



# **Nicor Gas Company – Evaluation Plans for 2020-2021**

**Plan Years 2018-2021**  
(1/1/2018-12/31/2021)

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## 1. INTRODUCTION

This document presents evaluation, measurement and verification (EM&V) plans for evaluating Nicor Gas' energy efficiency programs for 2020 through 2021, which are two of the four program years of Energy Efficiency Plan 2018-2021 (EEP 2018-2021). This version is an update for 2020.

Enacted energy legislation Section 8-104 was recently amended through Public Act 99-0906 ("PA 99-0906") that changed the period of the energy efficiency plan and required Illinois gas utilities to provide energy efficiency programs to low income and public-sector customers. Navigant developed evaluation plans to address the new legislation. PA 99-0906 caused key changes to the previous portfolio of plans, including:

- a. Twenty-five percent (25%) of the budget is no longer allocated to the Department of Commerce and Economic Opportunity (DCEO). Likewise, twenty percent (20%) of the savings goal is no longer allocated to the DCEO. Nicor Gas is now accountable for the entire budget and savings goals. Elements of the DCEO portfolio transferred to Nicor Gas include:
  - i. Income Qualified Programs, targeted at households with incomes at or below 80 percent of area median income.
  - ii. Public Sector Programs, targeting energy efficiency measures for entities including (but not limited to) local government, municipal corporations, school districts and community college districts.
  - iii. Market Transformation initiatives, which represent 5 percent of the portfolio budget in the approved Nicor Gas plan.
- b. The Nicor Gas Energy Efficiency Plan (EEP) is now based on a calendar year.<sup>1</sup>
- c. The EEP encompasses four (4) years versus three (3) years – the four year cycle is 2018 to 2021.

The next sections include an overview of evaluation approaches and a proposed high-level schedule for EEP 2018-2021 program-specific evaluation tasks. The appendix includes detailed, program-level evaluation plans. The Navigant team will update research plans annually for the evaluation effort as part of the detailed planning step.

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<sup>1</sup> Prior to 2018, the previous six program years began on June 1 of each year, and were designated PY1, PY2, PY3, etc. Program years ended May 31 except PY6 was extended seven months and ended December 31, 2017. Under the previous notation, program year 2018 would have been PY7.

## 2. GUIDING PRINCIPLES

The guiding principles for evaluation activities include the following:

### Impact Evaluation

- Verify gross and net savings to be applied toward statutory goals for each Nicor Gas program year using savings calculated from the Illinois Technical Reference Manual (TRM), the Illinois Energy Efficiency Stakeholder Advisory Group (SAG) net-to-gross (NTG) consensus process, primary and secondary evaluation research, and Nicor Gas' ICC orders. When programs are delivered jointly with electric utilities, calculate verified gross natural gas savings without interactive effects from the reduction of electricity usage.
- Estimate the NTG ratio for each program, including adjustments for free ridership and spillover, to support annual prospective deeming of NTG ratios consistent with the Illinois NTG Policy. Conduct primary NTG research at least once during the four-year planning cycle for each program following the NTG protocols in the TRM (some programs, such as income qualified, do not require primary NTG research because NTG values are deemed at 1.00 in the TRM).
- Wherever possible, consider performing free ridership research online in real time (soon after the participant decision is made), and collect spillover information via telephone after participation following TRM protocols.
- Where practical, program evaluations and measure technology research will be conducted using randomized controlled trials (RCT) or quasi-experimental design (QED) methods. When Navigant believes that randomized control trials or quasi-experimental designs are not practical, Navigant will provide an explanation and support for its decision as part of its evaluation plan.
- Conduct technical reviews and gather Illinois-specific data to update the Illinois TRM and recommend updated M&V approaches for applicable measures.

### Process Evaluation and Other Research

- Gather data, perform analysis, and create recommendations to help improve the functioning and effectiveness of the Nicor Gas programs.
- Collaborate with Nicor Gas and other Illinois utilities to suggest promising areas for energy efficiency (EE) research, industry best practices, or other topics of interest.

### Support Nicor Gas Strategic Goals

- Continue evaluating more of the portfolio in real time, including:
  - Conducting program tracking database reviews beginning in the second quarter (where data is available) in each program year to ensure the latest TRM algorithms are properly applied, and
  - Conducting surveys closer to participation date, drawing samples across program years when appropriate.
- Improve qualitative approaches with new data collection approaches (email or web based), supplemented with the Nicor Gas energyENGINE data system and/or survey data when appropriate.
- Leverage infrastructure investments in energyENGINE.
- Provide technical expertise and data to the SAG to support statewide goals.
- Provide technical expertise for evaluation in Regulatory Dockets.
- Provide technical expertise to address ad hoc evaluation issues.

- Support diverse vendors.

### Reporting

- Provide annual impact evaluation reports for all Nicor Gas programs.
- Provide annual impact and cost effectiveness portfolio summary reporting.
- The target delivery date for draft joint reports will be March 15, with all final joint reports by April 30.
- For Nicor Gas only programs, best efforts will be made to deliver a draft report by March 15 and a final report by April 30. This schedule, however, is dependent on delivery of final tracking data by January 30 of each year and adherence to review schedules, and may be revisited. Most of the 2018 Nicor Gas only reports were final within two months after April 30. For Nicor Gas only programs with only TRM-based measures, we expect draft delivery by April 15, with final reports by June 3. For Nicor Gas only programs with custom measures, we expect draft delivery by May 8, with final reports by June 26.
- After the impact evaluation is final, Navigant will provide a spreadsheet file of verified savings at the tracking record level (project or measure ID).
- Recommendation requests to update the TRM will be submitted to the TRM Administrator prior to the annual submission deadline (late February), and workpapers for accepted updates will be submitted by the May 15 due date in the TRM update process.
- NTG research results will be reported by August 1 each year, so that results can be reviewed and finalized in time for the September 1 initial evaluator NTG recommendations to SAG required by the Illinois NTG Policy. In 2020, NTG research will be completed one month earlier, by July 1, 2020 to inform development of the next EEP.
- Draft process research results will be delivered by September 15, with preliminary findings and recommendations shared earlier.
- Perform the four-year *ex post* cost-effectiveness analysis per Section 8-104(f)(8).

### Planning

- Provide evaluation plans for Nicor Gas programs each program year.
- The target delivery date for initial draft plans will be December 15, with final plans by February 28.
- Seek input from the SAG, Nicor Gas, and other Illinois utilities when drafting and updating annual evaluation plans.

### Coordination

- Navigant will coordinate with and/or seek input from other Illinois utilities (ComEd, Peoples Gas and North Shore Gas, Ameren Illinois) and their evaluators, the SAG including ICC staff, and the TRM administrator:
  - When planning evaluation research and survey activities
  - When conducting evaluation research where collaboration to achieve broader coverage and larger sample sizes may improve the research results.

Exceptions to these guiding principles may occur for some programs; if that is the case, exceptions will be noted in program-specific evaluation plans.

### 3. EVALUATION PLAN OVERVIEW

As part of the evaluation planning process, Navigant has drafted a high-level yearly plan and detailed program-level annual evaluation plans to help prioritize research plans and budgets.

#### **Four-Year Evaluation Research Plan**

The evaluation team has prepared a high-level yearly evaluation plan for the EEP 2019 – 2021 portfolio to identify research tasks by year. Final activities and allocations will be determined annually as program circumstances are better known.

The three tables in this section provide an overview of our current expectations for conducting impact research studies, net-to-gross research, and in-depth process evaluation research. Gross impact savings verification occurs for each program in all program years.

#### **Annual Evaluation Program Plans**

The evaluation team prepared evaluation plans for each program throughout EEP 2020-2021. The program evaluation plans serve as a roadmap as the evaluation team carries out specific evaluation tasks. The program plans provide additional details to describe the approaches for conducting annual gross, net, and process evaluation activities. The Income Eligible programs currently have an approved NTG of 1.0 and we have no plans to conduct NTG research on them in 2020 or 2021 – instead we show process research target and timing plans in Table 2. We revisit evaluation plans annually and revise approaches as needed to maintain relevance for programs as they evolve.

Supporting information on evaluation approaches and crosscutting activities is provided in Section 4. The individual program evaluation plans are provided in the Appendix.

**Table 1. Residential Programs High-Level Plan by Year**

Offering	Evaluation Research Activities by Year*				
	Process Researched Year(s)†	NTG Researched Year(s)†	NTG Results Delivered‡	Other Research	
				Year§	Activity
<b>Home Energy Efficiency Rebate (HEER)</b>					
Equipment Rebates	2019-2020	2019-2020	2020		
<b>Education and Outreach Track</b>					
BES	None Planned	N/A	NA	2021 2022	Net impacts for 2019 through 2021 will be analyzed through gas billing usage analysis of an RCT design
EEE	2020	None	NA	2018-19	Investigate water heating fuel split (completed)
ES Kits	2020	2020	2021	2020	In-Service Rates with Process/NTG
<b>Home Energy Savings (HES)</b>					
Audit/DI/ Wx Rebates	2017-18	2017-18	2018	2018 2020-21	Air Sealing/Insulation Billing Analysis (Completed) Wx market actor research related to non-joint program offering
<b>Multi-Family</b>					
Audit/DI	2018	2018	2019		
Retrofit Projects	2018	2018 2020	2019 2021		
Central Plant Optimization	2020	2020	2021		
<b>Residential New Construction (RNC)</b>					
RNC	2021	2021	2022	2019 2021	Calibrated Simulations of 2018 (Completed) Market actor research related to non-joint program design
<b>Emerging Technologies Program and Market Transformation</b>					
Research Studies and Pilot Programs				2018-19 2020-21 2020	Connected Savings Pilot Billing Analysis and Survey (Completed) Food Svs. Pilot MT Baseline Review Building Operator Certification (BOC) Savings Methodologies Research

\*Gross impact savings verification occurs for each program in all program years.

†Process Researched Year(s) and NTG Researched Year(s) indicate the program year(s) of participation of the research subjects.

‡NTG Results Delivered indicates the year when draft and final NTG results are completed and recommended to SAG for application in the subsequent program year.

§Other Research: Year indicates the time frame that the research will be conducted.



**Table 2. Income Qualified Programs High-Level Plan by Year\***

Offering	Year	Research Activity
<b>Single-Family Retrofits</b>		
IHWAP	2018-19	Community Action Agency Focus Groups and Interviews (Completed, 2019 CBA+IHWAP Slidedoc)
	2020	Participating Customers Process Survey (Gas only survey – ComEd is choosing not to participate. Nicor Gas would join study with PGL and NSG to achieve adequate sample size. Expand sample to include MF IHWAP participants).
<b>Income Eligible Multi-Family and Public Housing Energy Savings Programs</b>		
IHWAP	2020	Include MF participants when conducting the SF IHWAP survey
PHES	2018-19	Implementation Staff, PHA Representatives, Residents (Completed, 2019 Memo, ComEd funded)
	2021	Implementation Staff, PHA Representatives (Joint)
<b>Affordable Housing New Construction</b>		
New Construction	2018-19	Developer Survey, Implementer Interviews (Completed, 2019 Slidedoc)
	2021	Housing Developer Interviews (Joint)

\*Gross impact savings verification occurs for each program in all program years. The NTG ratio is 1.0 for all programs.

**Table 3. Business Programs High-Level Plan by Year**

Offering	Evaluation Research Activities by Year*				
	Process Researched Year(s)†	NTG Researched Year(s)†	NTG Results Delivered‡	Other Research	
				Year§	Activity
<b>Business Energy Efficiency Rebate (BEER) (includes Public Sector)</b>					
Equipment Rebates	2018	2018	2019	2018-21 2019-20	Pipe Insulation secondary research EMS billing usage impact analysis
Steam Traps	GPY4-GPY6 2018	2018	2019	2019 2020	Steam Trap Process, Savings Assessment (Completed) TRM Algorithm Review
Public Sector	2018	2018	2019		
Assess/DI	2018	2018	2019		
<b>Custom Incentives (includes Public Sector)</b>					
C&I Custom Public Custom	2020	2020	2021	2019-21	Document custom measure EULs to support TRM (Ongoing)
Joint RCx	2019	2019	2020		
Nicor Gas Only RCx	2020	2020	2021		
CHP	With NTG	Project Specific or 0.80			
<b>Strategic Energy Management (SEM)</b>					
SEM Cohorts	2018-21			2018-21	Gross impacts estimated through analysis of billed energy usage
<b>Small Business (includes Public Sector)</b>					
Assess/DI	2019	2019	2020		
Retrofit Projects	2019	2019	2020	2020	Standard Programmable Thermostats Billing Analysis of Past Participants
<b>Joint Non-Residential New Construction (NRNC)</b>					
	2018	2018	2019		
NRNC	2019	2019	2020		
	2021	2021	2022		

\*Gross impact savings verification occurs for each program in all program years.

†Process Researched Year(s) and NTG Researched Year(s) indicate the program year(s) of participation of the research subjects.

‡NTG Results Delivered indicates the year when draft and final NTG results are completed and recommended to SAG.

§Other Research: Year indicates the time frame that the research will be conducted.

## 4. EVALUATION APPROACHES AND CROSSCUTTING ACTIVITIES

### Impact Evaluation Approaches

The primary goal of impact analysis is to verify the gross and net savings claimed by Nicor Gas to be applied toward statutory goals. The effort has secondary goals of improving the accuracy of ex ante impact estimates, improving the accuracy and relevance of the TRM, and improving the accuracy and usefulness of the program tracking systems. The impact analysis will typically include the following components:

- **Program Tracking System Review and Quality Control Verification.** Verification procedures to measure savings values and quantities for accuracy as reported in the Nicor Gas program tracking database.
- **Measure Verification.** Verify the type of measures installed and the quantities claimed.
- **Ex Ante Gross Measure Savings Verification.** For TRM-based measures, Navigant will verify ex ante gross measure savings against the values and algorithms provided in the relevant ICC-approved version of the TRM. For non-TRM “custom” measures, Navigant will conduct evaluation research to verify gross impacts.
- **Impact Sampling.** In general, impact-related sampling will be designed to achieve a 90%/±10% level of confidence and precision at the program level, but may also include selected high priority measures at the 90/10 level. The participant sample population may exceed one program year where the program design and implementation and market have remained relatively unchanged. Where budget and schedule can accommodate, target a larger number of completions for NTG surveys than the minimum required for a 90/10 program-level result.
- **TRM Support.** Recommend adjustments to TRM measure values, algorithms or methods (as applicable) using primary and secondary sources, including Illinois-specific primary research.
- **NTG Ratio.** Conduct primary and secondary research to estimate free ridership and spillover and use them to recommend NTG ratios to the SAG. Complete NTG research by August 1, so that initial NTG recommendations can be made to the SAG by September 1 of each year and finalized by October 1 to be used for the following program year. In 2020, NTG research will be completed one month earlier, by July 1, to inform development of the next EEP.
- **Jointly Implemented and Coordinated Programs.** Evaluations of joint or coordinated programs will be designed to meet the needs of both the Company and ComEd, as well as other Illinois utilities, when appropriate. When programs are delivered jointly with electric utilities, calculate verified gross natural gas savings without interactive effects from the reduction of electricity usage.
- **Interim Impact Review Timing.** Navigant will conduct “real-time” impact evaluation as the default approach for programs, except where we are limited by data availability or where there is no significant benefit from early analysis. For programs with TRM-based measures, Navigant will conduct an interim review of per-unit savings from tracking data during the second quarter (if data is available) or early in the third quarter. We will focus the interim review effort on programs and measures with a larger contribution of savings to the portfolio. Six programs accounted for 95 percent of TRM-based measure savings in 2018 and will receive interim impact review: HEER, Home Energy Savings, Multi-Family, Energy Savings Kits, BEER, and Small Business. In addition, a mid-year impact review is conducted on EEE as a joint utility effort. For the high priority programs, we will provide spreadsheet output to Nicor Gas that will list all measures in the program’s dataset, providing quantity, total therms,

- ex ante and verified per unit terms, and realization rate. After Nicor Gas review, we will identify measures that require further investigation and discussion on the cause of the discrepancy and document findings and recommendations. The fifteen measures that accounted for 95 percent of TRM-based measure savings in 2018 will be designated high impact measures. For the high impact measures, we will compare per unit savings to the prior program year and also confirm correct adoption if the TRM algorithm has changed from the previous year. For programs with non-TRM custom measures, Navigant will draw M&V samples one to three times during the program-year, depending on the number of completed projects. We expect billing usage analyses will occur after the end of the program year but may cut across program years to increase sample sizes and ensure completion in time for the TRM update cycle. Navigant will review Nicor Gas or implementer developed ex ante savings calculations if requested, or when a new delivery channel is added to the portfolio.
- **Final Impact Evaluation.** Final impact reporting will take place after the program-year ends, when we receive final tracking data, expected by January 30. The target delivery date for draft joint reports will be March 15, with all final joint reports by April 30. For Nicor Gas only programs, best efforts will be made to deliver a draft report by March 15 and a final report by April 30. This schedule, however, is dependent on delivery of final tracking data by January 30 of each year and adherence to review schedules and may be revisited. Most of the 2018 Nicor Gas only reports were final within two months after April 30. For Nicor Gas only programs with only TRM-based measures, we expect draft delivery by April 15 with final reports by June 3. For Nicor Gas only programs with custom measures, we expect draft delivery by May 8 with final reports by June 26. After the impact evaluation is final, Navigant will provide a spreadsheet file of verified savings at the tracking record level (project or measure ID).

Measures that are included in the TRM are adjusted by evaluation through savings verification, while evaluation research is conducted on custom measures to estimate savings. Methods for savings verification of TRM measures that will be employed are tracking data review and engineering review of measure savings for compliance with the TRM. Estimating the evaluation-researched ex post gross savings of custom measures will involve tracking data review and, for sampled participants, engineering review of project files, on-site measurement and verification (M&V), and/or billing analysis.

### **Tracking System Review**

The gross impact evaluation foundation in each year 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 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 future evaluation activities.

Through this effort, we will specifically look at each of the fields in the program tracking databases, as well as the completeness of the information being collected, and compare this to the data needs for the impact evaluation effort as well as program process monitoring.

### **Quality Control Verification**

The Navigant team will work with Nicor Gas and the implementation contractors to review existing quality assurance and quality control (QA and QC) inspection and due diligence procedures for each program. The scope of this review will be more detailed when issues are observed in previous evaluations or substantial changes are made to implementation delivery and administration. Early priorities will focus on the Income Qualified and Public-Sector programs that were added to the portfolio from DCEO. Once a program or delivery path has been reviewed in detail, future work in this task area will be limited in scope and integrated into gross impact evaluation.

The key drivers in our review will be to assure customer eligibility, completion of installations, and the reasonableness and accuracy of savings recorded by the programs. We will work closely with program staff and those involved with developing the tracking databases to identify and define the key information needed from the tracking system for each program to support verification and evaluation tasks.

### **Illinois TRM Savings Verification**

For programs with measures included in the TRM, tracking data review is combined with an additional step to verify all measure types for compliance with the TRM. TRM verification will occur early in each program year to ensure the latest TRM is being applied correctly, thus allowing Nicor Gas to make any necessary changes early in the program year. This will expedite the final reporting at year end.

For measures covered by the TRM, verified gross savings are calculated for each participant using appropriate TRM algorithms and customer-specific data collected in the tracking system (or, where required by the TRM, supplemented by additional research), and then summed across participants to calculate program totals. To be eligible, a TRM measure must meet the physical, operational, and baseline characteristics as defined in the applicable version of the TRM. Specifically, gross savings will be verified by (1) reviewing the tracking system to determine whether all fields are appropriately populated, (2) reviewing measure algorithms and values in the tracking system to assure that they are appropriately selected and correctly applied, and (3) cross-checking total measures and savings recorded in the tracking database against verified findings.

Verification of measures may also include (1) a review of project-level documentation in each program year to verify participation, installed measure quantities, and associated savings and (2) verification of installation of energy efficient measures through participant surveys or field work for a sample of participants.

### **Engineering Review of Project Files**

For each project selected for the participant sample, an in-depth application review is performed to assess the engineering methods, parameters, and assumptions used to generate all ex ante impact estimates. For each measure in the sampled project, engineers estimate ex post gross savings based on their review of documentation and engineering analysis. Validation of savings through gas usage billing data analysis may be used in combination with the engineering review for individual sites. To support this review, Navigant requests project documentation in electronic format for each sampled project.

### ***Parallel Path Review***

Navigant will conduct project file reviews that fall under a “Parallel Path” designation. This approach has been applied to the Custom program since the first Plan cycle and may be expanded to additional programs. These are projects that the implementation contractor has identified early in the project application cycle that may pose a risk to realization of gross impacts, either due to the complex technical nature or difficulty in baseline determination, during evaluation efforts. Parallel path review is initiated by a request from the implementation contractor. As budget allows, Navigant accepts the project for review and receives the preliminary application documents for the project. Navigant conducts a review of project documentation and energy saving estimates and prepares a brief memo that identifies further questions or revisions to the gross savings estimates. The findings are discussed with the implementation contractor who then adopts the findings going forward or proceeds as originally intended with a better knowledge of evaluation risk for the project.

### ***On-Site Measurement and Verification***

An analysis plan is developed for each project selected for on-site data collection. Each plan explains the general gross impact approach used (including measurement plans), provides an analysis of the current inputs (based on the application and other available sources at that time), and identifies sources that will be used to verify data or obtain newly identified inputs for the verified gross impact approach.

Table 4 presents a listing of the International Performance Measurement and Verification Protocols (IPMVP) protocols, the nature of the performance characteristics of the measures to which M&V options typically apply, and an overview of the data requirements to support each option. Navigant’s approach to selecting M&V strategies will follow these guidelines.

**Table 4. Overview of M&V Options for Non-TRM Measures**

IPMVP M&V Option	Measure Performance Characteristics	Data Requirements
<b>Option A:</b> Engineering calculations using spot or short-term measurements, and/or historical data.	Constant performance	<ul style="list-style-type: none"> <li>• Verified installation</li> <li>• Nameplate or stipulated performance parameters</li> <li>• Spot measurements</li> <li>• Run-time measurements</li> </ul>
<b>Option B:</b> Engineering calculations using metered data.	Constant or variable performance	<ul style="list-style-type: none"> <li>• Verified installation</li> <li>• Nameplate or stipulated performance parameters</li> <li>• End-use metered data</li> </ul>
<b>Option C:</b> Analysis of utility meter (or sub-meter) data using techniques from simple comparison to multi-variate regression analysis.	Variable performance	<ul style="list-style-type: none"> <li>• Verified installation</li> <li>• Utility metered or end-use metered data</li> <li>• Engineering estimate of savings input to SAE model</li> </ul>
<b>Option D:</b> Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering.	Variable performance	<ul style="list-style-type: none"> <li>• Verified installation</li> <li>• Spot measurements, run-time monitoring, and/or end-use metering to prepare inputs to models</li> <li>• Utility billing records, end-use metering, or other indices to calibrate models</li> </ul>

For most projects, on-site data collection includes interviews that are completed at the time of the on-site visit, visual inspection of the systems and equipment, recording EMS settings, and collecting EMS trend data or production records when available and necessary. We may use spot measurements and short-term monitoring (e. g., less than four weeks), mainly for joint-utility projects with substantial gas and electric savings. After all the field data is collected, annual energy impacts are developed based on the on-site data, monitoring data, application information, and, in some cases, billing usage data. Engineering analysis is based on calibrated engineering models that make use of hard copy application review and on-site gathered information surrounding the equipment installed through the program (and the operation of those systems).

After completion of the engineering analysis, a site-specific impact evaluation report is prepared that summarizes the M&V plan, the data collected at the site, and all the calculations and parameters used to estimate savings.

### ***Billing Analysis with Statistical Validation Check***

A standard regression approach for estimating program natural gas energy savings is a preferred method for the evaluation of the energy use impacts of certain programs and measures. Navigant will perform billing analysis to evaluate programs when appropriate. Where practical, program evaluations will be conducted using randomized controlled trials or quasi-experimental design methods. When Navigant believes that randomized control trials or quasi-experimental designs are not practical, we will provide an explanation and support for this decision as part of the program's evaluation plan.

In general, consumption data analysis methods are best suited to programs with the following characteristics:

1. The expected net savings per participant (i.e., the effect size) are large or when large participant/nonparticipant sample sizes are possible.
2. The program can be designed using a randomized controlled trial.
3. Nonparticipant spillover is expected to be trivial within the comparison group.
4. Self-selection bias can be effectively controlled for.

In a randomized controlled trial (RCT) design, evaluators (and sometimes implementation contractors) randomly assign sampled members of a population of interest to a treatment group or a control group. Among the benefits offered by an RCT—when properly applied—is that it produces net savings estimates by netting out free ridership. The evaluation of a program must be designed and implemented this way from the outset; it is not possible for an evaluation team to apply RCT evaluation techniques after the program has been implemented if random assignment to treatment and control groups was not done before program launch. Most often, we do not evaluate programs via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. For example, rebate programs are offered to all customers that meet participation criteria, not offered selectively.

Where randomized assignments prove infeasible, quasi-experimental design (QED) evaluation methods may be substituted (although experimental designs are typically preferable when possible). Depending on the exact QED implemented, the savings may be net, gross, or somewhere in between with respect to the different pieces of a NTG adjustment (participant spillover, nonparticipant spillover, and free ridership). Quasi-experimental approaches are commonly used to evaluate behavior-based energy efficiency programs that cannot be constructed as experiments. Most often, we do not use quasi-experimental design consumption data because a 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.

### ***Support for TRM Updates***

The evaluation team will provide support to improving the TRM by participating in the Technical Advisory Committee (TAC) meetings and update process. Support may include reviewing new measures; suggesting changes to current methods or approaches, algorithms, and assumptions for existing measures; and gathering primary data from other evaluation activities to support updating



TRM assumptions. Navigant will provide technical review for workpapers developed by Nicor Gas and their implementation contractors.

Although the impact evaluation will use an Illinois TRM that has already been approved by the ICC for calculating gross savings, the independent evaluator will still have a responsibility to recommend updates and perform research to help improve the accuracy of the savings algorithms over time. Research priorities will be considered during the evaluation planning process, coordinated with Nicor Gas, other Illinois utilities, the TRM TAC, the SAG, and the annual update process for the TRM. Potential research topics will be gathered from annual evaluation findings and recommendations and from the TRM Technical Advisory Committee.

The TRM is updated annually based on input from Program Administrators, evaluators, and other interested stakeholders through a consensus-based decision-making process. The TRM updates are final by October 1 of each year and are effective January 1 of the new program year. To provide precision that reflects the activities needed for future actual TRM values to be used in each program year, the following TRM schedule will be followed:

- March 1: Submit TRM update requests to the TRM administrator.
- April 1: TRM Technical Advisory Committee (TAC) informs Program Administrators, evaluators, and SAG which measures are high or medium priority measures, for which work papers need to be prepared.
- May 15: Proposed updates to existing measure work papers to clarify terms or approaches, as well as proposed work papers for new measures, are submitted to the TRM Administrator.
- May 15 – September 15: Ongoing TAC meetings and review/comment on submitted workpapers to reach consensus on TRM updates.
- October 1: Final TRM values for the following program year.

### ***NTG Research and Framework Application***

Section 8-104 of the Public Utilities Act requires that evaluations include an assessment of net savings. The net savings analysis requires the evaluator to assess the influence of the Company's programs versus other factors on the customer's decision to install energy efficiency measures, either through the programs or outside of them. These program influences could include free riders, non-participant spillover, market transformation effects, and participant spillover. Evaluation efforts will measure net savings considering free ridership and participant spillover in all programs (except those where consensus values are deemed statewide without further research, such as income eligible programs), and, where supported by the program delivery model, non-participant spillover and market transformation effects. The NTG analysis will apply, follow and incorporate the Illinois Statewide NTG Methodologies Framework (IL NTG Framework or Framework) agreed to among the Illinois Stakeholder Advisory Group (SAG) participants, approved by the Illinois Commerce Commission and documented in the effective Illinois TRM Version and any subsequent updates to the Illinois NTG Methodologies Framework<sup>2</sup>.

The IL NTG Framework is intended to cover most residential and non-residential programs offered in Illinois. Programs covered in the Framework are listed in tables at the beginning of Framework

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<sup>2</sup>Available at [http://www.ilsag.info/il\\_trm\\_version\\_8.html](http://www.ilsag.info/il_trm_version_8.html)

Section 3: Commercial, Industrial, and Public-Sector Protocols and Section 4: Residential and Low-Income Sector Protocols. As noted in the Framework, if a program design changes significantly, then it may mean that the NTG protocol listed for that program is no longer appropriate. In that instance, Navigant shall follow the procedures outlined in the Framework's Section 1.4: Diverging from the IL-NTG Methods. The IL NTG Framework is likely to be updated periodically to incorporate new programs and to reflect recommended changes to existing methodologies. Navigant will apply those changes as they are approved and as are necessary. Navigant will follow all procedures and requirements set forth in the IL NTG Framework including the process for diverging from the IL NTG Framework and methods, procedures for non-consensus items, among others.

Navigant will continue to work with ICC Staff, the other Illinois utilities and evaluators, and the SAG to update the Illinois Energy Efficiency Policy Manual to ensure that programs across the state can be meaningfully and consistently evaluated and to develop consistent NTG evaluation methods that will be filed in the annual statewide TRM docket.

When NTG research is conducted on a program, the results will be summarized in memo that is final by August 1. This will allow time for evaluators to produce initial NTG recommendations to send to the SAG by September 1, as required by the Illinois NTG Policy. In 2020, NTG research will be final one month earlier, by July 1, to inform development of the next EEP. Navigant's initial recommended NTG ratios for the upcoming program year and associated rationale will be submitted to Program Administrators, Commission Staff and the SAG by September 1 of each year. In early September of each year, we will present our initial recommended NTG Ratios for each Energy Efficiency Program, Sub-Program, and/or Measure group (where applicable) to SAG, intended to represent the best estimates of future actual NTG ratio values likely to occur for the upcoming program year. SAG participants, including Navigant, will make best efforts to reach consensus regarding NTG ratios appropriate for deeming for the upcoming program year that are representative of the best estimates of future actual NTG ratio values likely to occur for the upcoming program year. In developing the final recommended deemed NTG Ratio, Navigant will review SAG feedback, consider all comments and discussions, and report final deemed NTG values on or before October 1.

### ***Timing and Samples to Meet Deadlines***

A key part of each program evaluation plan is developing and actively managing a detailed schedule for the evaluation, one that not only delivers reports on time but provides useful feedback on potential program improvements early in the review process. To meet timely reporting requirements, Navigant will develop this evaluation schedule based on Nicor Gas and the ICC's reporting deadlines provided in the Illinois EE Policy Manual and the availability of program data.

Navigant will conduct "real-time" impact evaluation as the default approach for programs, except where we are limited by data availability or where there is no significant benefit from early analysis. For high priority measures and programs with TRM-based measures, Navigant will conduct an interim review of per-unit savings from tracking data during the second quarter (if data is available) or early in the third quarter. For programs with non-TRM custom measures, Navigant will generally draw M&V samples one to three times during the program-year, depending on the number of completed projects. We expect billing usage analyses will occur after the end of the program year, and may be delayed until March meter readings are completed to capture the core of the heating season. Final impact evaluation will take place after the program-year ends, when we receive final tracking data

expected by January 30. Best efforts will be made to deliver draft reports by March 15, allowing for review time prior to wrapping up final versions by April 30.

Our general approach for sampling confidence and precision criteria is to attempt to achieve a 90 percent confidence interval with 10 percent precision within agreed upon sample frame segmentation. Where budget and schedule can accommodate, we will target a larger number of completions for NTG surveys than the minimum required for a 90/10 program-level result. If budget and time constraints are present, the following general strategies could be implemented in response:

- Reduce sample sizes, particularly for sampling domains that are less important (e. g., measure level results for measures whose contribution to savings is relatively small).
- For Commercial/Industrial projects being evaluated, rely more heavily on desk reviews and telephone surveys, rather than on-site surveys for primary data collection.

The overarching theme is to continue using the same overall evaluation strategy, but if needed, reduce data collection and research frequency, particularly in areas that are less critical to the overall evaluation effort.

As evaluation plans are developed in more detail, additional attention will be given to selection of the optimal sampling approach for each individual study. In general, stratified samples will be used when possible to improve the efficiency of the sample design (e.g., possibly oversampling selected high priority measures). Useful stratification variables will be identified based on a review of the program tracking databases, forecasts of program impacts, budget considerations and discussions with portfolio and program management. The need to over-sample some program paths, customer types or measures will also be based on discussions from the evaluation planning process. For example, for business programs, we will likely recommend a census of those projects with the greatest savings with samples taken from the other strata based on a stratified ratio estimation method.

Another approach to enhancing sampling efficiency is to develop a rolling two or three-year sampling strategy. This approach is applied only when there are minimal changes to a program and effectively treats the multi-year results as one population. This approach leverages the research done in prior years to optimize the incremental investment in the final year. This approach is highly beneficial primarily for programs that rely on field M&V for a significant percentage of sampled projects, because on-site research is quite costly. The Large Business Custom and Retro-commissioning offerings are likely to benefit most from this sampling approach. This approach can also be applied to other programs and research types, such as process and NTG research, however. The Navigant team will assess the potential for applying this approach in each year to optimize the use of the research dollars.

Navigant typically works with implementers and the utility to limit the number of duplicative contacts with customers. We have provided lists of proposed contacts (and unique identifiers) to coordinate with both the utility market research and other evaluators.

## Process Evaluation Approaches

Navigant's overarching objective with our process evaluations is to provide timely and useful information for each program using the appropriate tools at hand. This section provides a description of the approaches Navigant commonly applies to process evaluation, although not all approaches described here will be used when evaluating a specific program. The evaluation team is prepared to address key issues for individual programs on an as-needed basis and to move beyond the traditional use of participant and trade ally surveys asking satisfaction questions. The team does not anticipate conducting a process evaluation for each program in each year but rather targeting the available budget resources where they have the most value to Nicor Gas and its customers, plus leveraging surveys conducted as part of the NTG research.

We will coordinate process activities across programs and across utilities for joint and coordinated programs as appropriate to address the whole of Nicor Gas's approach to the market. Part of the process analysis schedule may be driven by the needs of the impact analysis, either gross or net, where data collection efforts overlap. During the evaluation planning phase, we will identify program-specific deadlines that might affect the schedule for process evaluation activities. We will prepare early feedback memos for certain high-priority programs and deliver them as they are completed.

While the process evaluation methods for each individual program will vary depending on the program's needs and stage of development, key tasks in conducting process evaluations using interview techniques and documenting review procedures include:

- Development of interview guides.
- Identifying appropriate parties to interview. Frequently, the evaluation will include in-depth qualitative interviews with those directly involved in each program, including program managers and implementation contractors, participating trade allies, and participating customers.
- Documentation of interviews and using findings in our evaluation reports.

Depending upon the circumstances, our team will use either a survey house to conduct structured surveys, online survey tools, or senior staff members to conduct telephone interviews. Our senior staff will be flexible in their approach to the discussion, allowing the respondent to talk about his or her experience or perspective while still shaping the discussion so that we collect the most important, relevant, and necessary information.

Navigant has a license and in-house expertise to employ Qualtrics, an online survey software tool used to design and conduct online surveys. Our team of process evaluation and survey design experts use Qualtrics to manage and monitor the flow of surveys going into programming and out into the field using high caliber, customized design elements to allow for flexibility in crafting survey batteries and to increase the likelihood of survey completion. Qualtrics allows for real-time reporting to help inform program decisions with up to the minute customer insights. It is a valuable tool used to capture the voice of the customer and identify ways to improve program engagement.

Depending on the needs of the evaluation, we might also use focus groups, in-store intercepts, or the Delphi method in our process evaluation activities.

As a practical matter, we find it important to provide early, timely, and continuous feedback to program implementers and staff. Such ongoing communication will provide Nicor Gas staff with process-related findings and concerns identified on an as-you-go basis, rather than waiting until the annual evaluation report is prepared many months later. These communications will be carried out at all times in a manner that preserves our independence and objectivity. To be most useful for program planning, Navigant will provide draft process results by September 1. Navigant will provide preliminary recommendations prior to releasing the draft report, conveying the results informally, so that feedback from program managers can help to refine the recommendations.

### ***Staff/Contractor Research***

Navigant will conduct in-depth interviews with Nicor Gas and contractor staff at the beginning of each program year evaluation cycle and as needed afterwards to establish an understanding of program context, as part of due diligence verification, and to help inform program-specific research priorities.

### ***Customer Research***

A primary objective of the process evaluation effort will be to help program designers and managers structure their programs to achieve cost-effective savings while maintaining high levels of customer satisfaction. Customer satisfaction can be measured through a battery of questions included within telephone surveys, online survey tools, or other interview instruments, and by reviewing program tracking data. Customer research will be used to help establish an understanding of program performance and to identify areas for program improvement. Customer research may also be used to inform NTG findings when deemed appropriate by the evaluation staff in accordance with program-specific evaluation goals.

### ***Trade Ally Research***

Trade allies play an essential role in the success of many of Nicor Gas' energy efficiency programs. Navigant will conduct research with the trade allies to understand their concerns and to help Nicor Gas enable the trade allies to be as effective as possible. Most typically this research involves in-depth interviews or survey administration.

Trade allies are also an essential source for analyzing the broader market impact of Nicor Gas' programs. They are best able to comment on the broader impacts (beyond measure uptake directly through the program) on both customer and contractor behaviors. Navigant will leverage the trade allies' market knowledge to measure these broader market effects, including non-participant spillover, as feasible. Our approach will typically involve in-depth interviews but could also involve telephone or online surveys, a Delphi panel, or other approach.

### ***Benchmarking and Best Practices***

Navigant has expertise conducting benchmarking research to identify best performing utilities by program or portfolio level. Navigant determines best performance by conducting data-driven research to identify comparable utilities with lower than median costs and higher than median savings at the regional and national levels, taking into account budget restrictions or other factors affecting individual

utility performance. Once best performing utilities and programs are identified, Navigant may conduct additional research to identify sources of best performance. This additional research may consist of best performing program or portfolio reviews and reaching out to staff at best performing utilities to conduct in-depth interviews.

Navigant will also bring its experience and understanding of best practices gleaned from our other portfolio evaluations to bear on our process evaluation research, findings, and recommendations when appropriate. Navigant may supplement its best practice expertise with primary and/or secondary research into best practices given a program's research priorities. Navigant will work with Nicor Gas to identify individual programs and processes to apply these techniques.

### ***Marketing Messaging***

Navigant's market messaging research consists of both secondary and primary research. Secondary research consists of conducting research into existing market messaging trends for a program segment and industry research on the state of energy efficiency market messaging. Primary research can consist of in-depth interviews with trade allies and customer research to identify the most effective marketing messaging for a market segment. Navigant's extensive experience with research into sources of customer engagement and barriers to participation with a wide range of utilities around North America will inform any primary research conducted to help ensure findings are meaningful and actionable. Navigant will work with the Company to identify individual programs and processes to apply these techniques.

### ***Tracking Data Analysis***

Navigant can help inform program design through a review of tracking data and the impacts of program design changes on program activities. This review can be supplemented by input from other sources as needed, including participant and trade ally interviews and the like.

### ***Other Market Actors***

Navigant evaluation staff may identify opportunities to conduct in-depth interviews with other market actors depending on program-specific evaluation priorities. Interviews with other market actors can offer insights into market conditions and/or best practices. Other market actors may include industry experts, other utility staff, non-participating trade allies, and vendors and manufacturers.

### ***Leveraging energyENGINE***

Navigant will structure its research to leverage the Nicor Gas energyENGINE data system. For example, Navigant will work with Nicor Gas to identify energyENGINE data fields that can be used to better design interview samples, and Navigant will differentiate research results for the different customer and trade ally segments tracked by the system.

## Additional Research Activities

Navigant conducts additional research above and beyond annual impact and process evaluation activities as needed on a program-by-program basis, keeping impact on the portfolio and budget priorities in consideration. Priorities for additional research include billing analyses to support savings verification and TRM updates, algorithm review for prescriptive or “semi-prescriptive” measures, real-time customer feedback through web-based survey tools, and benchmarking analysis to help Nicor Gas incorporate best practices from programs administered in other jurisdictions. Navigant will work with Nicor Gas and other Illinois parties to identify the programs that could most benefit from these supplemental research activities, being mindful of overall budget availability. Additional research may be requested as needed and considered as a part of annual evaluation planning process.

Based on our review of measure-level savings achieved and in the Nicor Gas plan, discussions with Nicor Gas, and input from the SAG, TRM TAC, and other Illinois utilities, we identified the following research tasks for the EEP 2018-2021 evaluation plan (separated into studies completed, currently active, and those under consideration):

### Completed

1. **Residential Insulation and Air Sealing** – Navigant completed an air sealing and insulation billing analysis initiated in PY6, releasing draft results on March 29, 2018 and sending out the final report in September 2018. The findings informed updates to the TRM residential insulation and air sealing measures. Navigant developed TRM work papers based on the study that were adopted into TRM version 7.0.
2. **Emerging Technologies Program: Connected Savings Pilot Impact Evaluation** – Navigant used billing data analysis to conduct the energy impact evaluation of the joint ComEd and Nicor Gas 2018 Connected Savings Pilot Program. Using energy consumption and weather correlations, the Connected Savings Program creates a thermodynamic model for each home to understand how it responds to weather changes. The model subsequently develops more efficient customer-specific cooling and heating schedules, which inform its adjustment of household thermostats. Whisker Labs, the program implementer, partnered with Honeywell to set up the Connected Savings Program in 2017 using a randomized controlled trial. In addition to the billing analysis, Navigant conducted an on-line survey of control and treatment groups. The work was completed in 2019.
3. **Residential New Construction** – For the 2018 impact evaluation, Navigant performed simulation modeling calibrated to energy bills for the gross impact analysis. A second round of updates to the simulation models was planned for late CY2020 when the majority of program homes are permitted under the new IECC 2018 code. In 2019, ComEd elected to discontinue the joint program design at the end of 2019, and Nicor Gas planned a program redesign for launch in 2020. The program design in development would rely upon prescriptive measures with gross impacts defined in the Illinois TRM. At this time, Navigant has cancelled plans to repeat the calibrated simulations in 2020.

4. **Steam Traps Process/Market Study and NTG Research** – In the fourth quarter of 2018, Navigant initiated a process/market research study on steam traps with a trade ally NTG research component. Research included secondary research on steam traps and utility programs, and surveys conducted with active trade allies, inactive trade allies, manufacturers, and participating customers from GPY4 through GPY6. Preliminary findings informed the BEER Program 2018 steam trap participant NTG research that occurred in July of 2019. A draft report was released for comment in September 2019, and will be final in December 2019 or January 2020. Key survey findings on steam usage monitoring and condensate recovery will be summarized in a separate memo for the TRM TAC. The Navigant team designed the process study to explore the steam trap market for both large commercial and industrial customers using steam traps for heating and industrial process applications. The research objectives for this study included investigating the following aspects of commercial and industrial steam trap usage:
- Systems and equipment description, including operating information such as hours of use, whether the steam trap operates at high or low pressure (e.g., 20 PSI range vs. 100 PSI range), and approach for handling condensate
  - Approach to steam system monitoring and usage tracking
  - Maintenance practices and observed failure rates
  - Corporate policies around maintenance, purchasing, and planning
  - Business sector barriers to steam trap inspection, maintenance, and replacement
  - Business customers' typical interactions with vendors. For example, do they have a contractor or do they talk with manufacturers reps? Who do they call when they need service and replacement of steam traps?
  - Steam trap supply chain including the flow of products from manufacturers to distributors to contractors to end users.
  - Estimated active trade ally perspective of participant free ridership and non-participant spillover.
5. **Steam Traps Impact Study** – An IL-TRM measure for steam trap replacement/repair currently exists, but a number of assumptions in the TRM are either dated or based on information that is not specific to Illinois. The large contribution of steam traps to portfolio savings merited consideration of an impact study, but background research was needed in 2018 to assess whether a viable study was feasible.

In 2018, the Nicor Gas, Ameren Illinois, Peoples Gas, and North Shore Gas evaluation teams conducted background research to understand 1) what data currently exist to support estimation of steam trap impacts, 2) the available study population of participants that have installed steam traps through energy efficiency programs in Illinois, and 3) the available evaluation methods to update the TRM. We produced an initial memo summarizing findings of our background research addressing the items above. A statewide conference call with evaluators, implementers, and other parties was held on October 29, 2018 to review the preliminary findings and identify action items prior to determining whether steam trap impact analysis should be pursued.

Following the statewide conference call, evaluators and utilities investigated the population of dry cleaning businesses statewide as a possible study target, but concluded there were insufficient numbers of participants and non-participants to conduct a viable billing analysis. Another action item from the call, gathering participant feedback on their method of



condensate handling and steam usage monitoring, was included in the steam trap process/market study, and findings were circulated with that study report. The steam trap impact feasibility assessment identified a need to address condensate recovery in the TRM algorithm, and this will be a topic for the TRM version 9 update process. Key survey findings on steam usage monitoring and condensate recovery will be summarized in a memo for the TRM TAC.

### Currently Active

1. **Steam Trap TRM Algorithm Update** – The steam trap impact feasibility assessment identified a need to address condensate heat recovery in the TRM algorithm, and this will be a topic for the TRM version 9 update process. Key findings on steam usage monitoring and condensate recovery from the steam trap process research will be summarized in a memo for the TRM TAC.
2. **Custom Gas Project EUL Secondary Research** – The goal of this research is to establish the effective useful life (EUL) values for non-TRM measures that are common in the Nicor Gas Custom Program. In 2019, Navigant reviewed the Custom Program’s participation from GPY3 through CY2018 and ranked measure categories by ex ante savings. This effort identified 33 measure categories, 19 of which are accounted for in ComEd’s EUL research or in the IL TRM v8.0. Four of the remaining 14 measures account for more than 1 percent of the 5-year population’s savings. A memo summarizing Navigant’s EUL estimates for the 14 measures was sent for comment in September 2019. This effort is ongoing – if new measures are installed through Custom Program, Navigant will work with the Nicor Gas implementer to establish an EUL.
3. **Small Business Thermostats Secondary Research on Impacts** – In 2018 and 2019, Navigant conducted secondary research of thermostat billing analysis studies (e.g., Michigan) to benchmark Illinois savings and assess whether other impact approaches are transferrable to Illinois.
4. **Commercial Energy Management System Gas Billing Analysis** – In 2019 and 2020, Navigant is examining gas energy bill impacts for a sample of energy management system (EMS) projects drawn from ComEd’s 2018 and 2019 rebate program. The effort will result in a memo documenting the realization rate findings and other savings metrics (e.g., therms per site or square foot). We will analyze results from billing data after the 2019/2020 gas heating season is completed. Findings will be available in Q2 2020. If the results are promising, a TRM version 9.0 workpaper will be proposed to the TAC and developed.
5. **Emerging Technologies Program** – Navigant is collaborating with Nicor Gas and implementer GTI to assess new technologies investigated through the Emerging Technologies Program. Nicor Gas and GTI perform primary research and analysis of new technologies, and Navigant provides secondary engineering review to support inclusion in the Illinois TRM. Completed, ongoing and planned research includes air deflectors for unit ventilators, steam traps, commercial weather stripping, and commercial spring loaded door hinges.
6. **Non-Residential Pipe Insulation** – In 2018 and 2019, Navigant conducted a secondary research investigation of thermal regain factors (TRF) to understand the residential sources for current TRFs and whether non-residential sources are available that could be used to update the TRM. Navigant did not locate a source of non-residential TRFs. As part of the

secondary research, Navigant investigated how site-specific data on pipe insulation projects could possibly be leveraged to refine non-residential TRF categories. A memo summarizing the secondary research findings will be distributed in Q4 2019 for discussion in Q1 2020.

PGL and NSG suggested additional research that could be done on thermal regain factors for Pipe Insulation. For example, an indoor heated space has an assumed regain of 85%, but there are situations where indoor pipe is located at the ceiling in a space that contains a large degree of thermal stratification. Is an assumed regain of 85% still accurate in this case? Most likely not. Also, is it still beneficial in most cases to insulate that indoor pipe so that the maximum amount of steam (or hot water) energy makes it to the terminal units where it is intended? The 85% of that heat loss may be staying in the space, but may not necessarily be useful (it may be overheating a space, or just collecting at the ceiling).

Navigant proposes to work with implementers to identify non-residential applications where the TRM version 8.0 default thermal regain factors are not representative, and propose alternative thermal regain factors or guidance that may be submitted to the TRM update process.

#### **Planned for 2020 or 2021**

- 1. Small Business Thermostats Impact Billing Analysis** – Navigant conducted a billing analysis of ComEd small commercial standard programmable thermostat electric cooling impacts in 2019, however the initial results (6.6 percent savings) were not statistically significant due to small sample size (49). The ComEd study was updated to include earlier participation years to increase the sample size to 89. Statistically significant savings of 10.4 percent were found, but the confidence interval was quite wide, and the team is currently considering an appropriate recommendation for to the TRM. To consider extending the analysis to gas space heating, Navigant conducted a statistical power analysis to estimate a sample size for gas. We then examined past gas utility Small Business Program participation data to determine if there is a viable population to conduct a billing usage analysis of programmable thermostats, or whether a pilot offering is required. Navigant estimated a sample of at least 150 participants was needed, which we believe would be feasible to obtain using a combined sample drawing from GPY6, 2018, and 2019 Nicor Gas BEER and Small Business programs and the ComEd Air Care Plus Program sample. If an adequate sample participant group can be identified, Navigant proposes to conduct a billing analysis through the 2019/20 heating season of past Nicor Gas and ComEd Air Care Plus participants that installed programmable thermostats. Results would be available in Q3 2020 if the dataset can be ready in April, with a goal to produce draft results by mid-summer.
- 2. Residential New Construction Market Actor Interviews** – The 2019 Residential New Construction program was jointly offered by Nicor Gas and ComEd, but will cease to be joint in 2020. A prescriptive-based rebate structure will be launched in 2020, with some completions anticipated during 2020. This study consists of market actor interviews (builders, raters, contractors) to assess the effects of the program design transition and identify opportunities for improvement. The interviews will also be an opportunity to identify potential energy saving market effects induced by the program.
- 3. Residential Weatherization Participant Research** – ComEd has recently ended joint weatherization rebates for non-low-income customers, reducing the attractiveness of the

- Nicor Gas program offering. This study consists of market actor interviews (homeowners, contractors) to assess the effects of the program design transition and identify opportunities for improvement.
4. **Kits In-Service Rate, NTG, and Satisfaction Survey** – Nicor Gas offers energy saving kits through the Elementary Energy Education Program, the Energy Saving Kits Program, and to income qualified customers. To date, kits have included water-saving and water heating measures and lighting (when joint with ComEd). In 2019, Nicor Gas will distribute home weatherization measures as a kit. The Illinois TRM version 8.0 uses weatherization in-service rates drawn from secondary research. The in-service rates, NTG, and satisfaction for these measures will be investigated through a survey of Nicor Gas kit recipients.
  5. **Non-Energy Impacts (NEIs) Primary Research** – NEIs are program impacts that are separate from energy savings. Navigant will inform Nicor Gas of opportunities to coordinate with ComEd or other Illinois utilities in assessing and proposing NEIs. For joint or coordinated programs, this could include coordinating on data collection and ensuring ComEd led research would cover gas-specific measures.
  6. **Non-Energy Impacts (NEIs) Secondary Research** – The Illinois electric utilities have conducted a substantial amount of secondary research in 2018 and 2019 into monetized NEIs for low-income programs. Navigant will review the secondary research compiled to date and identify NEI values that could be applied to gas utility cost-effectiveness.
  7. **Non-Energy Impacts – Economic Impacts of Energy Efficiency Programs**. In 2019, Navigant and the Ameren Illinois (AIC) evaluator are running the IMPLAN Model for ComEd and AIC to estimate the jobs impact from electric energy efficiency programs. Evaluators presented electric findings on job creation to the SAG in November 2019, and are updating the analysis based on feedback received. After incorporating feedback from the electric draft results, Navigant plans to extend the IMPLAN model to Nicor Gas using program tracking data inputs required to run the model (savings data aggregated by zip code).

#### **Considered, Currently not in 2020- 2021 Plan**

1. **Income Qualified (IQ) Crosscutting Process Research** – There are several gas and electric energy efficiency program offerings targeting income qualified populations. Process evaluations have been ongoing on individual offerings since 2018. Members of the SAG have recommended crosscutting process research to examine whether the current slate of offerings are effective at reaching all IQ sub-groups, and whether individual customers and delivery agents are being effectively served. Further discussion among parties is needed on the scope for a study.
2. **Residential Furnace Quality Installation and Quality Maintenance Gross and Net Impacts Secondary Research** –These measures are currently in the Illinois TRM. Nicor Gas included them in the HEER program in previous years but had limited participation and dropped them from the program.
3. **Residential Advanced Thermostat Billing Analysis** – Navigant could conduct a billing analysis gas impact evaluation on residential advanced thermostat installations, taking advantage of a larger population of installations, more robust tracking data, and energyENGINE demographics. Navigant would produce a TRM work paper if the assumptions or methodology need to be updated based on study findings.

4. **Small Business Advanced/Smart Thermostats Impact Billing Analysis** – Nicor Gas is interested in a billing study of small commercial advanced/smart thermostats. Nicor Gas has had few smart thermostats installed to date but is considering a pilot offering of smart thermostats to small business customers. Navigant has estimated a sample size of approximately 150 participants is required. Our basic approach would be to apply regression analysis to the monthly energy usage data of this group of customers before and after the installation of the measure, together with corresponding data from a group of matched controls, during the heating season months during which the predominant impact of installing this measure on energy usage would result from reduced space heating. If Nicor Gas chooses to pursue a pilot, it would take one to two years to get results from a billing study: we would need to work with Nicor Gas to design the study, recruit participants, install the measures, go through a complete heating season, and then conduct the analysis.
5. **Non-Residential Heating System EFLH** – Navigant could conduct a study to update the non-residential equivalent full load heating hour research Navigant conducted in GPY3 in the business sector. The study would include BEER and Multi-Family participants.
6. **Whole House “Deep Retrofits”** – Nicor Gas has investigated adding whole house comprehensive retrofits in the HES Program through assessments and bonus incentives to install multiple measures, but ComEd has ended weatherization rebates and Nicor Gas is not moving forward with deep retrofits. If the program does launch in the future, Navigant could develop models and use actual consumption data to calibrate them to determine the accuracy of TRM savings estimates and capture interactive savings effects.
7. **Water Saving Measures** – Navigant could conduct a billing analysis to estimate the impact of water saving measures distributed through kits by analyzing summer period energy usage (which may be observable when gas usage is limited to water heating and cooking). The Illinois evaluation teams are not aware of previous studies of this type that have been conducted in Illinois.

The four-year research plan schedule is summarized in Table 5. The table does not include program-level process and NTG research studies that are described in the individual program plans.

**Table 5. Four-Year Research Plan Schedule**

Activity	Status	2018	2019	2020	2021
<b>Residential and Income Qualified Research</b>					
Residential Insulation and Air Sealing Billing Analysis and TRM Workpapers	Completed	1Q-3Q			
Emerging Technologies Program Connected Savings RCT Pilot Impacts and Survey	Completed	1Q-4Q	1Q		
Residential New Construction – Updated Calibrated Simulation Models	Completed	4Q	1Q		
Kits In-Service Rate, NTG, and Satisfaction Survey	Planned			X	X
Residential New Construction Market Actor Interviews	Planned			X	X
Residential Weatherization Participant Research	Planned			X	X
<b>Business and Public Sector Research</b>					
Steam Traps – Background Research on Viability of Impact Study	Completed	2Q-4Q	1Q		
Steam Traps – Process Research Study	Active	2Q-4Q	1Q-4Q		
Steam Traps – Support TRM Algorithm Update for Condensate Recovery	Active		4Q	2Q	
Custom Gas Measure EULs	Active		2Q-4Q	Ongoing	Ongoing
Commercial EMS Billing Analysis	Active		4Q	2Q	
Non-Residential Pipe Insulation – Thermal Regain Factors	Active	4Q	1Q-4Q	2Q	
Small Business Thermostats – Savings Benchmarking and Sample Size Power Analysis	Active	4Q	1Q-4Q	1Q	
Small Business Standard Programmable Thermostats – Billing Analysis of Past Participants †	Planned			1Q-3Q	
<b>Other Research</b>					
Non-Energy Impacts (NEIs) Jobs Impact	Active		4Q	1Q-2Q	
Non-Energy Impacts (NEIs) Conduct Secondary Research	Planned			1Q-2Q	
Non-Energy Impacts (NEIs) Participate in Primary Research	Planned				X

† Study is planned, but depends on identifying an adequate sample participant population and matched controls.

## Annual and Ad-hoc Reporting

Navigant’s portfolio evaluation plan(s) will provide details on the exact nature of the annual reports that it will produce. At a minimum, we will produce a draft and final report annually encompassing each specific program evaluation. The annual reports will summarize evaluation findings for the previous year and present overall energy savings for the portfolio, along with any additional information required for annual and plan-cycle reporting. In the evaluation planning process, we will work with Nicor Gas to define the key dates and deliverables to ensure that our results meet the

Company's needs and those specified in the final Order for EEP 2018-2021 and the Illinois Energy Efficiency Policy Manual. Navigant will continue to collaborate with Nicor Gas and the SAG to refine report formats based on agreed upon templates.

Navigant will produce periodic ad-hoc reports, memos, and presentations providing timely feedback on the results of our data collection and analysis efforts to program managers and implementation staff. Memos produced throughout the program year will typically be included as an Appendix to the appropriate evaluation report. Customer-specific information (survey responses, site reports, etc.) will be kept confidential and excluded from public reports.

## **Cost Effectiveness Review and Summary Reporting**

Navigant will provide a brief annual portfolio summary report for each program year, 2018 through 2021, and will produce a final report summarizing the combined results for the four program years after the conclusion of 2021. The annual portfolio summary reporting will be presented in three spreadsheet documents, using templates recommended by the SAG, accompanied by a memo describing Navigant's approach and source of assumptions. The tables included are:

1. TRC and UCT Cost-Effectiveness Results Tables
2. Verified Energy Savings Summary Tables
3. High-Impact Measures Tables

The final evaluation summary report for the four years will summarize the results from the four annual reports in a concise format, and include the ex post cost-effectiveness report. Navigant will conduct a TRC cost-effectiveness analysis at the conclusion of the four-year program plan pursuant to Section 8-104(f)(8).

Work on the annual cost effectiveness spreadsheet reports will begin after annual impact evaluation reports are final, with draft results available August 15, and final results September 30.

## APPENDIX A. DETAILED PROGRAM EVALUATION PLANS

Navigant has developed program-specific plans to evaluate the entire portfolio of Nicor Gas energy efficiency programs. The following programs are covered in this plan, including income qualified programs and Public Sector programs introduced in 2017:

- Residential Programs
  - Program Home Energy Efficiency Rebates (HEER)
  - Program Energy Saving Kits (Kits)
  - Home Energy Savings (HES)
  - Multi-Family Home Energy Savings (MF)
  - Residential New Construction (RNC)
  - Elementary Energy Education (EEE)
  - Behavioral Energy Savings (BES)
- Income Qualified Programs
  - Affordable Housing New Construction (AHNC)
  - SF Weatherization and Retrofits
  - MF Weatherization and Retrofits
  - Public Housing Energy Savings (PHES)
- Business Programs (includes Public Sector)
  - Business Energy Efficiency Rebates (BEER)
  - Business Custom Incentives (Custom)
  - Small Business Energy Efficiency (SB)
  - Non-Residential New Construction (NRNC)
  - Retro-Commissioning (RCx)
  - Strategic Energy Management (SEM)
- Market Transformation Initiatives and Emerging Technologies Program (ETP)
  - Upstream Commercial Food Service Equipment Pilot
  - Building Operator Certification (BOC)

## **A.1 Residential Programs**



Home Energy Efficiency Rebate Program 2020 – 2021 Evaluation Plan

**Introduction**

The Home Energy Efficiency Rebate Program (HEER) provides rebates from Nicor Gas for the purchase and installation of high efficiency natural-gas furnaces and boilers. Customers are encouraged to install the most efficient gas heating equipment when replacing older, less efficient equipment. During the first six program years, customers found a trade ally, submitted a rebate application, and received their check through the mail after the work was done (for the most part). During 2018 through 2021, the participation approach adds a new option where customers may work with one of the Nicor Gas contractor circle members to obtain the desired equipment and receive an instant rebate at the time of installation. This new model will allow the contractor circle member to educate the customer on how to best utilize the equipment and maintain it in order to maximize efficiency.

Space heating equipment rebates are paired with other offerings such as HVAC Save (to make sure that the equipment has been properly installed and maintained) and advanced thermostat rebates to maximize energy savings in home heating.

We have prepared a two-year evaluation plan summary to identify tasks by year. Final scope and timing of activities for each year will be refined as program circumstances are better known.

**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Gross Impact - Interim Impact Review	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X
Research – 2019-20 Participant FR plus Process Survey	Q1-Q2	
Research – 2019 Participant SO plus Process Survey	Q1-Q2	
Research – Trade Ally FR and SO plus Process Survey	Q1-Q2	
Present Process and NTG Research Results	July 1	
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

## Evaluation Research Topics

The evaluation team has identified the following key objectives for evaluation research for program year 2020:

### *Impact Evaluation*

1. What are the program's verified gross savings?
2. What are the program's verified net savings?
3. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

### *Process Evaluation*

The process evaluation effort for program year 2020 will focus on completing NTG and process research with 2019 and 2020 participants and interviewing program managers.

## Evaluation Approach

### *Gross Impact Evaluation*

Navigant anticipates all measures offered through this program will be defined in the TRM. For measures covered by the TRM, the evaluation team will review the TRM measure characterizations and customer-specific data collected in the tracking system that substantiates the measures installed and make adjustments as needed to calculate verified savings. The gross impact evaluation for TRM measures will include a mid-year review and end-of-year final verification. Midway through the program year, Navigant will review the program tracking data to determine the level of input completeness, flag outliers, and identify incorrect algorithms or input assumptions. If necessary, the Navigant team will make recommendations for modifications to the tracking data for use in the impact evaluation effort. After the program year ends, verified measure savings are estimated and summed across participants to calculate the total verified savings for the program.

### *Net Impact Evaluation*

The net impact evaluation will apply the net-to-gross (NTG) ratio deemed through the Illinois Stakeholders Advisory Group (SAG) consensus process. The deemed NTGs are provided below.

**Table 2. Deemed NTG for 2020**

Program Path/Measure	Deemed NTG
Home Energy Eff Rebates (HEER) NTG value IF Basic Programmable thermostats are NOT included in rebates offered (excludes advanced thermostats)	0.72
Advanced Thermostats	NA*

\*The savings for natural gas heating provided in Illinois TRM Version 8.0, Section 5.3.16 were derived from a billing regression analysis with an experimental design that does not require further net savings adjustment.

Source:

Nicor\_Gas\_NTG\_History\_and\_2020\_Values 2019-10-01 Final.xlsx, available on the Illinois SAG website:

<https://www.ilsag.info/policy/net-to-gross-framework/>

### **Process and NTG Research**

Using program tracking data with 2019 and 2020 participants' email addresses, we will conduct research on free ridership in Spring of 2020 through a participant survey via telephone and website. Participants who submit their application online in 2020 Q1 will be able to click through the application confirmation page to the survey. Participants from 2019 with email addresses will receive an email invitation to the online survey. Participants from 2019 without email addresses and 2020 Q1 participants who do not apply online will be sampled for the telephone survey. Satisfaction questions will also be included in the online survey. In Spring 2020, Navigant will conduct participant spillover research through a participant telephone survey as well as research on non-participant spillover and trade ally perspective of participant free ridership through a participating trade ally survey.

The NTG surveys will include process questions. The process analysis will include a synthesis of both qualitative and quantitative data collected during the NTG surveys and in-depth interviews with program management and implementers.

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

We are not evaluating the HEER program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. In 2017, Navigant developed a scope of work for a quasi-experimental design study to conduct primary billing data research on the natural gas impact of Advanced Thermostats, to inform future updates to the TRM.

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

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

**Table 3. Core Data Collection Activities**

Activity	Target	Target Completes	Comments
In Depth Interviews	Program Management	1-2	Interview program staff
Interim Impact Review	All Program TRM Measures	Census	Review May 2020 program tracking data extract using the TRM measure characterizations
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures	Census	Gross savings verification using the TRM and customer-specific data collected in the tracking system
Process, Spillover, and Free Ridership Research – Online and Telephone Surveys	2019-20 Participating Customers and Trade Allies	TBD	Process, spillover, and free ridership research will be conducted in Spring 2020

## Evaluation Schedule

Table 4 below provides the schedule for evaluation of the 2020 HEER Program. Adjustments will be made as needed as program year evaluation activities begin.

**Table 4. Program Year 2020 Evaluation Schedule**

Activity/Deliverables	Responsible Party	Completion/Delivery
2019-20 Participant Process, Spillover, Free Ridership Surveys	Evaluation Team	Q4 2019 to Q2 2020
2019 Participant Process and NTG Memos	Evaluation Team	July 1, 2020
Present Free Ridership Recommendations to SAG	Evaluation Team	September 1, 2020
Interim Impact Review and Findings	Evaluation Team	July 31, 2020
Final Tracking Data to Navigant	Nicor Gas	January 30, 2021
Draft Impact Report to Nicor Gas and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	Nicor Gas / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	Nicor Gas / SAG	May 27, 2021
Final Impact Report to Nicor Gas and SAG	Evaluation Team	June 3, 2021

## Energy Saving Kits Program 2020 – 2021 Evaluation Plan

### Introduction

Nicor Gas plans to continue distributing Energy Saving Kits (ESK) during 2020-2021. The kits are free and include low-flow showerheads (1 or 2 per kit), kitchen aerators, shower timers, and bathroom aerators (1 or 2 per kit). These low-flow devices conserve hot water and therefore save the natural gas needed to heat the water. The option of only one bathroom aerator is new and based on Navigant’s PY5 evaluation recommendation to eliminate the waste of a percentage of bathroom aerators for those participants who do not need two. Also new to the ESK offering, beginning in 2019, are weatherization measures (caulk, weatherstripping, door seal, switch/outlet gaskets) that will further contribute to therm savings. The ESK 2019 program will continue to be free to all Nicor Gas residential customers who choose to request a kit. Further, the offering will target customers through direct email, outreach events, targeted emails, Energy Efficiency Program website promotions, and through financial heating assistance intake centers.

We have prepared a two-year evaluation plan summary to identify tasks by year. Final scope and timing of activities for each year will be refined as program circumstances are better known.

**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Gross Impact – Interim Impact Review	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X
Research – In-Service Rate (ISR), Participant FR plus Process Online Survey	X	
Research - Participant SO plus Process Survey	X	
Present NTG Research Results		Q3
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

### Evaluation Research Topics

The evaluation team has identified the following key objectives for evaluation research for program year 2020:

#### **Impact Evaluation**

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

3. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

### Process Evaluation

The process evaluation effort for program year 2020 will focus on completing NTG and process research with 2020 and 2021 participants and interviewing program managers.

## Evaluation Approach

### Gross Impact Evaluation

Navigant anticipates all measures offered through this program will be defined in the TRM. For measures covered by the TRM, the evaluation team will review the TRM measure characterizations and customer-specific data collected in the tracking system that substantiates the measures installed and make adjustments as needed to calculate verified savings. The gross impact evaluation for TRM measures will include a mid-year review and end-of-year final verification. Midway through the program year, Navigant will review the program tracking data to determine the level of input completeness, flag outliers, and identify incorrect algorithms or input assumptions. If necessary, the Navigant team will make recommendations for modifications to the tracking data for use in the impact evaluation effort. After the program year ends, verified measure savings are estimated and summed across participants to calculate the total verified savings for the program.

### Net Impact Evaluation

The net impact evaluation will apply the net-to-gross (NTG) ratio deemed through the Illinois Stakeholders Advisory Group (SAG) consensus process. The deemed NTGs are provided below.

**Table 2. Deemed NTG for 2020**

Program Path/Measure	Deemed NTG
Energy Saving Kits – Showerheads and Faucet Aerators	1.00
Energy Saving Kits – All Other Measures, including weatherization measures	0.84

Source:

*Nicor\_Gas\_NTG\_History\_and\_2020\_Values 2019-10-01 Final.xlsx*, available on the Illinois SAG website:

<https://www.ilsag.info/policy/net-to-gross-framework/>

### Process and NTG Research

Using program tracking data with 2020 and 2021 participants' email addresses, we will conduct research on free ridership in Spring of 2021 through an online participant survey. No sampling will be done; the evaluation team will email a link to the survey to all participants who provide an email address. Satisfaction questions will also be included in the online survey. If adequate email addresses are not available, Navigant will conduct this research through a telephone survey. In

Spring 2021, Navigant will conduct participant spillover research through a participant telephone survey.

The NTG surveys will include process questions. The process analysis will include a synthesis of both qualitative and quantitative data collected during the NTG surveys and in-depth interviews with program management and implementers.

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

We are not evaluating the ESK program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups.

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

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

**Table 3. Core Data Collection Activities**

Activity	Target	Target Completes	Comments
In Depth Interviews	Program Management	1-2	Interview program staff
Process, NTG, and ISR Survey Research	2020 Participants	TBD	In-Service Rate, Participant FR plus Process On-line Survey; SO plus Process Telephone Survey
Interim Impact Review	All Program TRM Measures		Review program tracking data using the TRM measure characterizations
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures		Gross savings verification using the TRM and customer-specific data collected in the tracking system

## Evaluation Schedule

Table 4 below provides the schedule for evaluation of the ESK Program. Adjustments will be made as needed as program year evaluation activities begin.

**Table 4. Program Year 2020 Evaluation Schedule**

Activity/Deliverables	Responsible Party	Completion/Delivery
Interim Impact Review and Findings	Evaluation Team	July 31, 2020
2020 Participant Process, Spillover, Free Ridership Surveys	Evaluation Team	Q3 2020 to Q1 2021
Final Version of Survey Instruments, Sampling Plan	Evaluation Team	November 15, 2020
2020 Participant Process and NTG Memos	Evaluation Team	July 1, 2021
In Service Rate Findings	Evaluation Team	May 15, 2021
Present Free Ridership Recommendations to SAG	Evaluation Team	September 1, 2021
Final Tracking Data to Navigant	Nicor Gas	January 30, 2021
Draft Impact Report to Nicor Gas and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	Nicor Gas / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	Nicor Gas / SAG	May 27, 2021
Final Impact Report to Nicor Gas and SAG	Evaluation Team	June 3, 2021



Home Energy Savings Program 2020 – 2021 Evaluation Plan

**Introduction**

The Home Energy Savings (“HES”) program is a whole house single family assessment and weatherization program with the objective to obtain natural gas and electricity savings in existing single-family buildings. The program targets Nicor Gas and ComEd customers with gas space heating and electric central air conditioning in single family homes or multi-family buildings with up to 4 units. Nicor Gas also offers program services to select municipalities serviced by municipal electric providers. Starting in 2020, ComEd is only participating in the assessment portion of the program, and has discontinued offering weatherization rebates. In 2021, we will perform research (described in Section 4) on the impact of this program change.

The HES program provides weatherization and shell improvement opportunities using standard, prescriptive and whole-house approaches. The standard offering provides home energy assessments to customers and achieves energy savings through the direct installation of energy saving products during the assessment including LED’s (offered jointly with ComEd), pipe insulation, showerheads, aerators, programmable thermostats, programmable thermostat reset, and co-pay advanced thermostats. If the participant chooses to implement the recommended weatherization work, financial incentives from Nicor Gas are offered.

The Prescriptive offering includes attic air sealing and insulation, duct sealing, and wall insulation performed by a program approved certified participating contractor. After a customer has expressed interest in the program, a participating contractor schedules a site visit to the home. No assessment is required and the participating contractor will complete the air sealing and insulation weatherization work. The customer receives an “instant discount” provided by Nicor Gas on the completed work.

We have prepared a two-year evaluation plan summary to identify tasks by year. Final scope and timing of activities for each year will be refined as program circumstances are better known.

**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Gross Impact - Interim Impact Review	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

## Evaluation Research Topics

The evaluation team has identified the following objectives for evaluation research for program year 2020:

### *Impact Evaluation*

1. What are the program's verified gross savings?
2. What are the program's verified net savings?
3. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

### *Process Evaluation*

Navigant's 2020 process research activities will include review of program materials and in-depth qualitative interviews with program management and implementers. These interviews will be used to develop a complete understanding of the final design, procedures, and implementation strategies for the program, including specific marketing tactics and perceived results, to understand the current program performance and inform our evaluation efforts.

## Evaluation Approach

### *Gross Impact Evaluation*

Navigant anticipates all measures offered through this program will be defined in the TRM. For measures covered by the TRM, the evaluation team will review the TRM measure characterizations and customer-specific data collected in the tracking system that substantiates the measures installed and adjust as needed to calculate verified savings. The gross impact evaluation for TRM measures will include a mid-year review and end-of-year final verification. Midway through the program year, Navigant will review the program tracking data to determine the level of input completeness, flag outliers, and identify incorrect algorithms or input assumptions. If necessary, the Navigant team will make recommendations for modifications to the tracking data for use in the impact evaluation effort. After the program year ends, verified measure savings are estimated and summed across participants to calculate the total verified savings for the program.

### *Net Impact Evaluation*

The net impact evaluation will apply the net-to-gross (NTG) ratio deemed through the Illinois Stakeholders Advisory Group (SAG) consensus process. The deemed NTGs are provided below.

**Table 2. Deemed NTG for 2020**

Program Path	Measure	Deemed NTG
Direct Install	Showerhead	1.07
	Kitchen Aerator	1.07
	Bathroom Aerator	1.07
	Programmable Thermostat	0.81
	Re-Programming Thermostat	0.85
	Hot Water Pipe Insulation	0.99
	Water Heater Temp Setback	0.98
	Advanced Thermostat	NA*
Weatherization	Air Sealing plus Attic Insulation	NA**
	Air Sealing (conducted without adding Attic Insulation)	0.83
	Insulation measures, excluding ceiling/attic insulation, including Wall, Floor Above Crawlspace, Basement Sidewall; Rim/Band Joist	0.85
	Duct Sealing	0.93

Source: *Nicor\_Gas\_NTG\_History\_and\_2020\_Values 2019-10-01 Final.xlsx*, available on the Illinois SAG website: <https://www.ilsag.info/policy/net-to-gross-framework/>

\* The savings for natural gas heating provided in Illinois TRM Version 8.0, Section 5.3.16 is a net savings value.

\*\* The savings for natural gas heating provided in Illinois TRM Version 8.0, Sections 5.6.1 and 5.6.5 are a net savings value.

### **Process and NTG Research**

Navigant’s 2020 process research activities will include review of program materials and in-depth qualitative interviews with program management and implementers. These interviews will be used to develop a complete understanding of the final design, procedures, and implementation strategies for the program, including specific marketing tactics and perceived results, to understand the current program performance and inform our evaluation efforts.

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

We are not evaluating the HES program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. In 2018 Navigant interpreted results of our air sealing and insulation billing analysis conducted in 2017 and 2018 and updated the TRM residential insulation and air sealing measures.

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

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

**Table 3. Core Data Collection Activities**

Activity	Target	Target Completes	Comments
Interim Impact Review	All Program TRM Measures		Review program tracking data using the TRM measure characterizations
In Depth Interviews	Program Management	1-2	Interview program staff
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures		Gross savings verification using the TRM and customer-specific data collected in the tracking system

## Evaluation Schedule

Table 4 below provides the schedule for evaluation of the HES Program. Adjustments will be made as needed as program year evaluation activities begin.

**Table 4. Program Year 2020 Evaluation Schedule**

Activity/Deliverables	Responsible Party	Completion/Delivery
Interim Impact Review and Findings	Evaluation Team	July 31, 2020
Final Tracking Data to Navigant	Nicor Gas	January 30, 2021
Draft Impact Report to Nicor Gas and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	Nicor Gas / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	Nicor Gas / SAG	May 27, 2021
Final Impact Report to Nicor Gas and SAG	Evaluation Team	June 3, 2021

## Multi-Family Program 2020-2021 Evaluation Plan

### Introduction

The Multi-Family Comprehensive Energy Efficiency Program (Multi-Family) will address residential (living units) and commercial (common areas, central plants) energy efficiency opportunities available in multi-family buildings. Further, the program will aim to overcome market barriers to the installation of energy efficiency measures in multi-family buildings by offering comprehensive assessments, technical assistance and incentives.

Multi-Family is designed so that customers can participate through three types of offerings. One offering consists of a free energy assessment and free installation of energy saving products. This portion of the program is offered jointly with ComEd. This direct install portion of the program offers free installation of low-flow showerheads, faucet aerators, domestic hot water pipe wrap, programmable thermostats and thermostat education, and lighting and adjustment of the temperature setting of hot water heaters to reduce the consumption of natural gas and electricity.

Customers are also eligible for rebates through the purchase and installation of qualifying energy efficient products and custom projects. Typical projects consist of boiler tune-ups, boiler controls, steam trap repairs/replacement, space and water heating equipment upgrades, and building shell insulation. These upgrades are performed by installing trade allies.

Starting in 2020, Nicor Gas will add a central plant gas optimization offering. This path provides a service where Energy Advisors representing the program administrator and contracted engineers complete a detailed review of a facility for capital improvement opportunities and for operation and maintenance issues that, if corrected, often provide short payback projects that are very attractive to owners. Examples of issues uncovered from a gas optimization study include correcting condensing boiler operating temperatures to ensure condensing operation and therefore savings. Resulting projects may qualify for prescriptive or custom rebates.

This program will continue from the program offered during 2018 and 2019, targeting property owners of residential gas heated multi-family buildings of five or more units including high-rise buildings, low-rise buildings, town homes, condominiums, assisted living, retirement communities, non-income qualified properties, and public and private school dormitories.

We have prepared a two-year evaluation plan summary to identify tasks by year. Final scope and timing of activities for each year will be refined as program circumstances are better known.

**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Gross Impact - Interim Impact Review	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X
Gross Impact – Custom Project Savings Verification Waves and Large Project Pre-Installation Review	X	X
Gross Impact – End-of-Year Custom Project Savings Verification	X	X
Research - Participant Free Ridership Survey*	X	
Present Free Ridership Research Results*		Q3
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

\* The 2018 FR survey did not have a sufficient number of FR completions to produce 90/10 results for Nicor Gas comprehensive measures.

Navigant will coordinate with the ComEd evaluation team on any issues relevant to joint program offerings.

## Evaluation Research Topics

The evaluation team has identified the following key objectives for evaluation research for program year 2020:

### Impact Evaluation

1. What are the program’s verified gross savings?
2. What are the program’s verified net savings?
3. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?
5. What is the level of free ridership for comprehensive measures in this program, based on evaluation research?

### Process Evaluation

Navigant’s 2020 process research activities will include review of program materials and in-depth qualitative interviews with program management and implementers.

## Evaluation Approach

### *Gross Impact Evaluation*

For measures covered by the TRM, the evaluation team will review the TRM measure characterizations and customer-specific data collected in the tracking system that substantiates the measures installed and make adjustments as needed to calculate verified savings. The gross impact evaluation for TRM measures will include a mid-year review and end-of-year final verification. Midway through the program year, Navigant will review the program tracking data to determine the level of input completeness, flag outliers, and identify incorrect algorithms or input assumptions. If necessary, the Navigant team will make recommendations for modifications to the tracking data for use in the impact evaluation effort. After the program year ends, verified measure savings are estimated and summed across participants to calculate the total verified savings for the program.

The gross impact evaluation approach for custom projects will be based on engineering analysis of all or a sample of projects to verify claimed savings or make retrospective adjustment to claimed gross savings. Custom projects will be sampled by size-based strata and analyzed together. All the sampled projects will be subject to engineering file review and a subset may receive on-site inspection and verification of installed measures. 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 that which was reported.

Navigant will employ IPMVP protocols for on-site measurement and verification of custom projects. The impacts for some projects will be verified by engineering review of site-collected data and determined with regression analysis of utility billing data and weather and/or other independent variables that affect energy use (for example, days of operation), as appropriate. This approach parallels IPMVP option C. If implemented measures are not amenable to regression analysis, the evaluated savings will be determined by engineering review with site verified data, incorporating historical data when available.

The sampling plan for custom projects, including those for engineering review and billing analysis, will target overall 10 percent precision at 90 percent confidence using the stratified ratio estimation technique to optimize sample size and control evaluation costs. Due to tight end-of-year impact reporting timelines, Navigant will sample for impacts in one or two waves – approximately July and/or December, and after the final program year projects are closed. Each sample will be based on lower precision targets for the wave, but when combined at the end of the year, the overall sample will meet targets. The Large Project Pre-Installation Review process provides evaluator feedback on savings methodology and baseline selection on large custom projects in pre-installation stages.

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

We are not evaluating the Multi-Family 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 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 all analysis.

### Net Impact Evaluation

The net impact evaluation will apply the net-to-gross (NTG) ratio deemed through the Illinois Stakeholders Advisory Group (SAG) consensus process. The deemed NTGs are provided below.

**Table 2. Deemed NTG for 2020**

Program Path/Measure	Deemed NTG
Multi-family In-Unit and Common Area Direct Install (all measures except in-unit DI faucet aerators and showerheads)	0.96
Multi-family In-unit Direct Install (faucet aerators and showerheads when using TRM specific baseline average water flow rates)	1.01
Multi-family Comprehensive All Rebated Measures	0.93

Source:

Nicor\_Gas\_NTG\_History\_and\_2020\_Values 2019-10-01 Final.xlsx, available on the Illinois SAG website:

<https://www.ilsag.info/policy/net-to-gross-framework/>

### NTG Research

Navigant will conduct primary research during program year 2020 to provide free ridership values for potential deeming in future program years through surveys with 2020 participating decision-maker customers that installed comprehensive measures. The 2018 NTG survey did not have a sufficient number of completions to produce 90/10 free ridership results for Nicor Gas comprehensive measures. The survey will be re-opened when the population is replenished. If the survey can be completed with 2020 participants, no further research will be conducted with 2021 participants. Sample design will attempt to achieve a 90/10 confidence/precision level of free ridership.

### Process Research

Navigant's 2020 process research activities will include review of program materials and in-depth qualitative interviews with program management and implementers.

### Data Collection, Methods, and Sample Sizes

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



**Table 3. Core Data Collection Activities**

Activity	Target	Target Completes	Comments
In Depth Interviews	Program Management	1-2	Interview program staff
Free Ridership Survey Research (CATI)	Participating Building Owners and Managers	TBD	Free ridership of comprehensive measures
Interim Impact Review	All Program TRM Measures		Review program tracking data using the TRM measure characterizations
Custom Project Savings Verification	Completed Custom Projects		One or two sampling waves, includes custom gas optimization projects
Large Project Pre-Installation Review	Custom Projects in the Pre-Installation Phase		Evaluator feedback on savings methodology and baseline on large projects in pre-installation stages
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures		Gross savings verification using the TRM and customer-specific data collected in the tracking system
End-of Year Custom Project Savings Verification	Completed Custom Projects		Custom projects not previously sampled

## Evaluation Schedule

Table 4 below provides the schedule for evaluation of the Multi-Family Program. Adjustments will be made as needed as program year evaluation activities begin.

**Table 4. Program Year 2020 Evaluation Schedule**

Activity/Deliverables	Responsible Party	Completion/Delivery
Interim Impact Review and Findings	Evaluation Team	July 31, 2020
Custom Project Savings Verification Waves	Evaluation Team	Q2 2020 to Q1 2021
Large Custom Project Pre-Installation Review	Evaluation Team	Ten business days
Final Tracking Data to Navigant	Nicor Gas	January 30, 2021
Draft Impact Report to Nicor Gas and SAG	Evaluation Team	May 8, 2021
Draft Comments Received	Nicor Gas / SAG	May 29, 2021
Send Revised Draft	Evaluation Team	June 12, 2021
Comments on Redraft	Nicor Gas / SAG	June 19, 2021
Final Impact Report to Nicor Gas and SAG	Evaluation Team	June 26, 2021
Conduct Free Ridership Survey, if population is sufficient	Evaluation Team	Q3 2020-Q1 2021
Free Ridership Research Findings Memo	Evaluation Team	August 1, 2021

## Nicor Gas Residential New Construction Program 2020 to 2021 Evaluation Plan

### Introduction

The 2019 Residential New Construction program was jointly offered by Nicor Gas and ComEd, but will cease to be joint in 2020. Some projects initiated under the 2019 program design that featured performance-based incentives will be completed in 2020. A prescriptive-based rebate structure will be launched in 2020, with some completions anticipated during 2020. In 2021, we will perform research (described in Section 4) on the impact of this program change.

The evaluation team determined the evaluation approach for the 2020-2021 period based on the needs of the program and the program’s evolution. The two-year evaluation approach for this program, summarized in Table 1, is based on the following:

- Gross and net (using deemed NTG ratios) impacts will be estimated each year
- Program manager and implementer interviews will be conducted each year
- Builder and rater interviews will be conducted in 2021 to explore their perspectives and satisfaction with the program changes

**Table 1. Evaluation Plan Summary**

Tasks	2020	2021
Tracking System Review (Prescriptive Path)	X	
Data Collection – Program Manager and Implementer Interviews	X	X
Data Collection – Builder and Rater Interviews		X
Data Collection – NTG Survey		X
Impact – Verification & Gross Realization Rate	X	X
Process Analysis	X	X

### Evaluation Research Topics

The 2020 evaluation will seek to answer the following key researchable questions:

#### **Impact Evaluation**

1. What are the gross annual energy and demand savings induced by the program?
2. Did the program meet its energy and demand savings goals? If not, why not?
3. What are the net impacts from the program?

### Process Evaluation and Other Research Topics

The process evaluation effort for 2020 will focus on the impact of program design changes. The process research will address the following questions when interviewing program managers and implementation contractors for their perspectives:

1. What has been the experience and feedback on the program design transition?
2. Are builders and raters satisfied with the program? What improvements, if any, would builders and raters like to see implemented?

We anticipate there will be insufficient numbers of completed prescriptive-based projects in 2020 to conduct NTG research on 2020 participants, but plan to survey 2021 participants.

### Evaluation Approach

Table 2 summarizes the proposed data collection activities for 2019 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	Notes
Tracking System Review	Tracking system	Census at mid-year	Prescriptive Path
In-Depth Interviews	Program management and implementers	2	
Gross Impact Evaluation	Use 2018 calibrated simulation realization rate to adjust 2020 claimed savings for 2019 initiated homes. Use the 2020 TRM for prescriptive measures.	All	
Verified Net Impact Evaluation	Calculation using deemed NTG ratio	NA	

### Tracking System Review

Navigant will review program tracking system data and ex ante savings for the newly launched Prescriptive Path to ensure these systems gather the data required to support evaluation activities. This review will occur during the program year after initial projects have completed.

### Program Management and Implementer Interviews

Navigant will interview Nicor Gas program managers and implementation contractors to gather essential information about program design, program changes, and builder and rater experience. The evaluation team will conduct interviews at the beginning of the evaluation and will communicate with program staff on an ongoing basis to gather additional information as needed.

### Gross Impact Evaluation

The 2018 and 2019 evaluations used the results of the 2018 calibrated energy simulations to determine gross realization rates for gas savings. For homes with 2020 claimed savings initiated under the 2019 performance-based design, the evaluation team plans to apply the 2018 realization rates to the ex ante savings to determine verified gross impacts. We will use the Illinois TRM for homes initiated under the prescriptive-based incentive design and completed in 2020.

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

Navigant is not evaluating the Residential New Construction 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 it would not be possible to create a valid matched control group for the customers in this program.

### Verified Net Impact Evaluation

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

**Table 3. Deemed NTG Values for 2020**

Program Measure	2020 Deemed NTG Value
Residential New Construction – Performance-Based (initiated 2019)	0.65
Residential New Construction – Prescriptive-Based (initiated 2020)	0.80

Source:

Nicor\_Gas\_NTG\_History\_and\_2020\_Values 2019-10-01 Final.xlsx, available on the Illinois SAG website: <https://www.ilsag.info/policy/net-to-gross-framework/>

### 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**

Activity or Deliverable	Responsible Party	Date Delivered
Program manager and implementation contractor interviews	Evaluation, Nicor Gas, RSR	May 2020
Tracking system ex ante review (Prescriptive Path)	Evaluation	July 30, 2020 or when initial projects are completed
2020 program tracking data	Nicor Gas	January 30, 2021
Draft report to Nicor Gas and SAG	Evaluation	April 15, 2021
Comments on draft (15 business days)	Nicor Gas and SAG	May 6, 2021
Revised draft by Navigant	Evaluation	May 20, 2021
Comments on redraft (5 business days)	Nicor Gas and SAG	May 27, 2021
Final report to Nicor Gas and SAG	Evaluation	June 3, 2021

Elementary Energy Education Program 2019 – 2021 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. A furnace filter alarm whistle will be added to the kits for 2020 to reduce space heating (this measure is in the TRM for 2020). 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
Process Analysis – Analyze Teacher Surveys (collected by Franklin Energy)	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 Franklin Energy 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 Franklin Energy’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 (Wave 1, Final)†
Gross Impact Approach	Student Survey Analysis	All	Two Waves (Wave 1, Final)†
Process Analysis	Student Survey Analysis	All	One-time
In Depth Interviews	Program Management and Implementers	2	
Verified Net Impact	Calculation using deemed NTG ratio	NA	

† Navigant will coordinate with ComEd and the gas utilities 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 (Gas and Electric)	1.0

Source: SAG Website: <https://www.ilsag.info/policy/net-to-gross-framework/>

***(ComEd) 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
Process Analysis of Teacher Surveys	Evaluation	TBD
CY2020 program tracking data for Wave 1	ComEd/Gas Utilities	July 10, 2020
Wave 1 project documentation, engineering reviews, feedback	Evaluation	September 15, 2020
Final CY2021 Program tracking and customer survey data	ComEd/Gas Utilities	January 30, 2021
Draft Report to ComEd, Gas Utilities, and SAG	Evaluation	March 5, 2021
Comments on draft (15 Business Days)	ComEd/Gas Utilities and SAG	March 25, 2021
Revised Draft by Navigant	Evaluation	April 1, 2021
Comments on redraft (5 Business Days)	ComEd/Gas Utilities and SAG	April 7, 2021
Final Report to ComEd, Gas Utilities, and SAG	Evaluation	April 16, 2021

## Behavior Energy Savings Program 2019 – 2021 Evaluation Plan

### Introduction

The primary objective of the evaluation of the Nicor Gas Behavior Energy Savings Program is to estimate the natural gas savings generated by regularly mailing customers home energy reports (HERs) that provide information about their natural gas consumption and conservation. In 2020, the Nicor Gas program will consist of one wave with 155,00 report recipients. This wave was first launched in November 2019 and Navigant will evaluate November 2019 to December 2020 (a 14 month period) as part of the 2020 evaluation. This will avoid the issue that evaluating just November and December 2019 in a 2019 evaluation is unlikely to result in statistically significant savings due to the small number of data points.<sup>3</sup> To support program decision-making prior to the start of the 2020/2021 heating season, Navigant will conduct an interim impact evaluation of the 2019/2020 heating season (November 2019 through March 2020).

This program was designed as a randomized controlled trial (RCT). Customers in the target group of residential customers were randomly assigned to either the recipient group or the control (non-recipient) group to estimate changes in natural gas use due to the program. This approach simplifies the process of verifying energy savings: among other things it effectively eliminates free-ridership and participant spillover bias and thus the need for net-to-gross research. Customers may opt out of the program at any time, but they cannot opt in due to the RCT design.<sup>4</sup>

We have prepared an evaluation plan summary to identify tasks by year, shown in Table 1. Final scope and timing of activities for each year will be refined as program circumstances are better known.

**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Tracking System Review	X	X
Data Collection – Program Manager and Implementer Interviews	X	X
Interim Impact Review of 2019/2020 Heating Season	X	
Impact – End-of-Year Savings Verification	X	X

<sup>3</sup> In CY2021, Navigant will apply the first year persistence factor to the entire 14 months' worth of savings.

<sup>4</sup> HER recipients and control group members remain part of the recipient sample unless they move. Keeping HER recipients who opt out of the program in the recipient sample ensures the recipient and control groups remain balanced for evaluation and means that our savings estimate represents the intent to treat effect.

## Evaluation Research Topics

### Impact Evaluation

Navigant will address the following questions in the impact evaluation of the program:

1. How much natural gas savings do customers in the program save in 2020?
2. What is the uplift in other Nicor Gas energy efficiency programs due to the Behavior Energy Savings Program?

Navigant’s 2020 research activities will include interviews with program management and implementers. These interviews will be used to develop a complete understanding of the final program design, the number of HERs sent and distribution dates, targeting strategies, and other aspects of the program to inform our evaluation efforts. To support program decision-making prior to the start of the 2020/2021 heating season, Navigant will conduct an interim impact evaluation of the 2019/2020 heating season (November 2019 through March 2020).

### Process Evaluation

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

## Evaluation Approach

Table 2 summarizes the evaluation tasks for 2020 that will be used to answer the evaluation research questions.

**Table 2. 2020 Evaluation Plan Summary**

Activity	2020
Gross, Net Impact Approach (End of Year)	Regression analysis
Interim Impact Review of 2019/2020 Heating Season	Regression analysis
NTG Approach†	Uplift analysis
Program Manager and Implementer Interviews/ Review Materials	Yes

† The RCT regression analysis produces impacts which are intrinsically net savings, aside from uplift. The uplift calculation will be done for the End of Year only.

### Gross Impact Evaluation

Navigant will measure 2020 program impacts through billing analysis using lagged dependent variable (LDV) and linear fixed effects regression (LFER) models followed by an uplift analysis to account for participation in other programs. Although the LDV and LFER models are structurally different, both produce unbiased estimates of program savings assuming the RCT is well-balanced

with respect to the drivers of natural gas use. Billing analysis implicitly estimates net impacts so no net-to-gross adjustment is necessary. However, we will use the LDV model for reporting total program savings in 2020 because we believe that, on balance, it has superior statistical properties.<sup>5</sup> The LFER will be reported as a robustness check.

### LDV Model

The LDV model controls for non-treatment differences in energy use between treatment and control customers using lagged energy use as an explanatory variable. The model frames energy use in calendar month  $t$  of the post-program period as a function of both the treatment variable and energy use in the same calendar month of the pre-program period. The underlying logic is that systematic differences between control and treatment customers will be reflected in differences in their past energy use, which is highly correlated with their current energy use. Formally, the model is shown in the following equation.

$$ADU_{kt} = \beta_1 Treatment_k + \sum_j \beta_{2j} Month_{jt} + \sum_j \beta_{4j} Month_{jt} \cdot ADUlag_{kt} + \varepsilon_{kt}$$

Where:

$ADU_{kt}$	is average daily consumption of kWh by household $k$ in bill period $t$
$Treatment_k$	is a binary variable taking a value of 0 if household $k$ is assigned to the control group, and 1 if assigned to the treatment group
$Month_{jt}$	is a binary variable taking a value of 1 when $j = t$ and 0 otherwise <sup>6</sup>
$ADUlag_{kt}$	is household $k$ 's energy use in the same calendar month of the pre-program year as the calendar month of month $t$
$\varepsilon_{kt}$	is the cluster-robust error term for household $k$ during billing cycle $t$ ; cluster-robust errors account for heteroskedasticity and autocorrelation at the household level.

The coefficient  $\beta_1$  is the estimate of average daily kWh energy savings due to the program.

### LFER Model

The LFER model used by the evaluation team is one in which average daily consumption of kWh by household  $k$  in bill period  $t$ , denoted by  $ADU_{kt}$ , is a function of the following three terms:

1. The binary variable  $Treatment_k$ .
2. The binary variable  $Post_t$ , taking a value of 0 if month  $t$  is in the pre-treatment period, and 1 if in the post-treatment period.
3. The interaction between these variables,  $Treatment_k \cdot Post_t$ .

Formally, the LFER model is shown in the following equation.

<sup>5</sup> The LDV model's superior performance results from its greater flexibility relative to the LFER model. While the LDV model can accommodate time-varying individual customer controls, the LFER model treats all unobserved inter-customer heterogeneity affecting energy usage as time-invariant – a particularly unwelcome feature given the highly seasonal nature of gas consumption.

<sup>6</sup> In other words, if there are  $T$  post-program months, there are  $T$  monthly dummy variables in the model, with the dummy variable  $Month_{jt}$  the only one to take a value of 1 at time  $t$ . These are, in other words, monthly fixed effects.

$$ADU_{kt} = \alpha_{0k} + \alpha_1 Post_t + \alpha_2 Treatment_k \cdot Post_t + \varepsilon_{kt}$$

Three observations about this specification deserve comment. First, the coefficient  $\alpha_{0k}$  captures all household-specific effects on energy use that do not change over time, including those that are unobservable. Second,  $\alpha_1$  captures the average effect across all households of being in the post-treatment period. Third, the effect of being both in the treatment group and in the post period, i.e., the effect directly attributable to the program, is captured by the coefficient  $\alpha_2$ . In other words, whereas the coefficient  $\alpha_1$  captures the change in average daily kWh use across the pre- and post-treatment for the control group, the sum  $\alpha_1 + \alpha_2$  captures this change for the treatment group, and so  $\alpha_2$  is the estimate of average daily kWh energy savings due to the program.

### ***Uplift Analysis***

The HERs sent to participating households include energy-saving tips, some of which encourage participants to enroll in other Nicor Gas energy efficiency (EE) programs. If participation rates in other EE programs are the same for Behavior Energy Savings Program treatment and control groups, the savings estimates from the regression analyses are already “net” of savings from other programs as this indicates the HERs do not increase or decrease participation in other EE programs. However, if the HERs affect participation rates in other EE programs, then savings across all programs are lower than indicated by the simple summation of savings in the Behavior Energy Savings and EE programs. For instance, if the HERs increase participation in other EE programs, the increase in savings may be allocated to either the Behavior Energy Savings Program or the EE program, but cannot be allocated to both programs simultaneously.<sup>7</sup> Note that when the HERs decrease participation in other programs there is no issue of double counting and thus no adjustment to the savings total is made.

Data permitting, the evaluation team uses a difference-in-difference (DID) statistic to estimate uplift in other EE programs. To calculate the DID statistic, the change in the participation rate in another EE program between the current evaluation year and the pre-program year for the control group is subtracted from the same change for the treatment group. For instance, if the rate of participation in an EE program during the current year is 5% for the treatment group and 3% for the control group, and the rate of participation during the year before the start of the Behavior Energy Savings Program is 2% for the treatment group and 1% for the control group, then the rate of uplift due to the Behavior Energy Savings Program is 1%, as reflected in the equation below.

$$\begin{aligned} & (\text{current year treatment group participation} - \text{prePY treatment group participation}) \\ & - (\text{current year control group participation} - \text{prePY control group participation}) \\ & = \text{DID statistic} \\ & (5\% - 2\%) - (3\% - 1\%) = 1\% \end{aligned}$$

The DID statistic generates an unbiased estimate of uplift when the baseline average rate of participation is the same for the treatment and control groups, or when they are different due only to differences between the two groups in time-invariant factors, such as the residence’s square footage.

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<sup>7</sup> It is not possible to estimate and remove double counted savings generated by programs for which tracking data are not available, such as upstream rebate programs.

An alternative to the DID statistic is the post-only difference (POD) statistic, which is the simple difference in participation rates between the treatment and control groups during the evaluation year. The POD statistic generates an unbiased estimate of uplift when the baseline average rate of participation in the EE program is the same for the treatment and control groups. The evaluation team uses this alternative statistic in cases where the EE program did not exist in the pre-program year.

No adjustment for legacy uplift (uplift that occurred in prior years) is needed in CY2020 since this is the first year of the Behavior Energy Savings Program.

### ***Verified Net Impact Evaluation***

A key feature of the RCT design of the HER program is that the analysis inherently estimates net savings because there are no participants who would have received the individualized reports in the absence of the program. While some customers receiving reports may have taken energy-conserving actions or purchased high-efficiency equipment anyway, the random selection of program participants (as opposed to voluntary participation) implies that the control group of customers not receiving reports would be expected to exhibit the same degree of energy-conserving behavior and purchases. Therefore, this method estimates net savings and no further NTG adjustment is necessary.

### ***Interim Impact Evaluation of the 2019/2020 Heating Season***

Navigant will conduct an interim impact estimate of savings for the 2019-2020 heating season. This will help Nicor Gas know whether the program is performing above or below expectations and confirm Uplight's ex ante calculation, prior to the 2020/2021 heating season (so program adjustments can be made before the heating season starts). Without an interim review, Navigant's first impact evaluation occurs in spring 2021, which leaves only the 2021 fall heating months to adjust treatment group size in the plan cycle.

Navigant's interim savings estimate will cover November 2019 through March 2020 bills. Once billing data is received, Navigant requires 6 weeks to produce a draft savings estimate. If billing data is received by early May, then a draft estimate would be available by the end of June 2020. We will not perform the uplift analysis for this interim estimate (uplift is a time consuming calculation process with small impact – we found it reduces program savings by 1% to 3% for PGL and NSG). Reporting will be in memo format.

## Evaluation Schedule

Table 3 below presents an estimate of the evaluation schedule. The schedule for the impact analysis depends on receipt of the necessary data from Uplight and Nicor Gas.

**Table 3. 2020 Evaluation Schedule**

Activity/Deliverables	Responsible Party	Completion/Delivery
Data delivery for 2019-20 Heating Season	Uplight	May 5, 2020
Draft Interim Impact Report	Evaluation Team	June 19, 2020
Final Interim Impact Report	Evaluation Team	July 21, 2020
Interviews with program manager and IC	Evaluation Team	July 31, 2020
Data delivery to Navigant	Uplight	January 30, 2021
2020 EE Residential Program Tracking Data to Navigant	Nicor Gas	January 30, 2021
Draft Impact Report to Nicor Gas and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	Nicor Gas / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	Nicor Gas / SAG	May 27, 2021
Final Impact Report to Nicor Gas and SAG	Evaluation Team	June 3, 2021



## **A.2 Income Qualified Programs**

Affordable Housing New Construction CY2020 to CY2021 Evaluation Plan

**Introduction**

The 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 two participation levels: major renovation and new multi-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
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 ComEd, Nicor Gas and PGL and NSG, the ComEd 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
Gross Impact Evaluation	Early feedback review	As needed	Early feedback for large projects
Gross Impact Evaluation	Engineering review	All	Two waves: Interim* and Final
Verified Net Impact Evaluation	Calculation using deemed net-to-gross (NTG) ratio	NA	

\* Navigant will coordinate with ComEd and the gas utilities 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<sup>8</sup>, 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 interim impact review on large projects as needed.

Navigant will perform impact evaluation 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:

- a) First wave drawn in May 2020 and completed in August 2020
- b) The final tracking data is provided 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.

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

Program	CY2020 Deemed NTG Value
Affordable Housing New Construction	1.0

Source: SAG Website: <https://www.ilsag.info/policy/net-to-gross-framework/>

<sup>8</sup> 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>

***(ComEd) 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.

**Table 4. Schedule – Key Deadlines**

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

Income Eligible Multi-Family Energy Efficiency Program CY2020 to CY2021 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). Nicor Gas will be adding a new contractor channel for 2020.

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.<sup>9</sup>

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 (New contractor delivery channel only)	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

**Coordination**

These are joint programs with ComEd and the gas utilities and Navigant will coordinate closely with the 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

<sup>9</sup> 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).

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 and PGL/NSG 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 (New contractor delivery channel only)	Census at mid-year		
Annual Program Implementation Check-In	Program Management and Implementers	4	May 2020	Both components
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 and ex ante savings review for the new contractor channel during 2020, after initial projects are completed. The tracking data ex ante savings will be reviewed for correctness and 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. 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.

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

Program	CY2020 Deemed NTG Value
Multi-Family Non-PHA (Non-Public Housing Authority)	1.0

Source: SAG Website: <https://www.ilsag.info/policy/net-to-gross-framework/>



### ***Lead Lifecycle Analysis (Elevate Program Only)***

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 through 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<sup>10</sup> 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.

### ***(ComEd) 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

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<sup>10</sup> Navigant will complete additional interviews for PGL and NSG, up to 10 total.

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/Gas Utilities	January 2, 2020
Annual Program Implementation Check-In	Evaluation	May 15, 2020
Early Impact Review of New Contractor Channel	Evaluation	August 15, 2020
CY2020 EOY tracking data	ComEd/Gas Utilities	January 30, 2021
Draft Report to ComEd/Gas Utilities and SAG	Evaluation	March 12, 2021
Comments on draft (15 Business Days)	ComEd/Gas Utilities and SAG	April 2, 2021
Revised Draft by Navigant	Evaluation	April 9, 2021
Comments on redraft (5 Business Days)	ComEd/Gas Utilities and SAG	April 16, 2021
Final Report to ComEd/Gas Utilities and SAG	Evaluation	April 23, 2021

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. Nicor Gas will be adding a new contractor channel for 2020.

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
Data Collection – Participant Survey (Gas 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)<sup>11</sup> 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)
- 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. We will prepare joint impact reports for ComEd and the gas utilities for each of this program's delivery channels. 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?

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

Process evaluation for CY2020 will focus on program delivery given the ramp-up period in CY2018 and CY2019 for the IHWAP component.

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<sup>11</sup> Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0,  
<http://www.ilsag.info/technical-reference-manual.html>

What are participant perspectives and customer experience with the program?

## Evaluation Approach

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

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

Activity	Target	Target Completes	Notes
Gross Impact Evaluation	Engineering Impact Review	NA	Interim impact review for the new contractor delivery channel
Calculation of CPAS and Annual Savings	Engineering Impact Review	NA	End of Year for each program component
Survey	Gas Participants	Gas Sample	Will conduct for IHWAP component for Gas Utilities

### Gross Impact Evaluation

Since the SFR Program derives savings from deemed values contained in the TRM<sup>12</sup>, 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

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.

### (ComEd) 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.

### Surveys (Gas Only)

Navigant will continue CY2019 survey efforts for the IHWAP component, aiming to survey CY2019 participants in early CY2020 as a gas only study. Surveys will focus on customer awareness, perspectives, and satisfaction. These results will be reported in CY2020.

<sup>12</sup> Illinois Statewide Technical Reference Manual for Energy Efficiency Version 8.0, <http://www.ilsag.info/technical-reference-manual.html>

### 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.

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

Program	CY2020 Deemed NTG Value
Single Family Home Retrofits	1.0

Source: SAG Website: <https://www.ilsag.info/policy/net-to-gross-framework/>

### 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
Draft Process Report to Nicor Gas, PGL, and NSG	Evaluation	May 30, 2020
Tracking System Ex Ante Review for New Contractor Channel	Evaluation	August 15, 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

Public Housing Energy Savings Program CY2020 to CY2021 Evaluation Plan

**Introduction**

The Public Housing Energy Savings 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 conduct 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
Data Collection – Program Manager and Implementer Interviews	X	X
Data Collection – EESP and Stakeholder Interviews		X
Tracking System Review	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 ComEd, 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 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

### 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 and confirm whether utility program ex ante tracking data aligns with implementer tracking data.

### 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 (therms, 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.

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

Program	CY2020 Deemed NTG Value
Public Housing Authority	1.0

Source: SAG Website: <https://www.ilsaq.info/policy/net-to-gross-framework/>

### **(ComEd) 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	ComEd/Gas Utilities	July 30, 2020
Tracking System Ex Ante Review Findings and Recommendations	Evaluation	September 10, 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 8, 2021
Comments on redraft (5 Business Days)	ComEd/Gas Utilities and SAG	April 15, 2021
Final Report to ComEd/Gas Utilities and SAG	Evaluation	April 23, 2021

### **A.3 Business Programs (includes Public Sector)**

Business Energy Efficiency Rebate Program 2019 – 2021 Evaluation Plan

**Introduction**

The Business Energy Efficiency Rebates (BEER) program’s goal is to produce natural gas energy savings in the Business Sector and Public Sector by promoting the purchase and installation of prescriptive energy efficiency measures. The energy efficiency rebate component influences the purchase and installation of high-efficiency space heating, water heating, and process heating technologies. Boiler measures are divided into hydronic, condensing, and steam boilers of varying size categories. Also included as prescriptive measures are boiler tune-ups, boiler reset controls, steam traps, thermostats, low-flow spray valves, infrared heaters, water heaters, unit heaters, pipe insulation and an assortment of food service equipment.

The BEER program offers technical assistance in the form of assessments, the direct installation of low-flow salon sprayers, faucet aerators, showerheads, and additional indoor pipe insulation for customer facilities. The assessments culminate in a customer-facing report which summarizes the findings from the assessment and makes recommendations for energy-saving projects for the customer. Prescriptive measures are marketed through a combination of market push and pull strategies as well as trade ally activities. These efforts stimulate demand, while simultaneously increasing market provider investment in stocking and promoting high efficiency products.

Navigant will produce a single report with separate reporting of impacts, research findings, and recommendations for the Business Sector and Public Sector.

We have prepared a two-year evaluation plan summary to identify tasks by year. Final scope and timing of activities for each year will be refined as program circumstances are better known.

**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Gross Impact - Interim Impact Review	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

**Evaluation Research Topics**

The evaluation team has identified the following key objectives for evaluation research for program year 2020:

**Impact Evaluation**

1. What are the Business Sector verified gross savings?

2. What are the Business Sector verified net savings?
3. What are the Public Sector verified gross savings?
4. What are the Public Sector verified net savings?
5. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?
6. What updates are recommended for the Illinois Technical Reference Manual (TRM)?

### ***Process Evaluation***

Navigant's 2020 process research activities will include review of program materials and in-depth qualitative interviews with program management and implementers. These interviews will be used to develop a complete understanding of the final design, procedures, and implementation strategies for the program, including specific marketing tactics and perceived results, to understand the current program performance and inform our evaluation efforts.

## **Evaluation Approach**

### ***Gross Impact Evaluation***

Navigant anticipates all measures offered through the BEER Program will be defined in the TRM. For measures covered by the TRM, the evaluation team will review the TRM measure characterizations and customer-specific data collected in the tracking system that substantiates the measures installed, and make adjustments as needed to calculate verified savings. The gross impact evaluation for TRM measures will include a mid-year review and end-of-year final verification. Midway through the program year, Navigant will review the program tracking data to determine the level of input completeness, flag outliers, and identify incorrect algorithms or input assumptions. If necessary, the Navigant team will make recommendations for modifications to the tracking data for use in the impact evaluation effort. After the program year ends, verified measure savings are estimated and summed across participants to calculate the total verified savings for the program. Navigant will produce separate reporting of impacts, research findings, and recommendations for the Business Sector and Public Sector.

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

Navigant is not evaluating the BEER 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 for the following reasons.

- It may 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 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 all analysis.

### Net Impact Evaluation

The net impact evaluation will apply the net-to-gross (NTG) ratio deemed through the Illinois Stakeholders Advisory Group (SAG) consensus process. The deemed NTGs are provided below.

**Table 2. Deemed NTG for 2020**

Program Path/Measure	Deemed NTG
BEER – Business Sector	0.86
BEER – Public Sector	0.86

Source:

*Nicor\_Gas\_NTG\_History\_and\_2020\_Values 2019-10-01 Final.xlsx*, available on the Illinois SAG website:  
<https://www.ilsag.info/policy/net-to-gross-framework/>

### Process Evaluation

The process analysis will include a synthesis of both qualitative data collected during the review of program materials (including prior program process evaluations), and in-depth qualitative interviews with program management and implementers.

### Data Collection, Methods, and Sample Sizes

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

**Table 3. Core Data Collection Activities**

Activity	Target	Target Completes	Comments
In Depth Interviews	Program Management	1-2	Interview program staff
Interim Impact Review	All Program TRM Measures	Census	Review program tracking data using the TRM measure characterizations
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures	Census	Gross savings verification using the TRM and customer-specific data collected in the tracking system

## Evaluation Schedule

Table 4 below provides the schedule for evaluation of the BEER Program. Adjustments will be made as needed as program year evaluation activities begin.

**Table 4. Program Year 2020 Evaluation Schedule**

Activity/Deliverables	Responsible Party	Completion/Delivery
Interim Impact Review and Findings	Evaluation Team	July 31, 2020
Final Tracking Data to Navigant	Nicor Gas	January 30, 2021
Draft Impact Report to Nicor Gas and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	Nicor Gas / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	Nicor Gas / SAG	May 27, 2021
Final Impact Report to Nicor Gas and SAG	Evaluation Team	June 3, 2021

## Business Sector and Public Sector (Custom Incentives Program) 2020-2021 Evaluation Plan

### Introduction

The purpose of the Custom Incentives (Custom) program is to assist medium to large commercial, multi-family non-prescriptive public sector and industrial customers in identifying and implementing cost-effective gas energy efficiency measures that are not otherwise addressed in Nicor Gas' BEER or Small Business Programs. Additionally, the Custom program will offer a Nicor Gas only Retro-Commissioning (RCx) offering, assisting participants with low-cost and no cost tune-ups and adjustments to the operating systems, building controls, energy management systems and HVAC systems of existing buildings. The program will also consider rebates for Combined Heat and Power (CHP) projects.

Custom projects involve unique or process-related equipment or multiple measures with interactive effects that are not well-suited for prescriptive programs. In this program, performance-based incentives are provided to customers working on larger-scale projects. Incentives are typically higher than prescriptive incentives and are based on an energy savings or engineering analysis. Technical assistance is provided to customers or their contractors to help quantify the energy savings opportunity and customize incentives for specific projects. The program also provides custom audits and engineering studies to assist customers in understanding their efficiency opportunities by quantifying the estimated project costs, energy savings, and forecasted incentives.

Navigant will produce a single report with separate reporting of impacts, research findings, and recommendations for the Business Sector and Public Sector. The Coordinated Retro-Commissioning Program evaluation is addressed in a separate plan. For 2020, we will evaluate and report impacts for the Nicor Gas only RCx program within the Custom Program. We will conduct process and NTG research on the Nicor Gas only RCx program in 2021 on 2020 participants.

We have prepared a two-year evaluation plan summary to identify tasks by year. Final scope and timing of activities for each year will be refined as program circumstances are better known.



**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Gross Impact – Custom Project Savings Verification Waves and Large Project Pre-Installation Review	X	X
Gross Impact – End-of-Year Custom Project Savings Verification	X	X
Research – Business Sector and Public Sector Participant FR+SO plus Process Survey	X	
Non-participant spillover research	X	
Present NTG Research Results		Q3
CHP Project-Specific Process and NTG Research – Case-by-Case	X	X
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

## Evaluation Research Topics

The evaluation team has identified the following key objectives for evaluation research for program year 2020:

### Impact Evaluation

1. What are the Business Sector verified gross savings?
2. What are the Business Sector verified net savings?
3. What are the Public Sector verified gross savings?
4. What are the Public Sector verified net savings?
5. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?
6. What are the effective useful lifetimes (EULs) of the non-TRM, custom measures?

During 2021, the evaluation team will conduct Net-to-Gross (NTG) research through interviews with 2020 participating Business Sector and Public Sector customers to determine free ridership and spillover, and investigate non-participant spillover, to inform future NTG recommendations.

### Process Evaluation

Navigant's 2020 process research activities will include review of program materials and in-depth qualitative interviews with program management and implementers. These interviews will be used to develop a complete understanding of the final design, procedures, and implementation strategies for the program, including specific marketing tactics and perceived results, to understand the current program performance and inform our evaluation efforts. We will note differences between Business

Sector and Public Sector issues. Process research activities will include participant surveys to assess program satisfaction, barriers to participation, and suggestions for improvement.

## Evaluation Approach

### *Gross Impact Evaluation*

The gross impact evaluation approach for Custom projects will be based on engineering analysis of a sample of projects to verify claimed savings or make retrospective adjustment to claimed gross savings. Projects will be sampled by size-based strata and analyzed together. All the sampled projects will be subject to engineering file review and a subset may receive on-site inspection and verification of installed measures. 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 that which was reported.

Navigant will employ IPMVP protocols for on-site measurement and verification of custom projects. The impacts for some projects will be verified by engineering review of site-collected data and determined with regression analysis of utility billing data and weather and/or other independent variables that affect energy use (e.g., production data, days of operation), as appropriate. This approach parallels IPMVP option C. If implemented measures are not amenable to regression analysis, the evaluated savings will be determined by engineering review with site verified data, incorporating historical data when available.

The sampling plan for these projects will target overall 10 percent precision at 90 percent confidence using the stratified ratio estimation technique to optimize sample size and control evaluation costs. Due to tight end-of-year impact reporting timelines, Navigant will attempt to complete the majority of verification work prior to the end of the program year. The sampling for impact verification will occur in two to three waves – approximately July and/or December, and after the final program year projects are closed. Each sample will be based on lower precision targets for the wave, but when combined at the end of the year, the overall sample will meet targets. The Large Project Pre-Installation Review process provides evaluator feedback on savings methodology and baseline selection on large custom projects in pre-installation stages.

### *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

**Net Impact Evaluation**

The net impact evaluation will apply the net-to-gross (NTG) ratio deemed through the Illinois Stakeholders Advisory Group (SAG) consensus process. The deemed NTGs are provided below.

**Table 2. Deemed NTG for 2020**

Program Path/Measure	Deemed NTG
Business Sector Custom	0.79
Public Sector Custom	0.79
Nicor Gas only Retro-Commissioning	0.94
CHP	Project-Specific

Source:  
Nicor\_Gas\_NTG\_History\_and\_2020\_Values 2019-10-01 Final.xlsx, available on the Illinois SAG website: <https://www.ilsag.info/policy/net-to-gross-framework/>

**Process and NTG Evaluation**

The process analysis will include a synthesis of both qualitative and quantitative data collected during the review of program materials and in-depth qualitative interviews with program management and implementers. We will note differences between Business Sector and Public Sector issues.

During 2021, the evaluation team will conduct Net-to-Gross (NTG) research through interviews with 2020 participating Business Sector and Public Sector customers to determine free ridership and spillover, and investigate non-participant spillover, to inform future NTG recommendations.

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

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

**Table 3. Core Data Collection Activities**

Activity	Target	Target Completes	Comments
In Depth Interviews	Program Management	1-2	Interview program staff
NTG and process research	2020 participants and non-participants	TBD	Initiate research in 2020 for reporting in 2021
Project Savings Verification	Completed Business Sector and Public Sector Custom and Nicor Gas only RCx Projects		Two sampling waves, separate samples for Business and Public Sectors. Business and Public Sector waves may occur on separate timelines.
Large Project Parallel Path (Pre-Installation) Review	Business and Public Sector Projects in the Pre-Installation Phase		Evaluator feedback on savings methodology and baseline on large projects in pre-installation stages
End-of Year Project Savings Verification	Completed Business and Public Sector Custom and Nicor Gas only RCx Projects		Projects not previously sampled

## Evaluation Schedule

Table 4 below provides the schedule for evaluation of the Custom Program. Adjustments will be made as needed as program year evaluation activities begin.

**Table 4. Program Year 2020 Evaluation Schedule**

Activity/Deliverables	Responsible Party	Completion/Delivery
Custom Project Savings Verification Waves	Evaluation Team	Q2 2020 to Q4 2020
Large Project Pre-Installation Review	Evaluation Team	Ten business days
Final Tracking Data to Navigant	Nicor Gas	January 30, 2021
Draft Impact Report to Nicor Gas and SAG	Evaluation Team	May 8, 2021
Draft Comments Received	Nicor Gas / SAG	May 29, 2021
Send Revised Draft	Evaluation Team	June 12, 2021
Comments on Redraft	Nicor Gas / SAG	June 19, 2021
Final Impact Report to Nicor Gas and SAG	Evaluation Team	June 26, 2021
Final Version of Survey Instruments	Evaluation Team	November 15, 2020
Conduct NTG and process surveys	Evaluation Team	Q1, 2021
NTG Research Findings Memo	Evaluation Team	July 1, 2021
Process Research Findings	Evaluation Team	September 15, 2021

## Small Business Program 2020-2021 Evaluation Plan

### Introduction

The Small Business Program's (SB) objective is to obtain long-term natural gas energy savings from small business gas customers with energy efficiency retrofit and financial incentives to influence the installation of high efficiency natural gas equipment. This program will provide small commercial gas customers with turn-key installation services and incentives to replace older, inefficient equipment and increase the overall efficiency of buildings.

The program offers a free energy assessment to introduce customers to energy efficiency and creates an Energy Assessment Report to help customers identify and prioritize energy efficient improvements for their business. During the assessment, Energy Advisors offer customers free energy efficient products and services including low-flow bathroom and kitchen aerators, low-flow pre-rinse spray valves, salon sprayers, low-flow showerheads, and pipe insulation. Customers are given recommendations to improve the efficiency of their business. Recommendations align with the rebates available for small business customers for energy efficiency improvements and additions (i.e. pipe insulation, ozone laundry, and boiler reset controls), space and water heating, commercial food service equipment, steam traps, and boiler tune-ups. Small business customers may also qualify for higher custom incentives for energy-saving projects. Small business customers may directly apply for a rebate for energy efficiency projects in their facility.

We have prepared a two-year evaluation plan summary to identify tasks by year. Final scope and timing of activities for each year will be refined as program circumstances are better known.

**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Gross Impact - Interim Impact Review	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X
Gross Impact – Custom Project Savings Verification Waves	X	X
Gross Impact – End-of-Year Custom Project Savings Verification	X	X
Present NTG and Process Results from Survey Research Conducted with 2019 Participants and Trade Allies	Q3	
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

## Evaluation Research Topics

The evaluation team has identified the following key objectives for evaluation research for program year 2020:

### *Impact Evaluation*

1. What are the program's verified gross savings?
2. What are the program's verified net savings?
3. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?
4. What updates are recommended for the Illinois Technical Reference Manual (TRM)?
5. What are the researched values for free ridership and spillover?

### *Process Evaluation*

Navigant's 2020 process research activities will include review of program materials and in-depth qualitative interviews with program management and implementers. These interviews will be used to develop a complete understanding of the final design, procedures, and implementation strategies for the program, including specific marketing tactics and perceived results, to understand the current program performance and inform our evaluation efforts.

Process research activities in 2020 will include reporting the results of 2019 participant and trade ally survey research conducted to assess program satisfaction, barriers to participation, and suggestions for improvement.

## Evaluation Approach

### *Gross Impact Evaluation*

For measures covered by the TRM, the evaluation team will review the TRM measure characterizations and customer-specific data collected in the tracking system that substantiates the measures installed and make adjustments as needed to calculate verified savings. The gross impact evaluation for TRM measures will include a mid-year review and end-of-year final verification. Midway through the program year, Navigant will review the program tracking data to determine the level of input completeness, flag outliers, and identify incorrect algorithms or input assumptions. If necessary, the Navigant team will make recommendations for modifications to the tracking data for use in the impact evaluation effort. After the program year ends, verified measure savings are estimated and summed across participants to calculate the total verified savings for the program.

The gross impact evaluation approach for custom projects will be based on engineering analysis of all or a sample of projects to verify claimed savings or make retrospective adjustment to claimed gross savings. Custom projects will be sampled by size-based strata and analyzed together. All the sampled projects will be subject to engineering file review and a subset may receive on-site

inspection and verification of installed measures. 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 that which was reported.

Navigant will employ IPMVP protocols for on-site measurement and verification of small business custom projects. The impacts for some projects will be verified by engineering review of site-collected data and determined with regression analysis of utility billing data and weather and/or other independent variables that affect energy use (for example, days of operation), as appropriate. This approach parallels IPMVP option C. If implemented measures are not amenable to regression analysis, the evaluated savings will be determined by engineering review with site verified data, incorporating historical data when available.

The sampling plan for custom projects will target overall 10 percent precision at 90 percent confidence using the stratified ratio estimation technique to optimize sample size and control evaluation costs. Due to tight end-of-year impact reporting timelines, Navigant will sample for impacts in one or two waves – approximately July and/or December, and after the final program year projects are closed. Each sample will be based on lower precision targets for the wave, but when combined at the end of the year, the overall sample will meet targets.

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

Navigant is not evaluating the Small Business 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 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 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 all analysis.

### Net Impact Evaluation

The 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 below.

**Table 2. Deemed NTG for 2020**

Program Path/Measure	Deemed NTG
Direct Install (DI)	0.92
Prescriptive Rebates	0.83
Custom Rebates	0.93
Roll-up to program-level (DI, Prescriptive, Custom)	No recommendation

Source:

*Nicor\_Gas\_NTG\_History\_and\_2020\_Values 2019-10-01 Final.xlsx*, available on the Illinois SAG website:

<https://www.ilsag.info/policy/net-to-gross-framework/>

### NTG Research

Navigant will conduct NTG research in Q1 2020 through surveys with 2019 Small Business participating customers and trade allies. We will complete surveys with contacts who participated in the 2019 program to quantify free ridership and participant spillover, and we will include questions on trade ally perspective of free ridership and non-participant spillover in trade ally interviews. The sample design will attempt to achieve a 90/10 confidence/precision level in each stratum.

### Process Research

The process analysis will include a synthesis of both qualitative and quantitative data collected during the review of program materials (including prior program process evaluations), and in-depth qualitative interviews with program management and implementers (conducted both in 2018 and 2019). Process research activities in 2020 will include reporting the results of 2019 participant and trade ally survey research conducted to assess program satisfaction, barriers to participation, and suggestions for improvement.

### Data Collection, Methods, and Sample Sizes

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

**Table 3. Core Data Collection Activities**

Activity	Target	Target Completes	Comments
In Depth Interviews	Program Management	1-2	Interview program staff
Interim Impact Review	All Program TRM Measures		Review program tracking data using the TRM measure characterizations
Process and NTG Survey	2019 Participants and Trade Allies	TBD	Survey Q1 2020
Custom Project Savings Verification	Completed Custom Projects		One or two sampling waves
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures		Gross savings verification using the TRM and customer-specific data collected in the tracking system
End-of Year Custom Project Savings Verification	Completed Custom Projects		Custom projects not previously sampled

## Evaluation Schedule

Table 4 below provides the schedule for evaluation of the Small Business Program. Adjustments will be made as needed as program year evaluation activities begin.

**Table 4. Program Year 2020 Evaluation Schedule**

Activity/Deliverables	Responsible Party	Completion/Delivery
NTG Research Findings Memo (delivered by July 1 to inform the next plan cycle)	Evaluation Team	July 1, 2020
Interim Impact Review and Findings	Evaluation Team	July 31, 2020
Process Research Findings Slidedoc	Evaluation Team	September 30, 2020
Custom Project Savings Verification Waves	Evaluation Team	Q2 2020 to Q1 2021
Final Tracking Data to Navigant	Nicor Gas	January 30, 2021
Draft Impact Report to Nicor Gas and SAG	Evaluation Team	May 8, 2021
Draft Comments Received	Nicor Gas / SAG	May 29, 2021
Send Revised Draft	Evaluation Team	June 12, 2021
Comments on Redraft	Nicor Gas / SAG	June 19, 2021
Final Impact Report to Nicor Gas and SAG	Evaluation Team	June 26, 2021

## Coordinated Non-Residential New Construction Program 2020 to 2021 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 with CY2019 participants and is planned for CY2021 participants, the evaluation team will not be conducting NTG research with CY2020 participants.

**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 30 <sup>th</sup> 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 <sup>†</sup>	Two Waves <sup>†</sup>
Verified Net Impact Evaluation	Calculation using deemed NTG ratio	n/a	

<sup>†</sup> 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.<sup>13</sup> 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.<sup>14</sup>

**Table 3. Estimated Number of Projects in Sample**

Fuel-Type	Estimate of Projects in Sample (Approximate)
Electric	18
Gas	12
<b>Total</b>	<b>30</b>

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:

### **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.

<sup>13</sup> 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.

<sup>14</sup> 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.



***(ComEd) 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

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

### Introduction

The Coordinated Utility Retro-Commissioning (RCx) Program<sup>15</sup> 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 ft<sup>2</sup> 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, the evaluation team will not conduct process evaluation and impact sample sizes will be reduced in 2020.

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<sup>15</sup> Nicor Gas launched a stand-alone, Nicor Gas only RCx program in 2019. In 2019 and 2020, projects will be evaluated as part of the Custom Program, and evaluation plans are described there.

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

Tasks	CY2020	CY2021
Tracking System Review	X	X
Data Collection – Program Manager and Implementer 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	

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).
- 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 to quantify net savings impacts in therms, kWh, and kW from the program during CY2020 and identify any systemic problems with calculators.

### **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?

### Process Evaluation and Other Research Topics

The evaluation team will not conduct process research for the program in CY2020. NTG research will take place in 2020 with CY2019 participants and service providers.

## 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)	TBD	Census sample frame
Participant NTG Interviews	2019 Program Participants	TBD	Census sample frame
Gross Impact Evaluation	Engineering File Review	50	Quarterly
Gross Impact Evaluation	On-site M&V	TBD <sup>‡</sup>	
Verified Net Impact Evaluation	Calculation using deemed NTG ratio	Census	

<sup>‡</sup> 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 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 and the Gas Utilities’ research goals.

### **Sampling Strategy**

Our overarching goal is to research savings impacts sufficiently to report program-level savings at  $\pm 10\%$  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,<sup>16</sup> 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

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<sup>16</sup> 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.

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:

- a) 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.<sup>17</sup>
- b) 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.
- c) 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.

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<sup>17</sup> 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.

**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:

Navigant will apply overall values to all RCx Program offerings.

**Research NTG Impact Evaluation**

The evaluation team will conduct participating customer NTG research to provide NTG values for potential deeming in future program years through surveys with CY2019 participating customers for each program offering. All NTG research will address free-ridership and participant spillover using survey protocols developed by the Illinois NTG Working Group and incorporated into the TRM.

The evaluation team will conduct interviews with EESPs to inform NTG recommendations for each program offering, triangulating their results to inform the final recommended NTG value. Interviews will address free-ridership and spillover using protocols developed by the Illinois NTG Working Group and incorporated into the TRM.

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.

**(ComEd) 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**

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 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**

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 provided as results become available
CY2020 Program tracking data for final end of year sampling	ComEd/Gas Utilities	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/Gas Utilities and SAG	April 9, 2021
Revised Draft by Navigant	Evaluation	April 16, 2021
Comments on redraft (5 Business Days)	ComEd/Gas Utilities and SAG	April 23, 2020
Final Report to ComEd, Gas Utilities, and SAG	Evaluation	April 28, 2020
NTG Research Memo – draft	Evaluation	August 1, 2020
NTG Research Memo – final	Evaluation	September 30, 2020



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 and the gas utilities.
- 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 there is interest in specific site surveys that work can be completed after discussion with ComEd and the gas utility.
- (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/Prescriptive 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 by ComEd and Nicor Gas, Peoples Gas Company and North Shore Gas Company. The ComEd evaluation team will coordinate with the gas utility teams 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.

### **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	~3	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<sup>18</sup>

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 and the gas utility. 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.

Sampling will be considered as number of participants grow. 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.

### **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.

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<sup>18</sup> These measures are rebated separately from SEM program and savings for these measures are not counted in the SEM savings

**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](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 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.

### **(ComEd) 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.

## Evaluation Schedule

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 30<sup>th</sup> 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

#### **A.4 Market Transformation Initiatives and Emerging Technologies Program (ETP)**

Market Transformation Initiatives and Emerging Technology Program 2020 – 2021 Evaluation Plan

**Introduction**

Energy legislation Section 8-104 affords program administrators up to 3 percent of the portfolio budget to be dedicated to breakthrough equipment and devices and up to 5 percent of the portfolio budget to be dedicated towards market transformation initiatives. The Nicor Gas Energy Efficiency Program will employ Emerging Technologies and Market Transformation tools and techniques to integrate innovation in energy efficiency programs. Nicor Gas expects these tools and techniques will play a critical role in identification and demonstration of innovative energy efficiency technologies and identification and alleviation of market barriers towards adoption and implementation of energy efficiency strategies and offerings.

Nicor Gas will operate several market transformation and research efforts during EEP 2020-2021, as well as the Emerging Technology Program. If Nicor Gas claims savings during this period, Navigant will develop a plan and approach to verify the savings. Navigant will work with Nicor Gas to identify opportunities to provide supplemental research activities for these efforts, being mindful of overall budget availability. Currently, savings methodology research is planned for Food Service and Building Operator Certification.

**Table 1. Evaluation Plan Summary**

Activity	2020	2021
Market Transformation and Emerging Technology Program Supplemental Research	X	X
Building Operator Certification Savings Methodologies Research	X	



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<sup>19</sup>.

The table below shows the activities related to this evaluation plan.

**Table 1. Evaluation Approaches**

Tasks	CY2020
Energy Savings Analysis (TRM-based savings verification)	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

<sup>19</sup> Excerpted from “CNP Upstream Commercial Food Service Pilot Program: Implementation Plan” December 2018. Prepared by Frontier Energy for Gas Technology Institute.

Utilities, 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

## 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<sup>20</sup> 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 and the gas utilities 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.

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<sup>20</sup> CNP Upstream Commercial Food Service Pilot Program: Phase I.pdf, October 2018.

### **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**

<b>Activity</b>	<b>Responsible Party</b>	<b>Date Delivered</b>
In depth interviews with PM, implementers and distributors	Navigant	Q3 and Q4 of 2020
NTG secondary research	Navigant	With final impact report
Receive tracking data	ComEd/Gas Utilities	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/Gas Utilities	March 26, 2021
Revised draft	Navigant	April 9, 2021
Comments on revised-draft	ComEd/Gas Utilities	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