

Peoples Gas and North Shore Gas – Evaluation Plans for 2020-2021

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

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Peoples Gas and North Shore Gas

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1. INTRODUCTION

This document presents evaluation, measurement and verification (EM&V) plans for evaluating Peoples Gas (PGL) and North Shore Gas (NSG) energy efficiency programs for 2020 through 2021, which are the last two 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. PGL and NSG are now accountable for the entire budget and savings goals. Elements of the DCEO portfolio transferred to PGL and NSG include:
 - i. Income Eligible 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 a portion of the portfolio budget in the approved PGL and NSG plans.
- b. The PGL and NSG Energy Efficiency Plans (EEP) are now based on a calendar year.¹
- 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 2019-2021 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.

¹ 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 PGL and NSG 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 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 program 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).
- 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.
- 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 participant data, perform analysis, and create recommendations to help improve the functioning and effectiveness of the PGL and NSG programs.
- Within budget constraints, collaborate with PGL, NSG, and other Illinois utilities to identify, prioritize, and conduct research studies on energy efficiency (EE) technologies, industry best practices, non-participant characteristics, market characterizations, or other topics of interest.

Support PGL and NSG Strategic Goals

- Continue evaluating more of the portfolio in real time, including:
 - Conducting program tracking database reviews during the second quarter (results by July 1 if data is available by April 30) in each program year to ensure the latest TRM algorithms are properly applied,
 - Conducting the first wave of custom project verification prior to July 1 and additional waves later in the program year if participation is sufficient for sampling, and
 - Conducting surveys closer to participation, drawing samples across program years when appropriate.

- Improve qualitative approaches with new data collection approaches (email or web based), supplemented with Franklin Energy's Efficiency Manager™ data tracking and reporting system and/or survey data when appropriate.
- 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.
- The former DCEO programs and customer segments are new to the PGL and NSG implementation portfolios, and we will receive greater evaluation focus during this four-year cycle. It is critical to understand the impact and process aspects of these programs so PGL and NSG can optimize program design, participation levels, net impacts and lifecycle benefits. Research will differentiate between DCEO and PGL/NSG when interviewing participants.

Reporting

- Provide annual impact evaluation reports for all PGL and NSG programs. Include a table of historical realization rates and NTGs from prior program years.
- 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 PGL and NSG 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. For PGL and NSG only programs with only TRM-based measures, we expect draft delivery by April 15, with final reports by June 3. For programs with custom measures, we expect draft delivery by May 8, with final reports by June 26.
- 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 PGL and NSG programs each program year, including a portfolio-level timeline for NTG research and reporting activities.
- The target delivery date for initial draft plans is December 15, with final plans by February 28.
- Seek input from the SAG 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, Nicor 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 updated the high-level portfolio plan and detailed program-level annual evaluation plans to help prioritize research plans and budgets.

EEP 2018 – 2021 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 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. We revisit evaluation plans annually and revise approaches as needed to maintain relevance for programs as they evolve.

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

Cross-cutting notes for the tables:

- **Other Research / Notes: Year** indicates the time frame that the research will be conducted. **Notes** are added for some programs to clarify NTG research targets.
- **Process Researched Year(s)** and **NTG Researched Year(s)** indicate the program year(s) of participation of the research subjects. 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.
- **NTG Results Delivered** indicates the year when draft and final NTG results are completed and recommended to SAG
- **Gross impact savings verification** occurs for each program in all program years.

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 / Notes	
				Year	Activity
Home Energy Rebate					
Equipment Rebates	2019-20 (Participants and TAs)	2019-20 (Participants and TAs)	2020		
Weatherization Rebates	2020-21 (Participants and TAs)	2020-21 (Participants and TAs)	2021		
Advanced Tstat	None Planned	None ²	NA		
Home Energy Jumpstart					
DI	2020	2020	2021		
Advanced Tstat	None Planned	None	NA		
Education and Outreach Track					
Home Energy Reports	None Planned	N/A	NA	Each Year	Net impacts through RCT
EEE	2020	None	NA		
Multi-Family					
Audit / DI	2018	2018	2019		
Retrofit Projects	2018	2018	2019		

² The savings for natural gas heating provided in Illinois TRM Version 8.0, Section 5.3.16 is a net savings value.

Table 2. Income Eligible Programs High-Level Plan by Year

Offering	Year	Research Activity
Single-Family Retrofits		
Chicago Bungalow Association	2018-19	Participating Customer Survey, Energy Efficiency Service Provider Interviews (Completed, 2019 CBA+IHWAP Slidedoc)
	2018-19	Community Action Agency Focus Groups and Interviews (Completed, 2019 CBA+IHWAP Slidedoc)
IHWAP	2020	Participating Customers Process Survey (Gas only survey – ComEd is choosing not to participate. Nicor Gas will join study with PGL and NSG to achieve adequate sample size. Expand sample to include MF IHWAP participants).
Income Eligible Multi-Family and Public Housing Energy Savings Programs		
Weatherization Kits Distribution	2019-20	Recipient Survey (PGL only)
IEMS	2020	Property Owner/Manager Survey (Joint)
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)
Affordable Housing New Construction		
New Construction	2018-19	Developer Survey, Implementer Interviews (Completed, 2019 Slidedoc)
	2021	Housing Developer Interviews (Joint)

Table 3. Business and Public Sector 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 / Notes	
				Year	Activity
Business Program (BP) and Public Sector Direct Install and Prescriptive Rebates					
BP Equipment Rebates	2019	2019	2020	a) 2018-20 b) 2019-20 c) 2019-20 d) 2018-20	a) Pipe Insul. Secondary Research b) EMS Billing Analysis c) Boiler Tune-up Average Savings d) Steam Trap Algorithm Review
Public Sector Rebates	2019	2019	2020		NTG research will not include DCEO legacy projects
Assessment/DI	2019	2019	2020		
Food Service Upstream Reb.				2020-21	Secondary NTG research Support Baseline Development
Business Program and Public Sector Custom Rebates					
Custom and Public Sector	2018	2018	2019		NTG research did not include DCEO legacy projects
Public Sector Only	2020	2020	2021		NTG research will not include DCEO legacy projects
CHP	Combine with NTG	Project Specific	Project Specific	2020-21	Assessment of Natural Gas Savings in CHP Projects
Gas Optimization					
Gas Opt	2018 (SSPs) 2021 (Customers)	2018 (SSPs) 2021 (Customers)	2019 (SSP) 2022 (Cust.)		
Retro-Commissioning (RCx)					
RCx	2019	2019	2020		
Strategic Energy Management (SEM)					
SEM Cohorts	2019-21			2019-21	Gross impacts estimated through analysis of billed energy usage
Small and Midsize Business					
Audit/DI	2020	2020	2021		
Retrofit Projects	2020	2020	2021	2018-19	Thermostats – secondary research on savings
Joint Non-Residential Construction (NRNC)					
NRNC	Combine with NTG	2018, 2019, 2021	2019, 2020, 2022		

Table 4. Schedule of 2018-2021 NTG Research by Year

NTG Research			2018												2019												2020												2021												2022																									
			J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D														
Residential	Program	Sample	EEP 2018-2021																																																EEP 2022-2025																									
	HEJ	GPY6	Survey	Report		SAG	Apply results from GPY6 participants																																																																					
	HEJ	2020																																					Survey	Report		SAG	Apply results from 2020 Partic.																																	
	HE Rebate	GPY6	Apply results from GPY6 participants																																																																									
	HE Rebate HVAC Eq.	2019																									Survey	Report		SAG	Apply results from 2019 HVAC Eq.Participants																																													
	HE Rebate WRx	2020																																					Survey	Report		SAG	Apply results from 2020 Partic.																																	
	MF	GPY5	Apply results from GPY5 Participants																																																																									
	MF	2018													Survey	Report		SAG	Apply results from 2018 participants																																																									
RNC	2019/20																																					Survey	Report		SAG	Apply results 2019-20 Partic.																																		
			2018												2019												2020												2021												2022																									
Business	Program	Sample	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D														
	C&I+PS Custom	GPY4	Apply results from GPY4 participants																																																																									
	C&I+PS Custom	2018													Survey	Rpt		SAG	Apply results from 2018 participants																																																									
	PS Custom	2020																																					Survey	Report		SAG	Apply results from 2020 Partic.																																	
	C&I+PS Prescrip	GPY4	Apply results from GPY4 participants																																																																									
	C&I+PS Prescrip	2019																									Survey	Report		SAG	Apply results from 2019 Participants																																													
	Gas Opt	Deemed	NTG was deemed from RCx																																																																									
	Gas Opt (End Users)	GPY6	Survey	Report		SAG	Apply results from GPY6 EU																																																																					
	Gas Opt (SSPs)	2018													Survey	Rpt		SAG	Apply GPY6 EU & 2018 SSPs																																																									
	Gas Opt (End Users)	2021																																																	Survey	Report		SAG																						
	RCx	2019																									Survey	Report		SAG	Apply results from 2019 Participants																																													
	Small Business	GPY5	Apply results from GPY5 Participants																																																																									
	Small Business	2020																																					Survey	Report		SAG	Apply results from 2020 Partic.																																	
	Joint BNC	Multiple	Avg researched NTGs GPY3-5												Average research GPY3-6												Avg GPY4, GPY5, GPY6, 2018												Avg GPY5, GPY6, 2018, 2019												Avg GPY6, 2018, 2019, 2020																									
	Joint BNC (FR)	2018	Survey Free Ridership												Report		SAG																																																											
Joint BNC (FR)	2019																									Survey Free Ridership												Report		SAG																																				
Joint BNC (SO)	2020																																					Survey Spillover												Report		SAG																								
Joint BNC (FR)	2021																																																	Survey Free Ridership												Report		SAG												

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 PGL and NSG 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 Efficiency Manager 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. Report NTG research results 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 or Coordinated Programs.** Evaluations of joint or coordinated programs will be designed to meet the needs of PGL, NSG, 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.
- **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 (results by July 1 if data is available by April 30). We will prioritize the interim review effort on programs with a larger contribution of savings to the portfolio. Navigant will conduct a high-level engineering review of the 2020 Master Measure Database during Q1 of 2020, checking for correct adoption of 2019 interim review findings, updated TRM algorithms, and NTG values. For programs with non-TRM custom measures, Navigant will draw savings verification samples one to three times during the program-year, depending on the number of completed projects, with the first sample drawn prior to July 1. 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. Final impact evaluation will take place after the program-year ends, when we receive final tracking data, expected by January 30. We will make best efforts to deliver draft reports by March 15, allowing for review time prior to wrapping up final versions by April 30. (If events and needs change and that date needs to shift, we can work through the implications of the date change collectively, including interested SAG parties.)

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 PGL and NSG 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 Eligible 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 PGL and NSG 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
Option A: Engineering calculations using spot or short-term measurements, and/or historical data.	Constant performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • Spot measurements • Run-time measurements
Option B: Engineering calculations using metered data.	Constant or variable performance	<ul style="list-style-type: none"> • Verified installation • Nameplate or stipulated performance parameters • End-use metered data
Option C: 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"> • Verified installation • Utility metered or end-use metered data • Engineering estimate of savings input to SAE model
Option D: 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"> • Verified installation • Spot measurements, run-time monitoring, and/or end-use metering to prepare inputs to models • Utility billing records, end-use metering, or other indices to calibrate models

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 electric and gas 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 PGL and NSG 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 PGL, NSG, 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 1st of each year and are effective January 1st 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 PGL and NSG 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 Framework³.

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 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

³ http://www.ilsag.info/il_trm_version_6.html

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 a 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 PGL and NSG 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 programs with TRM-based measures, Navigant will conduct an interim review of per-unit savings from tracking data during the second quarter (results by July 1 if data is available by April 30). 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, with the first sample drawn prior to July 1. We expect billing usage analyses will occur after the end of the program year. 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. For PGL and NSG only programs with only TRM-based measures, we will target draft delivery by April 15, with final reports by June 3. For PGL and NSG only programs with custom measures, we will target draft delivery by May 8, with final reports by June 26.

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 somewhat 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 PGL and NSG and their customers, plus leveraging surveys conducted as part of the NTG research.

We will coordinate process activities across programs and across utilities for joint programs as appropriate to address the whole of the PGL and NSG 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.

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 PGL and NSG 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. Our process evaluation approach will be guided by these considerations:

- 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.
- We will consider including a best practices research component when planning program process evaluations. Due to evaluation budget constraints, we will need to prioritize which programs receive best practices research and the focus scope of the research (such as narrowing to specific aspects of program delivery).
- Process evaluations will include a profile of participants. Evaluations will report basic participant characteristics and include additional detail for priority programs if evaluation budgets allow.
- We will look for opportunities to conduct non-participant research. Due to evaluation budget constraints and the expense of conducting non-participant research, we will consider targeted, joint studies with ComEd. Priority areas are:
 - Non-participant surveys for Single Family and Multi-Family programs

- Non-participating trade ally research for Home Energy Rebate-HVAC and Small Business
- We will solicit and include specific process research survey questions identified by program managers.
- Our research will differentiate between DCEO and PGL/NSG when interviewing participants.

Staff/Contractor Research

Navigant will conduct in-depth interviews with PGL and NSG program management and implementation 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 including a battery of questions in telephone surveys, online survey tools, or other interview instruments, and by reviewing program tracking data. 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. 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 the PGL and NSG energy efficiency programs. Navigant will conduct research with the trade allies to understand their concerns and to help PGL and NSG 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 the PGL and NSG 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 PGL and NSG 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 across North America will inform any primary research conducted to help ensure findings are meaningful and actionable. Navigant will work with PGL and NSG 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 and Non-Participants

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 Efficiency Manager

Navigant will structure its research to leverage the Franklin Energy Efficiency Manager data tracking and reporting system. For example, Navigant will work with Franklin Energy to identify Efficiency Manager 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 needed 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 PGL and NSG incorporate best practices from programs administered in other jurisdictions. Navigant will work with PGL and NSG 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 PGL and NSG plans; discussions with PGL, NSG, AEG, and Franklin Energy; 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. **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, participant feedback on their methods for condensate handling and steam usage monitoring, was included in the steam trap process/market study conducted for Nicor Gas, and findings will be circulated to the TRM TAC. 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.

Currently Active

1. **Steam Trap TRM Algorithm Update** – 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.
2. **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.

3. **Kits In-Service Rate and Satisfaction Survey** – In 2019, PGL will distribute water saving and home weatherization measures as a kit to income eligible customers. The Illinois TRM version 8.0 uses weatherization in-service rates drawn from secondary research. The in-service rates and satisfaction for these measures will be investigated through a survey of kit recipients.
4. **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.

Franklin Energy 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 Franklin Energy 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.

5. **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. The secondary research covers studies on standard programmable and advanced programmable thermostats.
6. **Non-Residential Space Heating Boiler Tune-ups and Process Boiler Tune-ups.** The IL TRM does not give a standard efficiency improvement; instead the savings equation includes values for Eff before and Ei, the efficiency before the tune-up and the efficiency improvement provided by the tune-up. Franklin Energy collects site-specific boiler tune-up documentation, but ex ante savings assume a 82.21% to 84.13% efficiency improvement for both measures for prescriptive savings. Franklin Energy reports that the average standard improvement for tune-ups is often higher, and request an average default efficiency improvement be added to the IL TRM for these measures. In this proposed research, Navigant will analyze collected and aggregated program data to establish more representative portfolio average pre and post boiler tune-up efficiency values for each of these measures. This analysis, and its subsequent results, will be proposed as an Illinois TRM update.
7. **Assessment of Natural Gas Impacts in Combined Heat and Power (CHP) Projects.** PGL and NSG are encountering customers with CHP systems that have an opportunity to reduce natural gas usage through various operational and efficiency measures. Such projects are

not directly addressed in the TRM CHP measure and can be technically complex. The evaluation custom project impact team will assist in quantifying impacts of CHP modifications.

Planned for 2020 or 2021

1. **Non-Energy Impacts (NEIs) Coordination** – NEIs are program impacts that are separate from energy savings. Navigant will inform PGL and NSG 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.
2. **Non-Energy Impacts (NEIs) Jobs Impact** – 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. After incorporating feedback from the electric draft results, Navigant will produce a scope of work to extend the IMPLAN model to PGL and NSG 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.
2. **Small Business Process Research** – In consultation with program management, Navigant will consider additional process research to support the program manager and implementer. Possible topics include development of best practices in preparation for a pilot of small business behavioral programs, specifically to drive energy efficiency efforts by restaurant staff, and broadly transform staff behavior across those industry sectors that are most impactful.
3. **Small Business Thermostats Impact Billing Analysis** – PGL and NSG report that programmable thermostats are a common baseline scenario for small businesses in their service territories. Program volume to date has been very small – not a large enough population to conduct a billing analysis. Navigant is pursuing research on energy management systems (EMS), a similar measure but with a larger saving opportunity.
4. **Home Energy Reports Persistence Study** – PGL and NSG restructured their HER programs to bring the size of the programs in line with their overall savings goals. This resulted in thousands of participants no longer receiving HERs after June 1, 2016 and presents an opportunity to study HER savings persistence for PGL and NSG customers. Regarding measure 6.1.1 in the IL-TRM,⁴ Navigant could determine whether these dropped participants and existing HER program controls are randomly distributed by comparing usage

⁴ Measure 6.1.1 is “Adjustments to Behavior Savings to Account for Persistence” in Illinois Statewide Technical Reference Manual, Version 7.0, Volume 4.

- of the two groups in the year prior to when the participants received HERs. Assuming the participants and controls are randomly distributed, Navigant could conduct a study to calculate annual decay rates for the first year after reports were discontinued, which covers the period June 1, 2016 through May 31, 2017. The decay rate will be equal to one minus the ratio of the percentage savings in the first year after the reports were discontinued to percentage savings in the last year before the reports were discontinued.
5. **Income Eligible Single-Family Retrofits** – If program volume is sufficient, Navigant will consider a calibrated simulation study to determine the accuracy of TRM savings estimates and capture interactive savings effects.
 6. **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 and more robust tracking data. Navigant would produce a TRM work paper if the assumptions or methodology needs to be updated based on study findings.

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

Activity	Status	2018	2019	2020	2021
Residential and Income Eligible Research					
Kits In-Service Rate and Satisfaction Survey	Active		4Q	1Q-2Q	
Business and Public Sector Research					
Steam Traps – Background Research on Viability of Impact Study	Completed	2Q-4Q	1Q		
Steam Traps – Support TRM Algorithm Update for Condensate Recovery	Active		4Q	1Q-2Q	
Commercial EMS Billing Analysis	Active		4Q	1Q-2Q	
Non-Residential Pipe Insulation – Thermal Regain Factors	Active	4Q	1Q-4Q	1Q-2Q	
Small Business Thermostats – Secondary Research Savings Benchmarking	Active	4Q	1Q-4Q	1Q	
Space Heating and Process Boiler Tune-ups – Average Efficiency Increase	Active		4Q	1Q-2Q	
Assessment of Natural Gas Savings in CHP Projects	Active			X	X
Other Research					
Non-Energy Impacts (NEIs) Jobs Impact	Planned		4Q	1Q-2Q	
Non-Energy Impacts (NEIs) Coordination in Primary and Secondary Research	Planned	Consider on a case-by-case basis as opportunities for coordination with ComEd arise			

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 PGL and NSG to define the key dates and deliverables to ensure that our results meet each 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 PGL and NSG 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). Both the annual ex post TRC analysis and the four-year TRC cost-effectiveness analysis shall include both the gas and electric costs and benefits for the joint energy efficiency programs that NSG and PGL offer in conjunction with another Program Administrator such as ComEd.

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

APPENDIX A. DETAILED PROGRAM EVALUATION PLANS

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

- **Residential Programs**
 - Home Energy Rebates
 - Home Energy Jumpstart (HEJ)
 - Multi-Family Program
 - Home Energy Reports
 - Elementary Energy Education (EEE)
- **Income Eligible Programs**
 - Affordable Housing New Construction
 - Income Eligible Multi-Family
 - Income Eligible Single-Family Retrofits
 - Public Housing Energy Savings Programs
- **Business Programs (includes Public Sector)**
 - Direct Installation and Prescriptive Rebates
 - Custom Rebates (Custom)
 - Gas Optimization
 - Small and Midsize Business
 - Coordinated Business New Construction
 - Coordinated Retro-Commissioning (RCx)
 - Strategic Energy Management (SEM)
- **Market Transformation Initiatives**
 - Breakthrough Equipment and Market Transformation Initiatives
 - Upstream Commercial Food Service Equipment Pilot

A.1 Residential Programs

Home Energy Rebate Program 2020 – 2021 Evaluation Plan

Introduction

Under the Home Energy Rebate Program, cash rebates and education are offered to encourage the upgrading of water- and space-heating equipment and weatherization among residential customers of Peoples Gas and North Shore Gas. The Home Energy Rebate Program was designed to conserve natural gas and lower its participants' monthly energy bills. Both rental and owner-occupied dwellings are eligible for rebates. Customers must be active residential customers of Peoples Gas or North Shore Gas to receive rebates for gas saving measures. The premises must be used for residential purposes in existing buildings. Starting in 2020, ComEd will no longer jointly offer rebates for weatherization measures. The program is reviewing rebate levels and measure eligibility criteria, and may implement updates for 2020.

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 Savings Verification	X	X
Research – 2019 HVAC Equipment Participant FR plus Process Survey	1Q-2Q	
Research – 2019 HVAC Equipment Participant SO plus Process Survey	1Q- 2Q	
Research – Participating Trade Ally FR and SO plus Process Survey	1Q-2Q	
Process and NTG Research Results	July 1 (NTG) Sept 15 (Process)	
Research – Weatherization FR/SO plus Process Survey		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 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 program delivery from the participant perspective. The process research will address the following questions through survey research of 2019 HVAC equipment participants and trade allies:

1. What are participants' perspectives and overall satisfaction with the program?
2. How can the program be improved?
3. How did customers become aware of the program? What marketing strategies could boost program awareness?
4. Are there any program pain points and, if yes, what are ways to improve these points?

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.

Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the Home Energy Rebate 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.

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 in Table 2.

Table 2. PGL/NSG Deemed NTG for 2020

Program Path/Measure	Deemed NTG
Home Energy Rebate (HVAC and other equipment, excluding Smart Thermostats, Duct Sealing, Air Sealing, and Insulation Measures)	0.63
Advanced Thermostats	NA*
Home Energy Rebate - All scenarios of Air Sealing plus added Attic Insulation Installed in the Same Project (whether or not additional measures are installed in the same project)	NA†
Home Energy Rebate - Air Sealing (conducted without adding Attic Insulation)	0.77
Home Energy Rebate - Insulation measures, excluding ceiling/attic insulation, including Wall, Floor Above Crawlpace, Basement Sidewall; Rim/Band Joist	0.79
Duct Sealing	0.87

Source: PGL-NSG_NTG_History_and_2020_Values 2019-10-01 Final.xlsx, available on the Illinois SAG web site: <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.

† Applies only in scenarios where air sealing and attic insulation are installed at the same time, and only if the savings for natural gas heating are estimated using the Illinois TRM Version 8.0, Section 5.6.1 (Air Sealing) and Section 5.6.5 (Ceiling/Attic Insulation) adjustment factor of 72% that was derived from air sealing and insulation research by Navigant (2018). See Navigant (2018) ComEd and Nicor Gas Air Sealing and Insulation Research Report. The 72% adjustment factor was derived from a gas consumption data regression analysis with an experimental design that does not require further net savings adjustment.

Process and NTG Research

Using program tracking data with HVAC equipment participants' contact information, we will conduct research on free ridership in the first and second quarters of 2020 through an online or telephone participant survey. In Spring 2020, Navigant will conduct participant spillover research through a participant telephone survey as well as research on HVAC equipment trade ally perspective of participant free ridership and spillover 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.

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
End-of-Year Savings Verification	All Participating Customers		Gross savings verification using the TRM and customer-specific data collected in the tracking system
Process and Free Ridership Research – Online Surveys	2019 HVAC Equipment Participating Customers	TBD	Process and free ridership, Q1-Q2 2020. May add telephone component depending on submission counts.
Process and Spillover Survey Research – CATI Surveys	2019 HVAC Equipment Participating Customers	TBD	Process and spillover, Q1 2020
Process and NTG Survey Research	Participating HVAC Equipment Trade Allies	TBD	Process, free ridership, and spillover

Evaluation Schedule

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

Table 4. Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Participant Process and Free Ridership Survey	Evaluation Team	Q1-Q2 2020
Participant Process and Spillover Survey	Evaluation Team	Q1-Q2, 2020
Trade Ally Process, Free Ridership and Spillover Survey	Evaluation Team	Q1-Q2, 2020
NTG Research Findings Memo	Evaluation Team	July 1, 2020
Participant and TA Process report	Evaluation Team	September 15, 2020
Interim Impact Review and Findings	Evaluation Team	July 1, 2020
Final Tracking Data to Navigant	Franklin Energy	January 30, 2021
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	PGL & NSG / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	PGL & NSG / SAG	May 27, 2021
Final Impact Report to PGL & NSG and SAG	Evaluation Team	June 3, 2021

Home Energy Jumpstart Program 2020 – 2021 Evaluation Plan

Introduction

The Home Energy Jumpstart (HEJ) program seeks to: (1) secure energy savings through direct installation of low-cost efficiency measures, such as water efficient showerheads, faucet aerators, pipe insulation, and programmable thermostats at eligible single family residences; (2) secure energy savings through installation of energy efficiency measures with co-pays: advanced thermostats; and (3) perform a brief assessment of major retrofit opportunities (e.g., furnace, boiler, air conditioning, insulation and air sealing) and bring heightened awareness to the homeowners about additional efficiency programs. The program is exploring expanding the offering to include a leave-behind kit of measures such as weatherstripping, door sweep, furnace filter whistle, and shower timer. The basic program concept is currently being offered jointly between ComEd and Peoples Gas (PGL) and North Shore Gas (NSG) as the Home Energy Jumpstart program.

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 – 2020 Participant FR plus Process Survey	X	
Research – 2020 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 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 survey effort of 2020 participants. The process research will address the following questions through survey research of 2020 participants (process questions will be refined after discussions with program managers):

1. What are participants' perspectives and overall satisfaction with the program?
2. How can the program be improved?
3. How did customers become aware of the program? What marketing strategies could boost program awareness?

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.

Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating the HEJ 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.

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 in Table 2.

Table 2. PGL/NSG Deemed NTG for 2020

Program Path/Measure	Deemed NTG
HEJ - Faucet Aerators and Showerheads	1.02
HEJ - Programmable Thermostat	0.88
HEJ - Re-Programming Thermostat	0.80
HEJ - Boiler Pipe Insulation, DHW Pipe Insulation	0.88
Smart Thermostats	NA*

Source: PGL-NSG_NTG_History_and_2020_Values 2019-10-01 Final.xlsx, available on the Illinois SAG web site: <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.

Process and NTG Research

We will conduct research on free ridership and spillover with 2020 participants, either through a telephone or online participant survey. If the survey is conducted online, no sampling will be done; the evaluation team will email a link to the survey to all participants with an email address. Satisfaction and process-related questions will also be included in the survey, based on input from program management. The process analysis will include a synthesis of both qualitative and quantitative data collected during the NTG/Process surveys and in-depth 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
NTG and Process Survey Research	2020 Participants	TBD	Online or telephone to be determined
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 HEJ Program. Adjustments will be made as needed as program year evaluation activities begin.

Table 4. Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Interim Impact Review and Findings	Evaluation Team	July 1, 2020
Final Version of Survey Instruments, Sampling Plan	Evaluation Team	October 31, 2020
Final Tracking Data to Navigant	Franklin Energy	January 30, 2021
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	PGL & NSG / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	PGL & NSG / SAG	May 27, 2021
Final Impact Report to PGL & NSG and SAG	Evaluation Team	June 3, 2021
Conduct NTG and Process Survey	Evaluation Team	Q1 2021
Report Draft NTG Results	Evaluation Team	August 1, 2021
Report Process Findings	Evaluation Team	September 15, 2021

Multi-Family Program 2020-2021 Evaluation Plan

Introduction

The Multi-Family Energy Savings Program (Multi-Family Program) is jointly implemented by Peoples Gas (PGL) and North Shore Gas (NSG) companies and Commonwealth Edison Company (ComEd). The Multi-Family Program achieves natural gas energy savings for PGL and NSG and electric energy and demand savings for ComEd customers.

The PGL and NSG Multi-Family Program is designed to provide a “one-stop-shop” to multi-family property owners and managers to achieve comprehensive improvements in energy efficiency that previously would have required accessing multiple programs. The Multi-Family Program delivery approach consists of five paths:

The Direct Install (DI) and Energy Assessment “Jumpstart” paths of the program provide free energy efficiency products in residential dwelling units and common areas. The energy assessment identifies additional comprehensive efficiency upgrades that allow participants to implement deeper retrofit measures through other delivery paths.

The Prescriptive Rebate path provides standardized incentives for energy efficient equipment based on the size and efficiency of the equipment installed or on a per unit basis. The Partner Trade Ally (PTA) path also provides standardized incentives for energy efficient equipment while providing higher incentives to a network of trade allies selected, screened, and registered with the Multi-Family Program. These Partner TA's in turn offer better rebates to their customers to install energy-efficient products.

The program's Custom path provides technical services and custom rebates for non-standard building improvement upgrades. Multi-family property owners and managers may also participate in the PGL and NSG Gas Optimization Study Program that provides gas optimization assessments for multi-family buildings for capital improvement opportunities and operation and maintenance issues that, if corrected, deliver energy and cost savings to building owners and managers supported by financial incentives.

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
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 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 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

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 International Performance Measurement and Verification Protocols (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 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 in Table 2.

Table 2. PGL/NSG Deemed NTG for 2020

Program Path/Measure	Deemed NTG
Multifamily In-Unit and Common Areas / Assessment/Direct Install (all measures except in-unit DI faucet aerators and showerheads)	0.96
Assessment/Direct Install In-Unit (faucet aerators and showerheads when using TRM specified baseline average water flow rates)	1.01
Multifamily Comprehensive / Prescriptive Rebates	NA*
Multifamily Comprehensive (TAPI Incentives / Partner Trade Allies)	NA*
Multifamily Comprehensive / Custom Rebates	NA*
Multifamily Comprehensive / Roll-up of Prescriptive, PTA, and Custom	0.87*
Multifamily Comprehensive / Gas Optimization	0.91

Source: PGL-NSG_NTG_History_and_2020_Values 2019-10-01 Final.xlsx, available on the Illinois SAG web site: <https://www.ilsag.info/policy/net-to-gross-framework/>

* Free ridership from Navigant analysis of 23 participant interviews conducted in 2019 of 2018 MF Program participants (C/P 90/9). Path-based estimates were planned, but the number of completions was not large enough for path-based estimates.

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
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
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. Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Interim Impact Review and Findings	Evaluation Team	July 1, 2020
Custom Project Savings Verification Waves	Evaluation Team	Q2 2020 to Q1 2021
Large Custom Project Pre-Installation Review (If any)	Evaluation Team	Ten business days
Final Tracking Data to Navigant	Franklin Energy	January 30, 2021
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	May 8, 2021
Draft Comments Received	PGL & NSG / SAG	May 29, 2021
Send Revised Draft	Evaluation Team	June 12, 2021
Comments on Redraft	PGL & NSG / SAG	June 19, 2021
Final Impact Report to PGL & NSG and SAG	Evaluation Team	June 26, 2021

Home Energy Reports Program Evaluation Plan

Introduction

The primary objective of the evaluation of the PGL and NSG Home Energy Reports (HER) programs is to estimate the natural gas savings generated by regularly mailing customers reports that provide information about their natural gas consumption and conservation. In addition, participants are invited to log onto a dedicated program website that offers suggestions of additional opportunities to save energy, including other PGL or NSG energy efficiency programs they may qualify for, and allows participants to fine-tune their profiles and report conservation steps they have taken.

In 2020,⁵ the PGL and NSG HER programs consist of the following waves:

- PGL Wave 2016-12mo with 12,059 customers
- PGL Wave 2017-7mo with 62,892 customers
- NSG Wave 2016-12mo with 26,574
- NSG Wave 2017-7mo with 53,501 customers

All four waves were designed as randomized controlled trials (RCTs). Customers in the target group of residential customers from each utility 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.⁶

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.

⁵ 2020 spans January 1, 2020 to December 31, 2020. The program plans to increase the customer pool to produce more savings. Navigant will confirm the timing and counts of Home Energy Report recipients and control group members later in 2020 in preparation for the 2020 impact evaluation.

⁶ 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.

Table 1. Evaluation Plan Summary

Activity	2020	2021
Data Collection – Program Manager and Implementer Interviews	X	X
Impact – End-of-Year Savings Verification	X	X

Evaluation Research Topics

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	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.

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 for PGL and NSG?
 - a. What is the apparent long-run trend (flat, increasing, or falling) in program savings?
2. What is the uplift in other PGL and NSG energy efficiency programs due to the HER 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.

Process Evaluation

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

Evaluation Approach

Gross Impact Evaluation

For the four PGL and NSG waves, Navigant will measure 2020 program impacts through billing analysis using lagged dependent variable (LDV) and linear fixed effects regression (LFER) models, both of which were used and described in the GPY5 evaluation report.⁷

Although the two regression 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, as we have since GPY4, because we believe that, on balance, it has superior statistical properties.⁸ The LFER will be reported as a robustness check.

Enrollment uplift in other energy efficiency programs due to the HER program will be estimated the same way as in previous evaluation. Uplift savings will be netted out of HER results to avoid double counting.

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. Navigant's analysis will consider both uplift that occurs in 2020 and legacy uplift from previous program years.

⁷ Navigant Consulting, Inc. *PGL-NSG Home Energy Reports Program Evaluation Final Report, Gas Play Year 5*. March 31, 2017. Since Navigant previously validated the randomized designs of PGL Wave 1 and NSG Wave 1 as part of its GPY3 evaluation and the randomized design of NSG Wave 2 as part of its GPY5 evaluation, we will not repeat this step in the GPY6 evaluation.

⁸ 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.

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 Oracle and Franklin Energy.

Table 3. Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Interviews with program manager and IC	Evaluation Team	July 31, 2020
Data delivery to Navigant	Oracle	January 30, 2021
2020 EE Residential Program Tracking Data to Navigant	Franklin Energy	January 30, 2021
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	PGL & NSG / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	PGL & NSG / SAG	May 27, 2021
Final Impact Report to PGL & NSG and SAG	Evaluation Team	June 3, 2021

Elementary Energy Education Program 2020 – 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

A.2 Income Eligible 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 TRM⁹, 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 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/>

(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.

⁹ 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>

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 Wave 1 program tracking data, project savings calculators, and project documentation	ComEd/Gas Utilities	May 15, 2020
Wave 1 findings	Evaluation	August 28, 2020
CY2020 End of Year 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 CY2020 to CY 2021 Evaluation Plan

Introduction

The Income Eligible Multi-Family Energy Efficiency Program offers direct installation of energy efficiency measures and replacement of inefficient equipment, as well as educational information to further save money on energy bills. Eligible measures include LED and energy efficient lighting retrofits, programmable thermostats, advanced power strips, water efficiency devices, weatherization measures, pipe insulation, refrigerators, heating and cooling equipment and custom energy saving measures for eligible properties. The program also offers installation of health and safety measures, including installation of vents, electrical repairs, and asbestos and mold remediation.

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

Both the IEMS and IER-MF programs provide retrofits in common areas and tenant spaces to eligible multi-family properties in the ComEd service territory and serve as a “one stop shop” to multi-family building owners and managers whose buildings are targeted to income eligible residents.¹⁰

In November 2019, Peoples Gas began mail distribution of a free kit of self-install energy saving measures. Contents of the kit include a showerhead, faucet aerators, weatherstripping, switch and outlet gaskets, water heater setback instructions, shower timer, window film kits, and water heater pipe insulation. The kits are being distributed to customers that have been verified as LIHEAP grant recipients and therefore validated as Income Eligible. The offer will continue in 2020.

Peoples Gas plans to add a rebate offering for multi-family properties in 2020, utilizing partner trade allies to deliver measures at elevated incentive levels. Installed volume is expected to be a few hundred measures.

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

¹⁰ 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).

Table 1. Evaluation Approaches – Two Year Plan

Tasks	CY2020	CY2021
Data Collection – Building Owner and Property Manager Surveys (Lead Lifecycle Analysis)	X	
Data Collection – Program Manager and Implementer Interviews	X	X
Data Collection – Mail Distribution Kit On-line Survey (Peoples Gas)	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 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?

Navigant is conducting an on-line survey of Peoples Gas 2019 mail distributed self-install efficiency kit recipients. The survey will collect recipient responses on installation in-service rates and satisfaction.

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
Lead Lifecycle Analysis	Property Manager/Owner	Sample	Jan 2020 – March 2020	Only for the Elevate component.
Online Survey	2019 Mailed Distributed Kit Recipients	100 to 300	One Month After Mailing through 3/31/2020	PGL only
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

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)

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 five¹¹ interviews) to understand their experience.

Online Survey of PGL Mail Distributed Self-Installed Kits

Navigant is conducting an on-line survey of Peoples Gas 2019 mail distributed self-install efficiency kit recipients. The survey will collect recipient responses on installation in-service rates and satisfaction. Recipients will receive a post card invitation (English and Spanish) to take the survey one month after kit mailing. The survey is targeting 100 to 300 respondents when the survey closes on March 31, 2020.

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.

¹¹ Navigant will complete additional interviews for PGL and NSG, up to 10 total.

(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 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
Lead Lifecycle Analysis findings	Evaluation	May 31, 2020
PGL Kits Online Survey findings	Evaluation	May 31, 2020
Annual Program Implementation Check-In	Evaluation	May 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.

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 Surveys (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)¹² 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

¹² Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0,
<http://www.ilsag.info/technical-reference-manual.html>

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.

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	Final for each program component
Survey	Gas Participants	Gas Sample	Will conduct for IHWAP component for gas utilities
Calculation of CPAS and Annual Savings	Engineering Impact Review	NA	Two waves: Interim (electric)* and Final for each program component

Gross Impact Evaluation

Since the SFR Program derives savings from deemed values contained in the TRM¹³, 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.

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.

¹³ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 8.0,
<http://www.ilsag.info/technical-reference-manual.html>

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.

Table 4. Schedule – Key Deadlines

Activity or Deliverable	Responsible Party	Date Delivered
Draft Process Report for PGL, NSG, and Nicor Gas	Evaluation	May 30, 2020
CY2020 Final Tracking Data Request	Evaluation	November 1, 2020
CY2020 Final Wave Data	ComEd, Gas Utilities	January 30, 2021
Draft Report to ComEd, Gas Utilities, and SAG	Evaluation	March 8, 2021
Comments on Draft (15 Business Days)	ComEd, Gas Utilities, and SAG	March 29, 2021
Revised Draft by Navigant	Evaluation	April 5, 2021
Comments on Redraft (5 Business Days)	ComEd, Gas Utilities, and SAG	April 12, 2021
Final Impact Report to ComEd, Gas Utilities, and SAG	Evaluation	April 23, 2021

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

Coordination

Navigant will coordinate with the evaluation teams for 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	2	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.

Table 3. Deemed NTG Values for CY2020

Program	CY2020 Deemed NTG Value
Public Housing Authority	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 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 Program and Public Sector (Energy Jumpstart and Prescriptive Rebate Paths) 2020 – 2021 Evaluation Plan

Introduction

This evaluation plan covers measures installed and gas savings realized through the Business Program (BP) and Public Sector (PS) Energy Jumpstart and Prescriptive Rebate paths (participants with projects from either or both paths). The comprehensive BP and PS programs are implemented by Franklin Energy Services with trade ally engagement and technical support for program delivery and marketing. The Prescriptive Rebate path provides significantly more energy savings than the Energy Jumpstart path.

The Energy Jumpstart path provides a high-level assessment of energy saving opportunities that the customer or building owner can implement, and includes direct installation of low flow showerheads, kitchen and faucet aerators, and pre-rinse spray valves for appropriate businesses. Qualified Illinois Public Sector facilities receive free facility audits and free energy efficient products, including, exit signs, aerators, shower heads, pre-rinse spray valves, various lighting measures, and cooler and vending machine measures.

The Prescriptive Rebate path provides prescriptive rebates for existing customers and new construction where applicable. These incentives focus on heating systems, water heating systems, pipe insulation, steam traps, various boiler controls, and food service equipment.

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 – BP 2019 Participant FR+SO plus Process Survey	Q1	
Research – PS 2019 Participant FR+SO plus Process Survey	Q1	
Research – BP and PS Trade Ally FR+SO plus Process Survey	Q1	
Present NTG Research Results	Q3	
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

* The FR and SO data collection and survey completion will extend into Q1 of 2020 but will be based on 2019 program participants.

Evaluation Research Topics

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

Impact Evaluation

1. What are the BP verified gross savings?
2. What are the BP verified net savings?
3. What are the PS verified gross savings?
4. What are the PS 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)?

The evaluation team will conduct free ridership and spillover research with 2019 participating customers and trade allies. The combination of free ridership and spillover research results will be delivered July 1, 2020 to inform NTG recommendations for 2021 and beyond. The NTG research will not include DCEO legacy projects.

Process Evaluation

Navigant's 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 Program and Public Sector issues. The process evaluation effort with 2019 participants will focus on program delivery from the participant perspective. The process research will address the following questions:

1. What are participants' perspectives and overall satisfaction with the program?
2. What are the program components that most influence participation?
3. How can the program be improved?
4. How did customers become aware of the program? What marketing strategies could boost program awareness?
5. Are there any program pain points and, if yes, what are ways to improve these points?

Evaluation Approach

Gross Impact Evaluation

Navigant anticipates all measures offered through the Prescriptive Rebate and Energy Jumpstart paths 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 a single report with separate reporting of impacts, research findings, and recommendations for the Business Program and Public Sector.

Use of Randomized Controlled Trial and Quasi-Experimental Design

Navigant is not evaluating this 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 in Table 2.

Table 2. PGL/NSG Deemed NTG for 2020

Program Path/Measure	Deemed NTG
BP and PS Energy Jumpstart	0.79
BP and PS Prescriptive Rebates	0.79

Source: PGL-NSG_NTG_History_and_2020_Values 2019-10-01 Final.xlsx, available on the Illinois SAG web site: <https://www.ilsag.info/policy/net-to-gross-framework/>

Process and NTG Research

Navigant will conduct one-time free ridership research in Q1 2020 through a survey of 2019 participants and trade allies Spillover research will be conducted through a one-time telephone survey in Q12020. The NTG research will not include DCEO legacy projects.

The process analysis will include a synthesis of both qualitative and quantitative data collected during the NTG/Process surveys and in-depth 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 BP and PS Program TRM Measures	Census	Review program tracking data using the TRM measure characterizations
End-of-Year TRM Savings Verification	All BP and PS Participating Customers with TRM Measures	Census	Gross savings verification using the TRM and customer-specific data collected in the tracking system
Process and Free Ridership Research	2019 Participating Customers	TBD	Process and free ridership
Process and Spillover Survey Research	2019 Participating Customers	TBD	Process and spillover
Process and NTG Survey Research	2019 Participating Trade Allies	TBD	Process, free ridership, and spillover

Evaluation Schedule

Table 4 below provides the schedule for evaluation of the Prescriptive Rebate and Energy Jumpstart paths of the Business and Public Sector Program. Adjustments will be made as needed as program year evaluation activities begin. Navigant will produce separate reporting of impacts, research findings, and recommendations for the Business Program and Public Sector.

Table 4. Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Participant Process and Free Ridership Survey	Evaluation Team	Q1, 2020
Participant Process and Spillover Survey	Evaluation Team	Q1, 2020
Trade Ally NTG and Process Survey	Evaluation Team	Q1, 2020
Interim Impact Review Findings	Evaluation Team	July 1, 2020
NTG Research Findings Memo	Evaluation Team	July 1, 2020
Process Findings	Evaluation Team	September 15, 2020
Final Tracking Data to Navigant	Franklin Energy	January 30, 2021
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	April 15, 2021
Draft Comments Received	PGL & NSG / SAG	May 6, 2021
Send Revised Draft	Evaluation Team	May 20, 2021
Comments on Redraft	PGL & NSG / SAG	May 27, 2021
Final Impact Report to PGL & NSG and SAG	Evaluation Team	June 3, 2021

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

Introduction

This evaluation plan covers measures installed and gas savings realized through the Custom Rebate path of the Business Program (BP) and Public Sector (PS) programs. The custom applications include any project not covered under the Prescriptive Rebate path. For example, air sealing measures may fall into the Custom Rebate category. PGL/NSG can fund ComEd-delivered Retro-Commissioning and Non-Residential New Construction projects on a negotiated \$/therm saved basis under the Custom Rebate path. The Retro-Commissioning and Business New Construction programs are covered under separate evaluation plans, while PGL and NSG Custom Rebate projects are referred to here as the “Custom Program”. The BP and PS programs are implemented by Franklin Energy Services. Navigant will produce a single report with separate tables of impacts, research findings, and recommendations for the Business Program 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 – 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 – 2020 PS Participants: FR+SO plus Process Survey	X*	
PS Present NTG Research Results		Q3
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

* The 2020 NTG research for the Public-Sector-only will extend into 2021.

Evaluation Research Topics

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

Impact Evaluation

1. What are the BP verified gross savings?
2. What are the BP verified net savings?
3. What are the PS verified gross savings?
4. What are the PS verified net savings?

5. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?
6. What is the level of free ridership and spillover for the 2020 PS program participants, based on evaluation research?

Process Evaluation

Navigant will review program materials and conduct in-depth qualitative interviews with program management and implementers to inform the NTG and process survey with 2020 PS participants. The in-depth 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.

The NTG survey¹⁴ will include additional process questions to elicit feedback on participants' satisfaction and suggestions for program improvement. Final process research questions will be determined as program circumstances are better known and input is received from the program implementer.

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 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 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.

¹⁴ Survey completion will extend into Q1 of 2021 but will be based on 2020 program participants.

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. PGL/NSG Deemed NTG for 2020

Program Path/Measure	Deemed NTG
BP Custom Rebates	0.74
PS Custom Rebates	0.74

Source: PGL-NSG_NTG_History_and_2020_Values 2019-10-01 Final.xlsx, available on the Illinois SAG web site: <https://www.ilsag.info/policy/net-to-gross-framework/>

Process and NTG Evaluation

The evaluation team will conduct Net-to-Gross (NTG) research through interviews with participating 2020 PS customers in late 2020 and Q1 2021 to determine free ridership and spillover to inform NTG recommendations for 2022 and beyond. We will not conduct NTG research on public sector projects initiated under DCEO administration because they are not representative of the program delivery going forward.

The 2020 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.

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
Project Savings Verification	Completed BP and PS Custom Projects	90/10	Two sampling waves, separate samples for BP and PS.
Large Project Pre-Installation Review	BP or PS Projects in the Pre-Installation Phase	Census for Rebates >\$75,000	Feedback on savings methodology and baseline on large projects in pre-installation stages
Process and NTG Survey Research	2020 Participating PS Customer Decision Makers	TBD	Process, free ridership, and spillover, late 2020 and Q1 2021
End-of Year Project Savings Verification	Completed BP and PS Custom Projects	90/10	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. Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Custom Project Savings Verification Waves	Evaluation Team	Q2 2020 to Q1 2021
Large Project Pre-Installation Review	Evaluation Team	Ten business days
Final Tracking Data to Navigant	Franklin Energy	January 30, 2021
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	May 8, 2021
Draft Comments Received	PGL & NSG / SAG	May 29, 2021
Send Revised Draft	Evaluation Team	June 12, 2021
Comments on Redraft	PGL & NSG / SAG	June 19, 2021
Final Impact Report to PGL & NSG and SAG	Evaluation Team	June 26, 2021
Final Version Survey Instrument, Sampling Plan	Evaluation Team	August 31, 2020
Conduct PS Process and NTG Survey	Evaluation Team	Q4, 2020-Q1 2021
Report Draft NTG Results	Evaluation Team	August 1, 2021
Report Process Results	Evaluation Team	September 15, 2021

Business Program and Public Sector (Gas Optimization Studies) 2021-2021 Evaluation Plan

Introduction

The evaluation plan covers measures installed and gas savings realized through the Gas Optimization Studies path offered in the Business Program (BP) and Public Sector (PS). This path provides a service where Energy Advisors and contracted engineers complete a detailed review of a business facility for capital improvement opportunities and operation and maintenance issues that, if corrected, often provides 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 and aligning actual facility operating hours and ventilation scheduling. The BP and PS programs are implemented by Franklin Energy Services with service provider engagement and technical support for program delivery and marketing. Navigant will produce a single report with separate reporting of impacts, research findings, and recommendations for the Business Program and Public Sector.

The program received a substantial redesign in 2019, and participants under the new design are expected to complete projects beginning in 2020. Planned NTG and process research with 2019 participants has been cancelled, and will be deferred until a sufficient number of new-design participants have had time to complete projects – anticipated to be 2021.

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 – Gas Opt Project Savings Verification Waves and Large Project Pre-Installation Review	X	X
Gross Impact – End-of-Year Gas Opt Project Savings Verification	X	X
Research – BP Participant FR+SO plus Process Survey		X
Research – PS Participant FR+SO plus Process Survey		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 2020:

Impact Evaluation

1. What are the BP verified gross savings?
2. What are the BP verified net savings?

3. What are the PS verified gross savings?
4. What are the PS verified net savings?
5. What caused gross realization rate (RR) adjustments and what corrective actions are recommended?

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

The gross impact evaluation approach for Gas Optimization 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 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 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 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.

Navigant will produce separate reporting of impacts, research findings, and recommendations for the Business Program and Public Sector.

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 in Table 2.

Table 2. PGL/NSG Deemed NTG for 2020

Program Path/Measure	Deemed NTG
Business Program – Gas Optimization	0.91
Public Sector – Gas Optimization	0.91

Source: PGL-NSG_NTG_History_and_2020_Values 2019-10-01 Final.xlsx, available on the Illinois SAG web site: <https://www.ilsag.info/policy/net-to-gross-framework/>.

Process 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.

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 / Sample	Comments
In Depth Interviews	Program Management	1-2	Interview program staff
Project Savings Verification	Completed BP and PS Gas Optimization Projects	90/10	One or two sampling waves, separate samples for BP and PS. BP and PS waves may occur on separate timelines.
Large Project Pre-Installation Review	BP or PS Projects in the Pre-Installation Phase	Census Rebates > \$75,000	Evaluator feedback on savings methodology and baseline on large projects in pre-installation stages
End-of Year Project Savings Verification	Completed BP and PS Gas Optimization Projects	90/10	Projects not previously sampled

Evaluation Schedule

Table 4 below provides the schedule for evaluation of the Gas Optimization Program. Adjustments will be made as needed as program year evaluation activities begin. Navigant will produce a single report with separate reporting of impacts, research findings, and recommendations for the Business Program and Public Sector.

Table 4. Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Gas Opt Project Savings Verification Waves	Evaluation Team	Q2 2020 to Q1 2021
Large Project Pre-Installation Review	Evaluation Team	Ten business days
Final Tracking Data to Navigant	PGL & NSG / Franklin Energy	January 30, 2021
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	May 8, 2021
Draft Comments Received	PGL & NSG / SAG	May 29, 2021
Send Revised Draft	Evaluation Team	June 12, 2021
Comments on Redraft	PGL & NSG / SAG	June 19, 2021
Final Impact Report to PGL & NSG and SAG	Evaluation Team	June 26, 2021

Small and Midsize Business Program 2020-2021 Evaluation Plan

Introduction

The Small and Midsize Business (SMB) Program is designed to assist qualified Peoples Gas (PGL) and North Shore Gas (NSG) non-residential customers¹⁵ to achieve natural gas energy savings by educating them about energy efficiency opportunities through three program delivery paths:

- The Energy Assessment and Direct Install (DI) path provides installation of no-cost direct-install (DI) measures¹⁶ to businesses or tenants through on-site assessments conducted by the implementation contractor's (Franklin Energy Services) Energy Advisors. The energy assessment identifies additional retrofit energy efficiency upgrades.
- The Prescriptive path provides business owners/tenants with direct financial incentives for installation of retrofit measures recommended through the Energy Assessment. Customers receive rebates which cover 30 to 100 percent of the project cost based on the size and efficiency of the equipment installed or on a per unit basis.
- The Custom path provides technical services and custom rebates for non-standard building improvement upgrades.

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
Research – 2020 Participants FR plus SO plus Process Survey	X	
Research – Trade Ally FR plus SO plus Process Survey	X	
Present NTG Research Results		Q3
Process - Program Manager and Implementer Interviews/ Review Materials	X	X

¹⁵ To qualify, participants must be Peoples Gas or North Shore commercial or industrial customers that use less than 150,000 therms per year (small businesses) or between 150,000 therms and 400,000 therms per year (midsize businesses).

¹⁶ No-cost direct-install measures include low-flow showerheads and faucet aerators, pre-rinse spray valves, programmable/reprogrammed thermostats, and domestic hot water (DHW) pipe insulation.

Evaluation Research Topics

The evaluation team has identified the following key objectives for evaluation research for 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

The process analysis will include a synthesis of both qualitative and quantitative data collected during the NTG surveys with 2020 participants and in-depth 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 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 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.

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 NTGs are provided in Table 2.

Table 2. PGL/NSG Deemed NTG for 2020

Program Path/Measure	Deemed NTG
Assessment and Direct Install	0.95
Prescriptive, Partner Trade Ally, and Custom Rebates	0.92

Source: PGL-NSG_NTG_History_and_2020_Values 2019-10-01 Final.xlsx, available on the Illinois SAG web site: <https://www.ilsag.info/policy/net-to-gross-framework/>.

Process and NTG Evaluation

Navigant will conduct NTG and process research through surveys with 2020 Small and Midsize Business participating customers and trade allies. We will complete surveys with contacts who participated in the 2020 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. Navigant

will confer with program management and review participation levels by path and business size to determine a representative sample stratification for free ridership. Spillover results will be program-wide.

Navigant proposes to conduct up to two waves of data collection, based on the timeline of when it would be best to connect with customers regarding the survey topic of interest. The first wave would occur in the fourth quarter of 2020 focusing on process and free ridership, and the second wave focusing on process and spillover would occur in Q1 2021.

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
Custom Project Savings Verification	Completed Custom Projects	90/10	One or two sampling waves
Process, Free Ridership, and Spillover Research	2020 Participating Customers	TBD	Q4 2020 to Q1 2021
Process and NTG Survey Research	2020 Participating Trade Allies	TBD	Q1 2021
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures	Census	Gross savings verification using the TRM and customer-specific data
End-of Year Custom Project Savings Verification	Completed Custom Projects	90/10	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. Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Interim Impact Review and Findings	Evaluation Team	July 1, 2020
Final Versions of Survey Instruments, Sampling Plan	Evaluation Team	August 31, 2020
Process and NTG Surveys with 2020 Participants and Trade Allies	Evaluation Team	Q4 2020 to Q1 2021
Custom Project Savings Verification Waves	Evaluation Team	Q2 2020 to Q1 2021
Final Tracking Data to Navigant	Franklin Energy	January 30, 2021
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	May 8, 2021
Draft Comments Received	PGL & NSG / SAG	May 29, 2021
Send Revised Draft	Evaluation Team	June 12, 2021
Comments on Redraft	PGL & NSG / SAG	June 19, 2021
Final Impact Report to PGL & NSG and SAG	Evaluation Team	June 26, 2021
Report NTG Results	Evaluation Team	August 1, 2021
Report Process Results	Evaluation Team	September 15, 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 th each year
In-Depth Interviews	Program Management and Implementers	2	Augment with monthly calls
Material Review	Literature review, secondary research, program materials	n/a	Inform primary data collection activities
Gross Impact Evaluation	Early Feedback File Review	5	Early Feedback for Large Projects, As Needed
Gross Impact Evaluation	Engineering Desk Review	30 [†]	Two Waves [†]
Verified Net Impact Evaluation	Calculation using deemed NTG ratio	n/a	

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

Tracking System Review

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

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

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

Proposed gross impact sampling timelines are shown below.

CY2020 Gross Impact Sampling Waves

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

Gross Impact Evaluation

The evaluation team will conduct gross savings research using building energy simulation models on a sample of approximately 30 projects to determine CY2020 savings and calculate realization rates. This research will include an engineering desk review of each project in our sample. The evaluation team will also develop a summary sheet for each project reviewed that outlines the evaluation activities completed, any resulting changes to the building energy simulation model because of ex post review, and the net effect on the electric and therm savings relative to ex ante claimed savings.

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

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

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

Some new construction projects have high uncertainty surrounding the baseline selection (e.g., major renovations with HVAC reconfiguration), resulting in higher risk for downward evaluation savings adjustment if the evaluation determines that the appropriate baseline is more efficient than what was assumed in the ex-ante savings calculations. To anticipate and reduce the incidence of such cases, a review of the baseline by the evaluation team prior to incentive commitment may be appropriate. As a part of monthly evaluation update calls, there will be an opportunity for the program staff to identify projects where they perceive higher uncertainty. After discussion, the program staff and evaluation team may agree to have the evaluation team follow up with a brief but deeper review of project details and provide feedback on baseline selection within 10 days. The evaluation follow-up review will be optional, advisory and non-binding from the standpoint of updating ex ante savings claims but may serve to reduce downward savings adjustments in the ex post evaluation.

Sampling Approach

The evaluation team plans to create two sample frames, one focused on electric projects and the other focused on gas projects. The electric sample frame will be composed only of projects with electric savings. These projects may or may not have gas savings and may or may not be in any of the participating gas utilities' service territories. The gas sample frame will consist of all gas projects with positive therm savings before interactive effects from electric measures, regardless of whether

the project has electric savings or received a gas incentive.¹⁷ 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.¹⁸

Table 3. Estimated Number of Projects in Sample

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

Navigant will perform tracking system review and M&V project sampling in two waves in CY2020. The first wave of M&V sampling is expected to cover about one-half of projects completed in CY2020.

Verified Net Impact Evaluation

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

Table 4. Deemed NTG Values for CY2018

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

Source:

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.

(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.

¹⁷ 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.

¹⁸ 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.

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

The RCx Program is managed by ComEd. ComEd coordinates with Nicor Gas, Peoples Gas and North Shore Gas to account for gas savings generated through the program. The RCx Program continues to evolve to serve more diverse customer segments. To reach smaller customers and market segments, the utilities began expanding the program to support additional offerings in the fifth electric and second gas program years (PY5/GPY2) and in the seventh electric and fourth gas program years (PY7/GPY4). Beginning in CY2018 public sector customers could participate in any of the RCx offerings from the utilities.

There are four RCx Program options to optimize energy performance:

- Traditional RCx represents the original offering for large commercial buildings and completes a four-phase RCx process (Planning, Investigation, Implementation, and Verification). Projects are unique, and savings are determined using program standard and custom calculations developed by service providers and implementation contractors with input from the evaluators.
- Monitoring-Based Commissioning (MBCx) is a long-term engagement between the Energy Efficiency service provider (EESP) and customer to identify, implement, and monitor measures over time. MBCx features the integration of monitoring software into the building automation system to assist in the identification and documentation of deeper energy saving opportunities than those found in traditional RCx. It can also be used as a process to continue and augment prior projects that will help ensure measure persistence and improve building operations over time.
- Retro-Commissioning Express (RCxpress) is an offering targeted to mid-sized commercial buildings or buildings interested in a shorter project timeline. RCxpress uses program-standard calculators in addition to custom calculations for savings estimates.
- RCx Building Tune-Up (Tune-Up) is for customers less than about 150,000 ft² but with more than 100 kW of peak demand. This offering offers an implementation incentive in addition to the RCx study incentive provided in the other offerings.

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

Table 1. Evaluation Approaches – Two Year Plan

Tasks	CY2020	CY2021
Tracking System Review	X	X
Data Collection – 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 [‡]	
Verified Net Impact Evaluation	Calculation using deemed NTG ratio	Census	

[‡] 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 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,¹⁹ to fit research within budget constraints and as permitted by ComEd. The default strata will be defined by project size, offering type, and fuel type.

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

CY2020 Gross Impact Research Waves

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

All sampled projects will be subject to engineering file review. Gross impact estimates will mimic ex ante methods to the extent they are reasonable and accurate per data collected during verification steps. The evaluation team will modify calculations if methods are not reasonable or if verified operation differs from what was reported.

Wherever possible, ex post savings may be determined with regression analysis of trend or utility billing data and weather or other independent variables that affect energy use (for example, days of operation), as appropriate. If implemented measures are not amenable to regression analysis, the engineering review will form the basis of evaluated savings using IPMVP Option A. This review process may point to special needs of this market segment.

Proposed gross impact timeline:

¹⁹ 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.

- 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.²⁰
- 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.

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.

²⁰ 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.

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 provide 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, 2019

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

1. 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 programs²¹

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 the 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.

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

²¹ These measures are rebated separately from SEM program and savings for these measures are not counted in the SEM savings

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 30th in 2021 and substantive process reporting will be provided in a timely manner.

Table 4. Evaluation Schedule – Key Deadlines

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

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

A.4 Market Transformation Initiatives

Breakthrough Equipment and Market Transformation Initiatives 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 research and development (R&D) and up to 5 percent of the portfolio budget to be dedicated towards market transformation initiatives. PGL and NSG will employ Market Transformation tools and techniques to integrate innovation in energy efficiency programs. PGL and NSG 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.

Evaluation Approach

PGL and NSG will operate several market transformation and research efforts during EEP 2020-2021, for which it presently does not plan to claim savings. Therefore, no impact evaluation activities are planned for 2020 through 2021. If PGL and NSG claims savings during this period, Navigant will develop a plan and approach to verify the savings. Navigant will conduct annual program manager interviews to understand the status of these efforts and will work with PGL and NSG to identify opportunities to provide supplemental research activities for these efforts, being mindful of overall budget availability.

Table 1. Evaluation Plan Summary

Activity	2020	2021
Market Transformation and R&D Program Manager Interviews	X	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 success²².

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 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.

²² Excerpted from “CNP Upstream Commercial Food Service Pilot Program: Implementation Plan” December 2018. Prepared by Frontier Energy for Gas Technology Institute.

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 report²³ 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

²³ CNP Upstream Commercial Food Service Pilot Program: Phase I.pdf, October 2018.

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.

Methodology for Tracking Market Transformation Metrics

NEEA and RI will develop a model for establishing a market baseline projection. Navigant will review the model and inputs and assumptions and provide feedback.

The baseline will be used in future evaluation years to measure market transformation progress over time as a result of the pilot's activities.

Evaluation Schedule

Table 3 below provides the schedule for key deliverables and activities. Exact timing of evaluation activities is contingent on the Pilot implementation timing. Timing adjustments will be made, as needed, as implementation and evaluation activities progress.

Table 3. Schedule

Activity	Responsible Party	Date Delivered
In depth interviews with PM, implementers and 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