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CC: Jennifer Morris, ICC Staff; Randy Gunn, Jeff Erickson, Rob Neumann

From: Sharon Mullen, Roger Hill, Kevin Grabner

Date: August 25, 2018 (Interim Update September 14, 2018)

Re: Net-to-Gross Research Results from EPY9/GPY6 for the Coordinated Utility Retro-Commissioning Program

Introduction

This memo presents our free ridership and spillover research results for the EPY9/GPY6 Coordinated Utility Retro-Commissioning Program (Retro-Commissioning) among ComEd, Nicor Gas, Peoples Gas (PGL) and North Shore Gas (NSG) using the Illinois TRM version 6.0 methodologies.[1] The net-to-gross (NTG) research was conducted by surveying EPY9/GPY6 participants in November 2017 and February 2018 and interviewing participating service providers in March and April 2018. The focus of the research was to capture a representative sample of traditional RCx, RCxpress and Tune-Up participants and a representative sample of participating service providers. The participant and service provider free ridership and spillover results combined provide new findings to inform the CY2019 NTG discussions in September 2018.

Table 1 below provides a summary of the participant free ridership and spillover research findings for the two different algorithm options included in the NTG TRM. Overall, 19 participant surveys were completed, including two Traditional RCx, five RCxpress and 12 Tune-Up participants. Navigant completed 11 service provider interviews.

Commented [SD1]: Please include the final survey instruments as appendices.

Commented [KG2R1]: Added to the Appendices. We will add them in expanded form to the final memo.

[1] Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 6.0, Volume 4: Cross-Cutting Measures and Attachments, effective January 1st, 2018.

Table 1. Participant Free Ridership and Spillover Results

NTG Option	Program Path	Participant Free Ridership, (Weighted)	Participant Spillover	Sample (n)	Relative Precision @90% CI
Option 1	Traditional RCx*	0.24	0	2	25.9%
	RCXpress	0.09	0	5	4.8%
	Tune-Up	0.14	0	12	6.2%
	Population Roll-up	**0.13**	**0**	**19**	**1.6%**
Option 2	Traditional RCx*	0.31	0	2	20.7%
	RCXpress	0.10	0	5	4.4%
	Tune-Up	0.15	0	12	6.3%
	Population Roll-up	**0.14**	**0**	**19**	**2.0%**

* Free ridership results are not statistically significant due to the small number of responses.

Source: Navigant analysis of data from a telephone survey conducted by Navigant with EPY9/GPY6 Retro-Commissioning Program participants. MBCx was not evaluated for this program year.

Free Ridership and Spillover Research Data Collection

Navigant conducted the free ridership and spillover research following a self-report approach with program participants and with participating service providers. The participant research involved a telephone survey with an attempted census of 78 unique EPY9/GPY6 participants. We achieved a response rate of 28 percent by count across the three paths, while experiencing 17 percent unreturned voice mail messages, 13 percent refusal to participate in the survey, and 12 percent inaccurate contact information. The service provider research involved telephone interviews with 11 program service providers from an attempted census of 25 partner companies. Although the service provider response rate was 44 percent by count, the respondents were responsible for 71 percent of the savings generated through the program. The counts for the completed participant survey, service provider interviews, and sample design are outlined in Table 2.

Table 2. Free Ridership and Spillover Research Survey and Interview Disposition

Respondents	Unique Contacts	Target Completes	Actual Completes	Free Ridership Sample (n)	Percent Savings Represented
Participant Decision Makers	78	Census	19	19	12%
Electric					12%
Gas					4.5~~<1~~%
Service Providers	25	Census	11	11	71%

Source: Coordinated Retro-Commissioning EPY9/GPY6 Participant Survey responses.

Commented [SD3]: Does not seem like a representative sample in terms of gas savings, and this is reflected below in the scoring, but (as I note below) it doesn't appear to ultimately weight the service providers any higher for gas.

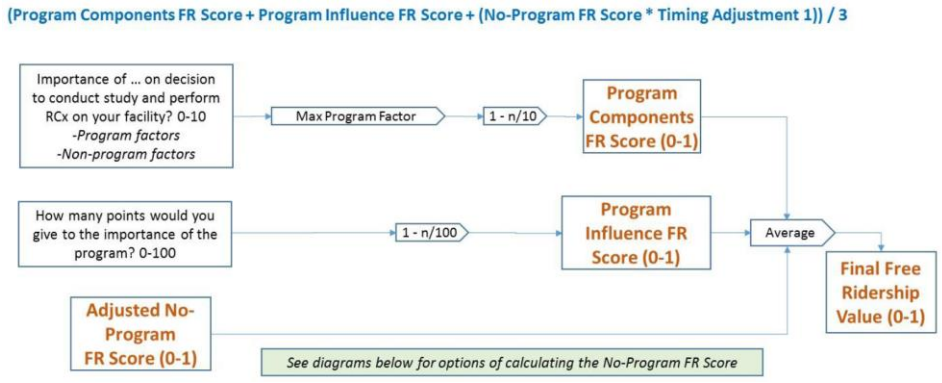
Commented [KG4R3]: There was a wrong data reference in the denominator of the original calculation. The survey covered 4.5% of the savings. This change does not affect the triangulation calculation

Following a low response rate to our participant survey in EPY8/GPY5, we took steps to improve the response this year. These steps include having the implementer email participants to take the survey before fielding the survey for both Waves and having a call center available to accept return-calls to take the survey during extended business hours. Participants from the Wave 1 sample who had fewer than two voice mail messages were contacted again with Wave 2. All participants were contacted up to five times or until they participated in the survey, refused to participate, or we discovered incorrect contact information. We will take additional steps in the future, including advanced email scheduling of appointments to conduct the survey.

Free Ridership Estimates

The following diagrams describe the TRM participant free ridership algorithms for commercial and industrial study-based programs. Figure 1 shows an overview of the framework which allows for two options for computing score 3. These two variants are shown graphically in Figure 2 and Figure 3 below.

Figure 1 Study-Based Free Ridership Overview



Source: Illinois TRM Version 6, Volume 4. Cross-Cutting Measures and Attachments, final February 8, 2017, effective January 1st, 2018.

Figure 2. Study-Based Free Ridership – No-Program FR Score Option #1

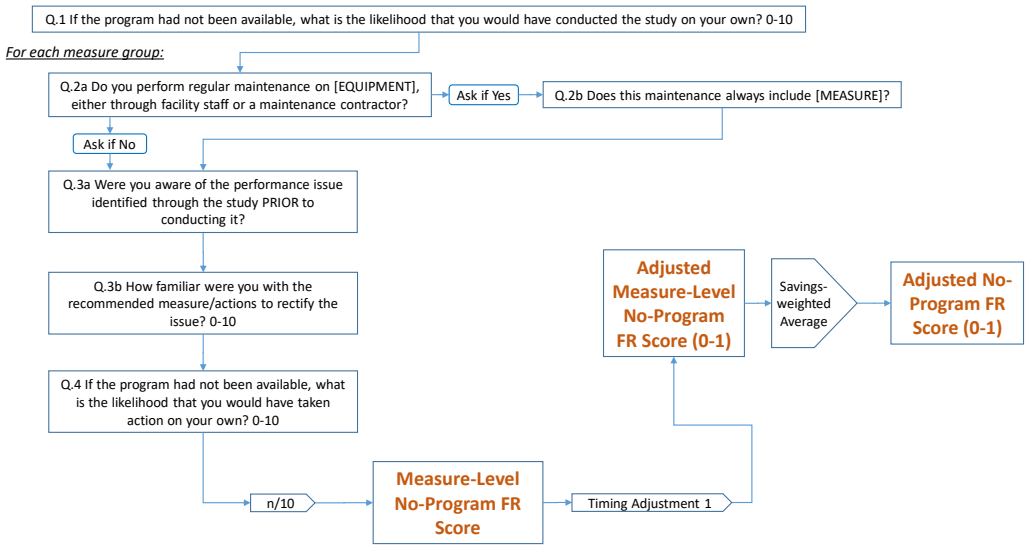
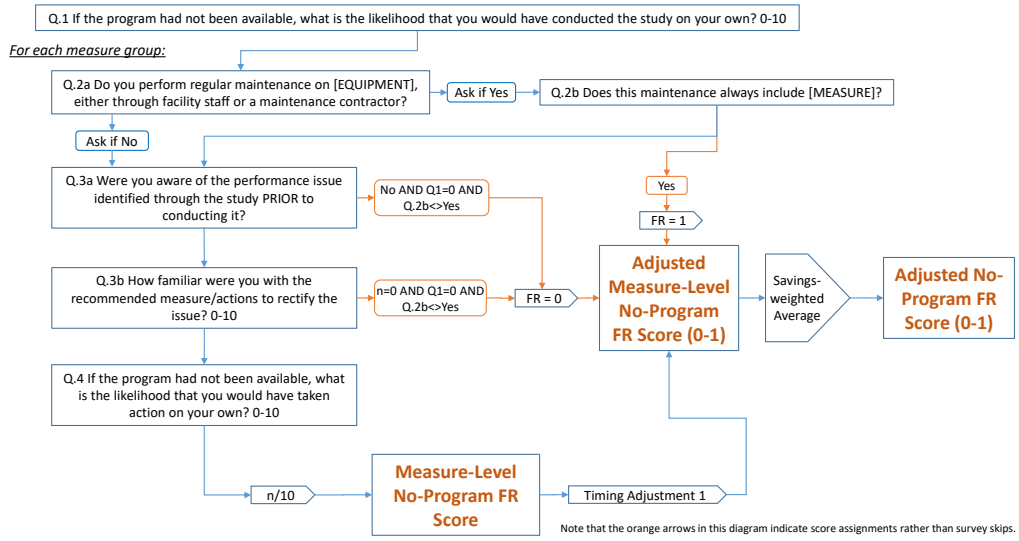


Figure 3. Study-Based Free Ridership – No Program FR Score Option #2



For the participant research, Navigant applied the algorithms indicated by the TRM version 6.0 to the data we collected from the EPY9/GPY6 Retro-Commissioning Program participants. To achieve the Program Influence score, we expanded the program factor/non-program factor rating questions with follow up questions to determine if this Retro-Commissioning Program was influential when considering, for example, previous experience with retro-commissioning, peer recommendations or trade organizations. We then prompted respondents with their three highest rated program factors when assigning points to the importance of the program and non-program factors when assigning points to the importance of non-program factors.

The TRM protocol requires the free ridership analysis to include an adjusted no-program free ridership score. This adjustment is determined by querying the decision maker about 1) the likelihood of conducting the study on their own had the program not been available and 2) how they addressed various implemented measures or actions prior to participating in the program. Results of our free ridership calculations using the two options are shown in Table 1.

Table 3 below shows the average for each component free ridership score by program path. The free ridership algorithm is applied to individual respondents, and then those respondent free ridership values are savings weighted for the final free ridership.

Commented [SD5]: Please provide the avg scores for each of the components.
Also, how often were the consistency check questions triggered, and how were they addressed?

Commented [KG6R5]: Component scores provided below

We will add discussion of the consistency check process.

Commented [SD7]: This is helpful and suggest, if we keep the 100 point allocation approach, that this be used for other programs as well.

Table 3. Free Ridership Component

Program Path	Program Component FR Score	Program Influence FR Score	Adjusted No-Program Score (Weighted):
Traditional RCx (n=2)	10%	40%	9%
RCXpress (n=5)	0%	20%	1%
Tune-Up (n=12)	8%	35%	1%

Navigant recommends the results from Option #1 because that option yields a more balanced representation of free ridership in that it considers the full body of evidence regarding no-program behavior in computing the No-Program FR Score. In contrast, Option #2 goes straight to a FR value of 0 (NTGR of 1.0) solely based on the decisionmaker self-reported responses that their routine maintenance excludes the incented equipment. This option does not consider other no-program evidence when computing the No-Program FR score. This essentially ignores the effect of the other no-program actions for such answer combinations, which in our view is inappropriate. This option also violates the general principal in the TRM that the NTG value should not be dependent on a single question.

Commented [SD8]: Seems like option 2 also has a skip that goes right to FR=1 and ignores other program evidence. Either way, they give almost the same response, so I am in agreement that option 1 is preferable since it allows for the full list of questions.

For the service provider research, Navigant interviewed service providers on participant free ridership, asking the following questions:

> According to program records, you completed Retro-Commissioning studies between June 2016 and December 2017. If the program did not exist this year, how many studies do you think you would have completed in the same period?
>
> Again, thinking about the program studies that you completed between June 2016 and December 2017, if the program did not exist this year, how many studies *of comparable breadth and depth* do you think you would have completed in the same period?
>
> According to program records, between June 2016 and December 2017 your program participants went on to achieve [RSPSAVINGS] from implementing recommended energy efficiency improvements. What percent of these savings do you think those customers would have achieved if the program did not exist this year?

Navigant found that the free ridership as reported by service providers was 0.025, while the free ridership as reported by participants was 0.13.

Combining Participant and Service Provider Results. Navigant calculated a weighted average of the participant and service provider free ridership utilizing the proposed triangulation approach[2] shown in Table 4 to arrive at one recommended free ridership score. Navigant rated the survey data on three aspects: accuracy, validity, and representativeness, using a scale of 0 to 10 where 10 means "extremely so" and 0 means "not at all".

Table 4. Triangulation Weighting Approach

NTG Triangulation Data and Analysis	Participants	Service Providers
How likely is this approach to provide an accurate estimate of free ridership?	6	8
How valid is the data collected/analysis?	5	5
How representative is the sample for Electric?	1.2	7.1
How representative is the sample for Gas?	0.1	7.1
Electric		
Average Score	4.1	6.7
Sum of Averages	10.8	10.8
Weight	**0.38**	**0.62**
Gas		
Average Score	3.7	6.7
Sum of Averages	10.4	10.4
Weight	**0.36**	**0.64**

Source: Coordinated Retro-Commissioning EPY9/GPY6 Participant and Service Provider survey responses.

Navigant arrived at the value for accuracy based on our understanding of the difference between participant and service provider understanding of the marketplace and likelihood of customers engaging in the study and recommended improvements without the program: we rate the trade ally data as more accurate than the participant data. Validity of the data is consistent for both populations. The representativeness was based on the savings the respondents contributed to the program, calculated at 100 * XX% of savings delivered by the respondents (i.e., electric participants at [100 * 12%], service providers at [100 * 71%]. The weights were determined by [(average score) / (sum of averages)]. These

[2] The triangulation approach is presented in TRM version 6.0 for residential rebate programs and is proposed for all sectors as an update to TRM version 7.0.

Commented [SD9]: The accuracy and validity of the participant responses seems questionable to me since they were almost all electric savings only. Seems like these scores should potentially be lower for gas.

Commented [KG10R9]: Navigant reviewed the data, and reconsidered the scoring for weighting participants versus RSPs. Of the three factors in the weighting average, two are not related to sample representativeness, and one specifically addresses sample representativeness. However, the simple average approach described in TRM v7 sets the importance of the representativeness of the sample to one-third weight, which is arguably too low in this situation. Navigant will adhere to the TRM protocol as written, but suggests the protocol be considered for revision.

Commented [SD11]: This is for elec, for gas it's <1%.

Commented [KG12R11]: For gas, the revised calculation was 4.5%

weights were subsequently applied to the researched NTG value for the participants and service providers, then added together:

Free Ridership = ((Participant FR) * (Participant Weight)) +

((Service Provider FR) * (Service Provider Weight))

Free Ridership = 13.0% * 0.36 + 2.5% * 0.64 = 6%

Navigant recommends using the weighted free ridership estimate of 6% achieved through this triangulation of 13 percent reported by the participants and 2.5 percent reported by service providers. The triangulation weighting reflects the service providers' greater understanding of the market and higher representation of the energy savings achieved through the program.

Participant Spillover

Navigant asked the participants if they had implemented or installed additional energy savings measures to reduce consumption at their facility since participating in the Retro-Commissioning Program. Navigant included questions to identify spillover candidates and measures, paraphrased below:

- Since completing your project, have you adopted any additional energy efficient operational improvements? What did you implement?
- How important was your experience in the Retro-Commissioning Program in your decision to make these additional changes? Please use a 0-10 scale, where 0 means 'not at all important', and 10 means 'extremely important'?

Participants did not report having implemented or installed additional operations or measures to save energy at their facilities since participating in the program. As a result, Navigant estimated participant spillover at zero.

Trade Ally Spillover

From interviews with the 11 service providers, Navigant identified none who responded with any percentage of their sales that were potential spillover. To determine whether the sales were spillover, Navigant analyzed responses from questions including:

- Have you conducted any studies with ComEd-territory customers without program rebates?
- How influential do you think the program was on these additional studies conducted without program rebates?
- Thinking about the savings that those non-rebated studies achieved, how would you describe those savings in terms of the savings that your studies achieved through the program?

Navigant determined that none of the 11 service providers reported any potential spillover.

NTG Results

The NTG research results for the two fuel types represented in the Coordinated Retro-Commissioning Program are summarized in Table 5.

Table 5. Summary of Free Ridership, Spillover and NTGR Research Results for the Coordinated Utility Retro-Commissioning Program

Fuel Type	Free Ridership	Participant Spillover	Trade Ally Spillover	Non-participant Spillover	NTGR
Electric	0.06	0.00	0.00	0.00	0.94
Gas	0.06	0.00	0.00	0.00	0.94

NTGR = 1 – FR + PSO + TSO + NPSO

FR = Participant Free Ridership; PSO = Participant Spillover; TSO = Trade Ally Spillover; NPSO = Non-Participant Spillover

Source: Navigant analysis of data from telephone surveys conducted by Navigant with EPY9/GPY6 Retro-Commissioning Program participants and service providers. MBCx was not evaluated for this program year.

NTG Comparison with Previous Research

For comparison, the NTG results we reported previously[3] using EPY6 and GPY1 program participants and participating service providers are presented below.

Table 6. Participant NTG Estimates (EPY6 and GPY1 Participants)

	Participant		Service Provider		Overall	
	Electricity	Gas	Electricity	Gas	Electricity	Gas
Net-of-Free-riders	0.91	0.82	0.90	0.998	0.91	0.91
Spillover	<0.01	<0.01	0.04	0.11	0.04	0.11
Overall NTG	**0.91**	**0.82**	**0.94**	**1.10**	**0.95**	**1.025**

Source: Navigant analysis of EPY6 and GPY1 Participant and Service Provider responses.

The overall electricity NTG value was updated to 0.95 by combining participant and service provider survey research results from EPY6[4]: electric free ridership (nine percent) and spillover (four percent).

[3] Evaluation Report: Northern Illinois Joint Utility Retro-Commissioning Program Report, January 14, 2013.

[4] Joint Utility Retro-Commissioning Program EPY6/GPY3 Evaluation Report, March 24, 2015.

Appendix 1: ComEd Retro-Commissioning Program NTG History

	Retro-Commissioning
EPY1	**NTG** 0.8 **Free-Ridership** 0% **Spillover** 0% **Method**: Program *ex ante* assumption. Customer self-report. Two completed surveys from a population of four participants bracketed the assumed NTG. Basic method.
EPY2	**NTG** 0.916 **Free-Ridership** 8.4% **Spillover** 0% **Method**: Customer self-report. Five surveys completed from an attempted census of a population of thirteen. Basic method.
EPY3	**NTG** 0.71 **Free-Ridership** 28.7% **Spillover** 0% **Method**: Customer self-report. Eight surveys completed from an attempted census of a population of 34 participants. Basic method.
EPY4	**Deemed NTG of 0.916 from EPY2** **Research NTG** 1.04 **Free-Ridership 0.097** **Spillover 0.136** **Method**: Program *ex ante* assumption and stipulated for EPY4. NTG based on EPY2 research. EPY3 research rejected due to small ratio of completed surveys.
EPY5	SAG Consensus: • 0.71
EPY6	SAG Consensus: • 1.04

	Retro-Commissioning
EPY7	**NTG: 1.04** There was no new NTG research in EPY5. The most recent NTG research is from PY4. **Free-Ridership: 0.10.** The PY4 Free-Ridership ratio is an equally weighted average of savings-weighted participant and service provider Free-Ridership scores. **Participant spillover: 0.14.** Source: Participant and trade ally surveys. (Includes spillover from trade allies that account for 94% of program participation) **Nonparticipant spillover: Negligible.** There is no evidence of non-participant spillover. Service providers are dropped from the program if they are not generating projects. If they are not generating projects in the program, they are probably not generating them outside the program.
EPY8	**Recommendation (based upon PY6 research):** **NTG: 0.95 (electric)** **Free Ridership: 0.09 (electric)** **Spillover: 0.04 (electric)** Spillover and Free-Ridership were calculated from self-report interviews with participants and service providers (n=18). The final EPY6 Free-Ridership ratio is an equally weighted average of savings-weighted participant and RSP Free-Ridership. Interviewed service providers account for 92% of electric savings. NTG research was not conducted for the gas companies.
EPY9	**NTG: 0.95 (electric)** **Free Ridership: 0.09 (electric)** **Spillover: 0.04 (electric)**

	Retro-Commissioning
	NTG Source: Free-Ridership and Spillover: PY6 NTG Research
EPY10	**NTG: 0.95 (electric)** **Free Ridership: 0.09 (electric)** **Spillover: 0.04 (electric)** **NTG Source:** Free-Ridership and Spillover: PY6 NTG Research Due to limited sample size of PY8 NTG research, EPY8 results will be included in EPY9 research and analysis.

Source: http://ilsagfiles.org/SAG_files/NTG/2017_NTG_Meetings/Final/ComEd_NTG_History_and_PY10_Recommendations_2017-03-01.pdf

Appendix 2: People Gas (PGL) and North Shore Gas (NSG) Retro-Commissioning Program NTG History

	Retro-Commissioning
GPY1	**NTG** 1.02 **Free ridership** 0.09 **Participant Spillover** 0.11 **Method and Source**: Evaluation research consisting of GPY1 participating customer and Retro-Commissioning Service Provider self-reports. Interviews conducted with 9 of 15 participants from Peoples Gas and North Shore Gas and eight of nine Service Providers. Participant and Service Provider spillover researched. **Peoples Gas: Verified Gross Realization Rate:** 1.06 **North Shore Gas: Verified Gross Realization Rate:** 1.20
GPY2	**Peoples Gas: Deemed NTG** 1.02; **Free ridership** 0.09; **Participant Spillover:** 0.11 **North Shore Gas: Deemed NTG** 1.02; **Free ridership** 0.09; **Participant Spillover:** 0.11 **Method and Source**: Deemed by SAG consensus from GPY1 evaluation research. **Peoples Gas: Verified Gross Realization Rate:** 1.04 **North Shore Gas: Verified Gross Realization Rate:** no savings installed
GPY3	**Peoples Gas: Deemed NTG** 1.02; **Free ridership** 0.09; **Participant Spillover:** 0.11 **North Shore Gas: Deemed NTG** 1.02; **Free ridership** 0.09; **Participant Spillover:** 0.11 **Method and Source**: Deemed by SAG consensus from GPY1 evaluation research. **Peoples Gas: Verified Gross Realization Rate:** 1.00 **North Shore Gas: Verified Gross Realization Rate:** 1.00
GPY4	**NTG** 1.02; **Free ridership** 0.09; **Participant Spillover:** 0.11 **Method and Source**: Deemed by SAG consensus. Values based on GPY1 evaluation research.

	Retro-Commissioning
GPY5	**NTG** 1.02; **Free ridership** 0.09; **Participant Spillover:** 0.11 **Method and Source**: No new research. Values based on GPY1 evaluation research.
GPY6	**NTG** 1.02; **Free ridership** 0.09; **Participant Spillover:** 0.11 **Method and Source**: No new research. Values based on GPY1 evaluation research.
GPY7	**NTG:** 1.02 **Method**: No new research. Retained GPY6 final value.

Source: http://ilsagfiles.org/SAG_files/NTG/2017_NTG_Meetings/Final/PGL_and_NSG_NTG_Summary_GPY1-7_2017-03-01_Final.pdf

Appendix 3: Nicor Gas Retro-Commissioning Program NTG History

	Retro-Commissioning
GPY1	**NTG** 1.02 **Free ridership** 9% **Spillover** 11% **Method**: Customer and service provider self-report. NTG based on GPY1 research – 11 participants with gas savings and eight of nine service providers surveyed. Enhanced method. Participant and Service Provider spillover researched.
GPY2	**NTG** 1.02 **Free ridership** 9% **Spillover** 11% **Method**: SAG deemed NTG ratio based on GPY1 evaluation research.
GPY3	**NTG** 1.02 **Free ridership** 9% **Spillover** 11% **Method**: SAG deemed NTG ratio based on GPY1 evaluation research.
GPY4	**NTG** 1.02 **Free ridership** 9% **Spillover** 11% **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** 1.02 **Free ridership** 9% **Spillover** 11% **Method**: No new research. Values based on GPY1 evaluation research.
GPY6	**NTG** 1.02 **Free ridership** 9% **Spillover** 11% **Method**: No new research. Values based on GPY1 evaluation research.
GPY7	**NTG:** 1.02 **Method**: No new research. Retained GPY6 final value.

Source: http://ilsagfiles.org/SAG_files/NTG/2017_NTG_Meetings/Final/Nicor_Gas_NTG_Summary_GPY1-7_2017-03-01_Final.pdf

Appendix 4: Survey Instruments

The survey instruments are embedded below.

Participant Survey Instrument

ComEd RCx PY9 Participant Script FIN

RSP Survey Instrument

ComEd Coordinated PY9 RC