materials |  |

Since CY2018, the program has added additional BR and PAR screw-in lamps and removed exit signs from the kits. ComEd’s net savings planning target is 4,406 MWh for CY2020.

The evaluation of this program over the coming two years will include a variety of data collection and analysis activities, including those indicated in the following table. The CY2020 gross impact evaluation will not vary significantly from the previous years.

Beginning in CY2019, the Small Business Kits Program expanded the eligible customer base beyond rural small businesses to include all ComEd small business customers. To determine updated NTG values, Navigant will examine the program participation from CY2019 and CY2020 to determine if updated NTG research is needed in CY2021. If NTG research is warranted during CY2021, Navigant will use participant self-report surveys to determine updated free-ridership and spillover numbers.

Table 2. Evaluation Approaches – Two Year Plan

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

#### Coordination

Although Ameren has an efficiency kits program, it is a residential sector program rather than a business sector program and the TRM parameters for kit programs are different for these two sectors.

### Evaluation Research Topics

The CY2020 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 (first year and lifetime)?
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

Process evaluation will not be done in CY2020 and will likely be undertaken in CY2021.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves |  |
| PM and IC Interviews | Program Management and Implementers | 2 | April – June 2020 | Augment with monthly calls |
| Gross Impact | Engineering Review | Census | July – Aug 2020 Feb – March 2021 | Two Waves† |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | Dec 2020 –  March 2021 |  |

#### Tracking System Review

Navigant will perform tracking system review in waves in CY2020, as well as reviewing the final tracking data. The Wave 1 of M&V sampling is expected to cover more than half of the projects.

#### Program Management and Implementer Interviews

The evaluation team will interview program managers and implementers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Gross Impact Evaluation

Since almost all the program’s savings are based on the Illinois Technical Reference Manual (TRM), the evaluation team will conduct a limited gross impact evaluation in CY2020. 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 calculations and totals. The evaluation team will use follow-up survey data collected by Franklin during 2020 to determine the CY2020 verified custom inputs for measure ISRs, and the hot water fuel type (%ElectricDHW and %FossilDHW).

#### Verified Net Impact Evaluation

The verified net impact evaluation will apply a program-level NTG ratio of 0.97 from the SAG consensus process to estimate the verified net savings for the program in CY2020, as shown in the table below.

Table 4. Deemed NTG Values for CY2018

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| SB Kits Program | 0.97 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### Evaluation Schedule

Table 1 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 5. Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Operations Manual and Workpapers | ComEd | November 1, 2019 |
| CY2020 program tracking data for Wave 1 | ComEd | September 4, 2020 |
| Wave 1 project documentation, engineering reviews, feedback | Evaluation | October 16, 2020 |
| Final CY2020 Program tracking and customer survey data | ComEd | January 30, 2021 |
| Internal Report Draft by Navigant | Evaluation | February 14, 2021 |
| Draft Report to ComEd and SAG | Evaluation | February 21, 2021 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 13, 2021 |
| Revised Draft by Navigant | Evaluation | March 20, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | March 27, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 8, 2021 |

## ComEd Standard Program CY2020 and CY2021 Evaluation Plan

### Introduction

As part of the Business Incentives Program[[38]](#footnote-39) the ComEd Standard Incentives Program (Standard) 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 Energy Efficiency Service Providers (EESPs). 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. 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 private sector and public-sector portions of the program.

The primary objectives of the CY2020 evaluation of the Standard Program are to: (1) quantify the gross and net savings impacts of the program; (2) conduct research to support the program’s mandate under the Future Energy Jobs Act (FEJA);[[39]](#footnote-40) and (3) investigate potential gas savings (therms conversion) counted as kWh, either using the TRM deemed inputs or billing analysis from gas usage data which may be collected from the gas utilities that serve the project sites.

Notable program changes  in CY2019 to CY2020 may include:

* Continued the public sector offering for facilities over 100 kW. Maintained incentive cost cap for private and public sector projects at 75%.
* Launched online application mid-year 2019.
* Include promotion of new RTU optimization measures for customers (>100 KW). These measures include cogged v-belts, coil cleaning, economizers, advanced controls, RTU replacement, and sealing.

Continuing from CY2019, ComEd’s marketing strategy presents the overall portfolio to customers. Streamlined incentive application and verification and quality control processes are expected to facilitate customer participation ease and minimize the time required for incentive payment.

Also continuing from CY2019, prior to issuing certain standard energy efficiency incentives in CY2020, ComEd will verify that the contractor responsible is certified through the Illinois Commerce Commission (ICC) to install energy efficiency measures.[[40]](#footnote-41)

ComEd’s CY2020 net planning target for the Business Incentives Program[[41]](#footnote-42) is 300,865 MWh for first year annual savings and 933,766 net MWh cumulative persisting annual savings (CPAS).[[42]](#footnote-43) ComEd expects to achieve these targets by installing 77 percent of measures in qualifying private sector commercial and industrial facilities, and 23 percent of measures in qualifying public sector premises.[[43]](#footnote-44)

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

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Participant Surveys |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Data Collection – EESP Interviews |  | X |
| Data Collection – Literature Review | X | X |
| Impact – Billing Analysis | X | X |
| Impact – Engineering Review | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | X |
| Net-to-Gross – EESP Spillover Research |  | 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 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.

### Evaluation Research Topics

The CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What are the program’s annual total lifetime verified gross savings? What are the verified gross savings from private and public lighting projects? What are the verified gross savings from private and public non-lighting projects?
2. What are the program’s verified annual total lifetime net savings?
3. 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)?

#### Process Evaluation and Other Research Topics

There will be no process evaluation for CY2020.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Notes |
| Tracking System Review | Tracking system | Census | Three waves |
| Review Workpapers | Update Tracking System Default Inputs | Census | Both New and Unchanged Workpapers |
| In-Depth Interviews | Program Management and Implementers | 4 | Augment with quarterly impact and process meetings |
| Net-to-Gross (FR and SO) and Process Surveys | Participant from July 2018-December 2019 and July 2017-June 2018 | 200 | Commenced in August 2019 to collect T12 data, paused and scheduled to resume in February with final CY2019 data |
| Gross Impact Evaluation | Engineering File Review | 85 | Three Waves\* plus Early Feedback for Large Projects |
| Gross Impact Evaluation | On-site M&V | 40 |  |
| Verified Net Impact Evaluation | Calculation using deemed NTG ratio | NA |  |
| Literature review, secondary research | Impact Research on CY2020 Operations | Census | Impact |

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

#### Tracking System Review

In line with program changes and accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform a tracking system review prior to conducting sampled gross impact evaluation. The goal of this review is to provide the program implementer with early feedback on the deemed savings in the tracking system.

#### Gross Impact Evaluation

Navigant will perform tracking system review and M&V project sampling in three waves in CY2020. The first wave of M&V sampling is expected to cover about one-third of projects completed in CY2020. Proposed gross impact sampling timelines are shown below. The CY2020 gross impact evaluation will not vary significantly from CY2019, but adjustments will be made to reflect specific measure and project characterizations.

CY2020 Gross Impact Sampling Waves

1. First wave sample drawn in June 2020 and completed by November 2020
2. Second wave sample drawn in October 2020 and completed in December 2020
3. Final wave starts February 2020

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 include 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. 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.

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.[[44]](#footnote-45)
* Measures with custom or partially-deemed ex ante savings input will be subject to retrospective evaluation adjustments to gross savings on custom variables. TRM algorithms and deemed parameter values will be used where specified by the TRM, and evaluation research will be used to verify or adjust custom variables.

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 (EMS will be sampled separately as was done in the past year). The sample of 20 on-sites drawn is also expected to achieve a 90/10 confidence/relative precision level (two-tailed test) to comply with the PJM verification requirements outlined in Manual 18B.

The 20 on-site projects will be randomly selected based on the magnitude of the project savings in the stratified sample. The on-site sample design will consider both lighting and non-lighting technologies, including measures with high savings variations and certain new technologies with potential savings impact (e.g., advanced lighting controls, EMS, etc.). Where the TRM allows retrospective adjustment of savings using site collected data (e.g., lighting quantities, VSD hours and controls), the savings are recalculated based on site-specific data but still using the approach set forth in the TRM. Parameters defined in the TRM are not adjusted even if the site findings suggest alternate values are more appropriate. For measures not covered in the TRM (such as EMS), the on-site data collection will be used to develop an independent assessment of project savings. For these projects, all available information is used to recalculate savings.

#### Verified Net Impact Evaluation

The evaluation team will apply the net-to-gross (NTG) ratios accepted by Illinois Stakeholders Advisory Group (SAG) consensus to estimate the verified net savings for the program (Table 3). Therms savings will be subjected to the electric NTG adjustments.

**Table 3. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Lighting | 0.83 |
| Non-Lighting | 0.78 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Research NTG Impact Evaluation

Navigant will finalize a participating customer NTG study as necessary to achieve 90/10 during CY2020 with end-of-year data from CY2019 to recommend NTG values for deeming September 2020. We will complete computer assisted telephone interviews (CATI) with a goal of up to 200 completed surveys for program participants to quantify participant free-ridership and spillover. The samples are from CY2018-2019 (July 2018 to December 2019) participating customers for free ridership and PY9-CY2018 (July 2017 to June 2018) participants for spillover. The final analysis will be completed to calculate participant NTG for lighting and non-lighting categories.

#### Calculation of Cumulative Persisting Annual Savings (CPAs) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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 |
| Program Operations Manual and Workpapers Review | ComEd and Evaluation | September 2019 - January 24, 2020 |
| Quarterly Impact/Process Meetings | ComEd/Navigant & IC Staff | Every three months |
| CY2020 Program Tracking Data for Tracking System Review | ComEd | June 1, 2020 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | June 26, 2020 |
| CY2020 Program Tracking Data for Sampling Wave 1 | ComEd | July 1, 2020 |
| NTG Research Memo - Draft | Evaluation | August 14, 2021 |
| NTG Recommendations (Participant) to ComEd and SAG | Evaluation | August 14, 2020 |
| Wave 1 Project Documentation, Engineering Reviews, Schedule, Conduct On-site M&V, Feedback | Evaluation | August 31, 2020 |
| NTG Research Memo – Final | Evaluation | Sept 30, 2020 |
| CY2020 Program Tracking Data for Sampling Wave 2 | ComEd | October 31, 2020 |
| Wave 2 Project Documentation, Engineering Reviews, Schedule, Conduct On-site M&V, Feedback | Evaluation | December 31, 2020 |
| CY2020 Program Tracking Data for Sampling Wave 3 | ComEd | January 29, 2021 |
| Wave 3 Project Documentation, Engineering Reviews, Schedule, Conduct On-site M&V, Feedback | Evaluation | February 26, 2021 |
| Internal Impact Report Draft by Navigant | Evaluation | March 5, 2021 |
| Draft Impact Report to ComEd and SAG | Evaluation | March 12, 2021 |
| Comments on Draft (15 Business Days) | ComEd and SAG | April 4, 2021 |
| Revised Impact Report Draft by Navigant | Evaluation | April 11, 2021 |
| Comments on Redraft (5 Business Days) | ComEd and SAG | April 19, 2021 |
| Final Impact Report to ComEd and SAG | Evaluation | April 27, 2021 |

## ComEd Strategic Energy Management Program CY2020 to CY2021 Evaluation Plan

### Introduction

Currently the Strategic Energy Management (SEM) Program has two types of participants: (1) new cohort made up of new participants, and (2) the alumni cohort for customers that continue to participate after their first year. Navigant’s focus in CY2020 will be on new cohorts as that detail becomes available for evaluation.

Notable program changes made from CY2019 to CY2020 include:

* Evaluation of new participants in the program as opposed to the alumni group that was reviewed in CY2019. Possible evaluation of alumni participants based on specific discussions with ComEd.
* As sites transition into the alumni cohort, the evaluation activities will change to meet the needs of the client and implementer without overburdening the site. Navigant will not complete onsite surveys with sites that have already been surveyed in the past or complete simpler surveys to not overburden participants. Impact evaluation may be reduced as well for sites that have already received impact evaluations in the past.

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

Table 1. Evaluation Approaches – Two Year Plan

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

The evaluation team determined the evaluation approach for the CY2020-2021 period based upon the needs of the program and program’s prior history. The two-year evaluation approach for this program is based on the following:

* Gross and net impact analysis will be conducted each year
* Site specific process surveys will occur every other year. If the program participation changes greatly from one year to the next or the customer has interest in specific site surveys that work can be completed after discussion with ComEd.
* Cumulative Persisting Annual Savings (CPAS) will be calculated based upon the requirements of Future Energy Job Act (FEJA).
* 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)
  + The influence of the SEM Program on increasing the number of Standard and Custom projects and their associated savings
* Limited process evaluation will be completed with the alumni cohorts to focus on persistence.

#### Coordination

The SEM Program is independently and jointly managed with Nicor Gas, Peoples Gas Company and North Shore Gas Company. ComEd will coordinate with gas utilities on issues relevant to the program. The SEM evaluation report is developed as a combined ComEd and gas utilities evaluation report. Navigant leads the evaluation and will work with each gas utility to finalize the report. There are special data collection issues with the SEM Program and Navigant will manage those data issues with ComEd and gas utilities.

### Evaluation Research Topics

The CY2020 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

There will be no process evaluation in CY2020. We plan on process evaluation research in CY2021 which is likely to focus on program satisfaction and the SEM process. This is needed since SEM is a developing program and this limited process research is necessary in 2021. The process research will address the following and, possibly, related questions:

1. What is the satisfaction of the participants?
2. How can the program structure be improved?
3. What were the major results of the SEM training? What actions did participants take? What recommended actions did they not take, and why?
4. What were the motivating factors for a facility to choose to participate?

### Evaluation Approach

Table 2 summarizes the evaluation tasks for CY2020 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

Final activities will be determined as program circumstances are better understood.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Notes | |
| Tracking System Review | Participating Customers | Census | Engineering Review – Cohort 3  Second Engineering Review – Alumni Cohort | |
| Gross Impact Evaluation | Engineering File Review | Census | This is a multi-regression model based upon whole-building data, production data and other key variables. | |
| Verified Net Impact Evaluation | Calculation Using Deemed NTG Ratio | \* | Deemed Value  Electric (1.00)  Gas (1.00) | |
| Interviews | Program Management and Implementers | ~2 | Augment with monthly calls | |
| Effective Useful Life Determination |  |  | 5 years |  |

\*Sample size will be determined to achieve 90/10

#### Tracking System Review

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is consistent with the program’s data in eTRACK. This latter task will become increasingly important as eTRACK undergoes development and more closely reflects the tracking data Navigant receives.

#### 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, 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, production data 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 but are not limited to:

* Changes in hours of operation
* Changes in employees
* Changes in production
* Various factors that affect the model savings
* Other measures installed at the site that were implemented through other Utility EE/DR programs or outside of the ComEd and Nicor Gas programs[[45]](#footnote-46)

Due to the small number of participating sites, Navigant will perform the impact analysis on all participating customers which may include participating sites and new sites based on discussion with ComEd. Sampling will be considered as number of participants grow.

#### Verified Net Impact Evaluation

The CY2020 net impact evaluation will apply the net-to-gross (NTG) ratio deemed through the Illinois Stakeholders Advisory Group (SAG) consensus process. The deemed NTG ratios are provided in Table 3.

Navigant will sample projects from the sites and apply the sample realization rates to the entire population to calculate overall savings. Navigant will consider several ways to stratify the SEM projects to design a sample once initial program data is received. Navigant will use a stratified ratio estimation sampling design to develop an efficient sample achieving 90/10 confidence/precision on the program-level realization rate. Once all sampled sites are evaluated, the realization rate of each stratum will be calculated. This realization rate will be applied to the total claimed savings within each stratum to calculate the final program savings.

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.

**Table 3. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| All-Electric | 1.00 |
| 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

#### Program Management and Implementer Interviews

The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the latest program developments.

#### Telephone and Web Surveys

Participant interviews will focus on participant satisfaction, and any potential improvements to program processes such as the training and onsite visits. The site interviews will be coordinated with the impact evaluation team to address any major operational changes occurring at the site.

Navigant will complete the gross impact review before conducting the surveys to identify any site-specific issues that could be addressed in the interviews. Prior to the interviews, the gas utilities and ComEd will review the surveys to ensure they meet the needs of the program. Once the surveys are complete, Navigant will finalize the engineering review by making any additional changes identified by the surveys.

### Evaluation Schedule

#### Research NTG Impact Evaluation

The CY2020 gross impact evaluation will not vary from the previous years. Over the course of 2019 we examined the program theory and evaluation approach to inform discussions in the fall Illinois Stakeholder Advisory Group (SAG) net-to-gross (NTG) deliberations about the need for doing free ridership surveys with SEM participants in future years. We plan to conduct NTG research in CY2020 and CY2021.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by FEJA, Navigant will report ex post gross and ex post net savings for the program and CPAS for the measures installed in CY2020. The measure life of five years will be used for the SEM Program. Evaluation will also add the savings converted from gas savings to the electric savings so that it is documented in the report.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

The evaluation team will not evaluate this program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. The evaluation will not use quasi-experimental design because there are not enough participants for individual measures in this program to achieve statistically significant savings estimates using this method. Table 4 provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress. Process reporting will occur after April 30th in 2021 and substantive process reporting will be provided in a timely manner.

Table 4. Evaluation Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity/Deliverables | Responsible Party | Date Delivered |
| CY2019 Site Reports and Models available to Navigant | ComEd | Q3/Q4 2020\* |
| Sample of sites determined and approved | Evaluation | Q3/Q4 2020 |
| Project review | Evaluation | Q3/Q4 2020 |
| Program manager interview | Evaluation | Q2/Q3 2020 |
| Internal Navigant Draft Report Review | Evaluation | March 6, 2021 |
| Draft Report to ComEd, Gas Utilities, and SAG | Evaluation | March 13, 2021 |
| Comments on draft (15 Business Days) | ComEd, Gas Utilities, and SAG | April 3, 2021 |
| Redraft of Report | Evaluation | April 10, 2021 |
| Comments on Redraft (5 Business Days) | ComEd, Gas Utilities, and SAG | April 17, 2021 |
| Final Report to ComEd, Gas Utilities, and SAG | Evaluation | April 24, 2021 |

\* Timing of tasks depends on timing of data availability are to be determined later

## ComEd Telecommunications Optimization Program CY2020 to CY2021 Evaluation Plan

### Introduction

The ComEd Telecommunications Optimization (Telcom) Program aims to cost-effectively generate and capture savings from energy efficiency projects undertaken by its telecommunications customers. The Telecom Program provides specialized energy assessments, energy management planning to help customers increase reliability, improve efficiency and reduce energy consumption without adversely affecting facility operations. The measures included in the Telecom Program include standard, retro‑commissioning, and custom measures, as seen in Table 1 below. ComEd’s net savings planning target is 8,413 MWh net for CY2020.

To participate in the program, the ComEd customer must be a telecommunication, internet service provider, or cable provider associated business located within ComEd’s service territory. Franklin Energy (Franklin) is responsible for the implementation of the program. Customers are recruited into the program by Franklin , and all customer interactions are tracked in ComEd’s Salesforce system. Franklin staff complete a free walkthrough assessment of the customer facility and deliver a report detailing the network and electrical equipment which could be updated and summarizing the electrical and thermal loads at the facility. Franklin assists the customer with prioritizing efficient measures and submitting a pre-approval application. Once the efficient measures are installed, Franklin assists in completing the final program application and completing a satisfaction survey.

Table 1. Telecom Program Measures by Type\*

|  |  |  |
| --- | --- | --- |
| Standard | Retro‑commissioning | Custom |
| Interior Lighting | Scheduling | Lighting |
| Exterior Lighting | Humidification controls | Network Equipment Upgrades |
| Lighting Controls | Equipment Sequencing | Uninterruptible Power Supplies |
| Variable Speed Drives | Airflow Management | Rectifiers |
|  | Economizers | Efficient Transformers |
|  | Controls Optimization | CRAC and CRAH Sizing |
|  | Operation and Maintenance | Switch Card Consolidation (“Network Combing”) |

\* The measures noted in program documentation received to date from Franklin. The program may include additional measures.

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

Table 2. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Project Level Desk Reviews | X | X |
| Impact – Project Level Site Visits and metering |  | X\* |
| Impact – Verification & Gross Realization Rate | X | X |
| Process Evaluation – based initial on PM interviews | X | X |

\*Site visits will be conducted on an as needed basis.

#### Coordination

The Telecom Program is not offered jointly with the gas companies, and there is no similar offering for Ameren Illinois. The evaluation team does not anticipate cross utility coordination for the Telecom Program evaluation.

### Evaluation Research Topics

The CY2020 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 project baselines properly determined? If not, why not and what guidance can the evaluation team provide for future projects?
5. What changes (if any) to the assessment process would improve accuracy of savings estimates?
6. Are interactions between measures which are analyzed using different approaches (e.g., deemed versus custom) properly determined?
7. What updates (if any) are recommended for the Illinois Technical Reference Manual (TRM)?
8. Is a Telecom‑specific equipment useful life (EUL)/cumulative persisting annual savings (CPAS) persistence life needed for any of the measures as they pertain to telecom?

#### Process Evaluation and Other Research Topics

The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions. During CY2020, Navigant is targeting approximately 10 projects based on a simple random sample of completed projects, and may additionally evaluate a census sample of the largest and highest uncertainty projects not captured in the random sample. Navigant will modify the CY2019 targets to include a stratified random sample of projects if warranted by higher program participation, to be revisited quarterly.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Timeline† | Notes |
| Tracking System Review | Tracking system | Census | Wave 1 and Final data | Two Waves |
| Measure-Level Savings Review | Tracking System and Project Files | Census | Wave 1 and Final data | Two Waves |
| Project-Level Desk Reviews | Project Files | Census | Wave 1 and Final data | Two Waves |
| Project-Level Site Visits – only on an as needed basis | Customer Facilities | TBD after receipt of Wave 1 extract | August 2020 – February 2021 | Largest projects with highest uncertainty (as-needed) measures per the IPMVP‡ |
| In Depth Interviews | Program Management and Implementers | ~2 | July – August 2020 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA | March 2021 |  |

Note: FR = Free Ridership; SO = Spillover

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

‡ IPMVP = International Performance Measurement and Verification Protocol

#### Tracking System Review

Navigant will perform tracking system review in waves in CY2020, as well as reviewing the final tracking data.

#### Gross Impact Evaluation

The Telecom Program includes savings derived from a collection of different sources. Standard lighting or variable speed drive (VSD) measure savings are based on the IL TRM. Retro‑commissioning and custom measures utilize project‑specific calculators. Given the diversity of savings sources, the evaluation team will take multiple approaches to determine verified gross impacts, performing both measure-level and project-level reviews. Based on discussions with program staff, a majority of the savings through the program are calculated using custom analyses. Therefore, the evaluation team will conduct detailed technical reviews of energy savings calculations and supporting documentation for all sampled custom measures

The evaluation team will perform measure-level reviews to assess the validity of the various tools and approaches the program uses to quantify savings. For standard measures, the evaluation team will ensure savings follow the methodology outlined for the appropriate measure in the IL TRM. The evaluation team will also review any custom measure calculation tools or models used by the program.

For projects selected for review, the evaluation team will review all savings calculations and compare analysis inputs to project-specific conditions, such as building weather location, hours of operation, project type and associated baseline determination,[[46]](#footnote-47) project‑specific baseline conditions, and customer energy usage. The evaluation team will adjust the analyses to site-specific conditions, as appropriate. Additionally, the evaluation team will examine interactive effects between measures to ensure they are properly quantified.

The evaluation team may complete parallel evaluations for projects which exceed 1,000,000 kWh of annual energy savings. During a parallel evaluation, the evaluation team will accompany implementer staff during the initial visit to the customers site to gather baseline information and install baseline monitoring equipment if needed. The evaluation team will provide guidance for the implementers’ consideration regarding baseline choice, analysis methodology, or specific parameters. Parallel evaluation projects still receive a detailed evaluation at the close of the program year[[47]](#footnote-48).

#### Verified Net Impact Evaluation

The verified net impact evaluation will apply program-level net-to-gross (NTG) ratios shown below, aligning with the value for the Data Center Program deemed through a consensus process by the IL SAG.

**Table 4. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Applicable Deemed NTG Value |
| Co-Location: New Construction | Energy NTG: 0.44  Demand NTG: 0.34 |
| Co-Location: Retrofit | Energy NTG: 0.78  Demand NTG: 0.82 |
| Non-Co-Location | Energy NTG: 0.67  Demand NTG: 0.67 |
| Lighting | 0.83 |
| Other Standard | 0.78 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Program Management and Implementer Interviews

The evaluation team will interview program managers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

Given the small number of participants, Navigant does not plan to complete a randomized control trial (RCT) or quasi-experimental design (QED) approach to the process evaluation but rather, attempt to get a census of all participants.

### 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 3, 2020 |
| CY2020 program tracking data for sampling Wave 1 | ComEd | July 3, 2020 |
| Wave 1 project documentation, engineering reviews, feedback | Evaluation | September 25, 2020 |
| CY2020 program tracking data for sampling Wave 2 | ComEd | January 30, 2021 |
| Wave 2 project documentation, engineering reviews, feedback | Evaluation | February 26, 2021 |
| Illinois TRM Update Research Findings | Evaluation | March 1, 2021 |
| Internal Report Draft by Navigant | Evaluation | March 5, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 12, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 2, 2021 |
| Revised Draft by Navigant | Evaluation | April 9, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 16, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 23, 2021 |

## ComEd Virtual Commissioning Program CY2020 Evaluation Plan

**Introduction**

The ComEd Virtual Commissioning Program (VCx)[[48]](#footnote-49) is an energy efficiency pathway within the Retrocommissioning Program (RCx)[[49]](#footnote-50) designed and operated for ComEd by Power TakeOff (PTO) that provides qualified ComEd business customers[[50]](#footnote-51) with energy management and information system services to better manage their energy usage, identify energy savings opportunities, and achieve energy savings through low- or no-cost energy-saving measures. The Virtual Commissioning 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 VCx Program, and monitor their progress throughout their participation in the program. Energy savings actions taken by each participant are documented as part of the program, and the 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 VCx Program collects specific information about each participant, including a detailed log of each contact PTO had with the customer, the operational actions each participant agreed to undertake, and the date each action was undertaken.[[51]](#footnote-52) 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.

The primary objectives of the CY2020 evaluation of the VCx Program are to: (1) quantify the gross and net savings impacts of the program; (2) conduct net-to-gross (NTG) research to ascertain the program’s free-ridership and spillover effects; and (3) investigate potential gas savings available through the program.

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

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

***Coordination***

At present there are no equivalent programs at other Illinois utilities. We will continue to monitor that situation.

**Evaluation Research Topics**

The CY2020 evaluation will seek to answer the following key researchable questions:

***Impact Evaluation***

1. What are the program’s verified annual total lifetime gross savings?
2. What are the program’s verified annual total lifetime net savings?
3. What is the appropriate net-to-gross ratio (NTGR) for this program?

***Net to Gross, Effective Useful Life, Process Evaluation and Other Research Topics***

1. How do participants channel through the portfolio?
2. What is the persistence of savings?
3. How can persistence of savings be increased?
4. What are the participants’ satisfaction with and perceptions of the program?
5. What aspects of the program would participants like to see changed?

**Evaluation Approach**

Table 2 summarizes the evaluation tasks for CY2020 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 Virtual Commissioning**

|  |  |
| --- | --- |
| Activity | CY2020 |
| Gross Impacts Evaluation | Regression Analysis |
| Review of Apparent Uplift in Other EE Programs | Yes |
| Sampling Frequency | Annual |
| Program Manager and Implementer Interviews | Yes |
| Materials Review | Yes |
| Participant NTG | Yes |
| Participant Survey | Yes |

***Gross Impact Evaluation***

Navigant will measure the VCx Program’s CY2020 annualized energy savings by developing baseline hourly energy usage models for each CY2020 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 CY2020 program savings will be the product of the sum of the individual participants’ gross annualized savings and the NTG ratio.

**Equation 1. Virtual Commissioning Load Model[[52]](#footnote-53)**

where:

is energy use in hour *i* of day *t*

equals 1 when *t* is a weekday and 0 otherwise[[53]](#footnote-54)

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

is the cooling degree-hours during hour *i* of day *t*[[54]](#footnote-55)

is the heating degree-hours during hour *i* of day *t*

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

The are unknown model parameters to be estimated

is a white-noise disturbance with zero mean and constant variance

In cases where the above model is used to assess the energy savings from changes pertaining to exterior lighting measures, the model may be adjusted to include an hours-of-daylight variable based on the customer’s longitude and latitude. When this variable and the set of month dummies are both included the CDH and HDH variables may be dropped from the model if there is evidence of multicollinearity.[[55]](#footnote-56)

Participant-specific parameter values will be obtained by fitting the above model to each participant’s actual interval 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[[56]](#footnote-57), to forecast individual annualized usage profiles for the post-install period for all participating customers. Annualized savings will be calculated by forecasting each participant’s predicted post-install 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.

Navigant will consider using modified models for certain types of changes, such as the exterior lighting example described above. All alternative models will be discussed and agreed to by Navigant and the program implementer. Due to the lack of a control group we will be unable to adjust the savings for any uplift it causes in participation in other EE programs. However, we will review participation in other ComEd programs before and after participation in the Energy Analyzer Program, and include questions in the NTG research survey instrument designed to identify uplift.

***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 CY2019 (Table 2). Navigant will apply that NTG ratio to the adjusted gross savings to estimate the verified net savings for the program in CY2019.

The regression analysis described in the previous section produces gross savings with respect to free ridership.[[57]](#footnote-58) Therefore, Navigant will pursue net-to-gross research in CY2019 to measure free-ridership as well as spillover. This research will involve participant interviews using the study-based protocol as defined by the Illinois Technical Reference Manual (IL TRM).[[58]](#footnote-59) We will use the results of this analysis to support a revised NTG proposal for CY2020.

**Table 3. Deemed NTG Value for CY2019**

|  |  |
| --- | --- |
| Program Path/Measure | CY2019 Deemed NTG Value |
| Remote Commissioning | 1.00 |

*Source:* [*http://ilsagfiles.org/SAG\_files/NTG/2019\_NTG\_Meetings/Final\_Values/ComEd\_NTG\_History\_and\_CY2019\_*](http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/ComEd_NTG_History_and_CY2019_) *Recommendations\_2018-10-01.xlsx*

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

As required by the Future Energy Jobs Act (FEJA), Navigant will report measure-specific ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2019 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated. Navigant will not have the gas usage data and so will not calculate gas savings for this program.

***Program Manager and Implementer Interviews***

Navigant will conduct interviews with the ComEd program manager and implementation contractor to understand the program design and goals. These interviews will focus on how Power Takeoff recruits and interacts with customers, whether and how Power Takeoff informs customers about or promotes other ComEd program offerings, and any areas for program improvement. These interviews will be used to inform our evaluations, including the instruments that will be used for participant surveys.

***Materials Review***

Navigant will request and review program materials to ensure a thorough understanding of the program design and any materials that the program provides to the customer. This review may include documents such as marketing materials; materials provided to participants to explain the program, help them implement the recommended changes, or promote other ComEd program offerings; public and participant-only internet sites; or explanations of program design.

***Participant Net-to-Gross and Process Survey***

The participant surveys will be combined with the NTG research described above and will consist of 20- to 30-minute surveys. We will survey as many participants as can be reached[[59]](#footnote-60) to provide a 90/10 confidence/precision level of NTG ratios for program-level savings. The survey will follow the appropriate free ridership and spillover protocols as defined in the TRM, with an additional focus on effective useful live (EUL) research and the process research questions listed above (i.e., improving persistence, customer satisfaction, desired programmatic changes.).

Research into channeling through the portfolio will be conducted using tracking data rather than customer self-report.

***Use of Randomized Control Trial and Quasi-Experimental Design***

The evaluation team uses a regression-based evaluation method for this program, but it is not a randomized controlled trail (RCT) or quasi-experimental design (QED). An RCT is not being utilized as the program was not designed with a random control group. A QED is not being used as we expect the program savings to be very different for each customer since they’re getting a unique program experience; the method we are utilizing allows us to estimate customer-specific impacts, whereas QED would estimate average program impacts.

**Data Requirements**

Table 4 shows the data Navigant will need for the CY2019 evaluation.

**Table 4. Data Requirements for CY2019 Virtual Commissioning Evaluation**

| Required Data | Relevant Information Requested |
| --- | --- |
| **Tracking Data** | **For all Virtual Commissioning participants:** |
| * Account ID |
| * Date participant was enrolled in Virtual Commissioning |
| * Date participant began each agreed-upon Virtual Commissioning energy-saving action |
| * Opt-out/move-out date (if relevant) |
| * Type of Business or Segment |
|  | * Customer contact information |
|  | * Tracking data for other ComEd C&I EE programs (for evaluation of post-participation changes in program participation) |
| **Customer Usage Data** | **For all Virtual Commissioning participants:** |
| * Account ID |
| * Hourly energy usage values\* for CY2019 (Jan 1, 2019 – Dec 31, 2019) and at least 1 year prior to enrollment |

\* Daily values rolled up from 30-minute interval AMI/AMR meter data obtained from PTO.

**Evaluation Schedule**

Table 5 provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress. Process reporting will occur after the April 30th impact deadline.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Manager and Implementer Interviews | Navigant | December 3-21, 2019 |
| Material Review and Participant Surveys | Navigant/Blackstone | February-March 2020 |
| NTG Draft Memo to ComEd | Navigant | August 15, 2020 |
| Recommended NTG to ComEd and SAG | Navigant | August 15, 2020 |
| Final NTG Memo to ComEd and SAG | Navigant | September 30, 2020 |
| Final evaluation data request sent to ComEd / PTO | Navigant | December 31, 2020 |
| Final evaluation data delivered to Navigant | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Navigant | March 6, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 27, 2021 |
| Revised Draft by Navigant | Navigant | April 3, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 10, 2021 |
| Final Report to ComEd and SAG | Navigant | April 19, 2021 |

# APPENDIX C. Income Eligible Programs Evaluation Plans

## ComEd Affordable Housing New Construction CY2020 to CY2021 Evaluation Plan

### Introduction

The ComEd Affordable Housing New Construction (AHNC) Program provides technical assistance and incentives for energy-efficient construction and major renovation of single-family and multi-family affordable housing. The program targets affordable housing developers and owners for the construction of housing for customers 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. The program is a coordinated program with Peoples Gas (PGL), North Shore Gas (NSG), and Nicor Gas.

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

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementation Contractor Interviews | X | X |
| Data Collection - Program Materials Review |  | X |
| Data Collection - Developer Interviews |  | X |
| Impact - Engineering Review | X | X |
| Impact - Measure-Level Deemed Savings Review | X | X |
| Impact - Verification & Gross Realization Rate | X | X |
| Process Analysis |  | X |

The evaluation team determined the evaluation approach for the CY2020-2021 period based on the needs of the program and the program’s prior evaluation history. The two-year evaluation approach for this program is based on the following:

* Gross and net impact analysis will be conducted each year
* Program manager and implementer interviews will be conducted each year
* Program materials review will be routinely conducted every other year, starting in CY2019. This is contingent on whether there are significant program changes.
* Interviews with affordable housing developers will be conducted in 2021
* Cumulative Persisting Annual Savings (CPAS) will be calculated based on the requirements of the Future Energy Jobs Act (FEJA)

***Coordination***

Navigant will coordinate with the evaluation teams from other utilities on any issues relevant to this program. Specifically, as this is a coordinated program with Nicor Gas and PGL and NSG, the evaluation team will coordinate closely with the gas utilities on issues common to this program. The evaluation activities and timing for each utility evaluation are the same for all utilities. Additionally, Navigant will solicit feedback from and coordinate with the Income Qualified Energy Efficiency Advisory Committee. Ameren does not currently offer an income eligible new construction program; however, we will coordinate on any issues which are common to the evaluation where applicable.

### Evaluation Research Topics

The CY2020 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***

There will be no process research conducted in CY2020.

**Evaluation Approach**

Table 2 summarizes the evaluation tasks for CY2020 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 CY2020 | Notes |
| Tracking System Review | Tracking system | Census |  |
| Gross Impact Evaluation | Early feedback review | As needed | Early feedback for large projects |
| Gross Impact Evaluation | Engineering review | All | Two waves\* |
| Verified Net Impact Evaluation | Calculation using deemed net-to-gross (NTG) ratio | NA |  |

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

#### Program Management and Implementer Interview

Navigant will conduct an in-depth telephone interview with program managers and implementation contractors to understand the current state of the program operations and to discuss any program changes which are relevant to the evaluation. This will be done so we can perform the evaluation with a solid understanding of the program.

#### Gross Impact Evaluation

Since the AHNC Program savings are derived from deemed values contained in the TRM[[60]](#footnote-61), gross savings will be evaluated primarily by (1) reviewing the project savings calculators to ensure that all fields are appropriately populated; (2) reviewing measure algorithms and values in the project savings calculators to assure 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 and project savings calculator review in two waves during the CY2020 evaluation period. Final program gross and net impact results will be based on the two waves combined. Proposed gross impact timelines for CY2020 are shown below:

1. First wave drawn in May 2020 and completed in August 2020
2. The final tracking data is provided by ComEd by January 30, 2021, with reporting finalized by April 30, 2021

#### 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 in CY2020. The CY2020 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 CY2020

|  |  |
| --- | --- |
| Program | CY2020 Deemed NTG Value |
| Affordable Housing New Construction | 1.0 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/*

*Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx*

#### Calculation of CPAS and Annual Savings

As required by FEJA, Navigant will report measure-specific and total ex post gross and net savings for the program, and the CPAS in CY2020 will be calculated for each measure along with the total CPAS for all measures. Additionally, the weighted average measure life will be estimated at the portfolio level.

Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### Evaluation Schedule

Table 4 provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress. We plan to conduct process evaluation activities early in the program year and report results to ComEd as valuable information becomes available.

Table 4. Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2020 program tracking data, project savings calculators, and project documentation | ComEd | May 15, 2020 |
| Wave 1 findings | Evaluation | August 28, 2020 |
| CY2020 program tracking data, project savings calculators, and project documentation | ComEd | January 30, 2021 |
| Draft report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on draft (15 business days) | ComEd and SAG | March 26, 2021 |
| Revised draft by Navigant | Evaluation | April 2, 2021 |
| Comments on redraft (5 business days) | ComEd and SAG | April 9, 2021 |
| Final report to ComEd and SAG | Evaluation | April 23, 2021 |

## ComEd Food Bank Distribution Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Food Bank Distribution Program provides packages of ENERGY STAR certified LEDs, Advanced Power Strips (APS), and Door Sweeps 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. The LEDs, APSs, and Door Sweeps are distributed at no cost to the food banks, food pantries and their customers. CLEAResult Consulting Inc. (CLEAResult) implements the program and coordinates program activities, including engaging with the food banks and their participating food pantries.

In addition to the LED Omni 4-packs distributed in CY2019, ComEd is planning on the addition of the following measures to the program in CY2020:

* 11 W LED Recessed Fixture
* Specialty LED BR30 4-pack
* LED Night Light
* Tier 1 APS Unit, 7 Plug
* Door Sweep

Further research to determine an in-service rate (ISR) for these measures will be conducted in the CY2021 evaluation if they are found to be a significant source of savings in CY2020.

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

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Participant Surveys |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Engineering Review | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |

#### Coordination

Navigant will coordinate with the Illinois Income Qualified Advisory Committee to share results and lessons learned, as needed.

### Evaluation Research Topics

The CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

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

#### Process Evaluation and Other Research Topics

Navigant will not conduct a process evaluation for this program in CY2020.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline |  |
| Tracking System Review | Tracking System | Census | Two waves† |  |
| Gross Impact Evaluation | Engineering Impact Review | Census | Two waves |  |
| Calculation of CPAS | Engineering Impact Review | Census | Two waves |  |
| In-Depth Interview | Program Management and Implementers | 1 | August 2020 |  |

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

#### Tracking System Review

Navigant will perform an early impact tracking system review in CY2020, and we will also review the final tracking data. The Wave 1 of M&V sampling is expected to cover about half of the projects.

#### 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 Technical Reference Manual (TRM) (v8.0). 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.

#### 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 in CY2020. The CY2020 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 CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| LED Lighting | 1.0 |
| Advanced Power Strip (Tier 1) | 1.0 |
| Door Sweep | 1.0 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_Values/ ComEd\_NTG\_History\_and\_CY2020\_Recs\_2019-09-27\_SAG\_Notes.xlsx

#### Program Management and Implementer Interview

Navigant will conduct an in-depth telephone interview with program managers and implementation contractors to understand the current state of the program operations and to discuss any program changes which are relevant to the evaluation. This will be done so we can perform the evaluation with a solid understanding of the program.

#### Calculation of Cumulative Persisting Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

Navigant is not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. Navigant is not using quasi-experimental consumption data because the savings are likely not large enough to achieve statistically significant estimates using this method.

### 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 |
| CY2020 program tracking data for sampling Wave 1 | ComEd | July 17, 2020 |
| Program Manager and Implementer Interview | ComEd | August 14, 2020 |
| Early impact findings memo | Evaluation | August 28, 2020 |
| Final CY2020 Program tracking data to Navigant | ComEd | January 29, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 26, 2021 |
| Revised Draft by Navigant | Evaluation | April 9, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 16, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 23, 2021 |

## ComEd Income Eligible Multi-Family Energy Efficiency CY2020 to CY 2021 Evaluation Plan

### Introduction

The Income Eligible Multi-Family Energy Efficiency Program 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, refrigerators, heating and cooling equipment and custom energy saving measures for eligible properties. The program also offers installation of health and safety measures, including installation of vents, electrical repairs, and asbestos and mold remediation.

There are two different components for this program. The Income Eligible Multi-Family Savings Program (IEMS) is administered by ComEd and Peoples Gas (PGL) and North Shore Gas (NSG) companies and is implemented by Elevate Energy. The Income Eligible Retrofits Multi-Family Program (IER-MF) is administered by ComEd, PGL and NSG, and Nicor Gas and implemented by Resource Innovations in partnership with the Illinois Home Weatherization Assistance Program (IHWAP).

Both the IEMS and IER-MF programs provide 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.[[61]](#footnote-62)

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

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Building Owner and Property Manager Surveys (Lead Lifecycle Analysis) | X |  |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact - Custom Analysis to confirm TRM savings estimates |  | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Impact - Field Work | X |  |

#### Coordination

These are joint programs with the gas utilities and Navigant will coordinate closely with the gas utilities on issues common to the programs. We will ensure that the program tracking data provided by ComEd aligns with that provided by the gas utilities and will pull our samples for field work and surveys with the aim of creating efficiencies between the programs and utilities. Ameren Illinois has a suite of energy efficiency programs for income eligible customers and we will coordinate with Ameren Illinois on as-needed basis. Additionally, Navigant will solicit feedback from and coordinate with the Income Qualified Energy Efficiency Advisory Committee.

### Evaluation Research Topics

The CY2020 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 savings targets?
4. Are there any updates recommended for the Illinois Technical Reference Manual (TRM)?

#### Process Evaluation and Other Research Topics

Navigant will consult with ComEd program leads and plan to conclude the partially completed CY2019 program delivery focused process research in CY2020. The research was planned to address the following research questions for both program components:

1. What are property managers’ and building owners’ perspectives and overall satisfaction with the program?
2. What are the barriers to participation for building owners and property managers?
3. What are conversion rates between marketing and outreach and customer participation? How long does project participation take?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | Two waves |  |
| Lead Lifecycle Analysis | Property Manager/Owner | Sample | Jan 2020 – March 2020 | Only for the Elevate component. |
| Annual Program Implementation Check-In | Program Management and Implementers | 2 | May 2020 | Both components |
| Gross Impact | Early Impact Review | Wave 1 Projects | June 2020 – Oct 2020 | Early Impact review for Wave 1 Projects |
| Gross Impact | On-site M&V | Sample | Sept 2020 – Dec 2020 | Only for the Elevate component |
| Gross Impact | Measure-Level Deemed Savings Review | EOY data | Feb 2021 – March 2021 | Both components |
| Gross Impact | Custom Analysis for non-TRM projects | All custom projects | Feb 2021 – March 2021 | Both components |
| Gross Impact | Verification & Gross Realization Rate | EOY data | Feb 2021 – March 2021 | Both components |

#### Tracking System Review

Navigant will perform tracking system review in waves in CY2020, as well as reviewing the final tracking data. The tracking data will be reviewed for completeness and Navigant will identify any missing inputs needed for conducting the evaluation.

#### Gross Impact Evaluation

The IEMS and IER-MF savings verification will be based on using the applicable TRM v8.0, 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. The impact evaluation will quantify gas measures eligible for kWh conversion and review the parameters ComEd used to estimate eligible gas savings.

This approach will be supplemented in CY2020 with a field work effort which will be focused on verifying measure quantities and installation. Additionally, Navigant will perform a custom analysis for measures which are not included in the 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 in CY2020. The CY2020 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 CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Air Sealing | 1.0 |
| Attic Insulation | 1.0 |
| Central Air Conditioner | 1.0 |
| CFL Lighting | 1.0 |
| Furnace | 1.0 |
| High Performance T8 | 1.0 |
| LED Exit Sign | 1.0 |
| LED Lighting | 1.0 |
| Occupancy Sensor | 1.0 |
| Packaged Terminal Heat Pump | 1.0 |
| Programmable Thermostat | 1.0 |
| Refrigerator | 1.0 |
| Room Air Conditioner | 1.0 |
| Advanced Power Strip | 1.0 |

*Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/*

*Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx*

#### Lead Lifecycle Analysis

Navigant will conclude the lead lifecycle analysis research started in CY2019 in early CY2020. The analysis will focus on the CY2019 program year. The lead lifecycle analysis provides insight into the customer’s decision-making process as they decide whether to participate in the program. This analysis examines a customer's interactions with program marketing and outreach touchpoints to determine whether the program is being promoted at critical decision-making points, such as when equipment fails or when renovations are being planned. In addition, the analysis will examine whether the program is following up with interested customers to encourage participation. The evaluation team will also quantify the conversion ratio between customers reached though marketing and outreach and those who ultimately participate in the program. The lead lifecycle analysis can be used to make targeted improvements to program marketing and outreach, allowing the program to convert more interested customers to participants.

The data collection for the lead lifecycle analysis is comprised of the implementation contractor interview completed in CY2019 and an estimated one to three additional discussions with program stakeholders to finalize details of the analysis. In addition, the evaluation team will interview a small sample of building owners and property managers in CY2020 (estimated five interviews) to understand their experience.

#### Annual Program Implementation Check-In

The evaluation team will conduct an annual program implementation check-in with the program managers and implementers in CY2020. The objectives of this meeting are identified below:

1. Discuss the program findings from CY2019 impact evaluations.
2. Identify tracking data issues and discuss potential ways of resolving them in CY2020.
3. Identify issues with the ex-ante calculators and discuss potential ways of resolving them in CY2020.
4. Review the CY2020 evaluation timeline to avoid any delays.
5. Talk about any changes in the program structure or measure mix being offered.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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, 2020 |
| Lead Lifecycle Analysis findings | Evaluation | March 31, 2020 |
| Annual Program Implementation Check-In | Evaluation | May 15, 2020 |
| CY2020 program tracking data for Wave 1 | ComEd | June 15, 2020 |
| Early Impact Memo | Evaluation | September 15, 2020 |
| CY2020 data extract for on-site sampling | ComEd | September 15, 2020 |
| On-site Verification | Evaluation | December 30, 2020 |
| CY2020 EOY tracking data | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 12, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 2, 2021 |
| Revised Draft by Navigant | Evaluation | April 9, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 16, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 23, 2021 |

## ComEd Income Eligible Product Discounts Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Income Eligible Product Discounts Program provides incentives to increase the market share of ENERGY STAR® certified LED bulbs and fixtures and efficient products such as window air conditioning units, air purifiers, and Tier 1 Advanced Power Strips (Tier 1 APS) 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 technologies. The incentives offered through this program for light bulbs and fixtures are larger than the incentives offered through the market rate Lighting Discounts Program. Currently, ComEd does not offer in-store discounts for the other non-lighting products through the market rate program. The Income Eligible Product Discounts Program is available through retail stores that are likely to serve a high percentage of ComEd residential customers with incomes at or below 80% of the Area Median Income.

The primary objective of the evaluation of the Income Eligible Product Discounts Program is to quantify net savings impacts from the program. The evaluation of this program over the next two years will include a review of the tracking databases, deemed savings reviews, verification of savings and measure-level and program-level realization rates, and estimation of net program impacts. These activities are highlighted in the table below.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Impact – Net Program Savings Estimate | X | X |



#### Coordination

Navigant will coordinate with the ComEd Residential Lighting Discounts Program on any LED bulb and fixture related issues relevant to this program. Ameren Illinois has a residential energy-efficient lighting program offering the Time of Sale discounts to residential electric customers but does not have a similar program targeting income eligible participants and Navigant will coordinate as needed. Navigant will also collaborate with the Income Qualified Energy Efficiency Advisory Committee.

### Evaluation Research Topics

The CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What are the program’s annual total verified gross and net energy savings (kWh) and peak demand (kW) savings?
2. Did the program meet savings goals, and if not, why?
3. What are the net impacts from the program? What is the level of free ridership associated with this program in stores where intercepts can feasibly be conducted

#### Process Evaluation and Other Research Topics

Navigant will not conduct process research for the program in CY2020 or CY2021. The data collection activities required for the process evaluation (Shelf Surveys and Trade Ally Interviews) will not be conducted. As a result, there will be no process related results for this program.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline |
| Tracking System Review | All Program Sales | Census | Ongoing |

#### Tracking System Review

The CY2020 program tracking data review will allow for the verification of rebated measure sales and characteristics of the rebated measures. The program tracking data review will verify that all necessary information is included for the evaluation team to successfully conduct the CY2020 gross impact analysis.

#### Gross Impact Evaluation

The evaluation team will perform an engineering review of savings calculations. For all lighting measures, Navigant 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[[62]](#footnote-65)

Annual Winter Coincident Peak kW Savings = Annual kW Savings \* Winter Peak Load CF[[63]](#footnote-66)

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

For the verification analysis in CY2020, the evaluation team will calculate gross savings using the following parameter estimates:

* **Program Bulb Sales** data will be obtained from the CY2020 EM&V tracking database analysis.
* **Program Bulb Installation Rates** will be obtained from the IL TRM v8.0.
* **Delta Watts** will be calculated using the bulb type lumen-equivalence mapping in the IL TRM v8.0.
* **HOU and Summer Peak CF** will be obtained from both the residential and non-residential sections of the IL TRM v8.0. 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.
* **Residential Bulb Installation Rate** will be obtained from the IL TRM v8.0.
* **Interactive Effects** will be obtained from the IL TRM v8.0.
* **Leakage** will be obtained from the IL TRM v8.0.

Navigant will also calculate gross kWh, kW, and summer and winter peak kW savings for all non-lighting measures (window air conditioners, air purifiers and Tier 1 APS) based on values deemed in the IL TRM v8.0. Navigant will (1) review the tracking system data to ensure that all fields are appropriately populated and savings are consistent with the implementation contractor’s workpapers and savings calculators that feed into the tracking system; (2) review new measures’ algorithms and values in the tracking system and the implementation contractor’s workpapers to ensure that they are appropriately applied; and (3) cross-check Navigant’s calculated savings with the implementation contractor’s calculated savings.

#### Verified Net Impact Evaluation

The verified net impact evaluation will apply the (NTG ratio accepted by Illinois Stakeholders Advisory Group (IL SAG) consensus to estimate the verified net savings for the program in CY2020

The CY2020 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 CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Lighting – DIY, Big Box, and Warehouse Locations | 0.62 |
| Lighting – Non-DIY, Big Box, and Warehouse Locations | 1.00 |
| Non-Lighting | 1.00 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/

Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Research NTG Impact Evaluation

The evaluation team will not conduct NTG research in CY2020 or CY2021. The required data collection activity (in-store intercepts) will not be conducted for these program years. As a result, no updated NTG recommendations will be made for this program.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the CPAS in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

***Use of Randomized Controlled Trial (RCT) and Quasi-Experimental Design***

We are not evaluating the Income Eligible Product Discounts Program via an RCT or quasi-experimental design because the program is delivered upstream and it is not possible to select treatment and control groups for programs where the participants are unknown.

### 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 |
| Wave 1 CY2020 Data Available for Ex Ante Review and Analysis | ComEd | June 15, 2020 |
| Wave 1 CY2020 Ex Ante Review Assessment Memo | Evaluation | July 26, 2020 |
| CY2020 Program tracking data is final | ComEd | January 30, 2021 |
| Draft Impact Report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on draft Impact Report (15 Business Days) | ComEd and SAG | March 25, 2021 |
| Revised Impact Report Draft by Navigant | Evaluation | April 5, 2021 |
| Comments on Impact Report redraft (5 Business Days) | ComEd and SAG | April 12, 2021 |
| Final Impact Report to ComEd and SAG | Evaluation | April 26, 202 |

## ComEd Income Eligible Single Family Retrofit Program CY2020 to CY2021 Evaluation Plan

**Introduction**

The Income-Eligible Single-Family Retrofit (SFR) 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 through two program components. One program component is delivered with the Chicago Bungalow Association (CBA) and is offered jointly with Peoples Gas. The portion of the program offered outside the City of Chicago is delivered by the Chicagoland Vintage Home Association (which is an extension of CBA) and is solely offered by ComEd. The other component is delivered leveraging the State of Illinois’ Home Weatherization Assistance Program (IHWAP). The IHWAP portion is offered jointly with Peoples Gas, North Shore Gas, and Nicor Gas.

Eligible program measures include, but are not limited to:

* 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
* Health and safety measures, such as installation of vents and electrical repairs

The following table shows the data collection and analysis activities over the coming two years.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Impact – Engineering Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Impact – Billing Analysis (Electric Only) |  | X |

The evaluation team created the evaluation approach for the CY2020-CY2021 period based on the needs of the program and program’s history. In CY2018, our impact evaluation efforts focused on conducting field work and verification of tracking data against the Illinois Technical Reference Manual (TRM)[[64]](#footnote-67) and our process evaluation efforts focused on questions related to gaps in participation and the program transition. In CY2019, we applied the results from CY2018 field work and continued process evaluation efforts to identify additional research for upcoming years. Looking forward, the two-year evaluation approach for this program includes:

* Tracking system review and analysis each year to calculate gross and net impact and Cumulative Persisting Annual Savings (CPAS)
* Billing analysis (electric) in 2021 to confirm TRM savings estimates if field work in 2020 finds significant deviations from TRM-deemed hours of use (HOU) for the target population. This timeline will allow for multiple years of post-participation data collection on CY2018 and CY2019 participants.
* Process evaluation conducted each year based upon client request, program performance, and any existing program barriers

***Coordination***

The ComEd evaluation team will coordinate closely with the Peoples Gas evaluation team on issues common to the CBA component and with the Peoples Gas, North Shore Gas, and Nicor Gas evaluation teams on issues common to the IHWAP component. To the best of our ability, we will prepare joint impact reports for ComEd and the gas utilities. The evaluation team will also coordinate with the Illinois Income Eligible Stakeholder Advisory Group and as needed, with Ameren Illinois, who administers the Residential Income Qualified Initiative. Similar to SFR, this initiative has two channels: a Moderate Income Implementation Contractor Channel and an Income Qualified Community Action Agency Channel.

**Evaluation Research Questions**

The CY2020 evaluation will seek to answer the following key research questions:

***Impact Evaluation***

1. What are the program’s annual total verified gross savings for lighting and non-lighting measures?
2. What are the program’s verified net savings?

**Evaluation Approach**

The team will conduct the evaluation tasks in Table 2 for both components to answer the above evaluation questions.

Table 2. CY2019 Core Data Collection Activities, Sample, and Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Target | Target Completes | Notes |
| Gross Impact Evaluation | Engineering Impact Review | NA | Two waves\* for each program component |
| Calculation of CPAS and Annual Savings | Engineering Impact Review | NA | Two waves\* for each program component |

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

***Gross Impact Evaluation***

Since the SFR Program derives savings from deemed values contained in the TRM[[65]](#footnote-68), the team will continue to evaluate savings by reviewing:

* Tracking system data to ensure the accurate population of fields
* Measure algorithms and values in the tracking system to ensure accurate calculation of savings
* Totals to ensure accurate summation of savings

To conduct a billing analysis (electric) in CY2021, Navigant will use a quasi-experimental design to confirm TRM savings estimates for groups of measures. We will not be evaluating the program via a randomized controlled trial because randomly assigned treatment and control groups are not part of the program’s design.

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

As required by the Future Energy Jobs Act (FEJA), we will calculate measure-specific and total CPAS in addition to gross and net savings for the program. We will also include electric savings converted from gas savings and estimate the weighted average measure life at the portfolio level.

***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 in CY2020. The CY2020 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 CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Advanced Thermostat | 1.0 |
| Air Sealing | 1.0 |
| Air Source Heat Pump | 1.0 |
| Attic Insulation | 1.0 |
| Basement/Sidewall Insulation | 1.0 |
| Bathroom Faucet Aerator SF (DI) | 1.0 |
| Bathroom Exhaust Fan | 1.0 |
| Central Air Conditioner | 1.0 |
| Duct Insulation and Sealing | 1.0 |
| ECM Motor Retrofit | 1.0 |
| Floor Insulation Above Crawlspace | 1.0 |
| Freezer | 1.0 |
| HW Pipe Insulation (1 ft.) (DI) | 1.0 |
| Kitchen Faucet Aerator SF (DI) | 1.0 |
| LED Indoor Specialty | 1.0 |
| LED Indoor Standard | 1.0 |
| LED Outdoor Specialty | 1.0 |
| LED Outdoor Standard | 1.0 |
| Programmable Thermostat | 1.0 |
| Refrigerator | 1.0 |
| Room Air Conditioner | 1.0 |
| Showerhead | 1.0 |
| Advanced Power Strip (Tier 2) | 1.0 |
| Wall Insulation | 1.0 |
| Heat Pump Water Heater | 1.0 |
| Water Heater Wrap | 1.0 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/

Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

**Evaluation Schedule**

Table 4 below provides the schedule for key deliverables and data transfer activities. If needed, we will adjust the schedule as evaluation activities progress. We plan to conduct process evaluation activities early in the program year and report results to ComEd and the gas utilities as valuable information becomes available.

Table 4. Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
|  |  |  |
| CY2020 Program Tracking Data for Wave 1 | ComEd, Gas Utilities | July 3, 2020 |
| Tracking System Ex Ante Review Findings and Recommendations to ComEd and Gas Utilities | Evaluation | September 11, 2020 |
| CY2020 Final Tracking Data Request | Evaluation | November 1, 2020 |
| CY2020 Final Wave Data | ComEd, Gas Utilities | January 30, 2021 |
| Draft Report to ComEd, Gas Utilities, and SAG | Evaluation | March 8, 2021 |
| Comments on Draft (15 Business Days) | ComEd, Gas Utilities, and SAG | March 29, 2021 |
| Revised Draft by Navigant | Evaluation | April 5, 2021 |
| Comments on Redraft (5 Business Days) | ComEd, Gas Utilities, and SAG | April 12, 2021 |
| Final Impact Report to ComEd, Gas Utilities, and SAG | Evaluation | April 23, 2021 |

## ComEd Income Eligible Energy Savings Kit Program CY2020 to CY2021 Evaluation Plan

### Introduction

The University of Illinois at Chicago Energy Resources Center (UIC-ERC) implements the Income Eligible Energy Savings Kit (IE Energy Savings Kits) 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, LEDs, low flow faucet aerators and low flow showerheads. The kits also include educational information on additional energy-saving actions customers can do to reduce their energy bills. The target population is income eligible 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 80% AMI or below 250% of the federal poverty line for their household size.

Table 1 lists the measures provided in the IE Energy Savings kits.

Table 1. IE Energy Savings Kit Measures

|  |
| --- |
| Measures |
| 7-Plug Advanced Power Strip (1) |
| 9W LED bulb (2) |
| 15W LED bulb (1) |
| 5W LED 60W replacement Candelabra (1) |
| 5W LED 60W replacement Globe (1) |
| 3-Way 15W LED bulb (1) |
| BR30 8W LED bulb (1) |
| LED night light (1) |
| Low flow faucet aerator for bathroom (1) |
| Low flow faucet aerator for kitchen (1) |
| Low flow showerhead (1) |

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 . IACAA through the 15 participating Community Action Agencies will be responsible for hand delivering the kits to eligible participants.

IACAA is responsible for customer recruitment which takes place in the (15) 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 IE Energy Savings Kits Program (need to be at 80% AMI or below 250% 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 IE Energy Savings Kits 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.

The primary objectives of the evaluation of the IE Energy Savings 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. The evaluation of this program over the coming two years will include a variety of data collection and analysis activities, including those indicated in the following table.

Table 2. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interview | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Engineering Review | X | X |

This evaluation plan details the evaluation approach for CY2020. The evaluation team will determine the evaluation approach for CY2021 based upon the needs of the program.

#### Coordination

As needed, Navigant will coordinate with the other Illinois utility evaluation teams on any issues relevant to this program. The evaluation team will coordinate with the Illinois Income Qualified Advisory Committee as needed.

### Evaluation Research Topics

The CY2020 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 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

Navigant will not conduct a process evaluation for this program in CY2020.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline | Notes |
| Tracking System Review | Tracking System | Census | Two waves† |  |
| Gross Impact | Tracking System | Census | Two waves |  |
| Calculation of CPAS | Engineering Impact Review | Census | Two waves |  |
| In-Depth Interview | Program Management and Implementers | 1 | August 2020 |  |

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

#### Tracking System Review

Navigant will perform an early impact tracking system review in CY2020 and we will review the final tracking data. The Wave 1 of M&V sampling is expected to cover about half of the projects.

#### Gross Impact Evaluation

The IE Kits Program’s savings are derived from the Illinois Technical Reference Manual (TRM). For the impact evaluation, gross savings will be evaluated by (1) reviewing the tracking system to ensure that all fields are appropriately populated, and (2) validate the program used the correct assumptions from the IL TRM v.8.0.

#### 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 in CY2020. The CY2020 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 4. Deemed NTG Values for CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| LED | 1.0 |
| Showerhead | 1.0 |
| Aerator | 1.0 |
| Advanced Power Strip | 1.0 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_Values/ ComEd\_NTG\_History\_and\_CY2020\_Recs\_2019-09-27\_SAG\_Notes.xlsx

#### Program Management and Implementer Interviews

Navigant will conduct an in-depth telephone interview with program managers and implementation contractors to understand the current state of the program operations and to discuss any program changes which are relevant to the evaluation. This will be done so we can perform the evaluation with a solid understanding of the program.

#### Calculation of Cumulative Persisting Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

Navigant is not evaluating the IE Energy Savings Kits Program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. Navigant is not using quasi-experimental consumption data because the savings are likely not large enough to achieve statistically significant estimates using this method.

### 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.

**Table 5. Schedule – Key Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2020 program tracking data for sampling Wave 1 | ComEd | June 12, 2020 |
| Early impact findings memo | Evaluation | August 14, 2020 |
| Final CY2020 Program tracking data to Navigant | ComEd | January 31, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 12, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 2, 2021 |
| Revised Draft by Navigant | Evaluation | April 9, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 16, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 23, 2021 |

## ComEd Manufactured Homes Energy Efficiency Program CY2020 to CY2021 Evaluation Plan

### Introduction

The ComEd Manufactured Homes Energy Efficiency Program offering provides energy efficient products and services to existing manufactured homes in the ComEd service territory to customers with income levels at or below 80% of the Area Median Income. The program is implemented by Slipstream. The program offers an evaluation of the mechanical system and envelope of the home, ductwork and air leak sealing, educational information, and direct installation of energy efficient measures. Slipstream plans to initially target manufactured homes in DeKalb, Grundy, Kankakee, and LaSalle Counties. CY2020 will be the second year this program is offered to ComEd customers.

Eligible program measures include, but are not limited to:

* LED lighting
* Smart and programmable thermostats
* Low-flow faucet aerators and showerheads
* Advanced power strips
* Refrigerators
* Belly insulation
* Ductwork and air leak sealing
* Furnace Blower Motor Replacement
* High Efficiency Bathroom Exhaust Fan
* Health and Safety Measures

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

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Impact – Field Work |  | X |
| Impact – Program Manager and Implementation Contractor Interviews | X | X |

The evaluation team created the evaluation approach for the CY2020 to CY2021 period based on the needs of the program. Looking forward, the two-year evaluation approach for this program includes:

* Tracking system review and analysis each year to calculate gross and net impact and cumulative persisting annual savings (CPAS)
* Field work in CY2021 that includes on-site visual verification to confirm measure installation and to identify any missed energy savings opportunities, dependent on participation

#### Coordination

The evaluation team will coordinate with the Illinois Income Qualified Advisory Committee as needed.

### Evaluation Research Topics

The CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What are the program’s verified gross and net savings?
2. Did the program meet its energy and summer peak demand savings targets? If not, why?

#### Process Evaluation and Other Research Topics

Navigant will not conduct process research for the program in CY2020.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline |
| Program Manager/Implementation Contractor Interviews | Engineering Impact Review | 1 | Summer 2020 |
| Early Impact Review | Engineering Impact Review | NA | August – October 2020 |
| Gross Impact Evaluation | Engineering Impact Review | NA | January – April 2021 |
| Calculation of CPAS and Annual Savings | Engineering Impact Review | NA | January – April 2021 |

#### Gross Impact Evaluation

Since the Manufactured Homes Energy Efficiency Program derives savings from deemed values contained in the TRM[[66]](#footnote-69), the team will evaluate savings by reviewing:

* Tracking system data to ensure the accurate population of fields
* Measure algorithms and values in the tracking system to ensure accurate calculation of savings
* Totals to ensure accurate summation of savings

Where possible, we may also supplement the above approach by reviewing:

* Project documentation to verify participation, installed measure quantities, and associated savings

These activities will also serve to assess program comprehensiveness and missed opportunities.

#### 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 in CY2020. The CY2020 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 CY2020**

|  |  |
| --- | --- |
| Program | CY2020 Deemed NTG Value |
| Manufactured Homes Energy Efficiency | 1.00 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01

#### Research NTG Impact Evaluation

No NTG research is planned for this income eligible program.

#### Ad Hoc Program Management and Implementer Meetings

The evaluation team will meet with the program manager and implementer on an ad hoc basis to support program evaluation. The purpose of these meetings will be information sharing and collaboration to resolve evaluation inconsistencies and ensure accurate and timely program evaluation. These meetings will provide program design and implementation context for the evaluation team to cater evaluation to the program. Possible topics include changes to program design and implementation, and expected program changes going forward. This is also an opportunity for the program manager and implementer to ask the evaluation team for preliminary research findings.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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 Manager and Implementer Interviews | Evaluation | May 15, 2020 |
| CY2020 program tracking data for Wave 1 | ComEd | August 31, 2020 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | October 19, 2020 |
| CY2020 Final Tracking Data Request | Evaluation | October 19, 2020 |
| CY2020 Final Wave Data | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 11, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 1, 2021 |
| Revised Draft by Navigant | Evaluation | April 6, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 13, 2021 |
| Final Impact Report to ComEd and SAG | Evaluation | April 20, 2021 |

## ComEd Public Housing Retrofits Program CY2020 to CY2021 Evaluation Plan

### Introduction

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

The purpose of this program is to work with 21 Illinois Public Housing Authorities (PHAs) and their portfolios of 51,693 housing units and other buildings to achieve energy savings. This market segment is considered underserved 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 equipment in residential units, common areas, maintenance and community buildings, and any other buildings they own and manage in ComEd’s territory.

Elevate Energy is the program implementation contractor for this program. Prior to CY2018, the program was operated under the Illinois Department of Commerce and Economic Opportunity (DCEO). CY2020 will be an impact-focused year for the evaluation, with the primary objective of quantifying the gross savings impacts of the program. In CY2021, the evaluation will reach beyond impact tasks by conducting surveys with building residents (the beneficiaries of the energy efficiency (EE) upgrades) and interviews with the growing number of Energy Efficiency Service Providers (EESP) delivering the program.

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

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Data Collection – Resident Interviews |  | X |
| Data Collection – EESP and Stakeholder Interviews |  | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Process Analysis |  | X |

#### Coordination

Navigant will coordinate with the evaluation teams for Nicor Gas, Peoples Gas, and North Shore Gas on any issues relevant to this program. Specifically, Navigant will coordinate impact and process research with the Ameren Illinois Public Housing Initiative evaluation team. Navigant will coordinate with the Ameren IL team on data collection and survey instrument design to ensure consistency where appropriate.

### Evaluation Research Topics

The CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

* What are the program’s annual verified gross savings (energy, peak demand, and total demand)?
* What are the program’s annual verified net savings?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Timeline |
| Early Impact Review | Tracking system | Census | August – September 2020 |
| Gross Impact Evaluation | Engineering File Review | Sample | August – September 2020 |
| Gross Impact Evaluation | Engineering Impact Review | NA | January – April 2021 |
| Calculation of CPAS and Annual Savings | Engineering Impact Review | NA | January – April 2021 |
| In Depth Interview | Program Management and Implementers | 1 | April – June 2020 |

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#### Tracking System Review

Navigant will perform tracking system review in waves in CY2020, as well as reviewing the final tracking data. The Wave 1 of M&V sampling is expected to cover about half of the projects.

#### Gross Impact Evaluation

The measure type, deemed or non-deemed, will dictate the savings verification approach. For measures with per unit savings values deemed by the TRM, Navigant will calculate verified gross savings estimated by multiplying deemed per unit savings (kWh and kW) by the database-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. 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.

#### 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 in CY2020. The CY2020 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 CY2020**

|  |  |
| --- | --- |
| Program | CY2020 Deemed NTG Value |
| Public Housing Authority | 1.0 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/

Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the CPAS in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Program Management and Implementer Interview

The evaluation team will interview the program manager about the goals of the program, implementation, and perceived effectiveness as relevant to the impact evaluation. The program implementer interview will focus on details of program implementation. Both interviews will focus on changes made in CY2020 in comparison to the prior program year. This will be done so we can perform the evaluation with a solid understanding of the program.

### 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 Manager and Implementer Interview | Evaluation | June 15, 2020 |
| CY2020 program tracking data for Wave 1 | Evaluation | July 30, 2020 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | September 10, 2020 |
| CY2020 Final Wave Data | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 8, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2021 |
| Revised Draft by Navigant | Evaluation | April 8, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 15, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 23, 2021 |

# APPENDIX D. Residential Programs Evaluation Plans

## ComEd Appliance Rebates Program CY2020 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 advanced power strips, advanced thermostats, air purifiers, electric clothes dryers, electric clothes washers, dehumidifiers, freezers, refrigerators, and pool pumps.

The primary objectives of the evaluation of the ComEd Appliance Rebates Program are to: (1) determine gross and net program savings and (2) examine the effectiveness of program processes in achieving savings.

The CY2020 gross impact evaluation will be conducted similarly to previous years, with adjustments to accommodate changes to the measure mix.

Table 1 summarizes the data collection and analysis activities scheduled for the next three years.

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

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Process Analysis |  | X |

#### Coordination

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this program, including coordinating with Ameren’s evaluation team on NTG survey instruments used for free ridership and spillover research. Additionally, Navigant will coordinate with the evaluation team for Ameren’s Retail Products program as they begin to offer rebates on appliances in 2020.

### Evaluation Research Topics

The CY2020 evaluation team will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What are the program’s verified gross kWh, peak demand kW savings, and therm savings?
2. What are the program’s verified net kWh, peak demand kW, and therm savings?
3. What are the program’s Cumulative Persisting Annual Savings (CPAS)?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

### Evaluation Approach

Table 2 summarizes the evaluation tasks for CY2020 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, Sampling, and Analyses**

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Notes |
| Tracking System Review | Tracking system | Census | Concurrent with gross impact analyses. |
| In-Depth Interviews | Program Management and Implementers | 2 | Augment with monthly calls |
| Gross Impact Evaluation | TRM Review | Census | Wave one and final data† |
| Verified Net Impact Evaluation | Calculation using deemed NTG ratio | Census |  |

\* SO refers to Spillover

† Navigant will coordinate with ComEd to determine appropriate date to pull the “wave 1” tracking data extract.

#### Tracking System Review

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures.

#### Program Management and Implementer Interviews

We will conduct in-depth interviews with program managers and implementation contractors to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

Key insights from in-depth interviews will inform impact analysis through a discussion of yearly program changes and will inform future process evaluation research topics. These interviews and meetings will also focus on findings and recommendations from Wave analyses to help ComEd and the implementation contractor plan for final reporting.

#### Researched NTG Analysis

The evaluation will not include NTG research in CY2020.

#### Gross Impact Evaluation

Appliance Rebates Program measure savings are derived from deemed values contained in the TRM. Subsequently, gross savings will continue to be evaluated by (1) reviewing the tracking system data to ensure that all fields are appropriately populated and savings are consistent with the implementation contractor workpapers and savings calculators that feed into the tracking system; (2) reviewing new measures’ algorithms and values in the tracking system and implementation contractor workpapers to ensure that they are appropriately applied; and (3) cross-checking Navigant’s calculated savings with the implementation contractor’s calculated savings.

Navigant will complete this process two times, once during the Wave 1 impact analysis and again during the final analysis in March 2021. The Wave 1 impact analysis provides an opportunity for Navigant to give early feedback to the implementation contractor and ComEd with ample time to discuss potential discrepancies and make adjustments prior to the end of the program year. Concurrently with the Wave 1 and final impact analyses, the evaluation team will review program data in ComEd’s eTRACK system to ensure data is consistent. In addition to calculating electric savings, the evaluation team will also calculate gas savings for eligible measures.

#### 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 provides the recommended NTG ratios for use in CY2020.

**Table 3. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020  Deemed NTG Value |
| Advanced Power Strip – Tier 1 | 0.76 |
| Advanced Thermostat | NA\* |
| Air Purifier | 0.79 |
| Clothes Dryer | 0.67 |
| Clothes Washer | 0.63 |
| Dehumidifier | 0.67 |
| Freezer | 0.63 |
| Pool Pump | 0.80 |
| Refrigerator – Time of Sale (TOS)\*\* | 0.65 |

\* TRM-deemed savings represent net savings for this measure.

\*\*TOS = Time of Sale

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Calculation of CPAS and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report electric, gas, and total CPAS for CY2020. For measures that achieve gas savings, Navigant will convert gas savings to electric savings for inclusion in total CPAS. Additionally, the weighted average measure life will be estimated, and Navigant will calculate the weighted average measure life for the program.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the Appliance Rebates Program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because the savings from the Appliance Rebates Program represent a small percentage of the total household’s savings and there are not enough participants in this program to achieve statistically significant savings estimates using this method.

### Evaluation Schedule

Table 4 provides scheduling details for key impact and process evaluation deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress. We plan to conduct process evaluation activities early in the program year and report results to ComEd as valuable information becomes available.

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

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Program Calculators and Workpapers | ComEd | October/November 2019 |
| CY2020 Program Tracking Data for Wave 1 Data Review and Analysis | ComEd | June 12, 2020 |
| Program Manager and Implementation Contractor Interviews | Evaluation | TBD |
| Tracking System Wave 1 Ex Ante Review Findings and Recommendations | Evaluation | August 14, 2020 |
| CY2020 Final Program tracking data | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 8, 2021 |
| Comments on Draft (15 Business Days) | ComEd and SAG | March 22, 2021 |
| Revised Draft by Navigant | Evaluation | March 29, 2021 |
| Comments on Redraft (5 Business Days) | ComEd and SAG | April 2, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 16, 2021 |

## ComEd Elementary Energy Education Program CY2020 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.

The primary objectives of the CY2020 evaluation of the EEE Program are to: (1) quantify net and gross electric savings impacts (as well as natural gas savings from ComEd-only kits) from the program and (2) identify enhancements to the program. The CY2020 gross impact evaluation will not vary significantly from the previous years. Table 1 lists the different surveys associated with this program.

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

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | TBD |
| Process Analysis – Analyze Teacher Surveys (collected by RAP) | X |  |

#### Coordination

Navigant will coordinate with the evaluation teams from other utilities on any issues relevant to this program, since the EEE Program is jointly offered by ComEd, Nicor Gas, Peoples Gas and North Shore Gas Companies, with Resource Action Programs (RAP) as the implementation contractor. In addition, Navigant will coordinate with the evaluation team for Ameren’s Direct Distribution Efficient Products program which has a similar program design to the EEE Program.

### Evaluation Research Topics

The CY2020 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 (first year and lifetime)?
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

The implementer conducts teacher and participant surveys throughout the year to measure satisfaction with the program. Because the program has doubled in size and quite a few new schools have been added to ComEd’s service territory since the NTC Middle School Kits program ended in 2018, Navigant proposes analyzing and summarizing the results from RAP’s teacher evaluation survey to ensure teachers that used to participate in NTC’s program are satisfied with the EEE program implementation.

Teaching the program material for the EEE program compared to the NTC program is very different. Teachers are responsible for teaching the program material to students over a certain amount of days for the EEE program. Navigant plans to analyze the results from the teacher evaluation surveys from those teachers that used to participate in the NTC program to understand the effectiveness of EEE’s program materials including the products in the kits focusing on opportunities for improvement.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Notes |
| Gross Impact Approach | Tracking system Review | All | Two Waves† |
| Gross Impact Approach | Student Survey Analysis | All | Two Waves† |
| In Depth Interviews | Program Management and Implementers | 2 |  |
| Verified Net Impact | Calculation using deemed NTG ratio | NA |  |

† Navigant will coordinate with ComEd to determine appropriate dates to pull Wave 1 tracking data extract.

#### Gross Impact Approach

Since all of the EEE Program’s savings are based on the Illinois Technical Resources Manual (IL TRM) estimates, the evaluation team will conduct a limited gross impact evaluation in CY2020. 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.

Verified gross savings for all the measures included in the kits will be calculated for each participant using appropriate IL TRM algorithms and customer-specific data collected in the tracking system. For custom input variables, 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. The evaluation team will convert therm savings to kWh savings for water saving measures in the ComEd-only kits.

#### Program Manager and Implementer Interviews

We will conduct in-depth interviews with program managers and implementation contractors to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

Key insights from in-depth interviews will inform impact analysis through a discussion of yearly program changes and will inform future process evaluation research topics. These interviews and meetings will also focus on findings and recommendations from Wave analyses to help ComEd and the implementation contractor plan for final reporting.

#### Verified Net Impact Evaluation

The verified net impact evaluation will apply a program-level NTG ratio deemed through a consensus process by the IL SAG to estimate the verified net savings for the EEE Program. The NTG values for CY2020 are shown in the table below.

Table 3. Deemed NTG Values for CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| LEDs | 0.84 |
| Other EEE Measures | 1.0 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial (RCT) and Quasi-Experimental Design (QED)

Navigant is not evaluating the EEE Program via an RCT because the program was not designed with randomly assigned treatment and control groups. Navigant is not using QED consumption data because this program contains many unique measures with significant cross-participation. In this case, QED consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis

### Evaluation Schedule

Table 4 below provides the schedule for key deliverables and data transfer activities. (See Table 2 for other evaluation details.) Adjustments will be made, as needed, as evaluation activities progress.

Table 4. Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2020 Calculators and Workpapers Review | Evaluation | October/November 2019 |
| CY2020 program tracking data for Wave 1 | ComEd | July 10, 2020 |
| Wave 1 project documentation, engineering reviews, feedback | Evaluation | September 15, 2020 |
| Final CY2021 Program tracking and customer survey data | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 25, 2021 |
| Revised Draft by Navigant | Evaluation | April 1, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 7, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 16, 2021 |

## ComEd Fridge Freezer Recycling Program CY2020 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 meet a reduced level of participation during CY2020, the program is reducing the incentive to $35 from the previous $50 per unit level. This incentive is provided for up to two recycled refrigerators or freezers 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 plans to collect a refrigerator or freezer (so the room AC unit can “ride for free”). Note that the program has discontinued eligibility for dehumidifiers in 2020. Participants contributing working room AC units receive a $10 program incentive. Additionally, smaller refrigerators (capacity less than 9 cubic feet) are eligible for recycling through special recycling turn-in events, where the program is providing $25/unit incentive for these smaller units. Finally, a few older units, that look large outside but are undersized (less than 10 cubic feet) interior measurements (called “small units” or “SUs”) are collected only if the customer is elderly or disabled and needs to have it removed and agrees to not receive an incentive.

During CY2020, impact related activities will be completed, including net-to-gross (NTG) related activities (data collection and analysis). The evaluation team will not be conducting a full process evaluation for CY2020, due to similar findings in past program cycles. However, a limited scope process evaluation will be done to examine the effect of the reduced incentive on customer participation and satisfaction levels. A full process evaluation is recommended for the CY2021 evaluation, given the three-year hiatus since the PY9 one was completed.

The objectives of the CY2020 evaluation are to quantify net energy and peak demand savings impacts from the program, , assess free ridership associated with recycled units and determine customer acceptance of the reduced incentive. CY2020 impact evaluation activities such as surveying participating customers and interviewing the largest and most active retailers reported to have sold new replacement units to participants will be completed and survey findings will be used to update the NTG ratio for future use.

The evaluation activities for this program over the coming two years are indicated in Table 1.

Table 1. Evaluation Approaches – Two Year Plan

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

The evaluation team determined the evaluation approach for the CY2020-2021 period based upon the needs of the program and the program’s history. The two-year evaluation approach for this program is based on the following:

* Annual gross and net impact analysis
* Optimized timing on when to conduct part-use, unit location and NTG research
* Cumulative Persisting Annual Savings (CPAS) will be calculated based upon the requirements of the Future Energy Job Act (FEJA)

#### 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. Due to the nature of participant responses and retailer prominence, the ComEd NTG scores are a hybrid of participating customer and retailer-based NTG, which is consistent with the Enhanced method in the TRM. The Ameren NTG scores, however, have less weight on retailer-based NTG scores. The two teams then compare and discuss results at the end of the evaluation process.

### Evaluation Research Topics

The CY2020 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 (first year and lifetime)?
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)?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Notes |
| Tracking System Review | Tracking system | Census |  |
| In Depth Interviews | Program Management and Implementers | 2 |  |
| Telephone and Web Surveys | Participating Customers | 425 | Focus on verification and net-to-gross assessment |
| In-Depth Interviews | Retailers Associated with Unit Replacements | 5 |  |
| Gross Impact Evaluation |  |  | Bottom-up regression-based estimation. Part-use factor from surveys. |
| Verified Net Impact Evaluation |  |  | Deemed NTG Value |

#### Tracking System Review

Navigant will perform tracking system review in waves in CY2020, as well as reviewing the final tracking data. Wave 1 is expected to cover about half of the projects.

#### Program Management and Implementer Interviews

We will conduct in-depth interviews with program managers and implementation contractors to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

Key insights from in-depth interviews will inform impact analysis through a discussion of yearly program changes and will inform future process evaluation research topics. These interviews and meetings will also focus on findings and recommendations from Wave analyses to help ComEd and the implementation contractor plan for final reporting.

#### Telephone and Web Surveys

A multi-modal approach will be used to conduct participant surveys, relying on both telephone and web surveys. This approach reflects the transition to a changing industry survey research environment and improved survey data quality and coverage. The participant survey will ask questions that will affect the evaluated part-use factor and NTG ratio. Participants will be asked how their units would have been disposed of if the program had not picked them up. The survey will also ask a few questions to gauge participant’s awareness of program features.

#### Gross Impact Evaluation

The CY2020 ex ante and evaluation-verified gross energy savings will be calculated directly using procedures specified in the Illinois Technical Reference Manual (TRM) version 8.0 (CY2020). The program tracking database and TRM v8.0 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 the customer’s decision to participate in 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 TRM v8.0 states that the most recent part-use-factor participant survey results available at the start of the program year shall be used in refrigerator and freezer recycling energy savings calculations. In CY2020, the source of the part-use factor is the CY2018 evaluation. Savings estimates will be developed for the full population of units collected in CY2020 to estimate CY2020 Unit Energy Consumption (UECs). The ex-post savings estimates of energy (kWh) savings will rely on regression equations as specified in the TRM v8.0. 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 v8.0. The coincidence factors in the TRM v8.0 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 CY2020. In addition, gross energy savings estimates will be adjusted for part-use, by applying part-use factors from the CY2018 evaluation.

#### Verified Net Impact Evaluation

The evaluation team will apply the NTG ratio(s) approved by the Stakeholder Advisory Group (SAG) to the estimate of evaluation-verified gross savings to compute verified net savings. Separate estimates will be made for each appliance type – refrigerators and freezers.

In addition, telephone and web surveys of customers and retailers will be conducted to update the research-based NTG ratio for future years. Under this approach, the existing participant survey is used to guide the analytical approach for the retailer associated units, as well as the non-replaced units picked up by Recleim at customers’ homes. Specifically, for those participating customers surveyed that indicate they would otherwise have their appliance retailer remove the old unit after a new one is acquired, the NTG ratio 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.

#### 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 participating customer surveys to understand how participants would have disposed of their units if the program had not picked them up. For participants that replaced their old units, surveys will include a question to determine who they bought the new unit from. We will include new response categories and related consistency checking questions to ensure the responses given to the question used to determine free ridership[[67]](#footnote-70) includes the disposal options available to them via the retailer they bought it from.
2. *In-depth interviews with retailers associated with unit replacements.* 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 during the past three years to provide information regarding trends and to characterize the robustness of utilized factors. 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. We will obtain the names of these retailers from the participating customer telephone surveys, wherein participants that replaced their unit will choose who they purchased it from.

**Free Ridership –** T the NTG ratio will be computed using an algorithm approach which utilizes a blend of 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 NTG ratio calculation.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by FEJA, Navigant will report ex post gross and ex post net savings for the program and the CPAS in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial (RCT) and Quasi-Experimental Design (QED)

Navigant is not evaluating the FFR Program via a RCT because the program was not designed with randomly assigned treatment and control groups. Navigant is not using QED consumption data because this program contains many unique measures with significant cross-participation. In this case, QED consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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 |
| CY2020 Calculators Review | Evaluation | October/November 2019 |
| Program management and implementer in-depth-interviews | Evaluation | April/May 2020 |
| CY2020 program tracking data for Wave 1 | ComEd | June 30, 2020 |
| NTG Draft Report to ComEd and SAG | Evaluation | July 15, 2020 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | July 31, 2020 |
| Participant telephone and web surveys | Evaluation | October/November 2020 |
| CY2020 program tracking data | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 25, 2021 |
| Revised Draft by Navigant | Evaluation | April 1, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 7, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 16, 2021 |

## ComEd Heating and Cooling Rebates Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Heating and Cooling (HVAC) Rebates Program offers incentives for the installation of qualifying, high efficiency heating and cooling equipment. The measures incentivized through the HVAC Rebates Program are air source heat pumps (ASHP), central air conditioners (CAC), ductless mini-split heat pumps (DMSHP), furnace blower motors (ECM[[68]](#footnote-71)), ground source heat pumps (GSHP), ENERGY STAR® thermostats, duct sealing and AC tune up . The program is implemented as a “closed network” Energy Efficiency Service Provider (EESP) program, meaning that only installations completed by a contractor in the ComEd Residential EESP Network qualify for a rebate. ComEd Residential EESPs must be Illinois Commerce Commission (ICC) Energy Efficiency Installer certified and meet the program eligibility requirements.

Notable program changes made from transitioning from CY2019 to CY2020 include:

* CACs will now be offered through a midstream rather than downstream channel. Due to this change, all rebates will be under $300 and will allow any contractor to receive a rebate for CACs, not just the “closed network” EESPs. Navigant will work with the implementer to evaluate these projects now that measure is being incentivized to distributors rather than customers.
* Duct sealing and AC Tune up are now being incentivized through the program.

The primary objective of the evaluation of the HVAC Rebates Program is to determine gross and net program savings..

The CY2020 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 two years will include a variety of data collection and analysis activities, including those indicated in the following table.

Table 1. Evaluation Approaches – Two Year Plan

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

The evaluation team determined the evaluation approach for the CY2020-CY2021 period based upon the needs of the program and program’s history. The two-year evaluation approach for this program is based on the following:

* Annual gross and net impact analysis.
* Interviews with the program manager and implementer will be conducted in CY2020 to inform the Navigant team of any substantial changes to the program for the upcoming year.
* Budget permitting, we will conduct participant spillover in CY2021 with CY2020 participants.
* Budget permitting, interviews with participating EESPs will be conducted in CY2021 to inform program spillover.

#### 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 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 hybrid participating customer and 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 CY2020 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 (first year and lifetime)?
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 not conduct process research for the Heating and Cooling Rebates Program in CY2020. Navigant will consult with ComEd program leads on focused, key process questions to be answered to help improve and inform the program in 2021.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Notes |
| Tracking System Review | Tracking system | Census | One interim and one final |
| In Depth Interviews | Program Management and Implementers | 2 |  |
| Gross Impact Evaluation | TRM Review | Census | One interim and on final |
| Verified Net Impact Evaluation | Calculation using deemed NTG ratio | NA | Deemed Value |

#### Tracking System Review

Navigant will perform an interim tracking system review in the summer of 2020 in line with program changes and an accelerated evaluation schedule for delivering tracking data to the evaluation team. Navigant will perform final tracking system review in February 2021 once Navigant receives the end of year tracking data from ComEd in preparation for the final CY2020 report.

***Program Management and Implementer Interviews***

We will conduct in-depth interviews with program managers and implementers to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

Key insights from in-depth interviews will inform impact analysis through a discussion of yearly program changes and will inform future process evaluation research topics. These interviews and meetings will also focus on findings and recommendations from wave analyses to help ComEd and the implementation contractor plan for final reporting.

#### Gross Impact Evaluation

The gross impact analysis will include a review of deemed savings estimates for all measures in the program, in 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. If new measures are included in CY2020, Navigant will perform a desk review of program calculations and compare savings to the Illinois TRM. The evaluation team will also 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 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 CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Central AC | 0.83 |
| Advanced Thermostat | NA |
| Air Source Heat Pump | 0.57 |
| Ductless Mini-Split | 0.63 |
| ECM Furnace Motor – with Furnace Upgrade | 0.78 |
| ECM Furnace Motor – without Furnace Upgrade | 0.78 |
| Geothermal Heat Pump | 0.59 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this program contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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 Calculators and Workpapers | ComEd | October/November 2019 |
| Program Management and Implementers Interviews | Evaluation | TBD |
| CY2020 Wave 1 program tracking data for Interim Review | ComEd | June 30, 2020 |
| Tracking System Wave 1 Ex Ante Review Findings and Recommendations | Evaluation | August 30, 2020 |
| CY2020 EOY program tracking data for Final Review | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 25, 2021 |
| Revised Draft by Navigant | Evaluation | April 1, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 7, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 14, 2019 |

## ComEd Home Energy Assessment Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Home Energy Assessment (HEA) Program 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 smart thermostats (with co-pays), and free and co-pay leave behind advanced power strips (at eligible single family residences) 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 CY2020, the program is being offered jointly between ComEd, Peoples Gas (PGL) and North Shore Gas (NSG) and Nicor Gas. The program is marketed as the HEA Program for ComEd, Home Energy Jumpstart Program for PGL and NSG, and Home Energy Savings Program for Nicor Gas. Franklin Energy Services LLC (Franklin Energy) is the implementation contractor for all the programs.

The ComEd CY2020 net savings forecast is 20,754 MWh per the ComEd 2018-2021 Energy Efficiency Demand Response Plan.

The primary objectives of the evaluation of the 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 PGL and NSG and Nicor Gas. The CY2020 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 two years will include a variety of data collection and analysis activities, including those indicated in Table 1.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Participant Surveys |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Net-to-Gross – Customer Self-Report Surveys |  | X |
| Process Analysis |  | 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, PGL and NSG Companies with Franklin Energy as the implementation contractor. The evaluation tasks for this program over the next two years are similar for these utilities.

### Evaluation Research Topics

The CY2020 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 (first year and lifetime)?
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

The evaluation team will not conduct any process research in CY2020.

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Notes |
| Tracking System Review | Tracking system | Census |  |
| In Depth Interviews | Program Management and Implementers | 2 |  |
| Gross Impact | Engineering File Review | Census | Two Waves† |
| Verified Net Impact | Calculation using deemed NTG ratio | NA |  |

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

#### Tracking System Review

The tracking system review serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is accurately calculating savings defined by the TRM.

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 2020. Wave 1 is expected to cover about half of the projects.

#### Program Management and Implementer Interviews

We will conduct in-depth interviews with program managers and implementation contractors to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

Key insights from in-depth interviews will inform impact analysis through a discussion of yearly program changes and will inform future process evaluation research topics. These interviews and meetings will also focus on findings and recommendations from Wave analyses to help ComEd and the implementation contractor plan for final reporting.

#### Gross Impact Evaluation

The key gross impact evaluation activities for the program in CY2020 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 is appropriately applied, and (3) cross-checking measure totals and savings recorded in the tracking database.

#### Verified Net Impact Evaluation

For CY2020, the primary method to determine net and gross savings will be a program tracking system review and applying measure-level net-to-gross (NTG) ratios that are deemed through a consensus process by the Illinois Stakeholder Advisory Group (IL SAG).

The verified net impact evaluation will apply the NTG ratios accepted by IL SAG consensus to estimate the verified net savings for the program. Those NTG values are shown in the following table.

**Table 3. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Lighting | 0.84 |
| Bath Aerators | 1.04 |
| Kitchen Aerators | 1.04 |
| Showerheads | 1.04 |
| Programmable Thermostats | 0.90 |
| Pipe Wrap | 0.80 |
| Tier 1 Advanced Power Strips | 0.85 |
| Co-Pay Tier 2 Advanced Power Strips | 0.85 |
| Co-Pay Smart Thermostats | NA |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the CPAS in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated. The evaluation will also add the savings converted from gas savings to the electric savings so that it is documented in the report.

#### Use of Randomized Controlled Trial (RCT) and Quasi-Experimental Design (QED)

Navigant is not evaluating the Home Energy Assessment Program via an RCT because the program was not designed with randomly assigned treatment and control groups. Navigant is not using QED consumption data because this program contains many unique measures with significant cross-participation. In this case, QED consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### 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 |
| CY2020 Calculators and Workpapers Review | Evaluation | October/November 2019 |
| CY2020 Program Tracking Data for Sampling Wave 1 | ComEd | June 30, 2020 |
| Tracking System Ex Ante Review Findings and Recommendations | Evaluation | August 14, 2020 |
| CY2020 Final Program Tracking Data | Evaluation | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on Draft (15 Business Days) | ComEd and SAG | March 25, 2021 |
| Revised Draft by Navigant | Evaluation | April 1, 2021 |
| Comments on Redraft (5 Business Days) | ComEd and SAG | April 7, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 14, 2021 |

## ComEd Home Energy Report Program CY2020 to CY2021 Evaluation Plan

### Introduction

The Home Energy Report (HER) Program is a behavioral-based energy efficiency program implemented by Oracle. In CY2020, ComEd’s HER program will consist of 12 waves of varying sizes.

The evaluation of this program over the coming two years will focus on estimating energy savings generated by regularly mailing customers reports that provide information about energy use and conservation. Table 1 lists tasks that we plan to complete as part of the evaluation. We plan to conduct the same type of analysis for the two years remaining in the evaluation cycle as we have in the past. We do not plan to conduct any process-related research at this time.

Table 1. Evaluation Approaches – Two-Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Regression Analysis | X | X |

#### Coordination

Our ComEd evaluation team 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 programs are closely coordinated. These evaluations are also closely aligned with the gas utility HER program evaluations.

### Evaluation Research Topics

The CY2020 evaluation will seek to answer the following key impact researchable questions:

1. How much energy do customers in the program save during the program year?
   * What is the apparent long-run trend (flat, increasing, or falling) in program savings?
2. What is the uplift in other ComEd energy efficiency programs due to the reports?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Timeline | Notes |
| In Depth Interviews | Program Management and Implementers | 1 | June-July 2020 |  |
| Tracking System Review | Tracking system | Census | August, 2020 |  |
| Impact\* | Regression analysis and uplift analysis | Census | February-April, 2021 |  |

\*Regression analysis produces impacts which are intrinsically net savings, aside from uplift.

#### Program Management and Implementer Interviews

The evaluation team will interview the program manager and implementation contractor about program marketing and processes to better understand the goals of the program, implementation, and perceived effectiveness. Both interviews will focus on changes made in CY2020 or expected in CY2021 in comparison to the prior program year. These interviews allow us to ensure that we know of program changes that could our impact evaluation.

#### Tracking System Review

Navigant will perform a tracking system review on wave 1 data part way through CY2020, as well as reviewing the final tracking data. The wave 1 review will allow us to identify and rectify any issues with the data before the final evaluation.

#### Impact Evaluation

For all waves, the evaluation team will measure CY2020 program impacts through billing analysis using a lagged dependent variable (LDV) model. Billing analysis implicitly estimates net impacts, so no net-to-gross adjustment is necessary.

The New Mover Wave evaluation will be slightly different from the other waves 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 identification, 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, the evaluation team will run the same LDV model 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 evaluations. Uplift savings will be netted out of HER results to avoid double counting. The evaluation team will consider both uplift that occurs in CY2020 and legacy uplift from PY4 to CY2019.

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 net-to-gross adjustment is necessary.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated. Converted gas savings will not be calculated for this program.

### 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 |
| Interviews with program manager and implementation contractor | Evaluation | Aug 31, 2020 |
| Mid-year data request | Evaluation | Jul 13, 2020 |
| Mid-year data delivery | ComEd | Aug 10, 2020 |
| Early data characterization memo | Evaluation | Aug 31, 2020 |
| Final data request | Evaluation | Dec 6, 2020 |
| Final data delivery[[69]](#footnote-72) | ComEd | Jan 30, 2021 |
| Draft report to ComEd and SAG | Evaluation | Mar 13, 2021 |
| Comments on draft (15 Business Days) | ComEd | Apr 3, 2021 |
| Revised draft to ComEd and SAG | Evaluation | Apr 10, 2021 |
| Comments on redraft (5 Business Days) | ComEd/SAG | Apr 17, 2021 |
| Final report to ComEd and SAG | Evaluation | Apr 24, 2021 |

Data will include approximately 70% of bills ending on or before December 31, 2020.

## ComEd Lighting Discounts Program CY2020 to CY2021 Evaluation Plan

### Introduction

The ComEd Residential Lighting Discounts Program provides incentives to increase the market share of qualified LED directional and specialty bulbs and fixtures sold through retail sales channels. The Lighting Discounts Program also provides educational materials to retailers to increase customer awareness and acceptance of energy-efficient lighting technologies and promote proper bulb disposal.

The primary objective of the evaluation of the Lighting Discounts Program is to quantify net savings impacts from the program. The evaluation of this program over the coming two years will include a review of the tracking databases, deemed savings reviews, verification of savings and measure-level and program-level realization rates, and estimating net program impacts. These activities are highlighted in the table below.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Impact – Net Program Savings Estimate | 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 programs are closely coordinated. The methods used in both evaluations are specified by the Illinois TRM and are generally consistent. Navigant will also coordinate with the Income Eligible Retail Discounts Program evaluation team on LED bulb and fixture related issues.

### Evaluation Research Topics

The CY2020 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?

#### Process Evaluation and Other Research Topics

Navigant will not conduct process research for the program in CY2020 or CY2021. The data collection activities required for the process evaluation (Shelf Surveys and Trade Ally Interviews) will not be conducted. As a result, there will be no process related results for this program.

### Evaluation Approach

The table below summarizes the evaluation task for CY2020.

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

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Notes |
| Tracking Data Review | All Program Sales | Census | Wave 1 and Final |
| In Depth Interviews | Program Management and Implementers | 2 |  |

#### Upstream Tracking System Review

The CY2020 program tracking data review 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).

#### Program Management and Implementer Interviews

We will conduct in-depth interviews with program managers and implementation contractors to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

#### Key insights from in-depth interviews will inform impact analysis through a discussion of yearly program changes. These interviews and meetings will also focus on findings and recommendations from Wave analyses to help ComEd and the implementation contractor plan for final reporting.Gross Impact Evaluation

The evaluation team will perform an engineering review of savings calculations. For all lighting measures, excluding connected LEDs, Navigant 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/1,000 \* Realization Rate

Annual Summer Coincident Peak kW Savings = Annual kW Savings \* Summer Peak Load CF Factor[[70]](#footnote-74)

Annual Winter Coincident Peak kW Savings = Annual kW Savings \* Winter Peak Load CF[[71]](#footnote-75)

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

For the verification analysis in CY2020, the evaluation team will calculate gross savings using the following parameter estimates:

* **Program Bulb Sales** data will be obtained from the CY2020 EM&V tracking database analysis.
* **Program Bulb Installation Rates** will be obtained from the IL TRM v8.0.
* **Delta Watts** will be calculated using the bulb type lumen-equivalence mapping in the IL TRM v8.0.
* **HOU and Summer Peak CF** will be obtained from both the residential and non-residential sections of the IL TRM v8.0. 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 v8.0.
* **Interactive Effects** will be obtained from the IL TRM v8.0.
* **Leakage** will be obtained from the IL TRM v8.0.

Navigant will also calculate gross kWh, kW, and summer and winter peak kW savings for Connected LED measures based on values deemed in the IL TRM v8.0. Navigant will (1) review the tracking system data to ensure that all fields are appropriately populated and savings are consistent with the implementation contractor’s workpapers and savings calculators that feed into the tracking system; (2) review new measures’ algorithms and values in the tracking system and the implementation contractor’s workpapers to ensure that they are appropriately applied; and (3) cross-check Navigant’s calculated savings with the implementation contractor’s calculated 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 in CY2020. The CY2020 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 CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Directional LED Bulbs and LED Fixtures | 0.52 |
| Specialty LED Bulbs | 0.59 |
| Connected LEDs and LED Nightlights\* | 0.80 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

\*The NTG value for Connected LEDs and LED Nightlights is the default value for new measures that do not have a researched value

#### Research NTG Impact Evaluation

The evaluation team will not conduct NTG research in CY2020 or CY2021. The required data collection activity (in-store intercepts) will not be conducted for these program years. As a result, no updated NTG recommendations will be made for this program.

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

In addition to first year (annual) savings, ComEd will be reporting lifecycle savings in CY2020 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 CY2020 and beyond, EULs will continue to be refined through a combination of primary or secondary research, as needed.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Federal Energy Job Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and CPAS in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial (RCT) and Quasi-Experimental Design (QED)

Navigant is not evaluating the Residential Lighting Discounts Program via a RCT because the program was not designed with randomly assigned treatment and control groups. Navigant is not using QED consumption data because this program contains many unique measures with significant cross-participation. In this case, QED consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### Evaluation Schedule

Table 4 provides the schedule for key deliverables and data transfer activities for the CY2020 evaluation. Adjustments will be made, as needed, as evaluation activities progress.

Table 4. CY2020 Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2020 Calculators/Workpapers Review | Evaluation | October/November 2019 |
| Wave 1 CY2020 Data Available for Ex Ante Review and Analysis | ComEd | June 30, 2020 |
| Wave 1 CY2020 Ex Ante Review Assessment Memo | Evaluation | July 31, 2020 |
| CY2020 Tracking system is final | ComEd | January 30, 2021 |
| CY2020 Draft Report to ComEd and SAG | Evaluation | February 28, 2021 |
| Comments on CY2020 Draft (15 Business Days) | ComEd | March 19, 2021 |
| CY2020 Revised Draft Report to ComEd and SAG | Evaluation | March 26, 2021 |
| Comments on Revised Draft (5 Business Days) | ComEd | April 1, 2021 |
| CY2020 Final Report to ComEd and SAG | Evaluation | April 10, 2021 |

## ComEd Multi-Family Market Rate Program CY2020 to CY2021 Evaluation Plan

### Introduction

The 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 Energy Efficiency Service Provider (EESP) installs in common areas and exterior areas for 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.

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. Program components include:

* Electric and gas energy assessments and provision of educational information.
* Information to building owners and managers as part of the assessment that explains how they can self-register for Business Energy Analyzer (BEA).
* Direct installation of electric and gas saving measures in tenant and common area spaces.
* EESP installation of electric and gas saving measures at no cost to customer, following agreed upon program pricing.

ComEd’s CY2020 net savings target is 27,584 MWh of cumulative persisting annual savings (CPAS). The CY2020 filing goal for participants is 14,000 residential units.

The primary objectives of the CY2020 evaluation are to quantify gross and net savings impacts from the program. The evaluation of this program over the coming two years will include a variety of data collection and analysis activities, including those indicated in the following table.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking System Review | X | X |
| Data Collection – Building Owner and Property Manager Surveys |  | X |
| Data Collection – Program Manager and Implementer Interviews | X | X |
| Impact – Engineering Review | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |
| Net-to-Gross |  | X |
| Process Analysis |  | X |

The evaluation team determined the evaluation approach for the 2020-2021 period based upon the needs of the program and program’s history. The two-year evaluation approach for this program is based on the following:

* Annual gross and net impact analysis
* Calculating Cumulative Persisting Annual Savings (CPAS) based upon the requirements of Future Energy Jobs Act (FEJA)

#### Coordination

Navigant will coordinate with the evaluation teams for other utilities on any issues relevant to this joint 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. The joint program evaluations and reporting timelines will be the same.

In addition, Navigant will coordinate with the evaluation team for Ameren regarding research topics in their Multifamily initiative, such as on-site verification for advanced power strip in-service rates.

### Evaluation Research Topics

The CY2020 evaluation will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What are the program’s annual verified gross savings?
2. What are the program’s annual verified net savings?
3. What are the program’s CPAS?
4. Are there any updates recommended for the Illinois Technical Reference Manual (TRM)?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 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 CY2020 | Notes |
| Tracking System Review | Tracking system | Census |  |
| In Depth Interviews | Program Management and Implementers | 2 |  |
| Gross Impact | Data Review and Analysis | Census | Wave 1 and Final Data† |
| Verified Net Impact | Calculation using deemed NTG ratio | Census |  |

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

#### Tracking System Review

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is consistent with the program’s data in eTRACK.

#### Program Management and Implementer Interviews

We will conduct in-depth interviews with program managers and implementation contractors to understand current program design and status as well as the program’s plan for the future. This will be done so that the evaluation team can evaluate the program with a solid understanding of the program.

Key insights from in-depth interviews will inform impact analysis through a discussion of yearly program changes and will inform future process evaluation research topics. These interviews and meetings will also focus on findings and recommendations from Wave analyses to help ComEd and the implementation contractor plan for final reporting.

#### Gross Impact Evaluation

The Multi-Family Market Rate Program savings verification will be completed using the Illinois TRM (v8.0) or secondary research for any measure with custom savings inputs. 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.

#### 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 provides the recommended NTG ratios for use in CY2020.

**Table 3. Deemed NTG Values for CY2020**

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| LED Linear (CA) | 0.96 |
| LED Omnidirectional | 0.67 |
| LED Specialty | 0.82 |
| Controls (IU) | 0.83 |
| Fluorescent Delamping (CA) | 0.83 |
| Showerhead | 1.03 |
| Bathroom Faucet Aerator | 1.03 |
| Kitchen Faucet Aerator | 1.03 |
| Programmable Thermostat (Direct Install) | 0.86 |
| Programmable Thermostat (Comprehensive) | 0.85 |
| Reprogram Thermostat | 0.86 |
| Advanced Power Strip (Tier 1) | 0.94 |
| Advanced Power Strip (Tier 2) | 0.83 |
| DHW Pipe Insulation | 0.83 |
| Other, Direct Installed In-Unit | 0.83 |
| Occupancy Sensor Lighting Control | 0.83 |
| LED Exit Sign | 0.83 |
| Beverage and Snack Control | 0.83 |
| Other, Direct Installed in Common Area | 0.83 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2020\_NTG\_Meetings/Final\_NTG\_Ratios/ComEd\_NTG\_History\_and\_CY2020\_Recs\_Final\_2019-10-01.xlsx

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the cumulative persisting annual savings (CPAS) in CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial (RCT) and Quasi-Experimental Design (QED)

Navigant is not evaluating the Multi-Family Market Rate Program via a RCT because the program was not designed with randomly assigned treatment and control groups. Navigant is not using QED consumption data because this program contains many unique measures with significant cross-participation. In this case, QED consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### Evaluation Schedule

Table 4 provides scheduling details for key impact evaluation 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 |
| Program Calculators and Workbook Review | ComEd | October/November 2019 |
| Program Manager, Implementer Interviews | Evaluation Team | TBD |
| CY2020 Wave 1 Tracking Data | ComEd | June 30, 2020 |
| Wave 1 data review and analysis memo | Evaluation Team | August 31, 2020 |
| Final CY2020 Tracking Data to Navigant | ComEd | January 30, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 5, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 25, 2021 |
| Revised Draft by Navigant | Evaluation Team | April 1, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 7, 2021 |
| Final Report to ComEd and SAG | Evaluation Team | April 16, 2021 |

# APPENDIX E. Pilots

## ComEd Adsorbent Air Cleaner Pilot CY2020 Evaluation Plan

### Introduction

The Adsorbent Air Cleaner pilot saves energy through reducing energy use in conditioning outdoor air. The technology adsorbs gas-phase contaminants from ventilation air, allowing outside air intake to be reduced. Phase I of the pilot developed energy models for technology deployment, completed a Provisional Measure TRM workpaper, and performed outreach for a field study. Phase II of the pilot secured an agreement to participate with a commercial building customer and will evaluate energy usage as well as other non-energy benefits including indoor air quality.

The version 8 of the Illinois statewide Technical Reference Manual (TRM) includes deemed normalized electric savings factors for five climatic zones for different combinations of ventilation and air-conditioning systems such as conventional variable air volume systems and dedicated outdoor air systems.

This evaluation plan describes the proposed methods Navigant will use to evaluate the energy savings from the Adsorbent Air Cleaner Pilot. A secondary objective of this evaluation is to develop a robust and consistent methodology to evaluate energy savings from future installations of this measure. This pilot’s evaluation includes several data collection and analysis activities for a single demonstration building. The evaluation includes an engineering analysis, and analysis of site data from the pilot implementer. Additionally, Navigant will provide recommendations on the applicability of the TRM measure to various building types.

The table below summarizes Navigant’s evaluation activities for this pilot.

Table 1. Evaluation Activities

|  |  |
| --- | --- |
| Tasks | CY2020 |
| Engineering Review | X |
| Data Collection – Data Request from Implementers | X |
| Impact – Engineering Analysis | X |
| Impact – TRM Whole Building Energy Model Review | X |

### Evaluation Research Topics

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

#### Impact Evaluation

1. What are the pilot’s total verifiable gross savings based on pilot activities extrapolated to the extent possible based on the data provided by Slipstream?
2. What are the pilot’s verifiable net savings?
3. What are the deemed savings factors for the different climate zones and combinations of HVAC systems?
4. What is the appropriate baseline for the pilot project?
5. What is the applicability to the pilot building of the whole building energy models used to develop TRM savings?

### Evaluation Approach

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

Table 2. Core Data Collection Activities and Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Target | Timeline | Notes |
| Baseline Determination | Information from the site including AC and ventilation equipment installed in the building and the building’s pre- project ventilation airflow requirements | Summer 2019 – December 31, 2019 |  |
| Reviewing whole building energy models that informed TRM workpaper | Algorithms used to calculate measure savings. | October/November 2019 |  |
| Engineering Data Collection | Information from the site, e.g., previously installed HVAC systems, model information of adsorbent air cleaners to be installed and any pre-treatment and post-treatment measurement data, duct system modifications, and sequence of operation changes available from the implementers. | May 2019 – Feb 2020 | To enable ComEd to claim summer and winter savings from this measure, the implementer should meter the post‑treatment system during the winter through Feb 2020 to capture both cooling and heating seasons. The Navigant verified savings for the pilot will be based on available information, extrapolated to the extent possible within the bounds of building seasonal operation. |

### Gross Impact Evaluation

As discussed previously, Navigant plans to conduct the evaluation analysis of this pilot measure using an independent engineering analysis.

The engineering study is contingent on receipt of site and equipment-specific data, including any relevant engineering parameters recorded by the implementers while installing the equipment.

#### Engineering Analysis

As part of the engineering analysis, Navigant will request data on HVAC equipment installed in the building and the building’s pre‑project ventilation airflow requirements. Leveraging information gathered from implementers and pilot participant, Navigant will determine the operational aspects of the air adsorbent cleaner and calculate the estimated energy savings within the bounds of the available data, and industry standard impact evaluation methods which allow extrapolation appropriate to the building operating mode for which the data was collected.

In particular, Navigant expects that the operation of the adsorbent air cleaner system, and relevant HVAC system air temperature setpoints, will vary widely between summer and winter seasons.

#### Baseline Determination

### Since this measure includes technology that affects indoor air quality, it is unlikely that the measure would be replicated by assembling purchased components. Therefore, using the pre-existing equipment is a viable baseline for this pilot. Navigant will consider whether using the impact baseline characterization of pre‑existing equipment may require a sunset clause if this technology starts to become available using build up components. Verified Net Impact Evaluation

The verified net impact evaluation will apply the net-to-gross (NTG) ratio recommended by Navigant for the pilot.

Table 3. Deemed NTG Values for CY2020

|  |  |
| --- | --- |
| Program Measure | CY2020 Deemed NTG Value |
| Adsorbent Air Cleaner | 1.00 |

Source: Memo forthcoming in fall 2019.

### 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 |
|  |  |  |
| Provide cooling interim report for review | ComEd | December 15, 2019 |
| Review and comment on cooling interim report | Evaluation | January 10, 2020 |
| Final project data provided by Slipstream | ComEd | March 31, 2020 |
|  |  | April |
| Preliminary Results Findings Discussion and TRM Work Paper Review | Evaluation, ComEd, IC | May - June 2020 |
| SubmitTRM Work Paper | IC | May 15, 2020 |
| Internal Report Draft by Navigant | Evaluation | Fall, 2020 |
| Draft Report to ComEd and SAG | Evaluation | December 11, 2020 |
| Comments on draft (15 Business Days) | ComEd and SAG | January 4, 2021 |
| Revised Draft by Navigant | Evaluation | February 5, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | February 12, 2021 |
| Final Report to ComEd and SAG | Evaluation | February 26, 2021 |

## ComEd Commercial Geothermal Advancement Pilot CY2020 Evaluation Plan

### Introduction

The ComEd Commercial Geothermal Advancement (CGA) Pilot supports commercial and light industrial geothermal or ground-source heat pump installations in ComEd’s service territory. AECOM, the Energy Resources Center at the University of Illinois at Chicago, and the Geothermal Alliance of Illinois are implementing the pilot. The CGA Pilot’s goal is to increase the market penetration of commercial and light industrial geothermal systems, and to make these installations cost-effective and long-lasting energy efficiency upgrades.

Navigant understands the CGA Pilot targets specific types of commercial geothermal systems (e.g. closed ground loops) and does not include new construction projects. The CGA Pilot incentive is $1,000 per ton. The implementers estimated that the average commercial geothermal system participating in the pilot would be 5-20 tons though larger and smaller systems could apply. The CGA Pilot incentivized four building retrofit projects during CY2019.

The evaluation’s objectives include: (1) evaluate savings generated by CGA Pilot systems installed in commercial buildings in the ComEd service territory and, (2) determine customers satisfaction with the Pilot and the role of the incentive in their participation (3) determine barriers to participation by interviewing customers who started but did not complete the application process for the Pilot.

### Impact Evaluation Objectives

Navigant plans for a custom evaluation with post-installation metering due to the size and complexity of the projects. Since there is not baseline metering data, we will use post-implementation data and determine loads based on installed equipment performance parameters and then apply performance criteria for baseline equipment to estimate baseline consumption. This is a standard practice for custom projects without baseline data.

Navigant’s primary objective is to evaluate savings generated by CGA Pilot systems installed in commercial buildings in the ComEd service territory. There is currently a draft workpaper for this measure which has been approved for inclusion in the IL TRM.

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

1. What are the energy and demand savings realized for the four projects in the CGA Pilot in CY2020?
2. What is the appropriate baseline system for each pilot project in the CGA Pilot (e.g., Time of Sale versus Retrofit/Early Retirement)?

Navigant will use the outcomes of the following activities to recommend how the CGA systems should be evaluated beyond the pilot period, and to recommend when projects should use a custom approach rather than the IL TRM algorithm.

### Impact Evaluation Approach

To evaluate the CGA systems through custom analysis, Navigant will:

* Using the algorithms in the TRM, develop savings estimates for the four CGA projects. Analyze on-site collected information and metered data to develop an independent estimate of energy and demand savings for the CGA Pilot projects

### Process Evaluation Objectives and Approach

Process evaluation activities will seek reasons why potential participants decided not to continue their applications to the Pilot as well as reasons why participants did complete their applications and their overall satisfaction with the CGA Pilot. The process research will address the following questions:

1. What are the participants’ perspectives and overall satisfaction with the CGA Pilot?
2. What are the barriers to participation in the CGA Pilot?

To collect information and feedback about the CGA Pilot, Navigant will conduct open-ended phone interviews with several different market actors. Separate interview guides will be developed for:

* Pilot participants
* Customers who expressed interest in the Pilot, but did not become participants
* Implementors
  + AECOM,
  + the Energy Resources Center at the University of Illinois at Chicago, and
  + Geothermal Alliance of Illinois
* ComEd Pilot manager

Navigant will provide these interview guides for review by ComEd prior to the first interview. Results will be compiled into a process evaluation report.

Navigant will apply the default net-to-gross (NTG) ratio of 0.80 to calculate verified net savings, pending approval by the Illinois Stakeholders Advisory Group (SAG). No NTG research is currently planned for the CGA Pilot.

Table 1. Deemed NTG Value for CY2020

|  |  |
| --- | --- |
| Pilot Measure | CY2020 Deemed NTG Value |
| Standard Non-Lighting | 0.80 |

CY2020 Source: Memo forthcoming in fall 2019.

### Evaluation Activities and Schedule

The table below summarizes the evaluation tasks 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 | Timeline |
| Tracking System Review | Tracking system | Census | TBD |
| In Depth Interviews | Pilot Management and Implementers | 2 | Fall 2019 |
|  |  |  |  |
| Gross Impact | Engineering File Review | Census | Pending project schedule |
|  |  |  |  |
| Researched Process | Telephone Survey with Participating Customers | Census | Fall 2019 |
| Researched Process | Telephone Survey with Prospective Participants | Census | Fall 2019 |
| Researched Process | Telephone Interviews with Trade Allies, Pilot managers, and implementers | Census | Fall 2019 |

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

Table 3. Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered\* |
|  |  |  |
| Interview guides ready for ComEd review | Evaluation | September 2019 |
| Draft Process Evaluation Report to ComEd and SAG | Evaluation | Q1 2020 |
|  |  |  |
| CY2020 project data | ComEd | January 30, 2021 (final Pilot tracking data) |
| Internal Report Draft by Navigant | Evaluation | March 1, 2021 |
| Draft Report to ComEd and SAG | Evaluation | March 8, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 29, 2021 |
| Revised Draft by Navigant | Evaluation | April 5, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 12, 2021 |
| Final Report to ComEd and SAG | Evaluation | April 21, 2021 |

**\***Schedule could be adjusted to reflect an earlier impact report date, pending data availability.

## ComEd Upstream Commercial Food Service Equipment Pilot CY2020 Evaluation Plan

### Introduction

In CY2019, ComEd, Nicor Gas and Peoples Gas and North Shore Gas launched an Upstream Food Service Equipment Pilot. These products have seen limited participation and savings within downstream programs. ComEd, Nicor Gas, Peoples Gas and North Shore Gas hope to increase participation and savings by moving up the supply chain and involving manufacturers and distributors as well as end users in the pilot. Purchasing decisions for food service equipment are largely influenced by first costs and by distributor stocking practices which make them good candidates for an upstream pilot.

The Upstream Commercial Food Service Equipment (CFSE) Pilot represents the first stage of a proposed multi-year pilot offering by ComEd, Nicor Gas, Peoples Gas and North Shore Gas (referred to as the “Utilities”). [This first stage was planned as an 18-month pilot beginning in February 2019 and concluding in July 2020. However, the pilot did not launch until September 2019 and currently the end data is unknown.] The goal of the pilot is to increase the uptake of energy efficient commercial food service (CFS) equipment among Chicagoland food service operators (referred to as “end users” or “utility customers”) through the utilization of point-of-sale (POS) customer rebates, upstream incentives, and a simplified administrative process. The goal of the pilot is to ease barriers to efficient equipment uptake by end users, thereby reducing gas and electricity usage in the CFS sector; the goal of the pilot is to gauge the potential for this implementation approach and refine it for full program implementation. This pilot emphasizes the importance of an upstream incentive approach as well as streamlining administration to help ensure success[[72]](#footnote-78).

The table below shows the activities related to this evaluation plan.

Table 1. Evaluation Approaches

|  |  |
| --- | --- |
| Tasks | CY2020 |
| Energy Savings Analysis | x |
| Net to Gross Secondary Research and Analysis | x |
| Review Baseline Projections | x |

This evaluation plan pertains primarily to the quantitative verification of pilot savings for efficient CFS equipment. In addition to the pilot’s short-term goal of generating savings through incenting efficient equipment, the pilot’s long-term goal is to transform the market for energy efficient CFS equipment. In order to achieve this long-term objective, the pilot will be re-designed during its 18-month implementation to optimize market transformation impacts. Measurement of long-term market effects requires the establishment of a market baseline and a projection of this baseline looking forward. Navigant, in conjunction with the pilot administrator, implementer, and designer (ComEd, Gas Technology Institute (GTI), Frontier, Resource Innovations (RI) and Northwest Energy Efficiency Alliance (NEEA)) will establish a baseline by identifying market progress indicators that will serve to quantify changes to the structure and function of the market compared to if there were no pilot. Navigant will develop a market progress evaluation plan appropriate to the market transformation objectives at a later date.

### Evaluation Topics

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

1. What are the gross and net energy and peak demand savings in CY2020 for this upstream pilot?
2. How can this pilot be optimized in order to transform the market for commercial food service equipment?

### Evaluation Approach

The following subsections summarize the evaluation tasks that Navigant will complete to verify CY2020 pilot savings. The detailed plan outlines activities for this research in four tasks as summarized in Table 2.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Target | Target Completes CY2020 | Timeline | Notes |
| Impact analysis | Program data | Census | Jan – April 2021 | Impact analysis using sales data and TRM savings algorithms |
| Net to gross development | Establish proxy for NTG or use default | Literature review | Q2, 2020 | Secondary research on NTG for upstream programs |
| Review baseline development | Current market status | Approximately six market indicators | TBD when the planners and implementers are ready | Collaborative work to review pilot theory, logic model and market baseline  Establish market progress indicators and associated data sources |
| In depth interviews | Pilot managers, implementers and distributors | 20 | Second half of 2020 | At or near the pilot conclusion |

### Impact Evaluation

#### Gross Impact Evaluation

Navigant will use a sales data analysis of the pilot to determine savings. We will use pilot tracking data and sales data from the participating market actors (food service equipment distributors) which will include equipment and customer information. Customer demographic data is necessary to confirm that each unit is installed within the utility service area. We will utilize the savings values and algorithms from the Illinois Technical Reference Manual (IL TRM) to develop energy savings estimates for each equipment type.

Based on the report[[73]](#footnote-79) prepared by GTI, food service equipment includes steam cookers, convection ovens, combination ovens, conveyor ovens, rack ovens, fryers, griddles, rotisserie ovens, broilers and others. The IL TRM lists energy savings calculation equations for these and other food service equipment. The inputs to these equations are the primary equipment specifications, such as input energy rate of the efficient and baseline cases, annual operating hours, and duty cycle (If these key parameters are unknown, the TRM also provides default values). Navigant will request the necessary tracking/sales data that contains the key parameters of the equipment and customer information.

#### Net Impact Evaluation

As the pilot is new and small, and its success and longevity are yet unknown, Navigant will conduct secondary research on NTG for this pilot. We will perform a literature review for NTG values for upstream programs in similar regions to find a reasonable proxy. If none exist, we will use the default NTG of 0.8.

### Pilot Management and Implementer Interviews

The evaluation team will interview the pilot manager about marketing and processes to better understand the goals of the pilot, implementation, and perceived effectiveness. The evaluation team will also interview participating distributors to better understand how the pilot met its goals.

### Derivation of Market Transformation Impacts

To help develop a robust market transformation evaluation framework, Navigant will review the pilot’s theory and logic model that is being revised by RI and NEEA. The logic model will be used to identify market transformation indicators that can be tracked and measured. Tracking market transformation indicators will allow ComEd to monitor where they are transforming the market and enacting change.

The following activities will be conducted to support the establishment of this market transformation evaluation framework.

#### Pilot’s Theory and Logic Model

Navigant will review the pilot’s theory and logic model (PTLM) currently being revised by NEEA and RI. Pilot logic model diagrams show the intended linkages between activities, outputs and outcomes, identify potential external influences and barriers as well as strategies to overcome them.

#### Methodology for Tracking Market Transformation Metrics

NEEA and RI will develop a model for establishing a market baseline projection. Navigant will review the model and inputs and assumptions and provide feedback.

The baseline will be used in future evaluation years to measure market transformation progress over time as a result of the pilot’s activities.

### Evaluation Schedule

Table 3 below provides the schedule for key deliverables and activities. Exact timing of evaluation activities is contingent on the Pilot implementation timing. Timing adjustments will be made, as needed, as implementation and evaluation activities progress.

Table 3. Schedule

|  |  |  |
| --- | --- | --- |
| Activity | Responsible Party | Date Delivered |
| In depth interviews with PM, implementers and distributers | Navigant | Q3 and Q4 of 2020 |
| NTG secondary research | Navigant | With final impact report |
| Receive tracking data | ComEd | January 31, 2021 |
| Impact analysis | Navigant | February 2021 |
| Draft impact evaluation report to ComEd, Nicor Gas, Peoples Gas, North Shore Gas, and SAG | Navigant | March 5, 2021 |
| Comments on draft | ComEd | March 26, 2021 |
| Revised draft | Navigant | April 9, 2021 |
| Comments on revised-draft | ComEd | April 16, 2021 |
| Final impact evaluation report to ComEd, Nicor Gas, Peoples Gas, North Shore Gas, and SAG | Navigant | April 23, 2021 |
| Review baseline projection and associated inputs and assumptions | Navigant | TBD, contingent on RI/NEEA timing |
| Identify Data Collection Needed for establishment of market baseline projection | Navigant | TBD, contingent on RI/NEEA timing |

## ComEd Income Eligible Program Design Pilot CY2019 and CY2020 Evaluation Plan

### Introduction

ComEd launched the Income Eligible Program Design Pilot (Pilot) to determine if engaging new income eligible market providers and trade allies would catalyze greater program participation and reduce program delivery costs. The aim of this Pilot is to define a framework for scalable program delivery through dedicated market providers and trade allies to create deeper savings, improved delivery and lower delivery costs for the income eligible weatherization offering. The Pilot is implemented in two phases by Franklin Energy. Franklin Energy researched, designed and executed multiple implementation projects incorporating different combinations of housing stock, measures, market providers, and included services (audits, direct install, and weatherization). The first phase of the Pilot involves research and assessment of the housing stock and potential market providers within ComEd’s service territory as well as the creation of an onboarding packet and an implementation plan for Pilot partners. In phase two, the Pilot team will select program design models to test out in three to four communities in ComEd territory . Franklin Energy will work with local trade allies and new market providers to identify up to 25 customer sites that meet the needs of each Pilot group, then complete the installations and monitor established metrics throughout the process. The Pilot will install measures in CY2019 and CY2020.

The Pilot seeks to answer this primary research question:

* Can engaging new income eligible market providers and trade allies catalyze

greater program participation and reduce program delivery costs?

A sub-question asks:

* Are there modifications to the current program design of ComEd’s Chicago Bungalow Association program that can be made that will result in deeper and/or more cost-effective savings for ComEd customers?

The evaluation of this Pilot will focus on the impact of the Pilot and will include data collection, data review, and analysis activities, including those in the following table.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2019 | CY2020 |
| Tracking System Review | X | X |
| Data Collection – Pilot Manager and Implementer Interviews | X | X |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |

### Evaluation Research Topics

The CY2019 and CY2020 evaluations will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What are the Pilot’s verified gross savings?
2. What are the Pilot’s verified net savings (first year and lifetime)?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2019 and CY2020 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  CY2019 and CY2020 | Timeline | Notes |
| Tracking System Review | Tracking system | Census | February | 2020 and 2021 |
| In Depth Interviews | Pilot Management and Implementers | 3 | January - February 2020 |  |
| Verified Gross Impact | Calculation using deemed NTG ratio | NA | January - April | 2020 and 2021 |

#### Tracking System Review

Navigant will review final tracking data for CY2019 and CY2020.

#### Verified Net Impact Evaluation

Since this Pilot is for income eligible customers the NTG ratio is 1.0 as approved by the Stakeholder Advisory Group (SAG).

**Table 3. Deemed NTG Values for CY2019 and CY2020**

|  |  |  |
| --- | --- | --- |
| Pilot Measure |  | CY2019 and CY2020 Deemed NTG Value |
| All measures |  | 1.0 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2019\_NTG\_Meetings/Final\_Values/ComEd\_NTG\_History\_and\_CY2019\_Recommendations\_2018-10-01.xlsx

#### Pilot Management and Implementer Interviews

The evaluation team will interview the Pilot manager to better understand the goals of the Pilot, implementation, and perceived effectiveness. The evaluation team will also interview the implementation team to better understand the Pilot’s implementation.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the Pilot and the cumulative persisting annual savings (CPAS) in CY2019 and CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the Pilot via a randomized controlled trial because the Pilot was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental design consumption data because this Pilot contains many unique measures with significant cross-participation. In this case, quasi-experimental consumption data analysis would produce savings estimates for bundles of commonly-installed measures, rather than for each measure individually, which is not the desired output for analysis.

### Evaluation Schedule

Tables 4 and 5 below provide the schedules for CY2019 and CY2020 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 – CY2019 Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2019 Pilot tracking data | ComEd | January 30, 2020 |
| Internal Report Draft by Navigant | Evaluation | February 24, 2020 |
| Draft Report to ComEd and SAG | Evaluation | February 28, 2020 |
| Comments on draft (15 Business Days) | ComEd and SAG | March 20, 2020 |
| Revised Draft by Navigant | Evaluation | March 27, 2020 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 3, 2020 |
| Final Report to ComEd and SAG | Evaluation | April 10, 2020 |

**Table 5. Schedule – CY2020 Deadlines\***

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2020 Pilot tracking data | ComEd | TBD |
| Internal Report Draft by Navigant | Evaluation | TBD |
| Draft Report to ComEd and SAG | Evaluation | TBD |
| Comments on draft (15 Business Days) | ComEd and SAG | TBD |
| Revised Draft by Navigant | Evaluation | TBD |
| Comments on redraft (5 Business Days) | ComEd and SAG | TBD |
| Final Report to ComEd and SAG | Evaluation | TBD |

\*Based on current information on the Pilot’s implementation, Navigant anticipates receiving CY2020 final tracking data in Q2 of CY2020. We anticipate delivering the final report to ComEd and SAG in Q3 within 90 days of receiving final CY2020 final tracking data.

## ComEd Savings for Income Eligible Seniors Pilot CY2019 and CY2020 Evaluation Plan

### Introduction

ComEd launched the Saving for Income Eligible Seniors pilot (Pilot) to test an approach aimed at providing greater access to energy efficiency measures for income eligible senior customers. The Pilot is implemented by CLEAResult, Green Home Experts and AgeOptions (the Illinois Department on Aging). The implementors work with social services agencies to engage income eligible ComEd customers aged 60 and older (income eligible seniors) and describe the pilot and obtain permission to install energy efficiency measures in their homes. Technicians install a suite of measures, when possible, including weather stripping, door sweeps, caulking, smart thermostats, LED lamps, and LED nightlights.

The Pilot seeks to answer the following research questions:

* Does engaging caseworkers and member agencies working with income eligible senior customers increase access and remove barriers for these customers to accessing energy efficiency measures?
* How does the cost of acquisition and quantity of savings from senior income eligible customers compare to that of other income eligible programs?
* Can agencies implementing the ComEd Low Income Home Energy Assistance Program (LIHEAP) successfully direct customers who did not qualify for LIHEAP to other programs?

The evaluation of this Pilot will focus on the impact of the pilot and will include data collection, data review, and analysis activities, including those in the following table.

Table 1. Evaluation Approaches – Two Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2019 | CY2020 |
| Tracking System Review | X | X |
| Data Collection – Pilot Manager and Implementer Interviews | X |  |
| Impact – Measure-Level Deemed Savings Review | X | X |
| Impact – Verification & Gross Realization Rate | X | X |

### Evaluation Research Topics

The CY2019 and CY2020 evaluations will seek to answer the following key researchable questions:

#### Impact Evaluation

1. What are the Pilot’s verified gross savings?
2. What are the Pilot’s verified net savings (first year and lifetime)?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2019 and CY2020 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 Timeline**

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Target | Target Completes  CY2019 and CY2020 | Timeline |
| Tracking System Review | Tracking system | Census | February 2020 & 2021 |
| In Depth Interviews | Pilot Management and Implementers | 2 | January 2020 |
| Gross Impact | Measure-Level Deemed Savings Review | EOY Data | January – April 2020 & 2021 |
| Verified Gross Impact | Verification & Gross Realization Rate | EOY Data | January – April 2020 & 2021 |

#### Tracking System Review

Navigant will review final tracking data for CY2019 and CY2020. This review will consist of verification that the tracking data includes all necessary measure parameters needed to accurately evaluate ex post savings. Any missing inputs needed for conduction the evaluation will be identified and flagged.

#### Gross Impact Evaluation

The pilot’s savings verification will be based on using the TRM v8.0. 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 ensure that they are appropriately applied; and (3) cross-checking totals. 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

Since this Pilot is for income eligible customers, the NTG ratio is 1.0 as approved by the Stakeholder Advisory Group (SAG).

**Table 3. Deemed NTG Values for CY2019 and CY2020**

|  |  |  |
| --- | --- | --- |
| Pilot Measure |  | CY2019 and CY2020 Deemed NTG Value |
| All measures |  | 1.0 |

Source: http://ilsagfiles.org/SAG\_files/NTG/2019\_NTG\_Meetings/Final\_Values/ComEd\_NTG\_History\_and\_CY2019\_Recommendations\_2018-10-01.xlsx

#### Calculation of Cumulative Persisting Annual Savings (CPAs) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the Pilot and the cumulative persisting annual savings (CPAS) in CY2019 and CY2020 will be calculated along with the total CPAS. Additionally, the weighted average measure life will be estimated.

#### Pilot Management and Implementer Interviews

To better understand the goals of the Pilot, implementation, and perceived effectiveness, the evaluation team will interview the Pilot manager about the pilot’s design and implementation, and any changes that have occurred.. The evaluation team will also interview the implementation team to better understand how the Pilot is meeting its goals.

### Evaluation Schedule

Table 4 below provide the schedules for CY2019 and CY2020 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 – CY2019 Deadlines**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| CY2019 Pilot tracking data | ComEd | January 30, 2020 |
| Internal Report Draft by Navigant | Evaluation | March 6, 2020 |
| Draft Report to ComEd and SAG | Evaluation | March 12, 2020 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 4, 2020 |
| Revised Draft by Navigant | Evaluation | April 10, 2020 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 16, 2020 |
| Final Report to ComEd and SAG | Evaluation | April 24, 2020 |

Table 5. Schedule – CY2020 Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered \* |
| CY2020 Pilot tracking data | ComEd | TBD |
| Internal Report Draft by Navigant | Evaluation | TBD |
| Draft Report to ComEd and SAG | Evaluation | TBD |
| Comments on draft (15 Business Days) | ComEd and SAG | TBD |
| Revised Draft by Navigant | Evaluation | TBD |
| Comments on redraft (5 Business Days) | ComEd and SAG | TBD |
| Final Report to ComEd and SAG | Evaluation | TBD |

\*Navigant anticipates completing the Final CY2020 Report to ComEd and SAG within 90 days of receiving final CY2020 final tracking data.

# APPENDIX F. Cross-Cutting Research Evaluation Plans

## ComEd Voltage Optimization Program CY2020 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 (LTCs) and capacitor banks, and integrating and optimizing software to flatten voltage profiles and lower average voltage levels on an electric power distribution grid. ComEd is working with an automation-optimization hardware and software vendor[[74]](#footnote-80) to implement the VO Program on selected parts of its distribution grid over the 2018-2025 period. This Evaluation Plan covers the third and fourth years (CY2020 and CY2021) of the planned VO Program roll-out and is based on the program description provided in ComEd’s 2018-2021 Portfolio Plan[[75]](#footnote-81) as well as ongoing discussions with ComEd’s VO implementation team.

ComEd’s CY2020 net planning target for the VO Program is 486,000 MWh.[[76]](#footnote-82)

The primary objectives of the CY2020 evaluation of the VO Program will be to quantify the net savings impacts of the program[[77]](#footnote-83), and prepare a white paper containing findings and recommendations for measuring VO savings to the Illinois Stakeholder Advisory Group (SAG) for inclusion in the next version of the Illinois Technical Reference Manual (IL-TRM V9.0). The evaluation of this program will include a variety of data collection and analysis activities, including those shown in Table 1.

Table 1. Evaluation Approach – Three Year Plan

|  |  |  |
| --- | --- | --- |
| Tasks | CY2020 | CY2021 |
| Tracking system review | X | X |
| Data collection – program manager and implementer interviews\* | X | X |
| Data collection – AMI and SCADA data from VO substations/feeders† | X | X |
| Impacts – measure net savings impact of VO in affected feeders | X | X |
| TRM research – develop method for measuring future VO impacts‡ | X |  |

\* These activities will be in the context of ongoing periodic meetings with the VO implementation team.

† SCADA and AMI data will be collected for feeders on which VO is installed during CY2020 and CY2021, and will be used (in combination with analytical models estimated using previously-received CY2018-19 data) to measure impacts.

‡ Navigant will submit findings and recommendations concerning VO EM&V to the IL Stakeholder Advisory Group (SAG) in a work paper for the IL TRM V9.0.

#### Coordination

Ameren Illinois is implementing a similar program and Navigant will coordinate with the Ameren evaluation, as well as with regulatory staff, on issues relevant to measurement and verification of VO impacts. Navigant staff are involved in the evaluation of both utilities’ programs and will identify and report on opportunities for collaboration, as well as any substantive differences in approach, when and as they arise.

### Evaluation Research Topics

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

#### Impact Evaluation

1. What are the program’s incremental and cumulative persistent annual verified energy savings?
2. What are the program’s incremental and cumulative peak demand reductions?
3. Other research topics:
   * 1. What voltage reductions did the program achieve?
     2. What are the effects of season, time of day, day-type, and feeder characteristics on the program’s energy and demand savings?

#### Process and Net-to-Gross Research

Navigant will not do a formal process evaluation of this program. To the extent that we identify opportunities for improvement through the normal course of our research, we will report them to ComEd. The VO Program requires no actions by any affected ComEd customers, so net and gross impacts are identical; thus, net-to-gross research is not required.

### Evaluation Approach

ComEd is currently meeting with Illinois Commerce Commission (ICC) staff and interested stakeholders to reach consensus on the most appropriate methodology to use for measuring VO savings going forward after CY2019, a process which is not expected to be completed until the end of December 2019. In support of this process, Navigant will present a white paper to the parties summarizing the analytical approaches seen in the available research and evaluation literature, their pros and cons, and key findings. Navigant will also run parallel analyses, using SCADA and AMI data from a representative sample of ComEd VO-enabled distribution feeders, to assess the relative performance of the various methodologies, including regression, cluster analysis, and machine learning. Once the parties reach consensus on the desired approach, Navigant will implement the selected analytical method to measure CY2020 VO savings.

Table below summarizes the evaluation tasks for CY2020 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 CY2020

|  |  |
| --- | --- |
| Activity | CY2020 |
| Target sample size (# of Test Feeders) | Census of VO-enabled feeders |
| Data collection (SCADA, AMI, tracking data, events log) | Census of VO-enabled feeders |
| Gross impacts evaluation | TBD |
| Program manager interviews / review materials | Yes |

#### Gross Impact Evaluation

***Measured Impacts on Sampled Feeders***

Navigant will employ robust statistical techniques to measure the VO Program’s annualized impacts for all feeders on which VO has been commissioned in each calendar year. The volt-var controls on the feeders in the sample will be operated on a pre-set, alternating (4-day-on/4-day-off) 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, real power (P), and reactive power (Q). This alternating VO-on/VO-off testing schedule should be followed for a period sufficient to generate test data covering at least three meteorological seasons (summer, winter, and either spring or autumn). Once sufficient test data have been generated for a given sample feeder, it will then be released from the alternating schedule and remain continuously in VO mode.

Navigant will analyze the impacts of VO using the analytical approach selected by the aforementioned consensus process.

#### Verified Net Impact Evaluation

Since the VO Program will require no actions by any affected ComEd customers, net and gross impacts are identical.

#### Calculation of Cumulative Persisting Annual Savings (CPAS) and Annual Savings

As required by the Future Energy Jobs Act (FEJA), Navigant will report ex post gross and ex post net savings for the program and the CPAS in CY2020 will be calculated along with the total CPAS.

### Data Requirements

Table 3 shows the data Navigant will need for the CY2020 evaluation.

Table 3. Data Requirements for CY2020 VO Evaluation

|  |  |
| --- | --- |
| **Data Source** | **Information Required** |
| **AMI Meters of Customers on Each VO Feeder** | • Feeder |
| • Substation |
| • Date / time stamp (30-minute intervals) |
| • Load-weighted service voltage from all meters served by feeder |
| **Substation SCADA System** | • Feeder |
| • Substation |
| • Date / times stamp (30-minute intervals) |
| • Voltage (at substation bus) |
| • Real power (MW or MWh) |
| • Reactive power (Mvar) / or power factor |
| • Weather data (temperature, humidity, wind speed) \* |
| **Other** | • VO control status |
| • Capacitor status (for capacitor banks controlled by VO) |
| • Log of substation / feeder status (outages, reconfigurations) |
| • Static feeder characteristics |

\* Navigant will acquire required observed weather data from area NOAA weather stations.

### Evaluation Schedule

Table 4 below provides the schedule for key deliverables and data transfer activities for the work leading to the CY2020 results. Adjustments will be made, as needed, as evaluation activities progress.

Table 4. Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date Delivered |
| Final CY2020 evaluation data delivered to Navigant | ComEd | January 29, 2021 |
| Draft CY2020 report to ComEd and SAG | Navigant | March 12, 2021 |
| Comments on draft (15 Business Days) | ComEd and SAG | April 2, 2021 |
| Revised Draft by Navigant | Navigant | April 9, 2021 |
| Comments on redraft (5 Business Days) | ComEd and SAG | April 16, 2021 |
| Final Report to ComEd and SAG | Navigant | April 23, 2021 |

## ComEd Effective Useful Life CY2020 Evaluation Research Plan

### Introduction

This research work plan details the specific tasks, activities, deliverables, and schedule associated with CY2020 persistence and effective useful life (EUL) evaluation research for the ComEd Energy Efficiency Program. The work plan addresses measure persistence in a manner consistent with Illinois Future Energy Job Act (FEJA) legislation and the goals set out by this legislation for attaining cumulative persisting annual savings (CPAS) by electric utilities. The work outlined in this plan is designed to estimate EUL values that take into consideration the technical life, measure persistence, and savings persistence.

Navigant conducted an EUL value of information (VOI) analysis in CY2019 that is summarized in Table 1. The purpose of the VOI analysis was to define the measures which have uncertainty in the existing EUL with high value potential for additional EUL research. The VOI analysis consisted of interviews with Subject Matter Experts (SME) about the accuracy of the current Illinois Technical Reference Manual (TRM) EULs. Navigant is focusing additional EUL research on the areas classified as “Research Recommended” and “Preliminary Research Recommended”. For CY2019, Navigant is completing research for LED Fixtures (Commercial), LED streetlighting, and retrofit add-on equipment (advanced lighting control systems and HVAC controls). The CY2019 research did not include any field studies and provided insight as to consider if primary on-site data collection is merited.

Table 1. Phase I EUL Analysis Findings

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EUL Uncertainty Assessment** | **Measure Name** | **TRM EUL** | **EUL +/- 20% Bounds** | **Probability EUL is Less than Lower Bound** | **Probability EUL is Greater than Upper Bound** |
| Preliminary Research CY2019 | LED Fixtures (Com) | 15 | 12 - 18 | 87% | 3% |
| Advanced Lighting Control Systems | 8 | 6.4 - 9.6 | 2% | 77% |
| HVAC Controls | 15 | 12 - 18 | 81% | 1% |
| LED Streetlighting | ComEd Requested[[78]](#footnote-84) | | | |
| Research Recommended CY2020 | Compressed air - Leak Repair | 3 | 2.4 - 3.6 | 17% | 60% |
| Retro-commissioning | New Recommendation[[79]](#footnote-85) | | | |
| Accurate | AC Tune-up | 3 | 2.4 - 3.6 | 48% | 29% |
| Energy Management System | 15 | 12 - 18 | 45% | 22% |
| LED Lamps (Res) | 10 | 8 - 12 | 43% | 28% |
| Lighting Controls | 8 | 6.4 - 9.6 | 40% | 32% |
| Programmable Thermostats (Res) | 8 | 6.4 - 9.6 | 29% | 32% |
| No Research Recommended | Thermostat Adjustment\* | 2 | 1.6 - 2.4 | 20% | 62% |
| LED Lamps (Com)\* | 15 | 12 - 18 | 77% | 4% |
| Programmable Thermostats (Com) | 10 | 8 - 12 | 63% | 20% |
| Smart Thermostats | 11 | 8.8 - 13.2 | 62% | 1% |

\*Previously addressed in the CY 2019 Research Plan regarding no research recommendation.

Source: Navigant Consulting, Inc.

In CY2020, Navigant is recommending research efforts for the following measures:

* **Compressed Air – Leak Repair.** Navigant will conduct field research for compressed air – leak repair**.** The VOI analysis found there was a 60% probability that the actual EUL is higher than the current TRM EUL. Additional field research may reveal that savings persist beyond the assumed value. Navigant proposes researching other compressed air measures simultaneously to cost-effectively understand the EUL of multiple measures. The initial draft plan was submitted mid-2019 for stakeholder input and a research plan is included below.
* **Retro-commissioning** Navigant does not recommend conducting retro-commissioning measure and program research. Instead for CY2020 we plan to develop a methodology for quantifying persistence for programs that have ongoing intervention, such as the virtual commissioning and monitoring-based commissioning program models. Data collection and analysis plans will be considered for subsequent years once there is a consensus on the approach.

Furthermore, there were two measures where we previously recommended research for CY2020. These have currently been added to the “no research recommended” category.[[80]](#footnote-86) These are two thermostat measures:

* **Programmable Thermostats (Commercial).** For CY2019, Navigant is conducting contractor interviews and customer surveys on HVAC controls and lighting controls. Early input from contractors indicate that the controls (at least the new installations) are mostly compatible with all host equipment. Navigant’s preliminary findings for the CY2019 research indicate that most controls can last an indefinite amount of time prior to failure. Navigant did investigate other reasons for removal. However, for thermostats (in the same category as HVAC controls), Navigant should additionally explore the savings persistence of the thermostats.

To do a savings persistence study, there are few options for the approach:

1. AMI-based: Commercial applications are not well suited for an AMI-based or billing analysis for persistence. The population sizes are not large enough and many installations are paired with other measures.
2. Field work: Data collection pre and post with multiple visits to each facility in the sample. This analysis will allow for checking thermostat settings and schedule, and noting any site-specific changes.
3. Assumptions-based: The unit energy savings for a deemed measure (which are intended to represent average savings across a population of measures) may already account for savings persistence as the use of the thermostat evolves for facilities, the sample average may not change. For example, a deemed unit energy savings is derived from metered data of a sample of installed equipment that are all operating at different stages of host equipment life with different operating patterns. The operational changes of this equipment over its lifetime may be captured by the average deemed unit energy savings calculated from the sample of metered equipment.

Therefore, based on CY2019 findings and the assumptions outlined above, Navigant believes that the savings persistence analysis would either have large uncertainty bounds or result in insignificant results and we are not recommending further research.

* **Smart Thermostats.** Navigant is prioritizing research on the first-year savings value and methodology for this measure versus savings persistence research. The first-year savings value anchors the findings for any persistence research and the methodology also would most likely be adopted for savings persistence research. We will revisit the need to perform EUL research for this measure after the first-year savings value is established.

We recommend delaying further research for the commercial LED fixture. As indicated above, the CY2019 research was preliminary to help establish further research needs; Navigant believes that the commercial LED fixture EUL research is important, however, we recommend additional research on LED fixtures be performed in CY2021 or later years. Research to date has not been conclusive, thus, the remaining avenue for researching EUL of LED fixtures is field site visits to identify the failure rate of the installations to date. However, the earliest date of installation per program records is the 2014/2015 time frame, which provides about five to six years of operation which is insufficient to ascertain the survival curve for LED fixtures. Additionally, the technology and installation practices have improved and the survival analysis for installations a few years ago will be different than installations today.

For CY2021, Navigant recommends conducting a new prioritization analysis with high impact measure data after the CY2019 data is available to identify if new measures have emerged as priority.

### Compressed Air Research

The following sections describe background and research approach for the compressed air research.

Per subject matter interviews, bad (audible) leaks are repaired immediately or flagged for repair during the next opportunity at the facility. Differentiating between this repair and what happens or happened as a result of a comprehensive survey[[81]](#footnote-87) is important to tease out in this study. Eventually, the small and medium leaks sap the system of capacity and pressure stability or become larger and are subsequently fixed. The alternate option to leak repair is to add a new compressor. Given the amount of machine redundancy, this may happen more than leak repair. In many cases, the standard practice is adding capacity to address loss of pressure for the demand uses which can be attributed to leaks.[[82]](#footnote-88)

#### Compressed Air Leak Repair EUL Background

Existing EUL for Compressed Air Leak Repair

Per the TRM, the compressed air leak repair has a two to five -year measure life. The reported value is dependent on implementer documentation that is subject to ex post verification.

There is no good number for the actual life of a specific leak repair, let alone the system as a whole. Generally, the main piping system lasts a long time, but most leaks occur on end use equipment. These leaks tend to return often due to the movement and vibration of the equipment. The weighted value based on size and life of each repair based on location and conditions is an unknown. The assumed leak rate increase per year is another unknown which will also vary significantly from site to site.

Defining Compressed Air Leak Repair Savings

As part of Navigant’s research to date, there has been debate if the EUL for compressed air leak repair is based on compressor demand savings or system capacity needs. Navigant’s approach is to understand what happens at the meter. Therefore, this study will draw a boundary around the air compressors and not the demand side, i.e. the repaired leaks. The compressors are the source of electricity energy use, whereas the demand side of the air compressors are the source of compressed air use. Navigant is defining the measure as not the repaired leak, but the savings at the compressor.

The challenge is that additional leaks spring up regularly. It is assumed that a compressed air system will leak more and more over time. The actual energy savings being achieved are higher than simply the year-over-year change in usage because the year-over-year change in usage reflects that additional leaks are occurring. There is a certain level of maintenance that is going to occur, but usage may be increasing every year without maintenance or without program intervention with a leak audit. Active leak repairs are still required to ensure that usage does not increase. This is different than Strategic Energy Management (SEM) and behavioral programs. For example, because the baseline is not that their energy use will get less and less efficient over time without intervention – it is that they have a fixed baseline, and meaningful improvements are made over that baseline that require active maintenance.

If a customer would have chosen to do leak repair in the absence of the program, **that is an attribution issue**, not an energy savings or measure life issue.

#### Compressed Air Leak Repair Persistence Factors

To cost-effectively research effective useful life (EUL) for compressed air leak repair, Navigant will explore a holistic approach. Since compressed air leak repair is frequently part of a larger project, we believe the EUL research can be conducted for a suite of compressed air measures in one study. Compressed air measures such as pressure reduction, flow controller, etc. will be included in any surveys or interviews as part of the leak repair study. These measures can be addressed via an implementer and retention survey, except for compressed air leak repair which will require site visits.

For the compressed air leak repair measure, we are proposing a customer survey, as well as site visits. Navigant will also conduct a desk review of the audits completed at sites that have had multiple audits over the program lifespan. The following table summarizes the approaches for this study and the desired outcome for the research. Navigant will first conduct small sample surveys to ensure the data collection plan will result in fruitful information.

Table 2. Compressed Air Research Approaches and Proposed Outcomes

| Approach | Outcome |
| --- | --- |
| Conduct telephone surveys of program participants or review implementer or service provider audit report for the following:[[83]](#footnote-89)   * Age of existing pieces of equipment[[84]](#footnote-90) * Description and schedule of existing O&M practices   + Commissioning and maintenance of controls   + Leak audit practices * Decisions on adding capacity (new compressors)   *<This approach may be combined with the retention surveys.>* | * Determine age of existing equipment * Understand effect of customer existing practices on decision making for compressed air maintenance and system improvements |
| Conduct retention surveys, this will include:   * Survey of previous participants 2 and 8 years post-retrofit to determine if equipment is still operating and at what level of performance (for control technology measures) * Follow up with telephone surveys, as needed, and nested sample of on-sites to validate web surveys. These surveys will explore the following questions:   + Have you conducted a leak audit and made repairs prior to the program? If yes, how often and when was the last time?   + Do you conduct leak audits or have a leak repair program? On what schedule? If not, what is your process to detect leaks?   + How do you decide what leaks to repair?   + Have you installed additional compressor capacity recently? When and why?   + Do you monitor your system pressure as a function of compressor demand?   + Would you be able to shut off your compressed air system during downtime, to provide a measurement of leakage? | * Determine retention of existing equipment * Determine age of existing equipment * Understand effect of customer existing practices on decision making for compressed air maintenance and system improvements |
| Conduct field study (leak repair measure only):   * Field study only for leak repair measure occurring 12, 18, or 24 months post-retrofit * Leverage existing impact evaluation on-site work by cross checking previous compressed air leak repair participation; leverage projects who have had multiple leak audits in multiple years * Focus only on leakage rate and the rate of leak formation. This will be based on the measurements as conducted in a leak audit. | * Understand the persistence of leak repair * Determining if savings are based on maintaining level of demand on compressor (assuming no change in operation) regardless if new leaks form or if repaired leaks leak again * Understand site practices |

Source: Navigant Consulting, Inc.

#### Compressed Air Leak Repair Persistence factors

The compressed air leak repair research approach will address multiple complex factors:

* New leaks formed continually
* Standard practice for facilities to fix leaks
* Alternate approaches to address leaks – i.e., increase supply
* Facility culture change

As part of this work and provided in Table 3, Navigant will investigate elements that may affect persistence. As part of the subject matter interviews, the following persistence topics were identified:

* Facility maintenance practices
  + Ongoing maintenance
  + Persist until become capacity constrained
* Barriers to leak repair
  + Need to shut down line
  + How important is energy savings compared to other competing interests
* Facility and operating conditions
  + Where is piping located (corrosive environment, clean room, other) and type of facility
  + System pressure
  + Piping sizing (undersized, then higher risks)

#### Measuring Compressed Air Leak Repair Savings

Navigant’s study will identify the rate at which compressed air leakage is reestablished in the system.

The first-year savings are based on fixing leaks resulting in lower compressor demand. The savings persistence is reliant on the formation of new leaks negating the benefits of the repaired leaks or the degradation of the repaired leaks. Therefore, the key metrics would be the **leakage rate** and the **rate of leak formation.** This approach assumes that each project captures the leakage percentage both before and after leak repair. The basis for the EUL assessments is the time required for 50% of the difference of pre- and post-repair leakage percentage to reestablish.

Leaks are currently identified through compressed air audits. The audit provider completes an inspection of the compressed air system and tags any leaks identified and estimates a CFM leakage rate for each leak. Leaks are then repaired by the customer or the audit provider and an incentive is provided.

A simple approach to estimate the rate at which leaks redevelop is simply to redo the audit on a periodic basis and identify the current leak level. This study will reassess the leaks at one and two years after the original audit. The data points will be used to develop a curve to calculate the point where the savings are expected to be at 50% of the first-year savings.

The change of the leakage at each period will be used to determine EUL. This effort will also address the following site-specific question – how often do they repair leaks? It is important to understand if leak repair is done as maintenance or combined with retrofit solutions. Finally, to understand if the common practice is to add capacity, we will find out how close the existing system is to capacity.

In addition to the site audit approach, Navigant will also complete a review of audits completed at sites that have had multiple leak audits completed. For these sites, the rate at which leaks redevelop can be estimated as the difference between the leak CFM identified in the second audit at the site compared to the leak CFM (after repair) from the first audit, divided by the time between the second audit and the repair.

#### Compressed Air Research Timeline

Timeline assumptions include:

1. No data cleaning or barriers to getting a list of past participants
2. No implementer coordination
3. Only one time data collection (no need to re-visit a year later)

Table 3. Compressed Air Deliverable Schedule

|  |  |
| --- | --- |
| Activity or Deliverable | Date Delivered |
| Coordination with implementer | January |
| Data collection template | January |
| Field web survey (population) | January-February |
| Telephone survey (small sample, up to 12) | March |
| On sites (small sample, up to 12) | February |
| Analyze preliminary results | March |
| Telephone survey (large sample) | April |
| On sites (large sample) | April |
| Draft Report for the TRM | June |
| Report for TRM Update | July |

### Commercial Program Persistence Framework

For any commercial program with ongoing interventions, Navigant recommends developing a methodology to assess the measure life for these program models. Current examples include the Virtual Commissioning (Power Take Off) and Monitoring-based Commissioning programs. There is no agreed-upon methodology for these program models. Currently, these programs use the retro commissioning program EUL. For this work, Navigant will engage stakeholders to develop a methodology to quantify savings persistence for both ongoing engagements and what happens to savings once those engagements end. If applicable, this methodological approach may be used for other program or measures, such as, Business Energy Analyzer, Tune-ups, building operating certificate, and compressed air leak repair.

For this research effort, Navigant will:

* Draft a plan for initial review
* Present the plan for the stakeholder community
* Gather feedback
* Release a revised draft plan
* Finalize plan

## ComEd Non-Energy Impacts CY2020 - CY2021 Evaluation Research Plan

**Introduction**

Navigant’s CY2020-CY2021 research plan to quantify and monetize Non-Energy Impacts (NEI) contains research for both income eligible programs and non-income eligible programs. Our research activities are based on the Stipulation and Future Energy Jobs Act (FEJA) legislation. In CY2020, Navigant will continue to conduct the research quantifying and monetizing NEIs for ComEd’s income eligible (IE) programs and begin to conduct the research in ComEd’s non-IE programs, as well as complete the economic, utility and societal NEI research. In CY2021, Navigant will complete the research on the participant IE and non-IE NEIs. Navigant will revise the annual research plan accordingly.

This plan includes the specific tasks, activities, deliverables, and schedule associated with quantifying and monetizing NEIs for ComEd’s IE energy efficiency programs as well as screening for non-IE energy efficiency programs.

This detailed evaluation plan also describes the proposed methods the Navigant team will use to quantify and monetize NEIs associated with IE and non-IE, residential, and business and public sector programs[[85]](#footnote-91).

ComEd and the stakeholder advisory group (SAG) are interested in first researching NEIs for ComEd’s income eligible (IE) programs, since substantial NEIs are typically associated with these programs. This decision is based on the *Commonwealth Edison Company 2018 – 2021 Energy Efficiency and Demand Response Plan Settlement Stipulation*[[86]](#footnote-92):

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

Future Energy Jobs Act (FEJA) legislation more broadly recognizes there may be NEIs associated with all energy efficiency programs, not only IE. FEJA states[[87]](#footnote-93):

*“A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and participant in the delivery of those efficiency measures and including avoided costs associated with reduced use of natural gas or other fuels, avoided costs associated with reduced water consumption, and avoided costs associated with reduced operation and maintenance costs, as well as other quantifiable social benefits…”*

***Overall Research Goals***

This NEI research is relevant to ComEd’s programs in varying amounts. This NEI research is distinct from annual program evaluation activities since most NEIs are currently not quantified nor monetized as part of evaluation activities. The Illinois Technical Reference Manual (IL TRM) currently includes only NEIs related to the avoided use of water and a deemed operations and maintenance (O&M) cost adjustment calculation. ComEd’s total resource cost test (TRC) considers avoided water consumption and carbon dioxide emissions.

The key objectives of this research are to:

* **Quantify NEIs associated with IE and non-IE programs as proposed updates to the IL TRM**
  + Calculate NEIs at the program level, first for IE programs and followed by non-IE programs as determined by evidence of NEIs from screening questions and other research.
* **Monetize NEIs associated with IE and non-IE programs as proposed updates to the IL TRM**
  + Calculate dollar savings per NEI for inclusion in TRC calculations.

***Research Questions***

This research will seek to answer the following key researchable questions:

* What is the best way to quantify the NEI (i.e., at the measure, program, or portfolio level)?
* What are the economic NEIs? Specifically, how will the job market respond to decreased electricity generation? How many jobs will be created or lost?What observable changes in labor income and economic output will be associated with decreased electricity generation?
* What are the societal NEIs? How many deaths, hospital admissions, non-fatal heart attacks, cases of acute bronchitis, for example, will be avoided? How much work loss will be avoided? What is the dollar value of associated costs avoided by society?
* What are the avoided costs to ComEd and its customers?
* Do income-eligible ComEd program participants experience reductions in medical visits, missed days of school and/or work, instances of thermal stress, and instances heating assistance?

This research will provide value to ComEd and its customers by identifying, quantifying and monetizing NEIs. Currently, the TRC calculations exclude NEIs except for avoided water consumption and carbon dioxide emissions.

***Summary of Evaluation Research Activities***

This section provides an overview of the planned methodology to estimate NEIs. Table 9 presents a summary of the evaluation research plan.

This plan improves upon previous NEI research conducted by the IL SAG in 2015 to consider NEIs for the IL TRM by:

* Basing calculations on recent, reputable studies
* Ensuring reproducible research, quantification, and monetization processes
* Establishing logical connections between NEIs and energy efficiency measures
* Quantifying both negative and positive NEIs

Table . Evaluation Plan Summary

| Activity | Rationale | Timing |
| --- | --- | --- |
| Quantify Economic NEIs | Quantify job-creation and other economic NEIs related to energy efficiency programs at the portfolio level and present results at SAG NEI WG. Develop report with findings. | Q1 2020 |
| Develop IE Participant and Non-participant Survey Instrument | In conjunction with ODC, Navigant is developing a survey instrument for single-family (SF) and multi-family (MF) program participants as well as a MF building owner and operator survey. Navigant is looking for feedback from ComEd and other IE stakeholders on the survey instruments once in draft form. | Q4 2019 |
| Quantify Societal NEIs | Quantify societal NEIs using AVERT and COBRA associated with energy efficiency programs at the portfolio level and present results at SAG NEI WG. Develop report with findings. | Q1 2020 |
| Quantify Utility NEIs | Quantify utility NEIs from IE energy efficiency programs and present results at SAG NEI WG. Develop report with findings. | Q4 2019 – Q1 2020 |
| Field IE Participant and Non-participant Surveys and Analyze Results | Navigant will field surveys of single-family (SF) and multi-family (MF) program participants and pipe line participants as well as a MF building owner survey. Monetize health benefits via information from northern IL hospital system data. | 2020 (control)  2021 (treatment) |
| Develop Non-IE Participant and Non-participant Survey Instruments | In conjunction with ODC (where possible), Navigant will develop survey instruments for programs whose screening questions indicated a presence of NEIs. Navigant will look for feedback from ComEd and other stakeholders on the survey instruments once in draft form. | Q2 2020 |
| Field Non-IE Participant and Non-participant Surveys | Navigant will field surveys with participants and non-participants of programs whose screening questions indicated a presence of NEIs. | 2020 (control)  2021 treatment) |
| Draft IL TRM Workpapers | Document NEI quantification methodology for inclusion in IL TRMv10 and TRC for IE programs and present findings at SAG NEI WG meeting | Q2 2021 |
| Draft IL TRM Workpapers | Document NEI quantification methodology for inclusion in IL TRMv11 and TRC for non-IE programs and present findings at SAG NEI WG meeting | Q4 2021 |

*Source: Navigant*

### Methodology

This detailed plan outlines activities for this research into nine discrete tasks, as summarized in Table 10.

Table . Summary of Tasks, Deliverables, and Timeline

| Tasks | Activities | Data Needed | Deliverables | Timeline |
| --- | --- | --- | --- | --- |
| Task 1: Quantify Economic NEIs associated will IE and non-IE programs | IMPLAN modelling and SAG NEI WG webinar | IMPLAN economic data by county and ComEd program data | Presentation deck and report with findings | Q3 2019 – Q1 2020 |
| Task 2: Develop IE Participant and Non-participant Survey Instruments | Develop harmonized surveys with ODC | IE program info | Draft and final survey instruments | Q4 2019 |
| Task 3: Quantify Societal NEIs associated will IE and non-IE programs | Use AVERT and COBRA to quantify societal NEIs | ComEd program tracking data | Draft and final report and presentation to SAG NEI WG | Q3-2019-Q1 2020 |
| Task 4: Quantify Utility NEIs associated with IE programs | Regression Analysis | * Payment transaction dates * Actual billed amounts by billing period * Source and amount of external assistance by billing period * Arrearage amount * Reconnections by billing period | Draft and final report and presentation to SAG NEI WG | Q4 2019 – Q1 2020 |
| Task 5: Field IE Participant and Non-participant Surveys and Analyze Results | Telephone and online surveys | * Customer contact information * Specific healthcare values from ComEd’s territory | * Memo summarizing early findings and presentation to SAG NEI WG (pre-treatment surveys) * Memo summarizing findings and presentation to SAG NEI WG (post-treatment surveys) | 2020 (pre)  2021(post) |
| Task 6: Develop Non-IE Participant and Non-participant Survey Instruments | Develop harmonized surveys with ODC | * Results from screening surveys * Non-IE program info | Draft and final survey instruments | Q2 2020 |
| Task 7: Field Non-IE Participant and Non-participant Surveys and Analyze Results | Telephone and online surveys | * Customer contact information | * Memo summarizing early findings (pre) * Memo summarizing findings and presentation to SAG NEI WG (post) | 2020 (pre) 2021 (post) |
| Task 8: Draft IL TRM Workpapers for NEIs associated with IE programs | Develop workpapers | Quantified and monetized NEIs | Workpapers for IL TRMv11 | Q3 2021 – Q2 2022 |
| Task 9: IL TRM Workpapers for NEIs associated with non-IE programs | Develop workpapers | Quantified and monetized NEIs | Workpapers for IL TRMv11 | Q4 2021 – Q2 2020 |

#### Task 1: Quantify and Monetize Economic NEIs for the Portfolio (Jobs created and customers’ savings on bills)

Navigant used Impact Analysis for Planning (IMPLAN) to analyze jobs impact related to energy efficiency goals. IMPLAN is widely used to conduct economic impact assessments and is a commonly used economic input-output (I-O) model.

The IMPLAN model is:

* Constructed based on the concept that all industries within an economy are linked together; the output of one industry becomes the input of another industry until all final goods and services are produced
* Used to both analyze the structure of the relevant area’s economy and the economic impact of the construction and operational phase of projects

IMPLAN models the economic activity within a specified area through the spending and consumption among different economic sectors, such as businesses, households, government entities, and external economies. Economic sectors or industries conduct typical business operations, including hiring employees, using capital to maximize performance, and selling goods or services to final users. Navigant’s energy efficiency IMPLAN analysis will:

* Input target spending data to IMPLAN economic sectors (i.e., industries) for use in the economic benefits model
* Rely upon IMPLAN’s regional attribution percentages to quantify the spending that is expected in the area
* Quantify the direct, indirect, and induced economic benefits of the incremental energy efficiency spending

Specifically, our analysis will quantify:

* Jobs (FTE)
* Labor Income ($)
* Economic Output ($)

#### Task 2: Develop IE Participant and Non-participant Survey Instrument

Navigant, in conjunction with ODC, is developing a survey instrument to quantify NEIs associated with IE program participation.

**Navigant will quantify the following NEIs based on feedback from participants:**

* Reduced medical visits due to reduced asthma symptoms
* Reduced missed days of school
* Reduced missed days of work
* Reduced medical visits due to thermal stress
* Reduced need for heating assistance

Navigant will survey MF building owners to quantify:

* Reduced vacancy
* Reduced equipment maintenance
* Marketability
* Reduced tenant turnover
* Home improvements
* Durability of property
* Reduced tenant complaints

Navigant will not attempt to quantify carbon monoxide poisoning, home fires, lead exposure, cardiovascular disease, improved mental health, or cancer through participant surveys.

#### Task 3: Quantify Societal NEIs

Navigant will utilize the EPA’s CO-Benefits Risk Assessment (COBRA) and AVoided Emissions and geneRation Tool (AVERT) models to quantify the avoided emissions and health benefits of ComEd’s CY 2018 programs. Navigant will pull energy efficiency program evaluation MW and MWh savings results to use as inputs for AVERT. AVERT produces an estimate of PM2.5, SO2, NOx, and CO2 avoided emissions within a given region. For ComEd, that region is the Great Lakes / Mid Atlantic Region defined in the EPA’s eGrid tool.

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

Navigant chose to utilize AVERT and COBRA for the following reasons:

* The tools were built by a trusted source
* Commonly used in state energy efficiency and renewable energy analyses
* Monetized impacts align with other impacts calculated at the participant level of this study

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

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

#### Task 4: Quantify Utility NEIs

Navigant will use a quasi-experimental method to quantify utility NEIs from ComEd’s IE programs. This method analyzes one year of pre- and post-program payment data and administrative cost data for a treatment group and comparison group. The treatment group is customers who participated in IE weatherization programs in CY 2018. Navigant received data containing information on ComEd CARE CY 2018 program participants. To select the comparison group, Navigant pulled random samples with quotas from PIPP, Residential Hardship, and LIHEAP programs. The quotas were based on the proportions of customers who participated in both IE weatherization programs and ComEd CARE programs in CY 2018.

Navigant will analyze both customer payment and utility cost metrics using a difference-in-difference (DID) technique. We are using a simple DID approach because we expect there will not be a large enough sample size to use a regression analysis. If the sample is larger than expected, we could use a regression analysis. The DID technique looks at the change in any given metric for participants between the post- and pre-periods and subtract from that the same difference for the comparison customers. Dollar values will determine avoided utility costs.

Navigant received CY2017 ComEd data (and has requested CY2019 data when available in Q1 2020) that included:

* Payment transaction dates
* Actual billed amounts by billing period
* Source and amount of external payment assistance by billing period
* Deferred payment agreement amounts
* Reconnections by billing period

**Using the above data, Navigant will quantify:**

* **Customer payment metrics –** Portion of households receiving payment arrangements, total arrangements in dollars, and the percentage of bill paid by arrangements
* **Billing and payment metrics –** Average annual billed amount, on-time payments, late payments, and the portion of each payment covered by ComEd CARE or LIHEAP
* **Utility metrics –** Amount of disconnections and reconnections and average carried arrearage

#### Task 5: Field IE Participant and Non-participant Surveys and Analyze Results

Navigant will conduct online and telephone surveys for MF and SF IE customers as well as MF IE building owners. We will:

* Use a third-party contractor to implement the telephone surveys and will use Qualtrics for the online surveys
* Take precautions to not survey the same customers surveyed for the ThreeCubed / Seventhwave research effort (see later detail for more information)
* Sample from a separate pool from the standard process evaluation activities
* Survey three sample groups in 2020 and conduct follow up surveys with the same sample in 2021

The survey schedule is outlined in Table 11.

Navigant is planning to survey three groups pre- and post-weatherization[[88]](#footnote-94).

* **Control (C)** – Surveys of households just after their unit has been weatherized (February 2020–December 2020)
* **Treatment (T)** – Surveys of households 9–12 months after their unit has been weatherized

Table . Summary of Planned Surveys

|  |  |  |
| --- | --- | --- |
| Survey | Field Dates | Method |
| Single Family Income Eligible Customer Survey | 2020  2021 | Online and Telephone |
| Multifamily Income Eligible Customer Survey | 2020  2021 | Online and Telephone |
| Multifamily Income Eligible Building Owner Survey | 2020  2021 | Online and Telephone |

This effort provides context for quantifying:

* **Occupant physical health impacts:** These questions will aim to understand impacts on occupant physical health because of ComEd’s energy efficiency programs. Example questions for this objective include:
  + In the past 12 months, has anyone in the household needed medical attention because your home was too hot or cold?
  + Other than a routine visit, has anyone in your household had to see a doctor, visit an emergency room, or be admitted to a hospital in the past 12 months for symptoms related to asthma?
* **Occupant financial health impacts:** These questions will aim to understand impacts on occupant financial health because of ComEd’s energy efficiency programs. An example questions for this objective includes:
  + In the past year, have you used any loans to assist with paying your energy bill?
* **Occupant comfort impacts:** These questions will aim to understand impacts on occupant comfort because of ComEd’s energy efficiency programs. An example question for this objective is:
  + Which of the following statements best describes the indoor temperature of your apartment during the winter or summer?
* **Building and home owner impacts:** These questions will aim to understand impacts on building and home owners because of ComEd’s energy efficiency programs. Example questions for this objective include:
  + During the last 12 months, approximately how much was spent on preventative maintenance or maintenance cost due to equipment failure on this property?
  + During the last 12 months, approximately how much was spent on marketing[[89]](#footnote-95)?

Navigant will develop the survey instrument questions primarily focusing on the objectives listed above. NEI equations are mapped to research questions at the end of this plan. Additional data points required to monetize NEIs are also outlined at the end of this plan.

#### Task 6: Develop Non-IE Participant and Non-participant Survey Instruments

Navigant, in conjunction with ODC (where possible), will develop survey instruments to quantify NEI associated with non-IE programs. Navigant will determine which non-IE programs to survey based on results from screening questions.

#### Task 7: Field Non-IE Participant and Non-participant Surveys and Analyze Results

Navigant will conduct online and telephone surveys for participants and non-participants of non-IE programs. We will:

* Use a third-party contractor to implement the telephone surveys and will use Qualtrics for the online surveys
* Sample from a separate pool from the standard process evaluation activities
* Survey groups in 2020 and conduct follow up surveys with the same sample in 2021

#### Task 8: Draft IL TRM Workpapers for NEIs associated with IE programs

Navigant recommends adding the NEIs to cross cutting volume 4 of the TRM, like the NTG methodology, with the NEIs presented at the program level. Navigant will present early findings to the Technical Advisory Committee to confirm how the results should be incorporated into the TRM for NEIs associated with IE programs.

#### Task 9: Draft IL TRM Workpapers for NEIs associated with non-IE programs

Navigant recommends adding the NEIs to cross cutting volume 4 of the TRM, like the NTG methodology, with the NEIs presented at the program level. Navigant will present early findings to the Technical Advisory Committee to confirm how the results should be incorporated into the TRM for NEIs associated with non-IE programs.

### NEI IE Equations

The following section outlines equations Navigant will use to quantify NEIs related to IE Wx programs.

#### Compare Sample Groups

***Quantifying the Benefit***

This equation will average the impact of treatment to compare a Wx group before and after treatment and a comparison group that had received treatment one year prior:

*Reduction in instance = [(Pre-treatment – Post-treatment) + (Pre-treatment – Comparison group)] / 2*

***Reduced Thermal Stress on Occupants***

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Percentage of hospitalizations, ED visits, and physician office visits for cold- and heat-related stress (state-specific where available)
* Average cost for each type of medical treatment including hospitalizations, ED visits, and physician office visits (state-specific where available and adjusted for inflation)
* Percentage of income-eligible with Medicare, Medicaid, Private/Other Insurance, or Uninsured (state-specific where available)

This equation quantifies the number of occurrences of (a) hospitalization, (b) ED visit, and (c) physician office visit avoided:

*N (a, b, c) =* [*(number of jobs completed in CY) \* (decreased rate of seeking medical care) \* (% of type of medical treatment sought for cold and heat-related thermal stress (for a, b, and c)*]

And the percent of annual medical costs for (a, b, and c) for those with (p1) Medicare, (p2) Medicaid, (p3) private/other, and (p4) uninsured or out-of-pocked payers:

*% of annual medical costs— (for p1, p2, p3, p4)—for population (for a, b, and c) =*

*[[(% of population by medical coverage type) \* (% of medical costs—by payer—for Population (for a, b, and c)] / (% of population by medical coverage type)]]*

And finally, the benefit associated:

*Total Program (without avoided deaths) =*

*[(N (a, b, c) \* % medical costs (for p1, p2, p3, p4)) \**

*Average cost for treatment (for a, b, and c)]*

***Monetizing Avoided Death Benefit***

To incorporate the benefit of avoided deaths, Navigant will need to find these additional inputs from reputable secondary sources:

* Number of deaths following hospitalization (state-specific where available)
* Percentage of hospitalizations resulting in deaths (state-specific where available)
* Current Value of Statistical Life

These equations are used by COBRA to monetize the number of avoided deaths:

*# of avoided deaths= [(% of hospitalizations resulting in deaths (U.S. population) \* (# of hospitalizations prevented by program in CY)]*

*Total benefit of avoided deaths = [# of avoided deaths \* VSL]*

#### Reduced Asthma Symptoms

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant had identified relevant inputs from the Illinois Department of Health Service Report (2017 data):

* Average cost for hospitalizations per adult and child and ED visit for all individuals (state-specific where available and adjusted for inflation)
* Percentage of income-eligible with Medicare, Medicaid, Private/Other Insurance, or Uninsured (state-specific where available)
* Frequency of re-admittance to hospital for adults and children and ED visits for all individuals
* Other direct medical costs and indirect costs associated with high-cost asthma patients adjusted for inflation
* Asthma prevalence rates in Illinois among both children and adults

These equations quantify the benefit associated for ED and hospitalizations:

*Benefit = (number of persons served by program in CY) \* (asthma prevalence for adults and children) \* (reduction in ED visits or hospitalizations) \* (frequency of re-admittance (adults and children)) \* (average hospital costs (adults and children))*

and other direct and indirect medical savings for high-cost patients:

*Benefit = (number of persons served by program in CY) \* (asthma prevalence for adults and children) \* (reduction in high-cost patients) \* (difference in high and low-cost patients after extracting the ED visit and hospitalization costs already claimed))*

#### Reduced Need for Pay-Day Loans

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Average loan amount
* Average interest payment

This equation quantifies the benefit:

*Total Benefit = (number of jobs completed in program year) \* (percent reduction in households using short-term, high-interest loans) \* (reduction in interest payments)*

#### Reduced Need for Heating Assistance

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Average monthly per person heating assistance subsidy (state-specific where available and adjusted for inflation)

This equation quantifies the benefit:

*Total Program Benefit = (number of jobs completed in CY) \* (percent of reduction in households requiring heating assistance) \* (average annual per person heating assistance subsidy) \* (average program household size)*

#### Reduced Missed Days at Work

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Average hourly wage (state-specific where available and adjusted for inflation)
* Percent of income-eligible worker without sick leave

This equation quantifies the benefit for missed days at work:

*Total Program Benefit = (number of jobs completed in CY) \* (% of program households with an employed primary wage earner) \* (reduction in missed days at work) \* (average hourly wage) \* (8 hours/day)*

#### Reduced Missed Days of School

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

We seek stakeholder feedback on three potential methods to monetize missed days of school:

***Monetizing the Benefit***

Navigant will need to find these additional inputs from reputable secondary databases:

* Average hourly wage (state-specific where available and adjusted for inflation)
* Percent of income-eligible worker without sick leave

To monetize the benefit of reduced missed days at school, Navigant will assume that the parent who is the primary wage earner will have to miss work to care for the sick child. This equation quantifies the benefit for missed days at school:

*Total Program Benefit = (number of jobs completed in CY) \* (% of program households with an employed primary wage earner) \* (reduction in missed days at school) \* (average hourly wage for parent) \* (8 hours/day)*

***Monetizing the Benefit***

Navigant will need to find these additional inputs from reputable secondary databases:

* Average hourly cost of childcare (state-specific where available and adjusted for inflation)

To monetize the benefit of reduced missed days at school, Navigant will assume that the parent will have to pay for childcare for that day. This equation quantifies the benefit for missed days at school:

*Total Program Benefit = (number of jobs completed in CY) \* (reduction in missed days at school) \* (average hourly cost for childcare) \* (8 hours/day)*

***Monetizing the Benefit***

Navigant will need to find these additional inputs from reputable secondary databases:

* Value of K12 school day in lifetime labor market benefit

To monetize the benefit of reduced missed days at school, Navigant will assume reduced missed days at school result in added lifetime labor market benefits. This equation quantifies the benefit for missed days at school:

*Total Program Benefit = (number of jobs completed in CY) \* (% reduction in missed days at school) \* (lifetime labor market benefit per day per student)*

#### Reduced Need for Food Assistance

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Average monthly per person food assistance subsidy (state-specific where available and adjusted for inflation)

This equation quantifies the benefit:

*Total Program Benefit = (number of jobs completed in CY) \* (percent of reduction in households requiring food assistance) \* (average annual per person food assistance subsidy) \* (average program household size)*

#### Reduced Property and Equipment Maintenance Cost

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Average annual cost for property maintenance
* Average annual cost for equipment maintenance

This equation quantifies the benefit:

*Total Program Benefit = (number of jobs completed in CY) \* (percent decrease in property and equipment maintenance cost) \* (average annual cost for property and equipment maintenance)*

#### Improved Housing Stability

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Average increase in value of extended lifetime of dwelling due to whole-house weatherization

This equation quantifies the benefit:

*Total Program Benefit = (number of jobs completed in CY) \* (percent of respondents observing increase in housing stability) \* (average increase* in value of extended lifetime of dwelling due *to whole-house weatherization)*

#### Reduced Marketing Cost

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Average annual marketing cost for multifamily building owners

This equation quantifies the benefit:

*Total Program Benefit = (number of jobs completed in CY) \* (percent decrease in marketing cost) \* (average annual marketing cost for multifamily building owners)*

#### Reduced Tenant Turnover and Unit Vacancy Cost

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

***Monetizing the Benefit***

Navigant will need to find these additional inputs from reputable secondary databases:

* Average monthly rent (state specific and adjusted for inflation if needed)

This equation quantifies the benefit:

*Total Program Benefit = (number of jobs completed in CY) \* (percent reduction in vacant units in month-equivalent) \* (average monthly rent)*

#### Reduced Tenant Complaints

***Monetizing the Benefit***

Although this research plan describes our current methodology for monetizing NEIs, we will revise our methodology as needed based on the data we are able to collect.

Navigant will need to find these additional inputs from reputable secondary databases:

* Average hourly wage for multifamily building maintenance and staff (state-specific where available and adjusted for inflation)

This equation quantifies the benefit:

*Total Program Benefit = (number of jobs completed in CY) \* (reduction in time spent responding to tenant complaints in hours) \* (average hourly wage for multifamily building maintenance and staff)*

## ComEd Residential Advanced Thermostats CY2020 Evaluation Research Plan

### Introduction

This evaluation research plan describes the research that the Navigant team will use to better understand the electric energy impacts from residential advanced thermostats incentivized through Illinois energy efficiency (EE) programs. This research builds on work completed in CY2019 and is being conducted at the request of Illinois Commerce Commission (ICC) staff, ComEd and regional stakeholders as a component of a consensus agreement for the Technical Reference Manual (TRM) version 7.0.

This research extends beyond previous Illinois advanced thermostat evaluation research studies by:

* Providing demand savings as well as annual electric savings
* Providing evidence to support or refute plausible explanations behind the savings results
* Incorporating advanced metering infrastructure (AMI) data and thermostat data
* Providing additional evidence beyond those provided in previous studies as to the representativeness of any comparison groups used in the study

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

Table 1. Evaluation Approaches

|  |  |
| --- | --- |
| Tasks | CY2020 |
| Collect and Process AMI and Thermostat Data | X |
| Coordinate with Opinion Dynamics and Engage Advanced Thermostat Subcommittee | X |
| Gross Impact - Econometric Analysis | X |
| Gross Impact - Adjusted ENERGY STAR Analysis | X |
| Final Reporting and Minor Supplemental Analyses | X |

#### Coordination

Navigant will conduct this research in coordination with Opinion Dynamics and the Advanced Thermostat Subcommittee, a subcommittee of the IL TRM Technical Advisory Commission (TAC). The Advanced Thermostat Subcommittee includes members of a variety of organizations, such as Navigant, Opinion Dynamics, ICC staff, Vermont Energy Investment Cooperative (VEIC), ComEd, Ameren, Google, Ecobee, and the Environmental Law and Policy Center (ELPC).

#### IL TRM v7.0 Stipulation

ICC staff, ComEd and regional stakeholders reached an agreement as part of the TRM update process for version 7.0, which will guide the current research effort for Advanced Thermostats. The stipulation is as follows:

In an effort to resolve potential disputes regarding the cooling reduction value in the IL-TRM for advanced thermostats, the Stipulating Parties agree to retain the 8% cooling reduction value for the 2019 IL-TRM Version 7.0, subject to completion of a statewide advanced thermostat evaluation utilizing AMI data. Specifically, the Stipulating Parties agree to work collaboratively with ComEd independent evaluator Navigant and Ameren Illinois independent evaluator Opinion Dynamics and other interested stakeholders to develop an Illinois-specific advanced thermostat evaluation method(s) that utilizes pre- and post-advanced thermostat participant AMI data and is developed with consideration of all proposed evaluation strategies, consistent with best industry practices, to be completed as soon as feasible for consideration in updating the IL-TRM. In developing the evaluation strategy, consideration will be given to adopting approaches that estimate cooling run time changes from the actual participants’ pre-advanced thermostat AMI data, along with actual post-advanced thermostat run time data provided by both the thermostat manufacturers and AMI data, as well as performing an econometric analysis on the AMI data using total home electricity consumption rather than estimated run time to provide another estimate and a comparison between the two methods. The Stipulating Parties further agree that nothing in this agreement precludes consideration of other evaluation approaches.

Below is proposed language that would be included as a footnote next to an 8% cooling reduction value for advanced thermostats in the 2019 IL-TRM Version 7.0:

In an effort to resolve potential disputes, without the need for litigation regarding the cooling reduction value in the IL-TRM for advanced thermostats, Stakeholders have reached through negotiation a separate stipulation that retains the 8% cooling reduction value in the 2019 IL-TRM Version 7.0, pending completion of a statewide advanced thermostat evaluation utilizing participant AMI data, and consistent with a Stipulation reached among stakeholders and the Program Administrators. Specifically, the parties have agreed to work collaboratively to develop an Illinois-specific advanced thermostat evaluation framework that utilizes AMI data, for consideration in updating the IL-TRM as soon as feasible, but no later than completing the evaluation in time for the 2021 IL-TRM Version 9.0, if practicable and, for Ameren Illinois, in a manner consistent with the timing of its AMI installation schedule.

### Evaluation Research Topics

This research focuses on measure 5.3.16 Advanced Thermostats.[[90]](#footnote-96) The goals of this study include:

* Evaluated estimate of annual cooling electric savings and coincident demand savings, which will be available to inform the IL TRM as a part of the IL TRM TAC process coordinated by VEIC
* Research to understand and contextualize findings, including understanding those that are unexpected, such as the effect of advanced thermostats on non-weather-related energy use

The CY2020 evaluation will seek to answer the following key researchable questions at a minimum. Additionally, some research questions may be added or edited as Navigant coordinates this research with the Advanced Thermostat Subcommittee.

* What is the impact of residential advanced thermostats on cooling season electric consumption?
* What adjustments could be made to the ENERGY STAR method for estimating field savings for advanced thermostats in order to improve estimates of cooling savings and what are the savings estimates for Illinois of an adjusted ENERGY STAR method?
* What is the impact of residential advanced thermostats on electric demand at certain critical times?

### Evaluation Approach

The table below summarizes the evaluation tasks for CY2020 that will be used to answer the evaluation research questions.

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

|  |  |  |
| --- | --- | --- |
| Activity | Target(s) | Notes |
| Collect and Process AMI and Thermostat Data | * Request data from ComEd and thermostat manufacturers * Receive and process data * Address data issues |  |
| Coordinate with Opinion Dynamics and Engage Advanced Thermostat Subcommittee | * ~7 Touchpoint Meeting(s) with Advanced Thermostat Subcommittee * 1-on-1 Meetings as necessary * Ongoing coordination meetings with Opinion Dynamics | Dependent on level of stakeholder feedback and data availability |
| Gross Impact - Econometric Analysis | * Analysis of AMI data | Dependent on data availability |
| Gross Impact - Adjusted ENERGY STAR Analysis | * Analysis of thermostat telemetry, survey, and HVAC metering data | Dependent on data availability |
| Final Reporting and Minor Supplemental Analyses | * Supplemental Analyses as Necessary * Final Report | Dependent on level of stakeholder feedback and data availability |

#### Collect and Process AMI and Thermostat Data

Navigant sent data requests for ComEd advanced thermostat participants to ComEd, Nest and Ecobee in Summer 2018. Navigant expects to receive AMI interval data for ComEd customers for the period from at least March 2017 through March 2019. To date, Navigant has received data spanning the period from March 2018 through March 2019.

Navigant will work with parties from whom data has been requested to receive and validate AMI and thermostat data. This task will include processing and reviewing data, addressing any issues that arise, and ensuring data quality and completeness.

#### Coordinate with Opinion Dynamics and Engage Advanced Thermostat Subcommittee

At the request of the ICC Staff, Navigant has coordinated in CY2019 with Opinion Dynamics, evaluator for Ameren Illinois, to develop a unified set of methods for performing the current research, with the intent that the same methods would be conducted for both ComEd and Ameren Illinois advanced thermostat programs. For CY2020, Navigant will continue to coordinate with Opinion Dynamics in order to ensure that the two evaluators are aligned on the research to be conducted and methods to be employed.

For CY2020, Navigant will engage with stakeholders on the Advanced Thermostat Subcommittee through a series of Touchpoint meetings, as well as one-on-one meetings with individual subcommittee members as necessary. These meetings will serve two primary goals: (1) to reach consensus on methods and (2) to review and understand results. Delays in receiving data from ComEd or the thermostat vendors will impact how much Navigant is able to coordinate with stakeholders and still complete research by May 2020 for the IL TRM.

**Reach Consensus on Methods**

Navigant will coordinate with the Advanced Thermostat Subcommittee to the greatest extent possible in order to reach agreement on the methodology for this research. In CY2019, the subcommittee reached consensus to pursue two parallel pathways: (1) an econometric analysis of AMI data and (2) an analysis of adjustments to the Environmental Protection Agency’s (EPA’s) ENERGY STAR method for estimating energy savings due to advanced thermostats. The specific details of these methods will further need to be developed with stakeholder input.

Agreement on methods prior to seeing results serves several purposes: (1) to create a transparent record of the research to be conducted and questions to be answered (2) to make sure stakeholders understand the methods to be employed; (3) to create a framework with which to assess the validity of the research results, including understanding the assumptions and limitations of the agreed upon methods prior to seeing results; and (4) this framework enables Navigant (the independent evaluator) to be inclusive of input from financially vested parties without risking the objectivity of the research. While this process does not guarantee accuracy of the results, it will facilitate the interpretation and assessment of results in a consistent way among all stakeholders.

Importantly, reaching agreement on the methods does not mean that the results will be automatically adopted in the TRM. The purpose of this research is to provide Illinois-specific research and recommendations as appropriate. The decision of how to update the TRM will be the responsibility of stakeholders as part of a separate process coordinated by VEIC.

**Review and Understand Results**

Navigant will coordinate touchpoint meetings and 1-on-1 meetings as needed to discuss the study’s findings. The purpose of these meetings will be to provide valuable context and/or plausible explanations for whatever savings estimates are found. This context has been a common request and a proactive discussion of results will mitigate concerns of key stakeholders and facilitate future discussions regarding updating the TRM.

#### Econometric Analysis

The econometric analysis of AMI data to estimate energy savings is one pathway that was agreed upon by stakeholders in CY2019. Econometric analysis would utilize AMI data to simulate an experiment, comparing the difference in cooling electric energy use before and after installation of the advanced thermostat, and will utilize a comparison group such as future participants or non-participants.

In CY2019, Navigant and Opinion Dynamics began the development of this method, incorporating the feedback of the Advanced Thermostat Subcommittee. Pending delivery of ComEd’s AMI data, the details of this analysis will be further developed with the feedback of the Subcommittee. Navigant will then conduct the econometric analysis to produce an estimate of energy and peak demand savings. Depending on the final approach taken, Navigant will comment on whether the econometric analysis estimate should be considered an estimate net or gross savings. If the estimate is gross, this research does not encompass estimating a net-to-gross (NTG) ratio.

#### Adjusted ENERGY STAR Analysis

The EPA’s ENERGY STAR program prescribes a method for demonstrating field savings for connected thermostats.[[91]](#footnote-97) Stakeholders have expressed a strong desire to leverage this method for evaluation purposes. In CY2019, Navigant and Opinion Dynamics discussed this method with stakeholders, with two key outcomes:

* Many stakeholders agree with the evaluators that the unadjusted ENERGY STAR method is insufficient for evaluation purposes
* Many stakeholders believe that adjustments to the ENERGY STAR method could yield results that would be appropriate for evaluation

Navigant and Opinion Dynamics proposed a number of adjustments to the ENERGY STAR method that would improve the accuracy of the method, subject to the data available and the timeline prescribed by the IL TRM v7.0 Stipulation. Navigant will further develop the details of this analysis with the Subcommittee. The adjusted ENERGY STAR analysis produces an estimate of gross savings. This research does not encompass estimating a NTG ratio.

#### Final Reporting and Minor Supplemental Analyses

Based on stakeholder feedback, Navigant and Opinion Dynamics will consider additional, minor analyses proposed by the group that can inform the group’s interpretation of the results of the research. Navigant will conduct any additional analyses as warranted and document the findings in a report. Separate from this study, VEIC will coordinate a process through IL TRM TAC for how best to update the IL TRM considering the findings from this study.

### Evaluation Schedule

The timeline of this research is dependent on the availability of AMI and thermostat data. In order to meet the timeline of the IL TRM v7.0 Stipulation to inform IL TRM v9.0, this research needs to be completed by May 2020. In CY2019, since AMI data was expected by March 20, 2019, this data is required as soon as feasible for ComEd. Further delays of delivery of the AMI data will decrease the amount of time available for stakeholder engagement, which greatly increases the risk of negative stakeholder responses. This research may not be finished in time to inform IL TRM v9.0 at all if data is received after November 30, 2019.

Navigant will continue to coordinate meetings with the Advanced Thermostat Subcommittee prior to receiving AMI or thermostat data in an effort to expedite the study. Table below provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress.

Table 3. Schedule – Key Deadlines

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Approximate Date |
| Deliver AMI Data | ComEd | ASAP, no later than November 30, 2019 |
| Collect Thermostat Data | Evaluation and Thermostat Manufacturers | ASAP, December 2019 |
| Collect Available Survey and HVAC Metering Data | Evaluation | ASAP, December 2019 |
| Touchpoint Meeting 11 | Evaluation | December 2019 |
| Touchpoint Meeting 12 | Evaluation | January 2020 |
| Touchpoint Meeting 13 | Evaluation | February 2020 |
| Touchpoint Meeting 14 | Evaluation | March 2020 |
| Draft Results – Econometric Analysis | Evaluation | March 2020 |
| Draft Results – Adjusted ENERGY STAR Analysis | Evaluation | March 2020 |
| Touchpoint Meeting 15 | Evaluation | April 2020 |
| Touchpoint Meeting 16 | Evaluation | May 2020 |
| Final Report Completed | Evaluation | May 2020 |
| Additional Meetings / Engagement as Necessary | Evaluation | May – August 2020 |

## Technical Reference Manual

### Introduction

The purpose of the Illinois Technical Reference Manual (IL TRM) is to provide a transparent and consistent basis for calculating energy and demand savings in Illinois.[[92]](#footnote-98) The overall goal of this evaluation research is to improve the IL TRM input parameter assumptions. All evaluators in Illinois, including Navigant, are part of the Illinois Stakeholder Advisory Group (SAG) Technical Advisory Committee (TAC) and are charged with providing materials to continually update and improve the IL TRM to provide the most accurate input parameter assumptions and impact evaluation methodology.

This evaluation research plan summarizes Navigant’s approach for conducting evaluation research to update measures in the IL TRM. The purpose of this plan is to provide a summary of the prioritization framework and to outline the methodology for secondary and primary research efforts. We expect these activities to occur on a rolling basis each year during the two-year period.

### Evaluation Research Topics

The objectives of IL TRM evaluation research are:

1. Develop a framework for ongoing evaluation research contributions to IL TRM updates, including scope and schedule for such activities.
2. Promote statewide coordinated evaluation research efforts through the TAC.
   1. Outline status update and communication processes to keep interested stakeholders apprised of this work and provide stakeholders meaningful opportunities to comment.
   2. Work with the TAC and IL TRM administrator to provide valuable input while avoiding duplication of efforts.
   3. Share results with ComEd, the Illinois gas utilities, Ameren IL and their evaluator, and other relevant stakeholders.
   4. Participate in annual prioritization for TRM evaluation research in conjunction with the TAC, including attending and providing feedback during research prioritization and TRM measure prioritization meetings.
3. Review current IL TRM measures and priority recommendations from the TAC to develop evaluation research based on energy savings, historical realization rates, variability and uncertainty in measure impacts, feasibility to update, relative contributions of measures and planned future use, among others.
4. Conduct secondary research to develop comparable industry benchmarks for selected measures and propose standardized deliverables for secondary research including inputs to IL TRM measure work papers.
5. Determine appropriate thresholds for determining when to conduct primary evaluation research. Upon selection, develop appropriate methods to conduct such research.

### Evaluation Approach

This evaluation plan segments activities for TRM research into four discrete activities, as summarized in Table 1 below. As stated above, we expect to conduct these activities on an ongoing basis, resulting in an updated list of measures for evaluation research each year.

**Table 1. Summary of Activities, Tasks, and Deliverables**

|  |  |  |
| --- | --- | --- |
| Activity | Tasks | Deliverables |
| Statewide Coordination | * Participate in Illinois SAG and TAC meetings * Participate in statewide coordination among utilities, evaluators and stakeholders | * TAC meeting to discuss planned secondary and primary research * Evaluation plans and activities reflect statewide coordination |
| TRM Research Prioritization | * Define framework for determining high impact measures for secondary and primary research * Determine gaps in current TRM research plan | * Annual list of secondary and primary research priorities |
| Secondary Research | * Conduct literature review * Conduct engineering review, including review of past measure participation | * Secondary Research Memo * TRM Work Paper |
| Primary Research | * Conduct primary research effort through metering, data collection, modeling, or other engineering method | * Primary Research Evaluation Plan * Primary Research Memo * TRM Work Paper |

#### Statewide Coordination

Navigant coordinates evaluation research with relevant stakeholders to prioritize and conduct a coordinated research effort, including the following:

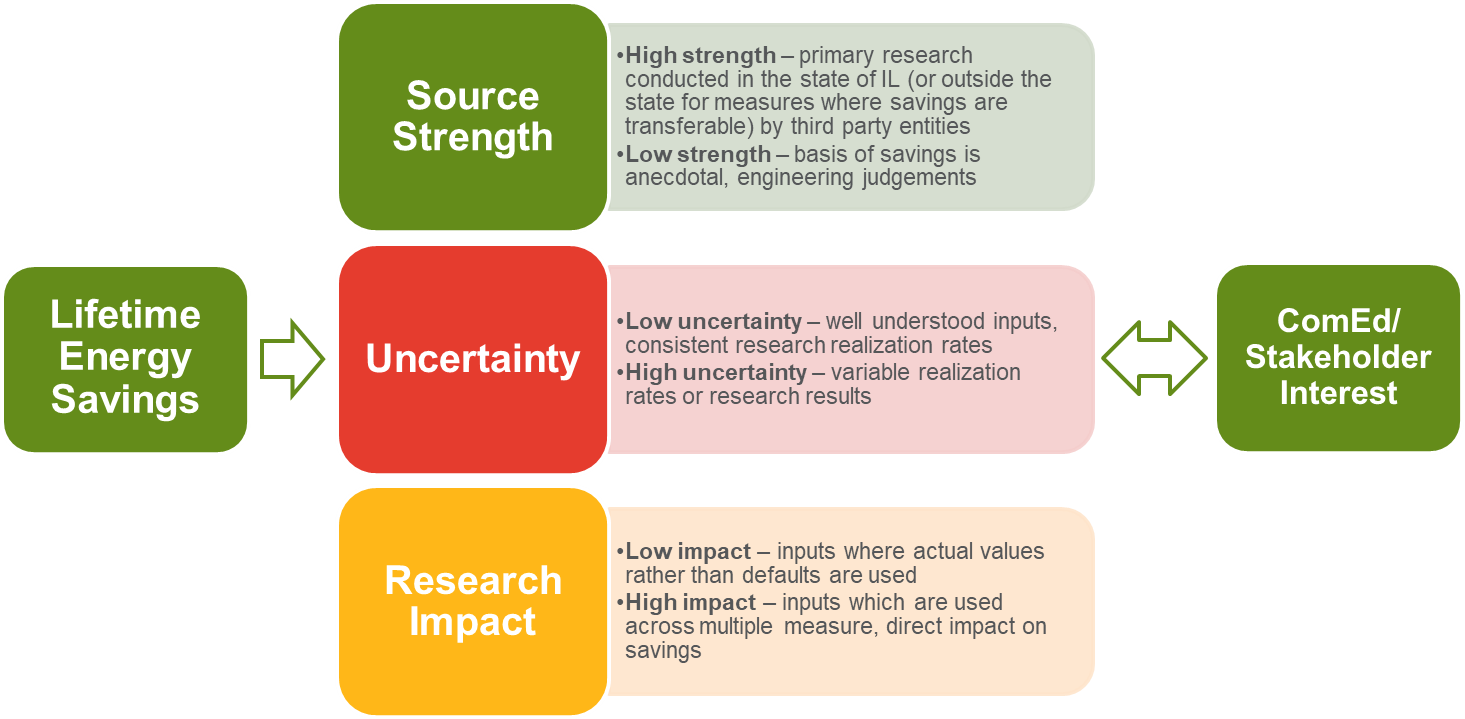
* **Ameren Illinois evaluation team.** Navigant holds monthly calls with the Ameren Illinois evaluation team and coordinates on statewide evaluation research.
* **Illinois Gas Utilities.** Navigant also evaluates Nicor Gas’, Peoples Gas’ and North Shore Gas’ energy efficiency programs and will coordinate with our internal team on research items of interest to the gas utilities.
* **Continued IL SAG and TAC participation.** Navigant will continue to participate in IL SAG and TAC meetings to engage stakeholders at key stages of evaluation research plan development to ensure that objectives and methodology align with statewide and regional goals and other ongoing research. Additionally, Navigant will notify the TAC of the primary research planned during the TRM update process and will report out on research efforts during TAC calls.

#### Measure Prioritization

Navigant has developed a prioritization framework for IL TRM evaluation research tasks. The purpose of this framework is to aid the IL TRM Administrator and TAC in identifying current IL TRM measures that have the highest potential for updating current IL TRM algorithms or savings estimates. Figure 1 below provides a schematic of the prioritization framework. Navigant will update this framework as needed, based on new information about technologies, measures or programs. The framework considers the following:

* **Energy Savings.** Prioritize measures with significant planned Cumulative Persisting Annual Savings (CPAS) and/or high anticipated planned savings
* **Measure Research Criteria**. Rank each measure based on three criteria. Navigant uses a one to five ranking for the three below criteria, where a five represents a high need for research and a one represents a low need for research.
  + **Source strength** – Focus on measures which have not been well-studied recently. We will prioritize updates to measures with references noted by industry as “weak”, e.g., values based on another state, values based on engineering simulations instead of primary data collection, or values which do not account for significant interactive effects.
  + **Uncertainty** **of measure savings** – Consider evaluated research realization rates over time, program changes, or measure mix changes
  + **Research impact** – Consider how likely the results from the research will develop into significant IL TRM updates.
* **Stakeholder and utility interest.** Consider interest from ComEd or other stakeholders in developing measure research priorities.

**Figure 1. TRM Evaluation Research Prioritization Schematic**

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*Source: Navigant*

The framework will assist Navigant in (1) identifying gaps in our current TRM research plans and to (2) determine the appropriate level of rigor for each research effort. The following tables present results from the CY2018 high impact measures list by energy savings and whether there is a current or planned research initiative.

**Table 2. Commercial & Industrial Measure Prioritization**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **End Use Type** | **Verified Gross First Year Savings (kWh)** | **Percent Impact on First Year Savings** | **Verified Gross Lifetime Savings (kWh)** | **Percent Impact on Lifetime Savings** | **Research?** |
| LED Lighting (Lamps, Fixtures) | 763,348,911 | 65% | 8,444,289,666 | 63% | 2019 EUL Research Effort |
| Other (Custom, RCx, etc.) | 140,925,025 | 12% | 1,701,853,347 | 13% | 2019 EUL Research Effort |
| Voltage Optimization | 66,014,049 | 6% | 990,210,730 | 7% |  |
| Other (HVAC) | 34,661,587 | 3% | 508,377,194 | 4% |  |
| Compressor system | 27,242,260 | 2% | 250,862,979 | 2% | Demand-side compressed air TRM research considered for 2021 |
| Networked Lighting & Controls | 21,613,178 | 2% | 247,191,435 | 2% |  |
| Programmable Thermostat | 17,893,833 | 2% | 65,606,815 | 0% |  |
| Occupancy Sensor & Other Controls | 15,353,508 | 1% | 121,696,725 | 1% |  |
| Other (Refrigeration) | 10,941,508 | 1% | 122,417,083 | 1% |  |
| Energy Management Systems | 10,067,150 | 1% | 151,007,253 | 1% |  |
| **Total\*** | **1,173,850,680** | **100%** | **13,361,864,886** | **100%** |  |

*Source: Navigant Analysis*

\* Indicates that these are total values for the sector, not for the tabulated values.

**Table 3. Residential Measure Prioritization**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **End Use Type** | **Verified Gross First Year Savings (kWh)** | **Percent Impact on First Year Savings** | **Verified Gross Lifetime Savings (kWh)** | **Percent Impact on Lifetime Savings** | **Research?** |
| LED Lighting (Lamps, Fixtures) | 493,293,952 | 76% | 4,761,729,360 | 79% | 2019 EUL Research Effort |
| Refrigerator | 38,320,158 | 6% | 312,544,533 | 5% |  |
| Advanced Thermostat | 21,801,159 | 3% | 218,011,591 | 4% |  |
| Advanced Power Strips Tier 1 | 10,803,443 | 2% | 75,624,098 | 1% | APS In-Service Rate Research |
| ECM Furnace Motor | 7,415,736 | 1% | 148,314,720 | 2% |  |
| Air Purifier | 5,482,708 | 1% | 49,344,372 | 1% |  |
| Freezer | 4,779,903 | 1% | 38,411,881 | 1% |  |
| Room & Central Air Conditioner | 3,317,542 | 1% | 54,495,457 | 1% |  |
| Low Flow Showerhead | 2,964,787 | 0% | 29,647,874 | 0% |  |
| Heat Pumps (ASHP, Ductless HP, GSHP, Others) | 1,613,844 | 0% | 29,650,966 | 0% |  |
| **Total\*** | **648,191,485** | **100%** | **6,042,720,284** | **100%** |  |

\* Indicates that these are total values for the sector, not for the tabulated values.

Source: Navigant Analysis

**Table 4. Income Eligible Measure Prioritization**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **End Use Type** | **Verified Gross First Year Savings (kWh)** | **Percent Impact on First Year Savings** | **Verified Gross Lifetime Savings (kWh)** | **Percent Impact on Lifetime Savings** | **Research?** |
| LED Lighting (Lamps, Fixtures) | 90,374,976 | 84% | 876,174,674 | 85% | 2019 EUL Research Effort |
| Advanced Power Strips Tier 1 | 3,369,629 | 3% | 23,587,400 | 2% | APS In-Service Rate Research |
| Low Flow Showerhead | 944,527 | 1% | 9,445,273 | 1% |  |
| Air Sealing | 869,626 | 1% | 13,044,385 | 1% |  |
| Attic/Wall/Basement /Floor/Foundation Insulation | 851,956 | 1% | 21,298,907 | 2% |  |
| Faucet Aerators | 551,728 | 1% | 4,965,555 | 0% |  |
| PTAC/PTHP | 483,305 | 0% | 7,249,577 | 1% |  |
| HVAC Control System & Maintenance | 420,354 | 0% | 7,566,364 | 1% |  |
| Heat Pumps (ASHP, Ductless HP, GSHP, Others) | 323,862 | 0% | 5,808,380 | 1% |  |
| Room & Central Air Conditioner | 238,500 | 0% | 4,086,024 | 0% |  |
| **Total\*** | **107,634,721** | **100%** | **1,036,172,473** | **100%** |  |

\* Indicates that these are total values for the sector, not for the tabulated values.

Source: Navigant Analysis

#### Secondary Evaluation Research

Secondary evaluation research efforts will (1) inform near-term updates to the TRM and (2) assess need for a primary research effort. Secondary evaluation research efforts may include reviewing applicable state TRMs, conference papers (e.g., IEPEC, ACEEE), consulting internal and external industry experts, reviewing previous measure-level evaluation findings, and reviewing available cost or technology data from stakeholders.

There are two deliverables typically associated with the secondary evaluation research effort; a research findings memo and TRM measure workpaper, outlined in the table below.

**Table 5. Secondary Evaluation Research Deliverables**

|  |  |
| --- | --- |
| Deliverable | Description |
| Secondary Research Memo | The secondary research memo will typically include the following sections:   * Background   + Measure prioritization, i.e., why Navigant conducted secondary research on this measure   + Description of measure technology and role in ComEd portfolio * Methodology   + Sources reviewed (research papers, TRMs, conference papers, industry experts)   + Type of engineering/econometric review performed * Findings   + Findings from literature review   + Findings from engineering/econometric review * Recommendations   + Changes recommended to the TRM in the short term   + Recommendations for additional primary or other type of research |
| TRM Work Paper | A TRM work paper will include TAC submittal procedure and deadlines to share this information with statewide stakeholders and to submit work papers to the TAC by May 15 of each year to be incorporated into future versions of the TRM. An example is embedded here: |

*Source: Navigant*

#### Primary Evaluation Research

Once a need for primary evaluation research is identified, Navigant will work with ComEd, and relevant stakeholders as appropriate, to plan and deliver primary evaluation research. Primary evaluation research could include any ComEd territory specific data collection or analysis effort including:

* On-site metering
* Billing analysis
* Modeling
* Surveys/Interviews/Observations
* Collection of cost data

### Evaluation Schedule

The table below includes a general schedule for IL TRM evaluation research that we expect to implement on a rolling basis, using the CY2020 timeframe as an example.

**Table 6. TRM Evaluation Research Schedule by Task**

|  |  |  |
| --- | --- | --- |
| Activity or Deliverable | Responsible Party | Date |
| 2020 IL TRM research priorities established by stakeholders (complete) | Evaluation/ComEd/ Stakeholders | September 26, 2019 |
| Evaluation review/prioritization (complete) | Evaluation | October 2019 |
| Secondary research (in progress) | Evaluation | May 15, 2020 |
| Develop TRM work papers (in progress) | Evaluation | May 15, 2020 |
| 2020-2021 primary research planning | Evaluation | June-July 2020 |
| Feedback to inform next TRM prioritization | Evaluation | August 2020 |
| 2021 IL TRM research priorities established by stakeholders | Evaluation/ComEd/ Stakeholders | September 2020 |

*Source: Navigant*

1. ComEd 2019-2021 Evaluation Plan:   
   https://s3.amazonaws.com/ilsag/ComEd\_CY2019-CY2021\_Evaluation\_Plan\_Final\_2019-02-19.pdf [↑](#footnote-ref-1)
2. Commonwealth Edison Company’s 2019-2021 Energy Efficiency and Demand Response Plan dated June 30, 2017, page 6. [↑](#footnote-ref-2)
3. Northeast Energy Efficiency Partnerships (2017). Non-Energy Impacts Approaches and Values: An Examination of the Northeast, Mid-Atlantic, and Beyond [↑](#footnote-ref-3)
4. NMR Group (2011), Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts Evaluation [↑](#footnote-ref-4)
5. Oak Ridge National Laboratory (2014). Health and Household-Related Benefits Attributable to the Weatherization Assistance Program [↑](#footnote-ref-5)
6. Three3, Inc. and NMR Group (2016). Massachusetts Special Cross-Cutting Research Area: Low-Income Single-Family Health- and Safety-Related Non-Energy Impacts (NEIs) Study [↑](#footnote-ref-6)
7. See <http://www.ilga.gov/legislation/publicacts/99/099-0906.htm> [↑](#footnote-ref-7)
8. Net refers to incentives calculated as net incentives = NTG x paid incentives [↑](#footnote-ref-8)
9. There may be a need to do further analysis even if the program TRC exceeds 1.0. If the overall portfolio is not cost-effective, a deeper review of the custom programs may be necessary to help bolster the portfolio. [↑](#footnote-ref-9)
10. 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-10)
11. Fully custom savings refer to savings which take an entirely custom approach specific for that project, to calculating savings. These should be based on site-specific metering or billing data. Partially-deemed savings are those which rely on TRM calculations or input variables which are not specific to the site, but are deemed based on research. [↑](#footnote-ref-11)
12. Corresponding to a score of 8, 9 or 10 for the importance of the program on their decision to do the spillover. [↑](#footnote-ref-12)
13. 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-13)
14. 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-14)
15. Corresponding to a score of 8, 9 or 10 for the importance of the program on their decision to do the spillover. [↑](#footnote-ref-15)
16. 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-16)
17. Bulbs installed in residential locations will be assigned residential HOU and Peak CF estimates from the IL TRM v6.0. [↑](#footnote-ref-17)
18. Typically, carryover savings would use evaluation research findings from the prior two program years to estimate res/non-res split, installation rate, and NTGR. [↑](#footnote-ref-18)
19. Distributors collect email addresses at the time of purchase. [↑](#footnote-ref-19)
20. The evaluation team will use a variety of methods to determine project‑specific inputs even for projects not selected for a site visit. Methods may include reviewing posted building schedules online, telephone verification with the participant, and reviewing billing data. [↑](#footnote-ref-20)
21. For example, a project could have multiple baselines for a retrofit project—additional added electric load would have an ‘industry best practices / code’ baseline whereas a more efficient servicing of the pre‑existing load may have an ‘existing equipment’ baseline. [↑](#footnote-ref-21)
22. 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-23)
23. The number of projects in the sample may change based on the final list of projects and their savings. Additional gas projects may be sampled if utility-specific realization rates are warranted. [↑](#footnote-ref-24)
24. http://ilsagfiles.org/SAG\_files/NTG/2019\_NTG\_Meetings/Final\_Values/ComEd\_NTG\_History\_and\_CY2019\_Recommendations\_2018-10-01.xlsx [↑](#footnote-ref-25)
25. To qualify, participants must be ComEd public sector non-residential customers with monthly peak demand levels up to 100 KW. [↑](#footnote-ref-26)
26. No-cost direct-install measures include low-flow showerheads and faucet aerators, pre-rinse spray valves, smart power strips, and controls for novelty coolers, beverage machines, and snack machines. [↑](#footnote-ref-27)
27. These measures began to be added midyear CY2019, and include package terminal air conditioners (PTAC), package terminal heat pump (PTHP), single-package and split system unitary air conditioners, small commercial programmable and advanced thermostats, small commercial programmable and advanced thermostat adjustments, notched v-belts, and advanced rooftop controls. [↑](#footnote-ref-28)
28. Illinois Public Act 099-0906 (http://www.ilga.gov/legislation/publicacts/99/099-0906.htm). [↑](#footnote-ref-29)
29. Sampling in this manner for 85/15 confidence/precision is the approach used by Exelon-PECO for sub-program level research. When the subprograms are considered the overall research achieves 90/10 results for the program. [↑](#footnote-ref-30)
30. The data required to develop an ex post savings estimate depends on several factors including: measure seasonality; the size of the project savings; whether the project is selected for an on-site visit; whether there are both gas and electric savings; the availability of gas company billing data; and on the completeness of the data provided by the implementer. Where possible based on the data provided by the implementer, Navigant will provide a preliminary estimate of the ex post savings subject to final quality control checks. Where additional data or clarifications are needed, or a site visit is required, Navigant will request the additional information from the implementer and/or make initial contact with the participant within 45 days to schedule a site visit. [↑](#footnote-ref-31)
31. To qualify, participants must be ComEd private-sector commercial or industrial customers with monthly peak demand levels up to 100 KW. [↑](#footnote-ref-32)
32. 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-33)
33. 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-34)
34. The ComEd 2018-2021 EE/DR Plan does not split the savings target of the Small Business Program for the Private and Public Sector 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-35)
35. 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). See “Commonwealth Edison Company’s 2018 – 2021 Energy Efficiency and Demand Response Plan,” June 30, 2017, pp. 134. [↑](#footnote-ref-36)
36. See https://amerenillinoissavings.com/for-my-business/explore-incentives/small-business-incentives for more information. [↑](#footnote-ref-37)
37. Opinion Dynamics is the lead evaluator for Ameren Illinois energy efficiency programs. [↑](#footnote-ref-38)
38. The Business Incentive Program is comprised of the non-residential 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-39)
39. Illinois Public Act 099-0906 (http://www.ilga.gov/legislation/publicacts/99/099-0906.htm), passed in 2016. [↑](#footnote-ref-40)
40. Energy Efficiency Measure Installer certification is only required to seek certification pursuant to Code Part 462 if the entity performs, while installing energy efficiency measures, electrical connections other than connections of class 2 circuits as defined in the National Electric Code effective August 24, 2016 and the incentive for the measure is $300 or more. These rules do not apply if the customer self-installs the measure. [↑](#footnote-ref-41)
41. The ComEd 2018-2021 EE/DR Plan does not split the savings target of the Business Incentive Program for the Standard and Custom portions of the program. The Business Incentive Program 1st year and CPAS targets include CHP and Data Center Programs. See “Commonwealth Edison Company’s 2018 – 2021 Energy Efficiency and Demand Response Plan,” June 30, 2017, pp. 6-7, 51-52. [↑](#footnote-ref-42)
42. 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). See “Commonwealth Edison Company’s 2018 – 2021 Energy Efficiency and Demand Response Plan,” June 30, 2017, pp. 134. [↑](#footnote-ref-43)
43. 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-44)
44. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 8.0, available at: <http://www.ilsag.info/technical-reference-manual.html> [↑](#footnote-ref-45)
45. These measures are rebated separately from SEM program and savings for these measures are not counted in the SEM savings [↑](#footnote-ref-46)
46. For example, a project could have multiple baselines for a retrofit project—additional added electric load would have an ‘industry best practices / code’ baseline whereas a more efficient servicing of the pre‑existing load may have an ‘existing equipment’ baseline. [↑](#footnote-ref-47)
47. More information on parallel evaluations can be found in the Memo “ComEd Parallel Impact Evaluation Process v3.docx” prepared by Erin Daughton of ComEd November 13, 2017. [↑](#footnote-ref-48)
48. Formerly known as Remote Commissioning, the name was changed to Virtual Commissioning in CY2019 when it was brought within the RCx Program to avoid confusion with similarly-named programs. [↑](#footnote-ref-49)
49. Although VCx falls within the RCx Program it will be evaluated separately due to differences in implementation and the evaluation methodology. [↑](#footnote-ref-50)
50. To qualify, a participant must be a ComEd business customer with at least one year of 30-minute interval smart-meter data available prior to engagement. [↑](#footnote-ref-51)
51. Recommended actions are focused on operational adjustments to automated systems and may include, but are not limited to, adjusting HVAC schedules to match occupancy, installing smart timers to turn off unneeded equipment during off or light-duty hours, managing equipment start-up and shut-down schedules, and delamping. [↑](#footnote-ref-52)
52. In CY2018 Navigant employed a daily regression model to estimate VCx Program savings applied to 30-minute interval AMI usage data aggregated to daily totals. Midway through CY2019 PTO proposed using an hourly model where feasible instead, using 30-minute interval usage data aggregated to hourly totals, to provide “insights into the impact of the program on peak hours” (June 13, 2019 memo, Power TakeOff, “RE: ComEd Virtual Commissioning Program – CY2019 Program Updates Review,” p. 3). [↑](#footnote-ref-53)
53. 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-54)
54. Navigant will use a grid search to solve for individual premise degree-day balance points. [↑](#footnote-ref-55)
55. Past experience suggests that inclusion of the hours-of-daylight and month dummy variables in models for exterior lighting changes tends to annihilate the coefficients on the degree-day variables. Continuing to include them would not cause statistical bias to the coefficients of any included variables, but it might cause the regression standard errors to be larger than would be the case if the degree-day variables were dropped. [↑](#footnote-ref-56)
56. See http://rredc.nrel.gov/solar/old\_data/nsrdb/1991-2005/tmy3/ for more information. [↑](#footnote-ref-57)
57. The evaluation does capture participant spillover, and the program is unlikely to generate significant non-participant spillover, but the evaluation does not remove free-ridership bias. Thus, research to identify free-ridership is warranted. [↑](#footnote-ref-58)
58. See IL TRM version 7.0, volume 4, section 3. [↑](#footnote-ref-59)
59. If participation is similar to PY9, when there were 75 participants in the program, Navigant will aim to reach a census of program participants, focusing on those with the highest energy savings. [↑](#footnote-ref-60)
60. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 8.0 for projects with application dates after January 1, 2020. The TRM version used for each project will be based on its application date.

    available at: http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-61)
61. Multi-family properties served by the IHWAP, nonprofits that manage HUD 811 and HUD 202 housing, other federal or state subsidized housing, other building owners/managers and tenants in qualified geographic areas (e.g., Census tracts). [↑](#footnote-ref-62)
62. 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-65)
63. 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-66)
64. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0,

    http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-67)
65. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 8.0,   
    http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-68)
66. Illinois Statewide Technical Reference Manual for Energy Efficiency Version 8.0,   
    http://www.ilsag.info/technical-reference-manual.html [↑](#footnote-ref-69)
67. [↑](#footnote-ref-70)
68. Electronically commutated motors [↑](#footnote-ref-71)
69. This data will include approximately 70% of bills ending on or before December 31, 2020. [↑](#footnote-ref-72)
70. 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-74)
71. 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-75)
72. Excerpted from “CNP Upstream Commercial Food Service Pilot Program: Implementation Plan” December 2018. Prepared by Frontier Energy for Gas Technology Institute. [↑](#footnote-ref-78)
73. CNP Upstream Commercial Food Service Pilot Program: Phase I.pdf, October 2018. [↑](#footnote-ref-79)
74. Open Systems International (OSI) of Medina, Minnesota. [↑](#footnote-ref-80)
75. “Commonwealth Edison Company’s 2018-2021 Energy Efficiency and Demand Response Plan,” June 30, 2017, pp. 192-195. [↑](#footnote-ref-81)
76. Ibid. [↑](#footnote-ref-82)
77. Since VO is not a customer-facing program and requires no actions by any affected ComEd customers, free-ridership and spillover are not relevant, implying that net and gross impacts are identical. [↑](#footnote-ref-83)
78. LED streetlighting was not included in the VOI analysis. [↑](#footnote-ref-84)
79. Retro-commissioning was not included in the VOI analysis. [↑](#footnote-ref-85)
80. The other two measures thermostat adjustment and commercial LED lamps were previously deemed as not necessary for research. [↑](#footnote-ref-86)
81. The process of a comprehensive survey is rarely implemented without program intervention and typically finds 10% savings, but that does not mean that 10% appear every 2 years. More leaks appear, but the worst ones are fixed – possibly multiple times. The survey addresses the persistent medium and smaller leaks every 2 years in addition to the large leaks that happen to be active at the time of the survey. [↑](#footnote-ref-87)
82. The proposed plan here does NOT address the specific leak repaired and addresses the system as a whole. This is different than the existing implementation approach that measures and targets individual leaks. This approach is similar to coil cleaning.  For coil-cleaning, the savings value is not based on the individual fins cleaned, instead the savings are based on the change in conditions seen by the compressor.  [↑](#footnote-ref-88)
83. The ComEd program implementers could support this data collection effort as part of their implementation work. For example, Navigant can supply the questions/data collection form to be part of the inspections and project work as they interact with the applicant. Navigant has requested this for the retrofit add-on EUL research for CY2019 and the implementer rejected the request. [↑](#footnote-ref-89)
84. The industrial systems program in most projects collects equipment ages which can provide additional data points, especially if can be correlated to equipment replacement projects. [↑](#footnote-ref-90)
85. Pilot programs do not typically have a long enough duration to screen for NEIs and conduct primary research. However, for IE pilot programs, Navigant will determine if NEIs can be quantified if not already quantified elsewhere. [↑](#footnote-ref-91)
86. Page 7: http://ilsagfiles.org/SAG\_files/Landing\_Page/ComEd\_EE\_Plan\_5\_Stipulation\_Final.pdf [↑](#footnote-ref-92)
87. Page 33: http://www.ilga.gov/legislation/publicacts/99/PDF/099-0906.pdf [↑](#footnote-ref-93)
88. Terminology adopted from ThreeCubed / Seventhwave JPB Foundation research effort. [↑](#footnote-ref-94)
89. Question for multifamily building owners only [↑](#footnote-ref-95)
90. For more information on this measure, please review the IL TRM v8.0. [↑](#footnote-ref-96)
91. ENERGY STAR Connected Thermostat Products Method to Demonstrate Field Savings Version 1.0 (rev. Dec-2016). Available at: https://www.energystar.gov/sites/default/files/Version%201.0%20Method%20to%20Demonstrate%20Field%20Savings%20of%20ENERGY%20STAR%20Connected%20Thermostats.pdf [↑](#footnote-ref-97)
92. Policy Document for the Illinois Statewide Technical Reference Manual for Energy Efficiency, https://s3.amazonaws.com/ilsag/IL-TRM\_Policy\_Document\_Version\_2.0\_5-5-17\_FINAL.pdf [↑](#footnote-ref-98)