Memorandum

To: Jonathon Jackson, AIC, and Jennifer Morris, ICC
From: The Opinion Dynamics Evaluation Team
Date: September 4, 2018
Re: Student Energy Efficient Kit Program Household Survey Results

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This memorandum presents the results of the evaluation team's survey of Ameren Illinois Company (AIC) 2016 and 2017 Student Energy Efficient Kit Program participant student households.

The purpose of the study was to estimate free-ridership (FR) and spillover (SO) for the program's kit measures:

- CFLs
- Bathroom faucet aerators
- Kitchen faucet aerators
- Showerheads
- Water heater setback

We combine the FR and SO results to produce NTG for each measure as inputs for future planning.

Summary

Based on the survey results and analysis described in this memo, we identified the following potential future planning values for NTG. These values are consistent with a benchmarked study in a nearby region, however, as discussed before in the SAG, free-ridership estimates greater than zero for the non-lighting measures raise questions. Since these measures are provided free of charge through the program, rather than offered at a discount, it is not clear why a respondent would have purchased the measure absent the program – given that it had not already occurred. Free-ridership levels for lighting make more sense due to the multiple sockets in the home and the concurrent lighting program offered throughout Illinois.

Table 1. Future Planning Values for NTG Consideration

Measure	Value	Current Recommended Value[a]	Potential Update
CFL	NTGR	0.83	0.61
	FR	0.43	0.39
	SO	0.26	0.00
Bathroom Faucet Aerator	NTGR	1.04	0.87
	FR	0.13	0.13
	SO	0.17	0.00
Kitchen Faucet Aerator	NTGR	1.04	0.84

Measure	Value	Current Recommended Value[a]	Potential Update
	FR	0.13	0.16
	SO	0.17	0.00
Showerhead	NTGR	1.05	0.84
	FR	0.15	0.16
	SO	0.13	0.00
Water Heater Setback	NTGR	1.00	0.88
	FR	0.00	0.12
	SO	0.00	0.00

[a]http://ilsagfiles.org/SAG_files/NTG/2017_NTG_Meetings/Final/AIC_PY10_NTGR_Recommendations_for_SAG_FINAL_2017-03-01.xlsx

Background

To capture data relevant for estimating the program's future NTGR, the evaluation team developed a follow-up household survey to assess satisfaction with kit products, free-ridership, and spillover, using TRM V6.0 protocols.

The evaluation team originally planned to conduct a telephone survey with PY8 and PY9 participating student households as part of the PY9 evaluation but lacked participant contact information. To collect appropriate contact data for this survey effort, the evaluation team worked with the program implementer in February 2016 to develop a parent contact postcard that would be included in energy efficiency kits distributed in late PY8 and all of PY9. The postcard requested participating parents' contact information and permission to contact these participants for follow-up research. Parent response was extremely limited: the team received postcards from 46 of the 2,000 parents who received the postcards. We completed 23 telephone surveys from this effort. Beginning in January 2017, the team revised its approach, promoting a web link in the program's letter for parents that encouraged them to participate directly in the follow-up research online. Due to continued limited parent response to the online survey, the team extended the data collection timeline to allow participants through December 2017 to complete the survey. In total, 52 out of 7,499 parents completed the online survey. Between the two survey efforts, 75 parents completed the survey, The survey instrument can be found in Appendix A.

Findings and Recommendations

This section summarizes the team's findings. The team's research revealed information about kit measure free-ridership and spillover that may be considered when updating the recommended values for the SAG. It also assessed participant satisfaction with the kit components. This section includes one general recommendation, five recommendations related to the five school kit measures, and one recommendation related to participant satisfaction with the kit measures.

General

Finding 1: Nearly a year passed before the implementer fully integrated the process by which it encourages teachers to request parents complete the online survey. The implementer was cooperative with the evaluation team's request to include a follow-up survey to capture NTG, but response rates were low (less than 1%) throughout 2017. However, the process appears to be functional in 2018, where the evaluation team has

collected 186 parent survey responses out of 4,100 kits distributed from January through April, a 4.5% response rate.

Recommendation 1: The team recommends AIC maintain the changes made to the parent survey request process, including the implementer's reminders to teachers to encourage parents to take the survey, to improve the response rate over time. Now that the process is collecting surveys at a higher response rate, the evaluation team could report updated results in a future evaluation period.

CFLs

Finding 2: NTGR, free-ridership, and spillover values estimated from the parent survey results are lower than the values prescribed in the AIC 2018 NTGR Recommendations for the CFL measure.

Recommendation 2: The team recommends considering the CFL-specific NTG, free-ridership and spillover values estimated from the parent survey results reported in this memo for future AIC NTGR recommendations for school kit delivered CFL measures.

Bathroom Faucet Aerator

Finding 3: NTGR and spillover values estimated from the parent survey results are all lower than the values prescribed in the AIC 2018 NTGR Recommendations for the faucet aerator measures. The AIC 2018 NTGR Recommendations does not report separate NTGR, free-ridership and spillover values for bathroom and kitchen faucet aerators.

Recommendation 3: The team recommends considering the bathroom faucet aerator-specific NTG, free-ridership and spillover values estimated from the parent survey results reported in this memo for future AIC NTGR recommendations for school kit delivered bathroom faucet aerator measures. The team suggests the AIC 2018 NTGR Recommendations report separate bathroom and kitchen faucet aerator NTGR, free-ridership, and spillover values.

Kitchen Faucet Aerator

Finding 4: NTGR and spillover values estimated from the parent survey results are all lower than the values prescribed in the AIC 2018 NTGR Recommendations for faucet aerator measures. The AIC 2018 NTGR Recommendations does not report separate NTGR, free-ridership and spillover values for kitchen and bathroom faucet aerators.

Recommendation 4: The team recommends considering the kitchen faucet aerator-specific NTG, free-ridership and spillover values estimated from the parent survey results and reported in this memo for future AIC NTGR recommendations for school kit delivered kitchen faucet aerator measures. The team recommends the AIC 2018 NTGR Recommendations report separate kitchen and bathroom faucet aerator NTGR, freeridership, and spillover values.

Showerhead

Finding 5: NTGR and spillover values estimated from the parent survey results are lower than the values prescribed in the AIC 2018 NTGR Recommendations for the showerhead measure.

Recommendation 5: The team recommends considering the showerhead-specific NTG, free-ridership and spillover values estimated from the parent survey results reported in this memo for future AIC NTGR recommendations for school kit delivered showerhead measures.

Water Heater Setback

Finding 6: NTGR and spillover values estimated from the parent survey results are lower than the values prescribed in the AIC 2018 NTGR Recommendations for the water heater setback measure.

Recommendation 6: The team recommends considering the water heater setback-specific NTG, free-ridership and spillover values estimated from the parent survey results reported in this memo for future AIC NTGR recommendations for school kit delivered showerhead measures.

Satisfaction with Kit Measures

Finding 7: The Evaluation Team asked survey respondents about their satisfaction with the products they received in the kit. All participants (n=67) reported being satisfied, with 88% being *very satisfied* and the remaining being *somewhat satisfied.* The team asked participants about the reasons for their satisfied rating. Most who were *very satisfied* with the kit contents (85%, n=59) gave reasons for their rating:

- The kit offered homeowners energy savings (48%, n=50)
- The kit offered the opportunity to learn about conservation and perform an activity as a family (36%)
- The kit was a general benefit to their household (12%)
- The products improved the shower or faucet fixture's water pressure (4%)

Five of the eight respondents who were *somewhat satisfied* with the kit products also gave reasons for their rating:

- One respondent has not had an opportunity to install the products
- One respondent said the CFLs take some time to reach full light level
- One respondent appreciated that the kit offered homeowners energy savings
- One respondent said the shower head is too small for their shower fixture
- One respondent installed the light bulbs and shower head but did not need the other items.

Recommendation 7: Take advantage of participant satisfaction and program momentum by following up with students to take home materials that encourage parents to consider other energy saving opportunities in the household. Invite households to explore deeper energy savings, such as implementing equipment upgrades and building shell measures, by cross-promoting AIC's other residential program offerings.

Evaluation Methodology

In conducting this research, the evaluation team performed the activities outlined below.

Participant Household Surveys

The School Kits Program provides in-class energy education presentations to fifth- through eighth-grade students, and a program implementer distributes energy efficiency kits to students during their school visit. In PY8 and PY9, the Program provided education and kits to 15,038 students.

The implementer advised students to work with a parent to install the measures, complete the activity sheet,[1] and complete a postcard that requests the parent's permission to opt into a follow-up telephone survey, or parents were directed to a link to a follow-up online survey. In total, 2,000 PY8 and 7,499 PY9 kits included the request for a follow-up household survey.

The evaluation team sought to recruit program participants to participate in the household survey. To achieve an adequate participation rate, the team promoted the survey through a variety of incentives, from offering respondents a chance to win a $250 Visa gift card, to offering parents the opportunity to sign up their child's teacher for a chance to win a $250 Visa gift card, to a $25 Visa gift card for participating in the telephone survey (offered to 23 respondents).

Parent response was extremely limited; the team received postcards from 46 who agreed to a follow-up telephone survey. Beginning in January 2017, the team revised its approach, promoting a web link in the program's letter for parents to participate directly in an online survey. Due to continued limited parent response to the online survey, the team extended data collection to participants through December 2017, and in total, received 52 online survey responses. In January and February 2018, the team contacted the 46 households that sent a postcard, and 23 completed the survey via telephone.

The survey instrument can be found in Appendix A.

Analysis of Survey Data

In total, the evaluation team collected data from 75 respondents. The team programmed the survey to not force a response for any question; therefore, we reported the sample size for each question based on the actual number of respondents. A respondent was included in a measure's free-ridership analysis if they had installed the measure and answered at least one of the free-ridership questions. If a respondent reported they had not installed the measure they were not asked the free-ridership questions associated with that kit measure, as their responses would have no bearing on the weighted free-ridership estimate because no gross program savings are associated with the measure they were given. We do not report installation rates because we did not ask a full battery of questions designed to calculate, but only if at least one of the measures had been installed after receipt.

The evaluation team estimated products free-ridership, and spillover, and NTGR using TRM V6.0 protocols.

[1] Using information collected from the activity sheet, students completed the implementer-administered web-based student participant survey in the classroom, directly following kit installation. The evaluation team-administered survey collects additional household information and detailed information about participant decision making.

Free-Ridership

The Illinois Statewide NTG Methodologies document (IL-NTG Methods) appended to the TRM V6.0 protocols directs that measure-specific free-ridership calculations should include the following components: Timing, Efficiency and Quantity.

Outlines of the free-ridership components and their associated survey questions follow:

- **Timing (T):** The Timing (T) Score accounts for earlier installation of measures due to the program by asking respondents about their likelihood (0-10 scale) to have installed an item of any efficiency within 6 months, had they not received it through the program.
- **Efficiency (E):** The Efficiency (E) Score reflects the likelihood that customers would have installed the exact same energy efficient measure, had the program not existed. This is based on a question asking respondents to rate the likelihood that they would have installed the same measure had they not received them for free through the kit (on a 0 to 10 scale, where 0 is not at all likely and 10 is extremely likely). A higher likelihood value means a higher level of free-ridership (i.e., a lower attribution level for the program).
- **Quantity (E):** The question to compute the Quantity (Q) Score (applicable only to CFLs for the School Kits Program) asks respondents if they would have purchased one CFL on their own, or if they would have purchased more. If a respondent would have purchased more than one CFL on their own they received a Quantity Score of 10, as a higher score means a greater likelihood the respondent would have installed the same or a greater number of CFLs. If a respondent would have purchased one CFL on their own they received a Quantity Score of 6, to reflect that they would have purchased on their own half the amount of the CFLs they received through participating in the School Kits Program. A respondent only had the Quantity Score administered to them if their Efficiency Score was 6 or greater. If a respondent's Efficiency Score was less than 6 they were not asked the Quantity Score question and were assigned a Quantity Score of 0.

The final free-ridership value for a participant's measure was calculated by taking the minimum of the Timing, Efficiency, and Quantity Scores, as shown in the following equation:

$$Free\ Ridership\ (FR) = Min(T, E, Q)$$

The overall final free-ridership value per measure was calculated by weighting the participants' measure level free-ridership scores by ex post program savings.

Participant Spillover

The TRM V6.0 protocols specify that spillover calculations should include two close-ended questions to determine program influence on spillover actions.

The two required questions are:

1. How important was receiving the kit items and information from Ameren Illinois on your decision to purchase and install [MEASURE] on your own? (on a 0 to 10 scale, where 0 is not at all likely and 10 is extremely likely)

2. If you had not participated in the Ameren Illinois kit program, how likely is it that you would have still purchased and installed the [MEASURE]? (0-10 scale, where 0 is not at all likely and 10 is extremely likely)

The response to the first required question cited above is "Measure Attribution Score 1," and the response to the second required question cited above is "Measure Attribution Score 2." The specific measures referenced in the question are considered to be attributable to the program if the "Spillover Score" is greater than 5.0:

$$Spillover\ Score\ = \frac{Measure\ Attribution\ Score\ 1 + (10\ - Measure\ Attribution\ Score\ 2)}{2} > 5.0$$

The attribution criterion represents a threshold approach, in which energy impacts associated with measures implemented by program participants outside the program are either 100% program-attributable or 0% program-attributable.

For each measure mentioned, customers were asked how they know the measure is more efficient than other models. If the respondent identified the measure as ENERGY STAR or could name an efficiency level that the evaluation team confirmed as being above the minimum federal standard, it was considered eligible to count towards participant spillover.

To develop the spillover rate, the total energy and demand impacts from the sampled participants who installed additional measures due to participation in the program are summed, and then this sum is divided by the total ex post sample energy and demand impacts:

$$Participant\ Spillover\ Score\ (PSO)\ = \frac{Sum\ of\ Energy\ Impact\ from\ Additional\ Measures\ Installed}{Survey\ Sample\ Ex\ Post\ Gross\ Program\ Energy\ Impacts}$$

Net-to-Gross Ratio

The equation used to calculate the measure-specific NTGRs is as follows:

$$NTGR\ = (1 - FR + PSO)$$

Evaluation NTGR Findings

Free-Ridership

Table 3 summarizes the final savings weighted free-ridership score for each program measure.

Table 2. Free-Ridership Summary by Measure

Measure	n	Final Free-Ridership Score[a]
13-watt CFL	58	39%
1.0 Gallons Per Minute (GPM) Bath Faucet Aerator	35	13%
2.0 GPM Kitchen Faucet Aerator	33	16%
1.75 GPM High-Efficiency Shower Head	40	16%
Hot Water Temperature Card Thermometer	28	12%

[a] Weighted by ex post savings

Table 3 summarizes the distribution of Timing Score responses by measure along with the percent of responses missing and the average Timing Score.

Table 3. Timing Score Responses by Measure

If you had not received the kit, what is the likelihood you would have purchased any type of [MEASURE] within 6 months?	Measure				
Response	CFL (n=58)	Bathroom Faucet Aerator (n=35)	Kitchen Faucet Aerator (n=33)	Showerhead (n=40)	Water Heater Setback (n=28)
0 - Not at all likely	5	24	23	23	19
1	4	2	1	4	1
2	1	0	0	0	2
3	5	2	1	2	1
4	0	0	1	2	1
5	9	5	2	4	3
6	4	1	0	0	0
7	1	0	1	1	0
8	3	0	2	1	0
9	3	1	1	0	0
10 - Extremely likely	22	0	1	3	1
Missing	1	0	0	0	0
Percent Missing[a]	**2%**	**0%**	**0%**	**0%**	**0%**

Table 4 summarizes the distribution of Efficiency Score responses by measure along with the percent of responses missing and the average Efficiency Score.

Table 4. Efficiency Score Responses by Measure

If you had not received the kit, what is the likelihood you would have [purchased any CFLs], [purchased a aerator/showerhead that uses less water], [adjusted the water heater temperature to the same adjusted setting based on the temperature card]?	Measure				
Response	**CFL (n=58)**	**Bathroom Faucet Aerator (n=35)**	**Kitchen Faucet Aerator (n=33)**	**Showerhead (n=40)**	**Water Heater Setback (n=28)**
0 - Not at all likely	9	21	18	21	17
1	4	2	1	3	0
2	3	0	0	1	1
3	4	2	1	2	1
4	3	0	2	2	0
5	6	4	4	1	3
6	2	1	2	2	1
7	4	1	1	1	2
8	2	2	1	1	2
9	1	1	0	0	0
10 - Extremely likely	16	1	3	5	0
Missing	4	0	0	1	1
Percent Missing[a]	**7%**	**0%**	**0%**	**3%**	**4%**

Table 4 summarizes the distribution of Quantity Score responses for the CFL measure along with the percent of responses missing and the average Quantity Score.

Table 5. Quantity Score Responses

If you had not received the kit, would you have purchased 1 CFL on your own, or would you have purchased more?	Measure
Quantity Score / Response	**CFL (n=58)**
0 - Efficiency Score is < 6	29
6 - I would have purchased 1 CFL on my own	6
10 - I would have purchased more than 1 CFL on my own	17
Missing	6
Percent Missing[a]	**10%**

Participant Spillover

With the exception of CFLs and LEDs, no additional energy efficient measure purchases made by surveyed participants after their program participation passed the TRM V6.0 spillover screening criteria. The evaluation team is not attributing the additional CFL and LED purchases to School Kits Program spillover because the light bulbs are most likely discounted through funding from a residential upstream lighting program. The spillover estimate for the program is therefore zero.

NTGR

Table 4 summarizes the final free-ridership, participant spillover and NTGR estimates for each program measure along with the NTGR..

Table 6. Free-Ridership, Spillover and NTGR Summary by Measure

Measure	n	Final Free-Ridership Score	Spillover Score	NTGR
13-watt CFL	58	39%	0%	61%
1.0 Gallons Per Minute (GPM) Bath Faucet Aerator	35	13%		87%
2.0 GPM Kitchen Faucet Aerator	33	16%		84%
1.75 GPM High-Efficiency Shower Head	40	16%		84%
Hot Water Temperature Card Thermometer	28	12%		88%

For comparison purposes, and due to the low response rate, we benchmarked the results to those from a neighboring utility with a similar program. Table 7 provides this comparison. For the Midwestern utility, the evaluation team received 2,376 valid email addresses from 7,863 activity sheets households returned to the program. Following distribution of the email survey invitation in early 2018, 207 households completed the survey for a 12.5% response rate, well above the 1% rate of the household survey completed for AIC. The other program also has lower free-ridership for aerators than the current SAG approved FR for PY10. Further, we do not anticipate that any non-response bias would correlate with free-ridership. Therefore, we recommend these updated AIC free-ridership values be considered for future planning inputs as provided.

Table 7. Free-Ridership Summary by Measure

Measure	n, AIC	Updated AIC Free-Ridership Score[a]	n, Midwestern Utility	Midwestern Utility Free-Ridership Score[a]
13-watt CFL	58	39%	N/A	N/A
LED	N/A	N/A	382	50%
1.0 Gallons Per Minute (GPM) Bath Faucet Aerator	35	13%	226	12%
2.0 GPM Kitchen Faucet Aerator	33	16%	213	15%
1.75 GPM High-Efficiency Shower Head	40	16%	250	21%
Hot Water Temperature Card Thermometer	28	12%	N/A	N/A

[a] Weighted by ex post savings

Sources of Error in this Study

The possible sources of survey error are described below.

Survey Error

- **Sampling Error:** In recruiting for surveys to parents, the evaluation team attempted to reach the census of program participants; therefore, no sampling errors occurred.
- **Nonresponse Bias:** Two possible sources of nonresponse bias exist. First, given the number of kit recipients we tried to contact (9,499) compared to the number of responses (n=75, a 1% response rate), there is a likelihood the survey experienced nonresponse bias. The evaluation team addressed this bias by revising its recruitment approach, from collecting contact information via a postcard to follow up with parents at a later date, to encouraging parents to complete an online survey. Although it took some time to integrate the process by which the implementer encourages teachers to request parents complete the online NTG survey, it appears to be fully functional in 2018, where the evaluation team has collected 186 parent survey responses out of 4,100 kits distributed from January through April, a 4.5% response rate. The evaluation team can present these results in a future evaluation period. Second, the evaluation team programmed the survey to allow respondents to skip any question, resulting in further potential nonresponse bias. For example, seven respondents that reported installing at least one of the CFLs from the kit did not answer any of the CFL free-ridership questions.

Appendix A. Student Participant Household Survey

The team surveyed participant households electronically or by phone to determine free-ridership, spillover, and satisfaction with the products included in the program kit. The embedded document below is the survey guide that that the team used to collect information.

School_Kit_Household_NTG_Survey Inst