



## MEMORANDUM

**TO: Jonathon Jackson and Keith Goerss, Ameren Illinois Company**

**Tom Kennedy and Jennifer Hinman, Illinois Commerce Commission**

**FROM: Opinion Dynamics Evaluation Team**

**DATE: May 16, 2013**

**RE: In-Store Intercept Free Ridership Additional Information**

---

The evaluation team provided an earlier description of the method and results of our in-store intercept research in a memo dated February 28, 2013. Today's memo provides additional information regarding the 0.44 net-to-gross ratio (NTGR) found from that research, describing the variability found within the research. We hope that this information can help move forward any discussion of an appropriate NTGR value for PY5.

### Ameren Illinois Methodology

As stated in the earlier memo, Opinion Dynamics conducted interviews with 365 customers purchasing lighting at 10 participating retail locations, 136 of which purchased program bulbs. The interviews took place on Saturdays, Sundays, and Mondays over the course of four weeks in January 2013. We conducted interviews with customers purchasing CFLs and LEDs discounted through the program, CFLs and LEDs that were not discounted and incandescent and halogen light bulbs.

We conducted interviews at two different Do-It-Yourself (DIY) retailers, one warehouse retailer, and one big box retailer. We attempted to conduct interviews at another top-selling DIY retailer but were not granted permission. To gain entry to the individual stores, we first accompanied the program field representative who was conducting a lighting demonstration. The program representative helped the interviewer gain permission to come back and conduct additional interviews on the following two days. In all cases, permission was granted for the additional days.

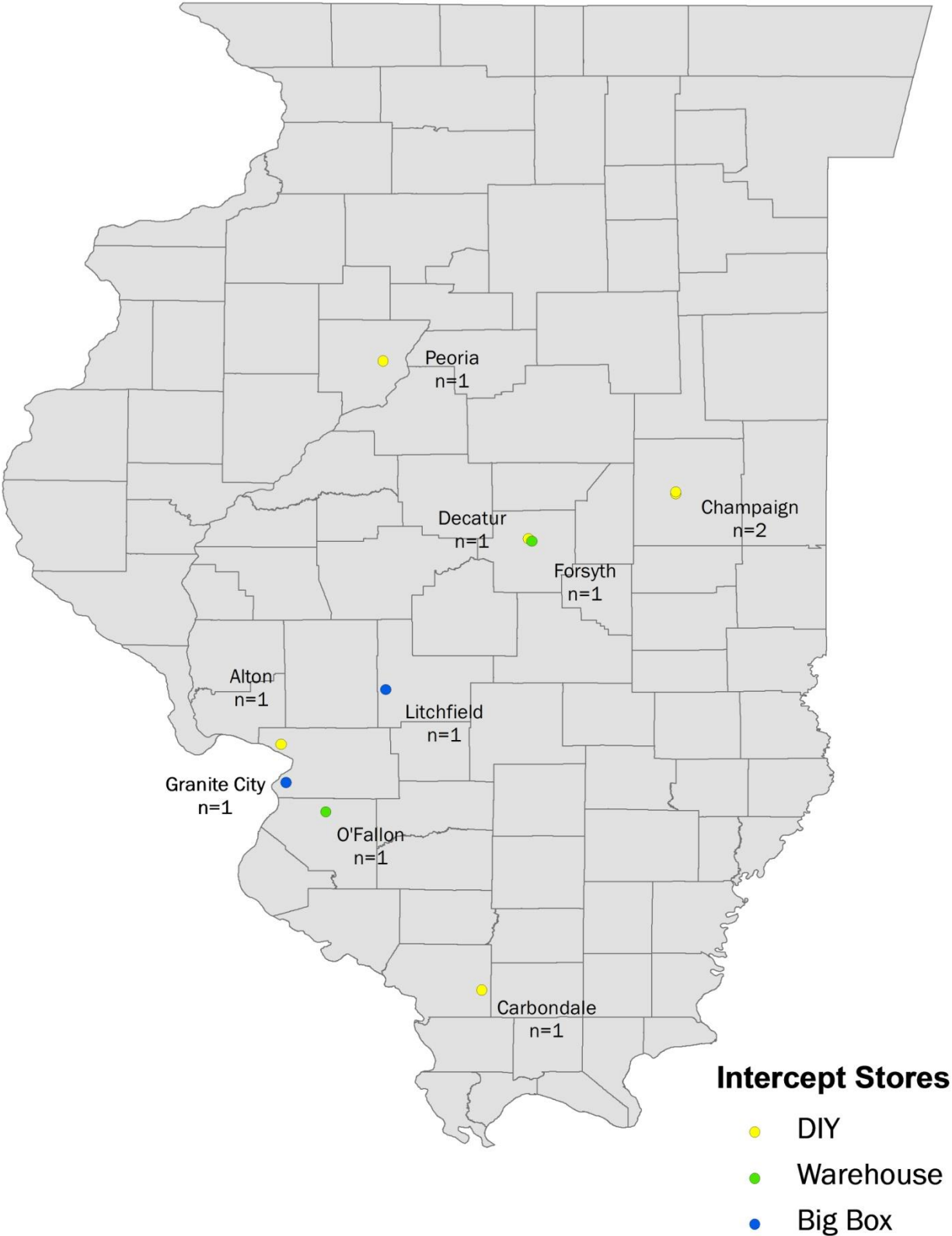
Table 1 shows the number of locations, days spent at each, and the total number of interviews completed by retailer type. We selected retail locations with the most program sales that had a demonstration day either on the schedule or where one could be added.

**Table 1. In-Store Interview Retailer Categories**

Retailer Type	Stores	Days	Interviews
Do-It-Yourself	6	18	217
Warehouse	2	6	99
Big Box	2	6	49
<b>Total</b>	<b>10</b>	<b>30</b>	<b>365</b>

Intercepts are a more expensive method compared to traditional self-report surveys, which are usually conducted over the telephone. They are particularly costly for utilities with large geographic territories like AIC. To assure quality, we had a single firm to conduct all the interviews, which meant paying travel and lodging for many locations. This significantly raises the cost per complete. For the AIC intercepts to be cost-effective, we had to make some tradeoffs: we could not go to stores in all areas of AIC territory, we could only spend one weekend in each store, and the total number of completes was smaller than we would have preferred. As stated earlier, though we completed 365 total interviews, only 136 were with AIC customers who were purchasing bulbs discounted through the program and could be used to estimate free ridership. Across the ten stores, the number of free ridership eligible interviews ranged from 6 to 27. Figure 1 shows the locations of the retail stores where we completed intercept interviews.

Figure 1. Ameren Illinois In-Store Customer Interview Store Locations



## Free Ridership Results

The AIC Residential Lighting program encourages customers to purchase efficient lighting by reducing the purchase price so that the price is closer to that of less efficient alternatives. The program also educates consumers about the benefits of efficient lighting. The intercept survey was designed to measure the influence of both program components. Accordingly, the formula for our free-ridership algorithm is:

$$\text{Free Ridership} = \text{Minimum (Rebate Impact, Information Impact)}$$

We take the minimum of the two components to ensure the program receives credit for whichever avenue of program influence mattered most to the customer. Averaging the components would penalize the program if it did not influence both. For example, a customer may already understand the benefits of CFLs but still would not buy them at full price. Averaging the two components would reduce overall program influence because the customer said the informational materials did not influence the purchase.

We measured the impact of the rebate by asking questions about the type and quantity of lighting that the customer would have purchased if the CFLs had cost more (\$1.00 per bulb for standard and \$1.50 for specialty). We measured the impact of program information by asking customers who saw the materials in the store to assess the influence of those materials on their decision to purchase CFLs.

As we discussed in the methodology section above, to gain entry to the stores to conduct the interviews, the first day of data collection at each store was done in conjunction with a program lighting demonstration. We conducted interviews for an additional two days at each store when there was no demonstration. The free ridership estimate for all days was 0.56. We compared the free ridership of purchases made during the hours that the demonstration was taking place to other hours and found that the difference in free ridership was not statistically significant. The free ridership rate of customers who purchased lighting during the demonstration was 0.53 compared to 0.57 for those who purchased lighting without the demonstration present. Because the difference is so small, we use the free ridership estimate from interviews conducted during all the hours we were in the store to calculate the program NTG ratio.<sup>1</sup>

**Table 2. Program Free Ridership**

Day Type	Free Ridership
All Hours <sup>a</sup>	0.56
Demonstration Hours	0.53
Non-Demonstration Hours	0.57

<sup>a</sup> We use this estimate in the calculation of overall lighting program NTG.

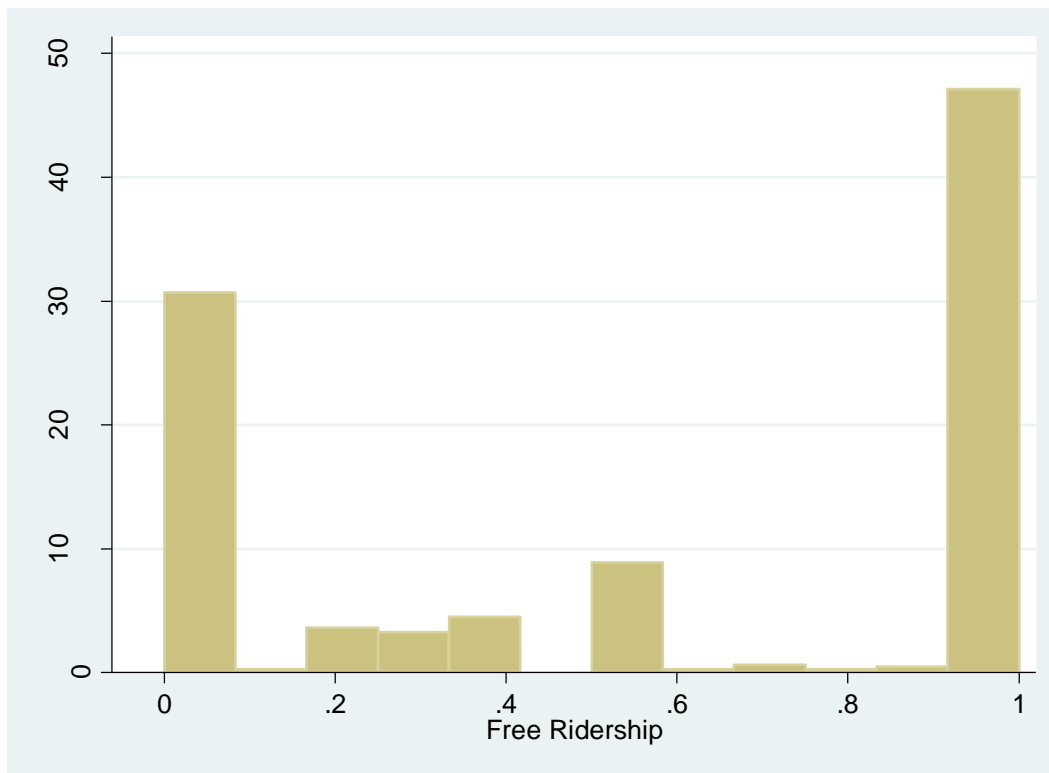
The variability of our free ridership estimate across respondents, stores, and days of the week suggests that if we were to conduct another round of intercept interviews, at a different set of stores, at a different time, we could come up with a very different estimate for free ridership. Figure

---

<sup>1</sup> Our free ridership estimate is based on interviews with 136 customers who purchased a total of 798 CFLs after excluding interviews conducted with non-AIC customers.

2 shows the distribution of the individual free ridership estimates.<sup>2</sup> The distribution is bimodal; most of the sales (78%) were made to customers who were either not free riders or were full free riders.

**Figure 2. Distribution of Free Ridership Estimate**



Note: the above information from 136 participants has a standard deviation of .45 and a coefficient of variation of .83

Because traditional sampling theory does not apply to convenience samples like the one used for the intercepts, we technically should not calculate confidence and precision levels for this free ridership estimate. However, it can still be a useful exercise as it provides some idea of the range in which true free ridership might fall if we sampling theory did apply. In this case, our precision at the 90% confidence level is 0.12. This means that if we were to conduct the study 100 times, in 90 of those, the true free ridership value would lie between 0.44 and 0.68 (i.e., NTGR of .32 to .56) while the other ten times it would be outside of those boundaries.

We also found a great deal of variability across stores. The free ridership estimate by store ranged from a low of 0.33 to a high of 0.87. These two specific values were found at the same DIY retailer located in different cities. With such large variation in free ridership across stores, it is important to include as many stores across as much of the territory as possible. However, as already discussed, with a territory as large as AIC's, it is cost prohibitive to do so.

Even when we did travel a great distance, such as the DIY store in Carbondale, the number of interviews we were able to complete that could be used to estimate free ridership was quite small. We were only able to complete 6 interviews with AIC customers purchasing program CFLs at the

---

<sup>2</sup> The results are weighted by the number of program-discounted CFLs each customer purchased so that the more bulbs a customer purchases, the greater the weight of that customer's free ridership estimate on the overall program estimate.

DIY store in Carbondale. We conducted 31 interviews over 3 days, but 9 were with non-AIC customers and 16 were with customers who were purchasing some other type of lighting. This store had to represent all of southern Illinois given the high costs to travel and complete interviews in this part of AIC territory but due to chance, it only resulted in 6 interviews.

**Table 3. Free Ridership Estimates by Store Type and Location**

Retailer and Location	Interviews	Free Ridership	Standard Deviation
Do-It-Yourself – Alton	16	0.33	0.40
Do-It-Yourself – Peoria	13	0.87	0.29
Do-It-Yourself – Champaign	9	0.70	0.36
Do-It-Yourself – Champaign	15	0.67	0.43
Do-It-Yourself – Carbondale	6	0.77	0.40
Do-It-Yourself – Forsyth	10	0.65	0.43
Warehouse – Decatur	10	0.36	0.46
Warehouse – O’Fallon	27	0.50	0.44
Big Box – Granite City	15	0.61	0.41
Big Box – Litchfield	15	0.60	0.47

Free ridership also varied by the day of the week on which the interviews were conducted. We conducted interviews on Saturdays, Sundays and Mondays. Saturdays had the lowest free ridership and Mondays the highest. It is possible that different types of customers shop on different days of the week with free riders less likely to shop on Saturdays. If this is true, it is important to conduct intercepts on all days of the week so the results reflect overall program sales. This would be difficult with a territory like AIC’s. It would mean conducting more interviews per store so that the total number of stores where we could conduct intercepts would need to be lower. As discussed above, limiting the number of stores is also not desirable given the variability in free ridership across stores.

**Table 4. Free Ridership Estimates by Day of the Week**

Weekday	Interviews	Free Ridership	Standard Deviation
Saturday	60	0.49	0.45
Sunday	49	0.60	0.42
Monday	27	0.67	0.46

In-store customer intercepts is a frequently used method for estimating upstream lighting program free ridership. Like all methods, intercepts have known methodological weaknesses. The self-report method itself may not be ideal for estimating free ridership given the low cost of the purchase (see Attachment 1 for a discussion of estimating free ridership for this type of program). But the bigger threat to the internal and external validity of results from intercepts (i.e., causality and generalizability of results) is the location and timing of the interviews. It is difficult to gain retailer permission to conduct the interviews with some not allowing the research at all. When permission is granted, intercept interviews are still so costly to conduct that convenience samples are used, and, as a result, the results may not be representative of overall program sales. While customer intercepts are an appropriate method given the current suite of tools available to evaluators,

because of the known methodological weakness, best practices often consider results from multiple methods.

## **Attachment 1 – Discussion about intercept methodology for upstream lighting program**

The goal of the Ameren lighting program is to increase the use of energy efficient lighting among residential customers. The primary means of influence is by discounting the cost of CFLs in retail stores so the price of CFLs is closer to less expensive inefficient alternative bulbs. The program also educates customers about the benefits of efficient lighting. The Ameren lighting programs is implemented using an upstream markdown method in which CFLs are automatically discounted at the point of sale. Customers “participate” by purchasing the discounted product at a retailer who has agreed to markdown the price of selected products. The point of sale system tracks the number of each product that customers purchase, and Ameren reimburses the retailer for all purchases of qualifying products made during the program year.

### **Estimating Lighting Program Free Ridership**

Estimating lighting program free ridership (FR) is more challenging than other programs due to the upstream method of program implementation. Retailers’ point-of-sale systems do not collect customer information so that after customers purchase program-discounted lighting and walk out of the store, they are lost for evaluation purposes. Most other utility programs collect participant information. For example, customers who participate in appliance rebate programs typically pay full price for a qualified appliance at a retailer, fill out a rebate application after their purchase and are then sent a check from the utility that discounts the purchase. This program design allows evaluators to make use of the self-report method to estimate program NTG. Evaluators contact participants after their participation and ask them questions about their purchase decision, which they use to estimate program free ridership and spillover.

Ideally, retailers would provide program implementers and evaluators with sales information that would allow them to calculate the lift in sales due to the program. The type of sales data needed would depend on program longevity, but the number of bulbs sold at regular pricing without a program discount would be needed. For newer programs, full category sales information for sales before and after the program was implemented would be ideal. For longer running programs, the retailer could provide sales data for comparison areas that do not have programs, sales when the program turns discounts off, or sales of like products that are not discounted. Evaluators have repeatedly asked but retailers refuse to provide non-program sale data. In some rare cases, retailers have provided non-program sales data but it was limited by retailer, product or time frame.

Without sales data, evaluators have attempted to use more traditional methods to estimate lighting program FR. Some evaluators have made use of the self-report method despite the lack of participant contact information. One approach involves conducting a survey with a sample of a utility’s residential customers and asking questions of those who reported purchasing lighting in the past. The results are of questionable validity. Light bulbs are a relatively low-cost item that few people give much thought. The questions require the respondent to remember minute details of a past purchase that took place in the past. It is also difficult to ensure that the customers purchased lighting that was discounted through the program instead of regular priced lighting.

To address the weaknesses of this self-report survey, evaluators have instead conducted in-store customer intercept interviews at participating retailers. The interview location ensures that the respondents are purchasing program-discounted lighting and the timing means that recall of the purchase details is not an issue. The focus of the purchase, a light bulb, is still not a significant one for most customers. Customers consider a number of factors when making purchases, and for low-

cost items like light bulbs, it is not clear whether they can accurately self-report what they would hypothetically purchase if the bulbs cost a couple of dollars more. The self-report method likely produces more accurate results when it is used for more expensive and considered purchases.<sup>3</sup>

The other weakness of in-store customer interviews is that they typically make use of convenience samples. Therefore, traditional sampling theory, which allows the calculation of confidence and precision levels, does not apply to in-store customer intercept studies. Evaluators attempt to conduct interviews in locations that represent the greatest percentage of bulbs sold through the program, but ultimately, they conduct interviews where and when they are allowed. Many retailers do not allow the interviews to take place in their stores.

---

<sup>3</sup> We are not saying that customers are not influenced by price changes when purchasing low cost items, but rather that they will struggle to accurately report on that influence. Lighting program implementers and evaluators who spend a great deal of time thinking about light bulb purchases typically cannot relate to the average customer who purchases light bulbs. As a result, we often ask detailed questions about light bulbs that are not realistic for the average customer to answer accurately.