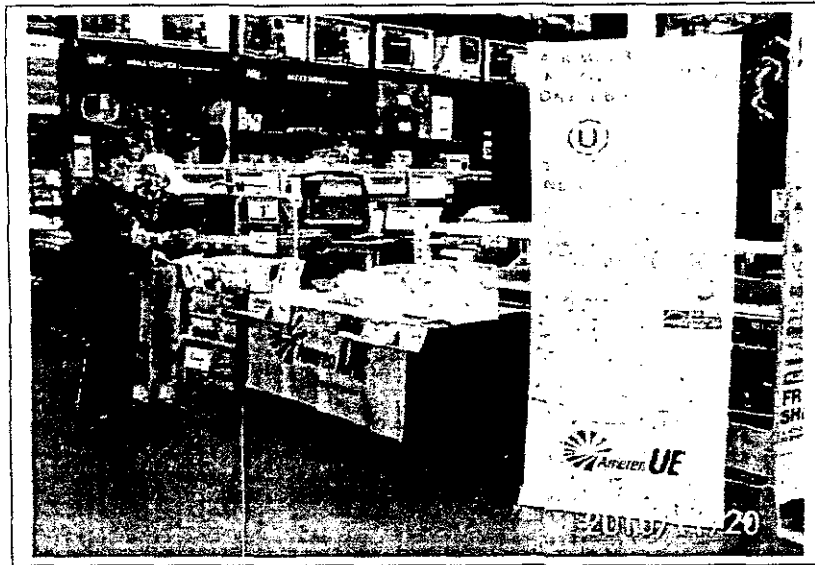


**Figure 12. Example of CFL Demonstration and Signage**



### **Marketing to Retailers**

As noted, retailer recruitment is conducted by APT and relies largely on the strong corporate relationships that the implementer has with many large retailers. The retailers who joined the program in its first year were transitioned into the new program, and additional new stores were added to the program. The most notable change was the addition of a few major big-box retailers.

In addition to recruitment, APT maintains strong relationships with its retail participants. Field representatives are assigned to retail stores and build professional relationships with store managers, conducting weekly, bi-weekly, or monthly visits to each store. This personal point of contact reportedly helps keep the retailers satisfied with the program, and also benefits the program by gaining the trust and support of the store managers. Ameren Missouri program staff reported that while monitoring ride-alongs with field representatives, they observed that store managers were familiar with the field representatives and seemed to have a strong relationship with the program.

### **Marketing to Customers**

Program staff reported that APT has seven field representatives, and each of them perform at least one retail in-store lighting demonstration per month. These demonstrations reinforce retailer education and increase the program's visibility to customers. The in-store marketing also includes POP displays and materials that clearly demonstrate Ameren Missouri's role in sponsoring the discounted lighting products, as well as product placement in prominent store locations such as ends of display aisles.

In addition to in-store marketing, Ameren Missouri advertises the program in their annual Personal Energy Report, which is sent to 900,000 customers every year. The program also gets promoted through the Ameren Missouri website and through emails to customers that have signed up for e-billing. Although no television or newspaper advertising promotes the program,

press releases are sent out for every major program event, and a local green reporter has highlighted Ameren Missouri's energy-efficiency programs in a number of TV news features.

Cooperative advertising, which was a major feature of PY1 implementation, was very limited in PY2. Ameren Missouri staff reported that the budget for cooperative advertising was greatly reduced, because of the desire to focus on markdowns and rebates.

### **Data, Communication, and Reporting**

APT's data tracking system is quite sophisticated, linking into the capabilities of larger retailers that use electronic POS systems, while also incorporating data from small retailers using the coupon system. These data are processed into monthly reports to Ameren Missouri, and program staff reported that APT has comprehensive data reporting. In addition to the monthly report, APT holds weekly meetings with Ameren Missouri program and implementation staff to discuss program status and needs. Additionally, Ameren Missouri staff members reportedly communicate with APT by phone or email about four to five times per day on average. There seems to be open communication regarding program design, strategy, and day-to-day processes and implementation decisions.

### **Payments and Invoicing**

EFI administers all payments to both residential customers (for appliance rebates) and retailers (for markdown and coupon incentives). These rebates are paid from a pre-paid account held by Ameren Missouri, which according to the program staff is a somewhat novel process for implementers at Ameren Missouri. This process has worked well, and allows for advance planning of payments. Rather than submitting an invoice, EFI submits a reconciliation that documents any differences between planned and actual rebate payments. Separately, APT submits invoices to Ameren Missouri for administrative costs, and these are paid from a different account.

Program staff reported that since the PY2 sales goals were higher to compensate for lower results in PY1, budget limitations have not yet been an issue. However, when funding availability shifts, APT is able to reduce or increase spending as needed. For example, when limited funds were available for lighting rebates, APT shut off the supply of 60W equivalent bulbs in some stores to reduce rebate costs temporarily. Then when funding became available again, those bulbs were restocked.

### **Achievements, Challenges, and Changes**

Program staff is proud of the successful transition to the new program design. Staff reported that the transition to subcontract implementation tasks to APT was smooth and that APT was diligent about collecting information to determine appropriate changes. The program staff was extremely happy with the processes and results of PY2, and one staff member noted that their job had become much more fun in the process. Staff reported on the excellent communication among the implementation team, and their very high opinion of APT's ability to implement the program effectively.

While there were no reports of major program shortcomings, stakeholders mentioned that the coincident timing of Ameren Missouri changing its brand name from AmerenUE was challenging because it required a complete overhaul of all POP materials. However, one

stakeholder noted that the change enabled them to create a “*new look*” and get more attention with the new in-store advertising materials. This transition also contributed to the shift away from cooperative advertising, because it was difficult to produce timely advertising with the correct branding. Despite the challenge, staff reported that they successfully made the change to the new brand, and that APT was instrumental in implementing those changes.

## Future Trends

Stakeholders plan to expand the program even more in PY3, signing on more retailers and increasing the diversity of retailers involved. PY3 will be responsible for achieving nearly half of the three-year savings target in just one year. Program staff hopes that the high sales volume continues in the next program year. The program has added new appliance rebates in PY3 for air purifiers and water coolers.

One of the changes that program staff seemed enthusiastic about was the effort to expand in urban areas, and in more grocery and drugstores. This effort, in concert with the SMD program, would help make CFLs available to low-income and urban customers. Another part of that effort is the push to offer multipacks of bulbs at dollar stores and discount stores. Multipacks allow for a lower per-bulb price to the customer, and staff hopes this would help make CFLs competitive with incandescent bulbs in low-income markets.

With the upcoming introduction of Energy Independence and Security Act (EISA) regulations, which will eliminate certain types of incandescent bulbs from the market, program staff is looking into ways to alter the program for future implementation years. For example, LED bulbs are being discussed as a potential core program offering in future years.

## Retailer Interviews

### Lighting

Telephone interviews with upstream market actors such as retailers provide key insight into the program and also identify how the program affected the target market. Cadmus interviewed 64 participating lighting retailers across six retail distribution channels. Table 41 presents these results by retail distribution channel.

**Table 41. Interviews Completed by Retail Distribution Channel (n = 64)**

Distribution Channel	Stores	Percent of Total
Bargain	12	19%
Grocery	7	11%
Hardware	1	2%
Home Improvement	17	27%
Mass Merchandise	17	27%
Warehouse	10	16%
<b>Totals</b>	<b>64</b>	<b>100%</b>

## Reasons for Participating in the Ameren Missouri Lighting Program

All respondents discussed their primary reason for participating in the Ameren Missouri lighting program. Corporate-level decision-making was the most cited reason for program participation, as reported by 34 percent of participating retailers. Twenty-two percent also said that the opportunity to save customers money was a key reason for participating in the program. One of these respondents said:

*"We wanted to participate in the program because we knew it would be a good deal for our customers."*

Another 14 percent indicated that they want to encourage/promote energy savings, and 9 percent said that they participate in the program in order to expose customers to CFLs. Two respondents said the following regarding energy savings and introducing customers to CFLs:

*"To save energy, help customers by reducing the price of CFLs, and transitioning them towards CFL bulbs."*

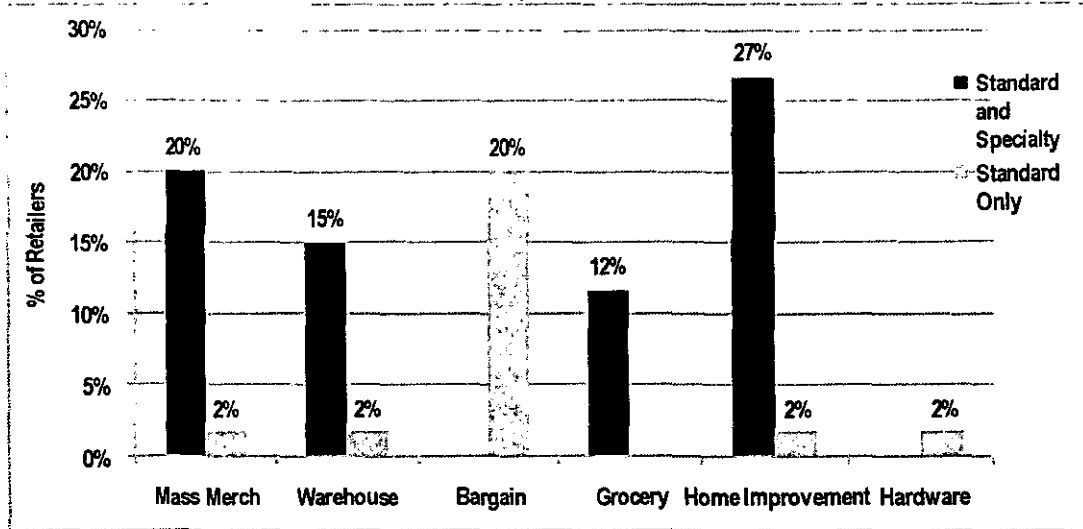
*"To convert people to the newer energy-saving bulbs."*

Some retailers also discussed that they want to expose customers to CFLs because incandescent bulbs and other inefficient lighting products will be slowly phased out beginning in 2012 per EISA legislation.

## Retailer Stocking Patterns

Lighting retailers were asked to describe their stocking practices for standard and specialty ENERGY STAR CFLs. Just under three-fourths of retailers stock both standard and specialty CFLs that are sponsored by the Ameren Missouri program. As shown in Figure 13, most home improvement stores and mass merchandise stores stock both types of CFLs. The bargain stores interviewed in this study stock only standard program-sponsored CFLs.

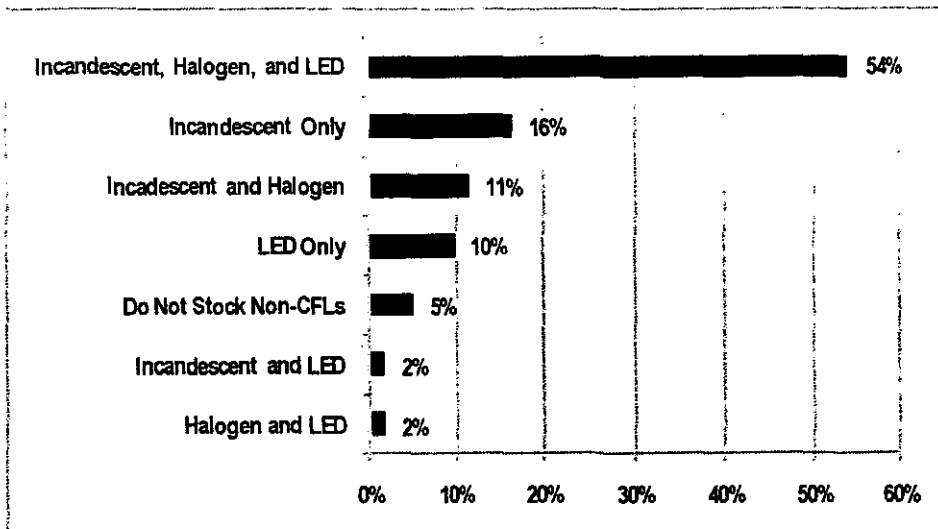
**Figure 13. CFL Stocking Patterns of Program-Sponsored Bulbs (n = 60)**



Retailers also discussed their stocking patterns for non-sponsored CFLs. Interestingly, 27 percent of participating retailers do not stock non-sponsored CFLs. These include three bargain stores, three grocery stores, two home improvement stores, and eight warehouse retailers. About half of participating retailers stock non-sponsored standard and specialty CFLs.

Non-CFL stocking practices vary across retailers and distribution channels as shown below. Fifty-four percent of participating retailers stock incandescent, halogen, and LED bulbs; with home improvement retailers accounting for 25 percent of stores that stock these bulbs. Interestingly, 5 percent of participating retailers (representing three warehouse stores) do not stock incandescent, halogen, or LED bulbs at all. This is indicative of strong program effects in these stores and distribution channels. Sixteen percent of retailers (representing nine bargain stores and one home improvement store) offer only incandescent bulbs as non-CFL lighting options.

**Figure 14. Non-CFL Stocking Practices by Distribution Channel (n = 61)**



On average, retailers attribute 53 percent of lighting sales to CFLs and 41 percent of sales to incandescent bulbs, as shown in Table 42. LEDs and other bulb types make up the remaining 6 percent of sales. One bargain retailer indicated that only five percent of his lighting sales can be attributed to CFLs.

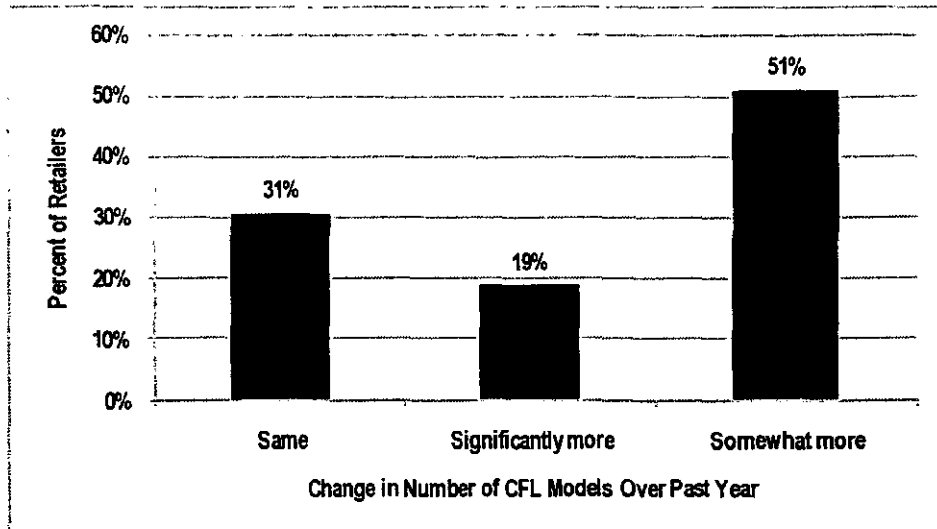
**Table 42. Percent of Annual Sales by Bulb Type**

Min, Max, and Average Sales	CFL Sales	LED Sales	Incandescent Sales	Other Lighting Sales
Minimum Reported Sales	5%	0%	0%	0%
Maximum Reported Sales	100%	20%	95%	30%
Average Reported Sales	53%	4%	41%	2%

Retailers then discussed how their stocking of CFL products has changed over the past year. Fifty-one percent of retailers reported that they stocked somewhat more models of CFLs than they did a year earlier. Nineteen percent indicated that they stock significantly more CFL models and 31 percent said that they stock the same number of CFL models. Figure 15 presents these findings.

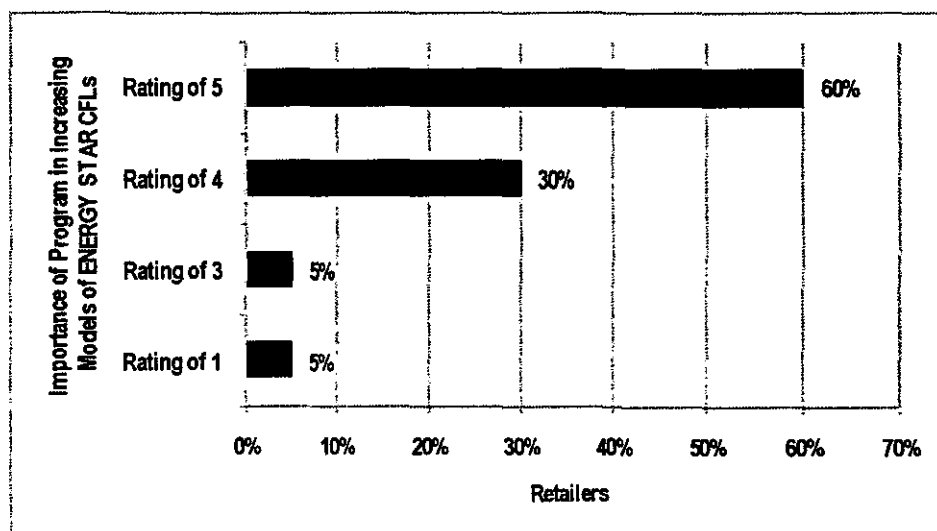
Positive program effects are also apparent across distribution channels. Most home improvement and mass merchandise retailers stock somewhat more CFL models than they did the previous year. Additionally, six home improvement retailers, two grocery stores, one hardware store, one bargain store, and one mass merchandise retailer reported stocking significantly more models of CFLs than in the previous year. Overall, the program had a positive influence on CFL stocking. One retailer in PY2 also sold ENERGY STAR fixtures, promoted by the program. This retailer indicated that his stock of light fixtures has not changed at all over the past year.

**Figure 15. Changes in Stock of CFL Models Over Past Year (n = 59)**



The 40 retailers who reported that they stock somewhat or significantly more CFL models than in the previous year rated the importance of the Ameren Missouri lighting program in helping bring about these increases. Sixty percent of these retailers believe that the program has been very effective in bringing about increases in the models of CFLs they carry and gave the program a rating of five. Thirty percent rated the program as a four. Only two retailers (representing 5 percent) gave the program a low rating. Figure 16 presents these findings.

**Figure 16. Importance of Ameren Missouri Lighting Program in Bringing About Increases in CFL Models (n = 40)**

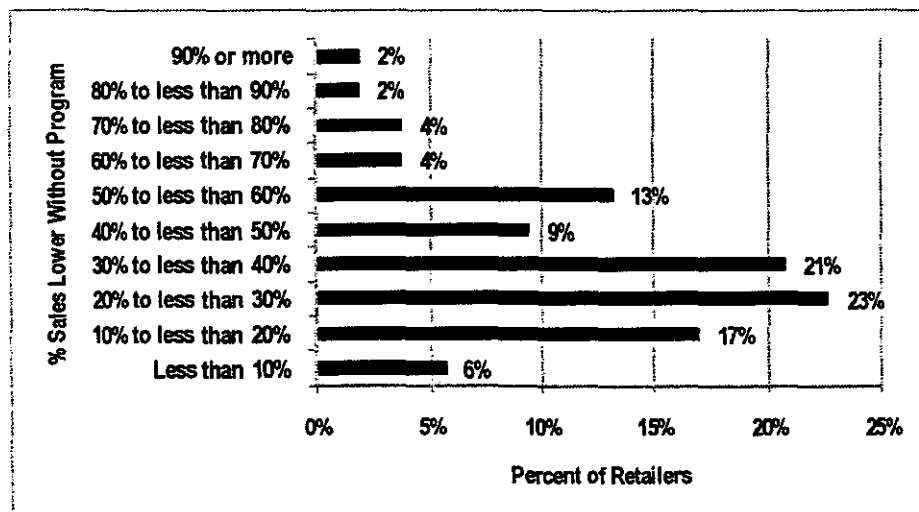


## Sales Trends

Ninety percent of retailers said that they would sell ENERGY STAR CFLs without the support of the Ameren Missouri lighting program. The 10 percent of retailers who would not stock ENERGY STAR CFLs in the absence of the program included two mass merchandise retailers and three bargain retailers. Ninety-one percent said that sales of standard ENERGY STAR CFLs would be lower in absence of the program, with the remaining seven percent indicating that standard CFL sales would remain the same in absence of the program.

Figure 17 shows that 23 percent of retailers estimated that standard CFL sales would be 20–30 percent lower without the support of the program<sup>20</sup>. Another 21 percent of retailers estimated that CFL sales would be 30–40 percent lower without the program. When weighted by the number of retailers for each category, CFL sales would be 35 percent lower in absence of the program. On the whole, retailers reported that without the program CFLs would be more expensive for customers, and therefore retailers would sell fewer CFLs at higher prices.

**Figure 17. Retailers Reporting Lower CFL Sales in Absence of the Ameren Missouri Program (n = 53)**



Nearly all of the retailers who said that CFL sales would be lower without the program also said that they expected CFL sales to increase as a result of participation in the Ameren Missouri lighting program. All but two retailers (one grocery and home improvement store) indicated that their expectations of increased sales through the program were met.

The two warehouse retailers who sell ENERGY STAR light fixtures answered additional questions in this part of the survey. Both of these retailers said that they would continue stocking ENERGY STAR light fixtures without the support of Ameren Missouri. Both stores also said that sales of ENERGY STAR light fixtures would be lower without the program. One warehouse retailer estimated that sales would be 20 percent to 30 percent lower and the other estimated that

<sup>20</sup> All retailers provided the same response for specialty CFLs except for one mass merchandise retailer.



sales would be 70 percent to 80 percent lower without the program. These retailers also expected that sales of ENERGY STAR light fixtures would increase through program participation and indicated that these expectations have been met. Neither of these retailers offered additional discounts on program-sponsored ENERGY STAR light fixtures.

## Pricing Trends

Twelve retailers indicated that among their non-program CFL selection they only sell standard ENERGY STAR CFLs. Of these 12, eight (66 percent) said the Ameren Missouri program CFLs are typically priced lower than non-program CFLs. Two retailers (a bargain store and mass merchandise retailer) indicated that program and non-program CFLs are priced the same. One grocery store reported program CFLs are priced higher than non-program CFLs. On average, program CFLs are priced \$1.79 lower per bulb than non-program CFLs. The grocery retailer who said that program CFLs are priced higher than non-program CFLs explained that this is the case because “[We have] a name-brand CFL bulb.” In other words, the name brand seems to add a premium to the price even when discounted by the Ameren Missouri lighting program.

Retailers were also asked to assess the impact of program-sponsored CFLs (standard and specialty) on the sales of other non-program CFLs. Twenty-seven retailers indicated that the Ameren Missouri lighting program did have an impact on the sale of other CFLs. Of these, 22 retailers (about 81 percent) believe that the program negatively impacted the sale of other CFLs. These retailers largely cited the lower price of program CFLs as the key reason for this negative impact. Five retailers (19 percent) believe that the program positively impacted sales of other CFLs. These retailers indicated that customers have more choices among CFL lighting products when the store sells program-sponsored CFLs.

Six retailers discussed additional discounts their stores applied to the program-sponsored CFLs. One retailer offered \$3–\$4 discounts on multi-packs, and others offered similar discounts (e.g. \$1 off, 50 percent off, etc).

## Program Satisfaction

All retailers were asked to rate various aspects of the program, including the program itself, using a standard 0 – 10 rating scale where 0 is very dissatisfied and 10 is very satisfied.

Retailers gave high ratings to the quantity of products discounted by the program. Ninety percent of retailers rated the quantity of products at least a 7; with 39 percent of retailers giving a rating of 10. Two retailers who gave this aspect of the program low ratings reported that they did not receive enough program CFLs or that they could not sell them.

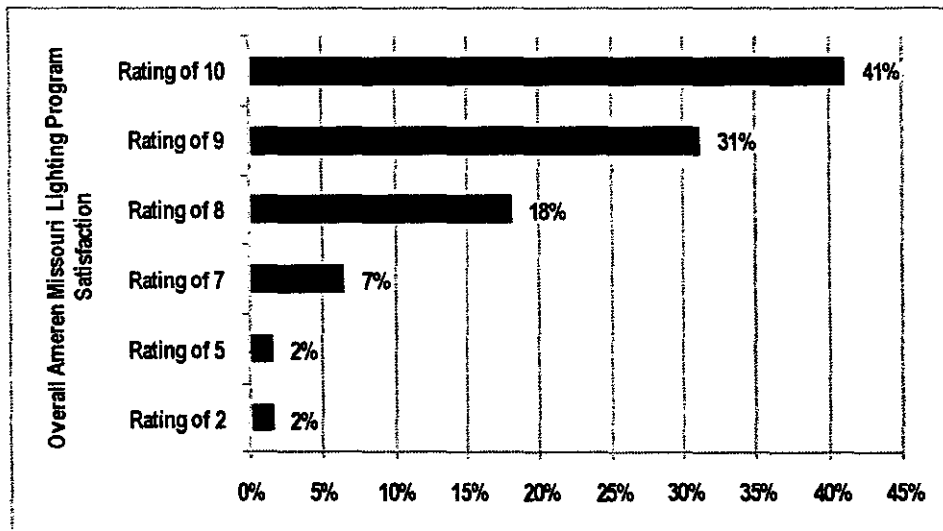
Ameren Missouri’s mass marketing efforts also received high ratings, as 85 percent of retailers rated marketing materials as a 7 or above; with 38 percent of retailers giving a rating of 10. Retailers who were not as satisfied with the marketing materials said that they did not receive enough marketing materials. One retailer also indicated that he had received too much marketing material.

Retailers were also very satisfied overall with the coordination of product placement and product promotions. Fifty percent of retailers rated coordination efforts a 10; with 92 percent of retailers giving this aspect of the program a rating of 7 or higher. Four stores who gave this aspect of the program a low rating said that there was not enough promotion of program-sponsored CFLs.

Ameren Missouri program managers and staff also received high marks from retailers. Ninety-six percent of retailers rated program staff 7 or higher; with 55 percent rating program staff 10. One retailer who gave very low ratings to Ameren Missouri program staff said that there was no communication between program staff and his store.

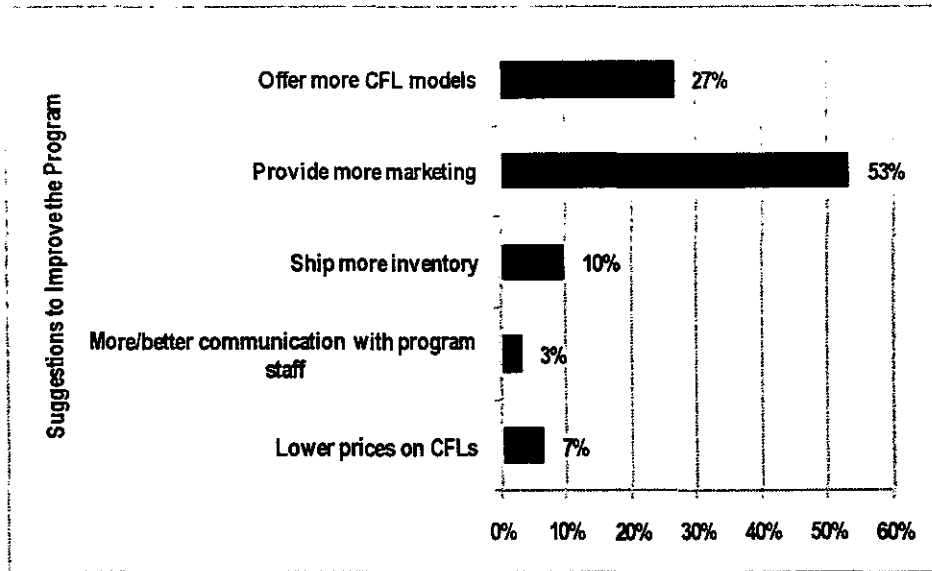
Lastly, retailers rated their overall satisfaction with the Ameren Missouri lighting program. Figure 18 shows that retailers were satisfied overall with the program. Forty-one percent of retailers rated the program overall as a 10; with about 97 percent of retailers rating the program a 7 or higher. Two retailers gave the program very low ratings. One retailer said that the program did not result in higher sales and the other retailer said that he was indifferent about the program.

**Figure 18. Overall Ameren Missouri Lighting Program Satisfaction (n = 61)**



Thirty retailers provided various responses when asked how the program could be improved. Figure 19 shows that more than half of retailers suggested that Ameren Missouri provide additional marketing materials. Twenty-seven percent suggested that Ameren Missouri discount more CFL models.

**Figure 19. Suggestions to Improve Ameren Missouri Lighting Program (n = 30)**



Seventy percent of retailers indicated that they were planning to participate in the Ameren Missouri lighting program going forward. Only one retailer said that he was not planning to participate in the future because of an interaction with a program representative earlier this year. The program representative apparently told this retailer that Ameren Missouri was going to discontinue the program at his store but the representative never visited the store to confirm. The retailer thinks that he will not receive program CFLs next year. Twenty-eight percent of retailers were unsure about future participation but did not provide any indication as to why.

### Appliances

Interviews with appliance retailers provide program insights and also identify how the program affected the target market. Cadmus interviewed 15 participating appliance retailers across five retail distribution channels. These interviews asked questions about ENERGY STAR dehumidifiers, freezers, and window AC units. The table below presents these interview completions by retail distribution channel.

**Table 43. Appliance Retailer Interviews Completed by Retail Distribution Channel (n = 15)**

Distribution Channel	Stores	Percent of Total
Hardware	1	7%
Home Furnishings	2	13%
Home Improvement	5	33%
Mass Merchandise	5	33%
Warehouse	2	13%
<b>Totals</b>	<b>15</b>	<b>100%</b>

All retailers indicated which of the three measures their stores sold, and survey administrators then asked questions for each measure that retailers sell. Table 44 shows the number of retailers

who sell each of the three measures. This analysis discusses stocking patterns, sales trends, and pricing for each measure independently of the others.

**Table 44. Measures Sold by Appliance Retailers (n = 15)**

ENERGY STAR Measure	Stores (n = 15)
Dehumidifiers	14
Freezers	11
Window ACs	12

## Reasons for Participating

All respondents discussed their primary reasons for participating in the Ameren Missouri appliance program. Five retailers (33 percent) said that they participated in the program in order to provide money-saving appliance options for customers. Four retailers (27 percent) indicated that program participation was decided at the corporate level. Three retailers (20 percent) said that they decided to participate in the program after Ameren Missouri representatives visited their store and asked them to participate. One of these respondents said:

*“Ameren presented the program to the store and [it] seemed like a good idea.”*

One retailer (7 percent) said that his store participated in the program to encourage/promote energy savings.

## Retailer Stocking Patterns

Appliance retailers were asked to describe their stocking practices for ENERGY STAR dehumidifiers, freezers, and window AC units. The appliance rebate program positively affected stocking patterns across all three measures.

The 14 retailers who sell dehumidifiers said that 79 percent (average of responses) of dehumidifiers on their sales floor qualified for Ameren Missouri’s rebate program as of January 1, 2010. Four of these retailers indicated that the percentage of rebate-qualified dehumidifiers on the sales floor had increased since last year. According to these four retailers, 90 percent of dehumidifiers for sale in their stores qualify for the Ameren Missouri appliance rebate. The program appears to have had positive effects on these four retailers.

The 11 retailers who sell freezers said that 50 percent (average of responses) of freezers on their sales floors qualified for the program rebate in January 2010. Three retailers reported that their current stock of freezers on the sales floor is greater than the stock one year ago. According to these three retailers, 68 percent (weighted average) of their freezers now qualify for the Ameren Missouri program rebate. The program has also had positive effects on the stocking of freezers.

The 12 retailers who sell window AC units also discussed changes in their stock of rebate-qualified units. In the summer of 2009, seven retailers stated that of the window AC units on their sales floors, an average of 63 percent were rebate-qualified. For the summer of 2010, all 12 retailers reported that 70 percent of their window AC units qualified for the Ameren Missouri program rebate. The program seems to be most effective in increasing the stocking patterns of window AC units among retailers.

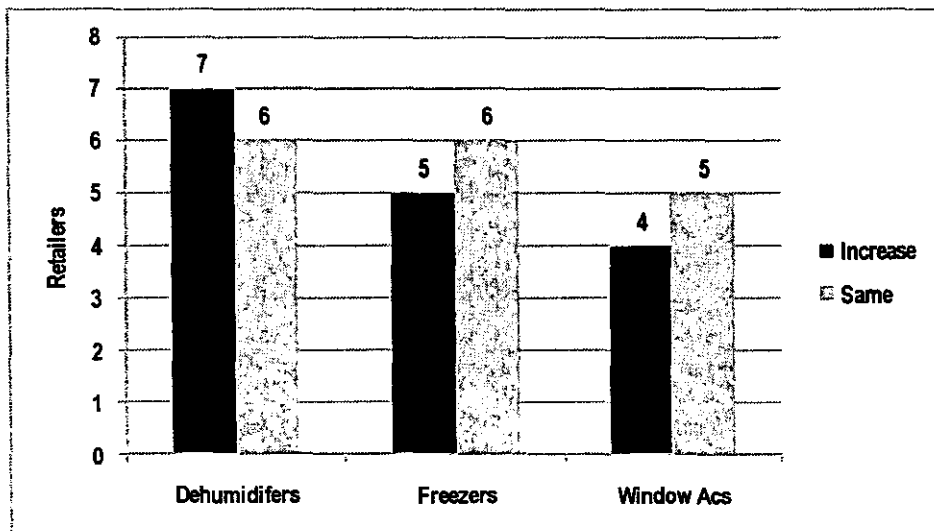
## Sales Trends

In absence of the Ameren Missouri appliance rebate incentives, 13 of the 14 retailers who sell ENERGY STAR dehumidifiers (97 percent) said they would still advertise and sell these products. All 11 retailers who sell ENERGY STAR freezers and all 12 retailers who sell ENERGY STAR window AC units would still advertise and sell these measures in absence of the program.

Seven of the 14 retailers (50 percent) who sell ENERGY STAR dehumidifiers estimated that sales of dehumidifiers would be 20 percent lower without support of the program. Just over half of the 11 retailers who sell ENERGY STAR freezers estimated that sales of these measures would decrease by an average of 18 percent without the Ameren Missouri appliance program. One fourth of window AC retailers estimated that their sales would also be lower by 18 percent if the Ameren Missouri rebates were not available.

Cadmus asked retailers if their sales of each ENERGY STAR measure changed from January 2010 to January 2011. Seven retailers said that their sales of ENERGY STAR dehumidifiers increased from the previous year, and six reported that sales were unchanged. For freezers and window ACs, more retailers reported no change in sales in the past year than those who reported an increase. Figure 20 presents these findings.

**Figure 20. Retailers Reporting Changes in Sales of ENERGY STAR Measures from Jan. 2010 to Jan. 2011**



Retailers also discussed perceived changes in consumer demand for each ENERGY STAR measure. More than half (57 percent) of retailers who sell dehumidifiers believed that there has been no change in demand for this measure over the past year. Three retailers (21 percent) reported a significant increase in demand for dehumidifiers over the past year. Two of these rated the importance of the program as 5; indicating that the Ameren Missouri appliance rebate program was very important in helping bring about increases in consumer demand. Three other retailers (21 percent) reported a slight increase in demand over the past year.

For retailers who sell ENERGY STAR freezers, five retailers of the 11 (45 percent) reported that consumer demand for the measure had increased significantly over the past year. Two of them also rated the importance of the program in bringing about this increase as a 5 on a scale of 1 to 5. Two retailers (18 percent) said that demand for ENERGY STAR freezers had increased somewhat, and four retailers (36 percent) said that demand had not changed at all over the past year.

Twenty-five percent of window AC retailers (three of 12) reported that consumer demand for ENERGY STAR window AC units had increased significantly this past year. One of these retailers rated the program's importance in bringing about this increase as a 5 on a scale of 1 to 5. Fifty percent (six retailers) indicated that demand for ENERGY STAR window ACs had increased somewhat, and another 25 percent (3 retailers) said that demand had not changed at all over the past year.

Retailers also provided estimates of the percentage of total sales for each measure that could be attributed to the program over the past 12 months. Twelve of the 14 retailers (86 percent) who sell ENERGY STAR dehumidifiers estimated that they sell, on average, 25 percent of their dehumidifiers through the program. The other 75 percent of dehumidifier sales are not through the program. Ten of the 11 retailers (91 percent) who sell ENERGY STAR freezers estimated that they sell, on average 24 percent of their freezers through the program. Lastly, nine of the 12 retailers (75 percent) who sell ENERGY STAR window ACs estimated the program accounts for 29 percent of their window AC sales.

## Program Satisfaction

All appliance retailers were asked to rate various aspects of the program, including the program itself, using a standard 0–10 rating scale where 0 is very dissatisfied and 10 is very satisfied. Across all aspects of the program, retailers are generally satisfied.

Fifty-three percent of retailers were very satisfied with Ameren Missouri's approach to incenting energy-efficient appliances. Most retailers rated this aspect of the program at least a 7. One retailer was indifferent (giving a rating of 5), and one retailer was very dissatisfied with this aspect of the program, indicating that customers did not know about the program because of a lack of promotional activities.

The dollar amounts for ENERGY STAR appliance rebates also received high ratings. The lowest rating was 7 (representing one retailer) and 40 percent (6 retailers) gave the program a rating of 10.

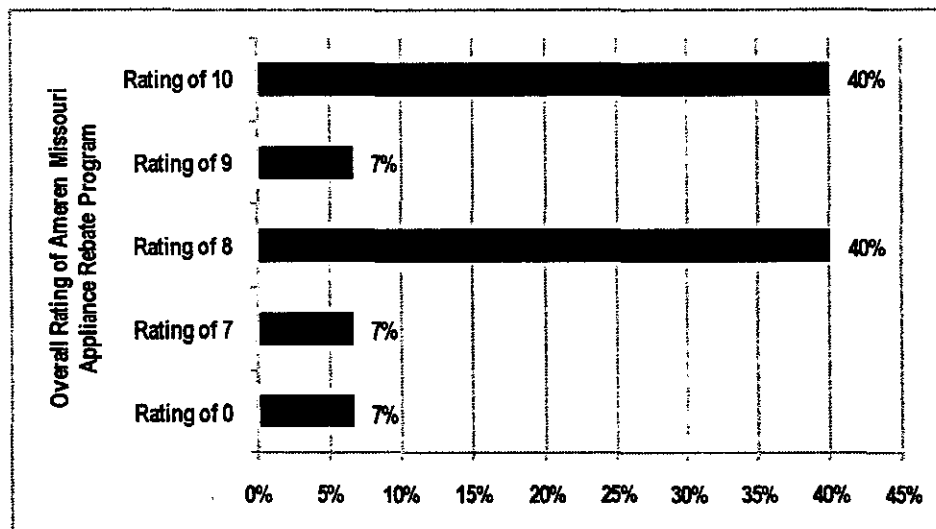
Ameren Missouri's mass marketing efforts received mixed ratings among retailers. Thirteen retailers rated this aspect of the program, as two retailers said they were not familiar with Ameren Missouri's marketing efforts. While 23 percent (three retailers) rated Ameren Missouri's mass marketing a 10, 38 percent (five retailers) of retailers rated this aspect of the program a 5. Three of these retailers all commented that they were mostly unaware of the mass marketing as they hardly ever saw it in their stores. Another retailer quipped that she "wouldn't call it mass marketing." One retailer rated the program's marketing efforts as a 0 and indicated that no one ever sees the advertising, as no one promotes it in his store.

Program coordination and product placement received generally good ratings. Fifty percent (of 12 retailers contributing) rated this aspect of the program a 10. One retailer was neither satisfied nor dissatisfied; rating product placement and program coordination a 5.

Ameren Missouri program managers also received good ratings from retailers. Fifty-eight percent of the 12 retailers responding to this question rated program managers a 10. The lowest rating was 7; given by one retailer.

Lastly, retailers rated their overall satisfaction with the Ameren Missouri appliance rebate program. Forty percent of retailers rated the program a 10 and another 40 percent rated the program an 8. Seven percent of retailers (represented by 1 retailer) expressed his dissatisfaction with the program by giving the program a rating of 0. He said that he was very dissatisfied with the program as there was “no promotion or customer support”.

**Figure 21. Overall Satisfaction with Ameren Missouri’s Appliance Rebate Program (n = 15)**



Ten retailers offered suggestions for improving the program in the future. Sixty percent (six retailers) suggested increasing marketing efforts by providing more marketing materials or conducting promotions more frequently. Two retailers suggested that Ameren Missouri should adjust marketing materials by reducing the size of pamphlets so that they fit better into boxes. Two other retailers suggested the Ameren Missouri should expand the program to other measures such as dishwashers, clothes washers, and refrigerators because the dehumidifiers market is very small.

Lastly, 60 percent (nine retailers) indicated that they plan to participate in the Ameren Missouri appliance rebate program going forward. While none other retailers said that they would not participate going forward, the remaining 40 percent of retailers had not yet made a decision about future participation.

## Appliance Participant Survey

Cadmus surveyed a sample of appliance rebate participants to assess freeridership and process efficacy from the participant perspective. The sample was stratified by appliance type in order to achieve accurate results for questions specific to each of the three main appliances rebated through the program: dehumidifiers, freezers, and room air conditioners. Table 45 below shows sample stratification by appliance type and precision levels at the 90 percent confidence level for each stratum and for the population as a whole. When responses are reported for the total population, they are weighted to represent each appliance's share of the population.

**Table 45. Appliance Rebate Participant Survey Sample Stratification**

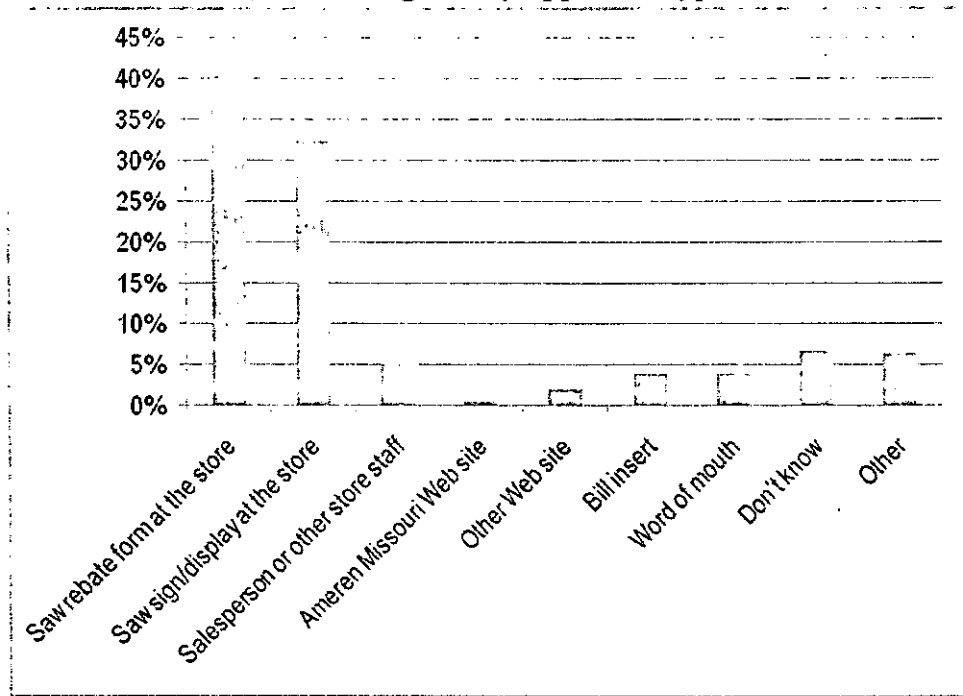
Appliance	Total Number of Participants	Proportion of Population (Weight)	Number of Participants Surveyed	Precision at 90% Confidence Level
Dehumidifiers	3,454	45%	50	11.6%
Freezers	490	6%	53	10.7%
Room Air Conditioners	3,853	49%	50	11.6%
<b>Grand Total</b>	<b>7,888</b>	<b>100%</b>	<b>153</b>	<b>6.6%</b>

### Program Awareness and Satisfaction

The survey asked participants how they first learned about the program. As shown in Figure 22, where results have been weighted by appliance type to represent the total population, a large majority of participants (77 percent) learned about the rebates in the store – either via the rebate form itself, signage, or from a salesperson.



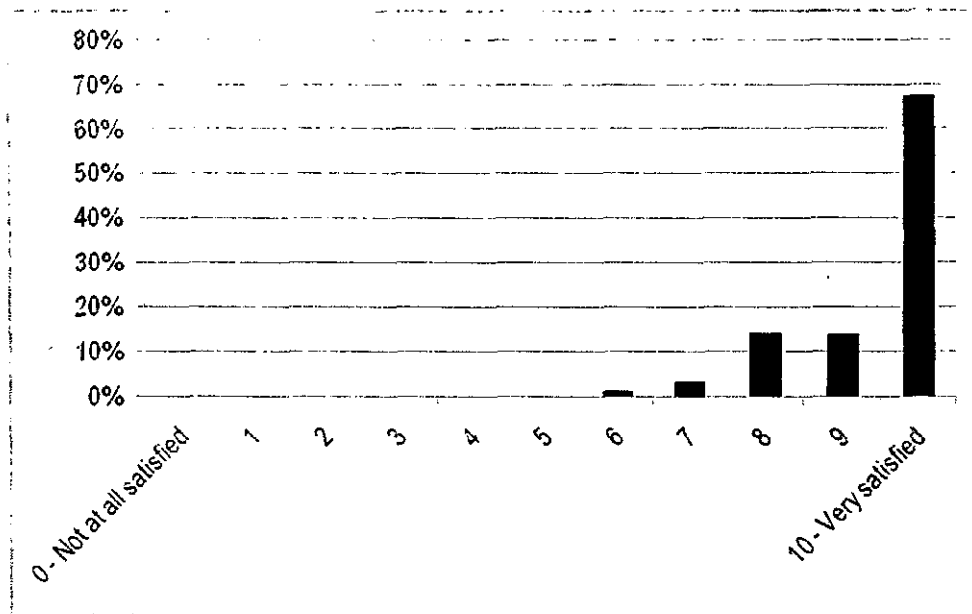
**Figure 22. Method of Learning About the Appliance Rebate Program  
(n=153, weighted by appliance type)**



While very few people (less than 1 percent) reported learning about the program from Ameren Missouri’s website, 29 percent of participants report having visited the Ameren Missouri website. This could represent an opportunity to increase online marketing of the program.

Program participants were very satisfied with the program overall. On a scale of 0 to 10, where 0 is not at all satisfied and 10 and very satisfied, 68 percent rated the program a 10. Furthermore, no respondents gave a score lower than six. Participant satisfaction results are shown in Figure 23.

**Figure 23. Participants' Satisfaction with the Appliance Rebate Program  
(n=153, weighted by appliance type)**



When asked whether they had any suggestions for potential improvements to the program, the most common suggestions offered were:

- Offer rebates on additional appliances (mentioned by 15 respondents)
  - Specific appliances mentioned were furnaces, ovens, and ground-source heat pumps
- Increase advertising and promotion of program (mentioned by 13)
- Increase the dollar amount of the incentives (mentioned by 4)

A number of commenters stated that they were pleased with the program and looked forward to seeing it expand.

### Measure-Specific Results

The survey asked a number of questions about the specific measure for which the respondent received a rebate. The results of these questions are reported in this section. Here, no weighting is applied, because the measure-level samples were random.

#### Dehumidifier

A total of 3,545 ENERGY STAR dehumidifiers were rebated through the program in PY2, accounting for over \$88,000 in customer incentives paid. The survey asked recipients of the dehumidifier rebate about their motivation for purchasing the ENERGY STAR unit. Responses are summarized in Table 46. Nearly half of respondents were simply in need of a new unit, citing problems with humidity, dampness, or mold in their homes. The demand for dehumidifiers in Missouri is high, due to the humid summer climate and the housing stock in which basements are common. Therefore it is logical that many people cited this need as the primary motivator for

purchasing the unit. 24 percent mentioned the incentive as one of the factors that motivated them to purchase the unit.

**Table 46. Motivation for Purchasing Dehumidifier  
(Multiple Responses Allowed, n=50)**

Reason	Number of Respondents	Percent of Respondents
Needed or wanted a dehumidifier due to humidity, dampness, or mold	24	48%
The incentive or rebate	12	24%
Old equipment didn't work	9	18%
Cost of the dehumidifier	9	18%
Wanted to save energy	3	6%
Features or size of the dehumidifier	3	6%
Wanted to reduce energy costs	2	4%
Brand of dehumidifier	2	4%
Old equipment working poorly	1	2%
Past experience with another Ameren program	1	2%
Recommendation of retailer	1	2%
Liked the appearance of the ENERGY STAR dehumidifier more than the old one	1	2%

Respondents were asked to specify whether they purchased the dehumidifier as a new addition to their home, or as a replacement of an existing unit. As shown in Table 47, a majority (54 percent) were adding a new unit to their homes.

**Table 47. Dehumidifiers: Replacement or Additional?**

	Number of Respondents	Percent of Respondents
Replacement	23	46%
Additional	27	54%

The participants who reported replacing an existing unit were asked about the old equipment they replaced. A majority (52 percent) reported that the old unit was between five and 10 years old. Table 48 shows the reported condition of the replaced dehumidifiers, and Table 49 shows the method of disposal.

**Table 48. Condition of Replaced Dehumidifiers**

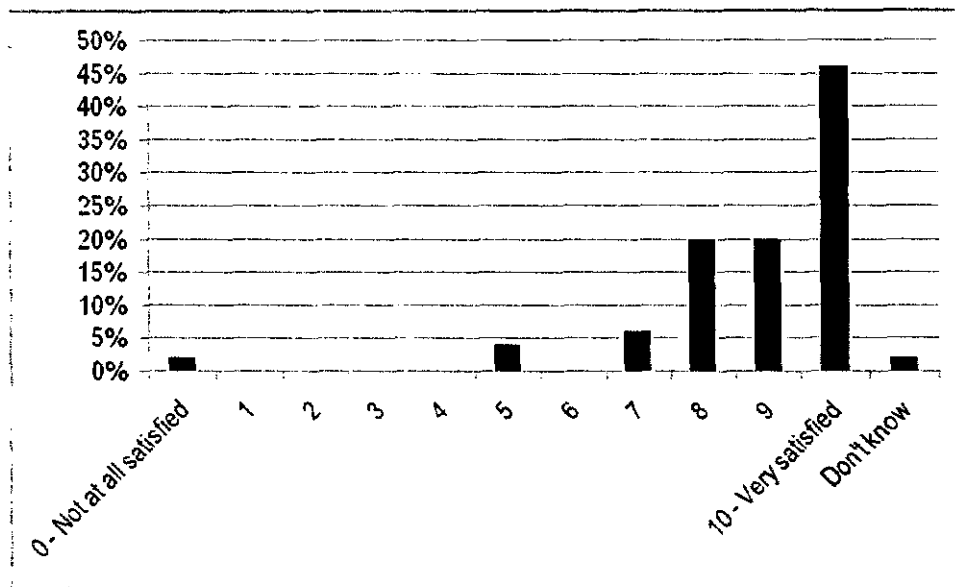
Condition of Unit	Number of Respondents	Percent of Respondents (n=23)
Good	2	9%
Poor	7	30%
Not working	14	61%

**Table 49. Disposal of Replaced Dehumidifiers**

Disposal Method	Number of Respondents	Percent of Respondents (n=23)
Sold or gave away	1	4%
Still in home but permanently removed	3	13%
Recycled	7	30%
Threw away or took to dump	12	52%

Respondents were highly satisfied with their new ENERGY STAR dehumidifiers, with 66 percent reporting a score of 9 or 10 on a satisfaction scale, as shown in Figure 24.

**Figure 24. Participant Satisfaction with Dehumidifier**



Participants were also quite satisfied with the incentive payments. Ninety-six percent of respondents were satisfied with the dollar amount of incentive they received for their dehumidifier, and 96 percent were satisfied with how quickly they received the incentive.

**Freezer**

A total of 490 ENERGY STAR freezers were rebated through the program in PY2, accounting for \$24,500 in customer incentives paid. The survey asked recipients of the freezer rebate about their motivation for purchasing the ENERGY STAR unit. Responses are summarized in Table 50. The most frequently mentioned reason for purchasing the new freezer was a desire to save energy (mentioned by 17 respondents).

**Table 50. Motivation for Purchasing Freezer  
(Multiple Responses Allowed, n=53)**

Reason	Number of Respondents	Percent of Respondents
Wanted to save energy	17	32%
Old equipment didn't work	13	25%
The incentive or rebate	13	25%
Features or size of freezer	12	23%
Needed or wanted a new freezer	8	15%
Cost of freezer	8	15%
Old equipment working poorly or too old	7	13%
Wanted to reduce energy costs	6	11%
Because of past experience with another Ameren program	1	2%
Saw advertisement for rebate program	1	2%
Liked the appearance of the ENERGY STAR freezer more than the old one	1	2%
Brand of freezer	1	2%

Respondents were asked to specify whether they purchased the unit as a new addition to their home appliances, or as a replacement of an existing unit. As shown in Table 51, a majority (68 percent) purchased the unit as a replacement.

**Table 51. Freezers: Replacement or Additional?**

	Number of Respondents	Percent of Respondents (n=53)
Replacement	36	68%
Additional	17	32%

The participants who reported replacing an existing unit were asked about the old freezer they replaced. As shown in Table 52, most (56 percent) of the replaced freezers were between 10 and 30 years old, and another 19 percent were over 30 years old.

**Table 52. Age of Replaced Freezers**

Age Category	Number of Respondents	Percent of Respondents (n=36)
Less than 5 years old	4	11%
5 to less than 10 years old	5	14%
10 to less than 20 years old	10	28%
20 years to less than 30 years old	10	28%
30 or more years old	7	19%

Table 53 shows the reported condition of the replaced freezers, and Table 54 shows the method of disposal. A fairly large number of replaced freezers (16, or 44 percent) were reportedly not working, which is in line with the finding that many replaced freezers were quite old. The

disposal methods reported show that a small number of the replaced freezers stayed on the grid – two units (6 percent) were sold or given away.

**Table 53. Condition of Replaced Freezers**

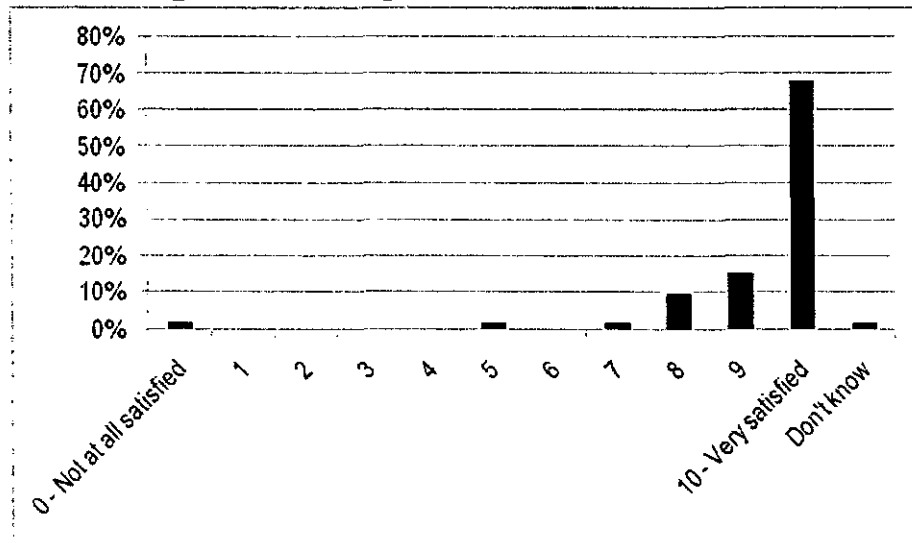
Condition of Unit	Number of Respondents	Percent of Respondents (n=36)
Good	10	28%
Fair	4	11%
Poor	5	14%
Not working	16	44%
Don't know	1	3%

**Table 54. Disposal of Replaced Freezers**

Disposal Method	Number of Respondents	Percent of Respondents (n=36)
Sold or gave away	2	6%
Still in home but permanently removed	10	28%
Recycled	3	8%
Threw away or took to dump	18	50%
Don't know	2	6%

Participants reported high levels of satisfaction with their new ENERGY STAR freezers: this measure showed the highest satisfaction ratings out of the three rebated measures. 68 percent of respondents rated the new appliance a 10 on a satisfaction scale, as shown in Figure 25.

**Figure 25. Participant Satisfaction with Freezer**



Freezer purchasers were also fairly satisfied with the rebate they received, although the level of satisfaction here is slightly lower than for the other two appliances. 89 percent were satisfied with the dollar amount of the incentive they received for the freezer, and 89 percent were satisfied with how quickly they received the incentive. The slightly lower level of satisfaction is likely due to the fact that the incentive amount likely accounts for a lower percentage of the total appliance cost, as compared to the other two incentives offered.

**Room Air Conditioners**

A total of 3,853 ENERGY STAR room air conditioners were rebated through the program in PY2, accounting for nearly \$200,000 in customer incentives paid. The survey asked recipients of the room air conditioner rebate about their motivation for purchasing the ENERGY STAR unit. Responses are summarized in Table 55. Over a third of respondents were simply in need of a new unit, and nearly a quarter were concerned with saving energy. 20 percent mentioned the incentive as one of the factors that motivated them to purchase the unit.

**Table 55. Motivation for Purchasing Room Air Conditioner  
(Multiple responses allowed, n=50)**

Reason	Number of Respondents	Percent of Respondents
Needed or wanted a new air conditioner	18	36%
Wanted to save energy	12	24%
The incentive or rebate	10	20%
Cost of air conditioner	9	18%
Features or size of air conditioner	8	16%
Old equipment didn't work	5	10%
Wanted to reduce energy costs	5	10%
Old equipment working poorly	2	4%
Brand of air conditioner	2	4%
Environmental concerns	1	2%
Liked the appearance of the ENERGY STAR air conditioner more than the old one	1	2%
Keeping up with the latest technology or trends	1	2%

Respondents were asked to specify whether they purchased the unit as a new addition to their home appliances, or as a replacement of an existing unit. As shown in Table 56, a majority (52 percent) purchased the unit as a replacement.

**Table 56. Room Air Conditioners: Replacement or Additional?**

	Number of Respondents	Percent of Respondents (n=50)
Replacement	26	52%
Additional	24	48%

The participants who reported replacing an existing unit were asked about the old equipment they replaced. A majority (65 percent) reported that the old unit was over five years old, and nearly a third of the units (27 percent) were over 10 years old. Table 57 shows the reported

condition of the replaced room air conditioners, and Table 58 shows the method of disposal. It is notable that while nearly a third of the old units (31 percent) remained in the home, 19 percent disposed the old unit responsibly by recycling it.

**Table 57. Condition of Replaced Room Air Conditioners**

Condition of Unit	Number of Respondents	Percent of Respondents (n=26)
Good	6	23%
Fair	6	23%
Poor	6	23%
Not working	8	31%

**Table 58. Disposal of Replaced Room Air Conditioners**

Disposal Method	Number of Respondents	Percent of Respondents (n=26)
Sold or gave away	4	15%
Still in home but permanently removed	8	31%
Recycled	5	19%
Threw away or took to dump	7	27%
Don't know	2	8%

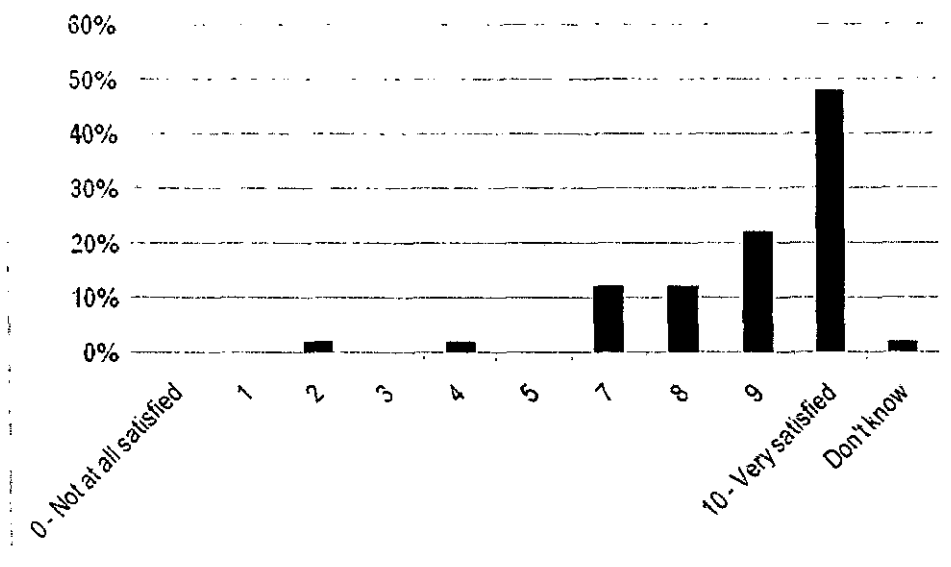
The survey also asked about unit installation. Since room air conditioners are sometimes installed only seasonally, the results (shown in Table 59) are in line with what was expected: only 60 percent of units were installed at the time the survey was conducted, which was during the winter months. An additional 30 percent of units were in storage for the winter.

**Table 59. Room Air Conditioners: Installed in Participant Home?**

	Number of Respondents	Percent of Respondents (n=50)
It is currently installed in my home	30	60%
It is installed at some other location	3	6%
It was installed and used over the summer but is currently in storage	15	30%
It is not installed or in use	2	4%

As shown in Figure 26, participants reported high levels of satisfaction with their new ENERGY STAR room air conditioners, with 70 percent of respondents rating the appliance a 9 or 10 on a satisfaction scale.



**Figure 26. Participant Satisfaction with Room Air Conditioner**

Room air conditioner participants were even more satisfied with their rebate than participants purchasing the other two appliances. 100 percent of respondents were satisfied with the dollar amount they received for the room air conditioner, and 98 percent of respondents were satisfied with how quickly they received their incentive payment. The room air conditioner rebate of \$50 is likely to account for a higher percentage of the cost of the appliance, as compared to the dehumidifier and freezer rebates.

### Spillover

The results of the participant survey indicate that a noteworthy amount of spillover occurred among program participants. This is a positive outcome in line with the program's market transformation goals. While this evaluation does not quantify savings associated with spillover measures, these findings demonstrate the depth of the impact the appliance rebate program has on its participants.

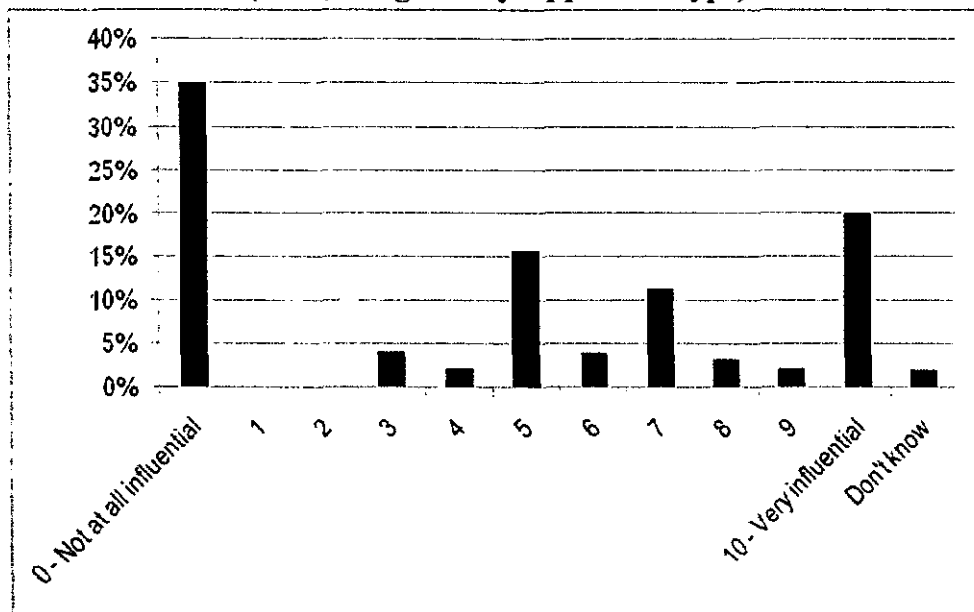
25 percent of respondents (weighted by appliance type) reported that since participating in the program, they added other energy-efficient products in their home that were not rebated by Ameren Missouri. Of those, 95 percent reported that the additional energy-efficient products added were ENERGY STAR rated. Furthermore, an additional 27 percent of participants reported that they took energy-efficient actions aside from installing new products. Examples given of energy-efficient products and actions included the following:

- Replacing incandescent light bulbs with CFLs (mentioned by 14 respondents)
- Infiltration control such as weather-stripping (mentioned by 10)
- Adding insulation (mentioned by 8)
- Replacing doors and/or windows (mentioned by 7)
- Turning off lights (mentioned by 2)

- Unplugging unused appliances (mentioned by 1)

The survey asked all respondents who had either installed energy-efficient products or taken energy-efficient actions (a total of 72 out of 153) to rate how influential the appliance rebate program was in their decision to take these additional steps. Responses to this question are summarized in Figure 27.

**Figure 27. Influence of Program on Additional Energy-Efficient Actions (n=72, Weighted by Appliance Type)**



While it is clear that a number of rebate recipients (35 percent) did not consider the program influential in their decision to take further energy-efficient actions, just over 20 percent rated the program's influence a 10 out of 10. This shows that a small but significant number of people are being strongly affected by their participation, which is the desired outcome of a market transformation program in terms of spillover.

## 6. Social Marketing Distribution

Ameren Missouri's Social Marketing Distribution (SMD) Program provides not-for-profit organizations with energy-efficient compact fluorescent light bulbs (CFLs), which the organizations can then distribute to Ameren Missouri customers in the communities they serve. The goal of the program is to reduce energy use in residential areas and therefore lower household energy expenses.

Through this program, Ameren Missouri has been able to reach customers who may not have qualified for other energy assistance programs and lacked the resources to make the initial purchase of CFLs. Organizations that have benefited from this program include those that help serve the needs of elderly and lower income groups. However, the program is available to any organization that meets the following requirements.

- Must be a not-for-profit organization that represents residential customers served by Ameren Missouri;
- Must be able to distribute a minimum of 5,000 CFLs or directly install a minimum of 500 CFLs;
- CFL distribution must be limited to residential customers residing in the Ameren Missouri service territory;
- Must provide sufficient performance data to allow evaluation, measurement, and verification of the project;
- Must also distribute consumer educational materials on CFL lighting, which are provided by Ameren Missouri;
- Must have a total cost per CFL less than Ameren Missouri's current maximum incentive for CFL lamps.<sup>21</sup>

The first SMD took place in December 2009. In this program, APT coordinated with local service providers, including Operation Food Search and Agape, among others, to deliver free 13W and 23W CFLs to Ameren Missouri customers who take advantage of those organizations' services. This section presents process and impact findings on the SMD Program.

### Evaluation Methodology

Cadmus conducted staff interviews and a participant survey to gather information about the SMD component of the L&A program.

Staff interviews, conducted in conjunction with the L&A Program interviews, gathered feedback from five key staff members, as outlined in Table 60, below.

---

<sup>21</sup> Since CFLs for the SMD are purchased in bulk, the cost per CFL is typically less than Ameren Missouri's upstream CFL incentives.

**Table 60. SMD Stakeholder Interviewees**

<b>Title</b>	<b>Organization</b>
Residential Program Manager	Ameren Missouri
Senior Program Manager	Ameren Missouri
Community Relations Director	Operation Food Search
Regional Director of Operations	APT
Program Manager	APT

Cadmus also designed and analyzed a survey, implemented by Tetra Tech Inc., of a random sample of 71 participants who received free CFLs subsidized by Ameren Missouri at local food pantries. The survey was designed to provide an understanding of installation rates and possible spillover associated with the distributions. The sample size was designed to produce a sampling error of  $\pm 10$  percent at the 90 percent confidence level.

### SMD Process Interview Findings

Ameren Missouri staff reported that the distributions were introduced in response to a challenge from Ameren Missouri management to introduce energy-efficiency programming in urban areas, in order to help those customers most in need. To address this challenge, L&A program staff developed the SMD component in conjunction with APT and local low-income service providers.

The implementation process begins when partner organizations submit information about their customers and APT verifies that at least 80 percent of the organization's customers live in Ameren Missouri's service territory.<sup>22</sup> SMD can consist of either direct-install campaigns or event distributions where bulbs are given to customers. Direct-install campaigns are more difficult to achieve and reportedly accounted for approximately 10 to 12 percent of the SMD volume in PY2.

Operation Food Search, one of the partner organizations that deliver the program, reported that the number of CFLs distributed to each client is determined by the size of the participant's family. Each family is to receive a minimum of two bulbs (one each of the 13-watt and 23-watt bulbs).

Ameren Missouri staff reported that the SMD component has very low overhead costs and is very efficiently implemented, because APT relies on the operational capacities of the organizations with which it partners. Therefore, the cost of the light bulbs themselves is the primary expense associated with this program component. The partner organizations are reportedly very happy with the program, and there is high demand for participation.

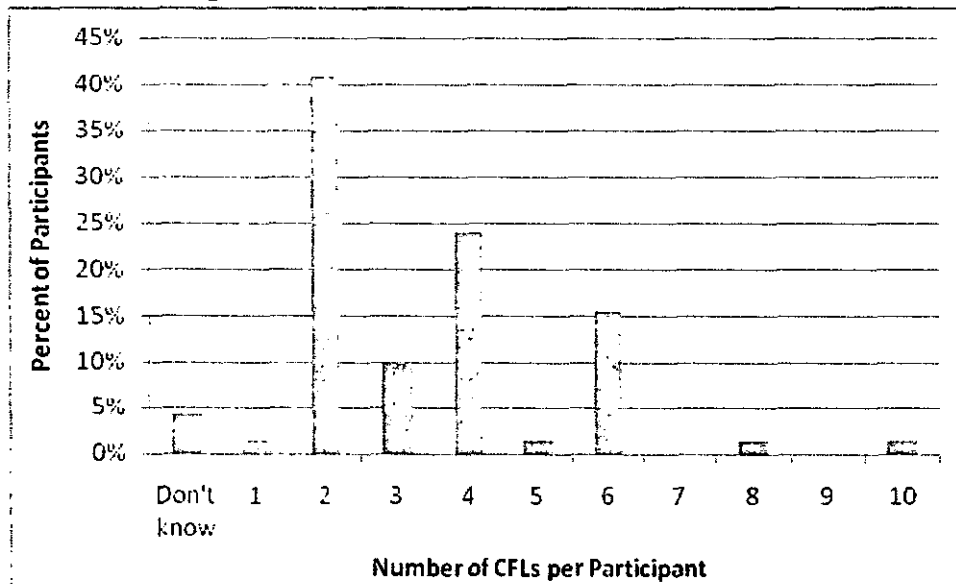
<sup>22</sup> While only 80 percent of the organization's constituents must live in Ameren Missouri's service territory, 100 percent of program bulbs are required to go to Ameren Missouri customers.

## SMD Participant Survey Findings

Cadmus surveyed 71 Ameren Missouri customers who had received CFLs at one of three food pantry locations. The survey was conducted by telephone, and survey operators asked participants questions about their satisfaction with the CFLs they received, their prior and future buying patterns for both CFLs and incandescent bulbs, and demographics and housing characteristics. The survey also included questions about bulb installation for the purpose of assessing impact; the results of are discussed in the following section.

Surveyed participants reported receiving an average of 3.5 CFLs each. As shown in Figure 28, most participants received bulbs in multiples of two, which may indicate that the 13-W and 23-W bulbs are being distributed in pairs. The most common number of bulbs received was two, and the highest number received was 10.

**Figure 28. Number of CFLs Received in SMD**



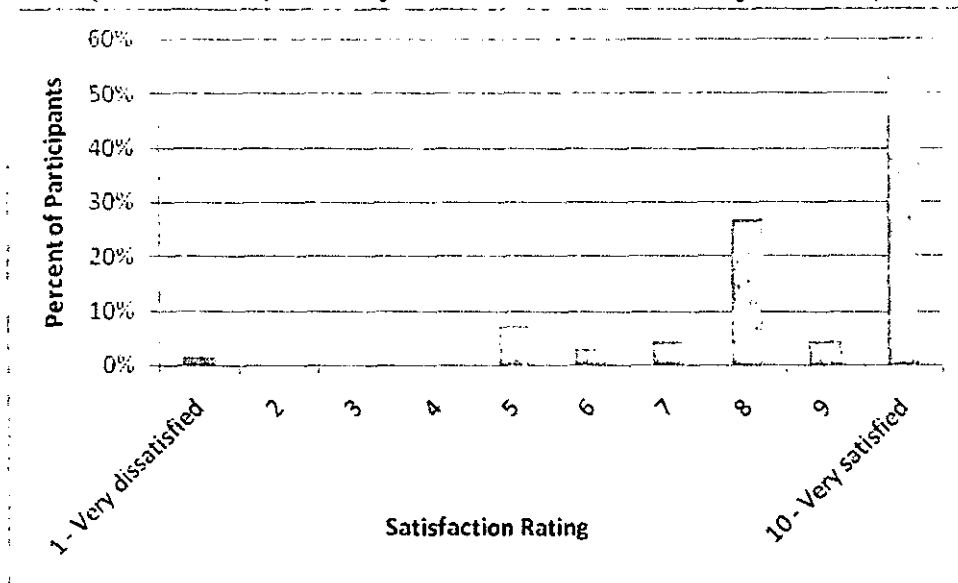
Seventy-seven percent of respondents reported installing all the bulbs they received, with an average of 3 CFLs installed. Only four respondents (6 percent) reported not installing any of the light bulbs they received. Of the 20 respondents who did not install all their bulbs, 16 (80 percent) reportedly stored the CFLs in their homes, with the remaining 20 percent reporting that they were not sure what they did with the bulbs. Based on these survey responses, Cadmus calculated the weighted average installation rate to be 88 percent.

Respondents who installed any light bulbs were asked whether those bulbs were still in use, and 97 percent responded affirmatively. Only two respondents (3 percent) said the bulbs were no longer in use, and both stated that the CFLs had burned out. Both of these participants reported replacing the burned-out CFLs with incandescent light bulbs.

When asked about their satisfaction with the CFLs in their home, respondents gave predominately positive feedback. As shown in Figure 29, only one participant gave a satisfaction

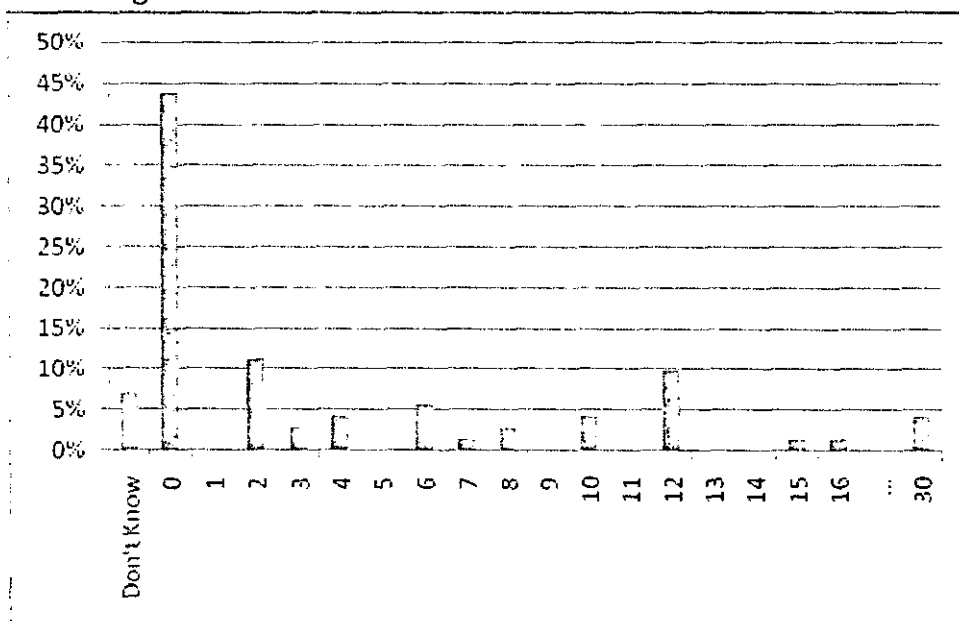
score below 5. That outlier gave a score of 1, indicating major dissatisfaction. However, a large majority (85 percent) gave the CFLs a score of 8 or higher.

**Figure 29. Participant Satisfaction with CFLs  
(1 to 10 scale, 1 is very dissatisfied and 10 is very satisfied)**



Participants were asked whether they had used CFLs in their home prior to receiving these free light bulbs, and they were evenly split between those who had (49 percent) and those who had not (49 percent). Among participants who had used CFLs in the past, the number purchased in the last year, as shown in Figure 30, ranged from two to 30, with an average of 4.8 bulbs per household.

**Figure 30. Number of CFLs Purchased in the Past Year**



The respondents who had purchased CFLs in the past year were asked from what kind of store or stores they had purchased their bulbs. These results, shown in Table 61, clearly indicate that mass merchandise or discount department stores were the most common place to purchase CFLs among this participant population. This category includes stores such as Target, Wal-Mart, and Kmart. Many types of stores were not mentioned by any participants, including drugstores, which are one of the targets for expansion of the upstream component of the L&A program.

**Table 61. Type of Store from Which Participants Had Previously Purchased CFLs (Multiple Responses Allowed, n=35)**

Type of Store	Number of Respondents	Percent of Respondents (n=35)
Grocery store	1	3%
Membership/warehouse store	0	0%
Home improvement store	11	31%
Hardware store	2	6%
Mass merchandise/discount department store	29	83%
Drugstore	0	0%
Convenience store	0	0%
Specialty lighting/electrical store	0	0%
Home furnishing store	0	0%
Mail order	0	0%
Online	0	0%
Bargain/dollar store	3	9%
Office supply store	0	0%

Participants were also asked about purchasing patterns for incandescent light bulbs. The responses, shown in Table 62 demonstrate that there is much similarity between CFL and incandescent purchasing patterns, with the primary difference being purchases from bargain/dollar stores. Nearly one-third (32 percent) of respondents reported having purchased incandescent bulbs at bargain or dollar stores, compared with only 9 percent reporting having purchased CFLs there.

**Table 62. Type of Store from Which Participants Had Purchased Incandescents (Multiple Responses Allowed, n=71)**

Type of Store	Number of Respondents	Percent of Respondents (n=71)
Grocery store	6	8%
Membership/warehouse store	0	0%
Home improvement store	10	14%
Hardware store	1	1%
Mass merchandise/discount department store	51	72%
Drugstore	1	1%
Convenience store	0	0%
Specialty lighting/electrical store	0	0%
Home furnishing store	0	0%
Mail order	0	0%
Online	0	0%
Bargain/dollar store	23	32%
Office supply store	0	0%
Other	3	4%

The survey asked participants whether they had purchased additional CFLs since receiving the free CFLs from the program. Fifteen (21 percent) reported that they had, and reported purchasing an average of 4.6 CFLs each since receiving the free bulbs. A majority (76 percent) had not purchased any additional bulbs since receiving the program CFLs. Nevertheless, most participants (87 percent) reported that they planned to purchase additional CFLs in the future. Of those who said they would not purchase CFLs in the future, the most common reason cited was that the CFLs were too expensive.

Participants were asked a short battery of demographic and home characteristic questions to determine participant age, type of dwelling, and home tenure. These results are summarized in Table 63, Table 64, and Table 65.

**Table 63. SMD Participant Age**

Age Cohort	Number of Respondents	Percent of Respondents (n=71)
60+	14	20%
50-59	15	21%
40-49	21	30%
30-39	15	21%
20-29	5	7%
Refused	1	1%



**Table 64. SMD Participant Dwelling Type**

Dwelling Type	Number of Respondents	Percent of Respondents (n=71)
One-family home detached from any other house	32	45%
One-family home attached to one or more houses	2	3%
Building with 3 or 4 apartments	4	6%
Building with 5 or more apartments	10	14%
Mobile home	23	32%

**Table 65. SMD Participant Home Tenure**

Tenure Type	Number of Respondents	Percent of Respondents (n=71)
Owner	28	39%
Renter	42	59%
Landlord	1	1%

At the conclusion of the phone survey, customers were asked whether they had any additional comments to share. In a finding that did not appear elsewhere in the survey, five participants (representing 7 percent of the total) noted that the bulbs supplied were not bright enough. Nonetheless, of the 25 customers who shared comments, 10 expressed their gratitude to Ameren Missouri for providing the free CFLs.

## SMD Impact Findings

In order to assess the savings impact of the SMD component of the program, Cadmus followed a methodology similar to that used to determine gross savings for the upstream lighting component, which is described beginning on page 15. The preliminary inputs to the analysis, shown in Table 66, were drawn from the program tracking database and from the analysis performed for upstream lighting.

**Table 66. SMD Summary of Participation**

Bulb Type	Incandescent Equivalent Wattage	Bulbs Distributed
13-watt CFL	60	57,470
23-watt CFL	100	57,220

These inputs were used to calculate weighted average CFL and equivalent incandescent wattage. Since CFLs purchased may not replace equivalent wattage incandescents, we use the same ratio of equivalent incandescent-to-CFL wattage, 4.0, used in the upstream lighting evaluation, also referred to as delta watts.

Per-unit gross energy savings are determined using the watt ratio and assuming 2.91 daily hours of use (HOU, as determined in the upstream lighting evaluation) according to the following formula.

$$\frac{CFL\ Watts \times Watt\ Ratio - CFL\ Watts \times HOU \times 365}{1000}$$

$$\frac{18\ Watts \times 4 - 18 \times 2.91\ hours \times 365}{1000} = 57.36\ kWh$$

In order to determine total program savings, per-bulb savings are multiplied by the 88 percent installation rate determined in the participant survey and by the number of bulbs distributed, as shown below. Since CFLs are distributed at no charge through this program component, the traditional definition of freeridership (participants still would have purchased the same product at the same time without the program) does not apply. Therefore, the NTG ratio estimate is 1.0.

**Table 67. SMD Total Energy Savings**

Product	Total Bulbs Distributed	Ex Post Gross Energy Savings Per CFL (kWh)	Ex Post Total Gross Energy Savings (MWh)	NTG Ratio	Net Energy Savings (MWh)
Social Marketing Distribution CFLs	114,690	57.36	5,789	1	5,789

As determined in the metering study discussed earlier in this report, Cadmus calculated that 12.2 percent of metered CFLs were in operation at the time of Ameren Missouri’s system peak. Using this information, Cadmus calculated the peak coincident demand savings per bulb using the following formula:

$$\frac{CFL\ Watts \times Watt\ Ratio \times Peak\ Use\ Coincidence}{1000} = \frac{18 \times 4 \times 0.122}{1000} = .0089\ kW$$

Table 68 shows per unit and total program peak demand reduction, which was calculated by multiplying per unit demand reduction by number of bulbs distributed and by the 88 percent installation rate. Once again the NTG ratio is 1.0, and no adjustment is made for freeridership, since the bulbs were distributed free of charge.

**Table 68. SMD Total Demand Reduction**

Product	Total Bulbs Distributed	Ex Post Per Unit Gross Demand Reduction (kW)	Ex Post Total Gross Demand Reduction (kW)	NTG Ratio	Net Demand Reduction (kW)
Social Marketing Distribution CFLs	114,690	.0089	898	1.0	898

## 7. Conclusions and Recommendations

The following conclusions and recommendations are offered based on findings presented in the previous chapters.

### Conclusions

The program exceeded its goals for CFL sales and savings during PY2; Table 69 and

Table 70 show overall participation and gross and net savings as well as the result compared to Ameren Missouri's goals.

**Table 69. PY2 Evaluated Participation, Gross and Net Savings**

Product	Total Program Sales	Ex Post Energy Savings (MWh)	Ex Post Demand Savings (kW)	NTG Ratio*	Net Energy Savings (MWh)	Net Demand Saving* (kW)
Upstream CFLs	1,547,459	72,097	12,435	0.96	69,214	11,938
Fixtures	591	73.3	8.3	1	73.3	8.3
Room Air Conditioner	3,853	443.1	231.18	0.62	274.7	143.3
Dehumidifier	3,545	347	283.6	0.52	180.4	147.5
Freezers	490	29.9	2.0	0.58	17.3	1.1
Total-PY2		72,991	12,960	0.96	69,759	12,238

\* Appliance NTG ratios are based on free-ridership estimates and do not include spillover.

**Table 70. PY2 Sales and Participation Targets and Results**

ENERGY STAR Lighting or Appliance Type	Program Targets	Results
CFLs (units)	1,177,537	1,547,459
Dehumidifiers (units)	1,500	3,545
Freezers (units)	2,600	490
Room Air Conditioner (units)	8,000	3,853
CFL Fixtures (units)	2,500	591
Total Net Energy Saving (MWh)	64,928	69,759
Total Net Peak Demand Savings (kW)	5,600	12,238

As shown in Table 71, the SMD program distributed 114,690 bulbs saving a total of 5,789 MWh.

Table 71. SMD Results

	Total Bulbs Distributed	Ex Post Total Gross Energy Savings (MWh)	Ex Post Gross Demand Savings (kW)	NTG Ratio	Net Energy Savings (MWh)	Net Demand Savings (kW)
Social Marketing Distribution CFLs	114,690	5,789	898	1.0	5,789	898

Combining the totals from the upstream lighting and appliance programs (Table ES2) with the SMD CFL program (Table ES5) yields an overall portfolio PY2 savings of 78,780 gross MWh and 13,858 gross kW. Net savings are slightly lower with 74,549 net MWh and 13,136 net kW. These savings do not include possible additional spillover which may occur when program participants purchase and install additional types of energy efficient measures outside of the program. This type of spillover is difficult to verify and quantify without detailed surveys and site verifications.

The evaluation found evidence that market transformation is occurring, as the multistate site visits indicated that Ameren Missouri's CFL market penetration (number of homes with at least one CFL) is 93 percent, which is higher than that in all the non-program areas, the newer program areas, and even all long-running program areas (based on the average in the long-running program areas). This may be evidence that Ameren's unique SMD program is broadening the reach of CFLs. A high market penetration indicates the program is wide-reaching; however, Ameren Missouri's low average saturation compared to long-running programs (16.3 percent vs. 23 percent, respectively) indicates significant opportunities for increased CFL purchases within customers' homes.

Ameren Missouri's program and incentive costs were lower than in most other participating program areas in the multistate study, yet CFL sales (both program bulbs and non-program bulbs) were higher, perhaps indicating an effective program delivery strategy.

Intercept surveys indicated some significant leakage in certain rural locations. The overall leakage rate for the program was 8.7 percent; however, this number doesn't consider possible leakage into the area (for instance, from the neighboring utility Ameren Illinois). Leakage rates in the St. Louis area are estimated to be lower, at roughly 3.4 percent.

As reported by retailers, the program has been successful in increasing the supply of energy-efficient CFLs and appliances in the market, and most retailers report significant increases in their sales due to the program. Program staff also reported success in product placement in end-caps and other visible store locations, which are likely to induce more sales.

Program stakeholders reported being pleased with the program, and plan to continue adding more retail outlets in the coming year. An additional two appliance types are planned as well.

## Recommendations

- ***Incorporate evaluation requirements into corporate retailer/manufacturer MOUs:*** Retailers are not always cooperative in responding to interview requests, allowing store intercepts, providing opinions on program processes, and providing information on their CFL sales levels; information that is needed to perform an evaluation. In some cases

during PY2, Cadmus was unable to collect data from all the retailers in our planned sample. The current memorandum of understanding (MOU) does not require specific cooperation with interviews or in-store customer surveys. Cadmus recommends modifying retailer and manufacturer MOU's to require cooperation with evaluation approaches.

- **Continue focusing on consumer education.** As reported by APT, store events and trainings have been effective in increasing consumer awareness and education about CFLs. The high level of market penetration is indicative of this effort. Cadmus recommends having education efforts on proper disposal of CFLs and proper application of specialty CFLs in specialty fixtures.
- **Consider switching to the coupon approach in stores vulnerable to leakage.** Evidence of leakage rates as high as 49 percent was found in some rural big-box stores. The coupon approach, which requires customers to complete an instant rebate form and ensures bulbs are purchased by Ameren Missouri customers, could alleviate this problem without eliminating the rural stores from the program.
- **Update appliance savings estimates in the tracking database.** Cadmus independently calculated the estimated savings for freezers, dehumidifiers, and room air conditioners. The *ex ante* estimates for freezers, in particular, were higher than our estimates, which may have been caused by an assumption of early replacement rather than new purchases. New savings estimates for freezers were approximately 25 percent of *ex ante* savings. *Ex ante* and realized savings estimates for dehumidifiers and room air conditioners were close to our estimates, and are dependent on particular sizes installed.
- **Perform additional mass marketing.** Based on a small level of dissatisfaction among retailers and the fact that many intercepted customers were unaware of Ameren Missouri's program, Cadmus recommends Ameren Missouri perform broader program marketing or advertising. General advertising can increase program spillover and hasten the market transformation as consumers will think more about their choices wherever they shop. Participating retailers will also feel they are benefiting more from the program.
- **Perform general marketing regarding appliance rebates:** While appliance rebate freeridership was not unnecessarily high, Ameren Missouri may be able to achieve greater savings by broadly marketing the program. The current approach attempts to convert customers already shopping for appliances from purchasing standard efficiency to higher efficiency products. Adding general marketing could encourage some customers to replace older, inefficient appliances early, which would result in greater energy savings and fewer free riders.

## Appendix A. CFL User Survey and Site Visits

### Sampling Plan

A total of 451 surveys were conducted in July 2010 by Tetra Tech Inc., a subcontractor to Cadmus, with randomly selected Ameren Missouri residential customers. The sample of survey respondents included both CFL purchasers and non-purchasers. Of the 451 households surveyed, 69 percent reported they had purchased CFLs during the previous six months (January – June 2010).

The sample was designed to achieve a precision level of at least  $\pm 5$  percent with 95 percent confidence for Ameren Missouri's service territory overall. The other goal of the survey was recruiting a minimum of 100 households for site visits. All 451 of those surveyed were asked to participate in site visits and were offered a \$50 incentive to allow a site inspector to inventory lighting in their home. Of those asked, 87 accepted, were scheduled, and completed site visits during the June and July of 2010.

Of the 1,450 customers initially contacted, 306 had non-working numbers. The remaining were contacted an average of 8.4 times to complete the 451 surveys, resulting in a cooperation rate of 39.4 percent. Table 72 summarizes the final distribution of telephone surveys.

**Table 72. Final Distribution of Telephone Surveys**

CFL Disposition	Completes	Recruited for Site Visit	Scheduled for Site Visit	Hard Refusal	Non Working Number
Unaware	8	136	87	84	306
Non Purchaser	185				
Non User	21				
6-month Purchaser	266				
All	451				

### Results

Respondents reported total CFL bulbs installed and in storage at the time of the telephone surveys. The majority of respondent households reported having between six and 10 CFLs installed. Respondents also reported having between one and five CFL bulbs in storage at the time of the telephone surveys. It is worth noting that self-reported CFL purchase data are often difficult for respondents to recall, and therefore are often unreliable. Individual home lighting audits are typically more accurate for assessing CFL penetration and saturation. The next section reports results from the site visits.

Table 73 summarizes reported CFL purchases, installations, and stored bulbs per household based on the survey results.

**Table 73. Summary of CFL Purchases by Installation and Storage**

Survey Question	Average
CFLs installed at time of survey	10.4
CFLs in storage at time of survey	5.1
CFLs purchased six months prior	5.2

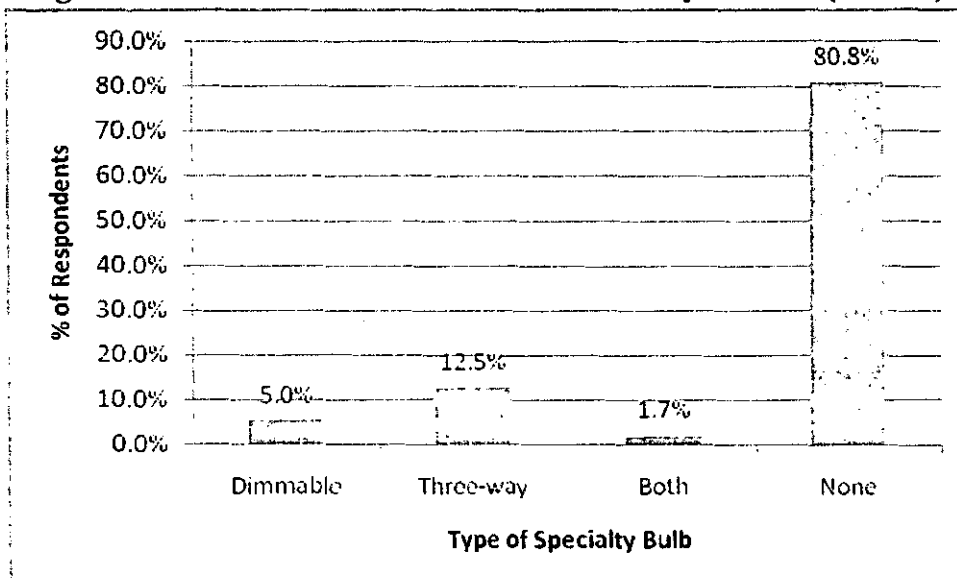
Respondents also were asked to discuss their CFL purchases in the six months prior to the Ameren Missouri telephone survey. These results are shown in Table 74.

**Table 74. CFLs Purchased During Six Months Prior to Ameren Missouri Telephone Surveys (n = 272)**

Number of CFLs Purchased in Six Months Prior to Survey	Percent of Respondents
0	31%
1-5	27%
6-10	30%
11-20	11%
21 or more	1%

Respondents also discussed their use of CFLs in specialty fixtures, such as dimmable and 3-way fixtures. As can be seen in Figure 31, almost 81 percent of respondents did not have CFLs installed in specialty light fixtures. This may indicate poor awareness of specialty CFL bulbs, and may be an opportunity for increased education and marketing of these bulbs types.

**Figure 31. Use of CFLs on Dimmable and 3-Way Fixtures (n = 308)**



Seventy-one percent of respondents with CFLs in specialty fixtures reported correctly using dimmable CFLs in dimmable fixtures. Similarly, 69 percent of respondents reported using

correct 3-way CFLs in 3-way lighting fixtures. These results, presented in Table 75 and Table 76, indicate more opportunity for education on the correct use of specialty CFLs.

**Table 75. Correct Use of CFLs in Dimmable Fixtures**

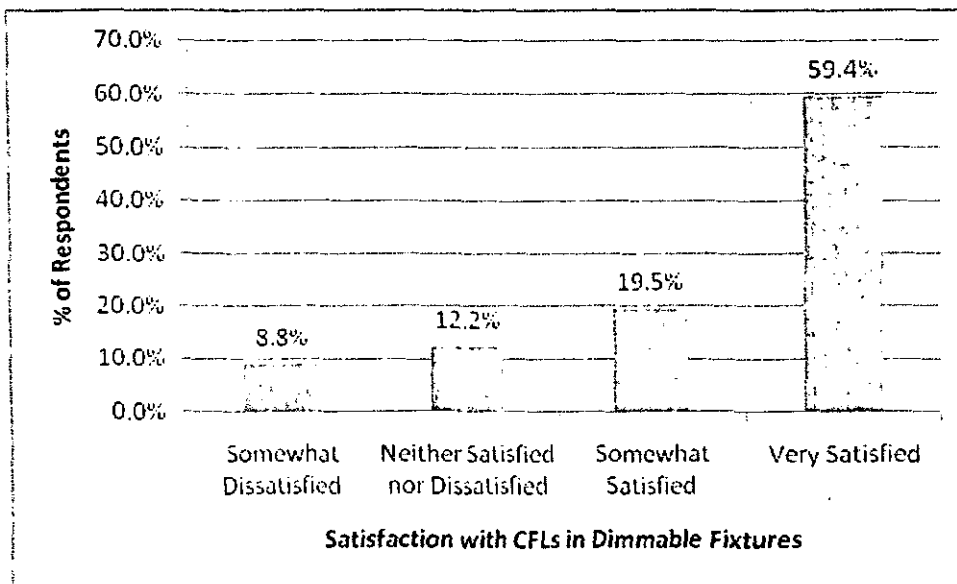
Correct Use of CFLs in Dimmable Fixtures	Percent of Respondents (n=19)
Use of Dimmable CFLs	71.6%
Use of Regular CFLs	28.4%

**Table 76. Correct Use of CFLs in 3-Way Fixtures**

Correct Use of CFLs in 3-Way Fixtures	Percent of Respondents (n=37)
Use of 3-way CFLs	69%
Use of Regular CFLs	31%

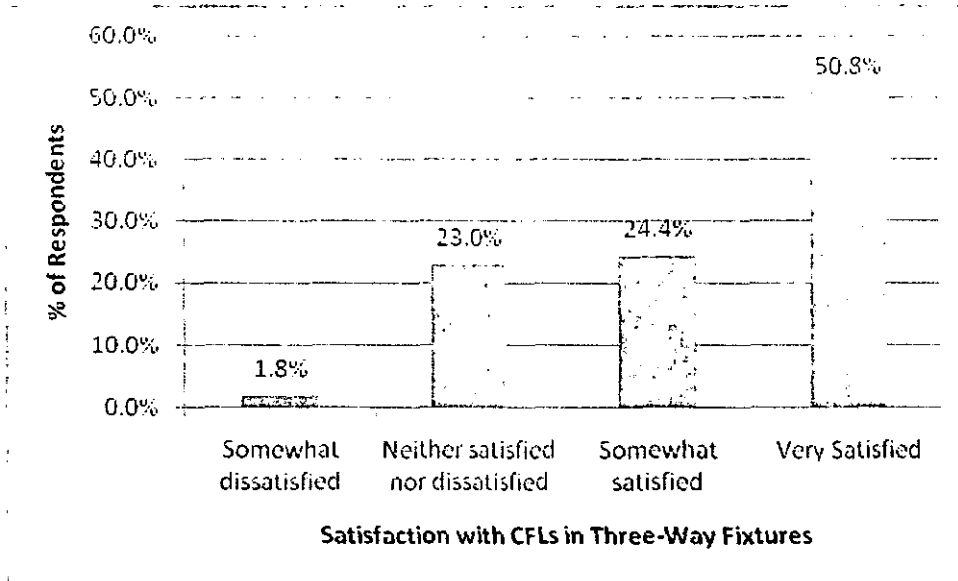
Respondents discussed their satisfaction with using CFLs in dimmable and 3-way light fixtures. Overall, respondents were satisfied with using CFLs in dimmable fixtures. Figure 32 shows that 59 percent of respondents are “*very satisfied*” using CFLs in dimmable fixtures. Just 51 percent of respondents indicated that they are “*very satisfied*” using CFLs in 3-way fixtures. Figure 33 presents overall satisfaction findings for 3-way CFLs.

**Figure 32. Satisfaction with CFLs in Dimmable Fixtures (n = 21)**





**Figure 33. Satisfaction with CFLs in 3-Way Fixtures (n = 44)**



The Ameren Missouri telephone survey elicited feedback about respondents' concerns with CFLs in general. Respondents overwhelmingly indicated that they do not have any particular concerns with CFLs (81.7 percent); however, disposal of CFLs is the number one concern respondents mentioned at 8.2 percent, and mercury was a concern for 3.5 percent of respondents. For non-safety concerns, respondents cited brightness, delayed full brightness of bulb, and shorter than anticipated life span as CFL concerns. Respondents also provided verbatim responses not included in the survey; of these respondents, many were related to personal safety and environmental concerns, including that CFLs easily shatter and that they add to pollution, while others cited concerns about the noise that the bulbs emit. Table 77 illustrates the results of this question.

**Table 77. Concerns with CFLs\* (n = 314)**

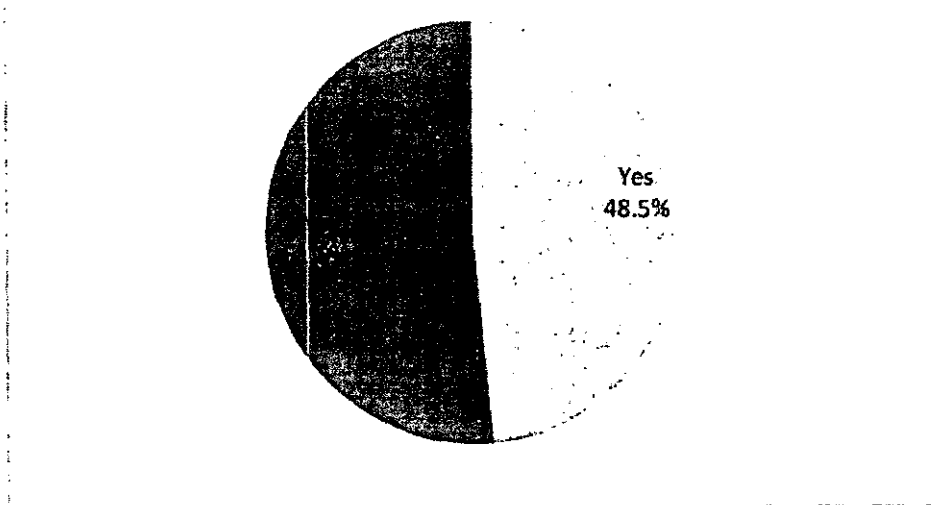
CFL Concerns	% of Respondents
None	81.7%
Mercury	3.5%
Requires Special Disposal	8.2%
Light Color	0.5%
Not Bright Enough	2.9%
Delayed Full Brightness	0.8%
Short Life	0.8%
Expensive	0.3%
Other	6.8%

\* Multiple responses were allowed.

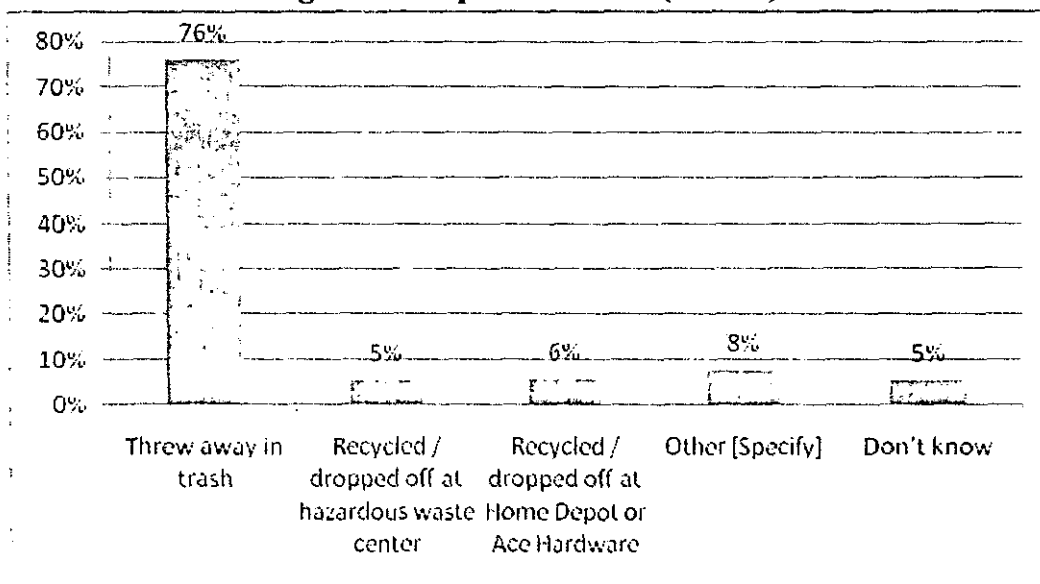
As shown in Figure 34, a high percentage of respondents (48 percent) reported that they had disposed of CFLs that were broken, burned out, or otherwise no longer useful. Respondents were then asked to describe their disposal methods. As shown in Figure 35, the majority of respondents disposed of CFLs by throwing them out with the trash. Overall, very few

respondents disposed of CFLs through environmentally-safe means. This indicates a significant opportunity for educating consumers about the proper disposal of CFLs.

**Figure 34. Percent of Respondents Who Have Disposed of CFLs (n = 309)**



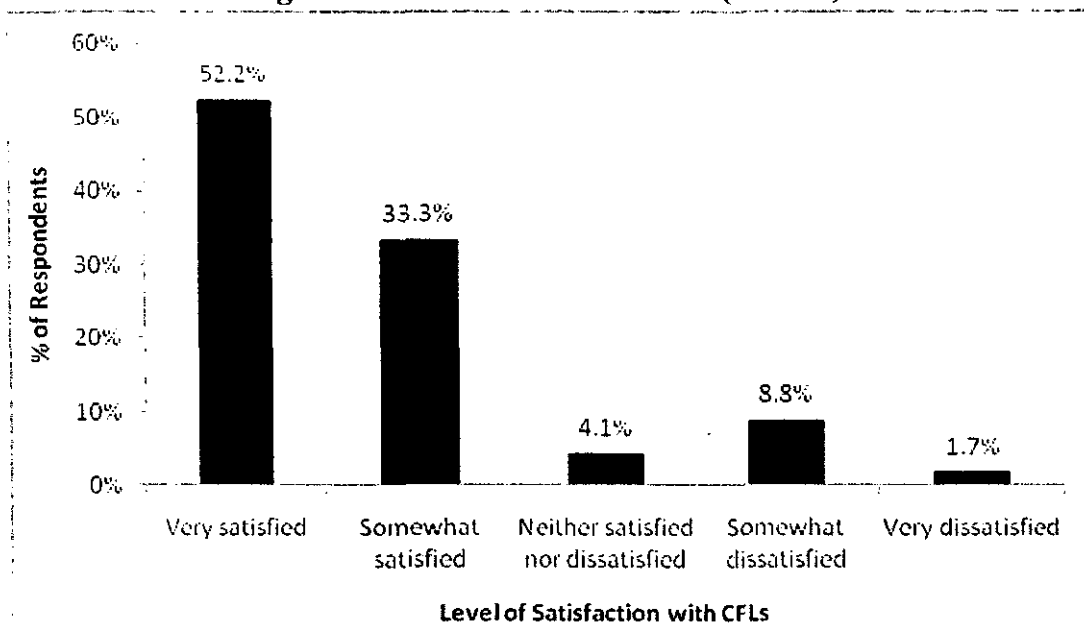
**Figure 35. Disposal Methods (n = 148)**



Ameren Missouri respondents also discussed their overall satisfaction with CFLs. Fifty-two percent of respondents reported being “*very satisfied*” with CFLs, while 1.7 percent of respondents reported being “*very dissatisfied*.” Figure 36 presents these results. Respondents who were generally dissatisfied provided additional feedback regarding their dissatisfaction. Of these 25 responses, eight indicated that they are concerned about the mercury that CFLs contain, three respondents do not like the requirements for proper CFL disposal, and three participants

discussed lack of education about CFLs. Other concerns included: price, color of light, and short bulb life.

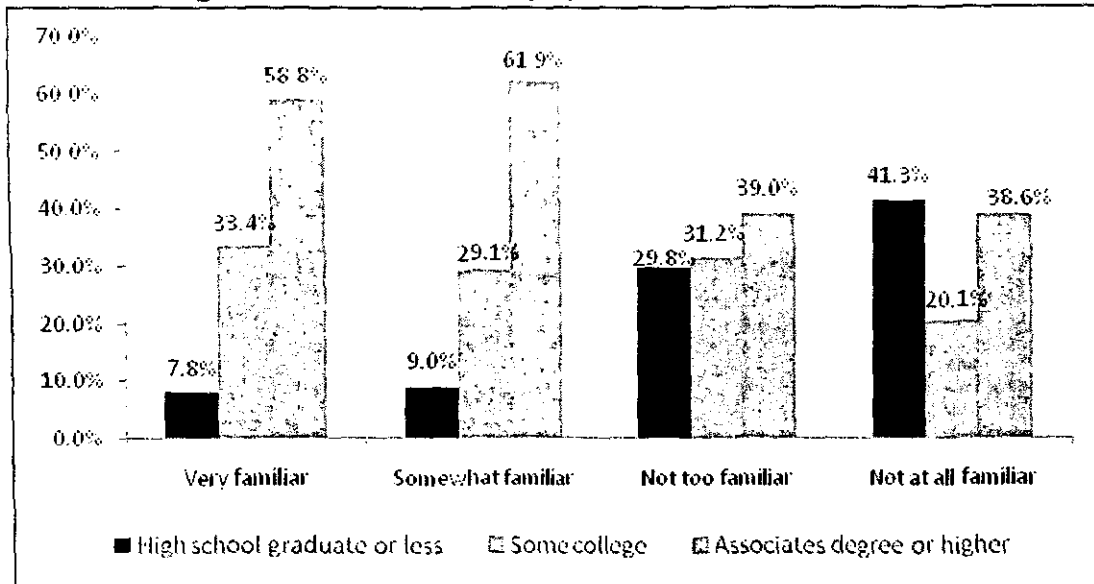
**Figure 36. Satisfaction with CFLs (n = 307)**



### CFL Awareness and Familiarity

Cadmus analyzed familiarity with CFLs based on respondents' education level, income, and ethnicity. More than half (58.8 percent) of respondents who reported that they are "very familiar" with CFLs earned at least an associate's degree, while only 7.8 percent of these respondents were a high school graduate or did not graduate high school. Overall, respondents who claimed to be "not at all familiar" with CFLs were less educated than those with some college education or an associate's degree or higher. These findings are presented in Figure 37.

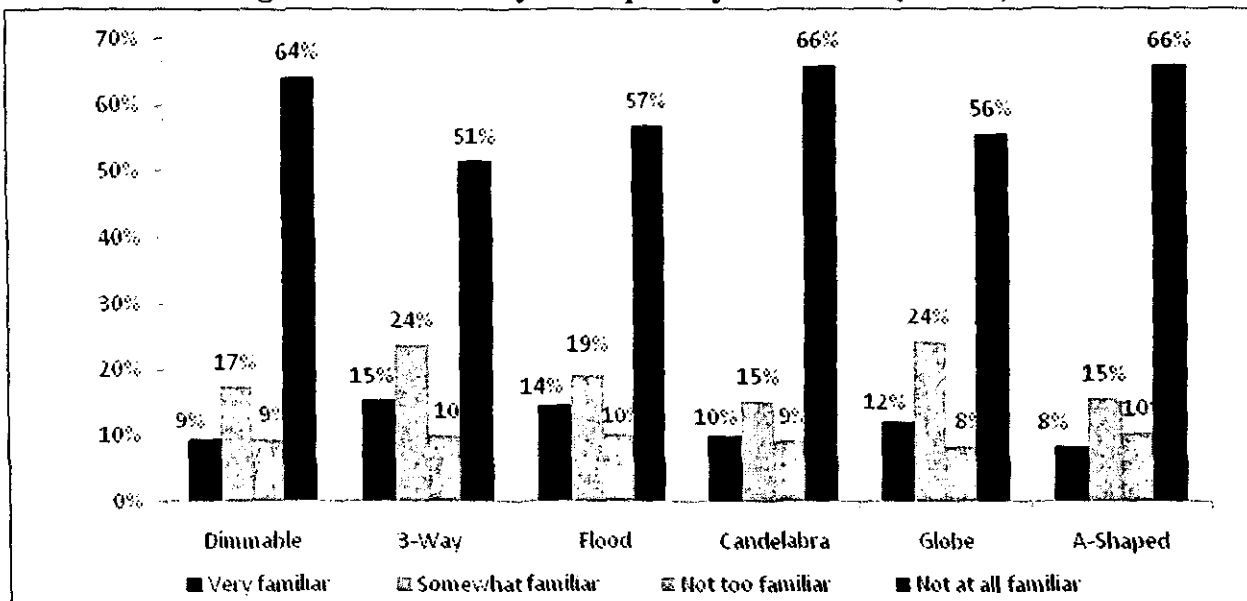
**Figure 37. CFL Familiarity by Educational Attainment\***



\* High school graduate or lower n = 36; Some college n = 95, Associates degree or higher n = 175.

We then asked participants about their familiarity with a variety of specialty CFL bulbs. Across all bulb varieties mentioned in the telephone survey, at least half of the 394 respondents were not at all familiar with specialty CFL bulbs. As presented in Figure 38, roughly 20 percent of respondents reported being at least somewhat familiar with all specialty CFL bulbs mentioned in the telephone survey except candelabra and A-shaped CFLs. The lower levels of familiarity with specialty CFL bulbs indicate that stronger marketing and customer education may be necessary to increase saturation and penetration of these bulbs.

**Figure 38. Familiarity with Specialty CFL Bulbs (n = 394)**



## CFL Usage

It is logical to find lower use of CFLs among lower income, lower educated, and minority residences. Cadmus found this to be the case when analyzing telephone survey data. The survey data show that CFL usage varied somewhat by educational attainment, ethnicity, and income.

Analysis of education distribution among respondents showed that almost two-thirds (64.4 percent) had at least some college education or a degree. Seven percent had less than a ninth grade education, and the remaining respondents had at least some high school education. Among respondents with at least an associate's degree, 84 percent have used CFLs, compared with 74 percent with some college education. Over 34 percent of respondents who are high school graduates or less have used CFLs. Table 78 presents these findings.

**Table 78. CFL Usage by Educational Attainment (n = 304)**

High School Grad or Lower	Some College	Associates Degree or Higher
34.2%	73.6%	84.4%

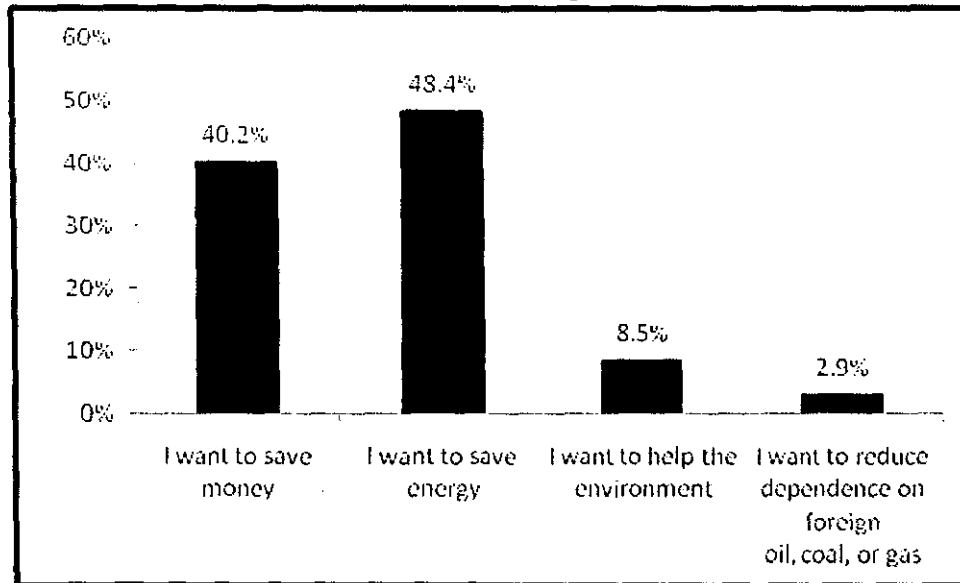
Ethnicity also seems to be a contributing factor to CFL usage. Table 79 shows that among respondents, 80 percent of Caucasians and 61 percent of black people reported using CFLs. Of those respondents who described themselves as "other" ethnicity, 64.5 percent reported having used CFLs in the interior or exterior of their home.

**Table 79. CFL Usage by Ethnicity\***

White	Black	Other Ethnicity
80.3%	61%	64.5%

\* White n = 336, Black n = 45, Other n = 15.

Telephone survey respondents also discussed why they are currently using CFLs. Around half (48 percent) indicated that they installed CFLs to save energy. Another 40 percent installed CFLs to save money. Only a handful of participants reported that they installed CFLs to either help the environment or reduce dependence on foreign fossil fuel sources. These findings are presented in Figure 39.

**Figure 39. Reasons for Using CFLs (n = 295)**

## CFL Purchases

Telephone survey participants were asked to identify the types of stores where they typically purchase CFL bulbs. These participants most often cited mass merchandise stores, such as Wal-Mart or Target. The second most cited store type was home improvement stores such as Home Depot or Lowe's. Participants also discussed their proximity to large discount stores or home improvement stores. Most participants (93.4 percent) live within 30 minutes from the nearest store. Specifically, more than half (64.6 percent) are within a 14-minute drive to the nearest store.

Survey respondents discussed how they first heard about CFLs. Survey administrators did not prompt respondents; therefore, respondents discussed multiple ways that they first heard about CFLs. Forty-one percent of respondents cited traditional media marketing such as television, radio, newspaper, and magazine advertisements. Roughly 17 percent of respondents also heard about CFLs through retail store displays or advertisements. Respondents also discussed a variety of other ways they heard about CFLs that were not included in the telephone survey. These responses included internet research or indirect marketing by associates at lighting or home improvement stores.

To conclude the CFL purchases section of the survey, respondents discussed their bulb storage habits and their bulb removal habits. Three-fourths of respondents indicated that they typically keep a supply of bulbs in storage. The remaining respondents typically purchase bulbs as needed when installed bulbs burn out.

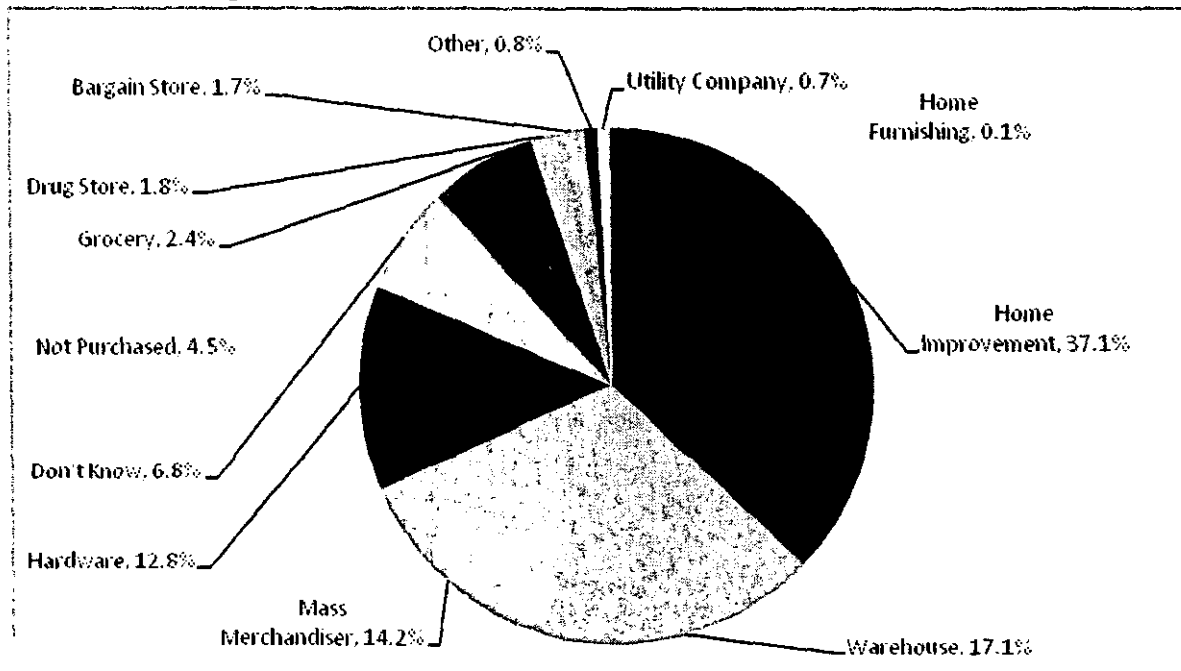
## Appendix B. Site Visits

This section describes information collected from 87 Ameren Missouri customers during site visits occurring during the summer of 2010. Site visits were performed by a combination of Cadmus and Mad Dash, Inc.

### Where Purchased

Site inspectors asked for each CFL found in a home, where that particular bulb was purchased (Figure 40). Home improvement stores (such as Lowe's or Home Depot) and warehouse stores (such as Sam's Club or Costco) were the most common, followed by mass merchandise stores (such as Target or Wal-Mart) and hardware stores (such as ACE Hardware). Most respondents had little difficulty telling inspectors where specific bulbs were purchased since they commonly shopped at the same store, however 6.8 percent didn't know and 4.5 percent had bulbs given to them.

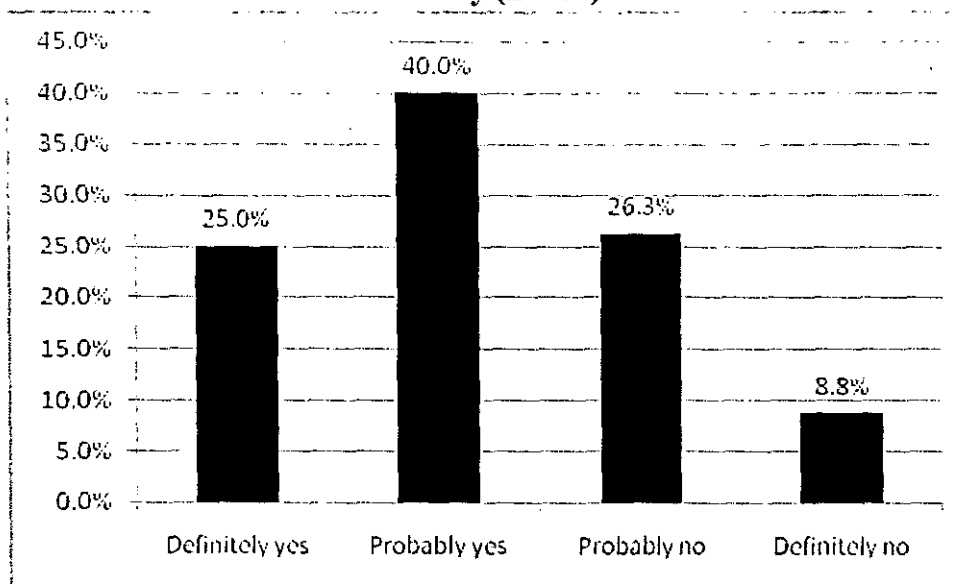
**Figure 40. Stores Where Each CFL Found Was Purchased**



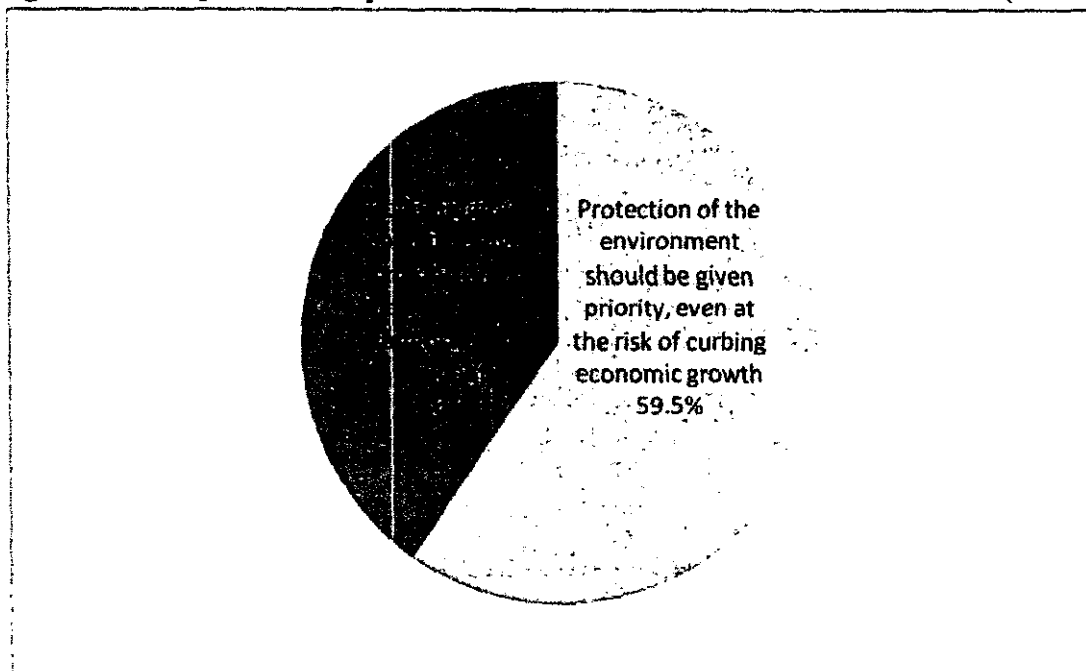
### Environmental and Early Adopter Tendencies

Participants were asked their opinions on several environmental questions. A majority of respondents (65 percent) stated that they believe the earth's average temperature is rising most likely due to human activity (Figure 41). Sixty percent also thought that "*protection of the environment should be given priority, even at the risk of curbing economic growth*" (Figure 42).

**Figure 41. Opinion on Whether the Earth’s Average Temperature Is Rising Due to Human Activity (n = 80)**



**Figure 42. Respondents’ Opinions on Economic Growth vs. Environment (n = 79)**



When asked about comfort with new technologies, over two-thirds of all respondents (71.8 percent) agreed “*I am skeptical of new technology. I like to wait until a new technology is proven before I buy it.*” Twenty-seven percent, however, agreed with the statement “*I always like to have the latest gadget.*” Eighty-seven percent agreed “*I am comfortable learning about how new technologies work*” (Table 80). Thus, while there was healthy skepticism about new



technologies, the majority are comfortable learning about new technologies—a positive response when trying to get households to adopt new, energy-efficient technologies.

**Table 80. Level to Which Respondents Are Comfortable with New Technology**

Level of Agreement	I am skeptical of new technology. I like to wait until a new technology is proven before I buy it	I always like to have the latest gadget	I am comfortable learning about how new technologies work
Strongly Agree	15.3%	2.4%	25.9%
Agree	56.5%	24.7%	61.2%
Disagree	18.8%	61.2%	10.6%
Strongly Disagree	9.4%	11.8%	2.4%
<b>Total Respondents</b>	<b>85</b>	<b>85</b>	<b>85</b>

## Inventory Results

While the most common type of room in homes were bedrooms (2.8 on average), basements, followed by outdoor spaces, had the most sockets per room (10.8 and 8.1, on average). Table 81 shows the average number of rooms in Ameren Missouri customer homes and the average number of sockets per room.

**Table 81. Number of Rooms and Sockets in a Typical Home (Total Homes Visited n = 87, Total Number of Sockets n = 6,049)**

Room Type	Average Number of Rooms with Sockets per Home*	Average Sockets per Room
Bedroom	2.8	3.9
Bathroom	2.2	4.1
Living Space	1.3	7.0
Closet	1.3	1.5
Kitchen	1.1	6.9
Hallway	1.1	2.5
Outdoor	0.9	8.1
Basement	0.6	10.8
Utility	0.6	2.5
Dining	0.6	6.6
Office/Den	0.6	5.3
Garage	0.5	6.0
Other	0.4	2.5
Foyer	0.4	4.6
<b>Total</b>	<b>14.3</b>	<b>4.9</b>

\* Any room with sockets was included in that particular category. If there were no sockets, such as a closet without a light, the room was not recorded.

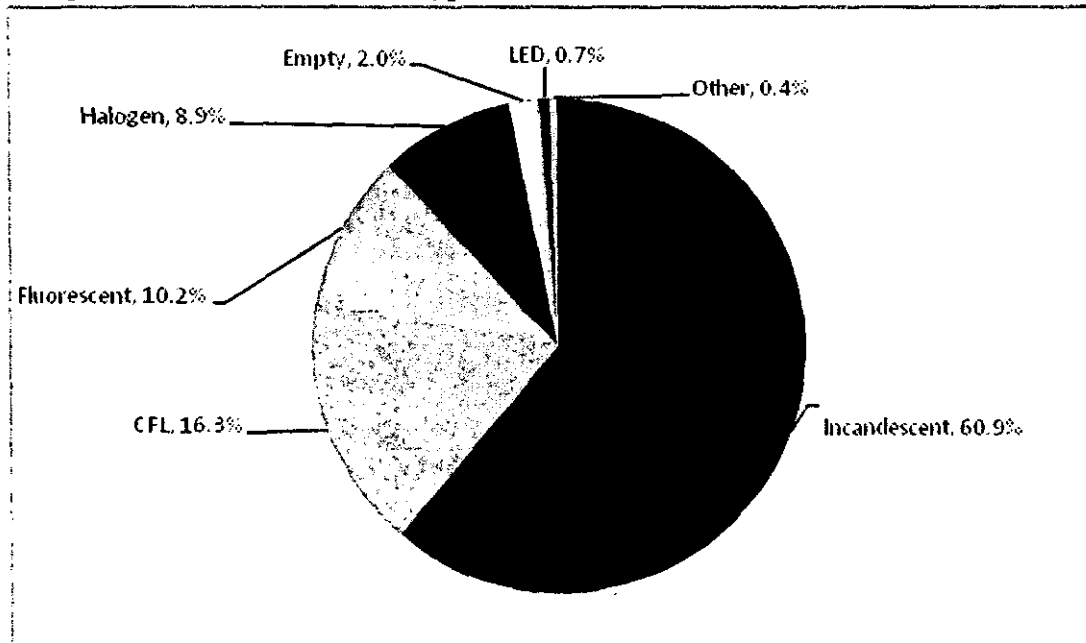
The on-site survey identified 6,049 sockets.<sup>23</sup> As shown in Table 82, the majority of these sockets (76.2 percent) were medium screw-based, followed by pin-based sockets, and then small screw-based sockets. Of all sockets catalogued, 16.3 percent had CFLs installed in them. The majority of installed CFLs were medium, screw-based. Two percent of all sockets did not have a bulb installed. Figure 43 shows the saturation for each bulb type. At 60.9 percent, incandescent bulbs made up the largest percentage, followed by CFLs at 16.3 percent, and fluorescent bulbs at 10.2 percent. There were 220 CFLs found in storage, yielding an average of 2.5 uninstalled CFLs per home.

**Table 82. Bulbs per Socket Type**

Socket Type	Total		CFLs		Empty Sockets	
	#	%	#	%	#	%
Medium Screw Base	4,612	76.2%	958	20.8%	115	2.5%
Pin Base	903	14.9%	0	0%	0	0%
Small Screw Base	480	7.9%	25	5.2%	4	0.8%
Other*	54	0.9%	4	7.4%	0	0.0%
<b>Total Sockets</b>	<b>6,049</b>	<b>100.0%</b>	<b>988</b>	<b>16.3%</b>	<b>119</b>	<b>2%</b>

\*Other includes GU-based bulbs.

**Figure 43. Percent of Bulb Type (Site Visits n = 87, Total Sockets n = 6,049)**

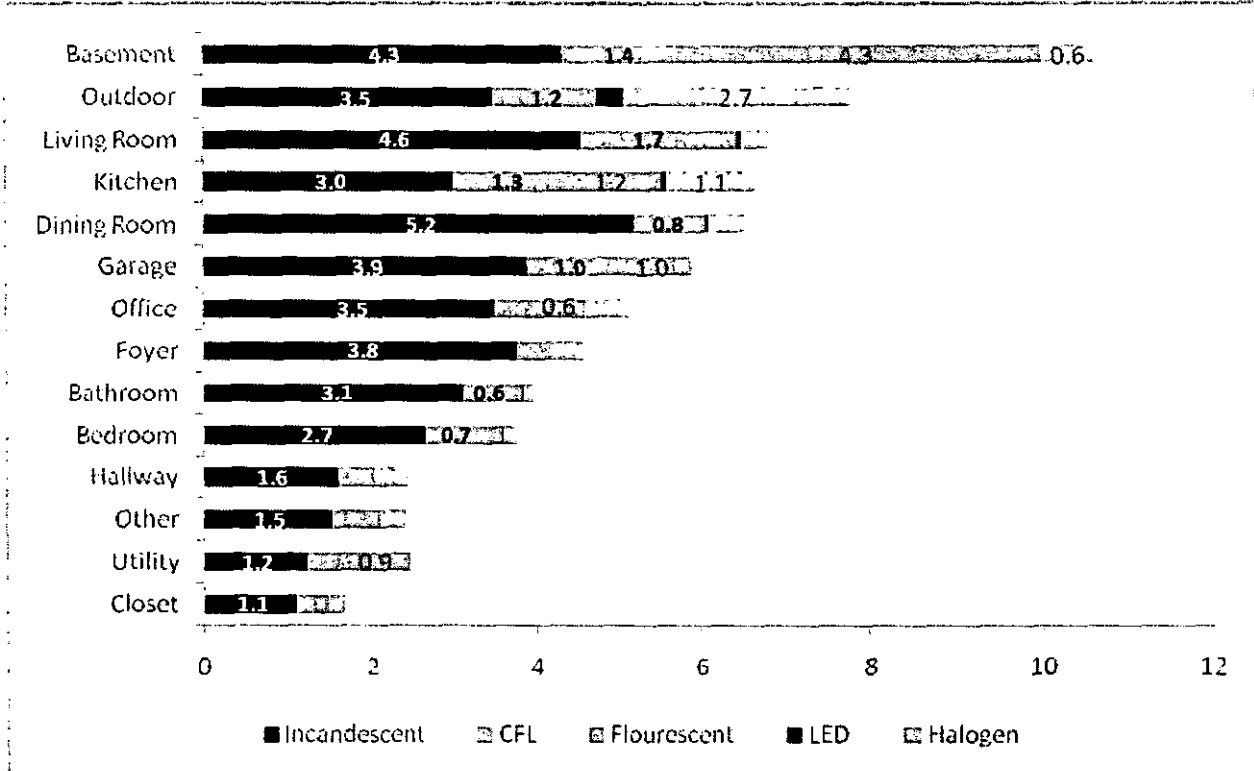


Among room types, basements had the greatest average number of installed bulbs, followed by outdoor areas, and then living rooms. Dining rooms had the highest average number of incandescent bulbs (5.2), followed by living rooms (4.6).

<sup>23</sup> This included empty sockets and sockets that had an installed, burnt out bulb.

Living rooms had the highest average number of CFLs (1.7), followed by basements (1.4), and then kitchens (1.3). While LEDs and halogens were not as common, on average 0.3 LEDs were installed in outdoor areas, 2.7 halogens were found outdoors, and 1.1 halogens were found in kitchens (Figure 44).

**Figure 44. Average Number of Bulbs per Room Type (Total Installed Bulbs n = 5,931)**



Of 1,208 CFLs on-site, 41.3 percent were reportedly purchased before 2009; 35.5 percent were purchased in 2009; and 16.5 percent were purchased during the first seven months of 2010 (Table 83).

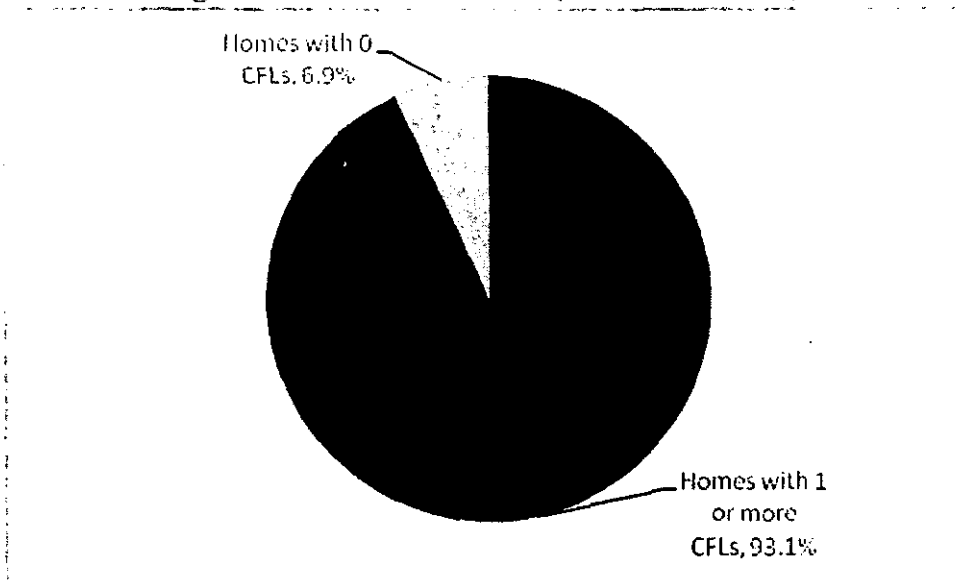
**Table 83. CFLs by Purchase Date**

Purchased	Before 2009	First Half of 2009	Second Half of 2009	2010*	Don't Know
Total CFLs Purchased (1,208)	41.3%	16.1%	19.4%	16.5%	6.7%
Average CFLs Purchased per Home	5.73	2.23	2.70	2.29	0.93

\* Site visits occurred in July and August 2010; this category only represents purchases through the beginning of August 2010.

CFL penetration was 93.1 percent (Figure 45).

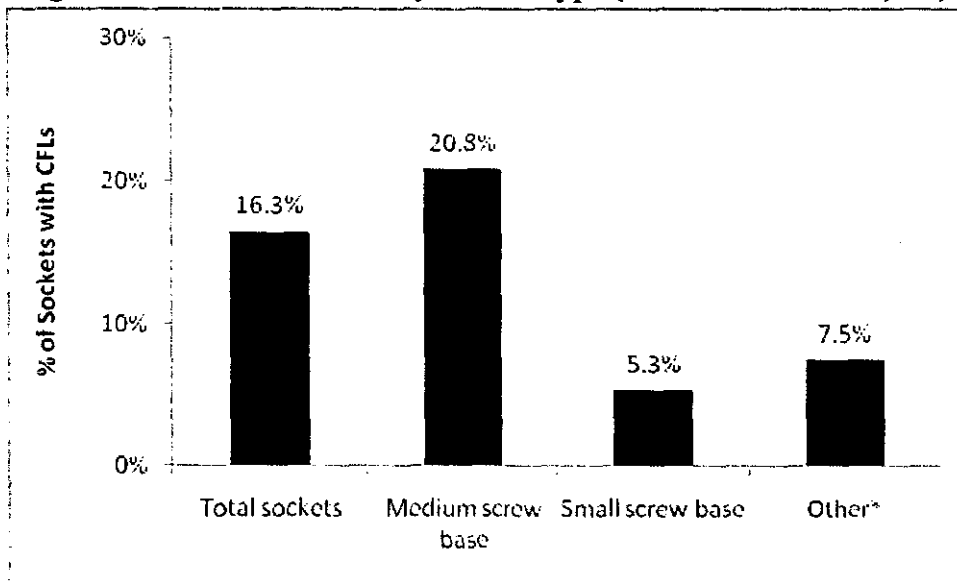
**Figure 45. CFL Penetration (Site Visits n = 87)**



The following figures display CFL saturation from several different approaches. Figure 46 shows CFL saturation by socket type. Among all sockets, CFL saturation was 16.3 percent. Among all medium, screw-based sockets, CFL saturation increased to 20.8 percent and dropped to 5.3 percent for small screw-based sockets. Although saturation among small screw-based sockets was lower than for medium screw-based sockets, the number of sockets without CFLs was highest among medium, screw-based sockets, as these were the majority of sockets found on-site.

Of 87 site visits and 5,931 total bulbs, 45 of them were installed LEDs. The installation rate among all CFLs purchased and on-site was 82 percent.

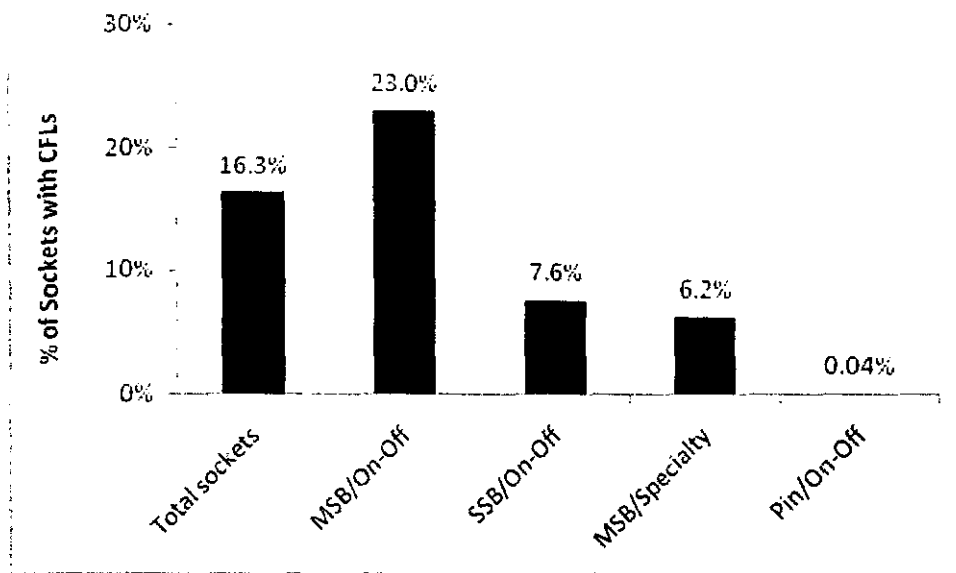
**Figure 46. CFL Saturation by Socket Type (Total Sockets n = 6,049)**



\* Other includes the pin-based GU bulbs.

The graph below adds another layer of data, showing CFL saturation by base and control types. Saturation was 23 percent for medium, screw-based sockets with an on/off control type.

**Figure 47. CFL Saturation by Socket/Control Type (Total Sockets n = 6,049)**



As shown in Figure 48, CFL saturation by room type was greatest in living spaces and bedrooms (24 percent and 19 percent), followed by kitchens (18 percent) and garages (17 percent). Figure 49 shows that among fixture types, CFL saturation was highest for lamps (both table lamps and floor lamps at 32.6 percent), followed by torchieres (18.3 percent) and ceiling fans (17.7 percent). As these results indicate, residents have the highest percentage of CFLs in their highest use areas.

## Appendix C. Store Intercepts – Detailed Results

CFL intercept surveys, while useful and valuable in identifying factors that influence purchasing decisions, do have some potential drawbacks. First, customers are not randomly selected, so we are not able to ensure accuracy at the planned 90 percent confidence level with 15 percent precision. Also, retail stores are reticent to allow intercepts, as many stores prohibit outside solicitation of their customers. After several requests, the evaluation team was allowed to conduct intercepts in many stores, but only in conjunction with Ameren Missouri program in-store demonstration events (see Table 84), which were marketing and education events that APT had already planned. Ideally, the intercepts would be conducted independently of these events, so that customer purchasing decisions would not be influenced. Cadmus staff interviewed customers in the lighting aisle in most cases, when allowed by store management; however, sometimes we were only allowed to talk to customers at the demonstration table.

In addition to providing an estimate of overall program leakage, the research provides guidance on where program bulb leakage is the most problematic so that Ameren Missouri can assess the need to revise its list of program partners.

Overall, the majority of survey respondents did not have prior knowledge of Ameren Missouri's CFL program. The eight percent (48 respondents) who did have prior knowledge of the program included 47 Ameren Missouri customers and one customer from Kansas City Power & Light (shown in Table 84). These customers purchased 10.5 percent of weighted program CFLs.

**Table 84. Customer Awareness of Ameren Missouri CFL Program (n = 611)**

Actual Purchases	Customers	Percent of Total Customers
Customers Aware of Program	48	8%
Customers Not Aware of Program	563	92%
<b>Total</b>	<b>611</b>	<b>100%</b>

This CFL-based store leakage analysis identified four Home Depot stores as potentially vulnerable to leakage that were initially categorized as non-vulnerable. These four stores (shown in Table 85) have high CFL-based leakage, and Cadmus recommends that Ameren Missouri carefully assess continuing the program in these stores.

**Table 85. Potentially Vulnerable Stores Initially Categorized as Non-Vulnerable (n = 4)**

Store Name	Store City	Percent of Non-Ameren Missouri Customers Purchasing Program CFLs	Percent of Program CFLs Sold to Non-Ameren Missouri Customers (weighted)
Home Depot	O'Fallon	8%	8%
	Wentzville	37%	29%
	Festus	17%	14%
	St. Charles	21%	27%

As mentioned in the assumptions, rural stores are expected to be more susceptible to program CFL leakage than urban stores because they serve a larger geographic area. Table 86 shows that

non-Ameren Missouri customers purchased roughly 40.3 percent of program CFLs in rural store locations. In urban store locations, non-Ameren Missouri customers purchased 3.4 percent of program CFLs. These findings are consistent with our assumptions regarding rural and urban store locations. Table 86 shows the weighted number of bulbs purchased in rural and urban stores and illustrates the resulting leakage rate, defined as 1 minus the percentage of bulbs purchased by Ameren Missouri Customers.

**Table 86. Weighted Program CFL Leakage by Rural and Urban Store Locations**

Program CFL Purchase Designations	Weighted Total Program CFLs Sold By:	
	Rural	Urban
Program Bulbs Purchased by Ameren Missouri Customers	187.30	1,204.54
Total Program Bulbs Purchased	313.66	1,246.32
Leakage	40.30%	3.40%

Program CFL leakage was very high at stores initially categorized as vulnerable (Table 87). On a weighted-bulb basis, non-Ameren Missouri customers purchased 9.41 percent of program CFLs. As described in the sample plan for customer intercepts, Cadmus analysts identified vulnerable stores based on their proximity to other utility service territories and based on non-Ameren Missouri meters (households) as a percentage of total meters in the same zip code as the store.

**Table 87. Weighted Program CFL Leakage by Vulnerable and Non-Vulnerable Store Locations**

Program CFL Purchase Designations	Weighted Total Program CFLs Sold By:	
	Vulnerable	Non-Vulnerable
Program Bulbs Purchased by Ameren Missouri Customers	443.824	563.90
Total Program Bulbs Purchased	489.92	613.72
Leakage	9.41%	8.12%

As discussed in the leakage assumptions, program bulb leakage may be higher in stores where implementer demonstrations occur because implementers actively promote and otherwise draw customer attention to the program bulbs on sale. Table 88 shows that demonstration stores sold 9.13 percent of program CFLs to non-Ameren customers. Non-demonstration stores sold significantly fewer program CFLs (5.12 percent) to non-Ameren customers.

**Table 88. Weighted Program CFL Leakage by Demonstration and Non-Demonstration Store Locations**

Program CFL Purchase Designations	Weighted Total Program CFLs Sold By:	
	Demo Store	Non-Demo Store
Program Bulbs Purchased by Ameren Missouri Customers	865.40	103.95
Total Program Bulbs Purchased	994.47	109.55
Leakage	9.13%	5.12%

This research demonstrates that overall, program CFL leakage is the highest in rural stores that hosted demonstrations and that were initially categorized as vulnerable. This research also identified four Home Depot stores that were initially categorized as non-vulnerable. Cadmus

recommends that Ameren Missouri carefully consider the advantages and disadvantages of continuing the program in high leakage stores. Discontinuing the program at highly vulnerable stores may stem leakage, but may also reduce overall purchases of program CFLs as well as reduce the store diversity across the service territory.

Table 89 summarizes completed intercept surveys by store, location, distribution channel, whether an Ameren Missouri demonstration occurred in conjunction with the intercepts, and by the leakage risk of that particular store. Even though the team reached our targets for the overall distribution channel for warehouses and mass merchandise stores, we were unable to reach 30 people in four of the stores, and added four additional stores to the original 20.



Table 89. Completed Stores (n = 24)

Store Name	Location	Distribution Channel	Leakage Risk	General Location	Dates	Demo Store	Completed Surveys
Ace Hardware	Chesterfield	Hardware	Non-Vulnerable	Urban	12/11/2010	Y	30
Dierberg's	St. Louis - Watson	Grocery	Vulnerable	Urban	1/28/2011 - 1/30/2011	Y	45
	St. Louis - Tesson Ferry	Grocery	Vulnerable	Urban	1/28/2011 - 1/30/2011	Y	45
Dollar Tree	Overland	Bargain	Vulnerable	Urban	11/14/2010; 11/15/2010	N	16
Family Dollar	St. Louis - MacCausland	Bargain	Vulnerable	Urban	11/11/2010; 11/12/2010	N	5
	St. Louis - Natural Bridge	Bargain	Vulnerable	Urban	11/12/2010; 11/15/2010	N	16
	St. Louis - Wells	Bargain	Vulnerable	Urban	11/11/2010	N	2
Home Depot	Festus	Home Improvement	Non-Vulnerable	Urban	12/12/2010	N	18
	O'Fallon	Home Improvement	Non-Vulnerable	Urban	12/4/2010	Y	30
	Overland	Home Improvement	Vulnerable	Urban	12/12/2010	N	12
	St. Charles	Home Improvement	Non-Vulnerable	Urban	12/11/2010	Y	30
	St. Louis - Brentwood	Home Improvement	Vulnerable	Urban	11/13/2010	Y	30
	St. Louis - S. Kingshighway	Home Improvement	Non-Vulnerable	Urban	11/21/2010	Y	30
	St. Louis - Sunset Hills	Home Improvement	Vulnerable	Urban	11/20/2010	Y	30
	Wentzville	Home Improvement	Non-Vulnerable	Urban	11/21/2010	Y	27
Sam's Club	St. Louis - Lemay Ferry	Warehouse	Vulnerable	Urban	1/29/2011	Y	24
Schnuck's	Florissant	Grocery	Non-Vulnerable	Urban	1/21/2011	Y	29
	St. Louis - Butler Hill	Grocery	Vulnerable	Urban	1/21/2011	Y	30
	St. Louis - Big Bend	Grocery	Vulnerable	Urban	1/29/2011	Y	31
Wal-Mart	Boonville	Mass Merch/ Discount	Vulnerable	Rural	11/20/2010	Y	23
	Desloge	Mass Merch/ Discount	Non-Vulnerable	Urban	11/14/2010	Y	18
	Maplewood	Mass Merch/ Discount	Vulnerable	Urban	12/4/2010	Y	30
	Moberly	Mass Merch/ Discount	Vulnerable	Rural	11/13/2010	Y	30
	Kirksville	Mass Merch/ Discount	Vulnerable	Rural	1/15/2011	Y	30
<b>Total Survey Participants</b>							<b>611</b>

Table 90 provides the leakage risk for the stores where we completed intercepts. Two-thirds (67%) of the stores were considered vulnerable to leakage.

**Table 90. Stores Completed by Leakage Risk (n = 24)**

Leakage Risk	Non-Vulnerable	Vulnerable	Total Stores
Stores	8	16	24
Distribution	33.3%	66.67%	100%

Table 91 provides the distribution of stores by general location.

**Table 91. Stores Completed by General Location (n = 24)**

General Location	Rural	Urban	Total Stores
Stores	3	21	24
Distribution	12.5%	87.5%	100%

Table 92 shows the breakdown of customers and program bulb sales by store and location. The Wal-Mart stores in Kirksville and Moberly and the Home Depot in Wentzville had the highest frequencies of non-Ameren Missouri customers purchasing program CFLs. We initially categorized these two Wal-Mart stores as high-risk or vulnerable to CFL leakage; however, we categorized the Home Depot in Wentzville as non-vulnerable. Many stores, such as the Ace Hardware in Chesterfield and the Home Depot in St. Louis – Brentwood, only sold program CFLs to Ameren Missouri customers. The last column of Table 92 shows the distribution of non-Ameren Missouri customers by store. These percentages represent customer-based leakage and provide guidance on each stores’ degree of vulnerability. On average, 8.6 percent of all customers who purchased program CFLs are non-Ameren Missouri customers.

**Table 92. Customers Purchasing Program CFLs by Store**

Store Name	Store City	Customers Purchasing Program CFLs			
		Program CFL Customers	Ameren Missouri Customers	Non-Ameren Missouri Customers	Percent of Non-Ameren Missouri Customers by Store
Ace Hardware	Chesterfield	25	25	0	0%
Dierberg's	St. Louis - Watson	16	16	0	0%
	St. Louis - Tesson	5	5	0	0%
Dollar Tree Store	Overland	8	8	0	0%
Family Dollar Store	St. Louis - McCausland	3	3	0	0%
	St. Louis - Wells	1	1	0	0%
	St. Louis - Natural Bridge	9	9	0	0%
Home Depot	O'Fallon	13	12	1	8%
	St. Louis - S. Kingshighway	23	22	1	4%
	St. Louis - Sunset Hills	17	15	2	12%
	Wentzville	19	12	7	37%
	St. Louis - Brentwood	16	16	0	0%
	Festus	12	10	2	17%
	Overland	7	7	0	0%
St. Charles	14	11	3	21%	
Sam's Club	St. Louis - Lemay	24	22	2	8%
Schnuck's	St. Louis - Butler	2	2	0	0%
	Florissant	17	17	0	0%
	St. Louis - Big Bend	21	21	0	0%
Wal-Mart	Maplewood	13	12	1	8%
	Boonville	8	7	1	13%
	Moberly	14	9	5	36%
	Desloge	3	3	0	0%
	Kirksville	18	10	8	44%
<b>Total</b>	<b>24</b>	<b>308</b>	<b>275</b>	<b>33</b>	<b>Average 8.6%</b>

Table 93 shows actual program CFL purchases by Ameren Missouri and non-Ameren Missouri customers. Again, the last column in Table 93 shows the percentage of program CFLs sold to non-Ameren Missouri customers by store.<sup>24</sup> These percentages represent CFL-based leakage by store and provide further guidance for store vulnerability.

<sup>24</sup> We weighted these percentages by the design weights described above.

**Table 93. Program CFL Purchases by Store**

Store Name	Store City	Weighted Program CFL Purchases by			
		Weighted Program CFLs Sold	Ameren Missouri Customers	Non-Ameren Missouri Customers	Percent of Program CFLs Sold to Non-Ameren Missouri Customers (weighted)
Ace Hardware	Chesterfield	230.76	230.76	0.00	0%
Dierberg's	St. Louis - Watson	33.880768	33.880768	0.00	0%
	St. Louis - Tesson	9.53	9.53	0.00	0%
Dollar Tree Store	Overland	13.59	13.59	0.00	0%
Family Dollar Store	St. Louis - McCausland	6.18	6.18	0.00	0%
	St. Louis - Wells	2.47	2.47	0.00	0%
	St. Louis - Natural Bridge	38.29	38.29	0.00	0%
Home Depot	O'Fallon	75.11	68.97	6.13	8%
	St. Louis - S. Kingshighway	86.60	85.83	0.77	1%
	St. Louis - Sunset Hills	33.20	28.53	4.68	14%
	Wentzville	90.43	64.38	26.06	29%
	St. Louis - Brentwood	43.96	43.96	0.00	0%
	Festus	42.92	36.79	6.13	14%
	Overland	16.37	16.37	0.00	0%
	St. Charles	39.85	29.12	10.73	27%
Sam's Club	St. Louis - Lemay	133.55	125.01	8.54	6%
Schnuck's	St. Louis - Butler	5.29	5.29	0.00	0%
	Florissant	29.50	29.50	0.00	0%
	St. Louis - Big Bend	45.53	45.53	0.00	0%
Wal-Mart	Maplewood	41.23	36.38	4.85	12%
	Boonville	10.47	10.16	0.31	3%
	Moberly	24.95	15.71	9.24	37%
	Desloge	18.55	18.55	0.00	0%
	Kirkville	31.42	12.94	18.48	59%
<b>Total</b>	<b>24</b>	<b>1,103.63</b>	<b>1,007.72</b>	<b>95.91</b>	<b>Average 8.69%</b>

Further analysis reveals that on average, three rural Wal-Mart stores (Moberly, Boonville, and Kirkville) sold 40 percent of their program CFLs to 14 non-Ameren Missouri customers. The Kirkville Wal-Mart appears to be a particularly high-risk rural store, and sold the most program CFLs to non-Ameren Missouri customers<sup>25</sup> (shown in Table 94). The Boonville store, however, had a leakage rate of only 3 percent. Table 94 also presents customer utilities as reported at the time of the intercept surveys. Four customers from the Wal-Mart in Kirkville reported Tricounty Electric Cooperative as their electricity provider. Another customer did not provide his utility to the researcher, but did indicate that he is from Iowa. Kirkville is approximately 48 miles from

<sup>25</sup> We weighted these program CFLs by the design weights described above.

the city of Bloomfield, Iowa, and roughly 30 miles from the border. Given Kirksville's proximity to Iowa, it is probable that this Wal-Mart regularly attracts customers from Iowa.

**Table 94. Rural Store Locations – Non-Ameren Customers and Weighted Program CFL Sales**

Store Name	Store City	Weighted Program CFLs Sold to Non-Ameren Customers	Non-Ameren Missouri Customers	Customer Reported Utilities
Wal-Mart	Moberly	9.24	5	<ul style="list-style-type: none"> <li>• Howard Electric</li> <li>• Kansas City Power &amp; Light</li> <li>• Rural Electric Cooperative</li> <li>• TXU Electric*</li> </ul>
	Boonville	.31	1	<ul style="list-style-type: none"> <li>• Kansas City Power &amp; Light</li> </ul>
	Kirksville	18.48	8	<ul style="list-style-type: none"> <li>• City of Unionville</li> <li>• Anonymous Iowa utility</li> <li>• North Central Rural Electric</li> <li>• Tricounty Electric Cooperative</li> </ul>
<b>Total</b>		<b>28.03</b>	<b>14</b>	-

\* TXU Electric is a utility based in Texas. This customer does not live in Missouri.

Nineteen non-Ameren Missouri customers purchased 89.21 of the leaked program CFLs from vulnerable store locations. These stores and locations are presented in Table 95. The Wal-Mart in Kirksville sold the most Program CFLs to non-Ameren Missouri customers of all vulnerable store locations. As discussed above, the remote and rural location of this particular Wal-Mart makes it highly susceptible to Program bulb leakage.

**Table 95. Vulnerable Store Locations – Non-Ameren Customers and Weighted Program CFL Sales**

Store Name	Store City	Weighted Program CFLs Sold to Non-Ameren Customers	Non-Ameren Missouri Customers	Customer Reported Utilities
Wal-Mart	Moberly	9.24	5	<ul style="list-style-type: none"> <li>• Howard Electric</li> <li>• Kansas City Power &amp; Light</li> <li>• Rural Electric Cooperative</li> <li>• TXU Electric*</li> </ul>
	Boonville	.31	1	<ul style="list-style-type: none"> <li>• Kansas City Power &amp; Light</li> </ul>
	Kirksville	18.48	8	<ul style="list-style-type: none"> <li>• City of Unionville</li> <li>• Anonymous Iowa Utility</li> <li>• North Central Rural Electric</li> <li>• Tricounty Electric Cooperative</li> </ul>
	Maplewood	4.85	1	<ul style="list-style-type: none"> <li>• Ameren Illinois</li> </ul>
Home Depot	St. Louis – Sunset Hills	4.68	2	<ul style="list-style-type: none"> <li>• Ameren Illinois</li> <li>• Kirkwood Electric</li> </ul>
Sam's Club	St. Louis – Lemay Ferry	8.85	2	<ul style="list-style-type: none"> <li>• Crawford County Cooperative</li> <li>• Sullivan Municipal Utilities</li> </ul>
<b>Totals</b>		<b>46.10</b>	<b>19</b>	

\* TXU Electric is a utility based in Texas. This customer does not live in Missouri.

Thirty-one non-Ameren Missouri customers purchased 89.79 program CFLs in ten stores where a program demonstration took place. The Wal-Mart stores in Kirksville and Moberly sold the most program CFLs to non-Ameren Missouri customers. The Home Depot in Wentzville also greatly contributed to program bulb leakage, as seven non-Ameren Missouri customers purchased 26.06 program CFLs. All seven of these customers reported that their utility is Cuivre River Electric Cooperative. Table 96 presents these findings.

**Table 96. Program Demonstration Store Locations – Non-Ameren Customers and Weighted Program CFL Sales**

Store Name	Store City	Weighted Program CFLs Sold to Non-Ameren Customers	Non-Ameren Missouri Customers	Customer Reported Utilities
Wal-Mart	Moberly	9.24	5	<ul style="list-style-type: none"> <li>• Howard Electric</li> <li>• Kansas City Power &amp; Light</li> <li>• Rural Electric Cooperative</li> <li>• TXU Electric*</li> </ul>
	Boonville	.31	1	<ul style="list-style-type: none"> <li>• Kansas City Power &amp; Light</li> </ul>
	Kirksville	18.48	8	<ul style="list-style-type: none"> <li>• City of Unionville</li> <li>• Anonymous Iowa Utility</li> <li>• North Central Rural Electric</li> <li>• Tricounty Electric Cooperative</li> </ul>
	Maplewood	4.85	1	<ul style="list-style-type: none"> <li>• Ameren Illinois</li> </ul>
Home Depot	St. Louis – Sunset Hills	4.68	2	<ul style="list-style-type: none"> <li>• Ameren Illinois</li> <li>• Kirkwood Electric</li> </ul>
	O'Fallon	6.13	1	<ul style="list-style-type: none"> <li>• Cuivre River Electric Cooperative</li> </ul>
	St. Charles	10.73	3	<ul style="list-style-type: none"> <li>• Cuivre River Electric Cooperative</li> </ul>
	St. Louis – S. Kingshighway	0.77	1	<ul style="list-style-type: none"> <li>• Duke Power</li> </ul>
	Wentzville	26.06	7	<ul style="list-style-type: none"> <li>• Cuivre River Electric Cooperative</li> </ul>
Sam's Club	St. Louis – Lemay Ferry	8.54	2	<ul style="list-style-type: none"> <li>• Crawford County Cooperative</li> <li>• Sullivan Municipal Utilities</li> </ul>
<b>Total</b>		<b>89.79</b>	<b>31</b>	-

\* TXU Electric is a utility based in Texas. This customer does not live in Missouri.

## Appendix D. Metering Data Preparation

### Logger Data Preparation

Cadmus analysts performed spreadsheet analysis, site documentation review, and SAS analysis to perform quality control on the data. Specific tasks are noted as follows:

- Cadmus reviewed *insitu* removal notes which identified loggers with potentially bad or questionable data. In some cases, analysts easily determined which loggers should be excluded from the HOU analysis based on field notes or a data review.
- We reviewed all raw logger data in Microsoft Excel<sup>®</sup> and then imported the data into SAS. Analysts reviewed counts of all events per logger. Loggers with very low or very high counts were carefully reviewed, as the former could indicate improper launching of the logger and the latter could indicate flickering problems.
- Cadmus carefully reviewed loggers that were flagged as questionable by removal technicians (e.g., participant removed, logger fell off fixture, poor installation) to ensure that the data represented *in situ* observations. Poor or improper logger installation did not always result in bad data, and therefore some data were included in the analysis even though the installation job may have been less than ideal.
- We reviewed logger data to identify extreme usage or non-usage, as well as usage that did not seem likely based on room type. For example, if a logger indicated a CFL fixture perpetually remained on throughout the metering period, analysts flagged the logger and contacted the homeowner to determine the data's accuracy.
- As a general quality control check, Cadmus removed data points that occur before the install date/time or after the removal date/time. This check prevents the analysis from including events that occurred prior to installation in the event that a technician did not reset the logger at the time of installation. This check also prevents the analysis from including events that occurred after the removal date in the event that logger data were downloaded on a different day than the removal date.
- Cadmus formatted time stamps on data points to show exact hours, minutes, and seconds of an event. This enabled analysts to obtain precise HOU estimates.
- Light flicker, which results from damaged bulbs, electrical work in need of repair, or ambient light such as that from televisions, computer monitors, sunlight, or passing car lights can be problematic when metering CFLs. Cadmus wrote the SAS program to eliminate on/off events that were less than three seconds apart. Once a light is switched on or off, it takes approximately three seconds for the logger to change its event status. Events recorded as less than three seconds apart were likely due to a flickering bulb. We deleted all records with repeated on/off events of less than three seconds from the analysis.<sup>26</sup>

---

<sup>26</sup> Note that the removal of records representing flicker had an insignificant impact on the HOU estimate.



- The SAS program includes a check to ensure that the total daily HOU do not exceed 24 hours. This checks the calculations and date formats in the SAS program.
- Cadmus converted all time 'on' data to seconds.
- We reduced the bulbs per fixture, a key element of the weighting scheme discussed below, using mean reversion, from five bulbs to two bulbs for one light logger. This logger was installed in the basement, and was left on 24 hours a day, 7 days a week.

Examples of light logger data are presented in Table 97.

**Table 97. Logger Data Example**

Cadmus ID	Logger Serial Number	Date	Time	Status	Status Code
145ACFA	LC09050020	6/11/2010	11:33:27	Was OFF	0
145ACFA	LC09050020	6/11/2010	19:13:49	Turned ON	1
145ACFA	LC09050020	6/11/2010	19:55:09	Turned OFF	0

Analysts identified 29 of the total 180 installed light loggers as having potentially bad data. After further review of data from these loggers and notes provided by removal technicians, analysts determined that 16 of these loggers should be removed from the analysis. Table 98 shows loggers installed by room, loggers removed, and the final quantity of loggers used in the HOU analysis. In most cases, participant removal and interference was the main reason for excluding loggers from the analysis. Logger installation error was more problematic for outdoor fixtures. Even when using a fiber-optic eye to control for exterior ambient light (i.e., sunlight), installation technicians did not always adequately angle the eyes to reduce exposure to sunlight. Table 99 shows loggers excluded by room and the reason for exclusion. Even after removing 16 loggers from the analysis, all 44 participating households remained in the final data set for the analysis.

**Table 98. Loggers Installed By Room Type (n = 180)**

Room Type	Loggers Installed	Loggers Removed	Final Logger Quantity for HOU Analysis
Basement	12	0	12
Bathroom	14	2	12
Bedroom	40	1	39
Closet	6	1	5
Dining	4	0	4
Foyer	5	1	4
Garage	5	0	5
Hallway	5	0	5
Kitchen	21	1	20
Living Space	46	4	42
Office/Den	7	1	6
Other	1	0	1
Outdoor	11	5	7
Utility	3	0	3
<b>Totals</b>	<b>180</b>	<b>16</b>	<b>164</b>

**Table 99. Loggers Excluded from Analysis by Room and Reason (n = 16)**

Room Type	Logger Serial	Reason for Exclusion from Analysis
Bathroom	LC09050390	Logger fell off fixture
	LC09050457	Dead battery/internal malfunction
Bedroom	LC09050349	Installation error
Closet	LC09050398	Logger fell off fixture
Foyer	LC09050583	Installation error
Kitchen	LC09050453	Logger malfunction/dead battery
Living Space	LC09050482	Logger removed and destroyed by participant*
	LC09050388	Dead battery/internal malfunction
	LC09050431	Logger removed by participant
	LC09050387	Logger removed and destroyed by participant**
Office/Den	LC09050390	Logger malfunction/dead battery
Outdoor	LC09050392	Installation error
	LC09050135	Installation error
	LC09050486	Installation error
	LC09050500	Logger malfunction/dead battery
	LC09050349	Bad logger data

\* Logger was initially installed in ceiling-mounted dome fixture. While cleaning, the participant removed the glass dome and ran it through the dishwasher with the logger still attached. No data could be collected from this logger.

\*\* Logger was initially installed on a table lamp. The participant removed the logger shortly after the installation and placed it in the dome of a torchiere floor lamp. The torchiere contained a 150 W incandescent bulb which severely burned the logger, destroyed it.

## Appendix E. Detailed Multistate Results and Comparative Statistics

The multistate modeling effort relies on data from telephone and on-site surveys conducted through June 2010 in areas with longstanding CFL programs, newer or smaller programs, and no CFL programs. Site visit data was collected from 1,533 households across 15 different areas.

### Areas Included in the Analyses

Sponsors of the Multistate Model Study include:

- Ameren Missouri;
- Ameren Illinois;
- ComEd;
- Consumers Energy in Michigan;
- Dayton Power and Light;
- EmPOWER Maryland;
- The five program administrators of the Massachusetts ENERGY STAR® Lighting Program (the Cape Light Compact, NSTAR, National Grid, Unitil, and Western Massachusetts Electric);
- National Grid in Rhode Island;
- The New York State Energy Research and Development Authority (NYSERDA); and
- The Salt River Project.

The various parties supporting this effort are referred to as program administrators (PAs):

- Electric utilities,
- Energy service organizations,
- Public service commissions, and
- State agencies.

NMR Group and Cadmus performed the modeling and analysis. The 10 PAs funded data collection in 11 program areas and four non-program areas, shown in the table below. PAs and evaluators chose these four non-program areas to complement the 11 program areas' demographic, social, and economic characteristics.

**Table 100. Participating Areas**

Area	Abbreviation	Years Supporting CFLs*	On-Site Sample Size
<b>Program Areas</b>			
Ameren Illinois (part Illinois)	AIU	1.5	92
Ameren Missouri (part Missouri)	AUE	0.5	87
ComEd (part Illinois)	ComEd	5.0	98
Consumers Energy (part Michigan)	Consumers	0.5	99
Dayton Power and Light (part Ohio)	DPL	1.0	72
EmPOWER Maryland (most Maryland)	EmPOWER	2.0	79
Massachusetts (entire state)**	MA	12.0	150
New York City***	NYC	11.0	100
New York State****	NYS	11.0	200
Rhode Island (entire state)*	RI	12.0	100
Salt River Project (part Arizona)	SRP	2.0	101
<b>Non-program Areas</b>			
Houston, Texas (Harris County)	Houston	N/A	100
Indiana (central portion)	IN	N/A	67
Kansas (entire state)	KS	N/A	95
Pennington County, SD (portion)	SD	N/A	93
<b>Total</b>			<b>1,533</b>

\* As of the beginning of 2010.

\*\* Surveyed the entire state, even though some portions may be served by municipal utilities not taking part in the ENERGY STAR Lighting Program.

\*\*\* Surveyed separately from the remainder of the state due to its unique demographic and economic characteristics.

\*\*\*\* State minus New York City and Nassau and Suffolk Counties.

### Development of Program Variables

Program variables were the statistical models' key components guiding calculation of NTG ratios. The team began developing these variables by reviewing CFL program plans and documents, prior evaluation reports, and program summaries, compiled by the Consortium for Energy Efficiency, the U.S. Department of Energy, and ENERGY STAR to locate CFL programs in each state and to gather information on CFL program activity through 2010 in each area.

Specifically, are database included:

- Data on program budgets;
- Numbers of CFLs incented;
- The percentage of budget allocated to incentives, marketing and advertising, and overhead;
- The percentage of CFLs with specialty features; and

- The method of support (e.g., retail coupons, catalog, and/or upstream approaches).<sup>27</sup>

The team successfully collected this information for all programs for 2009 and 2010, and verified data with the PAs. We tested these program variables in the model individually and in combination, but the only program variable found to be statistically significant in the 2010 CFL purchase model presented below was the number of bulbs supported by the program per household in the state.

The team also collected information on when the current program and any of its predecessor programs had been launched, then entered these data into the models. However, we did not consider these data to be current program variables, as they captured the *cumulative impact of prior program activity* on current purchases, not the impacts of the 2010 program on purchases.

### Modeling Procedures

Drawing on experiences with earlier modeling attempts, the team chose to use the zero-inflated negative binomial regression (ZINB) to model CFL purchases.<sup>28</sup> The ZINB method analyzes count data (e.g., the number of CFLs), with many cases falling at zero and with a fair degree of variability in the data. Compared to a related model (a negative binomial regression model), ZINB has the added benefit of not treating all zeros the same.

The procedure simultaneously runs a logistic model, sorting out differences in why someone may have zero purchases during a time period and a negative binomial regression to predict the number of CFLs purchased. The analysis led the modeling team to conclude two separate populations are represented by the observed zeros in the data. Those are:

1. CFL users who happened to not have made purchases during the observation time (i.e., the not-always zero group); and
2. Households likely to never purchase CFLs (i.e., the always zero group).

When using logistic regression to sort out reasons for zero purchases, the model also uses a negative binomial regression to estimate the probability of each count (including zeros) for participants in the not-always zero group. ZINB is a nonlinear procedure, and its interpretation differs from ordinary least squares models.

The team developed model specifications to include the program variables described above with additional variables for:

- Demographic, economic, and social characteristics;
- History of CFL use;
- Various measures of environmental opinions and early adoption behavior; and

---

<sup>27</sup> Specialty features primarily included dimmable and three-way capabilities, colored bulbs, small screw bases, and shapes other than the usual spiral.

<sup>28</sup> Prior efforts clearly showed that ordinary least squares regression did not accurately reflect data distribution, with many people reporting "zero" purchases. Likewise, earlier attempts at using the negative binomial regression model—which is similar to, but simpler than, the ZINB—suffered from poor model fit.

- Binary variables to denote:
  - Variations in data collection (e.g., revisit to homes that had taken part in the 2009 modeling effort).
  - Program design (e.g., NYSERDA's program focuses more on marketing than incentives).
  - Variations in data collection approaches (e.g., how site technicians address "*don't know*" responses to on-site survey questions) and outlying CFL purchase behavior (e.g., unusually high purchase rates in Houston and Pennington County, SD).

The team excluded variables found to be excessively collinear with other model variables or that had little statistical effect on CFL purchases.<sup>29</sup> The models presented are parsimonious in that their every variable has a statistically significant net effect on CFL purchases (at the five percent level of significance); removing any variables would reduce the model's predictive capability. In short, they represent the best models yielded by the analyses.

### **Model Results**

The model's logistic portion indicates which households will likely never purchase CFLs versus those more likely to be purchasers. A positive coefficient implies higher likelihood of being a non-purchaser of CFLs.

The model's negative binomial portion is limited to those likely purchasing CFLs. It estimates how many CFLs these households purchased in 2010. Table 101 shows the base case model variables and their coefficients. This model was chosen as the base case because it provided the best predictability across all areas modeled and made intuitive and theoretical sense, considering the logic of CFLs programs and household purchasing behaviors.

---

<sup>29</sup> Co-linearity was determined by the tolerance statistic and the variance inflation factor.

**Table 101. Base Case Model**

<b>Logistic (Inflated)</b>	<b>Coefficient</b>	<b>P&gt; z </b>
Intercept	-0.254	-0.842
Some college or higher education	-0.494	0.0015
Revisit (yes coded '1' to account for potential impact of our first visit as evidenced in some MA, NY, and Houston data)	-0.494	0.0015
CFL saturation at beginning of 2010	0.015	<.0001
Like to have new technology (1 to 5, descending scale)	0.306	0.004
<b>Negative Binomial</b>	<b>Coefficient</b>	<b>P&gt; z </b>
Intercept	0.941	0.0002
2010 bulbs supported/household	0.39	<.0001
CFL saturation at the beginning of 2010	-0.014	<.0001
Purchase bulbs at big-box store	0.405	0.0026
Years supporting CFLs through buy downs	-0.034	0.001
Data collection protocol treatment of 'don't know'	-0.77	<.0001
Homeowner	0.36	0.0029
Size of home (by 2,000 sq. ft., ascending scale)	0.387	<.0001
Likes to have new technology (1 to 5, descending scale)	0.174	0.0052
Revisit household	-0.347	0.0171

The base case model's logistic portion predicts that:

- 1) Households with higher education levels have a greater probability of purchasing CFLs.
- 2) Households that received the revisit site inventories were more likely to purchase CFLs.
- 3) Households with a greater CFL saturation at the beginning of 2010 were less likely to buy any CFLs, presumably because they had already purchased CFLs and did not need them when asked (until their current CFLs burn out or they exhaust their stock of stored CFLs).
- 4) Households that do like to have new technology were more likely to purchase at least one CFL.

The model's negative binomial portion predicts the number of bulbs a household is likely to purchase. As expected, the number of bulbs the program incented per household had a significant and positive effect on CFL purchases. Other factors influencing the number of CFL purchased included:

- 1) Participants who own their home had a propensity to purchase a greater number of CFLs in 2010.
- 2) Participants with larger homes purchased more CFLs in 2010.
- 3) Even though these households are more likely to purchase at least one CFL, participants who do seek the latest technology (measured on a four point scale ranging from strongly agree to strong disagree) purchased fewer CFLs in 2010 than those who do not seek the newest technology.
- 4) Households with a higher saturation of CFLs were likely to buy fewer CFLs. Similar to the model's logistic portion, this implies that those with higher levels of saturation simply did not need to buy as many CFLs.

- 5) Those in areas with longer running programs were less likely to buy more CFLs; this variable indicates the cumulative impact of older programs. Households in those areas have more CFLs because of the long program history.
- 6) Households who purchased CFLs at big-box stores were more likely to buy more CFLs, presumably due to the larger package size typically sold at these stores versus grocery or lighting specialty stores.
- 7) Finally, households visited in both 2009 and 2010 purchased fewer CFLs in 2010 than households visited only in 2010. Also, those areas where site inspectors did not require residents to guess when they purchased CFLs were likely to have lower CFL purchases. This could be because those asked to guess when bulbs were purchased tended to guess more recently (a common memory bias); when those allowed to not know were 25 percent or greater, they were eliminated from the model, and when less than 25 percent, unknown bulbs were set to zero.

### Model Diagnostics

We tested various model specifications, and evaluated quality of fit through a variety of techniques:

- Maximum likelihood  $R^2$ ;
- Predicted compared to actual values for purchases (P/A); and
- The probability level of significance for each explanatory variable.

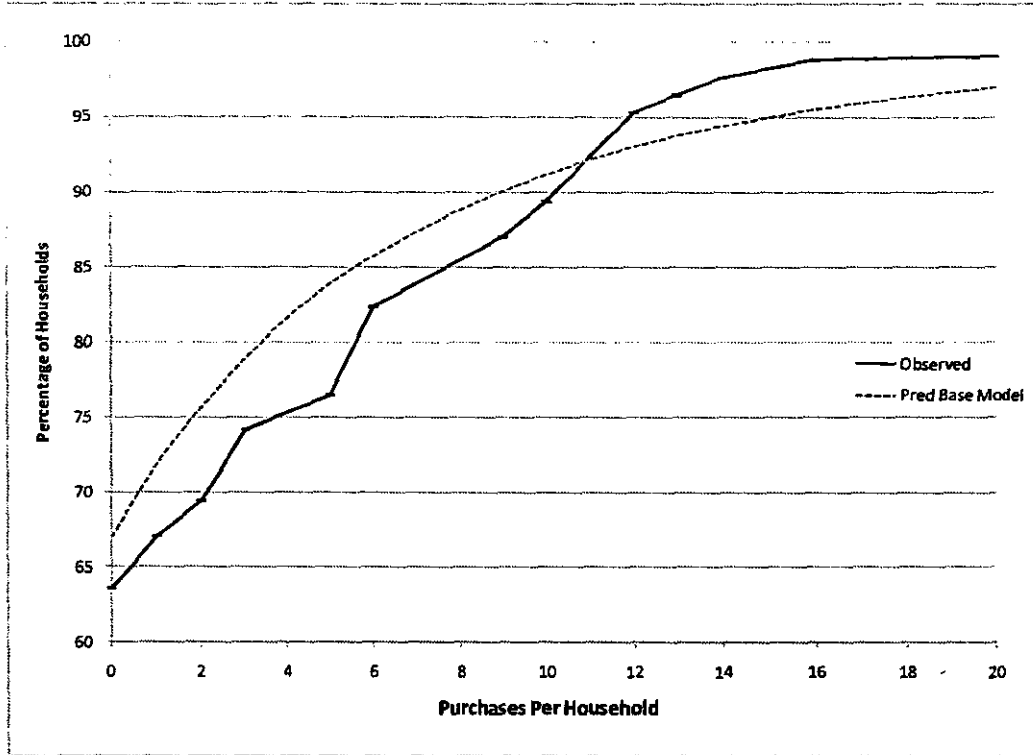
We also examined the coefficient signs to make sure they made logical sense.<sup>30</sup> Figure 50 compares the CFL purchase distributions from the predicted base model to actual reported site visit results; these represent the distribution of purchases within the Ameren Missouri territory. The subsequent figure presents a similar graph, showing results for the entire 15 areas combined.

---

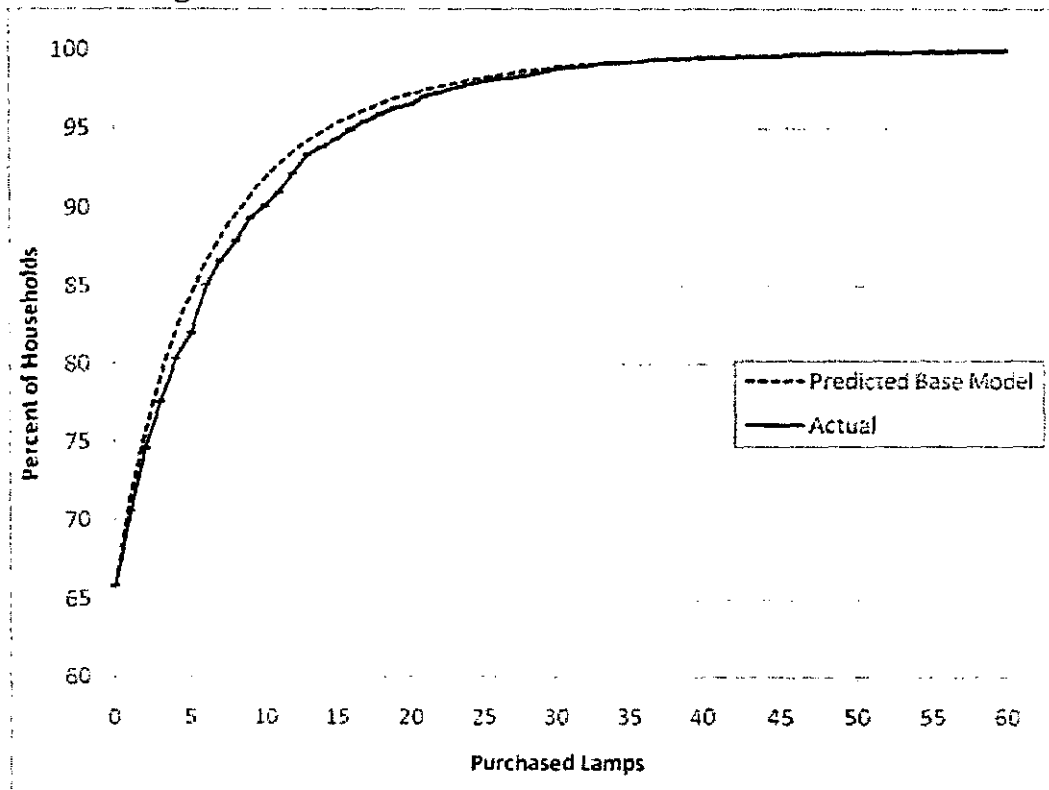
<sup>30</sup> For instance, the variable “area electricity rate”—defined as the average cents per kWh for the residential customer class of each program area—was found to be significant in an alternative model specification, and the resulting model showed that it was a good fit according to the tested diagnostics. However, the coefficient sign was negative, counter-intuitively indicating that higher electricity prices were associated with lower bulb purchases. When we replaced this variable with an “east coast” variable, the model fit was even better, indicating that the electricity price variable acted as a proxy for the country’s region. The region in question—the east coast—has the highest rates in the model, but also has the model’s oldest CFL programs. This relationship was eventually replaced with the “years supporting programs” variable, which provided yet a better model fit, and showed a more theoretically sound relationship than electricity price or a regional variable.



**Figure 50. Ameren Missouri Cumulative Predicted vs. Actual CFL Purchases**



**Figure 51. Cumulative Predicted vs. Actual for All Areas**



## NTG Calculations

To develop actual NTG estimates, we used a fitted model to predict purchases per household in the program's presence: that is, using actual bulb purchases supported per household by program in 2010 (see row A of the table below). We then used the same fitted model to predict purchases, assuming the program had not supported any bulbs in 2010 (row B). The "without program" scenario was estimated by setting the incented number of light bulbs per household to zero. Since the program encourages market transformation, the number of incented light bulbs per household cannot fully capture all program effects since the program also works to increase CFL availability and consumer awareness of CFLs over time. We believe these effects are captured in the "years of support" variable which varies across program areas. Programs running for longer periods of time are likely to have made more progress in achieving widespread CFL availability and increased consumer awareness than newer programs.

These calculations predicted that each Ameren Missouri household purchased an average of 2.544 CFLs in the first half of 2010. The predicted non-program scenario suggested that 2.045 CFLs would have been purchased in the program's absence. Subtracting without-program estimates from the predicted program scenario yielded an estimate of net predicted program purchases of 0.499 (row C). Dividing the net program purchase estimates by the incented CFLs per household of 0.52 (row D) yielded an NTG of 0.96 (shown in row E).

**Table 102. NTG Calculation**

Input	Value
A. Per-household purchases with program predicted	2.544
B. Per-household purchases without program	2.045
C. Net program purchases per household predicted	0.499
D. Incented CFLs per household	0.52
E. Total NTG	0.96

## Sensitivity Analysis

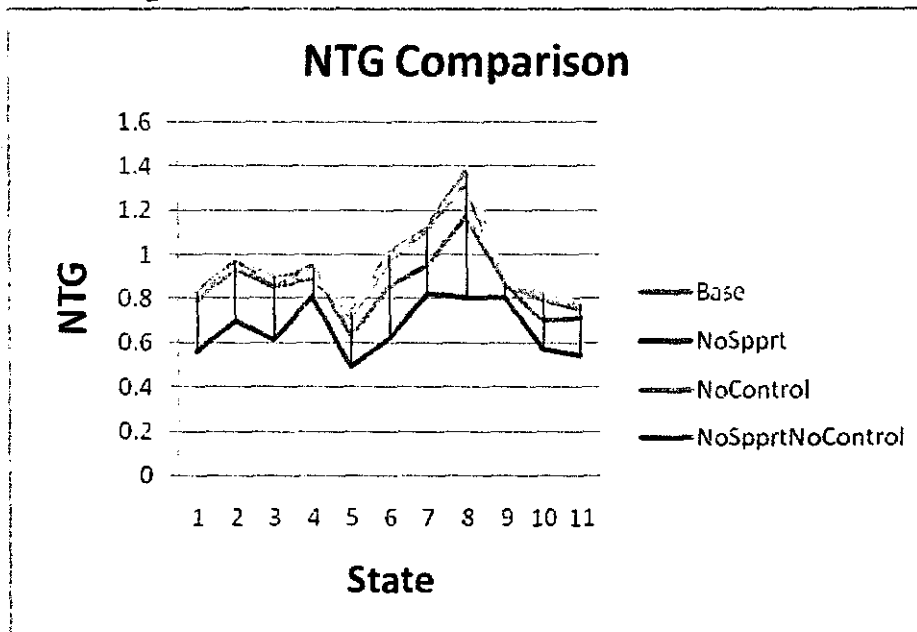
We calculated a 0.96 NTG estimate for Ameren Missouri, which is higher than the *ex ante* estimate of 0.8. This model yielded the best fit across all areas with a P/A value of 1.025. The evaluation team also analyzed many other variable combinations, and chose to report three additional modeled scenarios testing possible model limitations:

- **No Control States.** In this scenario, we completely removed all four control states from the model (testing the impact if we assumed control states were all contaminated by program spillover). In this case, the Ameren Missouri NTG ratio increased to 1.0, along with slight increases in other areas, and the average P/A for all areas was 1.07, higher than in our base case model.
- **No Years of Support Variable.** In this case, we removed the variable of years the P/A supported a CFL program in the model's logistic portion, indicating the number of years the program had been offered in that area. In this case, the P/A averaged 1.07, higher than in our base case model. The Ameren Missouri NTG ratio decreased to 0.62, and NTG ratios of all areas dropped similarly.

- **Combination No Control States and No Years of Support.** We removed both the control states and years of support variables from the model for this scenario. Overall, P/A averaged 1.06, and the NTG ratio for Ameren Missouri was 0.85.

In most scenarios, we found that the relative NTG ratios between different program areas remained fairly constant. Figure 52 shows NTG ratios across the 11 areas for the base case and the first two sensitivity analyses discussed above. (Ameren Missouri is State number 6)

**Figure 52. NTG Ratios—Base Case and Sensitivities**



The table below shows the NTG ratio and average P/A for each sensitivity analysis in each area.

**Table 103. Base Case and Sensitivity NTG Ratios and P/A**

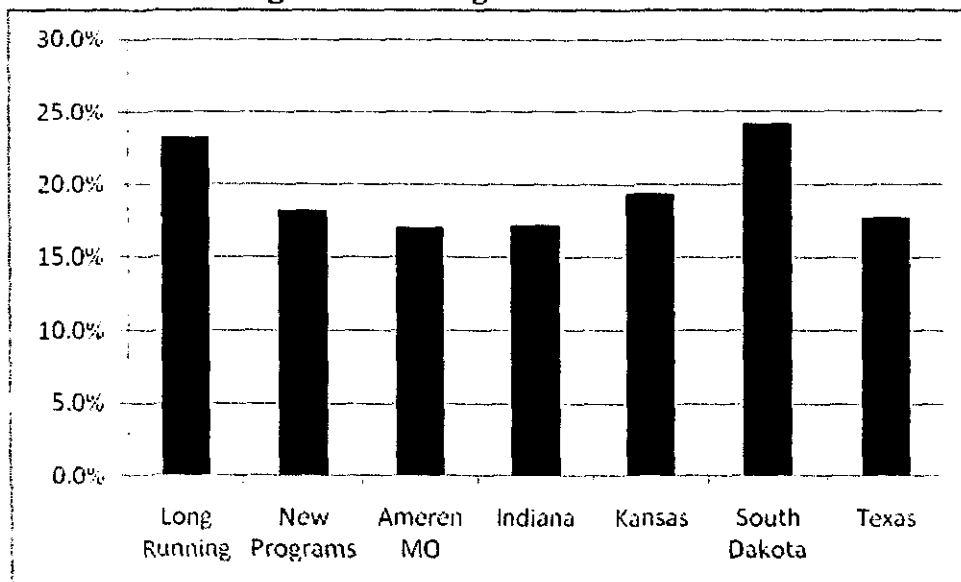
Area	Base Case	No Years of Support	No Control State States	No Years of Support / No Control States
1	0.79	0.56	0.83	0.78
2	0.93	0.7	0.97	0.97
3	0.85	0.61	0.9	0.85
4	0.89	0.81	0.91	0.95
5	0.71	0.49	0.73	0.63
<b>Ameren Missouri</b>	<b>0.96</b>	<b>0.62</b>	<b>1</b>	<b>0.85</b>
7	1.12	0.82	1.12	0.95
8	1.32	0.8	1.38	1.17
9	0.86	0.8	0.85	0.87
10	0.79	0.57	0.82	0.7
11	0.75	0.54	0.77	0.71
<b>Average P/A</b>	<b>1.025</b>	<b>1.074</b>	<b>1.06</b>	<b>1.06</b>

Additional analysis of multistate data yielded interesting comparisons among the program areas. For instance Ameren Missouri had higher levels of market penetration (homes with at least one CFL) than most other PAs, yet lower levels of CFL saturation (percentage of sockets in the home with CFLs). CFL saturation is higher in areas with longer running programs. Ameren Missouri's program costs per CFL purchased were lower than most areas and the CFL purchase rate was higher than most areas. Specifics on these results and others are included in Appendix E.

### Comparative Statistics

We used a total of 15 areas in the multistate analysis, with close to 100 site visits performed in each area. Four areas in the states of Kansas, Indiana, South Dakota, and Texas did not have programs.<sup>31</sup> To preserve confidentiality, we grouped multistate sponsors into those with newer programs (less than five years) and those with longer running programs. Figure 53 shows the average saturation of CFLs in new program areas, in long running program areas, in Ameren Missouri, and in each of the comparison areas; this is the total number of CFLs installed in all homes divided by the total number of installed bulbs. Interestingly, while non-program areas tended to have lower average saturations, they did not have the lowest. Only Indiana had lower average saturation than the new program areas (Texas and new program areas were equal). South Dakota's saturation was higher than the average of the long running program areas. Ameren Missouri's service area had average saturation among the newer program areas.

**Figure 53. Average CFL Saturation**



We also compared market penetration among the program and non-program areas, shown in Figure 54. Market penetration is the percentage of homes visited with at least one CFL installed.

<sup>31</sup> Except for Kansas, the non-program areas did not cover the entire state. For instance, Texas site visit participants were only in the Houston area and South Dakota only included Pennington County.

Ameren Missouri's market penetration is the highest among all new programs, and has a higher level of penetration than among most long running programs.

**Figure 54. Market Penetration**

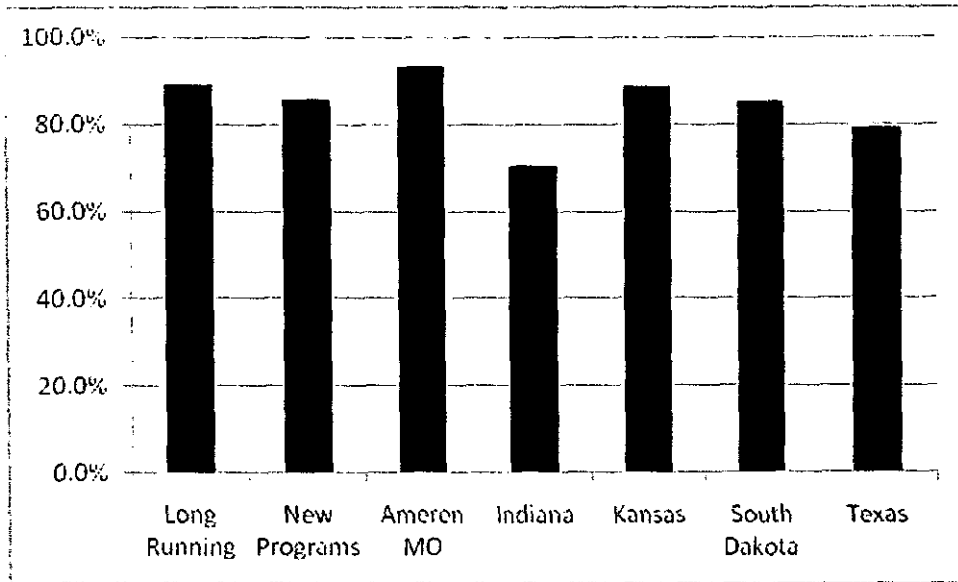
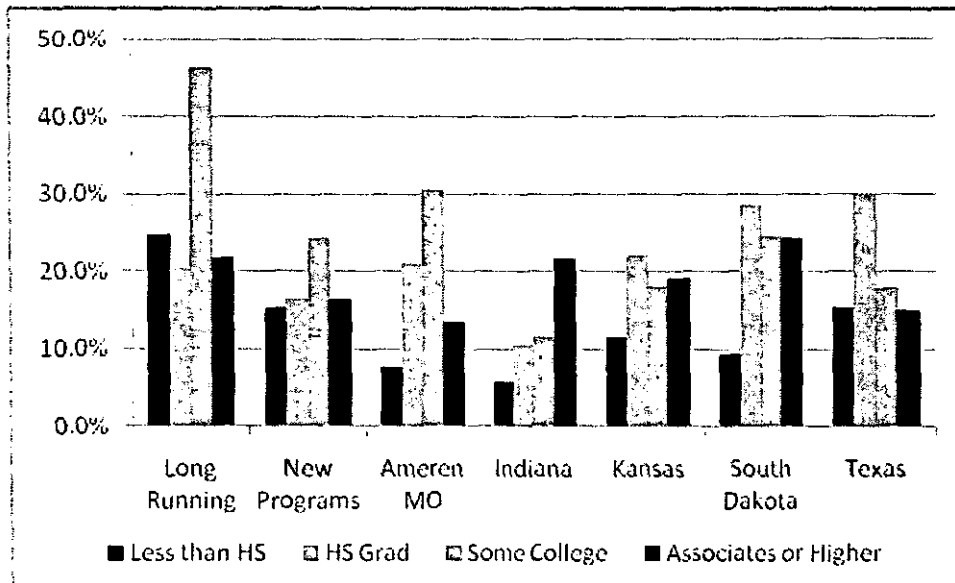


Figure 55 shows our analysis of saturation levels in each area by education level. Ameren Missouri residents who have completed some college have a higher CFL saturation than similar education levels in most other areas.

**Figure 55. Saturation Levels by Education**



Prior to the site visit, we asked participants whether they were familiar with CFLs. Lower familiarity is typically associated with lower CFL saturations; however, Ameren Missouri participants who reported being “not familiar” with CFL technology had higher CFL saturations than those who were familiar (Figure 56). This could be due to a different family member answering the survey than who typically purchases light bulbs, or that those familiar had smaller homes with fewer sockets, or, in the situation of renters, landlords may have installed the bulbs.

**Figure 56. Average Saturation by CFL Familiarity**

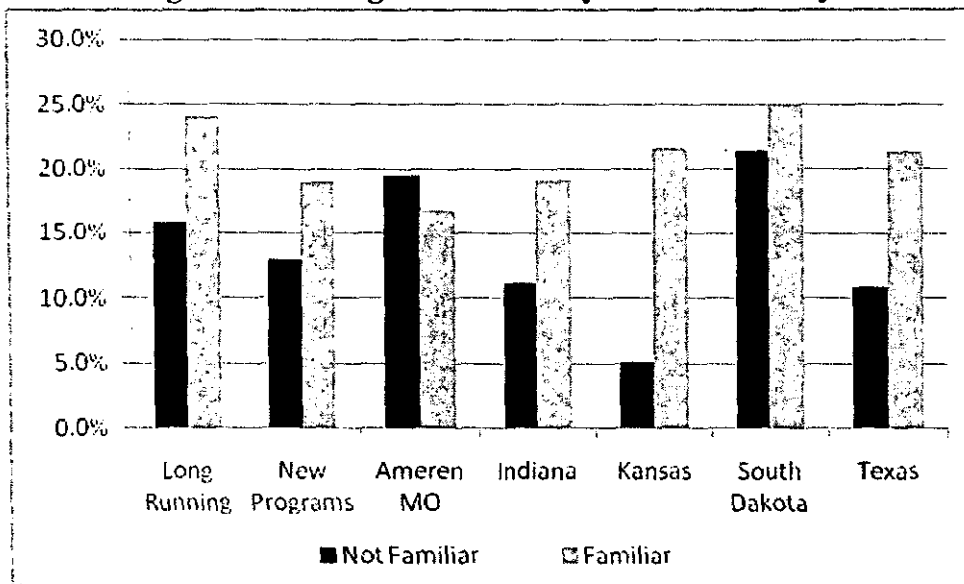


Figure 57 shows the average saturation for each area according to homeownership status. While it may be expected that CFL saturation is higher for those who own their home, rental homes are smaller on average, and thus may have a higher saturation but fewer actual numbers of installed CFLs.

**Figure 57. Average Saturation by Homeownership Status**

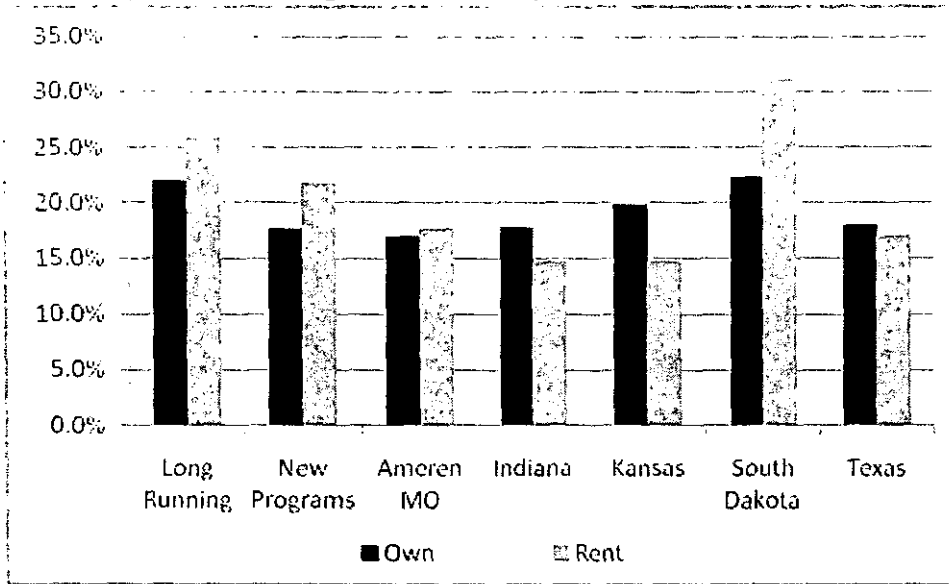


Figure 58 shows CFL saturations according to how residents answered the question “Based on your understanding of the facts, is the earth’s average temperature currently rising as a result of human activity?” According to this analysis, there are no overall patterns of CFL saturation related to question response, although in many areas those who responded “probably no” or “definitely no” had lower saturations. Ameren Missouri customers who responded “definitely no” to this question had the highest saturation among Ameren Missouri customers.

**Figure 58. Average Saturation of Climate Change Attitudes**

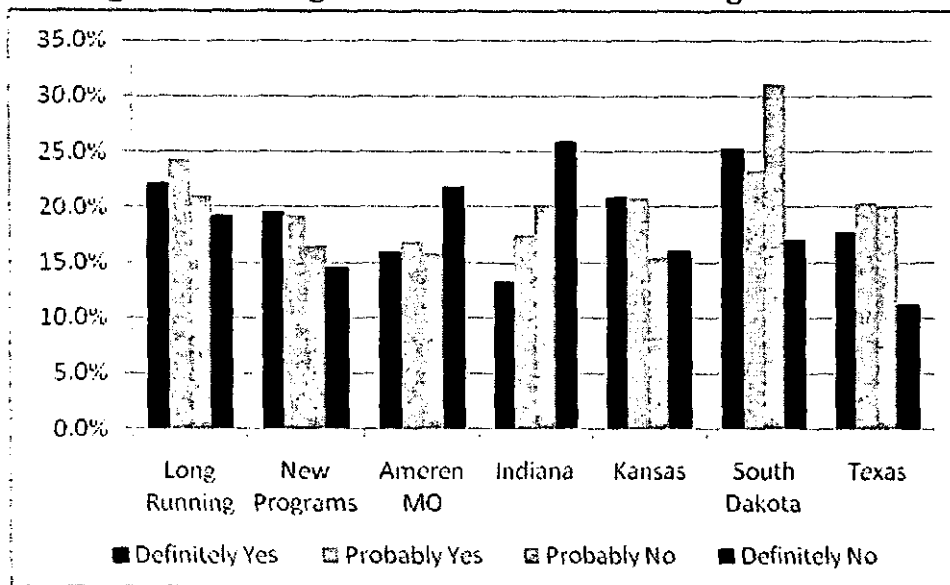
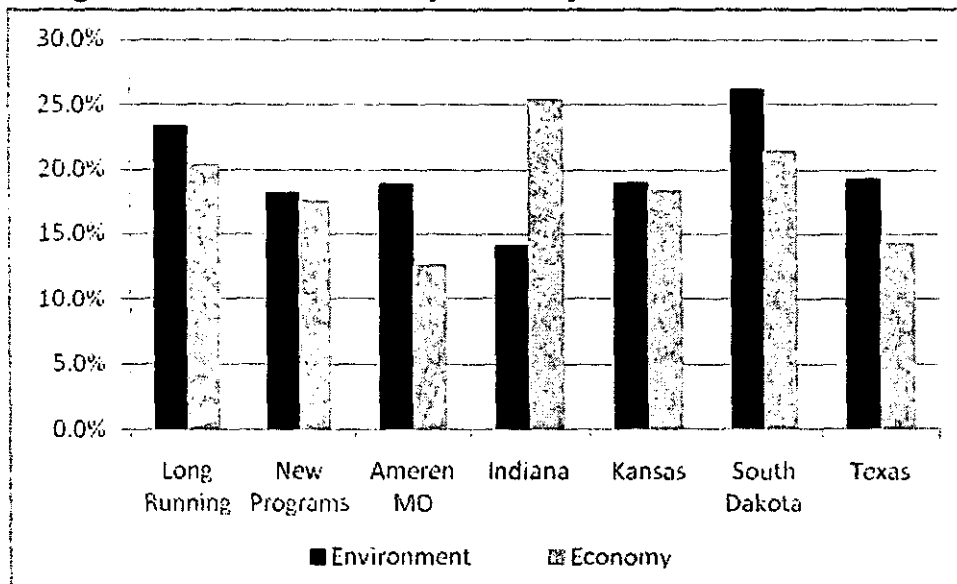


Figure 59 shows the results comparing CFL saturation to residents' answers to the following question: "With which one of these statements about the environment and the economy do you most agree:

- 1 Protection of the environment should be given priority, even at the risk of curbing economic growth, OR
- 2 Economic growth should be given priority, even if the environment suffers to some extent?"

For all areas except Indiana, those choosing the environment have a higher average CFL saturation than those choosing the economy.

**Figure 59. CFL Saturation by Economy vs. Environment Choice**



Our next comparisons describe how program activity related to CFL purchases, saturations, and NTG results for each program area. To preserve confidentiality, the areas compared in this analysis are referred to as A, B, C, etc.

Figure 60 compares the overall program budget and incentives-only budget per total incented CFLs of Ameren Missouri to other areas during the period of January through June 2010. Ameren Missouri program spending per incented CFL is below average among the compared programs. It should be noted that utilities may include different costs in the overhead budgets, for instance regulatory or management costs may be allocated differently among other programs.



**Figure 60. Total Program and Incentives Budget per Incented CFL**

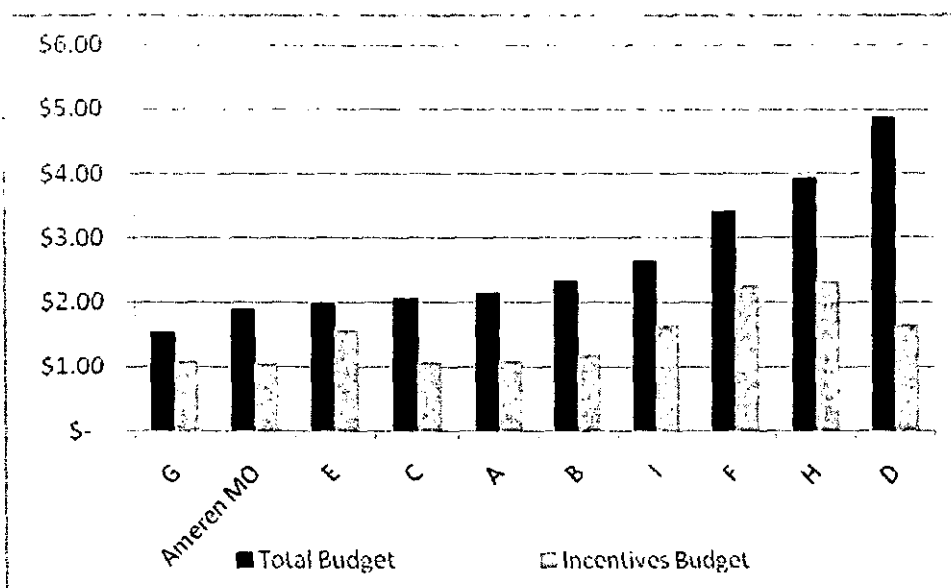


Figure 61 shows the total program budget and incentives budget per CFL purchased. CFL purchases include both incented CFLs and any CFLs purchased outside of the program (i.e., total number of CFL purchases identified during the site visits during the program period). Again, Ameren Missouri has one of the lowest budgets per CFL purchased inside and outside the program.

**Figure 61. Total Program Budget and Incentives Budget per Total CFL Purchased**

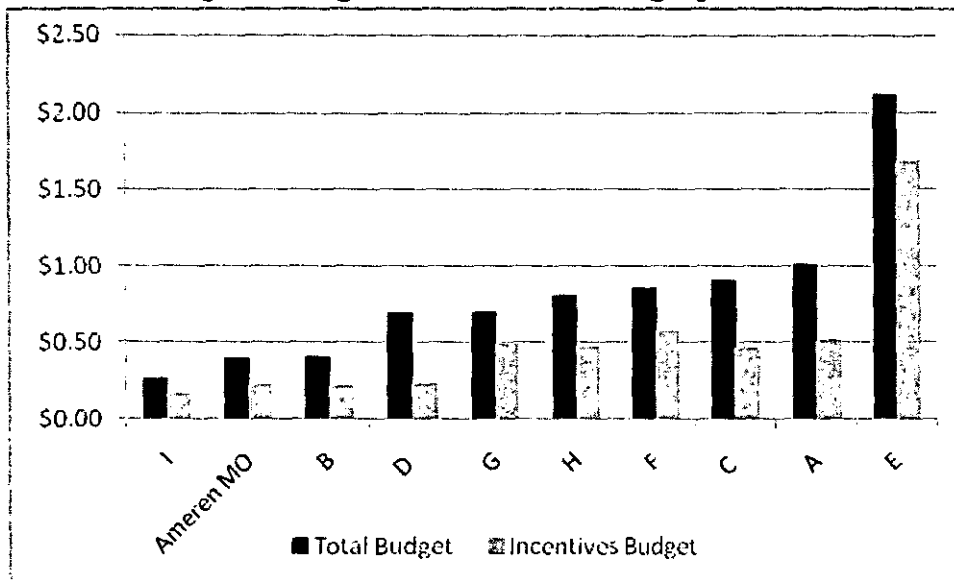
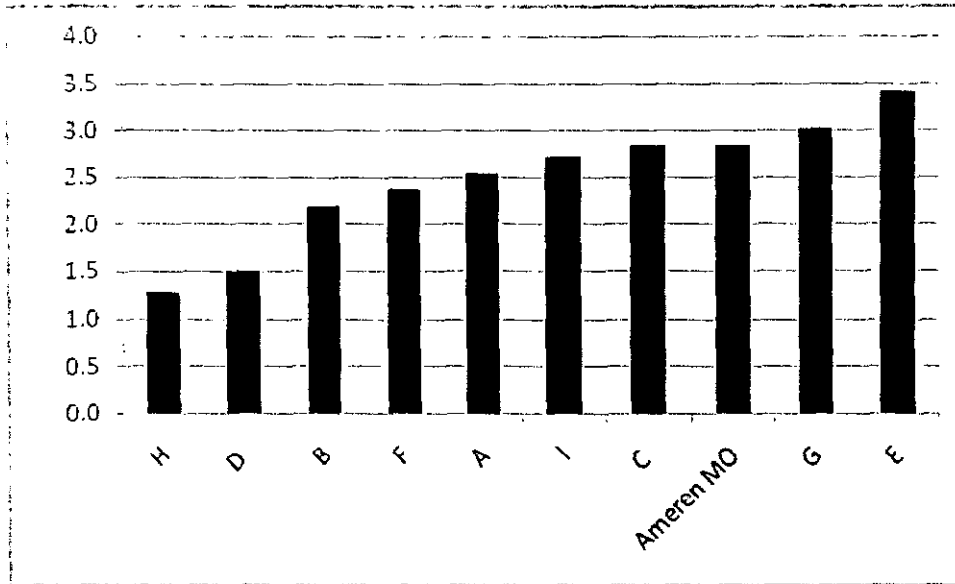


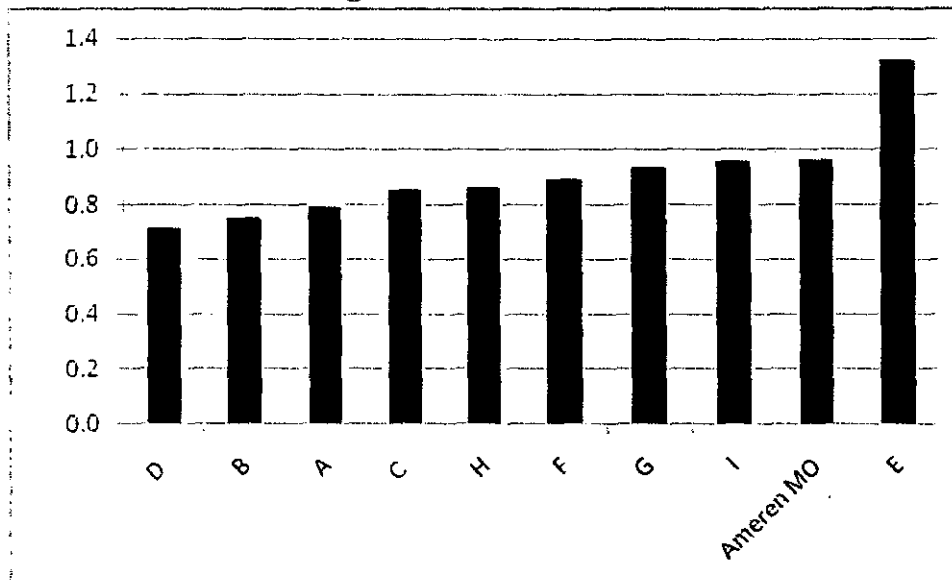
Figure 62 and Figure 63 show the total CFLs purchased in each area on a per household basis and the final NTG ratios for each area. In comparing the two figures, it is apparent that NTG

ratios tend to be higher among program areas with higher total CFLs purchased. Ameren Missouri was among the highest in CFL purchases per household and had among the highest NTG ratios.

**Figure 62. PY2 CFL Purchases per Household**



**Figure 63. NTG Ratios\***



\* The NTG ratio calculated for NYSEDA is the average of the NTG ratios for New York City and New York State (New York State does not include New York City).