Guidehouse
Outwit *Complexity*

To: ComEd, Nicor Gas, Peoples Gas, and North Shore Gas

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From: Malena Hernandez, Jenna DeFrancisco, Jayden Wilson, Opinion Dynamics

Date: September 7, 2023

Re: Combined Utility Non-Residential New Construction 2023 Net-to-Gross Research Results - Final

1. Executive Summary

This memo presents the results of the net-to-gross (NTG) research conducted by the evaluation team during the calendar year 2023 (CY2023) evaluation of the Combined Utility Non-Residential New Construction Program (New Construction Program or Program) implemented for ComEd, Nicor Gas, Peoples Gas, and North Shore Gas Companies. This research included the estimation of participant free ridership and the development of select process-related findings.

The evaluation team conducted in-depth phone interviews with a census of participants in the New Construction Program on a rolling basis from September 2022 to June 2023. The sample frame included 81 projects across four batches. Each batch included all projects in the Program's Reservation Phase at the time the batch was pulled (Batch 1 – September 2022, Batch 2 – December 2022, Batch 3 – February 2023, Batch 4 – May 2023).

The results from this research will inform Guidehouse's September 2023 recommendations to SAG of NTG values to be used for this Program in PY2024[1].

[1] The evaluation team did not conduct spillover research in CY2023.

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With a spillover rate of zero (from EPY9/GPY6) and free ridership of 0.43 (electric energy and demand) and 0.51 (therms) from this study, the NTG ratio is 0.57 for electric energy and demand savings and 0.49 for natural gas savings.

Table 1 summarizes the New Construction Program free ridership and NTG research findings. Detailed NTG methods and results are presented in Section 4 - Detailed NTG Results.

Table 1. Net-to-Gross Research Results for 2023 New Construction Program

Savings Type	Free Ridership	Spillover	NTG Ratio
kWh/kW	0.43	0	0.57
Therms	0.51	0	0.49

Source: Evaluation team analysis

Overall, the free ridership scores calculated from the CY2023 research are lower than those from recent years' NTG research. This is primarily driven by a single large project (accounting for 29% of kWh savings and 24% of therm savings of the total kWh and therm savings respectively across all interviewed projects) reporting high Program influence and low free ridership[2]. Some improvements to the data collection tool and process may have also contributed to capturing lower free ridership compared to past years. The level of Program engagement reported by respondents was highly variable across projects. This is to be expected, as the projects are custom and vary on a number of factors, such as project size, scope, timeline, etc. As such, free ridership was variable across interviewed projects, ranging from 0.05 to 1.00.

Starting with the NTG value used for the CY2019 Program year, the NTG values deemed by SAG have been the average of the previous four years of researched NTG values.[3] The evaluation team recommends that same approach for the NTG value for the CY2024 Programs. Table 2 provides the researched NTG ratios resulting from CY2018 through CY2022 evaluations plus the values from the new research. The evaluation team estimated a level of free ridership generally consistent with but slightly lower than historical results. Table 3 provides the historical NTG values applied to calculate net savings in each Program year.

[2] Excluding this large project from the analysis, the FR scores for the program would have been 0.58 for electric and demand savings and 0.65 for natural gas savings, which is fairly in line with CY2021 free-ridership results (0.64 and 0.70 respectively).

[3] Although the researched Program-level NTG ratio for each Program year is based on individual project-level NTG ratios weighted by savings, the 4-year value is not weighted by savings and instead is a simple average of the 4 years.

Table 2. Net-to-Gross Research Values for CY2018 through CY2023 and Recommendations for CY2024 Programs

Evaluation Year	Electric	Gas
CY2018	0.45	0.45
CY2019	0.51	0.39
CY2020	NA	NA
CY2021	0.40	0.39
CY2022	NA	NA
CY2023	0.57	0.49
Recommended Value for CY2024 (4-Year Average)	**0.48**	**0.43**

Source: Evaluation team analysis

Table 3. Historical Deemed Net-to-Gross Ratios

Evaluation Year	Electric	Gas
CY2018	0.60	0.77
CY2019	0.68	0.70
CY2020	0.59	0.58
CY2021	0.53	0.54
CY2022	0.48	0.43
CY2023	0.48	0.43

Source: https://www.ilsag.info/policy/net-to-gross-framework/ and Evaluation team analysis

Participant feedback indicates local policies and market preferences have driven aggressive energy efficiency strategies in the market that exceed current energy codes. Going forward, the evaluation team expects that stringent code requirements and market preferences for energy efficiency may continue to increase free ridership in the New Construction Program. The evaluation team suggests Program managers explore adopting a common practice baseline that would reflect the typical actions of participants in absence of the Program. Given the long engagement history of the New Construction Program in the Illinois new construction market, the evaluation team also suggests Program managers consider studying the long-term market effects of the Program to determine, what, if any, influence the New Construction Program had on developing and supporting these standard practices.

2. Free Ridership Survey Disposition

The evaluation team employed a real-time approach for researching free ridership. This methodology involves a review of project documentation and in-depth interviews with key decision-makers on the participating project teams. The interviews included questions about participants' awareness of incented energy efficiency measures and their motivations for incorporating these measures into the project. In addition, and in accordance with the evaluation plan, the evaluation team conducted a secondary documentation review (Enhanced Rigor

review) for the largest projects in the sample to corroborate or support adjustments to project-level results.[4] The following sections detail the evaluation team's approach.

2.1 Project Documentation Review

Before conducting each interview, the evaluation team reviewed the following project-related documents when applicable:

a. **Measure Incentive Reservation:** The evaluation team began by reviewing the measure incentive reservation for each project. This document allowed the evaluation team to explore Program attribution and, if needed, calculate NTG ratios for individual measures or end uses. The measure incentive reservation document contained:

   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 also reviewed the project narrative file for each project for which it was provided.[5] Developed by the implementation contractor, these narratives allowed the evaluation team to determine potential areas of Program influence. This file included:

   i. Contact information for key project stakeholders.

   ii. Project history—the implementation contractor listed 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 listed the date and a summary of the event/milestone.

   iii. Project narrative—the implementation contractor summarized the project.

c. **Program Influence Report:** When a project narrative was not provided, the evaluation team reviewed a Program influence report. The implementation contractor first started creating Program influence reports for each project in 2020. The Program influence report allowed the evaluation team to better understand how the Program sought to influence the energy efficiency design of participating projects. The file included:

   i. Project information including energy baseline and square footage.

   ii. Contact information for key project stakeholders.

   iii. Project-level influence report—an annotated checklist of ways the Program attempted to influence the project overall.

   iv. Measure-level influence report—a table detailing how the Program attempted to influence specific energy efficiency measures.

[4] The evaluation plan states the Enhanced Rigor review will cover the projects accounting for the top 20% of energy savings of the sample of completed interviews. In practice, the evaluation team included two projects in the Enhanced Rigor review, accounting for 37% of electric savings and 32% of gas savings.

[5] Beginning in 2020 the implementation contractor began replacing the project narrative descriptions with Program influence reports for all new projects, as such, only select sampled projects had a project narrative.

d. **Enhanced Rigor Documentation:** The evaluation team requested additional documentation for the largest projects in the sample frame. This documentation included all relevant project materials, communications, email documentation of engagement history, and other project files. Reviewing these materials before post-reservation interviews allowed the evaluation team to gain context about projects that would be part of the Enhanced Rigor sample. Section 2.3 - Enhanced Rigor Project Documentation Review describes how the evaluation team used this information when calculating NTG results.

2.2 Post-Reservation Interview

The evaluation team reviewed Program tracking data and requested the project documentation detailed above in four batches between September 2022 and June 2023. Each batch included all projects in the Program's Reservation Phase at the time the batch was pulled (Batch 1 – September 2022, Batch 2 - December 2022, Batch 3 - February 2023, Batch 4 - May 2023). The evaluation team received project documentation for 81 projects overall. Although some of these projects will close and be included in the Program's CY2023 annual impact evaluation, others are expected to be finalized in future program years.

Outreach and interviewing occurred in four timeframes in correspondence with the receipt of project batches. Each outreach and interviewing period occurred during a 5-week period following the receipt of project materials. During these periods, the evaluation team attempted to reach the primary contact (either a building owner or design team member) for each project. This "rolling interview" approach diverged from how the evaluation team handled post-reservation interviews in prior evaluation years. Previously, the evaluation team reached out to all projects in the Program's Reservation Phase at the beginning of the evaluation year at a single time. In CY2023, the evaluation team chose to implement "rolling interviews" to ensure interviews were occurring closer to when the project entered the reservation phase.

The evaluation team sought to speak with key decision-makers for each project. In most cases, the primary project contact was the key decision-maker. The evaluation team verified this information verbally before continuing the interview or requested contact information for a more appropriate project contact. During the interview, participants responded to attribution-related questions to support the NTG analysis. When appropriate, the evaluation team also incorporated follow-up questions for each project linked to the potential points of influence identified in the documentation review.

Of the 81 projects in the sample frame, the evaluation team completed 37 valid interviews, achieving a response rate of 46%. Since this analysis relies on a census approach, the concept of sampling error does not apply. As Table 4 shows, the 37 respondents represent projects that account for 51% of the total ex ante kilowatt-hour savings and 41% of the total ex ante therm savings.

Table 4. Free Ridership Decision Maker Survey Disposition

Measure	Population	Sample Frame	Target Completes	Completed Interviews ‡	Percent of Population	Percent of Population kWh Savings*	Percent of Population Therm Savings†
Overall Program	81	81 (Census)	30	37	46%	51%	41%

* Total ex ante kWh savings for the population: 23,099,056 kWh

† Total ex ante therm savings for the population: 782,455 therm

‡ 38 respondents were interviewed in full; however, the evaluation team excluded one project from analysis due to evidence the respondent was not qualified to speak on the project's participation in the Program

Source: Evaluation team analysis

One project (there were originally 38 interviewed projects) was excluded from the analysis because their open-ended responses indicated they were not sufficiently qualified to speak about the project's experience with the Program and the incorporation of energy-efficient design into the project.

2.3 Enhanced Rigor Project Documentation Review

The evaluation team conducted an Enhanced Rigor project documentation review to corroborate or support project-level NTG findings. In accordance with the evaluation plan, the evaluation team also conducted a secondary documentation review for the largest projects in the sample to corroborate or support adjustments to project-level results. During this process, two members of the evaluation team independently reviewed all relevant project materials, communications, email documentation of engagement history, and other project files. Based on review of this documentation and the respondent's transcribed interview, each analyst developed a narrative to support a recommendation of 1) no change, 2) excluding Program Influence Score, or 3) excluding Counterfactual Score. Section 4.2 - Free Ridership Consistency Check and Enhanced Rigor Analysis describes the results of this process.

Of the 37 completed interviews, the evaluation team selected two projects for an Enhanced Rigor documentation review, as indicated in Footnote 4, Page 4. As Table 5 shows, these two projects account for 37% of the total kilowatt-hour savings captured in the interviews and 32% of the total therm savings captured in the interviews.

Table 5. Complete Enhanced Rigor Reviews

Measure	Completed Interviews	Projects with Enhanced Rigor Review	Percent of Completed Interviews	Percent of Completed Interviews kWh Savings*	Percent of Completed Interviews Therm Savings†
Overall Program	37	2	5%	37%	32%

* Total ex ante kWh savings for completed interviews: 11,695,049 kWh

† Total ex ante therm savings for completed interviews: 317,965 therm

Source: Evaluation team analysis

3. Free Ridership Protocol

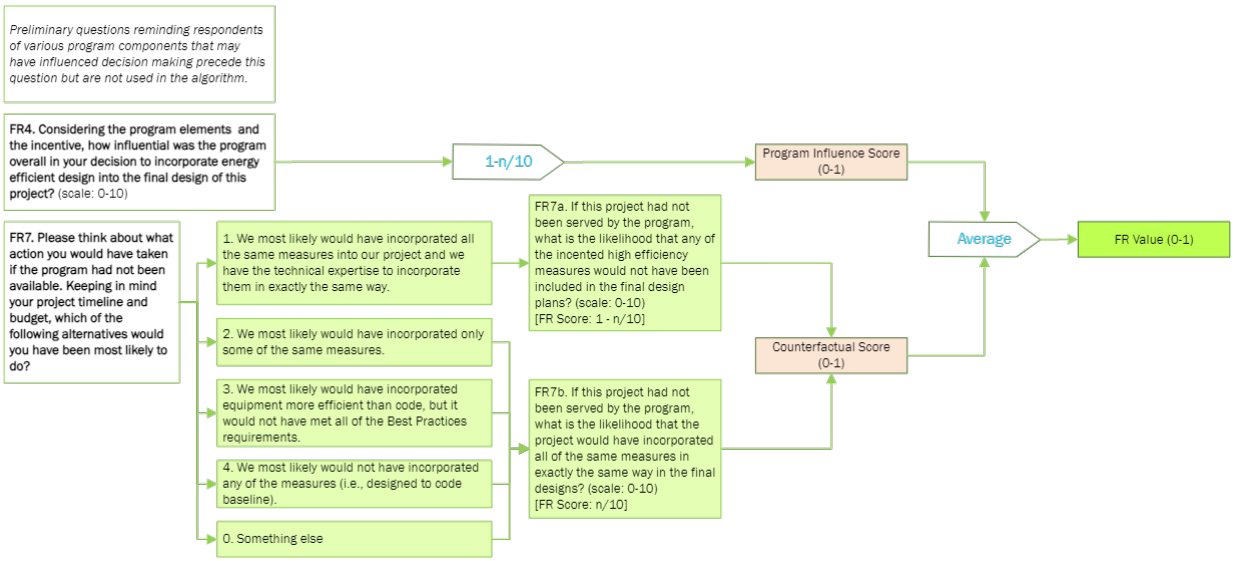
3.1 Participant Free Ridership Estimation

The evaluation team applied the relevant free ridership protocols recently agreed upon by the Illinois NTG Working Group and planned for inclusion in the Illinois TRM v12.0. This protocol calculates free ridership as the average of two free ridership sub-scores (Program Influence Score and Counterfactual Score), which are calculated based on three items: overall Program influence, a scenario-based counterfactual question, and a likelihood-based counterfactual score.

3.1.1 *Free Ridership Algorithm*

Figure 1 describes the algorithm that the evaluation team used to calculate free ridership for the New Construction Program. Notably, the New Construction Program free ridership algorithm does not include quantity and timing adjustments because the concept of project timing and deferred free ridership is not applicable to new construction projects. New construction programs intervene in the early phases of ongoing construction projects (i.e., after the decision to build has been made). As a result, participation in the New Construction Program would not be expected to accelerate the construction of the new building.[6]

Figure 1. New Construction Program Free Ridership Algorithm



Source: Developed by the evaluation team based on the core non-residential free ridership protocol agreed upon by the Illinois NTG Working Group and planned for inclusion in the Illinois TRM v12.0.

The new algorithm includes four key changes relative to the algorithm developed by the Illinois SAG NTG Working Group in 2021:

1. Renaming Efficiency FR Score 1 (EF1) to Program Influence FR Score (PI)
2. Renaming Efficiency FR Score 2 (EF2) to Counterfactual FR Score (CF)

[6] Illinois TRM v11.0 Vol 4. Protocol 3.4.1

3. Eliminating the No Program Score question (FR8)

4. Adding an additional follow-up to the scenario-based counterfactual (FR7b)

Notably, the new counterfactual follow-up (FR7b) is the same question as the eliminated No Program Score question (FR8); but in the new algorithm, it is asked of only a subset of respondents based on their answer to the scenario-based counterfactual question—as opposed to being asked of all respondents in the previous algorithm. Given this and the fact that this question was asked of all respondents when conducting the interviews, the evaluation team had all the necessary scores needed to apply the new algorithm for the NTG analysis.

The new algorithm calculates project-level free ridership scores as the average of the Program Influence Score and Counterfactual Score. The Program Influence Score is calculated based on an overall program influence question (FR4), and the Counterfactual Score is calculated based on a scenario-based counterfactual question (FR7) and follow-up questions (FR7a and FR7b) (see Figure 1).

Table 6 summarizes the questions that define the Program Influence Score and Counterfactual Score.

Table 6. Net-to-Gross Analysis Plan (Free Ridership Question Score Map) – New Algorithm

FR Sub Score	Questions		Algorithm Notes
Program Influence Score	Overall Program influence (FR4)		This question asks respondents to rank the overall influence of the Program on a scale from 0 to 10, where 0 corresponds to “no influence at all” and 10 corresponds to “extremely influential.”
Counterfactual Score	Scenario-based counterfactual (FR7)		This question asks respondents to select which alternative behavior they would have been most likely to do had the Program not been available.
	Scenario-based counterfactual follow-up	Free rider counterfactual follow-up (FR7a)	(Asked of those whose FR7 suggests full free ridership) This question asks respondents to rank the likelihood that the project would not have included any of the same measures it did, had the Program not been available, on a scale from 0 to 10, where 0 corresponds to “not at all likely” and 10 corresponds to “extremely likely.”

FR Sub Score	Questions		Algorithm Notes
			(Asked of those whose FR7 suggests partial or no free ridership)
		Non-free rider counterfactual follow-up (FR7b)	This question asks respondents to rank the likelihood that the project would have included the exact same measures in the same way, had the Program not been available, on a scale from 0 to 10, where 0 corresponds to "not at all likely" and 10 corresponds to "extremely likely."

Source: Free ridership protocols recently agreed upon by the Illinois NTG Working Group and planned for inclusion in the Illinois TRM v12.0.

The evaluation team also attempted to isolate free ridership by measure or end uses when deemed appropriate by the respondent. Consistent with prior evaluations, however, most respondents did not choose to differentiate numeric responses between measures. In CY2023, 11 out of 37 respondents (30%) provided measure-level responses. In these cases, the evaluation team calculated free ridership for each measure and used a savings-weighted average to determine project-level results.

3.2 Participant Spillover Estimation

As planned, the CY2023 NTG evaluation did not include an evaluation of Program spillover. In electric Program year (EPY) 9/ gas Program year (GPY) 6, the evaluation team conducted an online survey of Program participants and training participants to quantify potential cases of spillover resulting from the New Construction Program and concluded there was no spillover.

4. Detailed NTG Results

4.1 Free Ridership Component Scores

The NTG algorithm calculates **project**-level free ridership scores as the average of the Program Influence Score and Counterfactual Score (see Figure 1). To obtain the **Program**-level free ridership, the evaluation team calculated separate savings weighted averages for the Program Influence Score and Counterfactual Score based on ex ante gross kilowatt-hour savings and gross therm savings. The overall free ridership score reflects the average of these two estimates. Table 7 shows these results for the CY2023 research.[7]

Table 7. Free Ridership Component Scores

Savings Type	Program Influence Score	Counterfactual Score	Free Ridership
kWh/kW	0.33	0.52	0.43
Therms	0.41	0.61	0.51

Source: Evaluation team analysis

[7] Of the 37 interviewed projects, 36 projects had electric savings and 33 had gas savings.

With the spillover rate of zero (from EPY9/GPY6) and free ridership of 0.43 (electric energy and demand) and 0.51 (therms), the NTG ratios for CY2023 are 0.57 for electric energy and demand savings and 0.49 for natural gas savings[8].

4.2 Free Ridership Consistency Check

Throughout each post-reservation interview, the evaluation team used follow-up questions to verify the consistency of prior responses. In addition, if a respondent provided responses to the overall Program influence question (FR4) that were inconsistent with their No Program Score (FR8), they received a specific consistency check question.[9] None of the 37 respondents provided responses that remained inconsistent at the completion of the interview.

4.3 Enhanced Rigor Analysis

The evaluation team reviewed project-level results for two Enhanced Rigor projects and any projects flagged for inconsistency review due to open-ended responses. Neither of the two projects reviewed under the Enhanced Rigor protocols had inconsistencies between the calculated FR scores and Program documentation. Beyond the exclusion of one project due to the respondent not being sufficiently qualified to speak about their participation in the program, the evaluation team did not adjust any project-level scores based on the review of open-ended responses.

5. Final NTG Results and Recommendations

Because projects that participate in the New Construction Program are generally large, custom, and relatively few in number, the Program's estimated NTG ratios have varied over time. To account for this variability, the fact that projects typically span multiple years, and to increase the number of observations from which the value is calculated, the evaluation team recommends continuing to use an average of several years of NTG ratios (previous four years of researched NTG ratios) to calculate net savings for CY2024 Programs.

5.1 Non-Residential New Construction Program NTG History

Table 8 summarizes Guidehouse's draft recommendations for the New Construction Program electric and gas measures to be used in CY2024 based on our newest NTG research. The table shows the researched NTG ratios from the past 4 Program years, including the CY2023 NTG results, and the 4-year average by fuel type.[10] Table 9 provides the historical NTG values applied to calculate net savings in each Program year.

[8] Using the free ridership protocols drafted by the Illinois SAG NTG Working Group in 2021 (old protocol), the electric and gas participant free ridership would have been 0.45 and 0.53 respectively, resulting in NTG ratios of 0.55 (electric) and 0.47 (gas).

[9] Respondents received a follow-up question if their responses to FR4 and FR8 were both greater than seven or both less than three.

[10] While the researched program-level NTG ratio for each program year is based on individual project-level NTG ratios weighted by savings, the 4-year value is not weighted by savings and instead is a simple average of the four years.

Table 8. Net-to-Gross Research Values for CY2018 through CY2023 and Recommendations for CY2024 Programs

Evaluation Year	Electric	Gas
CY2018	0.45	0.45
CY2019	0.51	0.39
CY2020	NA	NA
CY2021	0.40	0.39
CY2022	NA	NA
CY2023	0.57	0.49
Recommended Value for CY2024 (4-Year Average)	**0.48**	**0.43**

Source: Evaluation team analysis

Table 9. Historical Deemed Net-to-Gross Ratios

Evaluation Year	Electric	Gas
CY2018	0.60	0.77
CY2019	0.68	0.70
CY2020	0.59	0.58
CY2021	0.53	0.54
CY2022	0.48	0.43
CY2023	0.48	0.43

Source: https://www.ilsag.info/policy/net-to-gross-framework/ and evaluation team analysis

For applying to Programs in CY2024, Guidehouse recommends the NTG ratios of 0.48 (electric) and 0.43 (gas), based on the 4-year average of researched values.

Appendix A. *Qualitative Findings of Free Ridership*

Overall, the CY2023 NTG results appear consistent with the qualitative feedback offered by respondents during post-reservation interviews. The evaluation team found building codes, environmental certifications (e.g., LEED, Green Globes), market preferences, and site-specific needs were key drivers of energy efficient design. Respondents offered positive remarks when speaking about their participation in the New Construction Program but rarely identified the Program as the sole motivating factor in their decision to include Program-incentivized measures in their project. One respondent said:

> *"Some of [the incentivized measures/strategies] were done because that's what we've kind of deemed as our standard of design up to this point. A few of them are because of the [building type] itself and the way that they operate the [building type]. Some of them are what we've seen make projects work better overall. Each of them is kind of independent of one another."*

Many respondents praised the Program technical assistance for providing useful feedback and context that allowed them to better discuss the efficiency of their projects, make more informed decisions, and revisit and validate existing choices. Multiple respondents indicated they used the energy modeling completed by the Program to gauge the amount of energy and financial savings the planned measures/strategies would achieve; others used the modeling to backcheck their own internal modeling. Additionally, respondents indicated using the modeling to frame internal project discussions and convince owners/clients of the benefits of the planned measures/strategies. One respondent recounted:

> *"One thing that ComEd does is they do their own energy model. [We use it] as a back check or a second look at what we're looking at... We get that as resourceful information, we then can verify where we're heading with the project."*

Respondents also spoke about the benefit of the design feedback they received from the Program team. One design team member recounted that the Program engineer was able to explain things to the project owner without becoming overly technical, pushing the owner towards achieving higher efficiency. Another respondent indicated that, although they planned to use the same measures, the Program engineer assisted them in optimizing the implementation of said measures.

Participant feedback indicates local policies and market preferences have driven aggressive energy efficiency strategies in the market that exceed current energy codes. Several respondents indicated they had "higher than code internal standards" or a design baseline higher than code minimum. One respondent noted:

> *"As a company, one of our values is having efficient systems and efficient equipment beyond code. A project like this, I think we kind of already are*

designing for those higher levels of efficiency, and then it just kind of makes it easy to slide into the energy efficiency incentives."

Multiple participants stressed they felt the entire industry has shifted to a design baseline that incorporates efficiencies above code minimum. One respondent recounted:

"I would say that most of the items were going to be used regardless of the New Construction Offering. Some of this stuff in the [Program recommendations] is kind of standard operating procedure for a lot of development. Is it not?"

Going forward, the evaluation team expects that stringent code requirements and market preferences for energy efficiency may continue to increase free ridership in the New Construction Program. The evaluation team suggests that Program managers explore a common practice baseline that would reflect the typical actions of participants in absence of the Program. Given the long engagement history of the New Construction Program in the Illinois new construction market, the evaluation team also suggests Program managers consider studying the long-term market effects of the Program to determine, what, if any, influence the New Construction Program had on developing and supporting these standard practices.

A.1 *Environmental Certifications and Free Ridership*

During post-reservation interviews, 13 of 37 projects mentioned that the pursuit of an environmental certification had a direct influence on their decision to pursue high efficiency measures and design strategies for their project. Amongst the certifications mentioned were LEED (10 projects), Green Globes (1 project), the Chicago Sustainable Development Policy (CSDP) (1 project), and the National Green Building Standard (NGBS) (1 project).

Projects pursuing certification frequently indicated that the measures/design-strategies incentivized by the Program were integrated irrespective of the Program to meet environmental certification requirements. One respondent detailed:

"We abide by LEED certification for our projects of which Silver is the minimum. By going through the LEED Silver minimum, coupled with [other standards and requirements], we end up having a fairly robust building that incorporates a ton of energy savings measures. So, our driver is LEED, our driver has not been the ComEd energy Program."

Multiple respondents indicated projects pursuing environmental certification are prime candidates for Program participation, as the energy-efficient measures/design strategies eligible for incentives are often already a part of the planned project prior to Program engagement. One respondent specified:

> *"LEED also requires a lot of efficiency… so naturally participating in the efficiency Program went hand in hand with becoming LEED certified."*

Projects subject to environmental certification requirements that receive incentives through the New Construction Program may exhibit higher levels of free ridership as their decision to pursue incentivized measures may have been effectively required, even if not prescriptively required.

A.2 *Timing of Program Engagement and Free Ridership*

During post-reservation interviews, multiple projects indicated that by the time the Program engaged with the project, much of the project design was codified and unchangeable. These projects identified that they may have been able to integrate more energy-efficient measures or design strategies if they had been engaged by the Program earlier, including one respondent who said:

> *"There might have been more opportunity if we would have engaged a little sooner in the process, which unfortunately we didn't. We have done that on some other projects and been successful there."*

Projects engaged by the Program later in the design and construction process may exhibit higher levels of free ridership as there may have been less flexibility in design. This lack of flexibility may result in the incentivization of pre-existing eligible measures/strategies, rather than the inclusion of additional energy savings measures/strategies suggested by the Program.

A.3 *Program Satisfaction*

During post-reservation interviews, the evaluation team solicited additional feedback from participants about their experiences with the Program and potential improvements. Many shared positive experiences working with Program staff and showed appreciation for their collaboration among project teams. Only six of the 37 respondents indicated any dissatisfaction with their participation. Two respondents indicated they wished the incentives overall and for particular measures were higher. Two respondents detailed that their Program contacts changed throughout their participation, leading to confusion. One respondent felt the paperwork required to participate changed frequently and was extensive and time-consuming. Another participant recounted it was difficult to get in contact with the Program, and that the paperwork was confusing.

Appendix E provides additional verbatim responses.

Appendix B. *ComEd Non-Residential New Construction Program NTG History*

	Business New Construction Service
PY1	NTG was not evaluated for PY1 because program began in PY2.
PY2	**NTG:** 0.59 **Free Ridership:** 41% **Participant Spillover:** 0% **Method:** Customer self-report. 14 projects were assessed from a population of 16. Enhanced method. NTG scores were adjusted for standard design national retail stores.
PY3	**NTG:** 0.65 (0.69 for Systems Track and 0.54 for Comprehensive Track) **Free Ridership**: 35% **Participant Spillover:** 0% (qualitative evidence observed, not quantified) **Method:** Customer self-report. 13 interviews with individuals representing 15 projects out of population of 37 projects. Enhanced method. NTG scores were adjusted for standard design national retail stores.
PY4	**Compressive Track – Retroactive application of NTG of 0.54** **Systems Track used PY2 value of 0.59** **NTG:** 0.57 (based on weighted average of 0.59 for Systems Track and 0.54 for Comprehensive Track) **EPY4 Research Comprehensive Track:** 0.54 **EPY4 Research Systems Track:** 0.59 **Free Ridership:** 43% **Spillover:** 0% **Method:** EPY3 deemed value for Systems Track projects. Customer self-report for Comprehensive Track projects. Interviews with individuals representing 5 of 6 Comprehensive Track projects. Enhanced method. NTG scores were adjusted for standard design national retail stores and LEED projects.
PY5	Illinois SAG Consensus • 0.65
PY6	Illinois SAG Consensus • 0.65

	Business New Construction Service
PY7	**Full Program NTG:** 0.59 **Comprehensive NTG:** 0.59 **Systems Projects NTG:** 0.64 **Free Ridership:** 0.43 **Spillover (all types):** 0.05 **Source.** The NTG from estimate is from the EM&V EPY4 participant survey. Spillover is an EM&V estimate based on our literature review. In 50 participant interviews from EPY2-4 we found two spillover projects. Some of those interviews were early in the program's life when spillover is less likely. We also looked at existing literature on past studies and a wide range of spillover values. For example, in September 2012, National Grid Rhode Island published 2011 Commercial and Industrial Programs Free Ridership and Spillover Study. For commercial new construction, they found 78% participant spillover and 0% nonparticipant spillover. Southern California Gas recently did a study to estimate spillover for its 2013 and 2014 Savings By Design program by looking at past studies. They only found a couple of older California studies relevant to commercial new construction. The 2003 BEA reported 11% participant spillover and 1% nonparticipant spillover. A 2002 study by the same evaluator showed 13% participant spillover and 5% nonparticipant spillover. Finally, they also looked at the NYSERDA New Construction Program Impact Evaluation Report from 2007-2008, which found participant spillover of 20% and nonparticipant spillover of 61%. This study has been questioned and we understand that NYSERDA is reevaluating its validity. Given the ComEd program design and implementation approach, it is reasonable to expect that a meaningful amount of spillover is being created and should be credited to the program. Given the range of spillover amounts we found in our literature review, we believe a spillover amount of 5% is probably a realistic and probably conservative estimate. That spillover is probably occurring through the action of architects, engineers, and builders who have had exposure to the program and, to a lesser degree, building owners who had a building go through the program. Given that mix, we have not tried to differentiate between participant and nonparticipant spillover.
PY8	**Recommendation (based upon PY6 research):** **Full Program NTG:** 0.80 – Preliminary, updated number to be provided later **Free Ridership:** 0.20 **Spillover:** 0.00 The researched NTGRs are being developed using a real time approach where the evaluation team conducts interviews with program participants both after each project passes the reservation phase, and again after it passes the verification phase.

<table>
<tr><th></th><th>Business New Construction Service</th></tr>
<tr><td>PY9</td><td>Full Program NTG: 0.77
Free Ridership: 0.23
Spillover: 0.00

NTG Research Source:
Free Ridership: Participant and service provider self-report through real time EMV.
Spillover: NTG real time research methods in EPY6 combine participant and service provider survey results</td></tr>
<tr><td>CY2018</td><td>Full Program NTG: 0.60
Free Ridership: 0.40
Spillover: 0.00

NTG Research Source:
Free Ridership: PY8 Participant and service provider self-report through real time EMV.
Spillover: NTG real time research methods in EPY6 combine participant and service provider survey results.</td></tr>
<tr><td>CY2019</td><td>Full Program NTG: 0.68
Free Ridership: NA
Spillover: NA

<table><tr><th>Year of Research</th><th>Electric</th></tr><tr><td>PY6</td><td>0.80</td></tr><tr><td>PY7</td><td>0.77</td></tr><tr><td>PY8</td><td>0.60</td></tr><tr><td>PY9</td><td>0.54</td></tr><tr><td>4-Year Average</td><td>0.68</td></tr></table>
NTG Research Source: Average of four most recent years of NTG research, as per Illinois SAG consensus</td></tr>
</table>

<table>
<tr><th></th><th>Business New Construction Service</th></tr>
<tr><td>CY2020</td><td>
Full Program NTG: 0.59
Free Ridership: NA
Spillover: NA
<table>
<tr><th>Year of Research</th><th>Electric</th></tr>
<tr><td>PY7</td><td>0.77</td></tr>
<tr><td>PY8</td><td>0.60</td></tr>
<tr><td>PY9</td><td>0.54</td></tr>
<tr><td>CY2018</td><td>0.45</td></tr>
<tr><td>4-Year Average</td><td>0.59</td></tr>
</table>
NTG Research Source: Average of four most recent years of NTG research including CY 2018 participating customer survey, as per Illinois SAG consensus
</td></tr>
<tr><td>CY2021</td><td>
Full Program NTG: 0.53
Free Ridership: 0.49
Spillover: NA
<table>
<tr><th>Year of Research</th><th>Electric
Research Value/SAG Value</th></tr>
<tr><td>PY8</td><td>0.60/0.80</td></tr>
<tr><td>PY9</td><td>0.54/0.77</td></tr>
<tr><td>CY2018</td><td>0.45/0.60</td></tr>
<tr><td>CY2019</td><td>0.51/0.68</td></tr>
<tr><td>CY2020</td><td>NA/0.59</td></tr>
<tr><td>4-Year Average</td><td>NA/0.53</td></tr>
</table>
NTG Research Source: Average of four most recent years of NTG research, as per Illinois SAG consensus
</td></tr>
</table>

	Business New Construction Service
CY2022	**Full Program NTG:** 0.48 **Free Ridership:** 0.60 **Spillover:** NA **NTG Research Source:** Average of four most recent years of NTG research, as per Illinois SAG consensus
CY2023	**Full Program NTG:** 0.48 **Free Ridership:** 0.60 **Spillover:** NA **NTG Research Source:** Average of four most recent years of NTG research, as per Illinois SAG consensus

Year of Research	Electric Researched Value/SAG Value
PY9	0.54/0.77
CY2018	0.45/0.60
CY2019	0.51/0.68
CY2020	NA/0.59
CY2021	0.40/0.53
4-Year Average	**NA/0.48**

Year of Research	Electric Researched Value/SAG Value
PY9	0.54/0.77
CY2018	0.45/0.60
CY2019	0.51/0.68
CY2020	NA/0.59
CY2021	0.40/0.53
CY2022	NA/0.48
4-Year Average	**NA/0.48**

Source: https://www.ilsag.info/wp-content/uploads/ComEd-NTG-History-and-CY2021-Recs-2020-09-30-Final.pdf
https://www.ilsag.info/wp-content/uploads/ComEd-NTG-CY2023-Recommendations-Final-2022-09-30.xlsx

Appendix C. *Peoples Gas (PGL) and North Shore Gas Non-Residential New Construction Program NTG History*

	Business and Public Sector Joint Non-Residential New Construction Program
GPY4	**NTG:** 0.52 **Method and Source:** PGL and NSG have joined the Business New Construction (BNC) Program offered by Nicor Gas and ComEd. The BNC Program NTG value was the recommended value for Nicor Gas for GPY4.
GPY5	**NTG:** 0.92; **Free ridership**: 0.08, **Spillover:** 0.00 **Method and Source:** Value drawn from gas-weighted free ridership and spillover results from participant interviews conducted for the Nicor Gas and ComEd GPY3/EPY6 BNC Program.
GPY6	**NTG:** 0.67 **Method and Source:** FR, PSO, and NPSO research conducted for Nicor Gas and ComEd for GPY4/EPY7 resulted in a NTG of 0.57 for gas. Illinois SAG consensus for GPY6 is a 3-year average of 0.52, 0.92, and 0.57. Also applies to small business new construction.
2018 (GPY7)	**NTG:** 0.77 **Method:** Research conducted for ComEd and gas utility program partners for GPY5/EPY8 resulted in a NTG ratio of 0.83 for natural gas measures. Illinois SAG consensus for GPY6 and GPY7 was to use a 3-year average of the most recent NTG research values. For GPY7, the three most recent research values are: 0.92, 0.57, and 0.83, producing an average of 0.77. The NTG value also applies to small business new construction. The research applied TRM v5.0 NTG algorithms.
2019	**NTG:** 0.70 **Method:** Evaluation research conducted during GPY6/EPY9 for gas utility and ComEd projects resulted in a NTG of 0.48 for gas, applying TRM v6.0 methodologies. Memo: Net-to-Gross Research Results from the EPY9/GPY6 Non-Residential New Construction Program, Navigant (now Guidehouse), 8/24/18, revised 9/21/18. FR based on 24 interviews, PSO based on 120 online survey responses. Illinois SAG consensus NTG for GPY6 and 2018 (GPY7) was to use a 3-year average of the most recent research results (which were 0.92, 0.57, and 0.83 for 2018 (GPY7). For 2019, the Illinois SAG consensus is a 4-year average of NTG values (0.70), based on: 0.92, 0.57, 0.83, and 0.48.
2020	**NTG:** 0.58; **Free Ridership:** 0.42 **Method:** NTG average of previous 4 program years GPY4 (0.57), GPY5 (0.83), GPY6 (0.48), and CY2018 (0.45); 2018 FR estimate of 55% from Navigant (now Guidehouse) CY2018 research, based on 23 completed interviews.
2021	**NTG:** 0.54, **2019 Participant Researched Free Ridership:** 0.61 **Method:** NTG is the average of previous 4 program years GPY5 (0.83), GPY6 (0.48), CY2018 (0.45), and CY2019 (0.39); 2019 FR estimate from Opinion Dynamics CY2019 research, based on 28 completed interviews.
2022	**NTG:** 0.43, **2021 Participant Research Free Ridership:** 0.61 **Method:** NTG is the average of previous 4 program years of research GPY6 (NTG=0.48); CY2018 (0.45); CY2019 (0.39); CY2020 (NA); and CY2021 (0.39). The 2021 FR estimate from Opinion Dynamics CY2021 research, based on 32 completed interviews from a population of 58 projects representing 74% of therm savings.

2023	**NTG:** 0.43, **2021 Participant Research Free Ridership:** 0.61 **Method:** NTG is the average of previous 4 program years of research GPY6 (NTG=0.48); CY2018 (0.45); CY2019 (0.39); CY2020 (NA); CY2021 (0.39); and CY2022 (NA). The 2021 FR estimate from Opinion Dynamics CY2021 research, based on 32 completed interviews from a population of 58 projects representing 74% of therm savings.

Source: *https://www.ilsag.info/wp-content/uploads/PGL_NSG_NTG_History_and_2022_Values_Final_2021-09-30.pdf*
https://www.ilsag.info/wp-content/uploads/PGL-NSG_NTG_2023_Values_Final_2022-09-30.xlsx

Nicor Gas Non-Residential New Construction Program NTG History

	Business and Public Sector Joint Non-Residential New Construction Program
GPY1	**NTG:** 0.33 **Free ridership:** 67% **Spillover:** 0% **Method:** Customer self-report for all projects. Interviews with individuals representing four of seven projects with gas incentives. NTG scores were adjusted for standard design national retail stores and LEED projects.
GPY2	**NTG:** 0.52 **Free ridership:** NA **Spillover:** NA **Method:** Illinois SAG deemed NTG ratio based on electric program evaluation results from EPY4.
GPY3	**NTG:** 0.52 **Free ridership:** NA **Spillover:** NA **Method:** Illinois SAG deemed NTG ratio based on electric program evaluation results from EPY4.
GPY4	**NTG:** 0.52 **Free ridership:** NA **Spillover:** NA **Method:** NTG values for GPY4 were deemed using values from GPY3 and reported in Table 14 of the Nicor Gas filed Energy Efficiency Plan for GPY4-GPY6.
GPY5	**NTG:** 0.52 **Free ridership:** NA **Spillover:** NA **Method:** NTG values for GPY4 were deemed using values from GPY3 and reported in Table 14 of the Nicor Gas filed Energy Efficiency Plan for GPY4-GPY6.
GPY6	**NTG:** 0.67 **Method:** FR, PSO, and NPSO research conducted for Nicor Gas and ComEd for GPY4/EPY7 resulted in a NTG of 0.57 for gas. Illinois SAG consensus for GPY6 is a 3-year average of 0.52, 0.92, and 0.57. Also applies to small business new construction.
2018 (GPY7)	**NTG:** 0.77 **Method:** Research conducted for ComEd and gas utility program partners for GPY5/EPY8 resulted in a NTG ratio of 0.83 for natural gas measures. Illinois SAG consensus for GPY6 and GPY7 was to use a 3-year average of the most recent research values. For GPY7, the three most recent research values are: 0.92, 0.57, and 0.83, producing an average of 0.77. The NTG value also applies to small business new construction.

	Business and Public Sector Joint Non-Residential New Construction Program
CY2019	**NTG:** 0.70 **Method:** Evaluation research conducted during GPY6/EPY9 for gas utility and ComEd projects resulted in a NTG of 0.48 for gas, applying TRM v6.0 methodologies. Memo: Net-to-Gross Research Results from the EPY9/GPY6 Non-Residential New Construction Program, Navigant (now Guidehouse), 8/24/18, revised 9/21/18. FR based on 24 interviews, PSO based on 120 online survey responses. Illinois SAG consensus NTG for GPY6 and 2018 (GPY7) was to use a 3-year average of the most recent research results (which were 0.92, 0.57, and 0.83 for 2018 (GPY7). For 2019, the Illinois SAG consensus is a 4-year average of NTG values (0.70), based on: 0.92, 0.57, 0.83, and 0.48.
CY2020	**NTG:** 0.58; **Free Ridership:** 0.42 Method: NTG average of previous 4 program years GPY4 (0.57), GPY5 (0.83), GPY6 (0.48), and CY2018 (0.45); 2018 FR estimate of 55% from Navigant (now Guidehouse) CY2018 research, based on 23 completed interviews.
CY2021	**NTG:** 0.54; **2019 Participants Researched Free Ridership:** 0.61 **Method:** NTG average of previous 4 program years GPY5 (0.83), GPY6 (0.48), CY2018 (0.45), and CY2019 (0.39); 2019 FR estimate from Opinion Dynamics CY2019 research, based on 28 completed interviews. **FR:** Guidehouse CY2019 Research
CY2022	**NTG:** 0.43, **2021 Participant Research Free Ridership:** 0.61 **Method:** NTG is the average of previous 4 program years of research GPY6 (NTG=0.48); CY2018 (0.45); CY2019 (0.39); CY2020 (NA); and CY2021 (0.39). The 2021 FR estimate from Opinion Dynamics CY2021 research, based on 32 completed interviews from a population of 58 projects representing 74% of therm savings.
CY 2023	**NTG:** 0.43, **2021 Participant Research Free Ridership:** 0.61 **Method:** NTG is the average of previous 4 program years of research GPY6 (NTG=0.48); CY2018 (0.45); CY2019 (0.39); CY2020 (NA); CY2021 (0.39); and CY2022 (NA). The 2021 FR estimate from Opinion Dynamics CY2021 research, based on 32 completed interviews from a population of 58 projects representing 74% of therm savings.

Source: https://www.ilsag.info/wp-content/uploads/Nicor_Gas_NTG_History_and_2022_Values_Final_2021-09-30.pdf
https://www.ilsag.info/wp-content/uploads/Nicor_Gas_NTG_2023_Values_Final_2022-09-30.xlsx

Appendix D. *Verbatim Responses*

Topic	Quote
Standard Practices	"So, the type of equipment, like [measure], it's basically our baseline, so there wasn't much that we had to do to go above and beyond what we were already planning to be in the program. I think would be we were already going to do most of the stuff before even enrolling in the program."
	"The requirements for the energy efficiency program aligned with our base specs."
	"It's just something that we were already doing, and it just happened that it also qualified for the incentive. So, it wasn't so much a decision we had to make as it was just part of our standard operating procedure to put that in."
	"Some of them were done because that's what we've kind of deemed as our standard of design up to this point. When you're looking at the [measure] and the [measure], that's kind of become a little bit of a standard for the [specific] industry."
	"I don't think it really improved much, since we had it in our baseline spec. It was already what we were achieving because of the company standards."
	"What ComEd is incentivizing is what every single project by most firms tries to do, which is push the envelope on efficiency as far as you can beyond code."
	"It was a combination of the [Chicago sustainability] checklist and operational preferences."
	"Those were recommendations from our team. We also have higher than code internal standards, which we push the client towards."
	"Our engineers and our firm, we're all somewhat driven to achieve a good balance, but also as much energy efficiency as we can on all of our projects."
	"As a development company, we try to be as responsible as possible with energy efficiency. And then also for the operation of the building, obviously, it makes more sense there. So, it's something that goes along with what we do typically."
	"I think a big part of it is probably that as a company, one of our values is having efficient systems and efficient equipment beyond code. A project like this, I think we kind of already are designing for those higher levels of efficiency, and then it just kind of makes it easy to slide into the energy efficiency incentives."
	"I mean, I think there are certain things that are such industry standard, like the energy efficient [measures], they're almost a no-brainer."
	"We as a company are always pushing energy conservation. Even before LEED became a thing in the early 2000s, we were always trying to be on the leading edge of providing good environmentally sustainable projects."
Incentives	"Mostly for the monetary value for our client. It's a very easy incentive to achieve since we're most likely going to hit those values anyways, so might as well enroll in the program and get the monetary value back while we're already doing it."
	"But I think that just kind of really made them move forward with it because of the rebate application and the possibility of a rebate. I don't want to say it was the linchpin that made us move forward with the overall project, but it definitely helped with it."

Topic	Quote
	"I would say on this one, we more just were wanting to take advantage of the incentives for what we would qualify for as it was designed."
	"I was aware that there were certain abilities to receive the incentive money, which helped to offset some of the costs of putting in the [measure], specifically, which allowed us then to use the [measure] and [measure] to reduce the time the lights are on."
	"It's just getting [incentive] to help care for [project occupants]. Because I mean, they're paying a whole lot more for all that equipment and they're only getting [incentive] bucks back."
	"When we were made aware of the program, just that there were rebate incentives, the [client] was certainly interested in that."
	"Really the benefit is the incentive and that brings our paybacks down over the premium for the traditional system."
	"The owner was definitely pushing for incentives for this to be put in place. But also not just the incentives, there's also cost benefits to the operations for them in the long run."
	"I think the rebates helped them make decisions because it doesn't pay for all of it as we all know, but it does soften it a little bit."
	"I wouldn't say it expressively impacted the design rather than maybe the financial urge just to get the whole building done a little bit over budget, knowing and hoping there would be an incentive coming through later."
Certifications	"We're getting LEED certification for this building as well, so all of those components helped us achieve LEED certification…Naturally participating in the efficiency program went hand in hand with becoming LEED certified."
	"All of our projects are, at a minimum, LEED Silver, and we're trying to make sure that we are sustainable and have energy efficiency throughout all of our new builds."
	"So [Company] has always been a rather green company if you will. We have a design bent on energy efficiency and really capturing the LEED program."
	"It was a combination of the [Chicago sustainability] checklist and operational preferences."
	"We abide by LEED certification for our projects of which Silver is the minimum. By going through the LEED Silver minimum, coupled with the requirements and standards as well as guidelines from the Chicago "external agency", we end up having a fairly robust building."
	"We were attempting to be as efficient as we could so we could get as many points as possible for LEED certification. The [client] is also very sustainably conscious. They have their own sustainability master plan."
	"As we looked at this project, we typically pursue some sort of Green rating certification. It has been predominantly LEED in the past. For this project we were going for NGBS certification. And with that, a lot of the measures that we took for that certification qualified and basically, we didn't change a lot to comply with or I guess to provide additional measures specifically for the ComEd program."

Topic	Quote
	"There are standards that LEED identifies clearly in order to reach that level. We have a checklist and scorecard that we run through. We develop a work plan for how those incentives will be incorporated in the project and we implement them in order to reach that level of silver."
	"So, these measures, not only do they provide an economic incentive to us in the form of this program, but they also contribute to being able to achieve the certification goal that we're also trying to accomplish."
	"I think the team worked through kind of general design for co-compliance with City of Chicago and using Green Globes' two globes as our baseline towards achieving that goal."
	"I think it just helps provide credit transparency on metrics of, say we go with the Green Globes. All right, we go for the points. But how does that actually translate into efficiency compared to code?"
Program Technical Assistance	"If we [weren't in the program], we'd kind of be doing it blindly and probably not make all the right changes to actually have an efficient building."
	"It was really just being able to frame the conversation about the building systems with the owner to show them, here's the baseline, here's what we're doing for your building, and then this is the incentives you qualify for because we're doing that."
	"And with energy modeling based on some of the less efficient [measures] they've had, I think we've been able to demonstrate some value to that system."
	"[The Slipstream engineer] that was involved with it was very good at explaining things in a simple and good way to this client who, while well intentioned, doesn't really want to get into the technical details. And so I think that my interactions and everything that I had to hear helped make it seem like a more attractive thing."
	"I think there was an initial modeling analysis that that was done, that provided a good metric then for us to react to and helped create a path or a map of how to make some simple changes to make our building more energy efficient."
	"I think a lot of them were ideas that we had come up with, but we were able to show with the modeling that it was certainly worthwhile. We were achieving what we were saying we were doing. For us, this was more validation."
	"The program allowed us to revisit choices. In some ways it lets you check off all of those boxes, as designers are typically prone to just doing what they did last time."
	"The design was almost entirely codified, but the program made us look back on decisions. Are we making the right decisions now that we are looking at it at the context of the program?"
	"It was mostly the engineer being able to get feedback through comments and being able to figure out the best means to approach it."
	"One thing that ComEd does is they do their own energy model. So as a back check or a second look at what we're looking at as a series of incentives on the project. We get that as resourceful information that we then can verify where we're heading with the project."

Topic	Quote
	"Since we don't really target something specific internally, that helps us, the program shares what those specific goals are that they're looking for, and then we can adjust to meet them."
	"I think that the way the ComEd energy efficiency analysis shows the measures, it shows a little bit differently. So, I think we likely would've done exactly the same thing, but maybe not because maybe there's a little more nuance that we understand a little bit better."
	"I would say the exercise probably forced us to look at alternates. And kind of go through a list, at the very beginning of the project and really kind of say, "Okay, we'll do this, this, and this." Whereas you might not have made those decisions till you got halfway through."
	"I think the upfront comments are always very helpful. We'll submit our preliminary design and get feedback on [design specification] and layout and those types of things. So generally those early upfront comments are very helpful."
	"One of the things that I've done for the first time in particular in this project, is gone back and looked at the carbon reduction calculation. Which is something that on previous projects we just haven't necessarily focused on. The program helps provide that information, it helps reinforce the value of some of the decisions that we make."
	"But I feel like we probably achieved some things that were greater than code with those, even just through the process of knowing what options were out there. I think it became apparent that the things that we were looking to already kind of do, could be improved a little bit more in those areas, and the incentive was a little bit larger in those areas."

Source: Evaluation team analysis