



Peoples Gas and North Shore Gas – Final Evaluation Plans for 2019-2021

Plan Years 2018-2021

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

Prepared for:

Peoples Gas and North Shore Gas

Prepared by:

Navigant

February 19, 2019

Submitted to:

Peoples Gas
North Shore Gas
200 East Randolph Street
Chicago, IL 60601

Submitted by:

Navigant
150 N. Riverside, Suite 2100
Chicago, IL 60606
Phone 312.583.5700
Fax 312.583.5701

Contact:

Randy Gunn, Managing Director
312.583.5714
randy.gunn@navigant.com

Kevin Grabner, Associate Director
608.497.2323
kevin.grabner@navigant.com

Robert Neumann, Associate Director
312.583.2176
rob.neumann@navigant.com

Disclaimer: This document was prepared by Navigant Consulting, Inc. ("Navigant") for Peoples Gas Light and Coke Company ("PGL") and North Shore Gas Company ("NSG") based upon information provided by PGL and NSG and from other sources. Use of this document by any other party for whatever purpose should not, and does not, absolve such party from using due diligence in verifying the document's contents. Neither Navigant nor any of its subsidiaries or affiliates assumes any liability or duty of care to such parties, and hereby disclaims any such liability.

TABLE OF CONTENTS

1. Introduction	1
2. Guiding Principles	2
3. Evaluation Plan Overview	4
4. Evaluation Approaches and Crosscutting Activities	9
Impact Evaluation Approaches	9
Process Evaluation Approaches	16
Additional Research Activities	19
Annual and Ad-hoc Reporting.....	22
Cost Effectiveness Review and Summary Reporting	22
Appendix A. Detailed Program Evaluation Plans	24
A.1 Residential Programs	25
Home Energy Rebate Program 2019 – 2021 Evaluation Plan	26
Home Energy Jumpstart Program 2019 – 2021 Evaluation Plan	31
Elementary Energy Education Program 2019 – 2021 Evaluation Plan	35
Home Energy Reports Program 2019 – 2021 Evaluation Plan	38
Multi-Family Program 2019-2021 Evaluation Plan	42
A.2 Income Eligible Programs	49
Peoples Gas and North Shore Gas Income Eligible Single Family Program 2019 to 2021 Evaluation Plan	50
Peoples Gas and North Shore Gas Income Eligible Multi-Family and Public Housing Energy Savings Programs 2019 to 2021 Evaluation Plan	55
Peoples Gas and North Shore Gas Income Eligible New Construction Program 2019 to 2021 Evaluation Plan	59
A.3 Business Programs (includes Public Sector)	63
Business Program and Public Sector (Energy Jumpstart and Prescriptive Rebate Paths) 2019 – 2021 Evaluation Plan	64
Business Program and Public Sector (Custom Rebate) 2019-2021 Evaluation Plan	70
Business Program and Public Sector (Gas Optimization Studies) 2019-2021 Evaluation Plan	76
ComEd, Nicor Gas and Peoples Gas and North Shore Gas Retro-Commissioning Program 2019 to 2021 Evaluation Plan	82
PGL and NSG and ComEd Strategic Energy Management Program 2019 to 2021 Evaluation Plan	92
Small Business Program 2019-2021 Evaluation Plan	98
Peoples Gas and North Shore Gas and ComEd Joint Business New Construction Program 2019 to 2021 Evaluation Plan	104
A.4 Market Transformation Initiatives	113
Market Transformation Initiatives 2019 – 2021 Evaluation Plan	114

1. INTRODUCTION

This document presents draft evaluation, measurement and verification (EM&V) plans for evaluating Peoples Gas (PGL) and North Shore Gas (NSG) energy efficiency programs for 2019 through 2021, which are the last three program years of Energy Efficiency Plan 2018-2021 (EEP 2018-2021). This version is an update for 2019.

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 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 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, 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 evaluation reports for 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 reports will be March 15, with best efforts made to produce final reports by April 30. This schedule, however, is dependent on delivery of final tracking data by January 30 of each year, and may be revisited.
- Research that will be used to update TRM algorithms will be completed by April 1 each year, so that reports can be reviewed and finalized, and work papers can be drafted in time for the May 15 TRM update process.
- NTG research will be completed by August 1 each year, so that reports can be reviewed and finalized in time for the September 1 initial evaluator NTG recommendations to SAG required by the Illinois NTG Policy. In 2020, NTG research will be completed one month earlier, by July 1, 2020 to inform development of the next EEP.
- Draft process research results will be delivered by September 1, 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 draft plans will be January 5, with final plans by February 20.
- 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 for the three-year period 2019 through 2021.

EEP 2018 – 2021 Evaluation Research Plan

The evaluation team has updated the high-level evaluation plan for the EEP 2018 – 2021 portfolio to identify research tasks by year for 2019 through 2021. 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 and is not shown on the table. Final activities and allocations will be determined annually as program circumstances are better known.

Annual Evaluation Program Plans

The evaluation team prepared evaluation plans for each program throughout EEP 2018-2021. 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. An **Activity** that is under consideration but not committed is indicated by **(UC)**. **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.
- **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 (Part. and TAs)	2019 (Part. and TAs)	2020 (Part. and TAs)		
Weatherization Rebates	2019	2019	2020		
Advanced Tstat	TBD	None ²	NA	2020-21	Conduct billing analysis
RNC (if offered)	2020	2020	2021	2018 and 2020	Calibrated simulation conducted for impact evaluation
Home Energy Jumpstart					
DI	2020	2020	2021		
Advanced Tstat	TBD	None	NA	2020-21	Conduct billing analysis
Education and Outreach Track					
Home Energy Reports	TBD	N/A	NA	2019	Net impacts through RCT Persistence study under consideration
EEE	2020	None	NA	2018-19	Investigate water heating fuel split
Multi-Family					
Audit / DI	2018	2018	2019	NA	
Retrofit Projects	2018	2018	2019		

² The savings for natural gas heating provided in Illinois TRM Version 7.0, Section 5.3.16 is a net savings value.

Table 2. Income Eligible 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
Single-Family Retrofits					
Audit/DI/ Retrofits	2018-19	NA	NA	2020	Calibrated simulation of comprehensive retrofits (UC)
Income Eligible Multi-Family and Public Housing Energy Savings Programs					
Audit/DI	2018-19	NA	NA		
Retrofit Projects	2018-19	NA	NA		
New Construction					
New Construction	2018 and 2020	NA	NA		

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	2018-19 2018-19	Pipe Insulation secondary research Steam trap billing analysis (UC)
Public Sector Rebates	2019	2019	2020		NTG research will not include DCEO legacy projects
Assessment/DI	2019	2019	2020		
Upstream Rebates	2019	2019	2020		
Business Program and Public Sector Custom Rebates					
Custom and Public Sector	2018	2018	2019		NTG research will 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		
Gas Optimization					
Gas Opt	2018 (SSPs) 2019 2021	2018 (SSPs) 2019 2021	2019 2020 2022	2019	NTG and process research with Study Service Providers (SSPs)
Retro-Commissioning (RCx)					
RCx	2019	2019	2020		
Strategic Energy Management (SEM)					
SEM Cohorts	2019-21	Under Consideration		2019-21	Gross impacts estimated through billing analysis
Small Business					
Audit/DI	2020	2020	2021		
Retrofit Projects	2020	2020	2021	2018-19 2020-21	Thermostats – secondary research on savings Advanced Tstat billing analysis (UC)
Joint Business New Construction (BNC)					
BNC	Combine with NTG	Every Year	Every Year		

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

[illegible]

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. Complete NTG research by August 1, so that initial NTG recommendations can be made to the SAG by September 1 of each year and finalized by October 1 to be used for the following program year. In 2020, NTG research will be completed one month earlier, by July 1, to inform development of the next EEP.
- **Jointly Implemented 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). 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 applied, and (3) cross-checking total measures and savings recorded in the tracking database.

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 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 behavioral programs and measures. Navigant will perform billing analysis to evaluate behavioral and other 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.

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 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.

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

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.

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 requested on a program-by-program basis, keeping budget priorities in consideration. Priorities for additional research include billing analyses to support savings verification and TRM updates, algorithm review for prescriptive or “semi-prescriptive” measures, real-time customer feedback through web-based survey tools, and benchmarking analysis to help 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 four-year savings in the PGL and NSG plans; discussions with PGL, NSG, 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 currently active and those planned or under consideration):

Currently Active

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 merits 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.

At this time, evaluators and utilities are investigating the population of dry cleaning businesses statewide as a possible study target that may have sufficient numbers of participants and non-participants to conduct a viable billing analysis. If consensus points to a feasible study, we will conduct this study as soon as possible. Other action items (for example gathering participant feedback on their methods for condensate handling and steam

usage monitoring) may inform updates to the Version 8 TRM. A dry cleaner billing analysis, if conducted, would likely occur during 2019 and result in an update for TRM Version 9.

2. **Non-Residential Pipe Insulation** – In 2018, Navigant is conducting a secondary research investigation of thermal regain factors. Navigant will produce a TRM work paper for TRM version 8.0 if the assumptions or methodology needs to be updated based on study findings. As part of the secondary research, Navigant will investigate opportunities for primary research on pipe insulation savings, including examining the tracking data for project characteristics and talking with the implementer about primary data that may be available.
3. **Small Business Thermostats Secondary Research on Impacts** – In 2018, Navigant is conducting secondary research from thermostat billing analysis studies (e.g., Michigan) to benchmark Illinois savings and assess whether other impact approaches are transferrable to Illinois. The secondary research will cover studies on standard programmable and advanced programmable thermostats.

Planned or Under Consideration

1. **Residential Advanced Thermostat Billing Analysis** – Navigant plans to 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 will produce a TRM work paper if the assumptions or methodology needs to be updated based on study findings.
2. **Small Business Thermostats Impact Billing Analysis** – For the EEP 2018-2021 period, advanced thermostats may be a higher priority for further research than standard programmable thermostats, but installed quantities are too low as of 2018 to conduct a billing analysis. ComEd will conduct a billing analysis of small commercial standard programmable thermostat impacts in 2019 that may provide an opportunity to estimate gas heating savings.
3. **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.
4. **Income Eligible Single-Family Retrofits** – Navigant will verify projects using the TRM and custom analyses (if necessary). 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.
5. **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 will determine whether these dropped participants and existing HER program controls are randomly distributed by comparing usage of the two groups in the year prior to when the participants received HERs. Assuming the participants and controls are randomly distributed, Navigant will consider a study to calculate annual decay rates for the first year after reports were discontinued, which covers the period

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.

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.

6. **Non-Energy Impacts (NEIs)** – 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 evaluation research would cover gas-specific measures.

The four-year research plan schedule is summarized in Table 5. Some research activities identified in Table 5 are under consideration, but not committed.

Table 5. Four-Year Research Plan

Activity	Status	Plan Description	2018	2019	2020	2021
Residential Advanced Thermostat Billing Analysis for 2020-21 heating season	Planned	HEJ and Home Energy Rebate			3Q-4Q	1Q-3Q
Steam Traps – Background Research on Viability of Impact Study	Active	Business - Prescriptive Rebate	2Q-4Q	1Q		
Steam Traps – Impact Study with Usage Billing Data *	Under Consideration			2Q-4Q		
Non-Residential Pipe Insulation – Thermal Regain Factors and Primary Research Opportunities	Active	Business - Prescriptive Rebate	2Q-4Q	1Q		
Small Business Thermostats – Savings Benchmarking	Active	Small Business Plan	2Q-4Q	1Q		
Small Business Advanced Thermostats – Billing Analysis †	Under Consideration	Small Business Plan			1Q-4Q	
Small Business– Process Research †	Under Consideration			1Q-4Q		
Home Energy Reports – Investigate Feasibility of a Persistence Study	Completed	Home Energy Reports	Q3			
Home Energy Reports – Persistence Study	Under Consideration	Home Energy Reports		2Q-3Q		
Income Eligible Single Family Retrofits Calibrated Simulations *	Under Consideration				1Q-4Q	

* Study is under consideration, but further exploration is needed prior to starting a research study.

† Study is under consideration, but decision to proceed and timing depend on future program implementation plans.

Table 6. 2019 Research Study Schedule (Committed Activities)

Activity	Start Research	Draft Deliverable / Report	Final Deliverable / Report
Home Energy Reports – Determine whether dropped participants and existing HER program controls are randomly distributed	May 2019	3Q 2019	3Q 2019
Steam Traps – Impact Study Background Research	2Q 2018	4Q 2018	1Q 2019
Non-Residential Pipe Insulation – Thermal Regain Factors and Primary Research Opportunities	3Q 2018	1Q 2019	1Q 2019
Small Business Thermostats – Savings Benchmarking	3Q 2018	1Q 2019	1Q 2019

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 (planned for April 30), with draft results available July 15, and final results August 31.

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 (includes Residential New Construction)
 - Home Energy Jumpstart (HEJ)
 - Elementary Energy Education (EEE)
 - Home Energy Reports
 - Multi-Family Program
- Income Eligible Programs
 - Income Eligible Single-Family Retrofits
 - Income Eligible Multi-Family and Public Housing Energy Savings Programs
 - Income Eligible New Construction
- Business Programs (includes Public Sector)
 - Direct Installation and Prescriptive Rebates
 - Custom Rebates (Custom)
 - Gas Optimization
 - Joint Retro-Commissioning (RCx)
 - Strategic Energy Management (SEM)
 - Small Business
 - Joint Business New Construction
- Market Transformation Initiatives
 - Market Transformation Initiatives

A.1 Residential Programs

Home Energy Rebate Program 2019 – 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.

Three-Year Evaluation Plan Summary

We have prepared a three-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. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Gross Impact - Mid-Year Review of TRM Compliance	X	X	X
Gross Impact - End-of-Year Savings Verification	X	X	X
Primary Research to Update the TRM - Smart Thermostat Billing Analysis		3Q-4Q	1Q-3Q
Research - Participant FR plus Process Survey	3Q-4Q	1Q-2Q	
Research - Participant SO plus Process Survey		One Time 2Q	
Research – Trade Ally FR and SO plus Process Survey		One-Time 2Q	
Process and NTG Research Results		July 1 (NTG) Sept 1 (Process)	
Process - Program Manager and Implementer Interviews/ Review Materials	X	X	X

Evaluation Plan for 2019

Evaluation Research Objectives

The evaluation team has identified the following key objectives for evaluation research for 2019:

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 2019 will focus on program delivery from the participant perspective. The process research will address the following questions through survey research:

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?

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 new construction 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. 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. The evaluation team will modify calculations if methods are not reasonable or if verified project characteristics differ from that which was used in the ex ante savings calculation. If program volume is sufficient, Navigant will consider a calibrated simulation approach in 2020, where building models are calibrated using actual billing data.

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. In 2020, Navigant plans to initiate a quasi-experimental design study to conduct primary billing data research on the natural gas impact of Advanced Thermostats, to inform future updates to the TRM.

Net Impact Evaluation

The 2019 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 2019

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 - Air Sealing and Insulation Measures	0.73†
Home Energy Rebate - Duct Sealing Measures	0.78‡
Home Energy Rebate - Duct Sealing, Air Sealing and Insulation Measures***	0.75§
Residential New Construction	0.65

Source: PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-1_Final.xlsx.

* The savings for natural gas heating provided in Illinois TRM Version 7.0, Section 5.3.16 is a net savings value.

† Measure-level NTG value of 0.73 applies to any single measure or combined set of air sealing and insulation measures, alone or in combination with other measures installed in the same project, EXCLUDING the net savings for air sealing and attic insulation installed in the same project (those net savings are always calculated separately).

‡ Measure-level NTG value of 0.78 for duct sealing applies only if the measure level NTG of 0.73 is used for air sealing (w/o attic insulation) and other insulation measures

§ Program-level NTG value of 0.75 applies to all DS/AS/I measures, alone or in combination, EXCLUDING the net savings for air sealing and attic insulation installed in the same project (those net savings are always calculated separately)

|| PGL and NSG do not have a deemed value established for residential new construction. We propose to use

the value of 0.65 that is used by ComEd and Nicor Gas, source:

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/ComEd_NTG_History_and_2019_Recommendations_2018-10-01.pdf, and

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final.pdf.

Process and NTG Research

Using program tracking data with participants' email addresses, we will conduct research on free ridership in the second half of 2019 and into Spring of 2020 through an online participant survey. 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 online survey. If adequate email addresses are not available, Navigant will conduct this research through a telephone survey. In Spring 2020, Navigant will conduct participant spillover research through a participant telephone survey as well as research on non-participant spillover and trade ally perspective of participant free ridership through a participating trade ally survey.

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

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

What	Target	Completed Interviews	When	Comments
In Depth Interviews	Program Management	1-2	Q2 2019	Interview program staff
Mid-Year TRM Compliance Review	All Program TRM Measures		Q2 2019	Review program tracking data using the TRM measure characterizations
End-of-Year Savings Verification	All Participating Customers		Feb – March 2020	Gross savings verification using the TRM and customer-specific data collected in the tracking system
Process and Free Ridership Research – Online Surveys	Participating Customers	TBD	Q3-Q4 2019	Process and free ridership. Repeat Q1-Q2 2020
Process and Spillover Survey Research – CATI Surveys	Participating Customers	TBD	Q2 2020	Process and spillover
Process and NTG Survey Research	Participating Trade Allies	TBD	Q2 2020	Process, free ridership, and spillover

Evaluation Schedule for 2019

Table 4 below provides the schedule for evaluation of the 2019 Home Energy Rebate Program. Adjustments will be made as needed as program year evaluation activities begin.

Table 4. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Participant Process and Free Ridership Survey	Evaluation Team	Q3-Q4, 2019, Q1-Q2 2020
Participant Process and Spillover Survey	Evaluation Team	Q2, 2020
Trade Ally Process, Free Ridership and Spillover Survey	Evaluation Team	Q2, 2020
NTG Research Findings Memo	Evaluation Team	July 1, 2020
Participant and TA Process report	Evaluation Team	September 1, 2020
Mid-Year TRM Compliance Review and Findings Memo	Evaluation Team	July 1, 2019
Final Tracking Data to Navigant	Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 3, 2020
Send Revised Draft	Evaluation Team	April 13, 2020
Comments on Redraft	PGL & NSG / SAG	April 20, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 27, 2020

Home Energy Jumpstart Program 2019 – 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 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.

Three-Year Evaluation Plan Summary

We have prepared a three-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. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Gross Impact - Mid-Year Review of TRM Compliance	X	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X	X
Primary Research to Update the TRM - Smart Thermostat Billing Analysis		3Q-4Q	1Q-3Q
Research - Participant FR plus Process Survey			One Time
Research - Participant SO plus Process Survey			One Time
Present NTG Research Results			Q3
Process - Program Manager and Implementer Interviews/ Review Materials	X	X	X

Residential Advanced Thermostat Billing Analysis – Navigant plans to 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 will produce a TRM work paper if the assumptions or methodology needs to be updated based on study findings.

Evaluation Plan for 2019

Evaluation Research Objectives

The evaluation team has identified the following key objectives for evaluation research for 2019:

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 2019 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.

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. For 2020, Navigant plans to initiate a quasi-experimental design study to conduct primary billing data research on the natural gas impact of Advanced Thermostats, to inform future updates to the TRM.

Net Impact Evaluation

The 2019 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 2019

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_2019_Recommendations_2018-10-1_Final.xlsx.

** The savings for natural gas heating provided in Illinois TRM Version 7.0, Section 5.3.16 is a net savings value.*

Process and NTG Research

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. There will be no primary NTG research in 2019.

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

What	Target	Completed Interviews	When	Comments
In Depth Interviews	Program Management	1-2	Q2-Q3 2019	Interview program staff
Mid-Year TRM Compliance Review	All Program TRM Measures		Q2 2019	Review program tracking data using the TRM measure characterizations
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures		Feb – March 2020	Gross savings verification using the TRM and customer-specific data collected in the tracking system

Evaluation Schedule for 2019

Table 4 below provides the schedule for evaluation of the 2019 HEJ Program. Adjustments will be made as needed as program year evaluation activities begin.

Table 4. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Mid-Year TRM Compliance Review and Findings Memo	Evaluation Team	July 1, 2019
Final Tracking Data to Navigant	Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 3, 2020
Send Revised Draft	Evaluation Team	April 13, 2020
Comments on Redraft	PGL & NSG / SAG	April 20, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 27, 2020

Elementary Energy Education Program 2019 – 2021 Evaluation Plan

Introduction

The Elementary Energy Education (EEE) Program’s primary focus is to produce electricity and natural gas savings in the residential sector by motivating students and their families to take steps to reduce energy consumption for water heating and lighting in their home. The program is offered in the electric service area of ComEd and the natural gas service areas of Nicor Gas (NG), Peoples Gas (PGL), and North Shore Gas (NSG).

Three-Year Evaluation Plan Summary

We have prepared a three-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. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Gross Impact - Mid-Year Review of TRM Compliance	X	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X	X
Process Research		X*	
Process - Program Manager and Implementer Interviews/ Review Materials	X	X	X

* For consideration

Evaluation Plan for 2019

Evaluation Research Objectives

The evaluation team has identified the following key objectives for evaluation research for 2019:

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 2019 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.

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 EEE 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 because the savings from the program measures represents less than ~5% of whole home usage, which is not sufficient to achieve statistically significant savings estimates using this method.

Net Impact Evaluation

The 2019 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 2019

Program Path/Measure	Deemed NTG
Elementary Energy Education – All Measures	1.00

Source: PGL_and_NSOG_GPY7_NTG_Values_2017-03-01_Final.xlsx.

Process and NTG Research

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. There will be no primary NTG research in 2019.

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

What	Target	Completed Interviews	When	Comments
In Depth Interviews	Program Management	1-2	Q3 2019	Interview program staff
Mid-Year TRM Compliance Review	All Program TRM Measures		Q2 2019	Review program tracking data using the TRM measure characterizations
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures		Feb – March 2020	Gross savings verification using the TRM and customer-specific data collected in the tracking system

Evaluation Schedule for 2019

Table 4 below provides the schedule for evaluation of the 2019 EEE Program. Adjustments will be made as needed as program year evaluation activities begin.

Table 4. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Mid-Year TRM Compliance Review and Findings Memo	Evaluation Team	July 1, 2019
Present Recommendation to Deem the NTG at 1.00	Evaluation Team	September 1, 2019
Final Tracking Data to Navigant	Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 2, 2020
Send Revised Draft	Evaluation Team	April 12, 2020
Comments on Redraft	PGL & NSG / SAG	April 19, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 26, 2020

Home Energy Reports Program 2019 – 2021 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 2019⁵, 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

Three-Year Evaluation Plan Summary

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

Table 1. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Tracking System Review	X	X	X
Data Collection – Program Manager and Implementer Interviews	X	X	X
Impact – End-of-Year Savings Verification	X	X	X
Investigate Persistence	1Q-4Q		

⁵ 2019 spans January 1, 2019 to December 31, 2019.

⁶ HER recipients remain part of the recipient sample unless they opt out of the program or move. Control group members remain part of the control sample unless they move.

Evaluation Plan for 2019

Evaluation Research Objectives

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 2019 for PGL and NSG?
 - a. What is the apparent long-run trend in program savings?
 - b. Are 2019 savings flat, increasing, or falling compared to prior program years?
2. What is the uplift in other PGL and NSG energy efficiency programs due to the HER program?

Navigant's 2019 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.

Impact Evaluation Methodology

Table 2 summarizes the evaluation tasks for 2019 that will be used to answer the evaluation research questions.

Table 2. 2019 Evaluation Plan Summary

Activity	2019
Gross, Net Impact Approach	Regression analysis
NTG Approach†	Uplift analysis
Program Manager and Implementer Interviews/ Review Materials	Yes

† The regression analysis produces impacts which are intrinsically net savings, aside from uplift.

Gross Impact Evaluation

For the four PGL and NSG waves, Navigant will measure 2019 program impacts through billing analysis using lagged dependent variable (LDV)⁷ and linear fixed effects regression (LFER) models, both of which were used and described in the GPY5 evaluation report.⁸

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 2019, as we did in our GPY4 and GPY5 evaluations, because we believe that, on balance, it has superior statistical properties.⁹ 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 2019 and legacy uplift from previous program years.

TRM Research

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,¹⁰ Navigant will determine whether these dropped

⁷ This model is identical to the post-program regression (PPR) model used in Navigant's previous evaluations. We have changed the nomenclature to better align with academic research and because LDV is more descriptive of the model structure than PPR.

⁸ 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.

⁹ 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.

¹⁰ Measure 6.1.1 is "Adjustments to Behavior Savings to Account for Persistence" in Illinois Statewide Technical Reference Manual, Version 6.0, Volume 4.

participants and existing HER program controls are randomly distributed by comparing usage of the two groups in the year prior to when the participants received HERs.

Assuming the participants and controls are randomly distributed, Navigant will consider 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.

Evaluation Schedule for 2019

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. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Interviews with program manager and IC	Evaluation Team	June 28, 2019
Data delivery to Navigant	Oracle	January 30, 2020
2019 EE Residential Program Tracking Data to Navigant	Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 2, 2020
Send Revised Draft	Evaluation Team	April 16, 2020
Comments on Redraft	PGL & NSG / SAG	April 23, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 30, 2020

Table 4. TRM Research Schedule – Key Deadlines

Activity/Deliverables	Responsible Party	Date Delivered
Interview program implementer about feasibility of a persistence study	Evaluation Team	December 4, 2018
Data request	Evaluation	May 14, 2019
Deliver Data	Oracle	June 18, 2019
Draft Decay Rate and Persistence Study and draft workpaper to PGL & NSG	Evaluation	Sept 24, 2019
Comments on drafts (15 Business Days)	PGL & NSG	Oct 21, 2019
Submit workpaper to the TAC	Evaluation	Oct 28, 2019

Multi-Family Program 2019-2021 Evaluation Plan

Introduction

The Multi-Family Energy Savings Program (MESP or 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 operation and maintenance issues that, if corrected, deliver energy and cost savings to building owners and managers supported by financial incentives.

Three-Year Evaluation Plan Summary

We have prepared a three-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. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Gross Impact - Mid-Year Review of TRM Compliance	X	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X	X
Gross Impact – Custom Project Savings Verification Waves and Large Project Pre-Installation Review	X	X	X
Gross Impact – End-of-Year Custom Project Savings Verification	X	X	X
Research - Participant FR plus SO plus Process Survey	X*		
Present NTG Research Results	Q3		
Process - Program Manager and Implementer Interviews/ Review Materials	X	X	X

FR – Free Ridership; SO - Spillover

* The FR and SO data collection and survey completion will extend into Q2 of 2019 and will be based on 2018 program data.

Navigant will coordinate with the ComEd evaluation team on any issues relevant to this joint program. Specifically, the NTG research activities and timeline will be coordinated with similar research to be conducted by ComEd. Navigant will coordinate the data collection and survey instruments design for consistency and capture the appropriate questions in the decision maker surveys. The joint program evaluations and reporting timelines will be the same.

Evaluation Plan for 2019

Evaluation Research Objectives

The evaluation team has identified the following key objectives for evaluation research for 2019:

Impact Evaluation:

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

Process Evaluation:

Navigant's 2019 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. The process research will address the following questions:

1. What are building owners' and property managers' perspectives and overall satisfaction with the program?
2. How can the program be improved?

The NTG survey will include additional process questions to elicit feedback on participants' satisfaction and suggestions for program improvement.

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 2019 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 2019

Program Path/Measure	Deemed NTG
Multifamily In-Unit / Assessment/Direct Install (all measures except faucet aerators and showerheads when using TRM specified baseline average water flow rates)	0.85
Assessment/Direct Install (faucet aerators and showerheads when using TRM specified baseline average water flow rates)	1.03
Multifamily Comprehensive / Prescriptive Rebates	0.76
Multifamily Comprehensive (TAPI Incentives / Partner Trade Allies)	0.88
Multifamily Comprehensive / Custom Rebates	0.72
Multifamily Comprehensive / Roll-up of Prescriptive, PTA, and Custom	0.84
Multifamily Comprehensive / Gas Optimization	0.91

Source: http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-01_Final.xlsx

NTG Research

Navigant will conduct primary research during program year 2019 to provide NTG values for potential deeming in future program years through surveys with 2018 participating decision-maker customers.

We will complete computer assisted telephone interviews (CATI) with contacts who participated in the 2018 program to quantify participant free ridership. A telephone survey will collect information on free ridership close to the time the customer made the decision to participate in the program. A telephone survey will collect information on spillover with participants of GPY6. Sample design will attempt to achieve a 90/10 confidence/precision level of NTG ratios at the measure category level (for measures that achieve most of the program savings), and a roll up at the program-level, through a weighted average of measure energy savings in the program.

The Peoples Gas and North Shore Gas NTG research activities and timeline will be coordinated with similar research to be conducted by the ComEd and the Nicor Gas multi-family programs. Navigant will coordinate the data collection and survey instruments design for consistency and capture the appropriate questions in the decision maker surveys.

Process Research

The process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings and during the decision maker customer surveys. The study will be conducted using program year 2018 participants and include surveys with participating decision makers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program offerings and changes to program application requirements.

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

What	Target	Completed Interviews	When	Comments
In Depth Interviews	Program Management	1-2	January 2019	Interview program staff
Process and NTG Survey Research (CATI)	Participating Building Owners and Managers	TBD	Q1 2019 to Q2 2019	Process, free ridership, and spillover
Mid-Year TRM Compliance Review	All Program TRM Measures		Q2 2019	Review program tracking data using the TRM measure characterizations
Custom Project Savings Verification	Completed Custom Projects		Q2 to Q4 2019	One or two sampling waves
Large Project Pre-Installation Review	Custom Projects in the Pre-Installation Phase		When requested during 2019	Evaluator feedback on savings methodology and baseline on large projects (if any) in pre-installation stages
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures		Feb – March 2020	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		Feb – March 2020	Custom projects not previously sampled

Evaluation Schedule for 2019

Table 4 below provides the schedule for evaluation of the 2019 Multi-Family Program. Adjustments will be made as needed as program year evaluation activities begin.

Table 4. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Mid-Year TRM Compliance Review and Findings Memo	Evaluation Team	July 1, 2019
Custom Project Savings Verification Waves	Evaluation Team	Q2 2019 to Q1 2020
Large Custom Project Pre-Installation Review (If any)	Evaluation Team	Ten business days
Final Tracking Data to Navigant	Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 3, 2020
Send Revised Draft	Evaluation Team	April 10, 2020
Comments on Redraft	PGL & NSG / SAG	April 17, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 26, 2020
Conduct Process and NTG Survey	Evaluation Team	Q1-Q2 2019
NTG Research Findings Memo	Evaluation Team	July 31, 2019
Process Research Findings	Evaluation Team	September 1, 2019

A.2 Income Eligible Programs

Peoples Gas and North Shore Gas Income Eligible Single Family Program 2019 to 2021 Evaluation Plan

Introduction

The Income Eligible Single Family Program provides retrofits to single-family households in Peoples Gas (PGL) and North Shore Gas (NSG) 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 and this program component is jointly offered by ComEd and Peoples Gas. The other component is delivered leveraging the State of Illinois' Home Weatherization Assistance Program ("IHWAP").

Eligible program measures include but are not limited to:

- Advanced and programmable thermostats
- HVAC equipment such as boilers, furnaces, central and room air conditioners and ductless heat pumps
- High efficiency water heaters and furnaces
- Low-flow faucet aerators and showerheads
- Attic and wall insulation
- Air sealing
- Health and safety measures, such as installation of vents and electrical repairs

Three-Year Evaluation Plan Summary

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

Table 1. Evaluation Approaches – Three Year Plan

Tasks	2019	2020	2021
Impact – Engineering Review	X	X	X
Impact – Verification & Gross Realization Rate	X	X	X
Impact – Field Work		X	
Impact – Billing Analysis*		X	
Data Collection - Program Manager and Implementer Interviews	X	X	X
Data Collection - Participant Surveys	X		X
Data Collection - Energy Efficiency Service Provider Interviews		X	
Data Collection - Community Action Agency Focus Groups	X		X

* Under consideration

The evaluation team created the evaluation approach for the 2019-2021 period based on the needs of the program and program's history. In 2018, our impact evaluation efforts focused on verification of tracking data against the TRM¹¹ and our process evaluation efforts focused on questions related to gaps in participation and the program transition. In 2019, we will continue process evaluation efforts to inform additional research for upcoming years. Looking forward, the three-year evaluation approach for this program includes:

- Tracking data review and engineering analysis each year to calculate gross and net impacts
- Field work in 2020 to confirm measure installation and to assess any missed energy savings opportunities
- If program volume is sufficient, Navigant will consider a billing analysis or calibrated simulation study in 2020 to determine the accuracy of TRM savings estimates and capture interactive savings effects. This timeline will allow for one year of post-participation data collection on 2018 participants.

Coordination

The evaluation team will coordinate closely with the ComEd evaluation team on issues common to the CBA component and the IHWAP component. The evaluation team will also coordinate with the Illinois Income Eligible Stakeholder Advisory Group and as needed, with Ameren Illinois since they have a suite of energy efficiency programs for income eligible customers.

Evaluation Research Questions

The 2019 evaluation will seek to answer the following key research questions:

Impact Evaluation

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

Process Evaluation and Other Research Topics

The process evaluation effort for program year 2019 will focus on program delivery. The process research will address the following questions:

1. What are participants' perspectives and overall satisfaction with the program?
2. What is the impact of the 2018 transition on the Community Action Agencies (CAAs)? Are the reporting processes working well for them? What are the CAAs perspectives and experience with the program?
3. How can the program be improved?
4. How can program processes be streamlined within state and federal regulations?

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

5. How did customers become aware of the program? What marketing strategies could boost program awareness?
6. Are there any program pain points and, if yes, what are ways to improve these points?

Evaluation Approach

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

Table 2. 2019 Core Data Collection Activities, Sample, and Analysis

Activity	Target	Target Completes	Notes
Gross Impact Evaluation	Engineering Impact Review	NA	Mid-Year and End of Year
Focus Group	Community Action Agencies	Sample	IHWAP component
In-Depth Interviews	Program Management and Implementers	2	Will conduct for both program components. Augment with periodic calls.
Surveys	Participants	Sample	One wave, will conduct for IHWAP component

*Navigant will coordinate with ComEd and Peoples Gas and North Shore Gas to determine appropriate dates to pull tracking data extracts for each wave.

Gross Impact Evaluation

Since the Single Family Retrofit Program derives savings from deemed values contained in the TRM¹², 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

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

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

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

Use of Randomized Controlled Trial and Quasi-Experimental Design

To conduct the billing analysis in 2020, Navigant will use a quasi-experimental design to confirm TRM savings estimates for groups of measures (if the study proceeds). We will not be evaluating the

¹² Illinois Statewide Technical Reference Manual for Energy Efficiency Version 7.0,
<http://www.ilsag.info/technical-reference-manual.html>

program via a randomized controlled trial because randomly assigned treatment and control groups are not part of the program's design.

Verified Net Impact Evaluation

The TRM deems NTG at 1.0 for Income Eligible programs.

Research NTG Impact Evaluation

No NTG research is planned for this income-eligible program.

Process Evaluation

The program year 2019 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during participant surveys. The 2019 study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, a customer survey, and a focus group with community action agencies (CAAs). The process research will be coordinated with ComEd in the joint program implementation.

The customer survey will target all participants in the IHWAP component since the program's ramp up in June 2018. The survey will focus on customer awareness, perspectives, and satisfaction. This survey research will be conducted in August 2019.

The focus group will assess how reporting processes are working for CAAs following the 2018 transition by collecting information from the most active CAAs on perspectives and satisfaction with program implementation.

Evaluation Schedule

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

Table 3. Schedule – Key Deadlines

Activity or Deliverable	Responsible Party	Date Delivered
Community Action Agency Focus Groups	Evaluation	Q1, 2019
Process Survey Fielding, Participants	Evaluation	Q2-Q3, 2019
Interim project documentation engineering review	Evaluation	July 1, 2019
2019 Program tracking data for Final Wave	PGL & NSG	January 30, 2020
Process Analysis Findings	Evaluation	September 1, 2019
Draft Report to PGL & NSG and SAG	Evaluation	March 13, 2020
Comments on draft (15 Business Days)	PGL & NSG and SAG	April 3, 2020
Revised Draft by Navigant	Evaluation	April 10, 2020
Comments on redraft (5 Business Days)	PGL & NSG and SAG	April 17, 2020
Final Report to PGL & NSG and SAG	Evaluation	April 30, 2020

Peoples Gas and North Shore Gas Income Eligible Multi-Family and Public Housing Energy Savings Programs 2019 to 2021 Evaluation Plan

Introduction

The primary objectives of the program year 2019 evaluation of the Income Eligible Multi-Family and Public Housing Energy Savings Programs are to quantify gross and net savings impacts from the programs and determine key process-related program strengths and weaknesses to identify ways in which the programs can be improved. This three-year evaluation plan includes activities scheduled to evaluate the program savings impact and process activities for 2019 through 2021.

The programs provide retrofits in common areas and tenant spaces in Public Housing Authority (PHA) buildings and other multi-family buildings that have a specific designation as low income. The offering provides incentives for building system updates (boilers, central plants, HVAC tune-ups, custom projects) as well as direct install opportunities for qualified buildings in the PGL and NSG service territories.

Three-Year Evaluation Plan Summary

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

Table 1. Evaluation Approaches – Three Year Plan

Tasks	2019	2020	2021
Mid-year tracking data ex ante savings review	X	X	X
Data Collection – Property Manager/Owner Interviews	X*		
Data Collection – Program Manager and Implementer Interviews	X	X	X
Impact – Engineering Review	X	X	X
Impact – Measure-Level TRM Savings Review	X	X	X
Impact – Field Work	X		
Process Analysis	X	X	X

* Interviews planned for 2018 will occur in 2019.

Coordination

Evaluation will coordinate closely with the other gas and electric utilities on issues common to this program. Ameren Illinois has a suite of energy efficiency programs for income eligible customers and evaluation will coordinate with Ameren on an as needed basis. Additionally, Navigant will solicit feedback from and coordinate with the Income Eligible Stakeholder Advisory Committee.

Evaluation Research Topics

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

Impact Evaluation

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

Process Evaluation and Other Research Topics

The process evaluation effort for 2019 will focus on program delivery. The process research will address the following questions:

1. What are property managers' and building owners' perspectives and overall satisfaction with the program?
2. Are there barriers to participation? The following subjects will be investigated: incentive levels for building systems measures, health and safety issues, and master metered vs individually metered properties.
3. How can the program be improved?

Evaluation Approach

The table below summarizes the evaluation tasks for 2019 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

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

Activity	Target	Target Completes 2019	Timeline	Notes
In Depth Interviews	Program Management and Implementers	2	January 2019	Augment with periodic calls
Process Survey	Property Manager/Owner	Sample	Q2-Q3, 2019	One Wave*
Gross Impact	TRM Measure Review	All	June 2019 – March 2020	Mid-Year, End-of-Year*
Gross Impact	Engineering File Review and Field Work	Sample	June 2019 – March 2020	Two Waves*
Verified Net Impact	Calculation using deemed NTG ratio	NA	March 2020 – April 2020	

* Navigant will coordinate with PGL and NSG to determine appropriate dates to pull tracking data extracts for each wave.

Gross Impact Evaluation

The Income Eligible Multi-Family and Public Housing Programs savings verification will be based on using the applicable Illinois TRM (v7.0), or secondary research for any measure with custom savings inputs. Gross savings will be evaluated primarily by: (1) reviewing the tracking system data to ensure

that all fields are appropriately populated; (2) reviewing measure algorithms and values in the tracking system to assure that they are appropriately applied; and (3) cross-checking totals. Verified gross savings will be estimated by multiplying TRM-derived per unit therm savings by the verified quantity of eligible measures.

This approach will be supplemented with a review of documentation on a sample of projects in some program years to verify participation, installed measure quantities, and associated savings, and verification of installation of energy efficient measures through participant surveys or field work.

Use of Randomized Controlled Trial and Quasi-Experimental Design

We are not evaluating this 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 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. Also, it would not be possible to create a valid matched control group for the customers in this program.

Verified Net Impact Evaluation

The TRM deems NTG at 1.0 for income eligible programs.

Research NTG Impact Evaluation

No NTG research will be done for this income eligible program.

Process Evaluation

The program year 2019 process evaluation research will include a synthesis of both qualitative and quantitative data collected during the program staff and implementer interviews and meetings, and during the property owner or manager surveys. The 2019 study will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, amidst varying opportunities from program offerings. Interview questions will also seek to identify how to qualify properties and people for this program and the result will be a sector-level customer journey map to visualize customer satisfaction.

Evaluation Schedule

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

Table 3. Schedule – Key Deadlines

Activity or Deliverable	Responsible Party	Date Delivered
Program Operations Manual Review	PGL & NSG	January - March, 2019
2019 program tracking data for Wave 1 early impact review and process survey work	PGL & NSG	June 30, 2019
Building Owner / Manager process survey fielding	Evaluation	Q2-Q3, 2019
Mid-year impact findings memo	Evaluation	July 1, 2019
Final 2019 Tracking Data to Navigant	PGL & NSG	January 30, 2020
Process Analysis Findings	Evaluation	September 1, 2019
Draft Report to PGL & NSG and SAG	Evaluation	March 7, 2019
Comments on draft (15 Business Days)	PGL & NSG and SAG	March 28, 2020
Revised Draft by Navigant	Evaluation	April 7, 2020
Comments on redraft (5 Business Days)	PGL & NSG and SAG	April 14, 2020
Final Report to PGL & NSG and SAG	Evaluation	April 22, 2020

Peoples Gas and North Shore Gas Income Eligible New Construction Program 2019 to 2021 Evaluation Plan

Introduction

The Peoples Gas (PGL) and North Shore Gas (NSG) Affordable Housing New Construction program provides technical assistance and incentives for energy-efficient construction and major renovation of single-family and multi-family affordable housing. The program targets affordable housing developers and owners for the construction of housing for customers with incomes at or below 80% of the Area Median Income. An additional goal of the program is to educate housing developers on cost-effective energy efficient building practices. The program has three participation levels: major renovation, new multi-family, and new single-family. The program is a coordinated program with ComEd and Nicor Gas.

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

Table 1. Evaluation Approaches – Three Year Plan

Tasks	2019	2020	2021
Tracking System Review	X	X	X
Data Collection - Program Materials Review	X		X
Data Collection - Program Manager and Implementer Interviews	X	X	X
Data Collection - Developer Interviews		X	
Impact - Engineering Review	X	X	X
Impact - Measure-Level Deemed Savings Review	X	X	X
Impact - Verification & Gross Realization Rate	X	X	X
Process Analysis	X	X	X

The evaluation team determined the evaluation approach for the 2019-2021 period based on the needs of the program and the program's prior history. The three-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 conducted every other year, starting in 2019
- Interviews with affordable housing developers will be conducted in 2020

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 and Nicor Gas, the evaluation team will coordinate closely with these 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.

Evaluation Research Topics

The 2019 evaluation will seek to answer the following key researchable questions:

Impact Evaluation

1. What are the verified gross annual energy savings for the program?
2. What are the verified net annual energy savings for the program?

Process Evaluation and Other Research Topics

In 2019, Navigant will review results of our Q4 2018 AHNC developer survey to address the following questions:

1. How can the program be improved? Are there changes or improvements which could be made to the educational component of the program?
2. Do program marketing materials effectively target affordable housing developers and owners?
3. Do program materials clearly guide affordable housing developers through the participation process?

Evaluation Approach

Table 2 summarizes the evaluation tasks for 2019 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

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

Activity	Target	Target Completes 2019	Notes
Gross Impact Evaluation	Engineering review	Census	Mid-Year
Gross Impact Evaluation	Early feedback review	As needed	Early feedback for large projects
Gross Impact Evaluation	Engineering review	All	End-of Year
Verified Net Impact Evaluation	Calculation using deemed net-to-gross (NTG) ratio	NA	
In-Depth Interviews	Program management and implementers	2	
Program Materials Review	Program manuals, brochures, application forms, marketing materials	All	

* Navigant will coordinate with Peoples Gas and North Shore Gas to determine appropriate dates to pull tracking data extracts for each wave.

Tracking System Review

Navigant will review program tracking system data to ensure these systems gather the data required to support evaluation activities and allow program managers to monitor key aspects of program performance at regular intervals. Additionally, the evaluation team will review the tracking system data to ensure that all fields are appropriately populated and are consistent with the values in the project savings calculators.

Gross Impact Evaluation

Since the Affordable Housing New Construction program savings are derived from deemed values contained in the TRM¹³, gross savings will be evaluated primarily by (1) reviewing the project savings calculators to ensure that all fields are appropriately populated; (2) reviewing measure algorithms and values in the project savings calculators to assure they are appropriately applied; and (3) cross-checking totals. This approach will be supplemented, where possible, with a review of project documentation in each program year to verify participation, installed measure quantities, and associated savings.

Navigant will perform a tracking system and project savings calculator review in two waves during the 2019 evaluation period. Final program gross and net impact results will be based on the two waves combined. Proposed gross impact timelines for 2019 are shown below:

- a) First wave will be drawn in May 2019 and completed in August 2019
- b) The final tracking data is provided by Peoples Gas and North Shore Gas by January 30, 2020, with reporting finalized by April 30, 2020

Verified Net Impact Evaluation

The TRM deems the NTG ratio at 1.0 for income-eligible programs.

Research NTG Impact Evaluation

The program has historically seen a deemed NTG ratio of 1.0 because the program targeted the income-eligible sector. However, TRM v7.0 includes the following language,

“There has been general consensus among Illinois stakeholders that the NTG value for Income Eligible programs is not likely to be significantly different from 1.0, particularly where the person making the participation decision is the Income Eligible resident. Until the Stakeholder Advisory Group (SAG) establishes a different policy, the NTG value will be deemed at 1.0. Discussions will be held with SAG members on the value in and methods for performing such research and the timing of the application of such research.”

In 2019, Navigant will review results of our Q4 2018 AHNC developer survey which qualitatively explores free ridership among participating developers (who typically are not the income eligible customer). If results from this survey suggest substantial free ridership, then Navigant will initiate a

¹³ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 7.0 for 2019, available at: <http://www.ilsag.info/technical-reference-manual.html>

discussion with SAG members on the value of potential research to quantify free ridership for the program.

In-Depth Implementer Interviews

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

Program Materials Review

Navigant will review program materials for consistency and effectiveness in messaging, program requirements, and the participation process. Program materials to review may include websites, brochures, application forms, newsletters, email blasts, and implementation manuals.

Randomized Controlled Trial and Quasi-Experimental Data

Navigant is not evaluating the Affordable Housing New Construction program via a randomized controlled trial because the program was not designed with randomly assigned treatment and control groups. We are not using quasi-experimental consumption data because it would not be possible to create a valid matched control group for the customers in this program.

Evaluation Schedule

Table 3 provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress.

Table 3. Schedule – Key Deadlines

Activity or Deliverable	Responsible Party	Date Delivered
2019 program tracking data, project savings calculators, and project documentation	PGL & NSG	April 3, 2019
Program manuals and marketing materials	PGL & NSG	August 9, 2019
Wave 1 findings	Evaluation	July 1, 2019
Process evaluation findings report	Evaluation	September 1, 2019
2019 program tracking data, project savings calculators, and project documentation	PGL & NSG	January 30, 2020
Draft report to PGL & NSG and SAG	Evaluation	March 6, 2020
Comments on draft (15 business days)	PGL & NSG and SAG	March 27, 2020
Revised draft by Navigant	Evaluation	April 3, 2020
Comments on redraft (5 business days)	PGL & NSG and SAG	April 10, 2020
Final report to PGL & NSG and SAG	Evaluation	April 24, 2020

A.3 Business Programs (includes Public Sector)

Business Program and Public Sector (Energy Jumpstart and Prescriptive Rebate Paths) 2019 – 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. Navigant will produce separate reporting of impacts, research findings, and recommendations for the Business Program and Public Sector.

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.

A midstream incentive pilot program begun in 2017 encourages greater adoption of energy-efficient equipment in commercial kitchens within the city of Chicago. While the PGL Natural Gas Savings program currently offers prescriptive rebates for energy-efficient commercial kitchen equipment, the mid-stream pilot seeks to increase uptake by providing instant rebates to Chicago customers purchasing equipment through area food service equipment distributors.

Three-Year Evaluation Plan Summary

We have prepared a three-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. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Gross Impact - Mid-Year Review of TRM Compliance	X	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X	X
Secondary Research and Updated TRM Work Papers for Pipe Insulation Thermal Regain Factors	X		
Steam Traps – Background Research on Viability of Impact Study	Q1		
Primary Research to Update the TRM – Steam Trap Impact Billing Analysis (Study under consideration)	X		
Research – BP Participant FR+SO plus Process Survey	X*		
Research – PS Participant FR+SO plus Process Survey	X*		
Research – BP and PS Trade Ally FR+SO plus Process Survey	X*		
Present NTG Research Results		Q3	
Process - Program Manager and Implementer Interviews/ Review Materials	X	X	X

* The FR and SO data collection and survey completion will extend into Q2 of 2020 but will be based on 2019 program data, unless there is a particular interest to consider part of 2020 program year data.

Evaluation Plan for 2019

Evaluation Research Objectives

The evaluation team has identified the following key objectives for evaluation research for 2019:

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)?

Navigant will continue the secondary research investigation of thermal regain factors for non-residential pipe insulation and submit findings in Q1 of 2019. As part of the secondary research,

Navigant will investigate opportunities for primary research on pipe insulation savings, including examining the tracking data for project characteristics and talking with the implementer about primary data that may be available.

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 a steam trap billing analysis should be pursued.

At this time, evaluators and utilities are investigating the population of dry cleaning businesses statewide as a possible study target that may have sufficient numbers of participants and non-participants to conduct a viable billing analysis. If consensus points to a feasible study, we will conduct this study as soon as possible. Other action items (for example gathering participant feedback on their method of condensate handling) may inform updates to the Version 8 TRM. A dry cleaner billing analysis, if conducted, would likely occur during 2019 and result in an update for TRM Version 9.

The evaluation team will conduct free ridership research with participating customers through a telephone survey to determine free ridership in waves to facilitate participant recall by spacing the timing of the survey close to the date of participation (Q2 2019 – Q2 2020). In Q2 2020 a one-time telephone survey will be conducted to assess spillover. 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 2019 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 for 2019 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?

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 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. In 2019, we are investigating whether drycleaner steam traps can be analyzed by quasi-experimental design.
- 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 2019 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 2019

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_2019_Recommendations_2018-10-1_Final.xlsx.

Process and NTG Research

Navigant will conduct one-time free ridership research through a participant survey, using program tracking data with participants' email addresses. We will conduct research on free ridership, satisfaction, and process-related questions in waves to facilitate participant recall by spacing the timing of the survey close to the date of participation (Q2 2019 – Q2 2020). Spillover research will be conducted through a one-time telephone survey in Spring 2020. 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 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

What	Target	Completed Interviews / Sample	When	Comments
In Depth Interviews	Program Management	1-2	Q1 2019	Interview program staff
Mid-Year TRM Compliance Review	All BP and PS Program TRM Measures	Census	Q2 2019	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	Feb – March 2020	Gross savings verification using the TRM and customer-specific data collected in the tracking system
Process and Free Ridership Research	Participating Customers	TBD	Q2 2019 – Q2 2020	2-3 Waves, Process and free ridership
Process and Spillover Survey Research	Participating Customers	TBD	Q2 2020	Process and spillover
Process and NTG Survey Research	Participating Trade Allies	TBD	Q2 2020	Process and spillover

Evaluation Schedule for 2019

Table 4 below provides the schedule for evaluation of the Prescriptive Rebate and Energy Jumpstart paths of the 2019 Business 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. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Participant Process and Free Ridership Survey	Evaluation Team	Q2, 2019 – Q2, 2020
Participant Process and Spillover Survey	Evaluation Team	Q2, 2020
NTG Research Findings Memo	Evaluation Team	July 1, 2020
Process Findings	Evaluation Team	September 1, 2020
Secondary Research and Updated TRM Work Papers for Pipe Insulation Thermal Regain Factors	Evaluation Team	March 15, 2019 (Findings) May 15, 2019 (Draft Workpaper, if updates are recommended)
Steam Trap Impact Study - Background Research on Study Viability, Memo	Evaluation Teams for PGL & NSG, Nicor Gas, and Ameren Illinois	Q1, 2019
Final Tracking Data to Navigant	Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 2, 2020
Send Revised Draft	Evaluation Team	April 9, 2020
Comments on Redraft	PGL & NSG / SAG	April 16, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 26, 2020

Business Program and Public Sector (Custom Rebate) 2019-2021 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 Business 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 separate reporting of impacts, research findings, and recommendations for the Business Program and Public Sector.

Three-Year Evaluation Plan Summary

We have prepared a three-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. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Gross Impact – Custom Project Savings Verification Waves and Large Project Pre-Installation Review	X	X	X
Gross Impact – End-of-Year Custom Project Savings Verification	X	X	X
Research – BP Participant FR+SO plus Process Survey	X*		
BP Present NTG Research Results	Q3		
Research – PS Participant FR+SO plus Process Survey		X*	
PS Present NTG Research Results			Q3
Process - Program Manager and Implementer Interviews/ Review Materials	X	X	X

* The FR and SO data collection and survey completion will extend into Q2 of 2019, but will be based on 2018 program data, unless there is a particular interest to consider part of 2019 program year data. The 2020 NTG research for the Public-Sector-only will similarly extend into 2021.

Evaluation Plan for 2019

Evaluation Research Objectives

The evaluation team has identified the following key objectives for evaluation research for 2019:

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 BP program, based on evaluation research?

During 2019, the evaluation team will conduct Net-to-Gross (NTG) research through interviews with participating BP customers to determine free ridership and spillover to inform NTG recommendations for 2019 and beyond. We will include Public Sector Custom Program participants in the 2019 survey research if projects were initiated under utility administration, but we do not expect a large enough population to produce a valid public sector NTG value for 2019. 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.

Process Evaluation:

Navigant will extend research and data collection activities began in 2018 through Q2 2019. This includes a review of program materials, and in-depth qualitative interviews with program management and implementers, and the NTG and process survey. 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. We will note differences between Business Program and Public Sector issues.

¹⁴ Survey completion will extend into Q2 of 2019 but will be based on 2018 program data, unless there is a particular interest to consider part of 2019 program year data.

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.

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 2019 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 2019

Program Path/Measure	Deemed NTG
BP Custom Rebates	0.69
PS Custom Rebates	0.69

Source: PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-1_Final.xlsx.

Process and NTG Evaluation

The 2019 process analysis will include a synthesis of both qualitative and quantitative data collected during the review of program materials (including prior program process evaluations), and in-depth qualitative interviews with program management and implementers (conducted both in 2018 and 2019). Other than the continuation of the research activities initiated in 2018 with planned completion in May 2019, there will be no additional primary research conducted for the Custom offering using 2019 participant data.

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

What	Target	Completed Interviews / Sample	When	Comments
In Depth Interviews	Program Management	1-2	Q1 2019	Interview program staff
Project Savings Verification	Completed BP and PS Custom Projects	90/10	Q2 to Q4 2019	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 for Rebates >\$75,000	When requested during 2019	Evaluator feedback on savings methodology and baseline on large projects in pre-installation stages
Process and NTG Survey Research	Participating Customer Decision Makers	TBD	Q1-Q2 2019	Process, free ridership, and spillover
End-of Year Project Savings Verification	Completed BP and PS Custom Projects	90/10	Feb – March 2020	Projects not previously sampled

Evaluation Schedule for 2019

Table 4 below provides the schedule for evaluation of the 2019 Custom 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. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Custom Project Savings Verification Waves	Evaluation Team	Q2 2019 to Q1 2020
Large Project Pre-Installation Review	Evaluation Team	Ten business days
Final Tracking Data to Navigant	Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 2, 2020
Send Revised Draft	Evaluation Team	April 13, 2020
Comments on Redraft	PGL & NSG / SAG	April 20, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 26, 2020
Conduct Process and NTG Survey	Evaluation Team	Q1-Q2 2019
NTG Research Findings Memo	Evaluation Team	July 31, 2019
Process Research Findings	Evaluation Team	September 1, 2019

Business Program and Public Sector (Gas Optimization Studies) 2019-2021 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 review a business facility for 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 separate reporting of impacts, research findings, and recommendations for the Business Program and Public Sector.

Three-Year Evaluation Plan Summary

We have prepared a three-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. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Gross Impact – Gas Opt Project Savings Verification Waves and Large Project Pre-Installation Review	X	X	X
Gross Impact – End-of-Year Gas Opt Project Savings Verification	X	X	X
Research – BP Participant FR+SO plus Process Survey	X		X
Research – PS Participant FR+SO plus Process Survey	X		X
Research – BP and PS Trade Ally SO plus Process Survey	X		
Process - Program Manager and Implementer Interviews/ Review Materials	X	X	X

Evaluation Plan for 2019

Evaluation Research Objectives

The evaluation team has identified the following key objectives for evaluation research for 2019:

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 2019 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.

Beginning in 2019, Gas Optimization participant NTG and process survey research will be conducted bi-annually on completed projects. This approach was chosen because the small annual population of projects and multi-year period from the initial study to project completion creates a challenge to get a representative sample of the program in a single year. In 2019 only, Navigant will conduct NTG and process research with gas optimization study providers. This research was deferred from GPY6 because a TRM NTG protocol was not approved until 2019.

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 2019 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 2019

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

Source: PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-1_Final.xlsx.

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.

Beginning in 2019, Gas Optimization participant NTG and process survey research will be conducted bi-annually on completed projects. This approach was chosen because the small annual population of projects and multi-year period from the initial study to project completion creates a challenge to get a representative sample of the program in a single year. In Q2 2019 only, Navigant will conduct telephone interviews with gas optimization study providers to gain further insights into NTG and process-related topics.

Participant research topics include an assessment of free-ridership and spillover, and the following process-related topics:

- Program satisfaction
- Program strengths and barriers
- Suggestions for improvement

Gas optimization study provider surveys also include an assessment of free-ridership and spillover, along with the following process-related topics: perspectives on customer participation experience, suggestions for increased energy savings and adoption of additional measures recommended in the study, and satisfaction. We will note differences between Business Program and Public Sector issues.

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

What	Target	Completed Interviews / Sample	When	Comments
In Depth Interviews	Program Management	1-2	Q3 2019	Interview program staff
Participant NTG and process survey research	2019 participants	TBD	Q1-Q2 2020	Telephone interviews
Study Service Provider NTG and process research	Active study service providers	TBD	Q2 2019	Telephone interviews
Project Savings Verification	Completed BP and PS Gas Optimization Projects	90/10	Q2 to Q4 2019	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	When requested during 2019	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	Feb – March 2020	Projects not previously sampled

Evaluation Schedule for 2019

Table 4 below provides the schedule for evaluation of the 2019 Gas Optimization 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. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Study Service Provider NTG findings	Evaluation Team	July 31, 2019
Study Provider and GPY6 Participant Process Research Findings	Evaluation Team	September 1, 2019
Gas Opt Project Savings Verification Waves	Evaluation Team	Q2 2019 to Q1 2020
Large Project Pre-Installation Review	Evaluation Team	Ten business days
Final Tracking Data to Navigant	PGL & NSG / Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 4, 2020
Send Revised Draft	Evaluation Team	April 11, 2020
Comments on Redraft	PGL & NSG / SAG	April 20, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 27, 2020

**ComEd, Nicor Gas and Peoples Gas and North Shore Gas Retro-Commissioning Program
2019 to 2021 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 2018 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 public and private 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 2019 to 2021:

Table 1. Evaluation Approaches – Three Year Plan

Tasks	2019	2020	2021
Tracking System Review	X	X	X
Data Collection – Participant Surveys	X		X
Data Collection – Program Manager and Implementer Interviews	X	X	X
Data Collection – Trade Ally Interviews		X	
Impact – Project-specific Billing Analysis	X	X	X
Impact – Engineering Review and Site Visits	X	X	X
Impact – Verification & Gross Realization Rate	X	X	X
Net-to-Gross – Customer Self-Report Surveys	X		X*
Net-to-Gross – Service Provider Interviews	X		X*
Process Analysis	X	X	X

Source: Navigant

* Electric only.

The evaluation team determined the evaluation approach for the 2019-2021 period based upon the needs of the program and program's prior history. The three-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 2019-2021.
- Because of the longevity and stability of the program, we will conduct process research with participants and service providers every other year, in keeping with past patterns. To minimize outreach costs, we will ask NTG questions during the same interview session as our process evaluation.
- Following the pattern from past evaluations, Navigant will conduct Net-to-Gross (NTG) research in alternate years. NTG research with participants and EESPs will conform to statewide NTG methodologies described in the Illinois Technical Reference Manual.

The primary objectives of the 2019 RCx evaluation is: (1) to quantify net savings impacts in therms, kWh, and kW from the program during 2019 and identify any systemic problems with calculators; (2) to update net-to-gross for program offerings for both gas and electric savings in 2019 and 2021 for electric and only 2019 for the gas companies; and (3) to determine key process-related program strengths and weaknesses and identify ways in which the program offering(s) can be improved. The process evaluation will include input from program management and the experiences of active EESPs and participants.

Coordination

Navigant will coordinate with the evaluation teams for other Illinois utilities on any issues relevant to this program. 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 Ameren Illinois (AIC) RCx Program. Both the

ComEd and AIC programs will conduct annual impact evaluations. Depending on the number of completed projects the AIC impact analysis may include a sample or census of participants. Approximately 30% of sampled projects will also receive on-site verification.

Evaluation Research Topics

The 2019 evaluation will seek to answer the following key researchable topics:

Impact Evaluation

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

Process Evaluation and Other Research Topics

The process evaluation effort for 2019 will include participants in the ComEd offerings. Process research may focus on persistence, channeling, and program delivery, and may address the following questions:

1. Why do Tune-Up customers drop out of the program?
2. How can channeling be increased across the portfolio?
3. How can reports be more valuable to the customers and offer next steps that are easy to follow?
4. How can program materials better encourage action from customers?
5. How does facility staff turn-over impact persistence of savings?
6. How do controls contractors impact project timelines?

Some insight into these questions may be learned from recent 2018 process evaluation research. Other topics for investigation may be raised by any of the coordinating utilities. New information will inform the TRM. Navigant will perform additional process research which may include research on impact of public sector projects introduced into the program, and effective useful life.

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 summarizes the evaluation tasks for 2019 including data collection methods, data sources, timing, and targeted sample sizes that will be used to answer the evaluation research questions.

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

Activity	Target	Target Completes 2019	Notes
Tracking System Review	Tracking system	Census	Three waves
In-Depth Interviews	Program Management and Implementers	4	Augment with monthly calls
Service Provider Interviews†	Active retro-commissioning service providers (EESP)	10	Census sample frame
Participant Interviews	Program Participants	40	Census sample frame
Gross Impact Evaluation	Early Feedback File Review	10	Early Feedback for Large Projects
Gross Impact Evaluation	Engineering File Review	53	Three Waves*
Gross Impact Evaluation	On-site M&V	26	
Verified Net Impact Evaluation	Calculation using deemed NTG ratio	Census	

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

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

Tracking System Review

In line with 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 in waves in 2019. Initial feedback on sampled project files will occur within 45 days of their posting. Navigant will report monthly preliminary evaluated impact findings. The three waves of M&V sampling are expected to cover about one fourth, one fourth and one half of the projects, respectively.

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.

In-Depth Interviews

We will conduct in-depth interviews with program managers and implementation contractors. Interviews will focus on progress to goals, identifying program successes and challenges, identifying drivers of those successes and challenges, as well as marketing tactics and EESP education.

Service Provider Interviews

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

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

Participant Interviews

We will interview 40 participants to inform NTG recommendations for each program offering, gauge participant satisfaction and answer other key participant research questions. Interviews will address free-ridership and participant spillover using protocols developed by the Illinois EM&V NTG Working Group and incorporated into the TRM.

We will target a 90/10 sample by program offering. For natural gas NTG research, we will attempt a census of all gas projects. Each gas participant data point will also constitute an electric participant data point.

Gross Impact Evaluation

The 2019 gross impact evaluation will not vary significantly from the previous years, but the sampling plan may be adjusted to reflect utility 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, to fit research within budget constraints and as permitted by ComEd.

The primary differentiator among participants is whether they are private or public-sector customers. Our sampling and analysis plans will seek to report on these groups with confidence and precision. The private sector offerings use an overlapping pool of service providers. As such, these projects will be sampled by size-based strata and analyzed together. The RCxpress or Building Tune-Up offering participants may form their own stratum(a) in the sampling protocol to ensure adequate representation in the sampling. The sampling plan for private sector participants will target at least overall 15% precision at 85% confidence using the stratified ratio estimation technique to optimize sample size and control evaluation costs. The strata will be defined by project size and/or offering type.

Public sector participants are significantly different from the private sector and these projects will be sampled separately, but in a similar manner, while also targeting overall 15% precision at 85% confidence¹⁵.

The impact research sample will be drawn in July 2019 based on actual status and *informed expectation to complete* prior to year's end. Since most RCx projects take several months between application and completion, the July status should identify most projects anticipated to complete in 2019. After program ex ante results are final, the July sample will be compared to the year-end program participation and savings, and Navigant will adjust the July sample to comply with sampling goals by adding additional projects to the sample (if participation exceeds July expectations), or not replacing projects that did not complete (if program participation falls short of July expectations).

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

2019 Gross Impact Research Waves

Navigant will perform tracking system review and M&V project review in three waves in 2019 following an initial sample plan in July 2019. The first wave of M&V review is expected to cover about one-quarter of the projects.

All sampled projects will be subject to engineering file review and about 50% of sampled projects will receive on-site inspection and verification of installed measures. Navigant will employ IPMVP – option A or B for projects enrolled in RCx, MBCx and RCxpress. Gross impact estimates will mimic ex ante methods to the extent they are reasonable and accurate per data collected during verification steps. The evaluation team will modify calculations if methods are not reasonable or if verified operation differs from what was reported.

The Tune-Up impacts will be verified by engineering file review and 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. This approach parallels IPMVP Option B or C, depending on which data are used. On-site verification of Tune-up projects will attempt to confirm that measures implemented for the program persist until evaluation verification. If implemented measures are not amenable to regression analysis, the engineering review will form the basis of evaluated savings using IPMVP Option A. This review process may point to special needs of this market segment. As noted above, Navigant will sample Tune-Up projects to report an offering-specific realization rate at 85/15 confidence and precision.

Proposed gross impact timeline:

¹⁵ 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) Projects completed and sampled at the time of the sample draw, will be researched by the end of October 2019.
- b) Second wave of completed projects will be posted in September 2019 and verified by December 2019.
- c) Final wave of completes will be posted January 15, 2020.

Table 3 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 2019 participation will be similar to 2018 participation¹⁶: RCx (14), MBCx (17), RCxpress (19), and Tune-Up (65). Participation by gas utility customers is unknown at the time of this Plan, but we anticipate approximately 40% of participants will be gas customers, based on recent history. The number of gas participants spread across three utilities may necessitate a near-census sampling of gas participants.

Table 3. 2019 Core Data Collection Activities and Sample*

What	Who	Private Sector Target Completes (approx.)	Public Sector Target Completes (approx.)
Engineering Review	Participating Customers	35	18
Onsite M&V Audit†	Participating Customers (nested among engineering review sample)	17	9
In Depth Interviews	Program Management‡	4	2

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

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

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

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

Savings Verification

- Any measures with per unit savings values deemed by the TRM, or otherwise directed by the TRM, would have verified gross savings estimated by multiplying deemed per unit savings (therm, kWh and kW) by the verified quantity of eligible measures installed. Eligible deemed measures must meet all physical, operational, and baseline characteristics required to be assigned to the deemed value as defined in the TRM.¹⁷

¹⁶ Counts based on analysis of the October 1, 2018 operations report and past performance completing pipeline projects.

¹⁷ Illinois Statewide Technical Reference Manual for Energy Efficiency Version 5.0, available at: <http://www.ilsag.info/technical-reference-manual.html>

- 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 will also include an analysis of on-site collected verification data for a subset of projects. The engineering analysis methods and degree of monitoring will vary from project to project, depending on 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. The sample of on-site visits drawn is also expected to achieve an approximate 90/10 confidence/relative precision level (one-tailed test) to comply with the PJM verification requirements outlined in Manual 18B.

Verified Net Impact Evaluation

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

Table 4. Deemed NTG Values for 2019

Coordinated Energy Efficiency Program Offering	2019 Deemed NTG Value
RCx	0.94
MBCx	0.94
RCxTune-Up	0.94
RCxpress	0.94
All-Natural Gas	0.94

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/ComEd_NTG_History_and_2019_Recommendations_2018-10-01.xlsx. Gas NTG values are found at http://www.ilsag.info/ntg_2019.html.

Navigant will apply overall values to all RCx Program offerings.

Research NTG Impact Evaluation

The evaluation team will conduct NTG research to inform NTG recommendations for the future for each program offering. Evaluators will collect NTG data for all program offerings in 2019 and 2021 for electric and in 2019 for gas. Public and private sector NTG will be determined separately. All NTG

research will address free-ridership and participant spillover using survey protocols developed by the Illinois EM&V NTG Working Group and incorporated into the TRM.

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

Use of Randomized Control 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.

Evaluation Schedule

Table 5 provides the schedule for key deliverables and data transfer activities. Adjustments will be made, as needed, as evaluation activities progress. We plan to conduct process evaluation activities early in the program year and report results to ComEd as valuable information becomes available by the 4th Quarter.

Table 5. Schedule – Key Deadlines

Activity or Deliverable	Responsible Party	Date Delivered
Program Operations Manual and Workpapers	ComEd	January 20, 2019
2019 program tracking data for QA/QC	ComEd	April 5, 2019
2019 program tracking data for sampling Wave 1	ComEd	April 30, 2019
Wave 1 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback	Evaluation	July 26, 2019
Tracking System Ex Ante Review Findings and Recommendations	Evaluation	July 26, 2019
2019 program tracking data for sampling Wave 2	ComEd	August 30, 2019
Wave 2 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback	Evaluation	November 30, 2019
2019 Program tracking data for sampling Wave 3	ComEd	January 17, 2020
Wave 3 project documentation, engineering reviews, schedule, conduct on-site M&V, feedback	Evaluation	February 24, 2020
Final Tracking Data from ComEd	ComEd	January 30, 2020
Illinois TRM Update Research Findings	Evaluation	March 2, 2020
Internal Report Draft by Navigant	Evaluation	March 2, 2020
Draft Report to ComEd, Gas Utilities, and SAG	Evaluation	March 9, 2020
Comments on draft (15 Business Days)	ComEd and SAG	March 30, 2020
Revised Draft by Navigant	Evaluation	April 7, 2020
Comments on redraft (5 Business Days)	ComEd and SAG	April 14, 2020
Final Report to ComEd, Gas Utilities, and SAG	Evaluation	April 24, 2020

PGL and NSG and ComEd Strategic Energy Management Program 2019 to 2021 Evaluation Plan

Introduction

The Strategic Energy Management (SEM) Program provides training and guidance to participating commercial and industrial customers, gathered in cohorts. Each cohort is a group of SEM participants that receive training together and work with each other to provide practical insight on how to implement energy efficiency measures at their sites. In addition, each site received one on one training to identify opportunities that were unique to each site. The program is jointly managed by ComEd and gas utilities. The program implementer manages the training and day to day operation of the SEM Program.

The goal of the SEM Program is to implement a process of continuous energy management improvements which result in energy savings and reductions in energy intensity. Energy savings can be achieved through operational and maintenance (O&M) improvements, incremental increases in capital energy efficiency projects, additional capital projects that would not otherwise have been considered (e.g., process changes, consideration of energy efficiency in all capital efforts), and improved persistence for O&M and capital projects. The program seeks to educate participants in the identification of low cost or no cost measures, improve process efficiency, and reduce energy use through behavioral changes.

Currently the program has two types of participants: (1) new cohort made up of new participants and, (2) the practitioners cohort for customers that continue to participate after their first year.

Notable program changes made from 2018 to 2019 include:

- As sites transition into the practitioner cohort, the evaluation activities will change to meet the needs of the client and implementer without overburdening the site. Navigant will not complete onsite surveys with sites that have already been surveyed in the past or will 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 2019 gross impact evaluation will not vary from the previous years. Over the course of 2018 we examined the program theory and evaluation approach to inform discussions in the fall Illinois Stakeholder Advisory Group (SAG) net-to-gross (NTG) deliberations about the need for doing free ridership surveys with SEM participants in future years. Plans for NTG research are tentative.

The evaluation of this program over the coming three years will include a variety of data collection and analysis activities, including those indicated in the following table. As noted above, limited process evaluation will be completed with the practitioner cohorts with a focus on persistence, but not detailed process evaluation.

Table1. Evaluation Approaches – Three Year Plan

Tasks	2019	2020	2021
Tracking System Review	X	X	X
Data Collection – Participant Interviews	X		X
Data Collection – Program Manager and Implementer Interviews	X	X	X
Impact – Billing Analysis	X	X	X
Impact – Engineering Review	X	X	X
Impact – Measure-Level Deemed Savings Review	X	X	X
Impact – Modeling	X	X	X
Impact – Verification & Gross Realization Rate	X	X	X
Process Analysis	X	X	X

The evaluation team determined the evaluation approach for the 2019-2021 period based upon the needs of the program and the program's prior history. The three-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 and/or the utility has interest in specific site surveys that work can be completed after discussion with ComEd and PGL and NSG.
- 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 Prescriptive and Custom Rebate projects and their associated savings
- Limited process evaluation will be completed with the practitioner cohorts to focus on persistence. The 2019 process study will include site participant interviews, and program manager and implementer interviews.

Coordination

SEM is managed jointly with ComEd. ComEd will coordinate with PGL and NSG on issues relevant to the program. There are special data collection issues with the SEM program and Navigant will manage those data issues with ComEd and PGL and NSG.

Evaluation Research Topics

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

Impact Evaluation

1. What are the verified energy savings in this program?
2. What were the realization rates of the projects? [Defined as evaluation-verified savings divided by program-reported (ex ante) savings].
3. Are there any major changes occurring during or after program implementation (production, size, hours etc.) which may have affected the results?

Process Evaluation and Other Research Topics

The process evaluation effort for 2019 will focus on program satisfaction and SEM process. The process research will address the following questions:

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

Evaluation Approach

Table 2 summarizes the evaluation tasks for 2019 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 2019	Notes
Tracking System Review	Participating Customers	Census	Engineering Review of participating Cohort(s)
Gross Impact Evaluation	Engineering File Review	Census	This is a multi-regression model based upon whole-building data, production data and other key variables.
Verified Net Impact Evaluation	Calculation Using Deemed NTG Ratio	*	Deemed Value Electric (1.00) Gas (1.00)
Interviews	Program Management and Implementers	~2	Augment with monthly calls
Effective Useful Life Determination			5 years

*Sample size will be determined to achieve 90/10

Tracking System Review

The tracking system review, concurrent with the start of the impact analysis cycle, serves two key purposes. Primarily, it ensures that the fields provided in the tracking data are sufficient for the evaluation team to calculate savings for the targeted measures. Additionally, this review helps guarantee that the tracking data is consistent with the program's data in ComEd's eTRACK. This latter task will become increasingly important as ComEd's 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, the International Performance Measurement and Verification Protocol (IPMVP) option C – billing/metered data regression, will be the main method of impact evaluation.
2. The data collection will focus on verifying or updating the assumptions that feed into the implementer's energy model for each site. This data may include: program tracking data and supporting documentation (project specifications, invoices, etc.), utility billing and interval data, Navigant-calibrated building automation system (BAS) trend logs, 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:

- Changes in hours of operation
- Changes in employees
- Changes in production
- Other measures installed at the site that were implemented through other Utility EE/DR programs or outside of the ComEd and PGL and NSG programs¹⁸

Due to the small number of participating sites, Navigant will be performing the impact analysis on all participating customers. Sampling will be considered as number of participants grow.

Verified Net Impact Evaluation

The 2019 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.

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

Table 3. Deemed NTG Values for 2019

Program Channel	2019 Deemed NTG Value
All-Electric	1.00
All-Natural Gas	1.00

Source:

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/ComEd_NTG_History_and_2019_Recommendations_2018-10-01.xlsx. Gas NTG values are found at http://www.ilsag.info/ntg_2019.html.

Program Manager and Implementer Interviews

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

Participant Interviews

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, both PGL and NSG 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.

Use of Randomized Control Trial or 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.

Table 4. Schedule – Key Deadlines

Activity/Deliverables	Responsible Party	Date Delivered
2019 Site Reports and Models available to Navigant	ComEd	Q3/Q4 2019*
Sample of sites determined and approved	Evaluation	Q3/Q4 2019
Project review	Evaluation	Q3/Q4 2019
Internal Navigant Draft Report Review	Evaluation	March 6, 2020
Draft Report to ComEd, PGL & NSG, and SAG	Evaluation	March 13, 2020
Comments on draft (15 Business Days)	ComEd, PGL & NSG, SAG	April 3, 2020
Redraft of Report	Evaluation	April 10, 2020
Comments on Redraft (5 Business Days)	ComEd, PGL & NSG, SAG	April 17, 2020
Final Report to ComEd, PGL & NSG, and SAG	Evaluation	April 27, 2020

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

Small Business Program 2019-2021 Evaluation Plan

Introduction

The Small Business (SB) Program is designed to assist qualified Peoples Gas (PGL) and North Shore Gas (NSG) non-residential customers¹⁹ 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) measures²⁰ to small 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 small 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.

A midstream incentive pilot program begun in 2017 encourages greater adoption of energy-efficient equipment in commercial kitchens within the city of Chicago. While the PGL Natural Gas Savings program currently offers prescriptive rebates for energy-efficient commercial kitchen equipment, the mid-stream pilot seeks to increase uptake by providing instant rebates to Chicago customers purchasing equipment through area food service equipment distributors.

Three-Year Evaluation Plan Summary

We have prepared a three-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.

¹⁹ To qualify, participants must be Peoples Gas or North Shore commercial or industrial customers that use less than 150,000 therms per year (an increase from the 60,000 therms cap of previous years).

²⁰ 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.

Table 1. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Gross Impact - Mid-Year Review of TRM Compliance	X	X	X
Gross Impact - End-of-Year TRM Savings Verification	X	X	X
Gross Impact – Custom Project Savings Verification Waves	X	X	X
Gross Impact – End-of-Year Custom Project Savings Verification	X	X	X
Research – Small Business Thermostat Savings Benchmarking	X		
Research – Small Business Advanced Thermostat Billing Analysis*		X	X
Research - Participant FR plus SO plus Process Survey		X†	
Research – Trade Ally FR plus SO plus Process Survey		X†	
Present NTG Research Results			Q3
Additional Process Research‡	X		
Process - Program Manager and Implementer Interviews/ Review Materials	X	X	X

* Study is under consideration.

† The FR and SO data collection and survey completion will extend into Q2 of 2021, but will be based on 2020 program data, unless there is a particular interest to consider part of 2021 program year data.

‡ Additional primary and/or secondary process research will be considered.

Small Business Thermostats Secondary Research on Impacts – In 2018 to 2019, Navigant is conducting secondary research from thermostat billing analysis studies (e.g., Michigan) to benchmark Illinois savings and assess whether other impact approaches are transferrable to Illinois. The secondary research will cover studies on standard programmable and advanced programmable thermostats.

Small Business Thermostats Impact Billing Analysis – For the EEP 2018-2021 period, advanced thermostats may be a higher priority for further research than standard programmable thermostats, but installed quantities are too low as of 2018 to conduct a billing analysis. ComEd will conduct a billing analysis of small commercial standard programmable thermostat impacts in 2019 that may provide an opportunity to estimate heating savings.

Evaluation Plan for 2019

Evaluation Research Objectives

The evaluation team has identified the following key objectives for evaluation research for 2019:

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 2019 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.

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 2019 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.

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 2019 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 2019

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_2019_Recommendations_2018-10-1_Final.xlsx.

Process and NTG Evaluation

The process analysis will include a synthesis of both qualitative and quantitative data collected during the review of program materials and in-depth qualitative interviews with program management and implementers. 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 2019 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. There will be no primary NTG research in 2019.

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

What	Target	Completed Interviews / Sample	When	Comments
In Depth Interviews	Program Management	1-2	Q3 2019	Interview program staff
Mid-Year TRM Compliance Review	All Program TRM Measures	Census	Q2 2019	Review program tracking data using the TRM measure characterizations
Custom Project Savings Verification	Completed Custom Projects	90/10	Q2 to Q4 2019	One or two sampling waves
End-of-Year TRM Savings Verification	All Participating Customers with TRM Measures	Census	Feb – March 2020	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	90/10	Feb – March 2020	Custom projects not previously sampled

Evaluation Schedule for 2019

Table 4 below provides the schedule for evaluation of the 2019 Small Business Program. Adjustments will be made as needed as program year evaluation activities begin.

Table 4. 2019 Evaluation Schedule

Activity/Deliverables	Responsible Party	Completion/Delivery
Mid-Year TRM Compliance Review and Findings Memo	Evaluation Team	July 1, 2019
Small Business Thermostat Savings Secondary Benchmarking Research	Evaluation Team	March 15, 2019
Custom Project Savings Verification Waves	Evaluation Team	Q2 2018 to Q1 2020
Final Tracking Data to Navigant	Franklin Energy	January 30, 2020
Draft Impact Report to PGL & NSG and SAG	Evaluation Team	March 12, 2020
Draft Comments Received	PGL & NSG / SAG	April 2, 2020
Send Revised Draft	Evaluation Team	April 9, 2020
Comments on Redraft	PGL & NSG / SAG	April 16, 2020
Final Impact Report to PGL & NSG and SAG	Evaluation Team	April 27, 2020

**Peoples Gas and North Shore Gas and ComEd Joint Business New Construction Program
2019 to 2021 Evaluation Plan**

Introduction

This plan covers 2019 to 2021 for the Business New Construction Program. Program year 2019 (January 1, 2019 to December 31, 2019) is the 11th program year of ComEd's energy efficiency savings portfolio and the eighth program year for energy efficiency gas savings. The Business 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 2019 program will not change significantly from 2018. The program has continued to develop and offer different program tracks to cater to different types of participants. These include the Comprehensive Track, the Expedited Assistance Track, the Design Replication Track, and the Accelerate Performance Track. The tracks vary in the incentives and technical assistance offered by the program based on the type of project and the point at which the project enters the program. In addition to these tracks, the program also serves public sector projects. Project must be 5,000 square feet or larger to participate in the offering.

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 2019.
- Use a rolling approach for the eventual derivation of NTG, interviewing project representatives as they enter the reservation stage.

The evaluation activities and timing for each utility evaluation are the same, as this is one evaluation for all utilities. Desk reviews and participant interviews are done without respect to the associated gas utility. Net-to-gross (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.

Joint Evaluation Approach

In this plan, Navigant outlines the evaluation objectives and activities for the program and how results pertain to each utility. The evaluation team determined the approach for the three-year period based on the program's needs and history. To recognize the singular nature of the program, the evaluation team will synthesize process findings from each fuel type into a single set of findings. The impact evaluation work will be slightly more fuel-specific: the electric impact evaluation will focus on a sample of projects with electric savings (Population of 84 projects expected in 2019), while the gas impact evaluation will focus on a sample of projects claiming gas savings (Population of 39 projects expected in 2019).

The 2019 gross impact evaluation will not vary qualitatively from the previous years and will be based on engineering desk reviews. As in past years, the 2019 evaluation will include customer free ridership research. The findings from the study will inform recommended NTG values for the Illinois Stakeholder Advisory Group (SAG) approval and future program application. The 2019 free ridership research will include in-depth interviews with participating customers to learn about their perspectives and satisfaction with the program, the technical assistance services and incentive offerings, and how to improve the program in the future.

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) 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. The evaluation of this program over the coming three years (2019-2021) will include a variety of data collection and analysis activities, including those indicated Table 1.

Table 1. Evaluation Approaches – Three Year Plan

Tasks	2019	2020	2021
Tracking System Review	X	X	X
Data Collection – Materials Review	X	X	X
Data Collection – Participant Interviews	X	X	X
Data Collection – Program Manager and Implementer Interviews	X	X	X
Impact – Engineering Review	X	X	X
Impact – Building Energy Simulation Modeling	X	X	X
Impact – Verification & Gross Realization Rate	X	X	X
Net-to-Gross – Free Ridership Self-Report Surveys	X		X
Net-to-Gross – Spillover Research		X	
Process Analysis	X	X	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 most research activities, including impact, process, and free-ridership analyses, annually. This approach will ensure that any year-to-year variations due to individual projects will not affect future years, as well as provide the program with timely information to continue to improve the program's design.

Evaluation Research Topics

The objectives of the 2019 evaluation are as follows:

1. Provide adjusted gross impacts for all completed projects using a researched realization rate.
2. Provide verified net savings for all projects completed in 2019.
3. Update the verification, due diligence, and tracking system review from 2019, if needed.
4. Continue the existing approach for NTG derivation. This includes:

- a. Review of program documentation for projects that have recently reached the reservation stage, including project narratives and Measure Incentive Reservation forms. If needed the evaluation team will coordinate with the implementation team to discuss their understanding of the project's participation prior to the evaluation team interviewing the project contacts.
- b. Collection of NTG data from an interview as soon as possible after the reservation date to minimize possible measurement issues associated with respondent recollection.

In the 2019 evaluation, the Navigant evaluation team will seek to answer the following key researchable questions:

Impact Evaluation

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

Process Evaluation

The program has several tracks for participants and serves a variety of customer types (e.g., public sector and small facilities). The process evaluation will explore participants' characteristics, satisfaction, and experiences with respect to these different paths, as well as other program implementation changes—such as changes to the program's marketing and outreach strategy, and program challenges. We will collect this information through program manager interviews, program participant interviews, and a review of program materials. Potential evaluation research questions may include:

- What design or implementation changes occurred in 2019, and how have these, if at all, changed the way the program is offered?
- What is the level of participation for the different program tracks and among different customer types (e.g., public sector)?
- How do participants' experience with the program differ for the different program tracks?
- What challenges did the program face over the course of the program year and how did the program respond to them?

Navigant will perform additional process research, upon the request of the program manager, to support the program manager and implementer as they consider future program changes. Possible topics may include, but will not be limited to, research on impact of public sector projects introduced into the program, and investigation of the effects of codes and standards on the baseline of new construction in the ComEd service territory, and collaboration on new or streamlined evaluation approaches to support program redesign. The evaluation team could also support the program's planned redesign by developing a program theory/logic model to help the program map out the planned activities, outputs, and outcomes and related performance indicators.

Evaluation Approach

Table 2 summarizes the surveys, interviews, and other primary data sources that will be used to answer these research questions in 2019. We anticipate employing similar sources and data collection activities in the evaluation of future program years, though quantities of projects reviewed will differ.

Table 2. Core Data Collection Activities, Sample and Analysis

Activity	Target	Target Completes 2019	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
Process and Impact Research on 2019 Operations	Literature review, secondary research	n/a	Process, Impact
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	
Researched NTG and Process	Telephone Interview with Participating Customers	~30	FR, Process, Targeting Projects Currently in Reservation Phase

Note: FR = Free Ridership

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

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

Tracking System Review

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

In line with program changes and an accelerated evaluation schedule for delivering tracking data to the evaluation team, Navigant will perform tracking system review and M&V project sampling in waves in 2019. The first wave of M&V sampling is expected to cover about two-thirds of the projects.

Proposed gross impact sampling timelines are shown below.

2019 Gross Impact Sampling Waves

- a) First wave sample drawn in July 2019 and completed September 2019

- b) Final (second) wave by January 30, 2020 or upon the completion of all 2019 projects)

In-Depth Interviews and Research

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

Telephone Interviews

To fully implement the rolling NTG approach, we will attempt to conduct interviews with decision makers for all projects currently in the reservation stage, regardless of program year, to best capture the program's early influence. Once a sampled project reaches the reservation stage, the implementation contractor will provide the evaluation team with contact information for project contacts, and the team will conduct a post-reservation interview as soon as is practical. The evaluation team will seek to speak with key decision makers for the project. In most cases, the primary project contact will be the key decision maker, but we will verify this as part of the interview and ask to be referred to the appropriate contact if necessary. We will also incorporate customized questions for each project linked to the points of influence identified in the documentation review.

Because we will attempt to interview a census of projects, no sampling of projects or differentiation between electric and gas savings is needed. . We expect to complete about 30 interviews, which will represent approximately two-thirds of all projects in the reservation stage. In 2019, the evaluation team does not expect there to be enough participating public sector projects to develop a separate NTG estimate but will estimate a public sector-specific NTG analysis when enough projects participate in the program to support it.

In addition to NTG research, interviewers will also ask participants about their experience with elements of the program tracks, as applicable, to provide the program with actionable information about the different tracks. Because of the nature of the questions and the fact that we will be asking these process-related questions to a census of participants in the reservation phase as part of the net-to-gross interviews, a randomized controlled trial or quasi-experimental design is not applicable for this research.

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 2019 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.

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 received a gas incentive.²¹ 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.²²

²¹ 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.

²² The number of projects in the sample may change based on the final list of projects and their savings.

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 2019. The first wave of M&V sampling is expected to cover about one-third of projects completed in 2018.

Verified Net Impact Evaluation

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

Table 4. Deemed NTG Values

Utility	2019 Deemed NTG Value
ComEd (MW and MWh)	0.68
Gas Utilities (therms)	0.70

Source:

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/ComEd_NTG_History_and_2019_Recommendations_2018-10-01.xlsx

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/PGL-NSG_NTG_History_and_2019_Recommendations_2018-10-01_Final.xlsx

http://ilsagfiles.org/SAG_files/NTG/2019_NTG_Meetings/Final_Values/Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final.pdf

NTG Impact Evaluation and Research

The team will implement a rolling approach for deriving the NTG estimates, where net savings data will be captured as projects progress through the stages of participation. This methodology will include the following for each sampled project:

- 1) **Project Documentation Review.** This includes:
 - a. **Measure Incentive Reservation.** The evaluation team will begin by reviewing the measure incentive reservation for each sampled project. This document will inform the evaluation team's characterization of the decision-making processes for specific components of each project. The measure incentive reservation documents contain:
 - i. Project description
 - ii. Estimated savings by energy efficiency measures (baseline compared to proposed equipment)
 - iii. Estimated incentive, by energy efficiency measures
 - b. **Project Narrative.** The evaluation team will also review project narrative files developed by the implementation contractor. These narratives will allow the team to determine potential points of influence of the program. Each project narrative file includes:

- i. Project contacts
- ii. Project history. The implementation contractor will list key dates for the project, including formal project milestones (e.g., date of application reception), informal milestones (e.g., documenting receipt of updated drawings), and communication between the participant and implementation contractor, for each entry, the implementation contractor will list the date and a summary description of the event/milestone.
- iii. Project narrative. The implementation contract will provide a summary of the project

2) Post-Reservation Interview. Once a sampled project reaches the reservation stage, the implementation contractor will provide the evaluation team with contact information for project contacts, and the team will conduct a post-reservation interview as soon as is practicable. The evaluation team will seek to speak with key decision makers for the project. In most cases, the primary project contact will be the key decision maker, but we will verify this as part of the interview and ask to be referred to the appropriate contact if necessary. If needed, the evaluation team will work with the implementer to identify alternate contacts. We will also incorporate customized questions for each project linked to the points of influence identified in the documentation review.

Use of Randomized Control 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. Adjustments will be made, as needed, as evaluation activities progress.

Table 5. Schedule – Key Deadlines

Activity or Deliverable	Responsible Party	Date Delivered
2019 program tracking data for participant interviews	ComEd	April 1, 2019
Post-reservation phase participant interviews	Evaluation	April 1, 2019 through November 29, 2019
2019 program tracking data for sampling Wave 1	ComEd	June 3, 2019
Wave 1 engineering desk reviews	Evaluation	September 30, 2019
2019 program tracking data for sampling Wave 2	ComEd	January 30, 2020
Wave 2 engineering desk reviews	Evaluation	February 28, 2020
NTG Analysis Findings	Evaluation	July 1, 2020
Internal Report Draft by Navigant	Evaluation	March 6, 2020
Draft Report to ComEd, Gas Utilities, and SAG	Evaluation	March 13, 2020
Comments on draft (15 Business Days)	ComEd and SAG	April 3, 2020
Revised Draft by Navigant	Evaluation	April 10, 2020
Comments on redraft (5 Business Days)	ComEd and SAG	April 17, 2020
Final Report to ComEd, Gas Utilities, and SAG	Evaluation	April 27, 2020

A.4 Market Transformation Initiatives

Market Transformation Initiatives 2019 – 2021 Evaluation Plan

Introduction

Energy legislation Section 8-104 affords program administrators up to 3 percent of the portfolio budget to be dedicated to breakthrough equipment and devices and up to 5 percent of the portfolio budget to be dedicated towards market transformation initiatives. 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.

Three-Year Evaluation Plan Summary

PGL and NSG will operate several market transformation and research efforts during EEP 2019-2021, for which it presently does not plan to claim savings. Therefore, no impact evaluation activities are planned for 2019 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. Three-Year Evaluation Plan Summary

Activity	2019	2020	2021
Market Transformation and Emerging Technology	X	X	X
Program Manager and Implementer Interviews			