Massachusetts ENERGY STAR®
Lighting Program 2010
Annual Report

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Appendices A - D

Submitted to:

Energy Efficiency Advisory Council Consultants
Cape Light Compact
NSTAR
National Grid
Unitil
Western Massachusetts Electric

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Massachusetts ENERGY STAR® Lighting Program 2010 Annual Report

Appendix A:

Results of the Massachusetts and Pennington County, South Dakota Telephone and Onsite Compact Fluorescent Lamp Surveys

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Executive Summary

This report presents the findings of research conducted to understand CFL awareness, use, and purchase behavior in Massachusetts and the comparison area of Pennington County, South Dakota in support of the Massachusetts ENERGY STAR® Lighting Program (the Program). Moreover, the report highlights concerns related to specialty CFLs and the so-called "hard-to-reach" population (HTR) in order to provide feedback to the Program Administrators (PAs) on the effect of recent shifts toward specialty CFLs and increased targeting of the HTR population. This research was conducted as part of a comprehensive impact evaluation of the Program; the findings from additional evaluation activities (multistate modeling, supplier interviews, conjoint analysis, revealed preference, and a Delphi panel) will be delivered in separate reports. Recommendations will be provided when evaluation results are available from at least some of these additional activities.

Background and Methodology

This report draws upon a random-digit dial (RDD) survey among 381 households in Massachusetts, conducted in the late summer of 2010 by computer-assisted telephone interviewing (CATI). When applicable, the 2010 RDD survey responses are compared to those obtained from a similar survey of 503 Massachusetts residents conducted in 2009. Additionally, the report draws upon an RDD survey of 500 residents of Pennington County, South Dakota, which serves as a non-program comparison area for the multistate model.

The report also summarizes the results of 75 onsite visits to Massachusetts households and 93 onsite visits to Pennington County households, all recruited through the telephone surveys. In addition, we returned to 75 of the 100 households that took part in the 2009 onsite visits in order to assess how lighting use had changed in the past year and identify possible new CFL purchases made during the same time period. As discussed more fully in the full report, we found few unexpected differences between the 75 "new" onsite visit households in Massachusetts and the 75 "revisit" onsite households, and have, therefore, combined the 150 onsite visits in Massachusetts into a single sample for most analyses. The two samples did, however, display substantial differences in the self-reported number and date of CFL purchases, so we analyze their purchase data as two separate samples.

The RDD and onsite survey data were weighted to reflect the population proportions for home ownership and education in Massachusetts and Pennington County based on the American Community Survey (ACS).

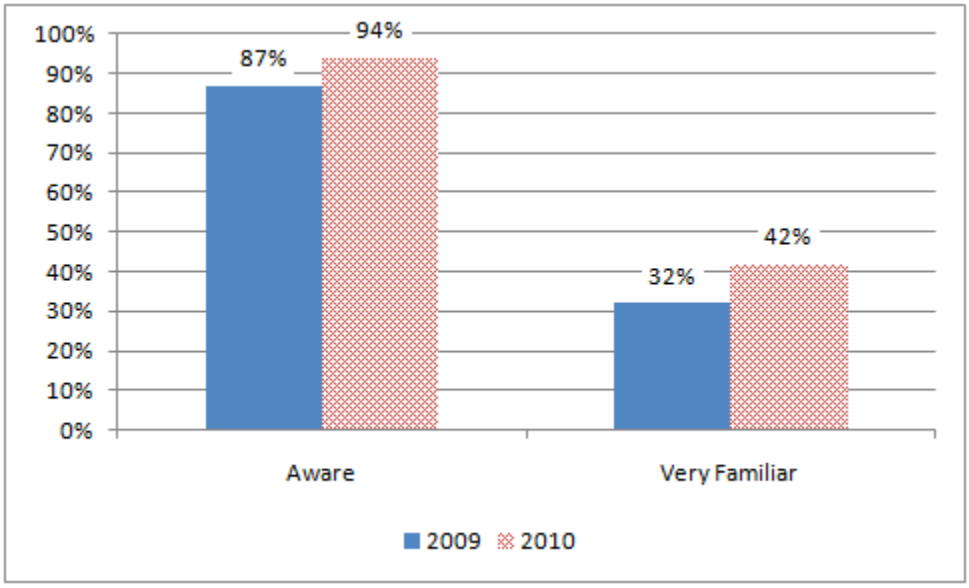
Summary of Findings

In this section, we present a summary of key findings from the RDD survey and onsites, and compare them to results from the 2007 *Market Progress and Evaluation Report* (MPER) where appropriate and informative.[1]

Awareness and Satisfaction

The vast majority of Massachusetts households said they were aware of CFLs: 94% of 2010 Massachusetts RDD respondents reported being aware of CFLs, and 42% reported being "very familiar" with CFLs (Figure ES-1). Respondents to the 2010 Massachusetts RDD survey reported significantly greater awareness and familiarity with CFLs than did respondents in 2009, when 87% were aware and 32% were very familiar. Awareness in Pennington County stood at 90%, and 38% of households reported being "very familiar" with CFLs.

Figure ES-1: CFL Awareness and Familiarity 2009 and 2010*

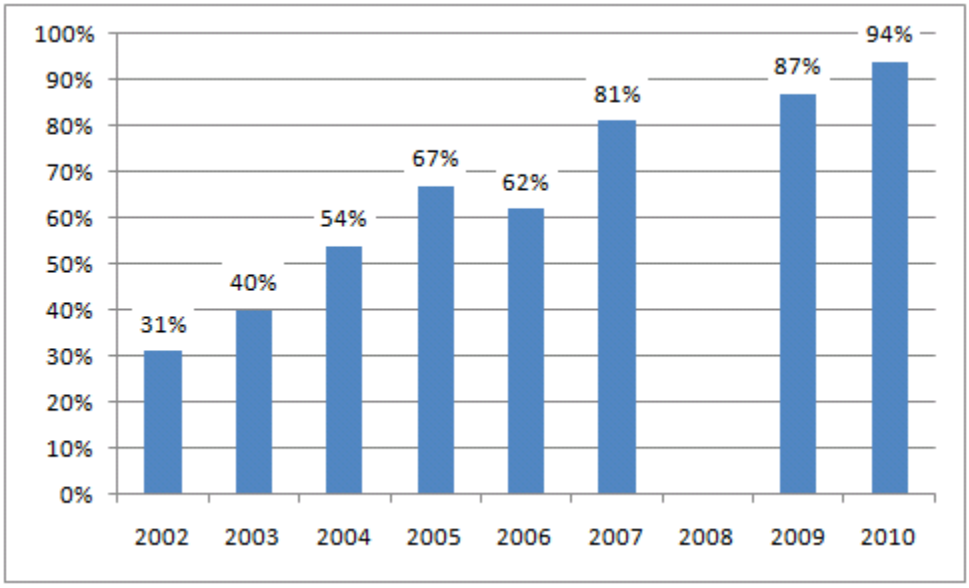


* Sample size 2009 = 503, 2010 = 381.

[1] Nexus Market Research, Inc (now NMR Group), RLW Analytics, Inc. (now KEMA), and Dorothy Conant (2008) *Market Progress and Evaluation Report (MPER) for the 2007 Massachusetts ENERGY STAR® Lighting Program.* Delivered to the Program Administrators on July 1.

The increased awareness in 2010 continues an upward trend in the state that can be traced back at least through 2002, when awareness stood at only 31% (Figure ES-2). This means that CFL awareness in Massachusetts has tripled over the past eight years.

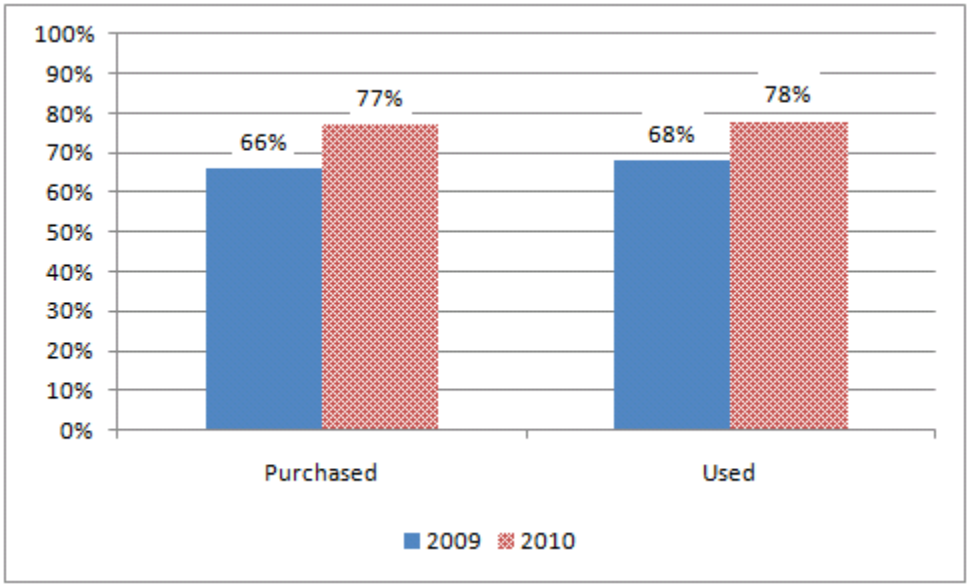
Figure ES-2: CFL Awareness 2002 through 2010*



* Source 2007 MPER and 2009 and 2010 RDD surveys; data not available for 2008

More than three-fourths (77%) of 2010 RDD survey respondents reported having purchased or received a CFL at some point and 78% reported having used a CFL (Figure ES-3). These percentages represent increases from the 2009 RDD in which just 66% of respondents reported having purchased or been given a CFL and 68% reported having used a CFL. In Pennington County, two-thirds (68%) of respondents report having purchased or received a CFL, and 71% said they have used CFLs.

Figure ES-3: CFL Purchase and Use among RDD Survey Respondents 2009 and 2010*



* Sample size 2009 = 503, 2010 = 381.

Most Massachusetts households are not at all familiar with most specialty CFLs; respondents reported greatest familiarity with globe CFLs (55%) and three-way CFLs (51%). Familiarity with specialty CFLs is only slightly lower in Pennington County than in Massachusetts. These findings should be seen as a baseline, with this line of questioning repeated in future evaluations to determine if familiarity increases as the program continues to support greater numbers of specialty products.

The most common reason given by Massachusetts respondents for using CFLs is to save energy (47% first response, 19% additional response) followed by saving money (13% first response, 17% additional response). Other common reasons given for using CFLs include helping the environment or reducing greenhouse gas emissions (23% overall), that the bulb is long lasting (18% overall), and that the bulb does not need to be replaced as often (10%).

Eighty-six percent of the Massachusetts RDD respondents in 2009 and 2010 who were currently using at least one CFL or had used one in the past reported that they were very or somewhat satisfied with them, compared to only 5% in 2009 and 10% in 2010 who were somewhat or very dissatisfied. Pennington County respondents were similarly satisfied with CFLs. The most common reason for dissatisfaction among Massachusetts respondents in 2010 was that the light is perceived as not bright enough (36%), which represents an increase from 2009 (25%).

Likewise, 56% of Pennington County respondents who were dissatisfied with CFLs explained that the bulbs were not bright enough. Other reasons for dissatisfaction include the light color or quality of the light, and the mercury or disposal hazard. It is worth noting that the most frequent source of dissatisfaction—lack of enough brightness—was only mentioned by 5% of all 2010 RDD respondents in Massachusetts who have used CFLs.

CFL Use

The vast majority of homes visited onsite (92% of the total onsite sample and 84% of homes in Pennington County) had CFLs installed. Closer analysis of only the revisit sample suggests that CFL use in these 75 homes increased, with a net gain of 158 CFLs (mean = 2.11).

Most of the homes from the combined Massachusetts onsite sample (61%) had at least six CFLs installed in them. More homes had standard CFLs (88%) than specialty CFLs (57%). Onsite homes had an average 11.7 CFLs installed (8.4 standard, 3.4 specialty).

There were a total of 380 CFLs in storage (average of 2.5 CFLs) in the onsite homes, with over half of them (51%) found in the small percentage of homes (4%) with sixteen or more CFLs in storage.

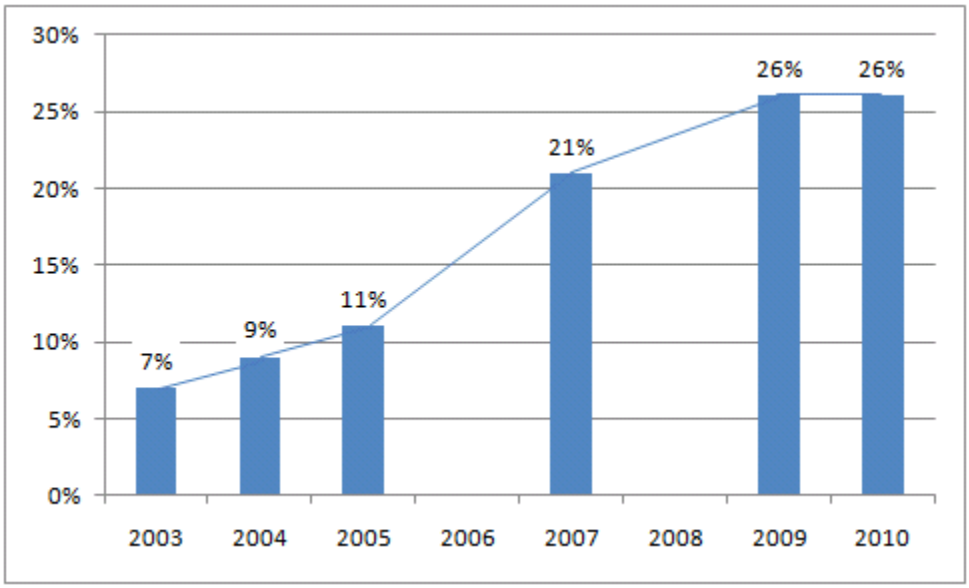
In both 2009 and 2010, seven out of ten RDD survey respondents (70% in 2009, 69% in 2010) had not disposed of any CFLs in the past 12 months. Sixteen percent of RDD respondents in 2009 and 13% in 2010 said they had thrown CFLs away while 11% in both years said they had recycled CFLs.

Socket Saturations

Just over one-fourth (26%) of sockets in Massachusetts onsite homes contained CFLs; saturation was a similar (24%) in homes in Pennington County, but saturation there is largely explained by the smaller size of homes in the area compared to Massachusetts. The remaining potential for CFLs and LEDs in Massachusetts is 62% based on all remaining incandescent and halogen bulbs in the home, although the actual potential is likely lower by an undetermined amount due to limitations of fixture shape, lighting application, and the preferences of the householder. Compared to data reported in the 2007 MPER, it appears that socket saturation has reached a period of relative stability, in some ways resembling the "S" curve of adoption suggested by Rogers (2003) by showing a relatively low adoption rate in earlier years (2003 to 2005), a period of rapid adoption (2005 to 2009), and then a gradual decrease in the adoption rate (2009 to2010).[2] It may indeed be that certain types of sockets—even many that could easily be converted to a standard spiral—may be "hard to reach." (Figure ES-4)

[2] Rogers, E.M (2003) *Diffusion of Innovations*. (Fifth Edition). Free Press: New York.

Figure ES-4: CFL Socket Saturation 2003 through 2010*



* Source 2007 MPER and 2009 and 2010 onsite surveys. Data not available for 2006 and 2008.

CFL Purchases

As mentioned above, the new visit and revisit onsite samples differed substantially in the number and date of self-reported CFL purchases. For this reason, we discuss the results of the two samples separately. Moreover, due to the timing of the onsite surveys, the purchase estimates reported here pertain to the entire year of 2009 but only to the *first half* of 2010 even though we refer to "2010" throughout the report for ease of discussion.

Approximately two out of five new Massachusetts onsite participants (40% in 2009, 44% in 2010) reported obtaining CFLs in these two time periods; a comparable portion (44%) of revisit onsite participants reported obtaining CFLs in 2009, but fewer (12%) reported obtaining CFLs in 2010. Patterns in Pennington County suggest a rapidly emerging CFL market; just 20% of Pennington County respondents reported purchasing CFLs in 2009, but 36% reported purchasing at least one CFL in 2010.

The fact that the percentage of revisit households purchasing CFLs in 2010 differs significantly from both the percentage of revisit households purchasing CFLs in 2009 revisit and the percentage of new visit households purchasing in 2010 may be due, in part, to a reactive effect of revisit households of their 2009 participation. By taking part in the 2009 onsites, the revisited participants may have changed their purchasing behavior or altered their strategies for estimating when they obtained CFLs, leading to substantially different self-reported purchase behavior for 2010. It is worth noting that New York City and New York State displayed similar patterns, with self-reported purchases being lower for the revisit sample compared to the new visit sample. In contrast, Houston showed the opposite pattern, with CFL purchases being higher among the revisit sample. We hypothesize that, in the more mature markets of Massachusetts, New York City, and New York State where many households already have CFLs, our initial visit served to

make them more aware of their CFL related behavior, while in the growing CFL market of Houston, our initial visit also induced participants to purchase more CFLs.[3]

About one-half of the CFLs purchased in 2009 and 2010 by Massachusetts onsite participants and 2010 Pennington County onsite participants were bought at home improvement stores. In Massachusetts, smaller numbers of households bought CFLs at warehouse stores, bargain stores, grocery stores or supermarkets, and hardware stores.

Federal Lighting Standards

One-fourth (25%) of 2010 RDD survey respondents had heard of traditional incandescent bulbs being phased out, a significantly greater percentage than in 2009 (18%). Once the provisions of the Energy Independence and Security Act (EISA) banning the manufacture or import of most traditional incandescent light bulbs not meeting the efficiency standard were briefly described to them, three out of ten respondents in both 2009 and 2010 said they were very or somewhat likely to buy extra incandescent bulbs for use when the new standards go into effect.

Hard to Reach Customers

RDD survey respondents who did not self-identify as white were statistically less likely to be aware of CFLs (84% non-white vs. 95% white) and to state lower levels of familiarity with CFLs (70% non-white vs. 87% white). Respondents who self-identified as Latino were statistically less likely to report having purchased or been given CFLs than were their non-Latino counterparts (70% Latino vs. 90% non-Latino).

High income households were more likely than low-income households to be aware of CFLs (98% vs. 90%), familiar with CFLs (91% vs. 78%), and to have used CFLs for four or more years (46% vs. 24%). Awareness of CFLs was very consistent across education groups, but both familiarity and duration of CFL use increased with educational attainment.

Prior use of CFLs was higher among both high-income (98%) and moderate-income households (93%) compared to low-income ones (78%) Respondents with a college education were also statistically more likely to have used CFLs than those with a high school diploma.

Due to the overall small onsite sample sizes for many individual demographic groups, the ability to generalize from the results of the HTR analysis is limited. One key finding, however, is that the PAs should not assume that *saturation* is lower among the groups they currently consider as HTR. Among HTR customer groups, only non-white households have saturation rates that fall below those of white households (21% for non-white vs. 27% for white). In most cases, HTR households have saturation levels that rival or exceed those of their college-educated, higher-income, home-owning counterparts—a finding largely driven by smaller home sizes and fewer sockets. In other words, many customers currently considered HTR may not use as *many* CFLs, but they have CFLs installed in enough sockets to have relatively high saturation. This again

[3] The NMR Team thanks Victoria Engel-Fowles for permission to cite these patterns from the NYSERDA CFL saturation studies in this report.

points to the *possibility* of prioritizing which *sockets* are HTR and why households have yet to fill them with CFLs as opposed to focusing on which *customers* are HTR. However, we refrain from making specific and final recommendations until the results from other activities addressing HTR customers (*e.g.* store intercepts and supplier interviews) are complete.

Regarding market segmentation for HTR customers, most of the demographic groups reported shopping for incandescent and CFL bulbs primarily at home improvement stores. Renters, however, are less likely to shop at home improvement stores when compared to members of other demographic groups. Other common store types at which respondents shop for incandescents and CFLs include bargain, warehouse, grocery, discount, and hardware stores. Onsite households with a respondent with some college, who is white, or who is a homeowner also named program administrators as a common source of CFLs.

Climate Change Attitudes

RDD respondents generally expressed concern about environmental issues and their role as energy users. More than three-quarters (76%) say that the Earth's average temperature is definitely or probably rising as a result of human activity. One out of four (26%) respondents "strongly agreed" that they would take action to reduce energy use over the next few months.

LEDs and Other Energy-Saving Technologies

Over one-half of Massachusetts RDD survey respondents in 2009 (54%) and over three out of five (61%) in 2010 were familiar with LEDs. The types of LED applications respondents were most likely to be familiar with were flashlights or lanterns (28% in 2009, 26% in 2010), automotive lighting (17% in 2009, 8% in 2010), holiday lighting (11% in 2009, 13% in 2010), and lighting for electronic devices (11% in 2009 and 2010). In both 2009 and 2010, the vast majority of RDD respondents could not name any energy saving lighting technologies other than CFLs and LEDs.

1 Background and Methodology

This report presents the findings of research conducted to understand CFL awareness, use, and purchase behavior in Massachusetts and the comparison area of Pennington County, South Dakota, in support of the Massachusetts ENERGY STAR® Lighting Program (the Program). Moreover, the report highlights concerns related to specialty CFLs and the so-called "hard-to-reach" population (HTR) in order to provide feedback to the Program Administrators (PAs) on the impact of recent shifts toward specialty CFLs and increased targeting of the HTR population. The report integrates the findings of research conducted by the NMR Group, Inc. (NMR), KEMA, Tetra Tech, and APPRISE, Inc. from July through October 2010 (hereafter the Team). When appropriate, we also compare the results from 2010 to those reported for 2009.[4] The research included a telephone survey and onsite socket inventory of households in Massachusetts and Pennington County, South Dakota as well as return visits to a sub-sample of households that took part in the 2009 onsite saturation study. This research was conducted as part of a comprehensive impact evaluation of the Program, and the findings from additional evaluation activities (multistate modeling, supplier interviews, conjoint analysis, revealed preference, and a Delphi panel) will be delivered in separate reports. We also refrain from making recommendations until evaluation results are available from at least some of these additional activities.

1.1 Methodology

This report drew upon several data sources: a random-digit dial (RDD) survey among 381 households in Massachusetts and 500 households in Pennington County, conducted by computer-assisted telephone interviewing (CATI). The report also summarizes the results of 75 onsite visits to Massachusetts households and 93 onsite visits to Pennington County households, all recruited through the telephone surveys. In addition, we returned to 75 of the 100 households that had taken part in the 2009 onsite visits in order to assess how lighting use had changed in the past year and identify possible new CFL purchases made during the same time period.

The PAs and the evaluation team chose Pennington County as a comparison area not because it mirrors the demographic and social characteristics of Massachusetts, but instead because it served as a useful non-program area for the multistate model. We have presented some of the results from Pennington County for the PAs' information and review, but, because it is not truly a comparison area for Massachusetts, we do not discuss the results for Pennington County in detail, nor do we perform tests of statistical significance between Massachusetts and Pennington County. All results presented in the report are subject to slight rounding error.

[4] NMR. 2010. *The Market for CFLs in Massachusetts*. Delivered to the Massachusetts Program Administrators on January 28.

1.1.1 Customer Telephone Surveys

The telephone surveys were conducted by two subcontractors: Tetra Tech for Massachusetts and APPRISE for South Dakota. Respondents in both states answered a core set of questions about CFL awareness and familiarity, prior CFL use, CFL satisfaction, where they shop for lighting purchasing products, and demographic and housing characteristics. They were also asked a battery of questions about environmental opinions and early adopter behavior, in support of the multistate modeling effort. We present the overall results of the environmental and early adopter questions but do not discuss them in detail as their primary purpose was to help inform the multistate model, to be delivered in a separate report. Finally, the survey also asked Massachusetts respondents an additional series of questions about why they use CFLs, use of CFLs by their social network, CFL disposal, LEDs and other efficient lighting technologies, and reactions to federal lighting standards.

In an effort to increase the representativeness of the Massachusetts sample and to survey more households in the HTR population, the Team called both landline and cell phone numbers and allowed respondents to answer the survey in either English or Spanish. For budgetary reasons, the Team translated only the core questions for Spanish interviewing. Table 1–1 shows the percentage of Massachusetts surveys fielded by each phone line type and language. The Pennington County survey included only landline numbers and was fielded only in English.

Table 1–1: Massachusetts Surveys Fielded by Phone Type and Language

	Massachusetts 2010
Sample Size	*318*
Landline survey	85%
Cell phone survey	15
Sample Size	*318*
English survey	92%
Spanish survey	8

1.1.2 Onsite Visits

After completing the core questions in the telephone survey, each RDD survey respondent in both Massachusetts and Pennington County was offered a $150 incentive to participate in an onsite visit to their home. Subcontractor KEMA randomly selected among all respondents voicing interest and called to set up an onsite visit. KEMA successfully completed the desired 75 "new" onsite visits (hereafter new visit) in Massachusetts and 93 of the 100 desired onsite visits in Pennington County.

In addition to the new onsite visits, KEMA also "revisited" 75 households that had taken part in the 2009 onsite lighting inventory (hereafter revisit). We offered these households $250 to secure their participation and compensate them for taking part in a second lengthy lighting inventory. The team presents an analysis comparing the revisit and new visit samples on a number of key

CFL-related and demographic factors in an effort to identify any systematic differences between the two groups. Following this comparison, we typically combine the revisit and new visits households into one sample with two exceptions: 1) analyses that apply only to the revisit sample, and 2) analyses of purchase data in which we identified systematic differences between the two onsite samples.

It is also important to note that the revisit methodology presented a few challenges. Although sending a trained technician to a home resulted in a fairly accurate count of lighting products, technicians may not have been allowed access to all areas of the home or property in one year or the other. Moreover, if two different technicians visited the home in different years, they may have categorized rooms and products differently. These instances of "measurement error" challenged our ability to identify which CFLs were new to the home. To address this error, the Team performed follow-up calls with the householder and technician to clarify discrepancies, but a few differences could not be explained. Due to adjustments made during data cleaning to account for unresolved differences between 2009 and 2010, in the analyses that follow the data reported for revisit homes may differ in tables focused on changes in use across time.[5]

Onsite Visit Data Collection

During the onsite visits, a trained technician gathered detailed information on each socket in the home. This information included:

- Bulb type
- Wattage
- Application
- Socket type
- Room location
- Specialty features
- Date and store type where CFLs were purchased
- Manufacturer and model number of CFLs, when these could be determined

Massachusetts households also provided information on willingness to pay different prices for CFLs to help determine price elasticity, the results of which will be delivered in a separate memo after completing the shelf-stocking survey which provides data necessary to determine price elasticity. Revisit households, moreover, answered questions about demographic and housing characteristics that may have changed over the past year and provided responses to the environmental and early adopter questions not included in last year's telephone survey.

A typical onsite visit proceeded as follows. A trained technician arrived at the home at a pre-scheduled time, introduced himself or herself, and asked for the contact person who had been

[5] The difficulties the Team experienced with measurement error should not preclude consideration of future panel studies. Had the Team decided in 2009 to treat the onsites as a panel, we would have developed data collection protocols in a manner that would have made it easier to follow the exact same procedures in the two years, thereby reducing, measurement error.

identified when scheduling the visit. The respondent and the technician walked through each room of the home examining all lighting sockets to see if they contained a bulb and, if so, the type of lighting technology in use, the switch type, and the base type. If the product was a CFL, the technician noted its manufacturer and model number and any specialty features. The technician also asked the respondent to estimate when he or she purchased that particular CFL. The technician and householder also examined bulbs in storage, again noting similar detailed information on stored CFLs. Visits typically took less than two hours.

1.1.3 Sampling Error and Weighting Schemes

Table 1–2 shows the final sample sizes for the 2010 RDD and onsite surveys and the associated error margin at the 90% confidence level, assuming a 50/50 break in responses, for each of the samples in the study. As the table indicates, we present some of the Massachusetts onsite results treating the revisits and new visits as independent samples, while in other analyses we combine them into one sample. See Section 2 for a comparison of the two samples on key factors.

Table 1–2: Sample Size and Sampling Error

Area	Survey	Population (households)	Sample Size	Sampling Error at 90% Confidence Level
Massachusetts	RDD Survey	2,457,167	381	4%
	Onsite Revisits	2,457,167	75	10%
	Onsite New Visits	2,457,167	75	10%
	Combined Onsites	2,457,167	150	7%
Pennington County	RDD Survey	38,321	500	4%
	Onsite Visits	38,321	93	9%

The weighting schemes for the both the RDD and onsite surveys adjust for householder education and home ownership/renter status as estimated by the United States Bureau of the Census's 2006 to 2008 *American Community Survey*.[6] These schemes mirror those used in the 2009 CFL Market report. The weighting scheme for the RDD surveys was based on detailed education categories for both owners and renters (Table 1–3).[7]

Table 1–3: Population, Sample Sizes, and Weights for RDD Survey

	Massachusetts			Pennington County		
	Households	**Sample Size**	**Weight**	**Population (households)**	**Sample Size**	**Weight**
State Total	*2,457,167*	*381*	*n/a*	*38,321*	*500*	*n/a*
Owner-occupied, Less than high school degree	108,785	4	4.16	1,844	11	2.14
Owner-occupied, High school degree	372,420	38	1.50	6,470	64	1.29
Owner-occupied, Some college / tech school	387,389	66	0.90	8,955	118	0.96
Owner-occupied, Bachelors degree or higher	726,334	176	0.63	8,511	198	0.55
Renter-occupied, Less than high school degree	151,669	9	2.58	1,470	9	2.08
Renter-occupied, High school degree	250,274	20	1.91	3,777	18	2.68
Renter-occupied, Some college / tech school	207,712	26	1.22	5,089	38	1.71
Renter-occupied, Bachelors degree or higher	252,554	37	1.04	2,205	32	0.88
Refused*	n/a	5	1.00	n/a	11	1.00

* Respondent refused to answer either the home ownership or the education question, or both.

Due to smaller sample sizes, however, the weighting scheme for the onsite surveys was based only on whether or not a homeowner had a college degree or not; all renters were weighted the same no matter their education level.[8] We use four different onsite weighting schemes for Massachusetts (Table 1–4). The first and second schemes treat the revisit and new visit samples

[6] United States Bureau of the Census. 2009. *2006-2008 American Community Survey 3-Year Estimates.* http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=ACS&_submenuId=datasets_2&_lang=en Accessed November 16, 2010.

[7] NMR. 2010. *The Market for CFLs.*

[8] The weighting scheme used in the multistate modeling report differs from the scheme used in this report, so the results for certain questions (*e.g.* CFL awareness, saturation, demographics) may differ slightly between the two reports. It is NMR's recommendation that the PAs use the data reported here for filing purposes.

as separate samples and weight them *each* to represent the proportion of households in Massachusetts with the relevant education and homeownership characteristics. The third scheme combines the revisit and onsite samples into one group meant to represent the proportion of households in Massachusetts by education and homeownership. The fourth weighting scheme also combines the two onsite samples and weights them to represent numerically all 2,457,167 households in Massachusetts. In each of the onsite weighting schemes, a few households received large weights due to small sample sizes in their demographic group.[9] Pennington County has only one onsite weighting scheme, adjusted to the proportion of households in the study area based on education and homeownership (Table 1–5).

[9] The weight for onsite revisit renters is large due to the lower rates of participation in the revisit panel; not surprisingly, renters are more likely to have moved, thus disqualifying them from the revisit panel.

Table 1–4: Population, Sample Sizes, and Weights for Onsite Survey – Massachusetts

	Weighted to Proportion of Households							Weighted to Number of Households	
		Revisit		New Visit		Combined Onsite		Combined Onsite	
	House-holds	Sample Size	Weight	Sample Size	Weight	Sample Size	Weight	Sample Size	Weight
State Total	*2,457,167*	*75*	*n/a*	*75*	*n/a*	*150*	*n/a*	*150*	*n/a*
Owner-occupied, Less than Bachelors degree	868,594	18	1.36	20	1.33	38	1.34	38	22,858
Owner-occupied, Bachelors degree or higher	726,334	41	0.50	34	0.65	75	0.57	75	9,684
Renter-occupied	862,239	10	2.42	21	1.25	31	1.63	31	27,814
Refused*	n/a	6	1.00	0	1.00	6	1.00	6	Excluded

* Respondent refused to answer either the home ownership or the education question, or both.

Table 1–5: Population, Sample Sizes, and Weights for Onsite Survey – Pennington County

	House-holds	Sample Size	Weight
State Total	*38,321*	*93*	*n/a*
Owner-occupied, Less than Bachelors degree	17,269	36	1.14
Owner-occupied, Bachelors degree or higher	8,511	29	0.70
Renter-occupied	12,541	26	1.15
Refused*	n/a	2	1.00

* Respondent refused to answer either the home ownership or the education question, or both.

2 Comparison of Revisit and New Visit Onsite Samples

This section compares the revisit and new visit onsite samples on such factors as CFL awareness, familiarity, use, and purchases as well as demographic characteristics. The purpose of this comparison is to identify any systematic differences between the two onsite samples in order to assess if they should be treated as two separate groups or combined into one sample. We limit our discussion in this section to the comparison of the two samples, saving further exploration of the actual findings regarding CFLs and demographic issues for later sections of the report.

Standard panel study procedure includes surveying the same individuals more than once but also asking the same questions to a new group—the replacement sample—and comparing the results to make sure they do not differ in undesirable ways. As expected, the two onsite samples in this study exhibited similar levels of CFL awareness and familiarity, as measured in the 2009 RDD survey for the revisit sample and 2010 for the new sample (Table 2–1). Likewise, current CFL penetration (*i.e.,* the percentage of households using at least one CFL), saturation (*i.e.,* the percentage of sockets filled with CFLs), and use (*i.e.,* the number of CFLs in use), as verified in the 2010 onsite survey, were also similar for the two onsite samples. However, differences emerged when we examined CFL purchases (Table 2–1) and key demographic characteristics (Table 2–2). Importantly, these differences could be the result of the study design—in fact, some of the differences reflect *desired* results of the study design.

Three aspects of the study design increased the *potential* for systematic differences between the revisit and new visit samples. First, householders in the revisit sample had already taken part in a previous onsite survey. This prior participation could have had an impact on how revisit households used and purchased lighting products and also on their recall of doing so, influencing how revisit households responded to questions about when and where they purchased CFLs. The second feature of the study that could have led to systematic differences reflects the fact that we could only perform a revisit if the householder had not moved since the onsite survey in 2009. Renters, of course, are more likely to move, so we had a difficult time securing their participation for a revisit. Third, we *purposely* implemented the 2010 RDD and onsite surveys in a manner that would increase the representation of households meeting the PAs' current definition of HTR, which ideally would result in the *intentional* introduction of a systematic bias between the two groups, as the 2009 sample had previously been identified as having fewer HTR households than desired.

An examination of the data suggests that, in fact, these three aspects of study design did lead to some systematic differences between the two samples in terms of demographic characteristics, but these differences were *anticipated* and *desirable* because of our explicit attempts to increase representation among HTR customers. In particular, the new visit sample had more renters, households headed by someone with less than a college degree, households headed by someone who self-identified as non-white, and households with an annual income of less than $75,000 (Table 2–2). In contrast, the new visit sample was also more likely to live in a single-family,

detached home and not in a large apartment building, which is unexpected given the greater numbers of renters, although renters can live in any type of home.

The team did, however, find one *undesirable* systematic difference between the revisit and new visit samples: the revisit sample recalled purchasing only 1.7 CFLs in 2009 and 0.7 in early 2010 while the new visit sample recalled purchasing 4.9 CFLs in 2009 and 3.3 in 2010 (Table 2–1). Although we cannot be certain of the source of these differences in self-reported purchases over time, it is likely that the experience of having to estimate when they purchased each CFL in their home last year meant that revisit households anticipated the question this year and may have thought about their responses ahead of time. It is also likely that revisit households had superior recall of purchases—particularly those made after the original visit—because they had become sensitized to CFL purchases due to their prior participation in the onsite.[10]

Table 2–1: Comparison of CFL-Related Factors for Revisit and New Visit Onsite Samples

(Base: All onsite respondents by visit type)

Factor	Massachusetts Revisit Onsite Sample	Massachusetts New Visit Onsite Sample
Sample Size	*75*	*75*
Aware of CFLs*	94%	97%
Somewhat or very familiar*	42%	46%
CFL penetration**	93%	91%
CFL saturation***	27%	26%
Mean number of CFLs in use	11.3	12.3
Mean number of CFLs purchased in 2009	1.7	4.9
Mean number of CFLs purchased in 2010	0.7	3.3

* Measured in the 2009 RDD survey for the revisit sample

** Percentage of homes with at least one CFL installed as verified in the 2010 onsite visit

*** Percentage of sockets filled with CFLs as verified in the 2010 onsite visit

Table 2–2: Comparison of Demographic Factors for Revisit and New Visit Onsite Samples

(Base: All onsite respondents by visit type)

Factor	Massachusetts Revisit Onsite Sample	Massachusetts New Visit Onsite Sample
Sample Size	*75*	*75*
Rent home*	13%	28%
Single-family detached home	53%	59%
Apartment with five or more units	21%	11%
Less than a college degree	14%	22%
Racial identification as non-white	9%	17%
Income less than $75,000**	66%	71%

* Unweighted because the weighting scheme forces the percentage of renters to equal that of the state population.

** Sample size for revisit = 54 and for new visit = 68

[10] We cannot conclude that the new visit sample had larger reported purchases due to the inclusion of the HTR sample currently being targeted by the program. See Section 6 for more detail on the HTR analysis.

Taking all of these comparisons into account, the only CFL-related factor that appears to have been systematically biased in an unexpected manner by the study design is the self-reported number of CFL purchased in 2009 and 2010. For this reason, the team believes it is appropriate to combine the revisit and new visit households into one sample for all analyses *except* those focused on *when CFLs were purchased*. Furthermore, because of the small sample sizes for some demographic groups considered HTR, we will also combine the revisit and new visit samples for the HTR analysis, grouping purchases for all of 2009 and 2010 so as to reduce the bias in self-reported purchase numbers between the two onsite samples.

3 Awareness of Energy-Saving Light Bulbs

The vast majority of respondents in Massachusetts and Pennington County reported being aware of and familiar with CFLs (Table 3–1). Specifically, 94% of 2010 Massachusetts RDD respondents and 96% of 2010 Massachusetts onsite respondents reported being aware of CFLs; similarly, 42% of 2010 RDD respondents and 44% of 2010 onsite respondents reported being "very familiar" with CFLs. Nine out of ten Pennington County RDD respondents reported being aware of CFLs. Respondents to the 2010 Massachusetts RDD survey reported significantly greater awareness and familiarity with CFLs than did respondents in 2009, when 87% were aware and 32% were very familiar.

Table 3–1: Awareness of CFLs

(Base: All respondents)

Awareness	**Massachusetts 2009 RDD**	**Massachusetts 2010 RDD**	**Massachusetts 2010 Onsite Sample****	**Pennington 2010 RDD**
Sample Size	*503*	*381*	*150*	*500*
Aware of CFLs	87%	94%*	96%	90%
Not aware of CFLs	13	6*	4	10
Familiarity	**Massachusetts 2009**	**Massachusetts 2010**	**Massachusetts 2010 Onsite**	**Pennington 2010**
Sample Size	*503*	*381*	*150*	*500*
Very familiar	32%	42%*	44%	38%
Somewhat familiar	39	38	40	39
Not too familiar	11	9	7	8
Not at all familiar	5	5	9	4
Not aware of CFLs	13	6*	-	10
Don't know / refused	1	0*	-	1

* Significantly different from 2009 at the 90% confidence level.

** Responses for revisit sample reflect their awareness and familiarity as stated in the 2009 RDD survey, while those for the new visit sample reflect awareness as stated in the 2010 RDD survey.

The Massachusetts PAs made the decision to promote a greater number of specialty CFLs in 2010 than in prior program years. In response, the Team added questions to this year's RDD survey to ascertain respondents' familiarity with various types of CFLs. Table 3–2 on the next page summarizes the results of this series of questions. Taking lack of awareness of CFLs into account, most respondents in both Massachusetts and Pennington County generally were not at all familiar with most types of specialty CFLs. Respondents in both areas were more familiar with globe CFLs (55% in Massachusetts, 47% in Pennington County) than any other kind of specialty CFL. A majority of Massachusetts respondents (51%) also reported some level of familiarity with three-way CFLs. Because the PAs had implemented this movement to specialty products only in early 2010, the results of familiarity with specialty CFLs should be seen as a

baseline, and this line of questioning should be repeated in future evaluation years in order to determine if familiarity with these products increases as the program continues to support greater numbers of specialty bulbs.

Table 3–2: Familiarity with Specialty CFLs

(Base: All RDD respondents)

Type of Specialty CFL	Familiarity	Massachusetts 2010	Pennington 2010
	Sample Size	*381*	*500*
Dimmable	Very familiar	12%	12%
	Somewhat familiar	19	16
	Not too familiar	14	8
	Not at all familiar	44	49
	Not aware of CFLs*	11	15
	Don't know / refused	<1	<1
3-way	Very familiar	16%	18%
	Somewhat familiar	20	17
	Not too familiar	15	7
	Not at all familiar	36	43
	Not aware of CFLs	11	15
	Don't know / refused	<1	<1
Flood or Recessed	Very familiar	16%	14%
	Somewhat familiar	16	16
	Not too familiar	13	8
	Not at all familiar	41	46
	Not aware of CFLs	11	15
	Don't know / refused	3	<1
Candelabra	Very familiar	9%	12%
	Somewhat familiar	17	17
	Not too familiar	13	9
	Not at all familiar	48	47
	Not aware of CFLs	11	15
	Don't know / refused	1	0
Globe	Very familiar	18%	18%
	Somewhat familiar	24	21
	Not too familiar	13	8
	Not at all familiar	33	38
	Not aware of CFLs	11	15
	Don't know / refused	<1	<1
A-shaped	Very familiar	14%	15%
	Somewhat familiar	14	15
	Not too familiar	16	8
	Not at all familiar	44	46
	Not aware of CFLs	11	15
	Don't know / refused	1	<1

* Includes those not at all familiar with CFLs or who do not know their familiarity with CFLs.

The 2010 RDD survey asked respondents who currently use CFLs why they do so. We recorded the first response and then all other responses given. The most common reason given for using CFLs was to save energy (47% first response, 19% additional response) followed by saving money (13% first response, 17% additional response). Other common reasons given for using CFLs included helping the environment or reducing greenhouse gas emissions (23% overall), that the bulb is long lasting (18% overall), and that the bulb does not need to be replaced as often (10%).

Table 3–3: Reasons for Using CFLs – Massachusetts Only

(Base: English speaking RDD respondents who currently have CFLs installed)

Reasons	Main Reason	Secondary Reasons (Multiple Response)
Sample Size	*289*	*289*
Save energy	47%	19%
Save money	13	17%
Long lasting bulb	6	12%
Someone else bought them/gave them to me*	6	2%
Help the environment / reduce greenhouse gas emissions	6	17%
Like the light	1	4%
Others recommended	1	1%
Like to try new things	3	<1%
No need to replace	2	8%
Inexpensive	1	0%
Needed bulbs / only bulb available	2	0%
Bulb not hot	1	1%
Other**	1	3%
Don't know/refused	4	-

* Includes 2% who explicitly said the bulbs were given during an energy audit or by a program administrator

** Includes two respondents who explicitly cited knowledge of EISA as a reason for buying CFLs now; these questions were asked prior to the EISA questions.

In order to understand the influences that may affect CFL use, the 2010 Massachusetts RDD survey asked respondents about CFL use among their social network. The results indicate that one-half (50%) of respondents reported that at least a few of their friends and family used CFLs, but (41%) respondents did not know or refused to answer this question. Of those respondents who had friends or family using CFLs, 71% indicated that most or all of their CFL-using acquaintances liked CFLs; only two percent of respondents said their acquaintances disliked CFLs.

Table 3–4: CFL Use by Friends and Family – Massachusetts Only

(Base: English speaking RDD respondents aware of CFLs)

Statements	RDD Survey
Sample Size	*344*
None of my friends and family	5%
A few of my friends and family	27
About half of my friends and family	9
Most of my friends and family	14
All of my friends and family	5
Don't know/refused	41

Table 3–5: Friends and Family Like CFLs – Massachusetts Only

(Base: RDD respondents who have friends or family who use CFLs)

Statements	RDD Survey
Sample Size	*185*
All or most do	71%
Some do and some don't	19
No, they do not like them	2
Don't know/refused	7

4 CFL Use and Saturation

The Team ascertained CFL use through questions in the RDD survey and by observing the number of CFLs currently installed in onsite respondents' homes. Data on the history of CFL use come largely from the RDD survey, while those on the number of CFLs in use and socket saturation come from the onsite survey. We note the source of the data for all tables reported below.

4.1 History of CFL Use

More than three-fourths (77%) of 2010 RDD survey respondents reported having purchased or received a CFL at some point, and 78% reported having used a CFL (Table 4–1).[11] These percentages represent increases from the 2009 RDD in which just 66% of respondents reported having purchased or been given a CFL and 68% reported having ever used a CFL. The percentage of Pennington County respondents stating that they had ever purchased or used CFLs was lower than in Massachusetts in 2010 but comparable to the Massachusetts results for 2009.

Table 4–1: Self-Reported Use of CFLs

(Base: All RDD respondents)

Ever Purchased or Received a CFL	**Massachusetts 2009**	**Massachusetts 2010**	**Pennington 2010**
Sample Size	***503***	***381***	*500*
Yes	66%	77%*	68%
No	15	10*	16
Don't know / refused	1	1	<1
Not aware of / familiar with CFLs	19	11*	15
Have Ever Used a CFL	**Massachusetts 2009**	**Massachusetts 2010**	**Pennington 2010**
Sample Size	***503***	***381***	*500*
Yes	68%	78%*	71%
No	12	11	13
Don't know / refused	1	<1	1
Not aware of / familiar with CFLs	19	11*	15

* Significantly different from 2009 at the 90% confidence level.

[11] The larger percentage of respondents who have used a CFL than those who have purchased or received a CFL may be because these respondents moved into a house in which CFLs were previously installed by a landlord or earlier occupant.

Forty-five percent of 2010 RDD survey respondents said they first started using CFLs in the past three years, which is similar to the results for 2009 (Table 4–2). However, a statistically larger percentage of respondents in 2010 than in 2009 reported having used CFLs for four or more years (31% in 2010 vs. 22% in 2009). Likewise, the percentage of respondents who had never used CFLs, were not aware of them, or did not know if they had used a CFL dropped from 2009 (32%) to 2010 (22%). These findings suggest that CFL users persisted in their use and new households have become CFL users over the past few years. It is also worth noting that Pennington County residents had more recently started using CFLs than those in Massachusetts—51% of Pennington County respondents had started using CFLs in the past three years, and only 18% had used them for four or more years.

Table 4–2: Self-Reported First Use of CFLs

(Base: All RDD respondents)

Years	Massachusetts 2009	Massachusetts 2010	Pennington 2010
Sample Size	*503*	*381*	*500*
Less than one year	7%	5%	7%
One to three years*	37	40	44
Four or more years	22	31*	18
Don't know / refused	1	2	1
Never used/not aware or familiar**	32	22*	29

* Includes 3.5 years

**Includes respondents who said they did not know if they had ever used a CFL.

4.2 Current Use of CFLs

According to their RDD survey responses, 72% of 2010 Massachusetts respondents and 65% of Pennington County respondents had CFLs installed in their homes (Table 4–3). A statistically greater percentage of Massachusetts RDD survey respondents in 2010 (72%) said they currently had CFLs installed than in 2009 (64%).

Table 4–3: Installed CFLs – Self Reported RDD

(Base: All RDD respondents)

Currently Have CFLs Installed	MA 2009 RDD	MA 2010 RDD	Pennington 2010 RDD
Sample Size	*503*	*381*	*500*
Yes	64%	72%**	65%
No	3	6	4
Don't know / refused	1	0	1
Not aware of / familiar with CFLs*	32	22	29

*Includes respondents who said they did not know if they ever used a CFL.

** Significantly different from 2009 at the 90% confidence level.

Limiting the analysis to onsite households only, a comparison of results in Table 4–3 and Table 4–4 reveals that households taking part in the onsite were more likely than the entire RDD to report using CFLs, suggesting onsite households are more enthusiastic about CFLs than the general population. Note that here we report revisit and new visit onsite samples separately in order to ensure comparability to their original RDD survey results. Specifically, 81% of Massachusetts revisit households, 82% of Massachusetts new visit households, and 72% of Pennington County onsite households reported using CFLs during the RDD survey. The onsite inventory found that *actual* use was even higher; 89% of revisit homes (based on the original 2009 onsite to ensure comparability with their 2009 RDD resurvey responses), 91% of new visit homes, and 84% of Pennington County homes actually had CFLs installed. The differences in self-reported and onsite verified use demonstrate that some of the RDD survey respondents who said that they were not aware of or familiar with CFLs actually used them.[12]

Table 4–4: Installed CFLs – RDD and Onsite Comparison

(Base: All onsite respondents; RDD self-reports of current use and onsite versified use)

Currently Have CFLs Installed	MA Revisit RDD	MA Revisit Onsite Sample***	MA 2010 RDD	MA New Visit Onsite Sample	Pennington RDD	Pennington Onsite
Sample Size	*75*	*75*	*75*	*75*	*93*	*93*
Yes*	81%	89%	82%	91%	72%	84%
No	9	11	4	9	6	16
Not aware of / familiar with CFLs**	9	--	14	--	22	--

* For onsite respondents, "yes" signifies that the technician saw at least one CFLs installed in the home.

**Includes respondents who said they did not know if they had ever used a CFL.

*** Based on CFLs installed as verified during the 2009 visit for comparability with their 2009 RDD survey responses for use. In 2010, 93% of revisit homes had at least one CFL installed.

[12] During the RDD survey, we could not ask individuals about use and purchase behavior of a product of which they were not aware. Some respondents may have said they were not aware of or familiar with CFLs in the hope of completing the survey more quickly, but others simply did not recall—or even realize—that they had CFLs or judged that they were "not at all familiar" with CFLs.

The analysis of the revisit sample suggests that CFL use increased in those 75 households from the summer of 2009—the date of the first visit—to the fall of 2010—the date of the second visit. Table 4–5 shows that only 18% of households reduced the number of CFLs they had in use from 2009 to 2010, and they collectively reduced their use by just 39 CFLs (mean = 0.52). Most of the households reducing their use did so by only one to five CFLs (17%). In contrast, 49% of households increased their CFL use by a collective 197 CFLs (mean = 2.11), although most of the households gaining CFLs added only one to five CFLs (36%), compared to 13% that increased their use by six or more CFLs (Table 4–6). The net gain in CFL use across the 75 households was 158 CFLs (mean = 2.11). See Section 5: Purchases of Lighting Products for discussion of the number of these CFLs likely purchased in the past year.

Table 4–5: Loss of installed CFLs from 2009 to 2010

(Base: All onsite revisit respondents and CFLs found installed in the home)

Loss in number of CFL sockets (weighted)*		**2009 to 2010**
Loss 1 to 5	% of households	17%
	% of CFLs	69%
Loss 6 to 10	% of households	0%
	% of CFLs	0%
Loss 10 or more	% of households	1%
	% of CFLs	31%
Total loss CFLs	39	
Mean CFL loss from 2009 to 2010	0.52	
Sample size	75	

* Percent of households sums to 100% between Table 4–5and Table 4–6

Table 4–6: Gain of installed CFLs from 2009 to 2010

(Base: All onsite revisit respondents and CFLs found installed in the home)

Gain in number of CFL sockets (weighted)*		**2009 to 2010**
Zero	% of households	32%
	% of CFLs	0%
Gain 1 to 5	% of households	36%
	% of CFLs	33%
Gain 6 to 10	% of households	9%
	% of CFLs	27%
Gain 10 or more	% of households	4%
	% of CFLs	40%
Total gain CFLs	197	
Mean CFL gain from 2009 to 2010	2.11	
Sample size	75	

* Percent of households sums to 100% between Table 4–5and Table 4–6

Most of the onsite homes had least six CFLs installed in them with 61% of all homes having six or more CFLs installed (Table 4–7). More homes had at least one standard CFL installed (88%) than had at least one specialty CFL installed (57%). Only 19% of those homes with specialty CFLs had six or more of them installed.[13] However, as explored in Table 4–9, this minority of homes with sixteen or more CFLs installed account for the plurality of all CFLs installed across the onsite homes.

Table 4–7: Current Use of CFLs by Type and Households

(Base: All onsite participants)

	Massachusetts Onsite Sample 2010
Sample Size	*150*
All CFLs	
Zero	8%
One to five	31
Six to fifteen	35
Sixteen or more	26
Standard CFLs	
Zero	12%
One to five	39
Six to fifteen	32
Sixteen or more	18
Specialty CFLs	
Zero	43%
One to five	39
Six to fifteen	14
Sixteen or more	5

[13] Specialty CFLs identified include: dimmable, three-way, A-shaped, flood, candelabra, globe, tubes/bent tubes, and bullet CFLs.

Table 4–8 shows that onsite homes had an average of 11.7 CFLs installed, comprised of 8.4 standard CFLs and 3.4 specialty CFLs. The median number of CFLs, however, is lower – seven overall, five standard CFLs, and one specialty CFLs. The differences between the median and mean numbers of CFLs results from the fact that many of the CFLs in use are accounted for by a relatively few households, as explored more in Table 4–9.

Table 4–8: Current Use of CFLs
(Base: All onsite participants)

	Massachusetts Onsite Sample 2010
Sample Size	*150*
All CFLs	
Total CFLs in use	1,765
Mean number of CFLs in use	11.7
Median number of CFLs in use	7
% of all CFLs in use	100%
Standard CFLs	
Total CFLs in use	1,259
Mean number of CFLs in use	8.4
Median number of CFLs in use	5
% of all CFLs in use	71
Specialty CFLs	
Total CFLs in use	506
Mean number of CFLs in use	3.4
Median number of CFLs in use	1
% of all CFLs in use	29%

The majority of CFLs in use tend to be concentrated in homes that have sixteen or more CFLs installed; two–thirds (66 %) of all installed CFLs were found in homes with at least sixteen CFLs (Table 4–9). More than half of the standard CFLs were concentrated in homes with sixteen or more CFLs (53%), while specialty CFLs were more evenly distributed between homes with one to five CFLs (27%), six to fifteen CFLs (32%) and sixteen or more CFLs (40%). Again, the finding that 40% of specialty CFLs was found in homes with 16 or more CFLs is driven largely by a single new visit home with numerous exterior floods.

Table 4–9: Current Use of CFLs by Percentage of CFLs Installed
(Base: All installed CFLs)

	Massachusetts Onsite Sample 2010
Sample Size	*1,765*
All CFLs	
One to five	8%
Six to fifteen	27
Sixteen or more	66
Standard CFLs	
Sample Size	*1259*
One to five	11%
Six to fifteen	36
Sixteen or more	53
Specialty CFLs	
Sample Size	*506*
One to five	27%
Six to fifteen	32
Sixteen or more	40

During the onsite survey, the Team collected data on the manufacturer for each CFL found in use in the home (Table 4–10 Table 4–11). Of the 1,767 CFLs for whom manufacturer could be determined, two manufacturers accounted for 31% of the CFLs—N:Vision produced 290 (16%) and GE manufactured another 273 (15%). Another six manufacturers each produced between 5% and 10% of CFLs, collectively accounting for another 43% of all CFLs in use. Twenty-five manufacturers produced the remaining one-fourth of CFLs found installed in homes. Specialty CFLs are made by various manufacturers, but some manufacturers are more likely to be the source of certain types of specialty CFLs than others. For example, Phillips manufactured 67% of the bug lights, while General Electric made 40% of the dimmable CFLs.

Table 4–10: Bulb Shape by Manufacture – Number of CFLs

	A-Bulb	Bug Light	Bullet/Torpedo	Candelabra	Circline	Flood/Spot	Globe	Spiral	Tube	Other	3-way	Dimmable	Grand Total*
Sample Size	*55*	*2*	*3*	*4*	*2*	*163*	*97*	*1,306*	*119*	*17*	*32*	*58*	*1,767*
N:Vision	2	0	0	2	0	21	2	252	1	11	11	1	290
General Electric	3	1	0	0	1	34	2	219	13	0	1	23	273
Sylvania	5	0	1	0	0	10	5	125	27	0	7	0	173
Maxlite	5	0	0	0	0	1	20	115	8	0	0	2	149
Commercial Electric	0	0	0	0	0	30	0	105	1	0	0	0	137
Harmony	0	0	0	0	0	1	0	121	0	0	2	0	122
Phillips	1	1	0	1	0	26	12	44	22	1	1	0	107
Feit	2	0	0	0	0	9	3	62	3	1	0	2	80
Lights of America	0	0	0	0	0	2	2	32	10	0	0	0	47
Ecosmart	0	0	0	0	0	0	18	28	0	0	2	0	47
Conserv Energy	0	0	0	1	0	12	0	26	0	0	0	9	39
Bright Effects	0	0	0	0	0	0	0	37	0	0	2	0	37
Panasonic	11	0	2	0	0	0	5	1	14	0	0	0	32
Greenlite	2	0	0	0	0	0	2	28	0	0	0	0	32
Earthmate	0	0	0	0	0	0	3	20	0	0	4	0	23
Westinghouse	0	0	0	0	0	4	8	5	2	0	0	10	19
TCP	0	0	0	0	1	0	5	11	0	0	1	0	18
Neptune	13	0	0	0	0	0	0	1	0	0	0	6	14
Satco	0	0	0	0	0	0	1	11	0	0	0	0	12
Honeywell	0	0	0	0	0	3	0	8	0	0	0	0	11
Great Value	0	0	0	0	0	0	0	5	3	0	0	0	8
LiteTronics	6	0	0	0	0	1	0	0	0	0	0	2	7
IKEA	0	0	0	0	0	2	2	1	2	0	0	0	7
Verilux	0	0	0	0	0	0	0	4	2	0	0	0	6
Sunpark	0	0	0	0	0	0	0	4	0	0	0	0	4
Globe	0	0	0	0	0	0	0	3	0	0	0	0	3
ULA	0	0	0	0	0	0	0	3	0	0	0	2	3
Lumacoil	0	0	0	0	0	0	0	1	0	0	0	0	1
Superior Lite	0	0	0	0	0	0	0	1	0	0	1	0	1

	A-Bulb	Bug Light	Bullet/Torpedo	Candelabra	Circline	Flood/Spot	Globe	Spiral	Tube	Other	3-way	Dimmable	Grand Total*
Sample Size	*55*	*2*	*3*	*4*	*2*	*163*	*97*	*1,306*	*119*	*17*	*32*	*58*	*1,767*
Weston	0	0	0	0	0	0	0	1	0	0	0	1	1
Keystone	0	0	0	0	0	0	0	0	1	0	0	0	1
Natural Sunlight	0	0	0	0	0	0	0	0	1	0	0	0	1
Round the House	0	0	0	0	0	0	0	1	0	0	0	0	1

* Dimmable and three-way CFLs may be of any shape, so they are not included in the Grand Total number of CFLs in use.

Table 4–11: Bulb Shape by Manufacturer – Percentage of CFLs

	A-Bulb	Bug Light	Bullet/Torpedo	Candelabra	Circline	Flood/Spot	Globe	Spiral	Tube	Other	3-way	Dimmable	Grand Total*
Sample Size	*55*	*2*	*3*	*4*	*2*	*163*	*97*	*1306*	*119*	*17*	*32*	*58*	*1767*
N:Vision	3%	0%	0%	56%	0%	13%	2%	19%	0%	63%	35%	2%	16%
General Electric	6	33	0	0	30	21	3	17	11	0	2	40	15
Sylvania	9	0	42	0	0	6	5	10	23	0	23	0	10
Maxlite	9	0	0	0	0	1	21	9	6	0	0	3	8
Commercial Electric	0	0	0	0	0	19	0	8	1	0	0	0	8
Harmony	0	0	0	0	0	1	0	9	0	0	5	0	7
Phillips	1	67	0	15	0	16	12	3	18	7	4	0	6
Feit	3	0	0	0	0	6	4	5	3	3	0	3	5
Lights of America	0	0	0	0	0	1	2	2	9	0	0	0	3
Ecosmart	0	0	0	0	0	0	19	2	0	0	5	0	3
Conserv Energy	0	0	0	30	0	7	0	2	0	0	0	15	2
Bright Effects	0	0	0	0	0	0	0	3	0	0	6	0	2
Panasonic	21	0	58	0	0	0	5	0	12	0	0	0	2
Greenlite	3	0	0	0	0	0	2	2	0	0	0	0	2
Earthmate	0	0	0	0	0	0	3	2	0	0	13	0	1
Westinghouse	0	0	0	0	0	2	8	0	1	0	0	17	1
TCP	0	0	0	0	70	0	6	1	0	0	4	0	1
Neptune	24	0	0	0	0	0	0	0	0	0	0	11	1
Satco	0	0	0	0	0	0	1	1	0	0	0	0	1
Honeywell	0	0	0	0	0	2	0	1	0	0	0	0	1
Great Value	0	0	0	0	0	0	0	<1	2	0	0	0	<1
LiteTronics	11	0	0	0	0	1	0	0	0	0	0	3	<1

	A-Bulb	Bug Light	Bullet/Torpedo	Candelabra	Circline	Flood/Spot	Globe	Spiral	Tube	Other	3-way	Dimmable	Grand Total*
Sample Size	*55*	*2*	*3*	*4*	*2*	*163*	*97*	*1306*	*119*	*17*	*32*	*58*	*1767*
IKEA	0	0	0	0	0	1	2	<1	2	0	0	0	<1
Verilux	0	0	0	0	0	0	0	<1	1	0	0	0	<1
Sunpark	0	0	0	0	0	0	0	<1	0	0	0	0	<1
Globe	0	0	0	0	0	0	0	<1	0	0	0	0	<1
ULA	0	0	0	0	0	0	0	<1	0	0	0	4	<1
Lumacoil	0	0	0	0	0	0	0	<1	0	0	0	0	<1
Superior Lite	0	0	0	0	0	0	0	<1	0	0	4	0	<1
Weston	0	0	0	0	0	0	0	<1	0	0	0	2	<1
Keystone	0	0	0	0	0	0	0	0	<1	0	0	0	<1
Natural Sunlight	0	0	0	0	0	0	0	0	<1	0	0	0	<1
Round the House	0	0	0	0	0	0	0	<1	0	0	0	0	<1

* Dimmable and three-way CFLs may be of any shape, so they are not included in the Grand Total number of CFLs in use.

4.3 Socket Saturations

In both 2009 and 2010, just over one-fourth of the sockets in Massachusetts onsite homes (26%) contained CFLs (Table 4–12). The percentage of sockets filled with incandescent bulbs decreased from 2009 to 2010, but was offset by increases in regular fluorescent and halogen bulbs rather than CFLs. CFL saturation is not very different between Massachusetts and Pennington County, where saturation stood at 24%. However, as Table 4–13 shows, this is partly a function of the fact that Pennington County respondents more frequently lived in smaller homes, and smaller homes in both areas tended to have higher saturation levels. Saturations of specialty bulbs of any type changed little in Massachusetts from 2009 to 2010, but saturations of specialty CFLs did increase from 4% in 2009 to 7% in 2010, suggesting that the new program focus on specialty CFLs may be having the desired impact. Optimistically, if each incandescent and halogen bulb were converted to CFLs, approximately 64% of sockets could still be converted to screw-in CFLs or LEDs, but the actual potential for CFLs and LEDs is likely less. Fixture shape, the nature of various applications, and the preferences of householders will limit the number of sockets that will be converted to CFLs or LEDs making realizable potential lower than 64%, but we do not have the data to estimate by how much lower.

Table 4–12: Socket Saturations
(Base: All onsite participants)

Sockets Containing	Massachusetts		Pennington 2010
	2009 Onsite	2010 Onsite	
Sample Size	*100*	*150*	*93*
Total Sockets	**3,709**	**6,741**	**4,356**
Incandescent bulbs	62%	57%	59%
CFLs	26	26	24
Fluorescent	6	9	13
Halogen	5	7	3
LEDs	<1	<1	0
Other	<1	1	0
*Any specialty bulb***	30%	31%	21%
*Any specialty CFL***	4%	7%	4%

* Specialty bulbs include: dimmable, three-way, tubes/bent tubes, flood shaped, candelabra shaped, globe shaped, bullet shaped, bug lights of any bulb type and A-shaped CFLs.
**Specialty bulbs and specialty CFLs also fall within shape categories and therefore are not additive.

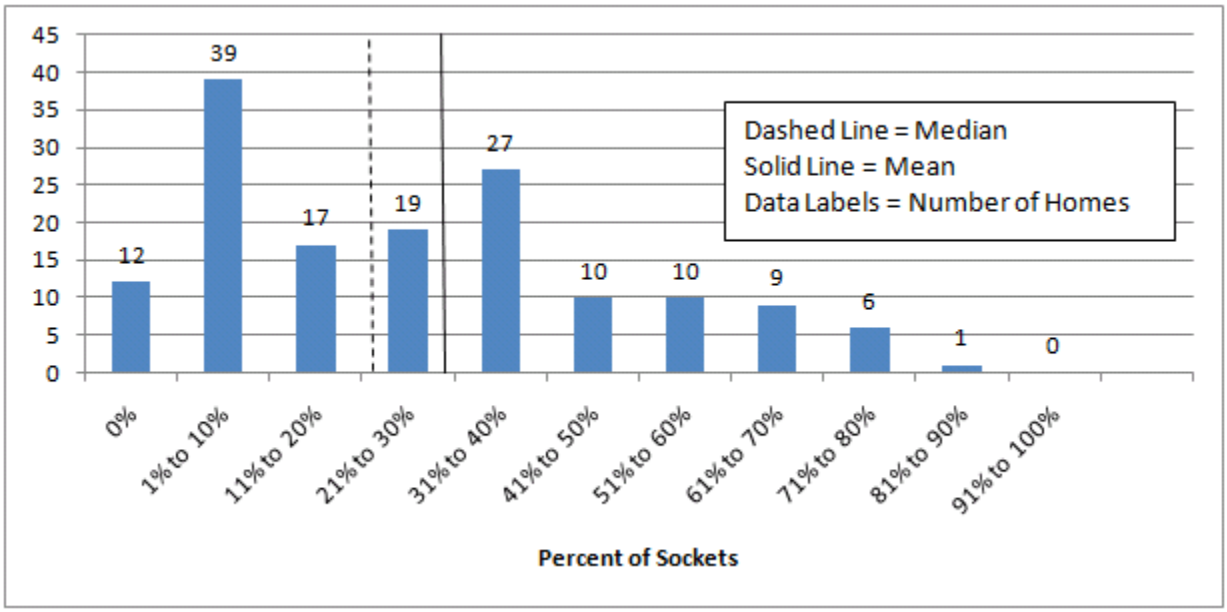
Table 4–13: Comparison of Saturations by Home Size

	MA Onsites n = 150		Pennington County n = 93	
	% Homes	Saturation	% Homes	Saturation
LT 2,000 sqft*	51%	28%	63%	28%
2,000 or more*	45%	24%	24%	22%
	% Homes	Saturation	% Homes	Saturation
Up to 5 rooms	43%	36%	53%	26%
6 room or more	56%	23%	47%	23%

* Many respondents did not know the size of their home, so the percent of homes does not add up to 100%.

Figure 4-1 displays the distribution of CFL saturation across homes, noting the mean (26%) and median (23%) saturation for all the homes. The data point to a bimodal distribution—meaning that it has two distinct "peaks." Specifically, the data evidence one peak in homes with saturation between one and ten percent (39 homes) and another with saturation between 31% and 40% (27 homes). A total of 26 of the onsite homes had more than one-half of their sockets filled with CFLs, although no homes had saturation of 100%.

Figure 4-1: CFL Saturation per Household



Looking more closely at only the revisit sample, we find that these households increased their use of CFLs from 23% of sockets to 27% of sockets (Table 4–14). Incandescent use decreased by 6%, with many of those sockets being converted to CFLs. Fluorescent and halogen bulbs also showed slight gains. Note that the data reported in Table 4–14 differ slightly from those in Table 4–12 due to adjustments made during the revisit analysis to account for unexplained differences in reported socket numbers between the two visits.

Table 4–14: Socket Saturation Revisit Households: 2009 and 2010

Sockets Containing	2009 Onsite	2010 Onsite Revisits	Change
Sample Size	*75*	*75*	
Total Sockets	**2,963**	**3,106**	**143**
Incandescent bulbs	63%	57%	-6%
CFLs	23	27	4
Fluorescent	7	8	1
Halogen	6	8	2

The remainder of the tables in this section summarize saturation from the 2009 and 2010 onsite surveys by room type, fixture type, socket type and bulb features.[14] The first four tables (Table 4–15 to Table 4–18) compare CFL saturation for these categories across the 2009 and 2010 onsite samples. For the PA's information, the remainder of the tables (Table 4–19 to Table 4–26) provide the saturation for all bulb types as well as the remaining potential—both percent of bulbs and number of bulbs—for CFLs and LEDs by room type, fixture and socket type, and bulb shape, but we do not discuss the data in detail.

[14] Given measurement error, the Team determined that comparisons of saturation from 2009 to 2010 among revisit homes would threaten the validity of the results.

Saturation of CFLs remained consistent or showed slight increases from 2009 to 2010 in most room types (Table 4–15). Notable gains in CFL saturation were made in bathrooms, the exterior of the home, and family rooms. Decreased usage was evident in dining rooms and garages.

Table 4–15: Socket Saturation by Room Type
(Base: All onsite participants)

Sockets Containing	2009 Onsite	2010 Onsite
Sample Size	*100*	*150*
Living Room	33%	35%
Kitchen	30%	28%
Bedroom	26%	28%
Hall	28%	28%
Exterior	19%	27%*
Bathroom	18%	27%*
Basement	34%	26%
Family Room	15%	25%*
Office	23%	24%
Foyer	16%	21%
Utility/Laundry	0%	19%
Garage	38%	12%*
Dining Room	20%	10%*
Other	0%	14%

In both samples, CFLs were most commonly found in portable fixtures such as table lamps and floor lamps (73% in 2009 and 76% in 2010) (Table 4–16). Use of CFLs in wall mounts and recessed fixtures increased from 2009 to 2010, as evidenced by an increase in saturation of these socket types (6% increase in saturation for both). CFL saturation dropped only in ceiling flush mount fixtures (from 28% to 24%). CFL use in ceiling fan and pendant fixtures as well as track lighting remained relatively stable from 2009 to 2010. Saturation remained lowest in pendant (18%), track (9%), and under-cabinet fixtures (3%). The saturation of screw-base sockets remained stable at about 30% across both samples (Table 4–17). GU base socket types are at 100% saturation. However, the saturation of pin-base sockets decreased slightly from 2009 to 2010, which is consistent with the slight increase in traditional fluorescent lighting, which is also pin based (Table 4–12).

Table 4–16: Socket Saturation by Fixture Type
(Base: All onsite participants)

Sockets Containing	2009 Onsite	2010 Onsite
Sample Size	*100*	*150*
Table Lamp	35%	41%
Floor Lamp	38%	35%
Ceiling Fan	28%	30%
Wall Mount	21%	27%
Ceiling Flush Mount	29%	24%
Recessed	17%	23%
Pendant	16%	18%
Track	8%	9%
Night Light	0%	<1%
Under Cabinet	0%	3%
Other	0%	10%

Table 4–17: Socket Saturation by Socket Type
(Base: All onsite participants)

Sockets Containing	2009 Onsite	2010 Onsite
Sample Size	*100*	*150*
GU Base	0%	100%
Screw base (small/medium)	28%	28%
Pin base	11%	7%
Other/Unknown	0%	<1%

CFLs have not made great headway into various types of specialty applications. Most bulbs of non-spiral shapes are not CFLs. However, the saturation of dimmable and three-way bulbs that are CFLs increased significantly from 2009 to 2010 (by 10% for each of these specialty bulb types), which may indicate some success in the PAs' increased support of specialty CFLs. Note that the Team believes that some mislabeling of the lighting technology for certain bulb types (*e.g.* globes and circline bulbs) may have occurred in either 2009 or 2010 as it is unlikely that their saturations changed this much in one year.

Table 4–18: Socket Saturation by Bulb Features

(Base: All onsite participants)

Sockets Containing	2009 Onsite	2010 Onsite
Sample Size	*100*	*150*
Spiral	100%	100%
Bug Light	0%	75%
Bullet/Torpedo	0%	50%
Globe**	11%	40%†
Flood/Spot	10%	17%
Tube	14%	14%
Circline**	44%	2%†
A-Bulb*	3%	2%
Candelabra	1%	1%
Other	0%	6%
*Dimmable***	9%	19%†
*Three-way***	17%	27%†

† Statistically significant at the 90% confidence level.

*A-shaped bulbs are the typical shape for standard incandescent bulbs. A-shaped CFLs are made to look and feel like traditional incandescent bulbs.

** Differences in the pictures provided to identify CFLs may have influenced whether technicians classified these products as CFLs or other types of lighting. Moreover, sample sizes for circline bulbs are small.

***Dimmable and three-way bulbs also fall within shape categories and therefore are not additive.

The remainder of the tables in this section provide detail on saturation for all bulb types and estimate the remaining potential for CFLs. The results for potential are presented both as percentages and the number of bulbs. It is important to keep in mind that the stated potential serves as a best case scenario. Actual potential will be lower due to limitations of fixture shape, lighting application, and the preferences of the householder.

Table 4–19: Socket Saturation – Room Types by Percent of Sockets

(Base: All onsite participants)

Socket Type	All Sockets	CFL	Fluorescent	Halogen	Incandescent	LED	Other	Potential for CFLs or LEDs
Sample Size	*150*	*150*	*150*	*150*	*150*	*150*	*150*	*150*
Total Sockets	**109,907,993**	**28,098,169**	**10,521,911**	**7,397,634**	**62,690,067**	**426,537**	**773,674**	**73,211,978**
Bedroom	18%	28%	3%	2%	63%	<1%	4%	66%
Bathroom	12%	27%	3%	4%	66%	<1%	<1%	69%
Kitchen	12%	28%	17%	11%	42%	3%	<1%	58%
Basement	11%	26%	28%	5%	41%	<1%	<1%	69%
Living Room	10%	35%	2%	4%	59%	<1%	<1%	61%
Exterior	8%	27%	0%	20%	53%	<1%	<1%	53%
Dining Room	6%	10%	1%	2%	87%	<1%	<1%	88%
Hall	6%	28%	1%	8%	63%	<1%	<1%	64%
Garage	3%	12%	45%	2%	40%	<1%	<1%	85%
Family Room	4%	25%	5%	11%	57%	1%	<1%	63%
Foyer	3%	21%	4%	5%	70%	<1%	<1%	74%
Office	2%	24%	11%	10%	55%	<1%	<1%	66%
Utility or Laundry Room	1%	19%	29%	4%	48%	<1%	<1%	77%
Other	5%	14%	20%	11%	55%	<1%	<1%	76%

Table 4–20: Room Types by Number of Sockets

(Base: All onsite participants)

Socket Type	All Sockets	CFL	Potential for CFLs or LEDs
Sample Size	*150*	*150*	*150*
Total Sockets (in millions)	**109.9**	**28.1**	**73.2**
Bedroom	19.3	5.4	12.7
Bathroom	13.3	3.5	9.2
Kitchen	13.7	3.8	8.0
Basement	12.5	3.3	8.6
Living Room	10.6	3.7	6.5
Exterior	8.7	2.3	4.6
Dining Room	6.5	.6	5.8
Hall	6.2	1.8	4.0
Garage	2.8	.3	2.4
Family Room	4.0	1.0	2.5
Foyer	3.6	.7	2.6
Office	1.9	.5	1.3
Utility or Laundry Room	1.5	.3	1.1
Other	5.2	.7	3.9

Table 4–21: Socket Saturation – Fixture Types by Number of Sockets

(Base: All onsite participants)

Socket Type	All Sockets	CFL	Fluorescent	Halogen	Incandescent	LED	Other	Potential for CFLs or LEDs
Sample Size	*150*	*150*	*150*	*150*	*150*	*150*	*150*	*150*
Total Sockets	**109,907,993**	**28,098,169**	**10,521,911**	**7,397,634**	**62,690,067**	**426,537**	**773,674**	**73,211,978**
Flush Mount	25%	24%	27%	1%	49%	<1%	<1%	76%
Wall Mount	20%	27%	5%	10%	57%	1%	<1%	62%
Table Lamp	13%	41%	1%	3%	55%	<1%	<1%	57%
Recessed	12%	23%	<1%	16%	60%	<1%	<1%	61%
Pendant	15%	18%	6%	1%	75%	<1%	<1%	81%
Floor Lamp	4%	35%	3%	4%	58%	<1%	<1%	61%
Track	2%	9%	<1%	65%	26%	<1%	<1%	26%
Ceiling Fan	6%	30%	<1%	<1%	69%	<1%	<1%	69%
Under Cabinet	2%	3%	35%	47%	1%	14%	<1%	36%
Night Light	<1%	<1%	<1%	<1%	100%	<1%	<1%	100%
Other	2%	10%	6%	6%	47%	<1%	31%	53%

Table 4–22: Socket Saturation by Fixture Types – Number of Sockets

(Base: All onsite participants)

Socket Type	All Sockets	CFL	Potential for CFLs or LEDs
Sample Size	*150*	*150*	*150*
Total Sockets (in millions)	**109.9**	**28.1**	**73.2**
Flush Mount	27.1	6.4	20.6
Wall Mount	22.1	6.0	13.6
Pendant	13.8	5.6	7.8
Ceiling Fan	13.1	3.0	7.9
Table Lamp	16.3	2.9	13.2
Recessed	4.7	1.6	2.9
Floor Lamp	1.8	.2	.5
Track	7.0	2.1	4.8
Under Cabinet	1.7	.06	.6
Night Light	.02	-	.02
Other	2.3	.2	1.2

Table 4–23: Socket Saturation – Socket Types by Percent of Sockets

(Base: All onsite participants)

Socket Type	All Sockets	CFL	Fluorescent	Halogen	Incandescent	LED	Other	Potential for CFLs or LEDs
Sample Size	*150*	*150*	*150*	*150*	*150*	*150*	*150*	*150*
Total Sockets	**109,907,993**	**28,098,169**	**10,521,911**	**7,397,634**	**62,690,067**	**426,537**	**773,674**	**73,211,978**
Screw base (small/medium)	86%	28%	<1%	5%	67%	<1%	<1%	67%
Pin base	14%	7%	68%	19%	<1%	1%	5%	68%
GU base	<1%	100%	<1%	<1%	<1%	<1%	<1%	<1%
Other / Unknown	<1%	<1%	<1%	8%	<1%	92%	<1%	<1%

Table 4–24: Socket Saturation by Socket Types – Number of Sockets

(Base: All onsite participants)

Socket Type	All Sockets	CFL	Potential for CFLs or LEDs
Sample Size	*150*	*150*	*150*
Total Sockets	**109.9**	**28.1**	**73.2**
Screw base (small/medium)	94.2	1.1	62.7
Pin base	15.2	.2	10.3
GU base	.2	0	0
Other / Unknown	.3	28.1	0

Table 4–25: Socket Saturation – Bulb Features by Percent of Sockets

(Base: All onsite participants)

Sockets Containing	All Sockets	CFL	Fluorescent	Halogen	Incandescent	LED	Other	Potential for CFLs or LEDs
Sample Size	*150*	*150*	*150*	*150*	*150*	*150*	*150*	*150*
Total Sockets	**109,907,993**	**28,098,169**	**10,521,911**	**7,397,634**	**62,690,067**	**426,537**	**773,674**	**73,211,978**
A-Bulb	41%	2%	<1%	1%	97%	<1%	<1%	97%
Spiral	20%	100%	0%	0%	0%	0%	0%	0%
Tube	12%	14%	68%	11%	<1%	1%	5%	68%
Flood/Spot	14%	17%	0%	36%	47%	<1%	<1%	47%
Candelabra	4%	1%	<1%	<1%	99%	<1%	<1%	99%
Globe	4%	40%	<1%	<1%	60%	<1%	<1%	60%
Circline	1%	2%	98%	<1%	<1%	<1%	<1%	98%
Bullet/Torpedo	<1%	50%	<1%	33%	<1%	<1%	17%	<1%
Bug Light	<1%	75%	<1%	<1%	25%	<1%	<1%	25%
Other	4%	6%	1%	5%	83%	5%	<1%	84%
*Dimmable***	5%	19%	<1%	12%	69%	<1%	<1%	88%
*Three-way***	2%	27%	<1%	<1%	73%	<1%	<1%	100%

*A-shaped bulbs are the typical shape for standard incandescent bulbs. A-shaped CFLs are made to look and feel like traditional incandescent bulbs.
**Dimmable and three-way bulbs also fall within shape categories and therefore are not additive.

Table 4–26: Socket Saturation by Bulb Features – Number of Sockets

(Base: All onsite participants)

Sockets Containing	All Sockets	CFL	Potential for CFLs or LEDs
Sample Size	*150*	*150*	*150*
Total Sockets (in millions)	**109.9**	**28.1**	**73.2**
A-Bulb	44.8	.9	43.6
Spiral	21.5	21.5	0.0
Tube	13.6	2.0	9.2
Flood/Spot	14.9	2.5	7.0
Candelabra	4.9	.05	4.9
Globe	4.1	1.6	2.4
Circline	1.2	.02	1.1
Bullet/Torpedo	.06	.03	0.0
Bug Light	.04	.03	.01
Other	4.8	.3	4.0
*Dimmable***	.9	5.1	3.5
*Three-way***	.5	2.0	1.5

*A-shaped bulbs are the typical shape for standard incandescent bulbs. A-shaped CFLs are made to look and feel like traditional incandescent bulbs.
**Dimmable and three-way bulbs also fall within shape categories and therefore are not additive.

4.4 Current Storage of CFLs

During the onsite visit, the technicians also counted the CFLs in storage in the homes. The top of Table 4–27 shows that nearly two-thirds of onsite homes have no CFLs in storage and only 13% have six or more.

Table 4–27: Current Storage of CFLs by Households*

(Base: All onsite participants)

All CFLs	2010 Onsite
Sample Size	*150*
Zero	63%
One to five	24
Six to fifteen	9
Sixteen or more	4
CFL Storage	
Total number of households	*150*
Total CFLs in storage	380
Mean number of CFLs in storage	2.5

Table 4–28 shows that just 21% of the CFLs in storage in onsite homes are found in homes with one to five stored CFLs, whereas 51% of the stored CFLs are found in the 4% of homes with sixteen or more CFLs in storage. In combination with the results shown in Table 3-25, these findings suggest that a few outliers who have many stored CFLs account for a large percentage of the total CFLs found in storage in onsite homes.

Table 4–28: Current Storage of CFLs by Percentage of CFLs in Storage

(Base: All onsite participants)

All CFLs	2010 Onsite
Sample Size	*150*
Number of CFLs in storage	380
One to five	21%
Six to fifteen	28
Sixteen or more	51

Focusing on the revisit sample, just 35 of the 75 revisit households stored CFLs in either 2009 or 2010 or both years. Table 4–29 suggests that about 35% of these CFL-storing households reduced the number of CFLs they had in storage between the summer of 2009 and the fall of 2010, resulting in a reduction of 40 CFLs in storage. About one-fourth (26%) of these households reduced their stored CFLs by only one to five bulbs, but 9% of households decreased the number of stored CFLs by six or more, accounting for 60% of the loss in stored CFLs. In contrast, most of the 35 households (66%) increased the number of CFLs they had in storage, adding 64 new CFLs in storage for a net increase of 24 CFLs in storage across the entire sample. See Section 5: Purchases of Lighting Products for discussion of how these data inform CFL purchases in the past year.

Table 4–29: Loss of stored CFLs from 2009 to 2010

(Base: All onsite revisit respondents and CFLs found installed in the home)

Loss in number of stored CFLs (weighted)*		**2009 to 2010**
Loss 1 to 5	% of households	26%
	% of CFLs	40%
Loss 6 or more	% of households	9%
	% of CFLs	60%
Total loss of stored CFLs	40	
Mean loss of CFL	1.14**	
Sample size	35	

* Percent of households sums to 100% between Table 4–29 and Table 4–30

** Based on households storing CFLs in 2009 or 2010 or both.

Table 4–30: Gain of stored CFLs from 2009 to 2010

(Base: All onsite revisit respondents and CFLs found installed in the home)

Gain in number of stored CFLs (weighted)*		**2009 to 2010**
Zero	% of households	3%
	% of CFLs	0%
Gain 1 to 5	% of households	57%
	% of CFLs	73%
Gain 6 or more	% of households	6%
	% of CFLs	27%
Total gain of stored CFLs	64	
Mean change	1.83	
Sample size	35	

* Percent of households sums to 100% between Table 4–29 and Table 4–30

** Based on households storing CFLs in 2009 or 2010 or both.

4.5 CFL Disposal

In both 2009 and 2010, seven out of ten survey respondents (70% in 2009, 69% in 2010) had not disposed of any CFLs in the past 12 months (Table 4–31). Among those who had disposed of CFLs in the past 12 months, most (16% in 2009, 13% in 2010) said they had thrown them away and many of the others had recycled them (11% in both years). A few had returned them to the store in order to recycle them.

Table 4–31: Disposal of CFLs in Past 12 Months

(Base: In 2009 asked to those RDD respondents aware of CFLs and who had purchased or received CFLs; in 2010, asked to those RDD respondents aware of CFLs who responded in English; multiple response)

	Massachusetts 2009	Massachusetts 2010
Sample Size	*362*	*344*
Threw away in trash	16%	13%
Recycled/dropped off at hazardous waste center	11%	11%
Returned to store to recycle	1%	2%
Don't know / refused	2%	1%
Have not disposed of CFLs	70%	69%

4.6 Satisfaction with Installed CFLs

Telephone survey respondents in Massachusetts continued to be satisfied with CFLs, with 86% in both 2009 and 2010 stating that they were "very satisfied" or "somewhat satisfied" with CFLs (Table 4–32). Pennington County residents also voiced high levels of satisfaction with CFLs, with 82% saying they were somewhat or very satisfied.

Table 4–32: Satisfaction with Standard CFLs

(Base: RDD survey current or past CFL Users)

Satisfaction	Massachusetts 2009	Massachusetts 2010	Pennington 2010
Sample Size	*339*	*313*	*374*
Very satisfied	55%	50%	52%
Somewhat satisfied	31	36	30
Neither satisfied nor dissatisfied	7	3	6
Somewhat dissatisfied	3	7*	7
Very dissatisfied	2	3*	5
Don't know / refused	2	1	1

* Statistically significant at the 90% confidence level.

Table 4–33 and Table 4–34 display the reasons RDD survey respondents voiced for dissatisfaction. Table 4–33 lists the percentage of dissatisfied respondents citing each reason for their dissatisfaction, while Table 4–34 shows the same information but based on all 2010 respondents who had ever used CFLs in order to show that the overall sample voiced very little dissatisfaction with CFLs (2009 data were not reported in this manner). The most common reason for dissatisfaction with CFLs among Massachusetts respondents in 2010 was that the light

is perceived as not bright enough (36%), which represents an increase from 2009 (25%). One out of five 2010 respondents (20%) also disliked the light color or quality of the light, but this is a decrease from 2009 when 36% of respondents cited this reason for dissatisfaction. When compared to 2009, a smaller percentage of respondents in 2010 also named dissatisfaction with the mercury or disposal hazard (12% in 2010 vs. 23% in 2009); this may reflect the fact that recycling options for CFLs have increased, with numerous retailers and other locations hosting CFL recycling drop boxes. Fewer respondents in 2010 mentioned dissatisfaction with the delay in the light coming in (13% in 2010 vs. 20% in 2009), but a few more cited the fit in the fixture (11% in 2010 vs. 7% in 2009). Pennington County respondents generally cited similar reasons for dissatisfaction with CFLs, but they were more likely to name premature failure/burn out (23%) than their counterparts in Massachusetts (7% in 2010, 11% in 2009).

Table 4–33: Reason for Dissatisfaction with CFLs

(Base: Respondents with CFL satisfaction ratings of "very dissatisfied," "somewhat dissatisfied," or "neither satisfied nor dissatisfied," multiple response)

Satisfaction	Massachusetts 2009	Massachusetts 2010	Pennington 2010
Sample Size	*40*	*42*	*72*
Light color or quality	36%	20%	10%
Not bright enough	25%	36%	56%
Mercury/disposal hazard/other safety	23%	12%	10%
Delay in coming on	20%	13%	21%
Burned out	11%	7%	23%
Savings less than expected	10%	8%	9%
Fit in the fixture	4%	11%	5%
Appearance	4%	2%	5%
Broke/stopped working	1%	4%	3%
Too bright	0%	2%	1%
Flickering	0%	8%	3%
Don't last as long	-	3%	0%
Price	n/a	7%	4%
Other reasons	n/a	9%	5%
Don't know / refused	<1%	7%	5%

Table 4–34: Reason for Dissatisfaction with CFLs

(Base: All respondents who have ever used a CFL)

Satisfaction	Massachusetts 2010	Pennington 2010
Sample Size	*313*	*374*
Light color or quality	3%	2%
Not bright enough	5%	10%
Mercury/disposal hazard	1%	2%
Delay in coming on	2%	4%
Burned out	<1%	4%
Savings less than expected	1%	2%
Fit in the fixture	1%	1%
Appearance	<1%	1%
Broke/stopped working	<1%	1%
Too bright	<1%	<1%
Flickering	1%	1%
Don't last as long	<1%	0%
Price	1%	1%
Other reasons	1%	1%
Don't know / refused	1%	1%

5 Purchases of Lighting Products

As mentioned above, the new visit and revisit onsite samples differed substantially in the number and date of self-reported CFL purchases. For this reason, we discuss their results separately. Moreover, due to the timing of the onsite surveys, the purchase estimates reported here pertain to the entire year of 2009 but only to the *first half* of 2010 even though we refer to "2010" throughout the section for the ease of discussion.

5.1 Number and Type of CFLs Purchased

Onsite participants were asked how many and what types of CFLs they had purchased or obtained in the years 2009 and the first half of 2010 (Table 5–1). Approximately two out of five new Massachusetts onsite participants (40% in 2009, 44% in 2010) reported obtaining CFLs in these two time periods; a comparable portion (44%) of revisit onsite participants reported obtaining CFLs in 2009, but fewer (12%) reported obtaining CFLs in 2010. The 2010 revisit onsite percentage is significantly different from both the 2009 revisit onsite percentage and the 2010 new onsite percentage. It is not clear why this difference exists; it may be due, in part, to a "reactive effect" on the part of the revisit sample from their 2009 participation. By taking part in the previous onsites, the revisited participants may have changed their purchasing behavior or altered their strategies for estimating when they obtained CFLs, leading to substantially different self-reported purchase behavior for 2010. Only one in five Pennington County respondents had obtained CFLs in 2009, but more than one in three (36%) obtained CFLs in 2010.

Far fewer onsite participants reported obtaining specialty CFLs. Approximately one out of six new Massachusetts onsite participants (17% in 2009, 15% in 2010) reported obtaining specialty CFLs, with 17% of revisit onsite participants obtaining specialty CFLs in 2009 decreasing to 7% in 2010. In Pennington County, 6% of respondents reported obtaining specialty CFLs in 2009, increasing to 14% in 2010.

Table 5–1: CFLs Purchased by Household and Type in 2009 and 2010

(Base: All onsite participants)

	2009			2010		
	MA Revisits	**MA New Visits**	**Pennington**	**MA Revisits**	**MA New Visits**	**Pennington**
Sample Size	*75*	*75*	*93*	*75*	*75*	*93*
All CFLs						
Zero	58%	60%	80%	88%*	56%**	64%
One to five	23	21	14	7*	26**	11
Six to fifteen	15	12	5	4*	14**	16
Sixteen or more	4	7	1	1	4	9
Standard CFLs						
Zero	62%	62%	82%	90%*	59%**	65%
One to five	38	22**	12	5*	27**	13
Six to fifteen	0	11**	5	4*	11	13
Sixteen or more	0	4**	1	1	4	9
Specialty CFLs						
Zero	81%	84%	94%	94%*	86%	86%
One to five	16	11	5	6*	10	10
Six to fifteen	1	3	1	1	4	3
Sixteen or more	1	3	0	0	1	1

* Significantly different from same sample in 2009

** Significantly different from revisit sample in same year

New Massachusetts onsite participants purchased an average of 4.9 CFLs in 2009 and 3.3 CFLs in the first half of 2010 (Table 5–2) with standard CFLs accounting for 73% and 70% of purchases, respectively. Revisited onsite participants purchased far fewer CFLs—an average of 1.7 in 2009 and 0.7 in the first half of 2010—with standard CFLs accounting for 71% and 78% of the totals in 2009 and 2010, respectively. As noted above, it is unclear why the difference between new and revisited Massachusetts onsite participants exists. Pennington County participants purchased an average of 1.5 CFLs in 2009 jumping to 4.8 CFLs in the first half of 2010. Specialty CFLs remained rare, however, with standard CFLs accounting for 83% and 86% of purchases, respectively.

Table 5–2: Number of CFLs Purchased in 2009 and 2010 by Type

(Base: All onsite participants)

	2009			2010		
	MA Revisits	**MA New Visits**	**Pennington**	**MA Revisits**	**MA New Visits**	**Pennington**
Sample Size	*75*	*75*	*93*	*75*	*75*	*93*
All CFLs						
Total CFLs purchased	120	364	137	52	246	443
Mean number of CFLs purchased	1.7	4.9	1.5	0.7	3.3	4.8
% of all CFLs purchased	100%	100%	100%	100%	100%	100%
Standard CFLs						
Total CFLs purchased	85	267	114	40	173	383
Mean number of CFLs purchased	1.2	3.6	1.2	0.6	2.3	4.1
% of all CFLs purchased	71%	73%	83%	78%	70%	86%
Specialty CFLs						
Total CFLs purchased	35	97	23	12	73	60
Mean number of CFLs purchased	0.5	1.3	0.2	0.2	1.0	0.6
% of all CFLs purchased	29%	27%	17%	22%	30%	14%

In order to extrapolate these purchases to all households in Massachusetts, we combined the revisit and new visit samples and weighted them to the population of all households in the states. This extrapolation suggests that Massachusetts households purchased a total of 8.5 million CFLs in 2009 and 5.3 million CFLs in the first half of 2010. Standard spiral CFLs accounted for 6.8 million of the CFLs purchased in 2009 and 4.1 million in the first half of 2010. Households purchased a total of 1.6 million specialty CFLs in 2009 and 1.2 million in the first half of 2010. At the time of the onsite, it appears that Massachusetts households were on track to exceed the number of CFLs obtained in 2009. According to national CFL shipment data, shipments in the second half of 2010 were slightly higher than in the first half of the year, with a ratio of 1.05. If we assume that shipment rate in Massachusetts matches that of the nation, then we can conclude that approximately 10.9 million CFLs were sold in Massachusetts in 2010, comprised of 8.4 million standard CFLs and 2.5 million specialty CFLs. In keeping with the program revision, specialty products comprised a slightly larger percentage of CFLs in the first half of 2010 than in 2009 (Table 5–3).

Table 5–3: Estimates of All CFLs Purchased in Massachusetts

Products	2009*	First Half 2010	All 2010
Total CFLs Purchased	*8,447,382*	*5,302,592*	*10,870,314*
Standard CFLs			
Total CFLs Purchased	6,806,150	4,078,801	8,361,543
% of All CFLs Purchased	81%	77%	77%
Specialty CFLs			
Total CFLs Purchased	1,641,2326	1,223,790	2,508,771
% of All CFLs Purchased	19%	23%	23%

In an effort to pinpoint the number of CFLs purchased between the summer of 2009 and the early fall of 2010, the Team counted the difference in CFL usage and storage from 2009 to 2010. As Table 5–4 shows, the revisit households added a total of 200 CFLs to their homes between the first and second visits. Most of these (158) were newly installed CFLs and the remaining 24 were newly stored CFLs. Even if all of the 99 CFLs stored in 2009 were installed in 2010, revisit households replaced each of these 99 stored CFLs and added another 24 CFLs in storage. Therefore, our best estimate is that revisit households purchased a total of 200 CFLs (2.4 per household) over the course of the year.[15] This estimate is equal to the self-reported purchases during the same period by revisit households (1.7 in 2009 and 0.7 in 2010; see Table 5–2).

Table 5–4: CFLs installed and stored 2009 to 2010

Installed and Stored	2009	2010	Change
Sample Size	*75*	*75*	
Net increase in CFLs installed (weighted)	699	857	158
Stored CFLs (weighted)	99	123	24
*Overall change in CFLs 2009 to 2010	182		
Average number of CFLs gained per household	2.43		

*Net increase of CFLs installed minus stored CFLs that were taken out of storage for 2010 plus those gained in storage for 2010

To verify the accuracy of this estimate further, the Team also examined the *unweighted* change in CFLs in use and storage in the revisit sample from 2009 to 2010 with their *self-reported* purchases in the second half of 2009 and the first half of 2010. We compared the unweighted numbers because the weighting scheme has a differential impact on individual households, and the raw comparison offers the more appropriate check on accuracy. The results in Table 5–5 show a high degree of correspondence between the two approaches of estimating CFL purchases in the past year lending increased credibility to both approaches. It should be kept in mind that by taking part in the 2009 effort, the revisit sample is likely more sensitive to their CFL use and purchases than the general population (or the new visit sample prior to our visit), thereby reducing the self-report error in their estimates of when CFLs were purchased.

Table 5–5: Accuracy Check on Revisit Purchase Analysis*

Data Source	Installed CFLs	Stored CFLs
Difference Summer 2009 to Fall 2010	183	45
Self-Reported Purchases Summer 2009 to Fall 2010	193	48

* Data are unweighted to provide a more appropriate comparison.

The team also determined the manufacturer for CFLs obtained in 2009 and the first half of 2010. Table 5–6 lists the number of CFLs purchased for each manufacturer by whether the product was

[15] Note that the Team had expected to compare model numbers of CFLs found in use and storage in 2009 with those in 2010, but the measurement discussed in Section 1.1.2 limited the usefulness of this analysis.

a specialty or standard CFL. We report the *number* of CFLs due to the relatively small sample sizes of purchases, particularly for each manufacturer. Commercial Electric, the former Home Depot Brand, accounted for the largest number of CFLs respondents reported purchasing in 2009 (137 CFLs); adding N:Vision, the current Home Depot brand name, bulbs (86 CFLs) to Commercial Electric yields a total of 223 CFLs (42% of the total), far higher than any other manufacturer for 2009. This demonstrates the dominance of Home Depot in the 2009 CFL market. The manufacturers for the CFLs reported as purchased in the first half of 2010 are more varied, with three manufacturers—General Electric, Sylvania, and Maxlite—accounting for 42% of the purchase. N:Vision and Commercial Electric comprised only 10% of the CFLs reported as purchased in the first half of 2010. Feit, Commercial Electric, and General Electric produced the greatest number of specialty CFLs reported as purchased in 2009, while, Ecosmart, Maxlite, Sylvania, and Conserv Energy accounted for the largest number of specialty products obtained in the first half of 2010. It is important to note that the *self-reported* date of purchase is subject to respondent error and the date of actual purchase may differ.

Table 5–6: Total Purchases by Manufacturer

Manufacturer	2009			2010		
	Specialty	**Standard**	**Total**	**Specialty**	**Standard**	**Total**
Sample Size	*137*	*399*	*536*	*80*	*227*	*307*
Commercial Electric	26	111	137	1	7	8
GE	21	40	61	3	47	50
N:Vision	19	67	86	2	18	20
Sylvania	14	40	54	12	29	41
Feit	30	16	47	8	14	21
Maxlite	0	31	31	15	22	37
Harmony	0	12	12	0	34	34
Ecosmart	4	10	14	16	7	23
Phillips	6	12	18	1	14	14
Conserv Energy	1	4	5	11	4	15
Earthmate	3	9	12	4	1	5
Bright Effects	1	5	6	1	8	9
Greenlite	0	10	10	1	5	5
TCP	3	8	10	0	2	2
Honeywell	0	11	11	0	0	0
Great Value	0	5	5	0	3	3
Lights of America	1	1	1	0	7	7
IKEA	2	1	3	2	0	2
Dura Bright	0	0	0	0	4	4
Verilux	2	0	2	0	2	2
ULA	0	0	0	2	1	4
Westinghouse	2	0	2	2	0	2
Broada	0	3	3	0	0	0
Sunpark	0	2	2	0	0	0
Weston	1	0	1	0	0	0
Globe	0	1	1	0	0	0

Manufacturer	2009			2010		
	Specialty	Standard	Total	Specialty	Standard	Total
Sample Size	*137*	*399*	*536*	*80*	*227*	*307*
LiteTronics	1	0	1	0	0	0
Neptune	1	0	1	0	0	0
Panasonic	0	0	0	1	0	1
Round the House	0	1	1	0	0	0

5.2 Type of Stores where Respondents Shop for Light Bulbs

Massachusetts RDD respondents who had bought incandescent or CFL bulbs in 2009 were asked where they had purchased them. In 2010, all RDD respondents were asked where they had purchased incandescent bulbs; those who said they had also purchased CFLs were asked where they had purchased the latter. It is important to note that the wording of the question was slightly different in the two years. In 2009, respondents were read a series of thirteen store types and asked if they had purchased any incandescent or, if applicable, CFL bulbs from that type of store during the past year. In 2010, respondents were asked simply, "Where do you buy incandescent or regular light bulbs?" and "Where do you buy CFLs?" and were read the thirteen store types. Thus, 2010 responses were more likely to reflect where bulbs were usually bought rather than where specific bulbs were bought during the past year.

As Table 5–7 shows, incandescent bulbs were most likely to be bought at mass merchandise or discount stores, home improvement stores, grocery stores or supermarkets, and hardware stores. CFLs were most likely to be bought at home improvement stores, mass merchandise or discount stores, and hardware stores.

Table 5–7: Type of Store where Bulbs were Purchased

(Base: RDD respondents who purchased incandescent or CFL bulbs in 2009; all respondents for incandescent in 2010 and respondents who purchased CFL bulbs in 2010; multiple response*)

Store Type	Massachusetts 2009		Massachusetts 2010		Pennington 2010	
	Incandes-cent Bulbs	CFL Bulbs	Incandes-cent Bulbs	CFL Bulbs	Incandes-cent Bulbs	CFL Bulbs
Sample Size	*346*	*215*	*381*	*314*	*500*	*364*
Grocery/supermarket	46%	20%	21%	16%	18%	13%
Warehouse	11%	10%	4%	5%	3%	6%
Home improvement	51%	46%	40%	48%	35%	50%
Hardware	28%	23%	14%	13%	25%	26%
Mass merchandise/discount	49%	34%	28%	21%	55%	45%
Drugstore	23%	12%	5%	3%	1%	<1%
Convenience	2%	0%	<1%	0%	0%	0%
Specialty lighting/electrical	4%	2%	1%	3%	1%	1%
Home furnishing	2%	1%	0%	1%	0%	<1%
Mail order catalog	1%	1%	0%	<1%	0%	<1%
Internet	1%	1%	1%	1%	0%	<1%
Bargain	24%	12%	9%	6%	3%	1%
Office supply	3%	0%	2%	1%	0%	<1%
Do not purchase	-	-	10%	0%	1%	1%
Military Base	-	-	0%	0%	4%	4%
Someone else buys / bought	-	-	1%	5%	0%	0%
PA program	-	-	<1%	4%	0%	0%
Where price is best	-	-	1%	1%	0%	0%
Other	<1%	1%	0%	1%	1%	<1%
Don’t know / refused	-	-	0%	0%	5%	4%

Onsite respondents were asked when and where they had purchased any CFLs found installed or in storage in their homes. As Table 5–8 shows, one-half or more of the CFLs purchased by Massachusetts and Pennington County households in 2009 were bought at home improvement stores with much smaller numbers bought at warehouse stores, bargain stores, grocery stores or supermarkets, and hardware stores. In 2010, the percentage of CFLs purchased at home improvement stores decreased by about 30% in both areas, with respondents turning increasingly to warehouse stores, bargain stores (in Massachusetts only), and mass merchandise or discount stores to buy CFLs. This points to a diversification in the types of stores carrying CFLs not only in Massachusetts but also in Pennington County, a non-program area.[16] Programs offered by the Massachusetts PAs provided 4% of the CFLs obtained in 2009 and 16% of those obtained in 2010.

Table 5–8: Type of Store where Bulbs where Purchased: Revisits and New Visits*

(Base: All onsite respondents; percentages based on weighted number of CFLs reported purchased in each time period; multiple response by time period but not by bulb)

	2009		2010	
Store Type	**Massachusetts**	**Pennington**	**Massachusetts**	**Pennington**
Sample Size	*150*	*93*	*150*	*93*
Number of CFLs Purchased	**406**	**150**	**205**	**519**
Home improvement	52%	75%	25%	42%
Warehouse	8	1	16	15
Bargain	7	0	15	0
Mass merchandise/ discount	5	5	10	13
Hardware	3	8	7	7
Grocery/supermarket	8	0	2	2
Drugstore	2	5	2	0
Home furnishing	1	0	1	0
Internet	1	0	0	0
PA program	4	0	16	1
Other**	0	0	0	3
Don't know/refused	10	7	7	17

* We do not report the store of purchase prior to 2009 due to the large numbers of "don't know" responses.

** Most "other" purchases in South Dakota occurred at a store on an air force base

[16] Note that NMR did not observe this pattern in Rhode Island or many of the other areas surveyed as part of the multistate modeling effort. In these areas, home improvement stores remained the most commonly named source of CFL purchases.

In support of the multistate modeling effort, the RDD survey included a question about how long it took respondents to drive to the nearest home improvement or large discount store. Most Massachusetts respondents drive fewer than fifteen minutes to get to the nearest store. Very few (6%) drive more than 30 minutes. Given the more rural setting, it is not surprising that only 54% of Pennington County residents live within 15 minutes of a home improvement or discount store; 12% of them drive more than 30 minutes to get to these stores. (Table 5–9)

Table 5–9: Average Time to Nearest Large Discount of Home Improvement Store

(Base: All Respondents)

Time	Massachusetts 2010	Pennington 2010
Sample Size	*381*	*500*
Fewer than 15 minutes	66%	54%
15 to 29 minutes	27%	35
30 to 59 minutes	5%	11
60 to 89 minutes	1%	<1
90 minutes or more	0%	<1
Don't know / refused	2%	0

5.3 EISA and Possible Stockpiling

The Federal Energy Independence and Security Act (EISA) of 2007 includes new efficiency standards for lighting products. EISA sets maximum wattage levels by lumen output for medium screw-base lamps that have a range from 310 to 2600 lumens and are capable of operating at a voltage range of 110 to 130 volts. The standards are to become effective under a phased approach beginning in 2012 (Stage 1) when general service bulbs will be required to use 20 to 30% less energy than current incandescent bulbs. EISA has raised some concerns about stockpiling incandescent bulbs. Incandescent stockpiling was documented in the United Kingdom,[17] and German sources report that sales of incandescent bulbs jumped by 34% during the first half of 2009 in anticipation of restrictions.[18] RDD survey respondents were asked if they had heard that some incandescent bulbs will be phased out and whether they planned to buy extra incandescent bulbs before 2012 and save them for use when the new standards go into effect. One-fourth (25%) of 2010 RDD survey respondents had heard of traditional incandescent bulbs being phased out, a significantly greater percentage than in 2009 (18%)(Table 5–10). Once EISA provisions were briefly described to them, three out of ten (30%) of the 2010 respondents and 29% of 2009 said they were very or somewhat likely to buy extra incandescent bulbs for use when the new standards go into effect. If we limit the analysis to only those respondents already aware of EISA, the percentages "very likely" to stockpile in 2009 and 2010 are higher, but only statistically so in 2009.

Table 5–10: EISA and Incandescent Purchases

(Base: English speaking RDD respondents)

Heard of EISA phase out	**Massachusetts 2009**		**Massachusetts2010**	
	All Respondents	**Aware of EISA**	**All Respondents**	**Aware of EISA**
Sample Size	*503*	*n/a*	*365*	*n/a*
Yes	18%	n/a	25%*	n/a
Plan to buy extra incandescent light bulbs before 2012				
Sample Size	*503*	*104*	*365*	*108*
Very likely	14%	22%*	15%	20%
Somewhat likely	15	17	15	9*
Somewhat unlikely	13	9	11	14
Very unlikely	52	49	52	52
Don't know/Refused	6	3	8	5

[17] Hoarding of incandescent bulbs by both retailers and consumers happened in the United Kingdom, after the government asked retailers voluntarily to stop selling 75-Watt and 100-Watt CFLs in advance of their legal banning in 2012. See http://www.nytimes.com/2009/04/24/world/europe/24bulbs.html?ref=earth. (Accessed April 2009)

[18] Europe's Ban on Old-Style Bulbs Begins. New York Times. August 31, 2009. http://www.nytimes.com/2009/09/01/business/energy-environment/01iht-bulb.html (accessed August 31, 2009)

6 Hard-to-Reach Analysis

The Massachusetts PAs revised the Program in 2010 to increase targeting of so-called HTR customers. Their working definition of these customers includes the following (listed in order of our discussion below):

- Non-Caucasian
- Ethnic minorities
- Household primary speaks a language other than English
- Household income between 60% and 120% of the state median income
- Has not attained a college degree

The Team sought to explore this definition of HTR and to provide information on whether it accurately describes HTR customers in Massachusetts. The first step in this exploration was to increase the number of respondents matching the current definition of HTR by fielding the RDD survey using both cell phone and landlines and allowing respondents to answer the survey in Spanish or English (See Table 1–1). The second step involved examining the remaining potential for CFLs, as it may be that converting sockets still filled with non-CFLs is more "hard to reach" than particular sub-groups within the population (See Section 0). The final step explores CFL awareness, familiarity, use, saturation, and purchases by demographic, economic, and social characteristics. Before presenting the results of this final set of analyses, we must caution that, despite our efforts to recruit households currently defined as HTR, the sample sizes for some of the groups become quite small, particularly for the onsite survey. Therefore, the ability to generalize the results remains limited.

6.1 Language, Ethnicity, and Race

Looking first at the primary language spoken at home and self-identified ethnicity and race, we find that the vast majority of RDD survey respondents were aware of and familiar with CFLs (Table 6–1 on the next page). Still, respondents who did not identify as white were statistically less likely to be aware of CFLs (84% non-white vs. 95% white) and to state lower levels of familiarity with CFLs (70% non-white vs. 87% white). Although linguistic, ethnic, and racial minority groups consistently reported using CFLs for fewer years, only the difference between self-identified Latinos and non-Latinos was statistically significant (20% Latino vs. 33% non-Latino). Table 6–2 likewise demonstrates differences in the percentage of respondents who had ever purchased or used CFLs, but only those who self-identify as Latino were statistically less likely to report having purchased or been given CFLs (70% Latino vs. 90% non-Latino) or used CFLs (72% Latino vs. 90% non-Latino) than were their non-Latino counterparts.

Table 6–1: Awareness and Familiarity of CFLs by Primary Language Spoken at Home and Self-Identified as Spanish/Hispanic/Latino

(Base: All RDD respondents for awareness and use; respondents aware of CFLs for familiarity)

Language	Sample Size	Aware of CFLs	Sample Size	Familiar with CFLs	Sample Size	Used CFL 4+ Years
English	358	94%	339	86%	358	33%
All Other	23	89%	20	76%	23	21%
Self-Identification	**Sample Size**	**Aware of CFLs**	**Sample Size**	**Familiar with CFLs**	**Sample Size**	**Used CFL 4+ Years**
All Other	345	94%	327	85%	345	33%
Spanish/Hispanic/Latino	33	94%	30	80%	33	20%*
Self-Identification	**Sample Size**	**Aware of CFLs**	**Sample Size**	**Familiar with CFLs**	**Sample Size**	**Used CFL 4+ Years**
White	324	95%	310	87%	324	32%
Non-White	57	84%**	49	70%**	57	26%

* Significantly different from respondents not identifying at Latino at the 90% confidence level.

** Significantly different from respondents self-identifying as white at the 90% confidence level.

Table 6–2: Prior Ownership and Use of CFLs by Primary Language Spoken at Home and Self-Identified as Spanish/Hispanic/Latino

(Base: All RDD respondents aware and familiar with CFLs)

Language	Sample Size	Have Purchased or been Given CFLs	Have Used CFLs in the Home
English	358	89%	90%
All Other	23	68%	73%
Self-Identification	**Sample Size**	**Have Purchased or been Given CFLs**	**Have Used CFLs in the Home**
All Other	316	90%	90%
Spanish/Hispanic/Latino	30	70%**	72%**
Self-Identification	**Sample Size**	**Have Purchased or been Given CFLs**	**Have Used CFLs in the Home**
White	302	87%	89%
Non-White	46	90%	81%

* Significantly different from respondents primary speaking English at the 90% confidence level.

** Significantly different from respondents not identifying at Latino at the 90% confidence level.

Table 6–3 and Table 6–4 show the *unweighted* counts by self-identified race of the number of CFLs in use at the time of the onsite or reported during the onsite visit as purchased in 2009 and 2010. They also display the *weighted* mean number of CFLs in use or purchased and socket saturation for each group. The data suggest that one-half of non-white households had more than six CFLs installed, compared to 68% of white households. Non-white households had an average of seven CFLs installed and saturation of 21% (Table 6–3), both considerably lower than white households. Moreover, nineteen of the twenty-two non-white households in the sample had purchased CFLs in 2009, but only twelve had purchased CFLs in 2010. In both time periods, white households purchased greater numbers of CFLs, on average, than did non-white households. We do not show these results for language or ethnicity; no Latino households and only two Spanish-speaking households took part in the onsites survey.

Table 6–3: Current CFL Use by Self Identified Racial Status

(Base: All onsite participants; unweighted counts of households in each grouping of use due to small sample sizes)

Data	Status	*Sample Size*	Zero	One to Five	Six to Fifteen	Sixteen+	Mean # of CFLs	Satura-tion
Onsite Visits	White	*125*	8	32	42	43	13.0	27%
	Non-White	*22*	3	8	7	4	6.9	21%

Table 6–4: CFL Purchases in 2009 and 2010 by Self Identified Racial Status

(Base: All onsite participants; unweighted counts of households in each grouping of use due to small sample sizes)

Data	Status	*Sample Size*	Zero	One to Five	Six to Fifteen	Sixteen+	Mean # of CFLs
Onsite Visits 2009	White	*125*	73	25	18	9	3.9
	Non-White	*22*	12	5	3	2	3.0
Onsite Visits 2010	White	*125*	81	24	15	5	2.4
	Non-White	*22*	19	2	1	0	0.7

6.2 Income and Education

The PAs' current definition of HTR customers includes households with less than a college degree. It also targets households between 60% and 120% of the median household income—what we call here "moderate income" households. Together, the PAs, EEAC consultants, and evaluation team agreed that the determination of moderate income would adjust for household size in accordance with the criteria for the Low Income Home Energy Assistance Program (LIHEAP). During the telephone surveys (or during the onsite visit for revisit households), respondents chose the category in which their household income fell and also stated the number of people in the household. Based on the scheme outlined in Table 6–5, we assigned all households in the RDD survey and onsite samples to one of three groups: 1) low income, 2) moderate income, and 3) high income. The shaded cells represent the moderate income group that best coincides with the current HTR definition. For example, the stereotypical four-member household making $50,000 to $99,999 a year is considered "moderate income." It is important to remember that these criteria are based on incomes relative to others in the state—the median is the mid-point, not the average. As such, designation as "high income" does not make a household "rich" but, instead, indicates their relative status compared to others in the state.

Table 6–5: Income Groups Adjusted for Household Size

Family Size	$0 to $29,999	$30,000 to $39,999	$40,000 to $49,999	$50,000 to $74,999	$75,000 to $99,999	$100,000 to $149,999	$150,000 or higher
1	Low	Moderate	Moderate	High	High	High	High
2	Low	Low	Moderate	Moderate	High	High	High
3	Low	Low	Low	Moderate	Moderate	High	High
4	Low	Low	Low	Moderate	Moderate	High	High
5	Low	Low	Low	Moderate	Moderate	Moderate	High
6 or higher	Low	Low	Low	Low	Moderate	Moderate	High

The data in Table 6–6 indicate that high income households were more likely than low-income households to be aware of CFLs (98% vs. 90%), to be familiar with CFLs (91% vs. 78%), and to have used CFLs for four or more years (46% vs. 24%). High-income households were also more likely than moderate income households to have used CFLs for four or more years (44% vs. 30%). However, no differences existed in awareness, familiarity, or duration of use between low-income and moderate income households. Awareness of CFLs was very consistent across education groups, but both familiarity and duration of CFL use increased with educational attainment. Familiarity with CFLs among college-educated respondents (94%) was significantly higher than for all three other educational groups. Prior purchase of CFLs was statistically higher among high-income households (93%) than low-income ones (84%), and use of CFLs was higher among both high-income (98%) and moderate-income households (93%) compared to low-income ones (78%) (Table 6–7). Note that this finding draws into question the inclusion of moderate-income households as HTR. Respondents with a college education were also statistically more likely to have used CFLs than those with a high school diploma.

Table 6–6: Awareness and Familiarity of CFLs by Income and Education

(Base: All RDD respondents for awareness and use; respondents aware of CFLs for familiarity)

Language	**Sample Size**	**Aware of CFLs**	**Sample Size**	**Familiar with CFLs**	**Sample Size**	**Used CFL 4+ Years**
Low Income	109	90%	98	78%	109	24%
Moderate Income	86	95%	82	84%	86	30%
High Income	116	98%*	113	91%*	116	46%*†
Self-Identification	**Sample Size**	**Aware of CFLs**	**Sample Size**	**Familiar with CFLs**	**Sample Size**	**Used CFL 4+ Years**
< High School	13	93%	12	68%	13	23%
High School	58	94%	54	76%	58	27%
Some College	93	94%	87	85%	93	29%
College	213	94%	202	94%$^{\infty\pm\delta}$	213	38%

* Significantly different than low-income households at the 90% confidence level.

† Significantly different than moderate-income households at the 90% confidence level.

$^{\infty}$ Significantly different than households with less than a high school education at the 90% confidence level.

$^{\pm}$ Significantly different than households with a high school diploma at the 90% confidence level.

$^{\delta}$ Significantly different than households with some college at the 90% confidence level.

Table 6–7: Prior Ownership and Use of CFLs by Income and Education

(Base: All RDD respondents aware and familiar with CFLs)

Income Group	Sample Size	Have Purchased or been Given CFLs	Have Used CFLs in the Home
Low Income	91	84%	78%
Moderate Income	80	91%	93%*
High Income	112	93%*	98%*
Education Level	**Sample Size**	**Have Purchased or been Given CFLs**	**Have Used CFLs in the Home**
< High School	10	81%	83%
High School	50	82%	80%
Some College	84	89%	89%
College	200	90%	92%±

* Significantly different than low-income households at the 90% confidence level.

± Significantly different than households with a high school diploma at the 90% confidence level.

Most respondents in all income groups used CFLs, but *every* high-income household in the onsite visit sample, had at least one CFL installed at the time of the onsite survey (Table 6–8). The average number of CFLs installed in homes, furthermore, increased with income. Saturation was comparable across all three incomes groups.[19] Turning to purchases, we find that, no matter what their income level, many households in both samples did not buy CFLs in 2009 or 2010 (Table 6–9). Across the eighteen-month period, high-income households purchased the largest number of CFLs (8.0), while purchase rates among low- and moderate-income households were comparable (4.6 for low-income and 4.7 for moderate-income).

Table 6–8: Current Use by Income

(Base: All onsite participants; unweighted counts of households in each grouping of use due to small sample sizes)

Data	Education	Sample Size	Zero	One to Five	Six to Fifteen	Sixteen+	Mean # of CFLs	Satura-tion
Onsite Visits	Low Income	*39*	5	11	17	6	7.8	26%
	Moderate Income	*46*	4	14	11	17	12.6	25%
	High Income	*39*	0	11	11	17	17.4	27%

Table 6–9: CFL Purchases in 2009 and 2010 by Income

(Base: All onsite participants; unweighted counts of households in each grouping of use due to small sample sizes)

Data	Status	*Sample Size*	Zero	One to Five	Six to Fifteen	Sixteen+	Mean # of CFLs
Onsite Visits 2009	Low Income	*39*	27	8	3	1	3.5
	Moderate Income	*46*	26	14	5	1	1.5
	High Income	*39*	17	6	10	6	5.4
Onsite Visits 2010	Low Income	*39*	30	6	2	1	1.1
	Moderate Income	*46*	25	11	7	3	3.2
	High Income	*39*	25	9	4	1	2.6

[19] In Rhode Island we found that high saturation of low-income households could at least partially be explained by their participation in low-income programs administered by National Grid or the federal Low Income Heating Assistance Program. This is not the case in Massachusetts, where most respondents saying they obtained CFLs from program administrator programs were moderate to high income.

All households headed by someone with a high school diploma had a CFL, but, as we discuss below on where respondents obtained CFLs, this cannot be explained solely by CFLs obtained through direct-install programs (Table 6–10). Households headed by high school graduates and those with some college each had about ten CFLs installed; saturation stood at 29% for households in which the respondent had a high school diploma and 27% in those where the respondent had some college. Households with college graduates had the greatest average number of CFLs installed (13.4) but the lowest saturation rate (23%), which is likely an artifact of the larger size of homes. The purchase data suggest that households with some college or a college degree purchase CFLs at similar rates, while those with a high school diploma purchased fewer CFLs (Table 6–11).

Table 6–10: Current CFL Use by Education

(Base: All onsite participants; unweighted counts of households in each grouping of use due to small sample sizes)

Data	Education	Sample Size	Zero	One to Five	Six to Fifteen	Sixteen+	Mean # of CFLs	Satura-tion
Onsite Visits	High School*	*18*	0	8	6	4	10.0	29%
	Some College	*35*	4	10	12	9	10.1	27%
	College	*86*	7	22	27	30	13.4	23%

* Includes two households in which respondent has less than a high school diploma

Table 6–11: CFL Purchases in 2009 and 2010 by Education

(Base: All onsite participants; unweighted counts of households in each grouping of use due to small sample sizes)

Data	Status	*Sample Size*	Zero	One to Five	Six to Fifteen	Sixteen+	Mean # of CFLs
Onsite Visits 2009	High School*	*18*	10	6	2	0	1.7
	Some College	*35*	25	6	3	1	4.0
	College	*86*	43	20	15	8	3.9
Onsite Visits 2010	High School*	*18*	12	4	2	0	1.5
	Some College	*35*	25	6	2	2	2.3
	College	*86*	55	16	12	3	2.5

* Includes two households in which respondent has less than a high school diploma

6.3 Homeowners and Renters

Although homeownership status is not currently a part of the PAs' definition of HTR, the Team explored the potential role that being a homeowner or renter may play on CFL awareness, familiarity, use and purchases. The results indicate that homeowners were statistically more likely to be aware of CFLs (96% vs. 90%), familiar with CFLs (89% vs. 75%), to have purchased or been given a CFL (91% vs. 79%), and to have used a CFL (91% vs. 81%) (Table 6–12 and Table 6–13).

Table 6–12: Awareness and Familiarity of CFLs by Homeownership

(Base: All RDD respondents for awareness and use; respondents aware of CFLs for familiarity)

Home Ownership	Sample Size	Aware of CFLs	Sample Size	Familiar with CFLs	Sample Size	Used CFLs 4+ Years
Home Owner	287	96%	275	89%	287	34%
Renter	93	90%*	83	75%*	93	27%

* Statistically different from home owners at the 90% confidence level.

** Statistically different from households contacted via land line at the 90% confidence level.

Table 6–13: Prior Ownership and Use of CFLs by Homeownership

(Base: All RDD respondents aware and familiar with CFLs)

Home Ownership	Sample Size	Have Purchased or been Given CFLs	Have Used CFLs in the Home
Home Owner	270	91%	91%
Renter	77	79%*	81%*

* Statistically different from home owners at the 90% confidence level.

Table 6–14 and Table 6–15 further indicate lower levels of CFL use and purchases among renters (5.4 CFLs in use and purchase rates of just over one in each time period) than among homeowners (15.0 CFLs in use and purchase rates of 4.9 CFLs in 2009 and 2.5 in the first half of 2010). However, due in large part to small homes (and small sample sizes), the socket saturation among the rented homes in our sample exceeds that of home owners (29% renter vs. 26% owner).

Table 6–14: Current CFL Use by Ownership Status

(Base: All onsite participants; unweighted counts of households in each grouping of use due to small sample sizes)

Data	Status	*Sample Size*	Zero	One to Five	Six to Fifteen	Sixteen+	Mean # of CFLs	Satura-tion
Onsite Visits	Own	*119*	9	27	37	46	15.0	26%
	Rent	*31*	3	14	13	1	5.4	29%

Table 6–15: CFL Purchases in 2009 and 2010 by Home Ownership

(Base: All onsite participants; unweighted counts of households in each grouping of use due to small sample sizes)

Data	Status	*Sample Size*	Zero	One to Five	Six to Fifteen	Sixteen+	Mean # of CFLs
Onsite Visits 2009	Own	*119*	65	25	18	11	4.9
	Rent	*31*	21	7	3	0	1.4
Onsite Visits 2010	Own	*119*	80	20	14	5	2.5
	Rent	*31*	23	6	2	0	1.2

Overall, it appears that CFL awareness, familiarity, and prior use are high, but some evidence exists that these attributes are lower in many households currently considered HTR than among their non-HTR counterparts. However, the lower rates of awareness, familiarity, and prior use do not mean that the PAs should assume that *saturation* is lower. Only households self-identifying as non-white had saturation rates lower than households identifying as white. In all other cases, saturation rates rivaled or exceeded those of college-educated, and higher-income, home-owning counterparts—a finding driven by smaller home sizes and fewer sockets of presumed HTR customers. In other words, many customers currently considered HTR may not use or buy as *many* CFLs, but they have CFLs installed in enough sockets to have relatively high saturation. This again points to the *possibility* of prioritizing which *sockets* are HTR and why households resist filling them with CFLs as opposed to focusing on which *customers* are HTR. However, we refrain from making specific and final recommendations until the results from other activities addressing HTR customers (*e.g.* store intercepts and supplier interviews) are complete.

6.4 Hard-to-Reach Market Segmentation

The PAs and EEAC Consultants also desired an analysis of where HTR customers shop for lighting products in general and CFLs in particular. The results, presented in Table 6–16, list the top three stores at which RDD survey respondents said they shop for incandescent bulbs and

CFLs. Most of the demographic groups reported shopping for *both* types of bulbs primarily at home improvement stores. For those groups who primarily shopped elsewhere, home improvement stores were the second most likely store at which they shopped for bulbs. Only one group differed from this pattern—renters did not typically shop at home improvement stores for incandescent bulbs, although they did shop there for CFLs. Other common store types at which respondents shopped for incandescents and CFLs include grocery, discount, bargain, and hardware stores. Only one store-type was unique to any demographic group: Spanish speakers and those self-identifying as Latino listed office supply stores among their top three locations to buy both CFLs and incandescent bulbs.

Table 6–17 presents similar information for the onsite lighting inventory, but instead lists the top three store types at which respondents in each group reported purchasing the CFLs installed or stored in their homes. Home improvement stores served as the most common store-type at which respondents recalled obtaining the CFLs found in their homes, but the percentages of respondents buying CFLs at home improvement stores varied from a low of 18% for renters to a high of 62% for non-white and low-income households. Overall, the second most common store type named is bargain stores. Warehouse stores and hardware stores were also common store types at which households obtained CFLs, but only renters named grocery stores among the top sources of CFLs in their homes. Onsite respondents, moreover, named one important source of CFLs not cited in the RDD survey—program administrators. Households with some college named PA programs as the second most common source of CFLs in their homes, and moderate income respondents and home owners cited PAs as the third most common source of CFLs. Renters, households with moderate to high incomes, and college educated households bought CFLs from a wider variety of stores (as evidenced by their lower percentages of purchases from home improvement stores) than other demographic groups.

The evidence suggests that diversifying the types of stores carrying CFLs would expand the venues at which the products are available and make them easier to access, but the only group that would likely increase its CFL use as a result *relative to the other groups* is renters. Moreover, as shown in Table 9–8, most of the renters in our sample pay their own electricity bills. Although their landlords may supply light bulbs, it is likely that many renters are buying their own bulbs or could easily swap out screw-in incandescent for CFLs to save money even if the landlord does provide the bulbs. Still, it must be kept in mind that saturation among renting respondents is the same as for owners, suggesting that boosting purchases among *all* types of households is the most likely way to boost CFL saturation.

Table 6–16: Stores Where Respondents Typically Purchase Light Bulbs

(Base: All RDD respondents for incandescent; RDD respondents who have purchased or been given a CFL for CFLs)

Status	Bulb Type	Sample Size	Top Store Type		Second Store Type		Third Store Type	
			Store Type	%*	Store Type	%*	Store Type	%*
English	Incandescent	*358*	Home Improvement	40%	Discount	31%	Grocery	24%
	CFL	*300*	Home Improvement	49%	Discount	22%	Grocery	17%
Not English	Incandescent	*23*	Bargain	41%	Home Improvement	38%	Office Supply	16%
	CFL	*14*	Home Improvement	44%	Bargain	22%	Office Supply	13%
Not Latino	Incandescent	*345*	Home Improvement	40%	Discount	31%	Grocery	24%
	CFL	*290*	Home Improvement	49%	Discount	22%	Grocery	17%
Latino	Incandescent	*33*	Home Improvement	38%	Bargain	35%	Office Supply	13%
	CFL	*22*	Home Improvement	43%	Bargain	23%	Office Supply	11%
White	Incandescent	*324*	Home Improvement	43%	Discount	26%	Grocery	22%
	CFL	*271*	Home Improvement	52%	Discount	22%	Grocery	16%
Non-White	Incandescent	57	Discount	35%	Home Improvement	27%	Bargain	20%
	CFL	43	Home Improvement	28%	Discount	16%	Grocery	14%
Low Income	Incandescent	109	Discount	33%	Home Improvement	24%	Grocery	20%
	CFL	78	Discount	25%	Home Improvement	22%	Grocery	14%
Moderate Income	Incandescent	86	Home Improvement	54%	Discount	26%	Hardware	19%
	CFL	74	Home Improvement	63%	Discount	18%	Hardware	16%
High Income	Incandescent	116	Home Improvement	49%	Grocery	24%	Discount	15%
	CFL	104	Home Improvement	64%	Grocery	22%	Hardware	17%
Less than High School	Incandescent	13	Home Improvement	28%	Bargain	25%	Discount	20%
	CFL	9	Home Improvement	25%	Bargain	18%	Discount	14%
High School	Incandescent	58	Discount	44%	Home Improvement	30%	Grocery	15%
	CFL	41	Home Improvement	39%	Discount	25%	Grocery	13%
Some College	Incandescent	93	Home Improvement	45%	Grocery	25%	Hardware	19%
	CFL	77	Home Improvement	49%	Discount	29%	Grocery	18%
College	Incandescent	213	Home Improvement	47%	Grocery	27%	Hardware	19%
	CFL	183	Home Improvement	58%	Hardware	20%	Grocery	18%

Status	Bulb Type	Sample Size	Top Store Type		Second Store Type		Third Store Type	
			Store Type	%*	Store Type	%*	Store Type	%*
Own	Incandescent	287	Home Improvement	51%	Discount	26%	Grocery	19%
	CFL	248	Home Improvement	60%	Discount	20%	Hardware	15%
Rent	Incandescent	93	Discount	32%	Grocery	26%	Bargain	20%
	CFL	65	Grocery	24%	Home Improvement	22%	Discount	22%

* Percent of respondents

Table 6–17: Stores Where CFL Purchased 2009 through 2010 – Onsite Sample

(Base: Onsite installed or stored CFLs for which respondents recalled the source of the CFL)*

Status	Sample Size	CFLs Purchased	Top Store Type		Second Store Type		Third Store Type	
			Store Type	% CFLs	Store Type	% CFLs	Store Type	% CFLs
White	125	1,240	Home Improvement	43%	Bargain	14%	Program Administrator	10%
Non-White	22	112	Home Improvement	62%	Bargain	17%	Warehouse	11%
Low Income	40	401	Home Improvement	62%	Bargain	8%	Hardware	7%
Moderate Income	46	430	Home Improvement	32%	Bargain	20%	Program Administrator	13%
High Income	39	364	Home Improvement	36%	Other***	13%	Bargain	11%
High School**	20	285	Home Improvement	53%	Bargain	16%	Hardware	13%
Some College	35	465	Home Improvement	49%	Program Administrator	18%	Bargain	16%
College	86	550	Home Improvement	35%	Warehouse	14%	Bargain	12%
Own	119	1,183	Home Improvement	49%	Bargain	13%	Program Administrator	9%
Rent	31	176	Home Improvement	18%	Bargain & Grocery****	17%	Hardware	15%

* Excludes CFLs for which respondents could not recall from where it had been obtained; these "don't know" responses were predominantly named for bulbs obtained prior to 2009.

** Includes two respondents who had not earned a high-school diploma

*** Includes charities, home furnishing stores, online sources, and yard sales

**** Tied as the second most common source of CFLs for renters

7 Climate Change Attitudes/Efficacy

In support of the multistate modeling effort, the 2010 surveys asked respondents a series of questions about global warming, the environment, and energy issues. We present these results here but do not discuss them in detail as they are of primary interest to the modeling effort.

Three out of four respondents (76%) in Massachusetts said that the Earth's temperature is rising as a result of human activity (Table 7–1). This stands in contrast to Pennington County, where 61% of respondents said the same.

Table 7–1: Earth's Average Temperature Rising as a Result of Human Activity

Opinion	Massachusetts 2010	Pennington 2010
Sample Size	*381*	*500*
Definitely yes	41%	23%
Probably yes	35	38
Probably no	10	18
Definitely no	5	11
Don't know/refused	10	9

Majorities of Massachusetts (66%) and Pennington County respondents (61%) stated that protection of the environment should be given priority, even at the risk of curbing economic growth (Table 7–2). These percentages are higher than those reported for the nation by Gallup, from whom we drew this question. The percentage of Americans arguing that the environment should be given priority has not exceeded 60% since April 2000; the percentage was as low as 38% in March 2010, but jumped to 50% in May 2010 after the April Deepwater Horizon oil spill.[20] The nature of our study may have biased respondents toward providing a more environmentally focused answer than they would otherwise have given.

Table 7–2: Economy vs. Environment

Statements	Massachusetts 2010	Pennington 2010
Sample Size	*381*	*500*
Protection of the environment should be given priority, even at the risk of curbing economic growth.	66%	61%
Economic growth should be given priority, even if the environment suffers to some extent.	21	25
Don't know/refused	14	14

[20] Jones, J. and L. Saad. 2010. Energy_Environment_May_27_2010.pdf. Wave 1 of a survey performed by USA Today and Gallup in May 2010. Report found at http://www.gallup.com/poll/137888/Energy-Environment.aspx on November 23, 2010.

When asked about their concern with various energy-related issues, Massachusetts respondents voiced greater concern with global warming and running out of fossil fuels (30% and 21% stating a great deal of concern, respectively) than did Pennington County residents (17% and 15%). Similar percentages in both areas indicated a great deal of concern about dependence on foreign oil (39% in Massachusetts, 36% in Pennington County).

Table 7–3: Concern with Energy Issues

Global Warming	**Massachusetts 2010**	**Pennington 2010**
Sample Size	*381*	*500*
A great deal	30%	17%
A fair amount	33	28
Only a little	24	25
Not at all	11	28
Don't know/refused	2	2
Running Out of Fossil Fuels	**Massachusetts 2010**	**Pennington 2010**
Sample Size	381	*500*
A great deal	21%	14%
A fair amount	30	23
Only a little	24	27
Not at all	25	34
Don't know/refused	1	2
Dependence on Foreign Oil	**Massachusetts 2010**	**Pennington 2010**
Sample Size	381	*500*
A great deal	39%	36%
A fair amount	35	27
Only a little	16	19
Not at all	9	16
Don't know/refused	1	2

One out of four (26%) Massachusetts respondents "strongly agreed" that they would take action to reduce energy use over the next few months, compared to only 18% of Pennington County residents. Massachusetts respondents were also more likely to believe their actions have an influence on global warming and climate change (28%, vs. 21% in Pennington County). Respondents in both areas held similar opinions about their ability to take more actions to reduce their household's energy use and the expense of taking actions to reduce usage.

Table 7–4: Energy Use and Climate Change

	Massachusetts 2010	Pennington 2010
Over the next few months I expect to take measures to reduce how much energy my household uses.		
Sample Size	*381*	*500*
Strongly Agree	26%	18%
Agree	47	47
Disagree	23	24
Strongly Disagree	2	6
Don't know/refused	1	5
	Massachusetts 2010	**Pennington 2010**
I can't do much more than I'm already doing to reduce the amount of energy my household uses.		
Sample Size	381	*500*
Strongly Agree	18%	17%
Agree	38	44
Disagree	36	32
Strongly Disagree	7	5
Don't know/refused	1	2
	Massachusetts 2010	**Pennington 2010**
It is too expensive for me to reduce my household energy use.		
Sample Size	381	*500*
Strongly Agree	8%	6%
Agree	19	17
Disagree	55	55
Strongly Disagree	15	16
Don't know/refused	3	6
	Massachusetts 2010	**Pennington 2010**
I believe my actions have an influence on global warming and climate change.		
Sample Size	381	*500*
Strongly Agree	28%	21%
Agree	49	45
Disagree	17	21
Strongly Disagree	4	9
Don't know/refused	2	4

8 LEDs and Other Energy Saving Lighting Technologies

Over one-half of RDD survey respondents in 2009 (54%) and over three out of five (61%) in 2010 were familiar with LEDs (Table 8–1). The types of LED applications respondents were most likely to be familiar with were flashlights or lanterns (28% in 2009, 26% in 2010), automotive lighting (17% in 2009, 8% in 2010), holiday lighting (11% in 2009, 13% in 2010), and lighting for electronic devices (11% in 2009 and 2010) (Table 8–2).

Table 8–1: Familiarity with LEDs

(Base: All RDD respondents in 2009; all English-speaking respondents in 2010)

Satisfaction	Massachusetts 2009	Massachusetts 2010
Sample Size	*503*	*365*
Familiar with LEDs	54%	61%

Table 8–2: Type of LED Applications Familiar with

(Base: All RDD respondents and respondents familiar with LEDs in 2009; English-speaking RDD respondents and respondents familiar with LEDs in 2010; multiple response for familiar products)

	Massachusetts 2009	Massachusetts 2010
Sample Size	*503*	*365*
Familiar with LEDs	54%	61%
Sample Size	*272*	*241*
Flashlights/lanterns	28%	26%
Automotive lighting	17%	8%
Holiday lights	11%	13%
Electronic devices	11%	11%
Task/Desk lamps*	8%	6%
Under cabinet lighting	6%	7%
Night lights	6%	4%
Light bulbs/screw in bulbs	5%	10%
Novelty fixtures	4%	5%
Outdoor residential	2%	3%
Recessed can lighting	2%	4%
Traffic/Streetlights	1%	1%
Misc. commercial uses	1%	3%
Misc. gadgets	4%	5%
General lighting needs / LED strips	--	3%
Other	--	5%
Refused/Don't know**	28%	21%

* Includes floor lamps in 2010

** 2009 includes those who did not specify a type

The percentage of respondents indicating that they used at least some form of LED in their home increased from eight percent to 39% from 2009 to 2010. The increase in the percentage of respondents familiar with LEDs certainly points to increased LED usage, but the increase in use may also be partly due to differences in the 2009 and 2010 surveys. In 2009, the survey first asked respondents if they used LEDs using a yes or no question; only those who answered yes were then asked to name which LEDs they used in their home. This year, in order to reduce survey length, we instead asked all respondents familiar with LEDs which types they currently used in their home. Although we offered respondents the opportunity to say that they did not use LEDs, some may have been reluctant to admit that they did not use them, falsely inflating the percentage of households using CFLs this year. It should be noted that in both years, stated LED users sometimes said they did not know the types of LEDs they used, perhaps indicating that respondents did not feel comfortable admitting that they actually did not use LEDs.

Among those who did report using CFLs in 2010, flashlights were the most commonly used (33%), followed by holiday lights (15%), various electronic devices (10%), table or desk lamps (9%), under cabinet lighting (8%), and non-specified uses (87%). These percentages sometimes differ from 2009, but because of the differences in the wording of questions and sample sizes noted above, the results are not directly comparable.

Table 8–3: Type of LEDs Currently in Use*

(Base: RDD respondents who reporting using LEDs in 2009; all English-speaking respondents who gave a valid response for use of LEDs in 2010, multiple response)

	Massachusetts 2009	Massachusetts 2010
Sample Size	*503*	*365*
Use LEDs	8%	39%
Sample Size	*39*	*153*
Flashlights	39%	33%
Task/Desk lamps**	24%	9%
Night lights	15%	2%
Electronic devices	12%	10%
Under cabinet lighting	7%	8%
Outdoor residential	5%	4%
Branded LED lights (Juno, GE, Sylvania, Energy Star, etc.)	5%	--
Novelty fixtures	4%	3%
Light bulbs/screw in bulbs	3%	7%
Unspecified general lighting needs	--	4%
Recessed can lighting	1%	4%
Holiday lights	1%	15%
Other	--	2%
Don't know/Refused	5%	16%

* Four percent mentioned various gadgets (*e.g.*, key chains or toys) and three percent automotive lighting, which do not constitute "household" lighting.

** Includes floor lamps in 2010

In both 2009 and 2010, the vast majority of RDD respondents could not name any energy saving lighting technologies other than CFLs and LEDs (91% in 2009, 85% in 2010) (Table 8–4). Among the few technologies respondents could name were fluorescent tubes, halogens, and solar. Note that 2009 and 2010 data are not directly comparable due to the different questionnaire structure; in 2009 all respondents were asked if they were aware of other energy saving lighting technologies; in 2010 only respondents aware of LEDs were asked the question due to a programming error.

Table 8–4: Awareness of Other Energy Saving Lighting Technologies

(Base: All RDD respondents 2009; RDD respondents aware of LEDs in 2010; multiple response)

	Massachusetts 2009	Massachusetts 2010
Sample Size	*503*	*241*
None/Don't Know*	91%	85%
Cold Cathode Fluorescent Lamps	-	1%
Fluorescent tubes	2%	2%
Halogen	2%	3%
Solar	2%	4%
Efficient incandescent/regular bulbs	1%	1%
Candles	<1%	2%
Sodium Vapor Lights	-	2%
Motion-sensitive/timer lights	<1%	1%
Other	3%	2%

* Includes irrelevant responses and technologies that are not efficient.

The vast majority (87% in Massachusetts, 84% in Pennington County) of RDD respondents agreed or strongly agreed that they were comfortable learning about how new technologies work, another question asked in support of multistate modeling to identify "early technology adopters" (Table 8–5). However, they were also likely (68% in Massachusetts, 70% in Pennington County) to agree or strongly agree that they were skeptical of new technologies and wanted to wait until new technologies were proven before they bought an item. Most respondents (73% in Massachusetts, 80% in Pennington County) did not feel they always needed to have the latest gadget.

Table 8–5: Technology and Adoption

(Base: All 2010 RDD respondents)

	Massachusetts 2010	**Pennington 2010**
I am skeptical of new technology. I like to wait until a new technology is proven before I buy it.		
Sample Size	*381*	*500*
Strongly agree	17%	18%
Agree	51	52
Disagree	23	20
Strongly Disagree	7	5
Don't know/refused	2	4
	Massachusetts 2010	**Pennington 2010**
I always like to have the latest gadget.		
Sample Size	*381*	*500*
Strongly agree	10%	4%
Agree	17	15
Disagree	58	64
Strongly Disagree	15	16
Don't know/refused	<1	1
	Massachusetts 2010	**Pennington 2010**
I am comfortable learning about how new technologies work.		
Sample Size	*381*	*500*
Strongly agree	33%	20%
Agree	54	64
Disagree	9	11
Strongly Disagree	3	2
Don't know/refused	2	2

9 Customer Demographics

Demographic comparisons in this section involve the Massachusetts 2009 and 2010 RDD survey respondents, the Pennington County RDD survey participants, and the American Community Survey (ACS) three-year estimates (2006-2008) for Massachusetts. For variables explored in more depth for the HTR analysis, we also report the characteristics of onsite participants. As discussed earlier, both the RDD and onsite data were weighted to reflect home ownership and education based on ACS data.

9.1 Housing Characteristics

The weighted results from Massachusetts RDD survey respondents and onsite participants indicate they were more likely to live in a single-family detached or attached home and less likely to live in an apartment building than were all Massachusetts residents (Table 9–1, next page). Not surprisingly, given the rural nature of Pennington County, survey respondents residing there were more likely than Massachusetts residents to live in single-family detached homes and mobile homes and less likely to live in apartment buildings.

Table 9–1: Type of Home

(Base: All RDD respondents and onsite participants)

Type of home	Massachusetts Census	Massachusetts RDD 2009	Massachusetts RDD 2010	Massachusetts Onsite Visits 2010	Pennington RDD 2010
Sample Size	*2,724,787**	*503*	*381*	*150*	*500*
Single-family detached	53%	55%	58%	57%	61%
Single-family attached (townhome, row home)	5	15**	13	13	9
Apartment with 2-4 units	22	12	12	14	3
Apartment with 5+ units	20	16	16	15	11
Mobile home	1	1	1	0	15
Other	<1	0	1	2	0
Don't know / refused	-	1	0	0	<1

* All housing units

** Duplexes counted with single-family attached in 2009, but with all two-to-four unit buildings in 2010, which is more in keeping with Census reporting.

The RDD respondents appear to live in newer homes compared to Massachusetts residents overall. Only 12% of Massachusetts housing units were built after 1989 compared to 18% of Massachusetts and 26% of Pennington County RDD respondent homes (Table 9–2).

Table 9–2: Decade Home was Built

(Base: RDD homeowners)

Decade	Massachusetts Census	Massachusetts 2009	Massachusetts 2010	Pennington 2010
Sample Size	2,724,787*	*409*	*296*	*390*
1930s or earlier	36%	26%	32%	5%
1940s	6%	6	5	8
1950s	11%	13	14	17
1960s	10%	11	10	10
1970s	12%	10	10	17
1980s	11%	12	10	13
1990s	7%	11	11	9
2000 or later	5%	7	7	17
Don't know / refused	-	4	4	5

* All housing units

About three out of five Massachusetts RDD survey respondents (59% in 2009, 65% in 2010) and seven out of ten Pennington County respondents reported that their homes were smaller than 2,000 square feet (Table 9–3).

Table 9–3: Size of Home

(Base: RDD respondents who provided an estimate of square footage)

Square Feet	Massachusetts 2009	Massachusetts 2010	Pennington 2010
Sample Size	*350*	*239*	*414*
Less than 1,400	31%	41%	40%
1,400 – 1,999	28	24	30
2,000 –2,499	18	17	16
2,500 – 3,499	11	11	11
3,500 – 3,999	3	5	2
4,000 – 4,999	2	1	1
5,000 or more	7	1	<1
Don't know / refused (sample size)	153	141	87

Massachusetts RDD survey respondents had only slightly larger homes than Massachusetts residents overall, with 60% of RDD respondents in 2009 and 55% in 2010 having homes with six or more rooms compared to 50% of resident statewide (Table 9–4).

Table 9–4: Rooms in Home

(Base: All RDD respondents)

Total Rooms	Massachusetts Census	Massachusetts 2009	Massachusetts 2010	Pennington 2010
Sample Size	*2,724,787*	*503*	*381*	*500*
1	2%	<1%	6%	1%
2	4	2	3	6
3	10	8	10	10
4	16	10	13	17
5	19	18	13	15
6	18	22	21	14
7	12	16	13	12
8	9	8	9	9
9	11*	6	7	6
10 or more		8	5	6
Don't know/refused	-	2	<1	1

* The ACS reports only 9 or more rooms.

9.2 Social Attributes

The weighted percentages of Massachusetts RDD survey respondents and onsite participants with college degrees or higher were similar to the figures for Massachusetts residents overall (about two out of five), except in the case of respondents to the 2009 RDD survey, who were more likely to have college degrees or higher. This is a strong indication that our efforts in the 2010 RDD survey to sample people with lower levels of education as part of the HTR analysis succeeded. Pennington County RDD respondents were less likely to have a college degree or higher (Table 9–5).

Table 9–5: Highest Level of Education

(Base: All RDD respondents and onsite participants)

Degree Attained	Massachusetts Census	Massachusetts RDD 2009	Massachusetts RDD 2010	Massachusetts Onsite Visits 2010	Pennington RDD 2010
Sample Size	*2,457,167*	*503*	*381*	*150*	*500*
Less than high school graduate	11%	3%	11%	2%	8%
High school graduate (Includes GED)	25	16	25	17	26
Some college or associates degree	24	20	24	34	36
Bachelors degree or higher	40	57	39%	40	28
Don't know / refused	-	3	1%	0	2

* Collected during the onsite visit instead of over the phone.

The RDD survey respondents were slightly less likely to live in single-person households than Massachusetts residents overall; 24% of the RDD respondents lived in single-person households compared to 29% of Massachusetts households overall; otherwise household sizes were similar. (Table 9–6).

Table 9–6: Number of Persons Living in the Home

(Base: All 2010 RDD respondents)

Number of Household Members	Massachusetts Census	Massachusetts 2010	Pennington 2010
Sample Size	*2,457,167*	*381*	*500*
1	29%	24%	24%
2	32	36	41
3	16	14	12
4	15	15	13
5	6	7	7
6 or more	3	3	4
Don't know/refused	-	1	1

More than three-quarters of Massachusetts (79%) and Pennington County (77%) RDD survey respondents said they were very or somewhat satisfied with their standard of living (Table 9–7), a question asked primarily in support of multistate modeling.

Table 9–7: Satisfaction with Standard of Living

(Base: All 2010 RDD respondents)

Satisfaction	Massachusetts 2010	Pennington 2010
Sample Size	*381*	*500*
Very satisfied	41%	39%
Somewhat satisfied	38	38
Neither satisfied nor dissatisfied	7	10
Somewhat dissatisfied	7	7
Very dissatisfied	5	4
Don't know/refused	1	2

Almost all of the Massachusetts (90% in 2009, 93% in 2010) and Pennington County (88%) RDD survey respondents said they paid their electric bills directly to the utility rather than as part of their rent or condo fee (Table 9–8).

Table 9–8: Method of Electric Bill Payment

(Base: All RDD respondents)

Response	Massachusetts 2009	Massachusetts 2010	Pennington 2010
Sample Size	*503*	*381*	*500*
Direct to electric company	90%	93%	88%
Part of rent/condo fee	7	6	10
Other	2	1	1
Don't know / refused	1	1	1

RDD survey respondents and onsite participants were more likely to speak English at home than Massachusetts residents overall (Table 9–9), a finding that is biased by the fact that the 2009 survey was fielded only in English and the 2010 survey was fielded in English and Spanish.

Table 9–9: Primary Language Spoken in Home

(Base: All RDD respondents and onsite participants)

Language	Massachusetts Census	Massachusetts RDD 2009	Massachusetts RDD 2010	Massachusetts Onsite Visits 2010	Pennington RDD 2010
Sample Size	*2,457,167*	*503*	*318*	*150*	*500*
English	78%	97%	90%	97%	99%
Spanish*	7	0	8	2	0
All Other**	15	1	2	2	1
Don't know/refused		1	0	0	<1

* Note that the percentage of households primarily speaking Spanish at home is equal to the percentage of surveys fielded in Spanish.

** For 2010 in Massachusetts included 1% Portuguese. Note that participation of speakers of other languages would be higher if we fielded in languages other than English or Spanish.

In terms of racial and ethnic diversity, RDD survey respondents reflect the Massachusetts population fairly well (Table 9–10). Onsite participants in 2010 were slightly less likely to be white than the general population, due to the Team targeting households in accordance with the PAs' current definition of HTR, including non-white households.

Table 9–10: Race and Ethnicity

(Base: All RDD respondents and onsite participants)

Race	Massachusetts Census	Massachusetts RDD 2009	Massachusetts RDD 2010	Massachusetts Onsite Visits 2010	Pennington RDD 2010
Sample Size	*2,457,167*	*503*	*318*	*150*	*500*
White	86%	87%	83%	81%	87%
Black or African-American	5	4	4	8	2
American Indian, Native Hawaiian, Pacific Islander, or Alaska Native	<1	2	1	4	7
Asian	4	4%	1	1	<1
Other	5		5	1	2
Don't know/refused	-	4%	5	1	2
Sample Size	*2,457,167*	*503*	*318*	*150*	*500*
Hispanic/Latino	7	n/a	12%	7%	<1
Don't know/refused	-	n/a	1	99	0

* The Team specifically targeted households that coincided with the PAs' current definition of hard to reach, including non-white households.

Among those who provided a usable response when asked about their household income, the RDD surveys included a greater percentage of lower-income respondents than the state of Massachusetts as a whole. Although 40% of Massachusetts households make less than $50,000 a year, 55% of 2009 and 53% of 2010 RDD survey respondents had incomes less than $50,000 (Table 9–11). The onsite participants better reflected the state's income distribution with 31% having incomes under $50,000. Again, the greater number of lower income households receiving new onsites reflect the efforts to target HTR customers. However, the numbers of respondents who refused to provide their household income limit the comparability of these results to the ACS.

Table 9–11: Household Income

(Base: All RDD respondents and onsite participants who provided an estimate of their income)

Household Income	Massachusetts Census	Massachusetts RDD 2009	Massachusetts RDD 2010	Massachusetts Onsite Visits 2010	Pennington RDD 2010
Sample Size	*2,457,167*	*370*	*316*	*150*	*428*
$15,000 or less	12%	20%	16%	9%	16%
$15,000 to $19,999	4	8	11	9	11
$20,000 to $29,999	8	11	9	13	15
$30,000 to $39,999	8	8	11	9	16
$40,000 to $49,999	8	8	6	7	12
$50,000 to $74,999	17	11	14	24	15
$75,000 to $99,999	14	16	14	10	9
$100,000 to $149,999	16	11	14	13	6
$150,000 or more	13	9	6	6	2
Refused (sample size)	-	122	41	14	55
Don't know (sample size)	-	11	24	2	18

Finally, Massachusetts RDD survey respondents (60% in 2009, 54% in 2010) were more likely to be female than the Massachusetts population (52%) as a whole (Table 9–12).

Table 9–12: Gender

(Base: All RDD respondents)

Gender	Massachusetts Census	Massachusetts 2009	Massachusetts 2010	Pennington 2010
Sample Size	*6,469,770**	*503*	*381*	*500*
Female	52%	60%	54%	57%
Male	48	40	46	43

* The census no longer lists the gender of the householder for married-couple families, so this is based on the total population of the state.

Massachusetts ENERGY STAR® Lighting Program 2010 Annual Report

Appendix B:

CFL Willingness to Pay (WTP) Analysis Results

Final Report

CFL Willingness to Pay (WTP) Analysis Results

Prepared for:

Bay State Gas (NiSource)
Berkshire Gas
Cape Light Compact
National Grid USA
New England Gas
NSTAR
Unitil/Fitchburg Gas and Electric
Western Massachusetts Electric

Middletown, Connecticut, April 29, 2011

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1. Introduction

As part of the impact evaluation of the Massachusetts ENERGY STAR® Lighting Program, KEMA, under subcontract to the NMR Group, Inc. (NMR), performed a battery of willingness to pay (WTP) questions to inform a NTG approach. Seventy five householders who had recently purchased standard spiral CFLs and 37 householders who had recently purchased specialty CFLs were asked questions about their willingness to pay for a single bulb at various price points. Using retailer pricing data collected during in-store shelf stocking surveys by the Team and supplemented with similar data collected by Lockheed Martin, the implementation contractor, an elasticity analysis with a subsequent assessment of the impact of the discount on respondents' willingness to purchase the bulb was used to estimate an estimate of free ridership. Use of the WTP questions and weighted estimates of shelf prices (full and discounted) results in a free-ridership estimate of 51% for standard spiral bulbs, and 69% for specialty bulbs. However, the small sample size of recent purchasers of specialty CFLs limits the conclusions which can be drawn from that analysis in particular.

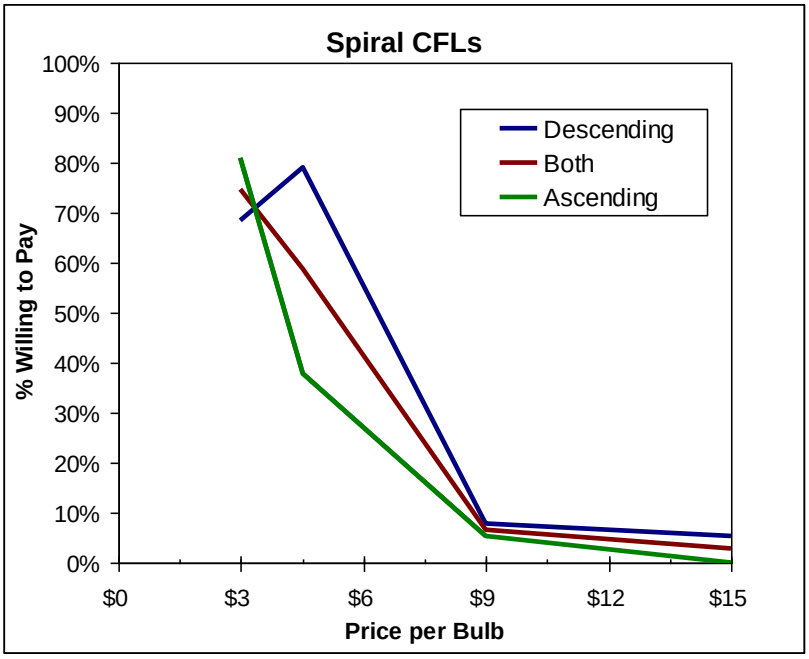
Another part of the impact evaluation was the CFL on-site saturation visits, during which householders who had purchased CFLs in the past year were asked about the price at which they recalled buying the most recently purchased CFL. A total of 75 respondents with standard, spiral CFLs answered these questions. After determining the price at which the CFL was purchased, the technician asked these householders up to two additional questions following the form "Would you have purchased this CFL if it had cost $X?" where X was in the set ($3, $4.50, $9, $15) per bulb and the questioning began at the base price at which they had originally purchased the CFL. About one-half of the respondents were asked these WTP questions in ascending order (37 respondents), and the remaining one-half in descending order (38 respondents). Respondents were also asked to name the prices at which they thought CFLs would be "too cheap" and "too expensive" To purchase. The mean price respondents reported having paid per CFL was $2.15 (standard error [SE] = $0.15) overall, $2.16 ascending (SE = $0.16), and $2.14 descending (SE = $0.24). Final, weighted pricing from the shelf stocking inventory suggests that standard spiral CFLs cost an average of $3.98 per bulb without a discount. The typical program rebate for standard spiral CFLs is $1.15 per bulb, which provides an estimated price of $ 2.83 typically paid per bulb with the PA's discount. Although the $2.16 respondent-stated price is below the $2.83 price estimated through the shelf-stocking inventory, the "past year" about which respondents answered preceded data collection for the shelf-stocking survey. The PAs may have offered larger discounts for standard spiral CFLs in the second half of 2009 and first half of 2010, the period covered by "the past year."

2. Standard CFL Results

2.1 Standard CFL Price Elasticities

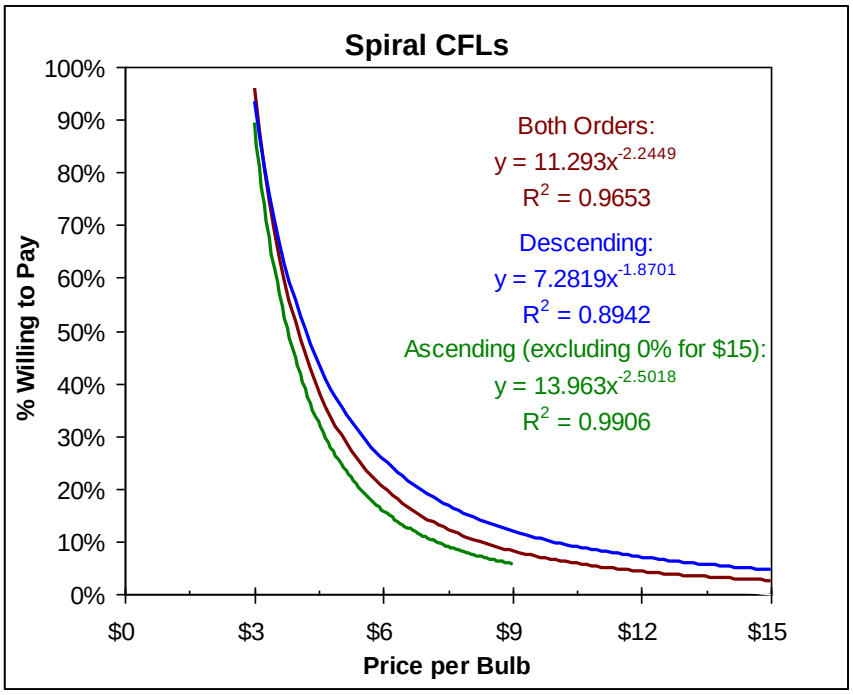
From the responses gathered, the Team created four variables based upon the reported WTP up to each of these price points ($3, $4.50, $9, $15 per bulb). The percent of respondents willing to pay each price was calculated and graphed in Figure 1. People asked in descending order were more willing to pay prices above $3/bulb, but the sample size is too small for this result to be statistically significant. The combined series, for all 75 respondents, is smooth and monotonic as desired.

Figure 1: Willingness to Pay for Spiral CFL



The best-fit power series for each of these is shown in Figure 2. The elasticities all have magnitudes that are greater than one. This indicates that customers' WTP is fairly sensitive to price. Among respondents asked in ascending order, no one was willing to pay $15, so that data point was dropped to fit this log-log-series.

Figure 2: Best-fit Power-Series Model for Each Series Above

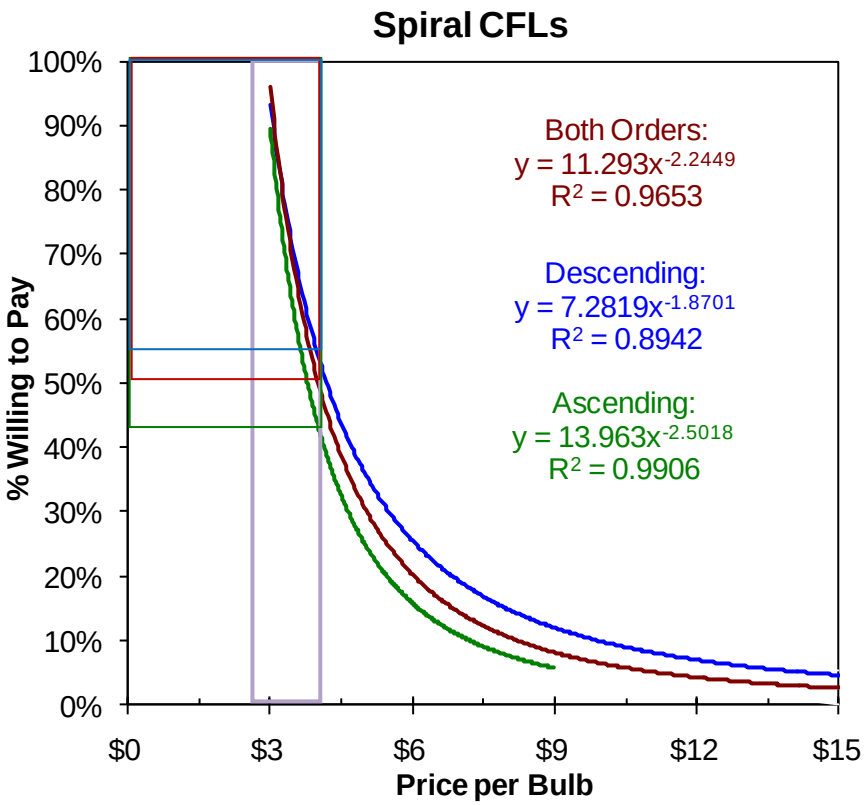


2.2 Impact of the Standard CFL Discount

The impact of the discounted price per bulb can be measured by entering average prices into the fitted equations (shown in Figure 3) and identifying the difference in percent of respondents willing to pay those prices (*i.e.,* the change on the Y Axis). Essentially, the colored boxes show the various price points at which householders reported a willingness to buy a standard CFL in the ascending, descending and averaged responses. For example, the blue box shows the modeled price points from the descending questions at which householders reported they would purchase bulbs at the non-discounted price of $3.98 and the PA's discounted price of $2.83.

In the model, WTP exceeds 100% at about $3.00 per bulb, which exceeds the actual discounted price of spiral CFLs. Therefore in our model, we have capped the WTP at 100% for discounted bulbs

Figure 3: Impact of Discount on Raw and Predicted Price Curves



The impact of the discount is the difference between customer WTP full price versus the discounted price. Free-ridership is captured through the number of households who received the discount but would have bought the CFL at full price. Here we operationalize free-ridership as the ratio of %WTP (full) / %WTP (discount). The results are shown in Table 1.

In the averaged order, it appears that when the price of a CFL drops from $3.98 to $2.83, the percent of people willing to purchase rises from 51% to about 100%. This places our free-ridership estimate at about 51%, meaning that about 51% of the discount purchasers would have bought the CFL regardless. At the 90% confidence interval, the precision around this estimate is +/- 7.1%. The equation (1-FR) converts this to a NTG estimate of 0.49, but this estimate *excludes* any spillover and should be considered a conservative estimate of NTG. By extension, this also means that about one-half of the standard spiral CFL purchases involved a change in behavior due to the PA's discount. The number of respondents in the ascending and descending groups are small, so the difference in their WTP full price is suggestive, but not statistically significant.

Table 1: Modeled Percent Willing to Pay for Standard CFL with and without Discount

	Fitted Discount $2.83/ bulb	Capped Discount $2.83/ bulb	Fit No Discount $3.98/ bulb	Free-Ridership $2.83/ bulb
Both	109%	100%	51%	51%
Ascending	103%	100%	44%	44%
Descending	104%	100%	55%	55%

3. Specialty CFL Results

The Team followed similar procedures for exploring the price elasticities for specialty CFLs. A total of 37 respondents currently using specialty CFLs recalled purchasing them in the past year and were, therefore, asked the WTP question battery. The number of each different types of specialty bulb included in the analysis is shown in Table 2. The small sample size of recent purchasers of specialty CFLs limits the conclusions which can be drawn from this analysis.

Table 2: Number and types of Specialty CFLs

A-Bulb	Bug Light	Candelabra	Dimmable	Flood/Spot	Globe	Quad Tube	3-way	Torpedo
2	1	1	3	7	7	1	5	0

Respondents were asked up to two questions of the form “Would you have purchased this CFL if it had cost $X?” where X was in the set ($5, $7.50, $15, $25) per bulb. As with standard CFL purchasers, WTP questions were asked in both ascending (14 respondents) and descending (23 respondents) orders.[1] Householders were also asked for the prices at which the CFL would be “too cheap” and “too expensive.” The mean price paid per CFL was $4.97 (SE = $0.45) overall ($6.09 ascending (SE = $0.79), $4.26 descending (SE = $0.49)).

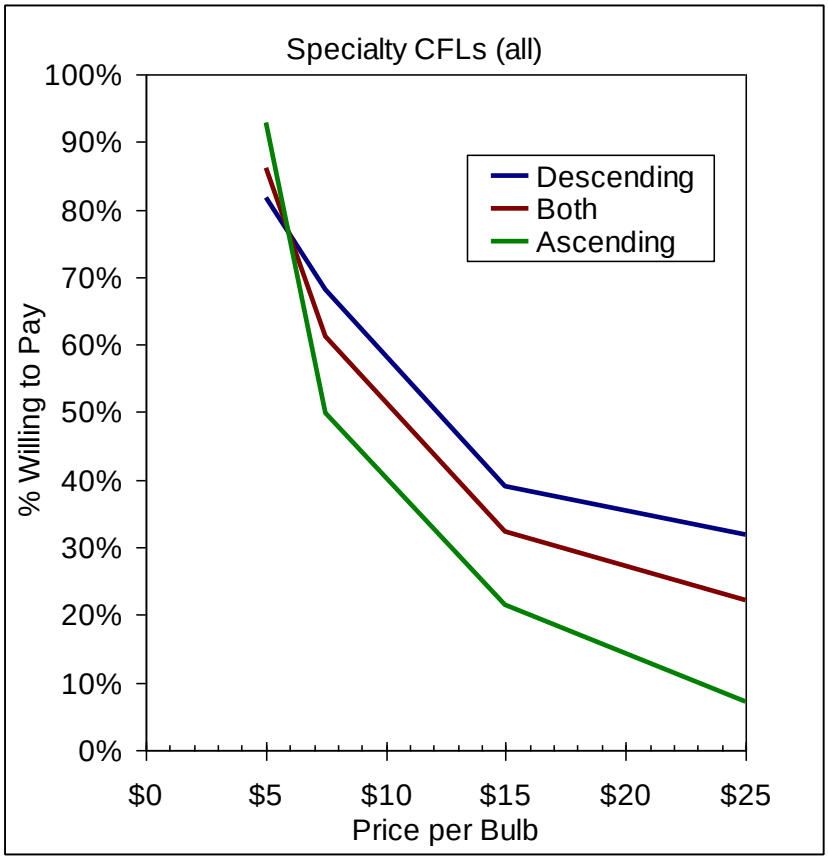
3.1 Specialty CFL Price Elasticities

From these responses, we created four variables representing WTP up to each of the price points included in the survey. The percent of respondents willing to pay each price was calculated and graphed in Figure 4. As with standard CFLs, householders asked in descending order were more willing to pay prices above $6/bulb, but there are so few respondents that this

[1] We alternated surveys between high to low and low to high question order for all CFL bulbs (standard and spiral). Since we did not alternate for each specific technology, specialty bulbs had more descending batteries than ascending, because the choice of question order was set prior to the visit.

is suggestive rather than statistically significant. The combined series for all 37 respondents is smooth and monotonic as desired.

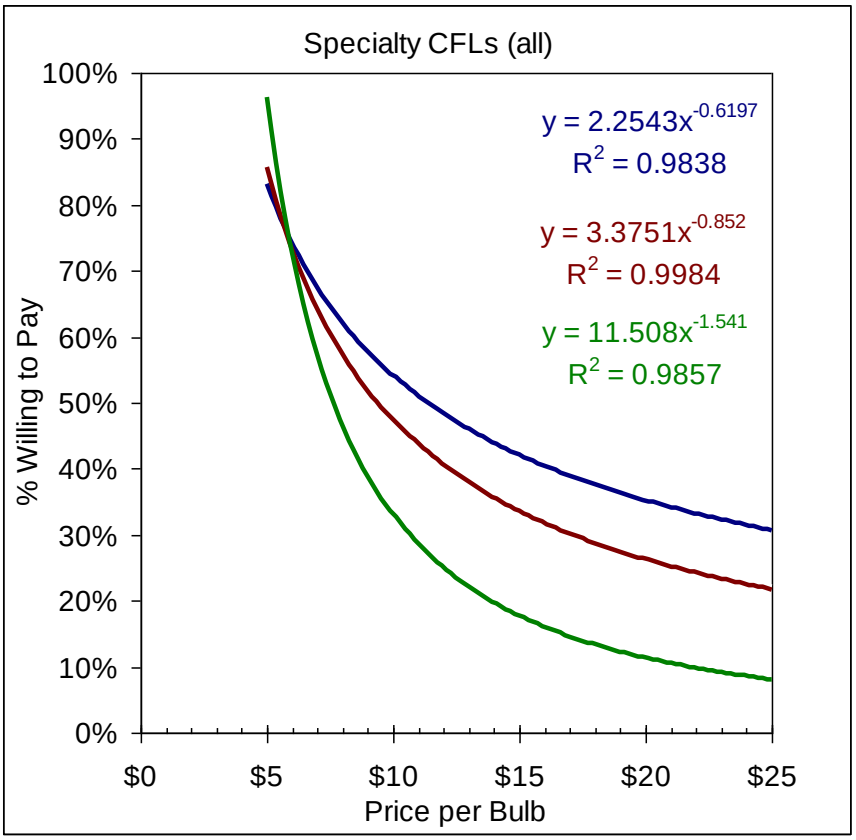
Figure 4: Willingness to Pay for Specialty CFLs



The best-fit power series for each of these is shown in Figure 2-2. The elasticities hover around -1. The combined series has an elasticity of -0.85. This can be interpreted to mean that specialty CFLs can be considered borderline inelastic to price, suggesting that a change in price for the product does not garner a significant change in the demand for them.[2] In other words, the data suggest that individuals who buy specialty CFLs are willing to do so with little concern for the price.

[2] Inelastic products typically fall into two groups: luxury goods and products with few alternatives (*e.g.,* insulin). While specialty CFLs certainly have little in common with a designer handbag, it may be that the individuals in our sample wanted to buy them for specific environmental or social "prestige" even though suitable incandescent or halogen alternatives existed.

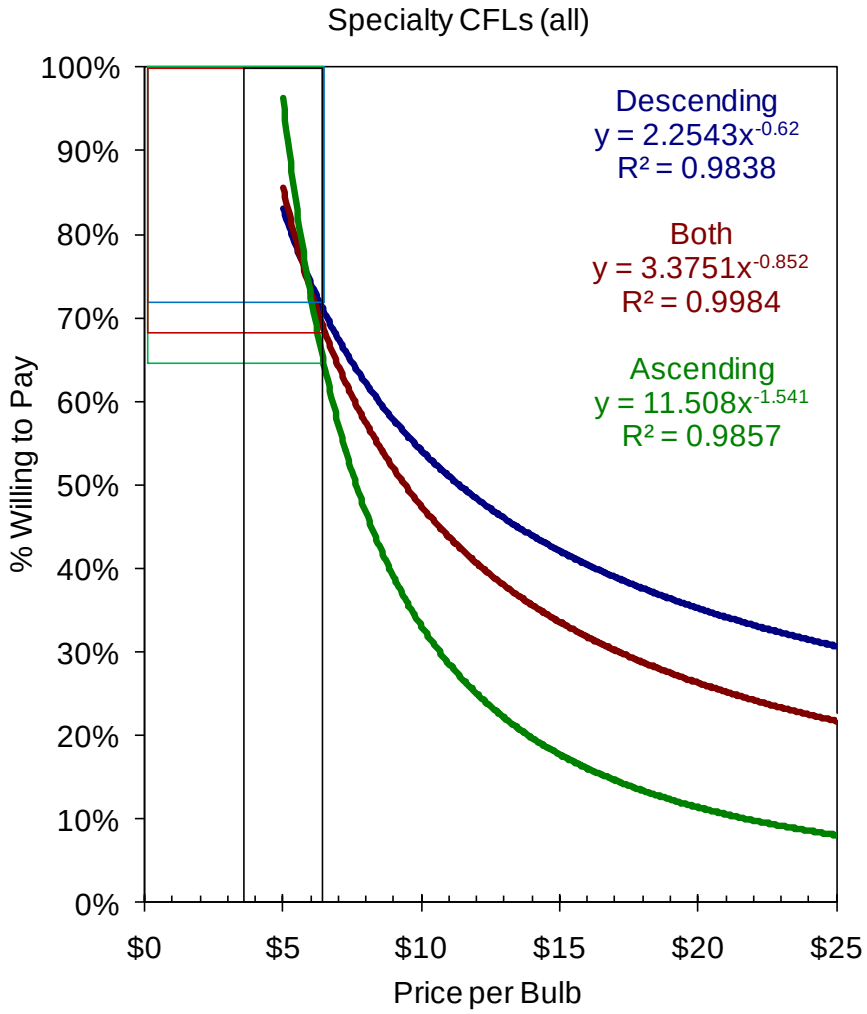
Figure 5: Best-fit Log-log Models



3.2 Impact of the Specialty CFL Discount

The shelf-stocking survey reports that the non-discounted price of specialty CFLs was about $6.43 per unit. The average rebate provided for specialty bulbs is $2.47 per bulb. This calculates to a modeled discount price of $3.96, slightly lower than the average $4.97 reported by the respondents. Again, the time period captured by “the past year” must be kept in mind. In 2010, the PA’s altered the program to discount a greater number and diversity of specialty CFLs, so the current shelf-stocking inventory would capture this program change, while “the past year” included in the WTP questions includes months that pre-date the shift to specialty CFLs. In the model, WTP exceeds 100% at about $3.50-$4 per bulb. Therefore in our model, we have capped the WTP at 100% for discounted CFLs.

Figure 6: Response to Discount and Non-discount Prices



We set the percent of the population willing to purchase CFLs at the discount price to 100%. The price data can be used with the fitted equations to generate fitted response for the discount and no-discount prices. As in the standard spiral discussion earlier, we can estimate free ridership by the ratio of %WTP (full) / %WTP (discount). These results are shown in Table 3. Our free-ridership estimate for the specialty CFLs is effectively the no-discount purchase rate of 69%. At the 90% confidence interval, the precision around this estimate is +/- 8.8%. This free ridership rate means that the NTG estimate is about 0.31, suggesting that 31% of discount recipients had their purchase behavior altered by the PA's discount. Again, we caution that this should be considered a conservative estimate of NTG as it does not take spillover into account.

Table 3: Modeled Percent Willing to Pay with and without a Specialty Discount

	Fitted Discount ($3.96/ bulb)	Capped Discount ($3.96/ bulb)	Fit No Discount ($6.43/ bulb)	Fit Free-Ridership ($3.96/ bulb)
Both	105%	100%	69%	69%
Ascending	138%	100%	65%	65%
Descending	96%	96%	71%	74%

4. Combined NTG Estimate

To calculate a free ridership estimate that combines the standard and specialty estimates, we calculated a weighted average of the discrete results. In this table we provide the free ridership results for specialty and standard bulbs as well as the quantity of program sales of each type for 2009 through the middle of 2010. The weighted average of the individual results provides a combined free ridership result of 55%, which translates into a conservative NTG estimate of 0.45 exclusive of spillover. At the 90% confidence interval, the precision around the overall free rider estimate is +/- 6.0%.

Table 4: Number and types of Specialty CFLs

Bulb Type	Quantity of Program Bulbs Sold (January 9, 2009- June 11, 2010)	Free ridership Estimate
Standard	3,592,541	51%
Specialty	887,336	69%
Combined	4,479,877	55%

Massachusetts ENERGY STAR® Lighting Program 2010 Annual Report

Appendix C:

Results of the Multistate CFL Modeling Effort

RESULTS OF THE MULTISTATE CFL MODELING EFFORT

Final

April 15, 2011

Submitted to:

Energy Efficiency Advisory Council Consultants

Cape Light Compact

NSTAR

National Grid

Unitil

Western Massachusetts Electric

Submitted by:

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Executive Summary

This report summarizes the analyses conducted in support of the multistate CFL modeling effort, highlighting the results as they pertain to the net-to-gross ratio (NTG) for the Massachusetts ENERGY STAR® Lighting Program. The Sponsors of this study include the following: Ameren Illinois (Ameren IL); Ameren Missouri (Ameren MO); ComEd; Consumers Energy in Michigan (Consumers); Dayton Power and Light (DP&L); EmPower Maryland (EmPower); the five program administrators of the Massachusetts ENERGY STAR® Lighting Program (Massachusetts) which are the Cape Light Compact, NSTAR, National Grid in Massachusetts, 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 (SRP). This report draws on data from 15 different geographic areas in the United States, but was written specifically for Massachusetts. The analyses draw primarily on data collected from 1,495 households that took part in onsite saturation surveys.[1] Note that the report uses the term "program administrators (PAs)" because the various parties supporting this effort include electric utilities, energy service organizations, public service commissions, and state agencies.

The key result emerging from the analysis of the models is that the NTG ratio for the eighteen-month period of January 2009 to June 2010 was 0.45. This executive summary provides an overview of the approach, methods, and findings that have led to this conclusion.

Areas Included in the Analyses

The multistate modeling effort relies on data drawn from telephone and onsite surveys conducted in areas with longstanding CFL programs, those with newer or smaller programs, and those with no CFL programs through June 2010. The ten PAs funded data collection in eleven program areas and four non-program areas (Table ES–1). The PAs and evaluators chose these four non-program areas to complement the demographic, social, and economic characteristics of the eleven program areas.

[1] We report many results for fewer than the 1,523 participants because some respondents provided unusable responses (*e.g.* failed to respond, responded "don't know", *etc.)*.

Table ES–1: Participating Areas, Sample Sizes, and Survey Dates

Area	Abbreviation	Years Supporting CFLs[e]	On-Site Sample Size
Program Areas			
Ameren IL (part Illinois)	AIU	1.5	92
Ameren MO (part Missouri)	AUE	0.5	87
ComEd (part Illinois)	ComEd	5.0	98
Consumers Energy (part Michigan)[a]	Consumers	0.5	61
Dayton Power and Light (part Ohio)	DPL	1.0	72
EmPower Maryland (most Maryland)	EmPower	2.0	79
Massachusetts (entire state)[b]	MA	12.0	150
New York City[c]	NYC	11.0	100
New York State[d]	NYS	11.0	200
Rhode Island (entire state)[b]	RI	12.0	100
Salt River Project (part Arizona)	SRP	2.0	101
Non-program Areas			
Houston, Texas (Harris County)	Houston	0.0	100
Indiana (central portion)	IN	0.0	67
Kansas (entire state)	KS	0.0	95
Pennington County, SD (portion)	SD	0.0	93
TOTAL			1,495

[a] A total of 99 homes were surveyed, but the analysis excludes those households who only have natural gas service with Consumers Energy.

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

[c] Surveyed separately from the remainder of the state due to its unique demographic and economic characteristics

[d] State minus New York City and Nassau and Suffolk Counties

[e] At the beginning of 2010

Development of Program Variables

The program variables were the key components of the statistical models guiding the calculation of the NTG ratios. The team began development of these variables by reviewing CFL program plans and documents, prior evaluation reports, and program summaries compiled by the Consortium for Energy Efficiency (CEE), the US Department of Energy (DOE), and ENERGY STAR in order to locate CFL programs in each state and gather information on CFL program activity through 2010 in each area. Specifically, we searched for: data on the program budgets; the number of CFLs incented; the percentage of the budget allocated to incentives, marketing and advertising, and overhead; the percentage of CFLs that had specialty features, and the method of support (*e.g.*, retail coupons, catalog, and/or upstream approaches).[2] The team successfully collected this information for all programs for 2009 and 2010 and verified the data

[2] Specialty features primarily included the following: dimmable and three-way capabilities, colored bulbs, small screw bases, and shapes other than the usual spiral.

with the PAs. These data were then entered into the model as individual variables or combined in various ways to represent "composite" variables, as described in more detail in Appendix B

We also gathered information on when the current CFL program and any of its predecessor programs had been launched in order to assess the impact of prior program activity on current purchases. This variable is not considered to be descriptive of the *current* program, however, and is kept separate from variables representing program activity in a given time period. We do show the implication of this choice on NTG-ratio estimation.

Comparison of Key Variables across Areas

Many of the PAs sponsoring this effort expressed an interest in the levels of CFL purchases, use, and saturation in their areas compared to the levels in the other areas taking part in this study, and Table ES–2 presents this comparison for current saturation, current use, and purchases from January 2009 through June 2010. The shaded cells indicate areas with results above the overall average for the entire sample. The data demonstrate that program areas differed widely in their level of saturation, current use (which depends in part on the size of the home), and purchases over the study period. Moreover, the data do not point to clear delineations between program and non-program areas; non-program areas rival and often exceeded program areas in CFL saturation, use, and purchases. This is important because the modeling process seeks to isolate the net impact of programs from the impacts of other demographic, economic, and social factors that may also influence CFL purchases, use, and saturation, but the lack of a strong "signal" between program activity and CFL purchase, use, and saturation increases the challenges of finding an effect.

Table ES–2: Current CFL Saturation by State

(Collected during onsite visits; saturation = percentage of sockets)

Area	Sample Size	Current Saturation (Percentage of lighting sockets filled by CFLs)	Current Use (Mean number of CFLs installed per household)	2009 to 2010 Purchases* (Mean number of CFLs purchased)
Program Areas				
Ameren IL	92	23%	12.9	9.7
Ameren MO	87	17%	11.4	6.4
ComED	98	20%	12.5	9.0
Consumers	61	18%	7.6	5.1
DP&L	72	15%	9.2	6.8
EmPower	79	19%	10.2	4.4
Massachusetts	150	27%	11.6	6.1
New York City	100	28%	8.2	6.7
New York State	200	21%	12.6	7.5
Rhode Island	100	20%	8.8	3.8
SRP	101	23%	11.8	8.7
Non-program Areas				
Indiana	67	17%	8.7	8.4
Kansas	95	19%	11.2	7.8
Houston	100	18%	9.3	7.3
Pennington Cnty, SD	93	24%	11.6	7.1
OVERALL	**1,495**	**21%**	**10.8**	**7.1**

* January 2009 to June 2010

Shaded cells indicate areas with results above the overall average for the entire sample

Modeling Procedures

The team used a zero-inflated negative binomial (ZINB) model to predict CFL purchases. Similar to the related model, the negative binomial regression model (NBRM), the ZINB is one of the more common methods of analyzing count data (*e.g.* the number of CFLs) with many cases falling at zero and with a fair degree of variability in the data.

The ZINB distinguishes between the zeros by first running a logistic model in which it sorts out the differences underlying zero purchases during a time period. Our analysis led the multistate modeling team to conclude zeros in the data represented two separate populations:

- CFL users who happened not to have purchased during the observation time (*i.e.*, the not-always zero group); and
- Households that will likely never purchase CFLs (*i.e.*, the always zero group).

The zero-inflation portion of the model uses a logistic regression to identify persistent non-purchasers, who can be thought of as never considering a CFL purchase.[3] For those not identified as persistent non-purchasers, the probability of each possible count of CFL purchases (including zero) is modeled as a negative binomial distribution, which has more cases at smaller numbers and very few cases at larger numbers.

The team also developed statistical models to explain CFL use and saturation, but we used different model types to do so. For CFL use, we turned to a NBRM, because the modeling procedures failed to identify systematic differences between the households that did not use CFLs (*i.e.*, their use was zero). Moreover, the ZINB was not an appropriate choice to model saturation because saturation is measured as the proportion of sockets in the home filled with CFLs. For saturation, we turned to ordinary least squares regression, the most commonly used linear regression technique. We discuss these models in more detail in the full report.

The team developed models using the different program variables and other explanatory variables capturing demographic, economic, and social characteristics, the concentration of box stores, duration of household CFL use, CFL storage, and CFL use and saturation prior to the purchase period under consideration, and various measures of environmental opinions and early adoption behavior. The team excluded explanatory variables found to be excessively collinear with other explanatory variables in the model, that had little statistical effect on CFL use, saturation, and purchases, that were tautological, or that made little theoretical sense.[4,5] The models presented in Section 6 are parsimonious in that almost every variable in them has a statistically significant net effect on CFL use or purchases (at the 0.10 level of significance); removing any of the variables reduces the predictive capability of the model or its maximum likelihood R^2 statistic.[6] In short, they represent the best models yielded by the analyses.

Results: Purchase Models and NTG Estimates

After developing numerous model specifications, the team used a series of diagnostics (see the full report for more detail) to select recommended "best models" for the full eighteen month

[3] In statistically parlance, it is most accurate to think in terms of the probability of being in the not-always zero purchasers group or the always zero purchasers group.

[4] Collinearity was determined by the tolerance statistic and the variance inflation factor.

[5] For example, the variable, "area electricity rate"—defined as average cents per kWh for the residential customer class of each program area—was found to be significant in some models, but the direction indicated that higher electricity price was associated with lower purchases. Closer examination revealed that the variable was serving as a proxy for the East Coast, where electricity rates are higher but also where programs have been operating for many years. CFL purchases tend to be lower on the East Coast because prior program activity has boosted saturation such that many households have relatively few sockets to fill with CFLs and have slowed their previously rapid purchases of the bulbs.

[6] The maximum likelihood R^2 is one of various statistics reported for non-linear regression that attempts to mimic the explained variance R^2 of OLS models. However, most statistical sources warn that its interpretation is not the same as OLS because non-linear models behave differently than linear ones. For this reason, the maximum likelihood R^2 can be understood as a method to assess a model's goodness of fit but should not be considered to be equivalent to the OLS R^2.

period running from January 2009 through June 2010 and another model that covers only January to June 2010. The models demonstrate that, after controlling for other factors, the number of CFLs supported per household had a significant and positive effect on CFL purchases in both time periods. Furthermore, CFL saturation was a significant predictor of the number of bulbs purchased in both models; this effect was negative, indicating that, the higher the rate of saturation, the fewer bulbs participants were purchasing. The most important source of variation between the two models involves a variable meant to isolate the impact of prior program support on current CFL purchases. This variable was not statistically significant in the eighteen-month model but as significant in the early 2010 model.

Using the specific models, the team used statistical software to predict purchases in the presence and absence of the program.[7] As shown in Table ES–3, for Massachusetts, the NTG ratios were 0.45 for the entire eighteen month period and 0.83 for the first half of 2010. Importantly, the estimate for the first half of 2010 assumes that the prior program support variable is *not* a measure of current program activity; the calculation of NTG, in other takes, takes the impact of prior program activity into account. However, some advisors to this project have made the argument that prior program activity should be treated as a current program variable. Table ES–4 shows the calculations which follow the same procedures described above, except that, when computing the non-program scenario, we also assume that all programs had no prior activity. This produces a NTG ratio of -2.77 (negative 2.77) for Massachusetts. The confidence intervals were developed using a bootstrap method, and their width reflects the non-linear nature of the models and the remaining uncertainty in the models.

Table ES–3: NTG Ratio Calculations*

Input	Full 18 Months	First half of 2010
A. Per-household purchases with program	7.59	2.39
B. Per-household purchases without program	6.77	1.93
C. Net program purchases per household	0.82	0.46
D. Incented CFLs per household	1.83	0.56
E. Total NTG	0.45	0.83
F. Confidence Interval	0.08 to 0.90	0.45 to 1.45

* Results subject to rounding error.

Table ES–4: Alternative 2010 NTG Ratio Calculations

Input	First half of 2010
A. Per-household purchases with program	2.39
B. Per-household purchases without program	3.94
C. Net program purchases per household	-1.55
D. Incented CFLs per household	0.56
E. Total NTG	-2.77

[7] Team members used STATA and SAS to predict these purchasers in order to confirm the reliability of the results.

Conclusions

The results of the eighteen-month CFL purchase model yield a NTG ratio for the period of January 2009 to June 2010 of 0.45, while the model limited to the first half of 2010 suggests a NTG of 0.83 when prior program support is included, and -2.77 (negative 2.77) when years of program support is set to zero. The difference in the estimates reflects economic, statistical, and programmatic factors, namely the improvement in the economy, the inclusion or exclusion of a variable that captures the impact of prior program activity, and the launch of new programs outside of Massachusetts and a program revision within Massachusetts that altered CFL purchase behavior between 2009 and early 2010.

For purposes of estimating NTG, the 2009 model is superior to the 2010 model, as evidenced by the larger maximum likelihood R^2 of 0.18 for the former compared to 0.12 for the latter. This may be at least partially because respondents could not accurately differentiate CFL purchases in 2009 from purchases in the first six months of 2010, whereas they could give more accurate estimates for the entire 18-month period. We therefore recommend presenting Delphi panel members only with the NTG of 0.45 from the 2009 when they weigh the NTG estimates from the various methods. If the 2010 model were presented, it should be both 0.83 with years of program support included, and -2.77 with years of program support set to zero. We believe this is unnecessarily complicated when there is a superior model with a single NTG estimate that can be presented instead.

1 Introduction

This report summarizes the analyses conducted in support of the multistate CFL modeling effort, highlighting the results as they pertain to the net-to-gross ratio (NTG) for the Massachusetts ENERGY STAR® Lighting Program. The Sponsors of this study include the following: Ameren IU (AIU); Ameren UE (AUE); ComEd; Consumers Energy in Michigan (Consumers); Dayton Power and Light (DPL); EmPower Maryland; the five program administrators of the Massachusetts ENERGY STAR® Lighting Program (Massachusetts) which are the Cape Light Compact, NSTAR, National Grid in Massachusetts, 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 (SRP). This report draws on data from 15 different geographic areas in the United States, but was written specifically for Massachusetts. The analyses draw primarily on data collected from 1,495 households that took part in onsite saturation surveys. Note that the report uses the term "program administrators (PAs)" because the various parties supporting this effort include electric utilities, energy service organizations, public service commissions, and state agencies.

1.1 Changing CFL Market and the Multistate Modeling Approach

CFL program evaluators nationwide are finding it increasingly difficult to provide valid and defensible estimates of net-to-gross (NTG) ratios for CFLs. Numerous recent studies employing various methods have struggled to provide estimates that are widely accepted as realistic and valid estimates of NTG.[8,9] The CFL program evaluation community has turned to a diverse range of methods: self-reported free ridership and spillover, comparisons of CFL sales and self-reported purchase behavior in program and non-program areas, manufacturer and retailer estimates of program-induced "lift" in sales, revealed preference models, and multistate purchase models, among others—only to be frustrated by what some reviewers saw as counterintuitive or unreliable NTG estimates. In fact, the comprehensive evaluation of the Upstream Lighting Program in California (ULP) completed in the Spring of 2010 for the California Public Utilities Commission (CPUC) assessed NTG using six different methods, with the results varying from as low as 23% to as high as 74%.[10,11] This and other recent NTG studies make clear that all

[8] For example, 1) KEMA. 2010. *Final Evaluation Report: Upstream Lighting Program*. Delivered to the CPUC February 8. 2) Summit Blue Consulting. 2009. *Energy Efficiency/Demand Response Plan Year 1 (6/1/2008-5/31/2009) Evaluation Report: Residential Energy Star Lighting*. Delivered to ComEd, November 16, 2009. 3) NMR Group, Inc. 2010. *Results of the Multistate CFL Modeling Effort*. Delivered to the Massachusetts ENERGY STAR Lighting Program Sponsors, February 4, 2010.

[9] Note that assessing validity—the knowledge that the estimate truly measures what it was supposed to measure—is not entirely possible for NTG ratio estimation as it inherently involves measuring a counterfactual, what would have happened if the program had not occurred. See NMR and Research Into Action. 2010. *Net Savings Scoping* Paper. Prepared for the Northeast East Energy Efficiency Partnerships Evaluation, Measurement, and Verification Forum. http://neep.org/uploads/EMV%20Forum/EMV%20Products/FINAL%20Net%20Savings%20Scoping%20Paper%20 11-13-10.pdf

[10] KEMA. 2010, ULP.

available estimation methods have strengths and weaknesses that ultimately influence the results. Given the rapidly changing CFL market, marked by volatile sales nationwide over the past three years, former "best practices" (*e.g.*, self reports of free ridership and spillover and simple comparison-state approaches) have become increasingly problematic. Numerous circumstances underlie the struggle to provide valid estimates of NTG, but chief among these is the rapid expansion of CFL programs throughout the nation,[12] the increased availability of CFLs regardless of CFL program activity, and limited access to CFL sales data from participating and non-participating retailers in both program and non-program areas. Not only do such circumstances limit the usefulness of former best practices to estimating NTG, but no clear methodology currently presents itself as the latest best practice in NTG estimation. For this reason, many PAs across the nation are embracing innovative approaches to estimating NTG in an effort to identify new ways of determining the impact of CFL program activity on actual CFLs purchases and energy savings.

Multistate modeling is one of these approaches. Numerous PAs and their evaluators have employed multistate—really multi-area—modeling as one possible avenue for estimating NTG. In this approach, data from households in multiple PA service territories are entered into a statistical model that attempts to capture the effect of program activity on CFL purchase and use behavior, net the impact of demographic, economic, and social factors that also affect such behavior. Previous attempts to use multistate modeling to explain CFL purchases and use met with mixed success.[13] Some of the limitations of the previous efforts include inconsistency in data collection instruments and the time of year in which data collection occurred, the failure to include variables that capture a household's environmental opinions or inclination to be an early adopter of technology, and the dominance in the model of program areas with long histories of supporting CFLs, leading to limited variation in the program score from which the authors determined program effects. The 2009 effort also relied on a modeling approach that the current team members concluded was not the most appropriate choice to model CFL purchases, as explained in Section 5 of this report. The current multistate modeling effort responded directly to these shortcomings by implementing greater consistency in the instruments and methods used to collect data and the timing of data collection, adding variables that capture environmental and other opinions that may affect adoption of CFL, including programs with a wide range of histories of support for CFLs, and specifying models using a technique closely related to the one employed in the prior effort but that the team believes is more suited to the unique nature of purchase data.

The principal goals of the multistate model are to identify and examine factors associated with CFL purchases from January 2009 to June 2010 and, if possible, isolate the effect of current CFL

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[11] The NTG ratios provided for the ULP were not all measuring the same time period; some were for the entire 2006 to 2008 period and others for blocks of that time making the range.

[12] Six of the 10 PAs sponsoring this study have programs that had been existence for less than three years as of June 2010.

[13] KEMA 2010 ULP; NMR 2010 Multistate CFL Modeling.

programs on those purchases. The evaluation team uses the modeling results to estimate NTG for each PA. The team bases these estimates on a model that we believe best describe CFL purchases for the entire eighteen month period as well as a model limited to the more recent 2010 time period. The analysis draws on data gathered over the telephone or at the homes of 1,495 households (Table 1–1). Note that throughout the report, the sample size reported for each area and overall will differ across table and variables, reflecting "don't know" answer, refusals to answer the question, and other missing or unusable data.

Table 1–1: Participating Areas, Sample Sizes, and Survey Dates

Area	Abbreviation	Years Supporting CFLs[e]	On-Site Sample Size
Program Areas			
Ameren IL (part Illinois)	AIU	1.5	92
Ameren MO (part Missouri)	AUE	0.5	87
ComEd (part Illinois)	ComEd	5.0	98
Consumers Energy (part Michigan)[a]	Consumers	0.5	61
Dayton Power and Light (part Ohio)	DPL	1.0	72
EmPower Maryland (most Maryland)	EmPower	2.0	79
Massachusetts (entire state)[b]	MA	12.0	150
New York City[c]	NYC	11.0	100
New York State [d]	NYS	11.0	200
Rhode Island (entire state)[b]	RI	12.0	100
Salt River Project (part Arizona)	SRP	2.0	101
Non-program Areas			
Houston, Texas (Harris County)	Houston	0.0	100
Indiana (central portion)	IN	0.0	67
Kansas (entire state)	KS	0.0	95
Pennington County, SD (portion)	SD	0.0	93
TOTAL			1,495

[a] A total of 99 homes were surveyed, but the analysis excludes those households who only have natural gas service with Consumers Energy.

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

[c] Surveyed separately from the remainder of the state due to its unique demographic and economic characteristics

[d] State minus New York City and Nassau and Suffolk Counties

[e] At the beginning of 2010

2 Recruitment Procedures

The data used in the modeling effort was derived largely from information collected during an onsite saturation survey in which team members counted all lighting products in the home and verified when installed and stored CFLs were purchased. Households were recruited for the onsite effort through telephone surveys. This section describes the selection of comparison areas, development of the surveys, sample designs and sampling error, and weighting schemes.

2.1 Choice of Comparison Areas

The multistate modeling effort relies on data from areas with longstanding CFL programs, those with newer or smaller programs, and those with no CFL programs through 2010. Table 1–1 lists the areas included in the study. Four of the areas—Houston, part of Indiana, all of Kansas, and Pennington County, South Dakota—serve as comparisons to the program areas. In order to select comparison areas, the PAs and the multistate modeling team examined data on household demographics, concentration of major retailers selling CFLs, and CFL programs across the nation to identify potential comparison areas lacking programs. The evaluation team experienced difficulty in finding non-program areas for two reasons. First, many formerly non-program areas have recently begun implementing programs. Second, the remaining non-program areas often differ substantially from program areas regarding characteristics shown to relate to CFL sales (*e.g.*, homeownership, socioeconomic status, cost of living including electricity costs, and access to retailers selling CFLs). The multistate modeling team confirmed that these four areas had no substantial or sustained CFL program activity as of June 2010.[14] It is worth noting that the portions of Indiana we surveyed are expected to have substantial programs by 2011.

2.2 Telephone Surveys

In order to identify households to take part in the onsite data collection needed for the multistate modeling effort, the multistate modeling team fielded telephone surveys in each of the program and non-program areas included in the analysis. In areas where the PAs serve most residents and in the comparison areas, the team conducted random digit dial (RDD) surveys of households with residential—and in Massachusetts also cell phone—numbers. In the areas where PAs served specific portions of the state, we randomly dialed residential customers of the PAs. The use of these two approaches leads to one primary difference: the RDD surveys are more likely to catch renters who live in master-metered buildings in which their landlord is listed as the customer. The team adjusts for this difference by weighting on owner/renter status in the weighting scheme, described below and presented in Appendix A.

[14] The City of Houston had a short-term bulb give-away program reaching less than 5% of the population of Harris County, and Black Hills Power in South Dakota had taken part in a *Change-a-Light Campaign* but team members confirmed via phone or email that no substantial or sustained CFL program activity existed in these areas.

2.3 Onsite Visits

The PAs and the evaluation team relied on an onsite saturation study to provide information on CFL use, storage, and purchases. The reliance on an onsite survey over a telephone survey reflected the finding in the 2009 multistate effort that telephone survey responses about use and purchases differed substantially—and not very systematically—from those verified onsite. For reasons discussed in detail in those reports, last year's multistate team concluded that the onsite data were more accurate.[15] In response, we rely only on onsite data in this current multistate modeling effort.

2.3.1 Recruiting Onsite Participants

The multistate modeling team identified onsite participants through the telephone surveys. The evaluators then randomly called each household tentatively agreeing to the onsite to set up an onsite visit. The PAs offered a $75 to $150 incentive to each homeowner, depending on the cost of living in their area, to entice customers to participate in the onsite visit. However, when calling to set up the visits, fewer respondents than expected decided to move forward with the onsite visits, reflecting difficulty with scheduling (most onsite visits were conducted during the summer), lack of familiarity with the PA (in non-program states), and distrust of letting strangers into the home. Thus, while the team originally anticipated an onsite sample size of about 1,700, the final sample size was actually 1,495.

2.3.2 Variations on the Onsite Recruitment Approach

Recruitment of onsite households varied from the approach described above in the Ameren Missouri, Consumers, and SRP service areas as well as Maryland, Massachusetts, New York City, New York State, and Houston. In the Consumers service territory, the evaluators recruited households for a comprehensive residential saturation study which addressed CFLs as well as other appliances and heating and cooling equipment. The evaluators asked some of the telephone survey questions while onsite in order to reduce the time on the phone and increase compliance with the onsite saturation study. In the SRP service territory, households had already completed telephone surveys before SRP joined the effort, but the evaluators performed follow-up surveys to make sure all relevant data were collected from SRP respondents. In Maryland and for 22 Ameren Missouri customers, the evaluators recruited households for a metering study, and only CFL users were included. Because Maryland served as a comparison area in the 2009 effort in which all homes were visited despite their stated use or non-use of CFLs, we were able to adjust the weighting scheme to reflect the sample from last year in which recruitment was random and included non-users as well as users. Similarly for the Ameren Missouri households, we based the weighting scheme for those households identified through the metering study to reflect the remaining randomly drawn sample from the service territory.

[15] For example, NMR Group, Inc. (2010) *Results of the Multistate Modeling Effort* and NMR Group, Inc. (2010) *The Market for CFLs in Connecticut*. Both available at http://www.ctsavesenergy.org/ecmb/documents.php?section=22.

In Massachusetts, New York City, New York State, and Houston, a sub-set of homes took part in the 2009 onsite efforts, and the evaluators revisited these homes in 2010 to identify any differences in use and saturation between the two visits. Each "revisit" household was paid an incentive ranging from $150 to $250 depending on their location and the number of sockets found in their home last year. Similar to Consumers' respondents, the evaluators asked many of the telephone survey questions of these householders while onsite in order to limit the time spent on the phone during recruitment for the repeat onsite visit. We have controlled for these revisit households in the models, where appropriate.

2.3.3 Conducting the Onsite Visit

The PAs and the evaluation team cooperatively developed onsite survey instruments. As with the telephone survey questionnaires, the onsite surveys differed slightly, largely reflecting the individual preferences of the PA or data collection firm, but all PAs and evaluators worked closely to ensure comparability across the study areas. The onsite visits in every area adhered to the following procedure:

A trained technician arrived at the home at a pre-scheduled time, introduced him or herself, and asked for the contact person who had been identified when scheduling the visit. The respondent and the technician walked through each room of the home examining all lighting sockets to see if they contained a bulb and, if so, the type of lighting technology in use and the switch type; some also noted the base type. If the product was a CFL, the technician noted its manufacturer and model number and any specialty features. The technician also asked the respondent to estimate when he or she purchased that particular CFL. The technician and householder examined bulbs in storage, again noting similar detailed information on stored CFLs.

One small variation in onsite protocols, however, led to some changes in the modeling procedures. In some areas, the technicians allowed respondents to say that they "did not know" *when* they had obtained CFLs found in their homes; in other areas, they strongly encouraged the respondents to guess at when the purchase occurred, resulting in very few or even no "don't know" responses. Table 2–1 summarizes the disposition of "don't know" responses to this critical question of when households obtained their CFLs. Although 88% of households provided a purchase date for all CFLs in their home, the remaining 12% did not provide a date of purchase.

Table 2–1: Disposition of "Don't Know" Responses to When Purchased CFLs*

Disposition	Percent of Cases
Sample Size	*1,495*
Provided data for all CFLs	88%
Don't know when purchased 1% to 24% of CFLs	4%
Don't know when purchased 25% to 74% of CFLs	2%
Don't know when purchased 75% to 99% of CFLs	1%
Don't know when purchased 100% of CFLs	4%

* Cases do not sum to 100% because of rounding error.

The team performed various diagnostics on the households that failed to provide purchase dates for all CFLs in their homes, and we concluded that they fell into two groups. The first group tended to have a large number of CFLs in the home and provided purchase dates for some of the CFLs but not all of them. The second group failed to provide a purchase date for any CFLs in their home, and these respondents were not concentrated in high CFL use homes.

The team then tested the impact of limiting our modeling efforts to households that did know various proportions of their CFLs. We found that the results changed little based on whether we set the cut off at knowing when 70%, 75%, or 80%—or even lower percentages—of CFLs were purchased. Given that the choice had little impact, we decided to limit the modeling procedure to households that knew the purchase data for 75% or more of their purchases. The choice is admittedly arbitrary, but we believed it represented a logical choice. Note that this decision excludes 105 (7%) of the 1,495 cases from the modeling effort. Moreover, we also include a flag for data collection protocols that allowed "don't know" responses to account for the fact that around five percent of the sample (those knowing 75% to 99% of their CFLs) would not have all of its purchases accounted for in the modeling effort.

The only other variations to the standard approach involved those places in which the technician also gathered information on home electronics, appliances, and heating and cooling technologies or installed lighting loggers. Data testing revealed no need to alter or control for these variations in the modeling process.

2.4 Weighting Scheme

In order to account for any potential bias toward CFL enthusiasts or homeowners, the evaluation team weighted the onsite sample back to the telephone survey-reported familiarity with CFLs as well as to Census data on the percentage of households that own or rent in each area.[16] In Massachusetts, Rhode Island, and Kansas, we weighted the data to the entire state, as we sampled from the entire state. Likewise, in Harris County (Houston) we sampled the entire county, while in Pennington County, SD, we sampled from the zip codes we had called for the RDD. For the remainder of the areas, we drew population data on the number of households from the American Community Survey (ACS) based on the counties represented in the telephone survey for each PA. This means that some of the estimates of households served differ from the actual population served for some PAs, but it allows for the more accurate pairing of county-level data such as unemployment and concentration of box stores (discussed below). Despite the numbers of households differing, the scheme should still reflect the general distribution of households by education and homeownership status in the service territory. (See the weighting scheme in Appendix A.)

[16] For Maryland and the 22 Ameren Missouri households in which only CFL users were sampled, we used data from other sources to determine familiarity with CFLs, as households using CFLs were all aware of CFLs and most also had relatively high levels of familiarity.

Please note that the weighting scheme used in this study differs from those used in some other reports delivered to individual PAs. The weighting schemes in other reports reflect concerns unique to individual PAs. In contrast, this effort required a consistent weighting scheme across areas. The implication is that summary statistics presented in this report will likely differ from those presented in other reports based on the same data. In many cases, the differences are slight, but sometimes they may appear more substantial. The team encourages the PAs to discuss with the evaluation team which results should be used for estimating electricity and demand savings and which to report in their regulatory filings.

3 Variable Specification

The Sponsors and the evaluation team collected nearly all of the data needed for the modeling effort through the telephone and onsite surveys, but we gathered a few variables from other sources. These include the program variables, electricity price, unemployment rates at the time of the survey, the change in the unemployment rate from January 2008 through January 2009, the concentration of various types of discount or home improvement stores (collectively called box stores), and whether the US Census Bureau classified the county as a metropolitan area, a micropolitan area, or a non-metropolitan area. We discuss the development of these other variables as well as specification of some of the survey data below.

3.1 Program variables[17]

The program variables were the key components of the statistical models guiding the calculation of the NTG ratios. The team began development of these variables by reviewing CFL program plans and documents, prior evaluation reports, and program summaries compiled by the Consortium for Energy Efficiency (CEE), the US Department of Energy (DOE), and ENERGY STAR in order to locate CFL programs in each state and gather information on CFL program activity through 2010 in each area. Specifically, we searched for data on the program budgets; the number of CFLs incented; the percentage of the budget allocated to incentives, marketing and advertising, and overhead; the percentage of CFLs that had specialty features, and the method of support (*e.g.*, retail coupons, catalog, and/or upstream approaches).[18] The team successfully collected this information for all programs for 2009 and 2010 and verified the data with the PAs. Table 3–1 summarizes the program data we gathered for each area for the three time periods: the first half of 2009, the second half of 2009, and the first half of 2010.[19] These data were then entered into the model as individual variables or combined in various ways to represent "composite" variables, as discussed in more detail in Appendix B. Ultimately, only the variables for individual components worked in the models, with the number of program supported CFLs per household serving as the consistent program variable identified across all the resulting models as discussed in Section 6.

We also gathered information on when the current CFL program and any of its predecessor programs had been launched in order to assess the impact of prior program activity on current

[17] NMR and Shel Feldman used a similar method in the appliances regression modeling approach conducted as part of the Market Progress and Evaluation Report for the Massachusetts ENERGY STAR Appliances Program. See NMR and Feldman (2005) *Statistical Analyses of Market Penetration of Energy Star-compliant Appliances*. Final delivered July 2005.

[18] Specialty features primarily included the following: dimmable and three-way capabilities, colored bulbs, small screw bases, and shapes other than the usual spiral.

[19] We show the data in these time periods to account for programs that began in the middle of 2009 or in January 2010. Some areas, however, keep data only for the entire program year. We had to allocate data to these smaller time periods, typically using the average unless the PA provided other information that indicated another appropriate allocation, such as for the programs that launched in mid-2009.

purchases. Because these variables were closely correlated, we added the scores together to yield a "prior program support" variable. This combined prior program support variable is not considered to be descriptive of the *current* program activity, however, and is kept separate from variables representing program activity in a given time period.

Table 3–1: Prior Program Support and Current Program Data by Area

Area	Years Supporting CFL	Years Buydown*	CFL Incented per Household	Budget Spent per Household	Percent of Budget for Incentives	Percent Standard CFLs
First Half of 2009						
Ameren IL	0.5	0.5	0.47	0.87	60%	87%
Ameren MO	No program in this period					
ComED	4.0	0.25	1.00	1.84	59%	67%
Consumers	No program in this period					
DP&L	0.0	0.0	0.63	1.09	75%	95%
EmPower	1.0	1.0	0.57	1.13	45%	90%
Massachusetts	11.0	6.0	0.51	1.98	71%	89%
NYSERDA**	10.0	0.0	0.15	0.22	40%	95%
Rhode Island	11.0	6.0	0.28	1.21	79%	94%
SRP	1.0	1.0	0.77	0.45	30%	55%
Houston	No program					
Indiana						
Kansas						
Pennington						
Second Half of 2009						
Ameren IL	1.0	1.0	0.43	0.95	51%	80%
Ameren MO	No program in this period					
ComED	4.5	0.75	1.39	2.13	70%	89%
Consumers	0.0	0.0	0.31	0.88	36%	86%
DP&L	0.5	0.5	2.64	4.58	75%	95%
EmPower	1.5	1.5	0.85	1.86	42%	90%
Massachusetts	11.5	6.5	0.77	1.98	71%	90%
NYSERDA**	10.5	0.5	0.23	0.93	62%	95%
Rhode Island	11.5	6.5	0.36	1.21	79%	90%
SRP	1.5	1.5	0.89	0.92	51%	48%
Houston	No program					
Indiana						
Kansas						
Pennington						

Area	Years Supporting CFL	Years Buydown*	CFL Incented per Household	Budget Spent per Household	Percent of Budget for Incentives	Percent Standard CFLs
First Half of 2010						
Ameren IL	1.5	1.5	0.39	0.95	0.51	86%
Ameren MO	0.5	0.5	1.09	2.05	0.55	89%
ComED	5.0	1.25	1.39	2.13	0.70	89%
Consumers	0.5	0.5	0.16	1.41	0.32	86%
DP&L	1.0	1.0	2.45	4.34	0.85	95%
EmPower	2.0	2.0	1.11	2.43	0.58	90%
Massachusetts	12.0	7.0	0.56	2.53	0.63	59%
NYSERDA**	11.0	1.0	0.26	0.56	0.62	95%
Rhode Island	12.0	7.0	0.21	1.32	0.40	80%
SRP	2.0	2.0	1.12	1.46	0.54	40%
Houston	No program					
Indiana						
Kansas						
Pennington						
Full Eighteen Month Period						
Ameren IL	1.5	1.5	1.14	2.45	0.54	84%
Ameren MO	0.5	0.5	1.20	4.81	0.26	89%
ComED	5.0	1.25	3.78	6.09	0.67	82%
Consumers	0.5	0.5	0.46	2.29	0.33	86%
DP&L	1.0	1.0	2.45	4.34	0.85	95%
EmPower	2.0	2.0	2.53	5.42	0.25	90%
Massachusetts	12.0	7.0	1.83	6.49	0.67	79%
NYSERDA**	11.0	1.0	0.63	1.70	0.59	95%
Rhode Island	12.0	7.0	0.84	3.73	0.65	88%
SRP	2.0	2.0	2.78	2.83	0.49	48%
Houston	No program					
Indiana						
Kansas						
Pennington						

* Refers to upstream as the dominant approach, although most areas still have some coupon, catalog, or give-away components to their programs.

** Includes both New York State and New York City

3.2 Additional Non-survey Variables

The evaluation team thought that certain external factors may have affected CFL sales and use, including the local economic conditions and the concentration of box stores.[20] Turning first to electricity price, we collected data on electricity price in 2009 and 2010, measured as cents per kilowatt hour, from the Energy Information Administration at the state level for all areas in the analysis. We supplemented these data with information on electricity rates in New York and Illinois to distinguish between the higher rates in the New York City and Chicago areas compared to the remainders of the state.

For economic conditions, the team focused on unemployment rates due to the inability to locate reliable and comparable data on foreclosure rates across all areas in the study.[21] We gathered unemployment data from the US Bureau of Labor Statistics (BLS).[22] The analyses included two different measure of unemployment, both collected at the county level. The first was the county unemployment rate during the month the telephone survey was fielded. The second was the change in the county unemployment rate from January 2008 to January 2009. The first approach provides a snapshot of the economic conditions in the county, while the second captures the relative change in the economic conditions. Both high unemployment rates and large changes in unemployment rates could affect purchasing behavior of CFLs, among other products.

The models also tested three different variables to capture the concentration of big box stores, specifically Home Depot, Lowes, Menards, and Wal-Mart (including Sam's Club).[23] First, the team used the "store locator" search engine on each retailer's website to count the number of their stores in each county in the study area. We then converted the store counts to estimated total square feet by county. For Wal-Mart, we used estimates gathered from its corporate website about the average square footage of each of its various store types (*i.e.*, Supercenter, Discount, Marketside, Neighborhood, and Sam's Club). We also located a national estimate of average square footage for Home Depot and applied that not only to Home Depot but also Lowes and Menards, because we were unable to locate a similar number for Lowes and Menards. We then summed the results into three different county-level estimates of total square footage for Wal-Mart stores and non-Wal-Mart stores, and then combined Wal-Mart and all other box stores. To adjust for the size of the county, the square footage of each box store per county was divided by the number of households in the county to yield variables capturing the concentration of box stores per household.

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[20] We chose the county level because it allowed for greater variation than state-level statistics, which would have been collinear with the program variable. The data required for developing the external variables were not always available at such smaller units of analysis such as the zip code.

[21] The team also included a question in the telephone surveys about the respondent's satisfaction with their standard of living.

[22] The BLS defines unemployment as jobless workers actually seeking employment; the measure excludes so-called "discouraged" jobless, those who have given up their job search.

[23] While Menards stores exist only in the parts of the Midwest, the chain is responsible for large numbers of CFL sales in these areas.

Finally, the evaluation team created a dummy variable using the current US Census Bureau designations of metropolitan, micropolitan, and non-metropolitan counties to control for effects that may be associated with central cities and their immediate suburbs as opposed to areas with smaller cities and towns (i.e., fewer than 50,000 people in any of the cities or towns in the county).

4 Comparisons across Participating Areas

Many of the PAs sponsoring this effort expressed an interest in the levels of CFL purchases, use, and saturation in their areas compared to the levels in the other areas taking part in this study. This section presents these comparisons. We find it extremely important, however, to caution against comparisons without understanding the context of the programs, the characteristics of each area, and the nature of CFLs. While the programs included in this study predominantly rely on an upstream approach, the details of their agreements with manufacturers and retailers differ: some support small packages of CFLs, others incent only large multipacks; most predominantly support spiral CFLs, but a few areas target specialty products. Moreover, the program history and the demographic, economic, and social characteristics of the areas differ, which in turn influences the lighting-related behavior of individual household. To offer one simple example, New York City households have the smallest number of sockets and the smallest number of CFLs installed, but they also displayed high levels of saturation. This is because homes in NYC tend to be small, multifamily units with very few sockets; the use of a few CFLs resulted in high saturation rates. Furthermore, purchase and use patterns must take into account one of the major selling points of CFLs: they last a long time. If a household purchased many CFLs in 2009, they may not do so again in 2010 because they do not have any more sockets they want to fill with CFLs.[24] Therefore, a declining purchase rate in the periods under examination does not necessarily point to a decline in program effectiveness. The rate could very well jump again in the next year. Finally, the purchase estimates for each time period are based on *respondent self-reports*, and these self-reports are subject to a high degree of measurement error, as purchasers often forget exactly when (and where) they purchased CFLs, as they are small in size and relatively inexpensive compared to such larger purchases as an appliance or a car. This problem becomes exacerbated as CFL adoption increases; CFLs become just another regular household purchase and do not stand out in the memories of individuals.

With these cautions and caveats in mind, we present information in this chapter on CFL socket saturation, awareness, familiarity, satisfaction, purchase, storage, and use for those households taking part in the onsite surveys. Appendix C contains similar comparisons for other key variables such as demographic, economic, and social characteristics.

4.1 CFL Socket Saturation

One of the primary purposes of the onsite visits was to conduct a socket count in order to estimate CFL saturation. Table 4–1 summarizes the area-wide saturation rate (i.e., all installed CFLs in the state divided by all sockets in the state) and the per-household saturation rate (i.e.,

[24] Having sockets they *want* to fill with CFLs is distinct from having sockets they *can* fill with CFLs.

the average percentage of sockets for each household) at the time of the onsite study.[25] It also lists the per-household saturation rate at the beginning of 2009, calculated backward by taking current saturation and subtracting any CFLs reported as purchased in 2009 or 2010.[26] The two per-household estimates of saturation are those used in the multistate model precisely because the model operates at a household level. The area-wide rate is the one most commonly reported by PAs nationwide because they are most concerned with describing the entire program area, not individual households. The data show that area-wide *current* saturation rates vary from 14% in the Consumers service territory to 28% in New York City; overall, the saturation rate is 21%. The per-household estimates of current saturation range from 15% in Indiana to 28% in Massachusetts. Importantly, we find no systematic differences in current saturation rates in program areas vs. non-program areas. Although saturation rates are relatively low in three of the non-program areas (Indiana, Kansas, and Houston), these rates are similar to or higher than those in many program areas. Pennington County, a non-program area, has one of the higher saturation rates in the sample, exceeded only by New York City and Massachusetts.

Looking at our proxy variable for saturation at the beginning of 2009, the data suggest that long-standing program areas tended to have the highest saturation rates—with the newer program area Ameren Illinois and the non-program area of Pennington County serving as exceptions. Saturation rates at the beginning of 2009 ranged from a low of three percent in Indiana to 20% in Massachusetts. Increases in saturation varied from six percent in the Consumers service territory to 14% in New York City and Houston. Three of the four non-program areas reported increased saturation of between 12% and 14%—exceeding the increase for the entire sample.

These wide-ranging saturation rates point to one of the critical needs for this study: factors other than programs influence whether households use or do not use CFLs. This effort seeks to untangle the effects of programs from those other factors.

[25] To illustrate the difference, consider these three hypothetical households. The first has just one CFL installed in its 20 sockets, the second has 40 CFLs installed in its 60 sockets, and the third house has five CFLs installed in its 10 sockets. The sum of the CFLs is 46, and the sum of the sockets is 90. This yields an area-wide saturation rate of 51%. However, the saturation rate for the households are 5%, 67%, and 50%, respectively. Averaging these saturations yields a saturation rate of 41%.

[26] This approach has three problems. First, it suffers from respondent self-reporting error regarding the time of purchase. Second, the approach assumes that none of the currently installed CFLs purchased after 2009 had replaced CFLs in the same socket. Finally, the method does not account for changes in the number of sockets in the home that may have occurred after the beginning of 2009. Therefore, it almost certainly *underestimates* saturation at the beginning of 2009, exaggerating the increase in saturation over time. Evidence from previously reported saturation rates in states such as Massachusetts (*e.g.* NMR 2007 *MPER*; NMR 2010 *Market for CFLs*) suggest saturation of 21% in 2007 and 26% in 2009 support this claim.

Table 4–1: Current CFL Saturation by State

(Collected during onsite visits; saturation = percentage of sockets)

Area	Sample Size	Area-wide	Per Household		
		Summer 2010	Summer 2010	Beginning 2009	Change
Program Areas					
Ameren IL	92	23%	25%	15%	10%
Ameren MO	87	17%	16%	7%	9%
ComED	98	20%	24%	12%	12%
Consumers	61	14%	17%	11%	6%
DP&L	72	15%	19%	10%	9%
EmPower	79	19%	20%	9%	11%
Massachusetts	150	25%	28%	20%	8%
New York City	100	28%	25%	11%	14%
New York State	200	21%	24%	12%	12%
Rhode Island	100	20%	23%	13%	10%
SRP	101	23%	24%	12%	12%
Non-program Areas					
Houston	100	18%	19%	5%	14%
Indiana	67	17%	15%	3%	12%
Kansas	95	19%	21%	9%	12%
Pennington Cnty, SD	93	24%	25%	15%	10%
OVERALL	**1,495**	**21%**	**23%**	**12%**	**11%**

As part of our data exploration prior to running CFL purchase and use models, the team also created scatterplots that graphed the relationship between purchases across the entire eighteen month period (2009 and early 2010) with saturation at the beginning of 2009, as well as the relationship between current household-level CFL use, determined by the number of CFLs in use, and household-level current CFL saturation, calculated as the percentage of all sockets containing CFLs. The relationship between saturation and purchases illustrates a challenge for successful CFL programs: those households with high saturation rates buy fewer CFLs (Figure 4-1). They have CFLs in many sockets—though usually not a majority of them—and for some reason either stop converting other sockets to CFLs or do so at a slower rate. Also, participants with the highest rates of saturation (100%) have some of the lowest number of bulbs installed (Figure 4-2). This reflects the fact that small homes have fewer sockets and, therefore, reach high levels of saturation through the use of fewer CFLs than larger homes with many sockets. Saturation may be high even if purchase numbers are small, depending on the size of the home. Both of these issues have important implications for programs—and for the modeling process—and the relationships have an impact on how the models behave.

Figure 4-1: Saturation at the Beginning of 2009 by Total Purchases

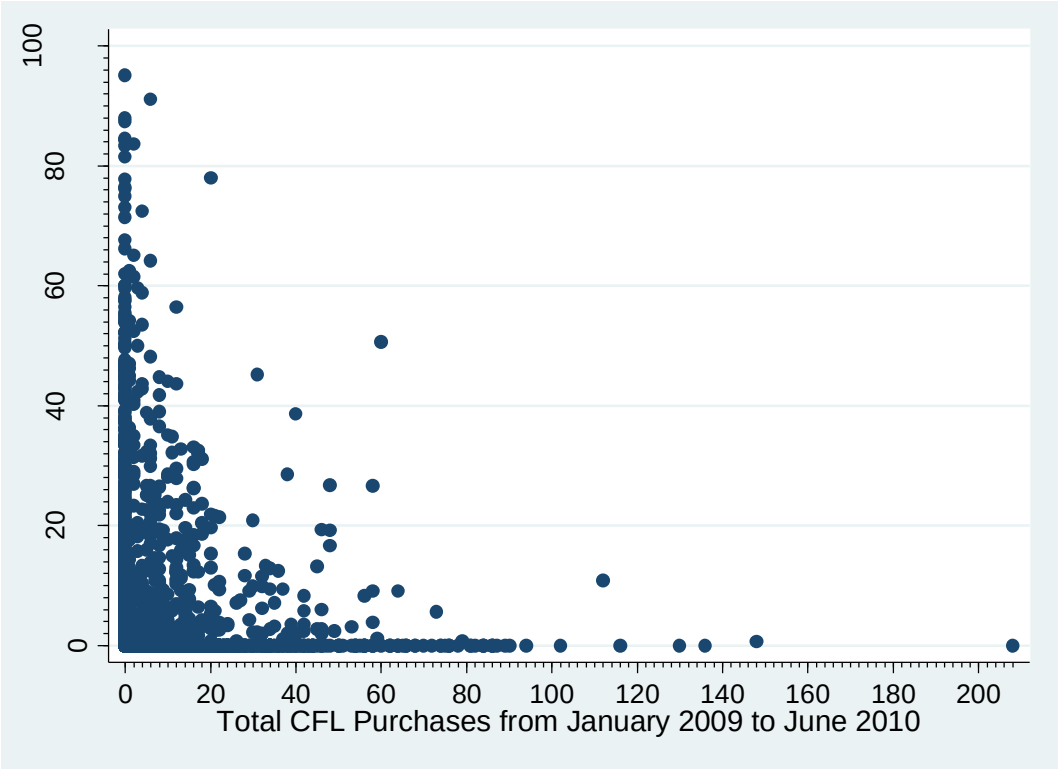
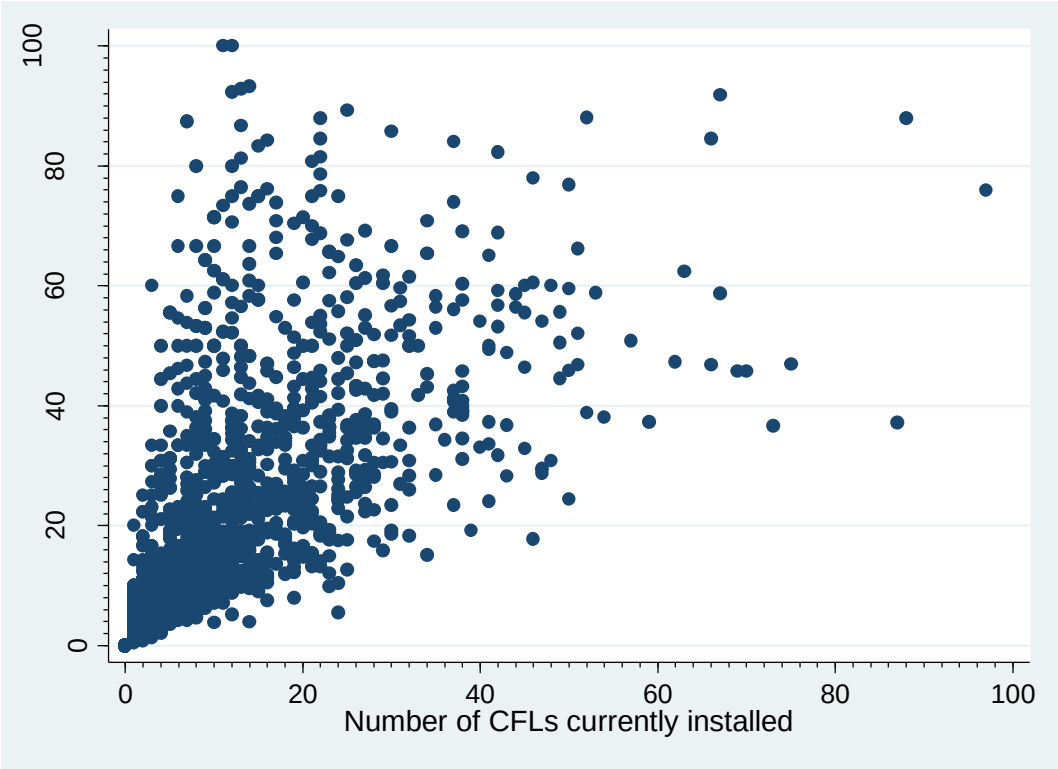


Figure 4-2: Current CFL Saturation by CFLs in Use



4.2 Comparison of Key Variables across Areas

We have identified some notable findings and patterns in the CFL purchase, use, and saturation data as shown in Table 4–2 and Table 4–3 (the shaded cells indicate areas with values greater than found for the entire sample). The data collected across numerous geographic areas and service territories for the multistate modeling effort show widespread awareness, familiarity and satisfaction with CFLs (Table 4–2). In all areas included in the analysis, the majority of respondents is aware, familiar and satisfied with CFLs. The area with the lowest level of CFL awareness and familiarity (New York City at 81% and 64%, respectively) also boasted a 93% satisfaction rate with CFLs among self-identified CFL users. The Salt River Project service territory exhibited the highest level of CFL awareness (98%) and households in the Ameren Illinois service territory voiced the highest level of familiarity with CFLs (86%).

Only one program area, New York State, reported increasing CFL sales, albeit small ones, across all three time periods included in the study (the first half of 2009, the second half of 2009, and the first half of 2010) (Table 4–3). Two program areas also displayed decreasing CFL sales across all three time periods; both areas—the Consumers service territory of Michigan and the Ameren IU service territory of Illinois—have fairly new programs. Among non-program areas,

Kansas reported declining CFL purchases over time, while Houston and Pennington County exhibited increasing CFL purchases over time, with substantial increases in 2010.[27]

[27] A handful of Pennington County onsite participants who had purchased or were using or storing CFLs explicitly told the technician that they bought them "on sale" at a retailer. This suggests that some areas lacking CFL programs are exposed to CFL promotions sponsored by parties other than utilities, public service commissions, or energy-efficiency organizations.

Table 4–2: Comparison of Key Variables across Areas – CFL Related Factors

Area	Aware of CFLS		Somewhat or Very Familiar with CFLs		Satisfied with CFLS	
	n	%	n	%	n	%
Program Areas						
Ameren IL	92	95%	92	86%	78	82%
Ameren MO	87	91%	85	83%	73	93%
ComED	98	94%	90	84%	73	91%
Consumers	61	93%	61	77%	45	76%
DP&L	72	93%	68	79%	53	90%
EmPower	79	86%*	79	86%*	68	87%
Massachusetts	150	95%	150	85%	130	89%
New York City	100	81%	100	64%	56	93%
New York State	200	93%	200	77%	164	91%
Rhode Island	100	92%	100	75%	84	89%
SRP	101	98%	97	85%	87	85%
Non-program Areas						
Houston	100	94%	100	67%	67	92%
Indiana	67	84%	67	72%	44	93%
Kansas	95	96%	91	86%	79	89%
Pennington Cnty, SD	93	90%	93	76%	72	84%
OVERALL	**1,495**	**91%**	**1,495**	**79%**	**1,173**	**88%**

* These data reflect adjustments made to account for the fact that only CFL users were surveyed in Maryland. Similar adjustments were made for a subset of the Ameren Missouri sample.

Table 4–3: Comparison of Purchases and Current Use of CFLs*

	Number of CFLs Purchased Jan – June 2009		Number of CFLs Purchased July – Dec 2009		Number of CFLs purchased in 2010		Number of CFLs Currently Stored		Number of Bulbs Installed**		Number of CFLs Currently Installed	
	n	**Mean**	**n**	**Mean**	**n**	**Mean**	**n**	**Mean**	**n**	**Mean**	**n**	**Mean**
Program Areas												
Ameren IL	92	3.3	92	2.5	92	2.2	92	2.7	92	55.8	92	12.9
Ameren MO	87	1.5	87	2.4	87	2.9	87	2.7	87	67.3	87	11.4
ComED	98	2.8	98	3.1	98	3.0	98	3.0	98	62.8	98	12.5
Consumers	61	3.0	61	1.3	61	0.9	61	2.0	61	52.6	61	7.6
DP&L	72	2.0	72	1.4	72	3.4	72	2.9	72	61.7	72	9.2
EmPower	79	2.2	79	1.7	79	2.9	79	2.4	79	55.0	79	10.2
MA	150	0.8	150	2.9	150	2.2	150	2.4	150	48.1	150	12.1
NYC	100	2.7	100	1.8	100	2.2	100	1.6	100	29.2	100	8.2
NYS	200	2.3	200	2.4	200	3.0	200	2.0	200	58.5	200	12.6
RI	100	0.6	100	1.9	100	1.3	100	1.8	100	44.1	100	8.8
SRP	101	4.4	101	1.8	101	2.6	101	2.8	101	52.4	101	11.8
Non-program Areas												
Houston	100	0.7	100	1.5	100	5.1	100	0.5	100	52.3	100	9.3
Indiana	67	2.4	67	3.2	67	2.8	67	1.8	67	50.6	67	8.7
Kansas	95	4.0	95	2.2	95	1.5	95	1.8	95	58.1	95	11.2
Pennington	93	0.1	93	1.4	93	5.6	92	2.4	93	48.0	93	11.6
OVER-ALL	**1,495**	**2.1**	**1,495**	**2.1**	**1,495**	**2.7**	**1,495**	**2.2**	**1,495**	**52.5**	**1,495**	**10.8**

* Does not account for households that did not know when they purchased their CFLs. Protocols in some areas allowed "don't know" responses more frequently than in other areas.

** Includes all lighting technologies, not just CFLs.

5 Model Choice, Development, and Analysis

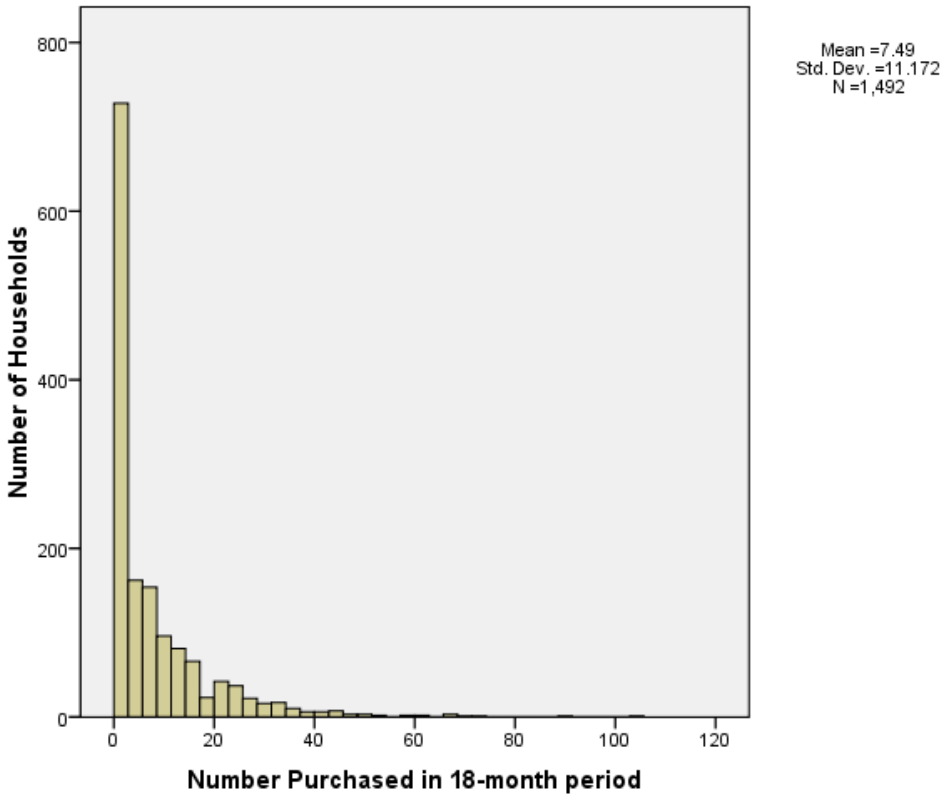
The nature of the data led the team to turn to non-linear models to estimate CFL purchases and use. Moreover, we also attempted models using a wide range of variables due to the complexity of CFL purchase and use behavior and the social and economic context in which this behavior occurs. This section explains model choice, development, and analysis.

5.1 Model Choice

The team used a zero-inflated negative binomial (ZINB) model to predict CFL purchases. Similar to the related model, the negative binomial regression model (NBRM), the ZINB is one of the more common methods of analyzing count data (*e.g.* the number of CFLs) with many cases falling at zero and with a fair degree of variability in the data (Figure 5-1).[28] In contrast to the NBRM, ZINB has the additional benefit of not treating all zeros the same. The team had used NBRM in the 2009 multistate effort and in earlier models considered for 2010 because we originally concluded that a "zero was a zero," which would make the NBRM the better choice. However, upon further discussion, we considered it likely that purchasing zero CFLs meant different things to households in the sample. Some households purchased zero CFLs simply because they did not need any CFLs during the time period under question. Other households, however, did not use CFLs and failed to buy them because they did not want CFLs or were not aware of them. We tested the ZINB to see if it supported this theory of underlying differences among, concluding it did.

[28] Long, J.S and J. Freese (2006) *Regression Models for Categorical Dependent Variables Using STATA*. STATA Press: College Station, TX. Elhai, J.D., P.S. Calhoun, and J.D. Ford "Statistical Procedures for Analyzing Mental Health Services Data." *Psychiatry Research* 160(2):129-236.

Figure 5-1: Histogram of CFLs Reported Purchased for the Eighteen-month Period



The ZINB model runs two simultaneous models, a logistic model and a negative binomial model. The logistic model distinguishes between the zeros, identifying the households that had a higher probability of never buying CFLs (*i.e.*, the always zero group) and those households who had a higher probability of simply not purchasing during the observation period (*i.e.*, the not-always zero group). The negative binomial portion of the procedure runs models that predict the number of purchases using those households in the not-always zero group from the logistic portion as well as households that actually reported purchasing CFLs in the observation period.

The team also developed statistical models to explain CFL use (number of CFLs installed) and saturation (percentage of sockets filled with CFLs), but we used different model types to do so for the following reasons. Because the CFL use data are count data with a strong right skew, we tested models using both NBRM and ZINB. We found that the two models performed almost identically, with model coefficients, probabilities, and maximum likelihood R^2 being the same.[29] Therefore, we concluded that there were no systematic differences driving "zero use" of CFLs as there was for purchases. Additionally, the ZINB was not an appropriate choice to model

[29] The maximum likelihood R^2 is one of various statistics reported for non-linear regression that attempts to mimic the explained variance R^2 of OLS models. However, most statistical sources warn that its interpretation is not the same as OLS because non-linear models behave differently than linear ones. For this reason, the maximum likelihood R^2 can be understood as a method to assess a model's goodness of fit but should not be considered to be equivalent to the OLS R^2.

saturation because saturation is measured as the proportion of sockets in the home filled with CFLs, not as a count. Since both ZINB and NBRM are suitable only for count data, the team explored other procedures and data transformations to confront the right skew in the saturation data, but we found none that fit the conditions. Therefore, the saturation models presented in this report rely on an ordinary least squares (OLS), the most common linear regression technique.[30] We did, however, suppress the constant, meaning that we forced the line described by the model to cross the X and Y axes at zero. This reflects the fact that saturation cannot fall below zero. The implication is that the explained variance of the model (R^2) is not applicable, even though, as we will see, it is rather high.

5.2 Model Development and Analysis

To develop the models, the team created models using the different program variables and other explanatory variables, including the following:

- Demographic, economic, and social characteristics
- Concentration and travel time to Big Box stores
- Duration of household CFL use
- CFL storage, CFL use, and CFL saturation prior to the purchase period under consideration
- Various measures of environmental opinions and early adoption behavior

The team excluded explanatory variables found to be excessively collinear with other explanatory variables in the model or that had little statistical effect on CFL use, saturation, and purchases, that were tautological, or that made little theoretical sense.[31]

For example, regarding tautology, the only ZINB model we successfully ran for CFL *use* that improved upon an NBRM included CFL saturation at the beginning of 2010 in the logistic portion of the model. This model found that households with high saturation in early 2010 were more likely to have at least some CFLs installed in June of 2010. While it is interesting to know that households with high saturation did not get rid of their CFLs, we concluded that this relationship was nearly tautological and rejected the model. We present the model in Appendix D for interested readers.

[30] In considering the best method to model market share we were limited in that Logit, Poisson, NBRM and Tobit models either required dichotomous or count data or "normalcy" in the dependent variable for the model to estimate reliably. Our data met none of these conditions, so we decided that OLS regression would be the most appropriate method to model market share despite that fact that the variable is a rate and has a heavy right skew. Market share was transformed by taking the arcsine root; the transformed variable was then modeled using OLS. We compared the model using the transformed variable to the non-transformed one, and they behaved very similarly to one another. Given that the transformed and original market share variable behaved similarly it was decided, for the sake of interpretation, to use the original form of market share in the models.

[31] Collinearity was determined by the tolerance statistic and the variance inflation factor.

The role of electricity price provides an example of a variable that made little theoretical sense. Reviewers of the 2009 multistate effort and earlier attempts at the 2010 effort often criticized the models for not including electricity price. For this reason, the team successfully ran ZINB models for 2010 purchases, but the coefficients indicated that *higher* electricity price was associated with *reduced CFL purchases*. Closer examination revealed that the electricity price variable was really capturing the fact that the East Coast areas in the model have higher electricity prices—and longer running programs—than the other areas in the model, a theory we tested by replacing electricity price with a dummy variable for East Coast and the prior program support variable. These models performed similarly or better than the electricity price variable. For this reason, we rejected the use of electricity price in the models and instead chose to use the prior program support variable which makes the most theoretical sense from a program standpoint and performed better than either the electricity price or East Coast variables. We present the electricity price model in Appendix D for interested readers.

One final note on the choice of program variables: although the team tested the various program variables in the model, we ultimately chose to use only the number of CFLs supported per household. This variable out-performed other program variables in the purchase models. In the use and saturation models, however, it behaved almost identically to the variable 'CFL budget spent per household'. As discussed in more detail in Appendix B, we opted for consistency in the program variable across models, even though both variables *entered individually* produced equivalent models.

The models presented in Section 6 are parsimonious in that every variable in them has a statistically significant net effect on CFL use or purchases (at the 0.10 level of significance); removing any of the variables reduces the strength of the model as determined by diagnostics such as the maximum likelihood R^2, the predictive capability of the model, or the statistical significance of other explanatory variables in the model. In short, they represent the best models yielded by the analyses.

6 Results and Implications for NTG

As described above, the evaluation team ran multiple models using different analysis techniques to understand the effects of CFL programs on CFL purchases, use, and saturation. In fact, multiple models worked for each time period under observation. In choosing between models, the team focused on the issues discussed in Section 5 as well as the probability associated with each variable in the model, the maximum likelihood R^2 statistic (related to, but different than, the explained variance for OLS regression models), and for purchases, the ratio of predicted to self-report purchases. We present the diagnostics for the selected models and alternative specifications in Appendix D.

Because the ZINB and NBRM utilized to predict CFL purchases and use are not linear modeling techniques, their interpretation is not immediately intuitive. As with OLS regression, the logistic and NBRM techniques produce "coefficients" for each independent variable. In OLS, the coefficient is the amount by which the dependent variable will change given a one-unit change in the independent variable. In nonlinear models, the direct interpretation of the coefficient is that it is the log likelihood of the independent variable bringing about a change in the dependent variable increase. Therefore, unlike in OLS model in which one can simply multiply the coefficient by the value of the explanatory variable to yield an estimate of the impact on the explained variable, the coefficients still point in the direction of the relationship. A positive coefficient suggests that the explanatory variable brings about an increase in purchases or use; a negative coefficient points to a decrease in purchases or use. In the 2009 effort and earlier drafts of the 2010 report, the team calculated the impact of each variable—and ultimately the NTG ratio—using an Excel spreadsheet. However, many readers found our explanations of the process confusing; moreover, this manual process increased the probability of data entry error. In response, the team ultimately turned to the statistical package STATA to model and predict purchases and to calculate NTG ratios. In order to verify the reliability of the STATA estimates, team members also reran the models and calculations in SAS, verifying the results.

6.1 CFL Purchase Models

The evaluation team presents two different recommended purchase models. The first model, shown in Table 6–2 on page 27, covers the entire eighteen-month period of January 1, 2009 to June 30, 2010. A number of reviewers suggested the development of this model for two reasons:

1. Using an eighteen-month model would reduce the self-report error in when households obtained CFLs. This reason is based on the assumption that allocating CFLs to 2009 or the first half of 2010—or even between the first and second half of 2009 as presented in earlier models—was difficult for respondents.
2. Some PAs preferred a description of the entire period, not portions of it.

Table 6–3 on page 29, in contrast, predicts purchases for the first-half of 2010 only. We developed this model for three different reasons:

1. Households may have superior recall of 2010 purchases because these purchases are more recent.
2. PAs with programs launched in late 2009 or the beginning of 2010 and those that had already filed NTG estimates for 2009 preferred the result for 2010 only.
3. National CFL shipment data pointed to improved purchases of CFLs, likely affected by the slowly improving economy, in 2010 compared to 2009. This suggests that the CFL purchase behavior in 2010 also differed from 2009, which may point to differing impacts on NTG ratios.

Regarding the third point, Table 6–1 displays national CFL shipment data from 2007 to 2010 by quarter. The data show increasing CFL shipments throughout 2007—the year of Wal-Mart's campaign to sell a hundred million CFLs—and the first quarter of 2008. Then shipments plunged in the latter half of 2008 and first three quarters of 2009. Shipments of CFLs did not begin to rebound until late 2009, and shipments remained strong in 2010. Given this change in shipments, which coincide to some extent with the slow improvement in the economy, the team and its advisors believe that models showing the entire period and 2010 alone were appropriate.

Table 6–1: 2007-2010 National CFL Shipments

	2007	2008	2009	2010
1st Quarter	76,939,726	98,776,098	63,135,546	89,653,617
2nd Quarter	82,341,541	79,972,622	64,826,208	91,602,221
3rd Quarter	112,582,206	72,356,258	62,453,600	82,335,303
4th Quarter	125,265,219	86,380,994	81,266,237	107,875,959*
Total	397,128,692	337,485,972	271,681,591	371,469,110*

Source: U.S. Imports of Selected Merchandise, U.S. Department of Commerce

*Note that the 4th Quarter 2010 imports (and therefore the 2010 total) are a projection, based on October 2010 imports.

For each of the purchase models presented below, the logistic portion indicates which households will likely never purchase CFLs versus those more likely to be purchasers. It only looks at households not purchasing CFLs in the time period. A negative coefficient means the chance of purchasing zero CFLs was lower in homes with higher values of that independent variable (*i.e.*, conversely, the chance of purchasing more than zero CFLs was higher). A positive coefficient means the chance of purchasing zero CFLs was greater in homes having a higher value of that variable (*i.e.*, conversely, the chance of purchase for more than zero CFLs was smaller).

The model's negative binomial portion is limited to those buying CFLs and zero purchasers more likely to buy. It estimates how many CFLs these households purchased in the time period and shows the explanatory variables and their coefficients.

6.1.1 Purchase Model for Eighteen Month Period

The logistic portion of the model predicts that:

- Households that own their homes were more likely to purchase some CFLs.
- Households with a greater CFL saturation at the beginning of 2009 were less likely to buy any CFLs, so they were considered to be in the always zero group. This is presumably because they already purchased CFLs and did not need them when asked (e.g., until their current CFLs burn out or they exhaust their stock of stored CFLs).
- Households that strongly agree that it is expensive to reduce energy use were less likely to buy any CFLs, presumably because they have already taken such low-cost options as buying CFLs.

The model's negative binomial portion predicts that 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:

- Households with a higher saturation of CFLs at the beginning of 2009 also were likely to buy fewer CFLs than those with a lower CFL saturation. Similar to the model's logistic portion, this implies that those households with high levels of saturation simply did not need to buy CFLs because they already had enough.
- Households living in counties with high unemployment purchased fewer CFLs; considered with the logistic portion, this implies that households living in such areas bought CFLs, but not very many of them.
- The larger the participant's home the more CFLs they purchased.
- Households satisfied with their standard of living were more likely to buy CFLs, perhaps reflecting their greater comfort level with paying the higher price for CFLs.
- Households in which the respondent self-identified as white bought more CFLs.
- Finally, households that bought CFLs at various types of Big Box stores purchased more CFLs, presumably due to the larger package size typically sold at these stores versus grocery or lighting specialty stores. Note that, in the 2010 model presented below, a combined Big Box store variable performed better than these individual variables, but the individual variables performed better in the eighteen-month model.

Table 6–2: Best Fit Eighteen-Month Purchase Model*

Variables	Coefficient	Probability of z
Logistic Model		
Intercept	-1.169	0.000
Homeownership (owner coded as 1)	-0.656	<0.001
CFL Saturation at Beginning of 2009	0.023	<0.001
Not expensive to reduce energy use (1 to 4, strongly agree coded as 1)	0.179	0.055
Negative Binomial		
Intercept	1.457	<0.001
Bulbs supported/household	0.062	0.012
CFL Saturation at the beginning of 2009	-0.012	<0.001
County unemployment rate at the beginning of 2009	-0.050	0.006
Size of home (by 2K sqft, ascending scale)	0.302	<0.001
Satisfaction with standard of living (1 to 5, strongly agree coded as 5)	0.054	0.066
Self-identify as white	0.328	<0.001
Purchase CFLs at Warehouse Store**	0.858	<0.001
Purchase CFLs at Home Improvement Store**	0.405	<0.001
Purchase CFLs at Mass Merchandise Store**	0.279	0.002

* Sample size = 1,239 and Maximum Likelihood R^2 = 18%. Reduction in sample size from full 1,495 cases reflects exclusion of households who knew purchase date for fewer than 75% of CFLs in home (105 cases), no response for the energy question (73 cases; question was mistakenly excluded from one telephone survey; efforts to collect onsite yielded responses for only some households), and refusal to answer demographic (51 cases) and standard of living (23 cases). Note that some households were excluded for more than one of these reasons.

** In the 2010 model below, combining these variables into one "shop at Big Box store" dummy variable performed as well as treating them separately. In this eighteen-month model, doing so reduced model fit.

6.1.2 Purchase Model for 2010

The logistic portion of the model predicts that:

- Households with higher education levels had a greater probability of purchasing any CFLs, that is, of not being in the always zero group.
- Households visited in both 2009 and 2010 were more likely to purchase CFLs.
- Households with a greater CFL saturation at the beginning of 2010 were less likely to buy any CFLs, so they were considered to be in the always zero group. This is presumably because they already purchased CFLs and did not need them when asked (e.g., until their current CFLs burn out or they exhaust their stock of stored CFLs).
- Households that like to have new technology were more likely to buy CFLs than those who do not like to have new technology. Conversely, households that did like to have new technology (indicated by responses of three or four) were more likely to have zero purchases, indicating a lower likelihood of buying CFLs.

The model's negative binomial portion predicts that 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:

- Homeowners were more likely to purchase a greater number of CFLs in 2010.
- The larger the participant's home the more CFLs they purchased in 2010.
- Even though they were more likely to buy CFLs than their counterparts who were skeptical of new technology, participants who responded that they like to have the latest technology purchased fewer CFLs than those technology skeptics that did buy CFLs, presumably because the early adopters already had a greater number of CFLs in their homes than the skeptics.
- Households with a higher saturation of CFLs at the beginning of 2010 also were likely to buy fewer CFLs than those with a lower CFL saturation. Similar to the model's logistic portion, this implies that those households with high levels of saturation simply did not need to buy CFLs because they already had enough.
- Those in areas with longer running programs were less likely to buy more CFLs. This variable indicates the cumulative impact of older programs, specifically that households in those areas have more CFLs because of the long program history. Therefore, they did not need to buy as many in 2010 compared to areas with newer programs.
- Households who purchased CFLs at Big Box stores were more likely to buy a greater number of CFLs, presumably due to the larger package size typically sold at these stores versus grocery or lighting specialty stores.
- Finally, two dummy variables associated with data collection were evident in the model. Those revisit households surveyed in both 2009 and 2010 purchased fewer CFLs in 2010 than households visited only in 2010. Also, those areas where onsite technicians did not require residents to guess their purchase period when they responded "don't know" to when the CFLs was purchased 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).

Table 6–3: Best Fit Early 2010 Purchase Model*

Variables	Coefficient	Probability of z
Logistic Model		
Intercept	-0.453	0.185
Some college or higher education	-0.491	0.003
Revisit (yes coded 1; to account for potential impact of our first visit as evidenced in some MA, NY, Houston data	-0.517	0.007
CFL Saturation at Beginning of 2010	0.015	<0.001
Like to have new technology (1 to 4, strongly agree coded as 1)	0.318	0.001
Negative Binomial		
Intercept	1.000	<0.001
2010 Bulbs supported/household	0.385	<0.001
CFL Saturation at the beginning of 2010	-0.015	<0.001
Purchase CFLs at Big Box Store	0.441	0.008
Years supporting CFLs**	-0.038	<0.001
Data Collection Protocol treatment of Don't Know	-0.801	<0.001
Homeowner	0.441	<0.001
Size of home (by 2K sqft, ascending scale)	0.353	<0.001
Likes to have new technology (1 to 4, strongly agree coded as 1)	0.157	0.008
Revisit household	-0.403	0.009

* Sample size = 1,349 and Maximum Likelihood R^2 = 12%. Reduction in sample size from full 1,495 cases reflects exclusion of households who knew purchase date for fewer than 75% of CFLs in home (105 cases) and refusal to answer demographic or early adopter questions (41 cases).

** Years administering a CFL-specific program plus years administering an upstream program

6.2 Current CFL Use and Saturation Models

The CFL use model, developed using the NBRM, describes the number of CFLs installed in the home at the time of the onsite visit in the summer or early fall of 200 (Table 6–4). Controlling for other factors, the model predicts the following:

- The number of CFLs incented by the program per household in 2010 increased the number of CFLs found installed in homes.
- The number of CFLs installed in homes was smaller in areas that have supported CFLs for a greater number of years. This counterintuitive finding is driven by the smaller size of homes in the majority of the long-standing program areas compared to most of the newer program areas.
- Households with higher saturation at the beginning of 2010 also had more CFLs installed by the time of the onsite visit. While this variable may seem self-evident, the relationship between CFL saturation and use is often mitigated by the size of the home. Smaller homes may have relatively few CFLs installed but also have higher saturation because they have fewer sockets to fill. See the saturation model below for additional discussion on this topic.

- The greater the length of time it takes the respondent to travel to a home improvement, discount, or warehouse store, the fewer CFLs we found installed in the home. Note that this variable is a proxy for strongly rural conditions but also strongly urban ones such as those found in New York City. In New York City, the high price of real estate and lack of building spaces means there are relatively few Big Box stores and traveling to those that do exist is often a lengthy process.
- The data collection protocol associated with the treatment of "don't know" responses was associated with finding fewer CFLs installed in homes.
- Owner-occupied homes used CFLs in greater numbers than renter-occupied ones.
- Larger homes had a greater number of CFLs installed than smaller ones.
- Larger households (i.e., with more family members) used more CFLs than smaller ones.
- Households in which the respondent had at least attended some college had a greater number of CFLs installed.
- Households that bought CFLs at Big Box stores (where pack sizes are larger) or at hardware stores (which in long-standing program areas have historically been key program partners) used more CFLs.

Table 6–4: Best-Fit Current Use Model

Variables	Coefficient	Probability of z
Intercept	0.461	0.003
2010 Bulbs supported/household	0.188	<0.001
Years supporting CFLs**	-0.023	<0.001
CFL Saturation at the beginning of 2010	0.025	<0.001
Distance to a Big Box Store	-0.076	0.055
Data Collection Protocol treatment of Don't Know	-0.372	<0.001
Homeowner	0.444	<0.001
Size of home (by 2,000 sqft, ascending scale)	0.305	<0.001
Number of members in household	0.054	0.006
Some college or higher education	0.240	<0.001
Purchase Bulbs at Big Box Store	0.727	<0.001
Purchase Bulbs at Hardware Store	0.531	<0.001

* Sample size = 1,347; Maximum Likelihood R^2 = 46%. Reduction of sample size from 1,495 due entirely to refusal to answer demographic questions and to estimate distance to a Big Box Store.

** Years administering a CFL-specific program plus years administering an upstream program

The CFL saturation model suggests some results that readers may find counterintuitive. On closer examination, the results can generally be explained by smaller homes, which often have high saturation due to smaller number of sockets.[32,33] Specifically, the model predicts that:

- The number of CFLs incented by the program per household in 2010 increased CFL saturation at the time of the onsite visit.
- The number of years the area has supported CFLs was associated with higher levels of CFL saturation.
- CFL storage was also higher in households with high levels of saturation. The inclusion of this variable is somewhat controversial, as storage could be seen as being caused by having high levels of saturation—if households have sockets filled with CFLs, then they store the remainder of a multipack, for example. While this relationship certainly exists, it is also true that *very few households—even those with high levels of saturation—store CFLs*. Instead, we believe that the inclusion of storage in the model points to the existence of CFL enthusiasts among a *subset* of respondents with high levels of saturation. They use and store numerous CFLs because they like CFLs, not only because they have all of their sockets filled.[34]
- CFL saturation is higher in homes in which it takes more time travel to a home improvement, discount, or warehouse store (i.e., Big Box stores). This relationship stands in contrast to that reported above for use, in which households who lived farther from Big Box stores used fewer CFLs. The team believes that the size of the home is the chief factor bringing about this somewhat counterintuitive result. For example, two high saturation areas—New York City and Pennington County, South Dakota—are marked by smaller home size and lengthy travel times to Big Box stores.
- As stated above, smaller homes tend to have higher levels of CFL saturation. This is despite their using smaller numbers of CFLs. This finding is driven by the fact that smaller homes have fewer sockets, so even relatively modest use of CFLs will yield high CFL saturation.
- In another counterintuitive finding, saturation was lower in households in which the respondent had at least some college. Again, we believe that home size is likely an intervening factor, as households with lower levels of education are often more likely to live in smaller homes than those with higher levels of education.
- Households that primarily speak English have higher saturation rates than households that do not primarily speak English.

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[32] For example, one home in New York City had just 14 sockets, but 10 of them were filled with CFLs, yielding saturation of 71%. In a home in a state with a more typical 50 sockets per household, saturation would have been 20%.

[33] The team was limited in its ability to use interaction variables by the large number of dummy variables in our models, which would keep all households originally scored as zero in the dummy variable as zero in the interaction effect, thereby decreasing the amount of information the model has to estimate net impacts.

[34] Exclusion of the storage model has minimal impact on the overall model, with coefficients for other variables changing slightly but the overall specification being very similar.

- Three different variables to designate whether respondents shop for CFLs at various types of stores also point to higher CFL use. While these variables partly capture whether or not people use CFLs at all (and hence do or do not shop for them), they also capture relative CFL saturation among those who do use and shop for CFLs. As described above for CFL use, the inclusion of the flag for Big Box stores and hardware stores is likely related to the sale of multipacks and participation in CFL programs. Drugstores, however, often sell CFLs in smaller packs and have only recently begun to take part in CFL programs across the nation in large numbers. We believe that this variable may be capturing the fact that some households with high levels of saturation buy CFLs where ever they can, leading them to buy in such venues as drugstores, which are not usually thought of as a common source of CFLs.

Table 6–5: Best-Fit Current Saturation Model

Variables	Coefficient**	Probability of z
2010 Bulbs supported/household	1.876	0.059
Years supporting CFLs*	0.244	0.010
CFL Stored at the time of the onsite visit	0.400	0.002
Distance to a Big Box Store	2.273	0.003
Size of home (by 2,000 sqft, ascending scale)	-2.268	0.026
Some college or higher education	-3.437	0.006
Primarily speaks English at home	10.669	<0.001
Purchase Bulbs at Big Box Store	13.895	<0.001
Purchase Bulbs at Hardware Store	11.048	<0.001
Purchase Bulbs at Drugstore	10.058	0.007

* Sample size = 1,344. We do not report the R^2 because the constant was suppressed. Loss of sample is largely due to the refusal to answer the question about distance to a Big Box and demographic questions, particularly educational attainment or primary language spoken at home.

** Data derived from OLS regression so the coefficient captures the impact on CFL saturation. Because the models are OLS and saturation cannot drop below 0%, the intercept was set equal to zero. We do not report the explained variance (R^2) because the intercept was set to zero, rendering the R^2 an inappropriate description of the model.

6.3 Calculation of NTG

To develop the actual NTG estimates, we used STATA (and verified the results with SAS) to calculate the predicted purchases in the presence of the program (Row A, Table 6–6) and the absence of the program for both the eighteen-month and 2010 models (Row B). The non-program scenario removes *only* the impact associated with the number of CFLs incented per household (see below for an alternative specification). These calculations *predict* that each Massachusetts household purchased an average 7.59 CFLs across the entire eighteen-month period and 2.39 in the first half of 2010. The predicted non-program scenario suggests that 6.77 CFLs would have been purchased in the absence of the program across the entire period, and 1.93 in the absence of the program in early 2010. Subtracting the without-program estimates from the predicted program scenario yields an estimate of net predicted program purchases (Row

C). Dividing the net program purchase estimates by the incented CFLs per household (Row D) yields NTG estimates in Row E. The estimate for the entire eighteen-month period is 0.45 and for the first half of 2010 is 0.83. The confidence intervals were developed using a bootstrap method of 250 iterations; the width of the intervals reflect the non-linear nature of the models and the remaining uncertainty in the models.

Table 6–6: Massachusetts NTG Ratio Calculations

Input	Full 18 Months	First half of 2010
A. Per-household purchases with program	7.59	2.39
B. Per-household purchases without program	6.77	1.93
C. Net program purchases per household	0.82	0.46
D. Incented CFLs per household	1.83	0.56
E. Total NTG	0.45	0.83
F. Confidence Interval	0.08 to 0.90	0.45 to 1.45

* Results subject to rounding error.

Reviewers of this effort have argued that we should calculate NTG for 2010 by also treating prior program support as a program variable. Table 6–7 shows the calculations which follow the same procedures described above, except that, when computing the non-program scenario, we also assume that all programs had no prior activity. The implication for Massachusetts is a precipitous drop in NTG so that it falls below zero. This strongly suggests that the Massachusetts and other long-standing programs *successfully* shifted CFLs sales that may not have occurred until 2010 to earlier time periods. Such activities mean that Massachusetts has secured greater energy savings because its households adopted CFLs at an earlier time period than counterparts in non-program or newer program areas. Compared with the NTG for 2010 in Table 6–6, it also strongly suggests that *current program activity* continues to have a positive impact on CFL purchases that is above and beyond the spillover impacts from prior years of the program. We did not calculate confidence intervals for this method because we do not recommend use of this alternative NTG ratio except to illustrate the importance of prior program activity for influencing current CFL purchase behavior.

Table 6–7: Alternative 2010 NTG Ratio Calculations

Input	First half of 2010
A. Per-household purchases with program	2.39
B. Per-household purchases without program	3.94
C. Net program purchases per household	-1.55
D. Incented CFLs per household	0.56
E. Total NTG	-2.77

Finally, the evaluation team presents the range of NTG ratios for the eighteen-month period and for 2010 across all the participating areas (Table 6–8). However, we present only the range of results to protect the confidentiality of these other areas. The table reveals that the NTG ratio for Massachusetts fell in the middle of the range across all areas in both the eighteen-month and 2010 models. Only long-standing program areas experienced NTG ratios below zero in the alternative calculation of the 2010 model.

Table 6–8: Comparative NTG Ratios

Area	Eighteen Months	First Half 2010	2010 w/o Prior Support
Minimum	0.34	0.70	-9.09
Massachusetts	0.45	0.83	-2.77
Maximum	0.59	1.30	1.23

7 Conclusions and Recommendations

The eighteen-month CFL purchase model yields a NTG ratio of 0.45 for the period of January 2009 to June 2010, while the model limited to the first half of 2010 yields a NTG of 0.83 when years of prior program support is included, and -2.77 (negative 2.77) when years of program support is set to zero. The difference in the estimates reflects economic, statistical, and programmatic factors, as described below.

First, the slowly improving economy may have boosted the NTG in 2010—at least the NTG with years of prior program support included. National CFL shipment data point to a dramatic improvement in CFL sales in 2010 compared to 2009. Given that all areas included in the model enjoyed a higher NTG ratio in 2010 than in 2009, the model likely captured the improved CFL sales that accompanied the slowly improving national economy.

Second, from a statistical standpoint, in the 2010 model the team successfully isolated the impact of prior program activity on 2010 purchases, but the variable capturing prior activity was not significant in the 2009 model. The successful isolation of this variable is the principal *statistical* factor boosting NTG in one 2010 estimate, and dramatically reducing it in the other estimate.

This statistical factor relates to the third factor likely contributing to the different NTG ratios: program activity within and outside of Massachusetts. Within Massachusetts, the PAs revised the 2010 program to focus more on so-called "hard-to-reach" customers and specialty products, and the model likely captured the positive impacts of these efforts. Moreover, many of the other program areas in the model started supporting CFLs only in late 2009 or early 2010. Their new activity appears to have boosted CFL purchases beyond those observed in Massachusetts and other long-standing program areas, explaining the negative relationship between purchases and "prior program activity" in the 2010 model. Yet, controlling for prior program activity demonstrated that the Massachusetts ENERGY STAR Lighting program still had a positive, significant impact on purchases in 2010. The program, in other words, is still increasing adoption of CFLs, and the 2010 model suggests that the program should be continued.

The negative relationship between prior program activity and CFLs purchases in the 2010 model also verifies the success of previous Massachusetts CFL program activity. The PAs have offered sustained and substantial CFL promotions since at least 1998.[35] In doing so, they shifted CFL sales that may have occurred in 2010 to earlier years, and, with NTG estimates well above 1.0 for several years, claimed the resulting electricity and demand savings earlier and longer as well.

Based on the results of the 2010 model, we recommend that the Massachusetts PAs continue some level of support for CFLs at this time, at least until Energy Independence and Security Act of 2007 enters full implementation. However, for purposes of estimating NTG, the 2009 model is superior to the 2010 model, as evidenced by the larger maximum likelihood R^2 of 0.18 for the

[35] PAs supported CFLs in some direct-installation or more limited CFL programs prior to 1998, leading some to argue the program history dates back to the early 1990s, perhaps even earlier.

former compared to 0.12 for the latter. This may be at least partially because respondents could not accurately differentiate CFL purchases in 2009 from purchases in the first six months of 2010, whereas they could give more accurate estimates for the entire 18-month period. We therefore recommend presenting Delphi panel members only with the NTG of 0.45 from the 2009 when they weigh the NTG estimates from the various methods. If the 2010 model were presented, it should be both 0.83 with years of program support included, and -2.77 with years of program support set to zero. We believe this is unnecessarily complicated when there is a superior model with a single NTG estimate that can be presented instead.

Appendix A: Sample Design and Weighting Scheme

The weighting scheme developed for this effort adjusts for home ownership rates for the service territory or geographic area in question and familiarity with CFLs. The data on home ownership rates and the number of households come from the *American Community Survey*. The data on familiarity come from the telephone surveys from which we drew the onsite samples, with two exceptions discussed below. We determined familiarity using two questions. First, we ascertained the telephone survey respondents' awareness with CFLs. Anyone familiar with CFLs was asked to state their level of familiarity, using a four-point scale in which one is "very familiar" and four is "not at all familiar". We considered anyone responding one or two to the scale as "familiar" with CFLs, and anyone responding three or four to the scale as "not familiar" with CFLs. Also, respondents not aware of CFLs were coded as not familiar with CFLs. We then ascertained the number of owners and renters who were familiar or not familiar with CFLs and developed the weighting scheme based on these counts as shown in Table A–1.

As noted above, two areas served as exceptions within this weighting scheme. Each area—Maryland and 22 Ameren Missouri cases—performed the lighting inventory as part of a metering study. They only metered homes of self-identified CFL users, and these users were all aware of and familiar with CFLs. Luckily, we could develop a weighting scheme for each area based on data from other sources. For Ameren Missouri, we simply weighted the households back to the proportions of owner/renter and familiar/not familiar in the remainder of the sample from the same service territory. For Maryland, we weighted back to data from the 2009 multistate effort, in which Maryland was surveyed as a comparison areas.

Table A–1 shows the resulting weights for each area.

Table A–1: Sample Design, Error, and Weighting Schemes for Onsite Data

Area	Owner/Renter	Familiarity with CFLs	Population	Sample Size	Weight
Ameren IL	Owner	Familiar	477,632	55	1.0
	Owner	Not Familiar	63,543	7	1.2
	Renter	Familiar	61,844	21	1.0
	Renter	Not Familiar	11,408	7	0.5
	Area Total		930,287	92	
Ameren MO	Owner	Familiar	955,271	41	1.4
	Owner	Not Familiar	135,475	26	0.3
	Renter	Familiar	107,543	12	1.3
	Renter	Not Familiar	46,090	7	1.0
	Area Total		2,065,037	86	

Area	Owner/Renter	Familiarity with CFLs	Population	Sample Size	Weight
ComEd	Owner	Familiar	1,461,252	62	1.0
	Owner	Not Familiar	236,960	12	0.8
	Renter	Familiar	242,480	15	1.4
	Renter	Not Familiar	74,020	8	0.8
	Area Total		3,482,588	97	
Consumers	Owner	Familiar	724,806	57	1.2
	Owner	Not Familiar	165,307	12	1.0
	Renter	Familiar	79,778	18	0.8
	Renter	Not Familiar	16,795	7	0.6
	Area Total		1,573,072	94	
Dayton Power & Light	Owner	Familiar	231,481	51	0.8
	Owner	Not Familiar	48,733	7	1.3
	Renter	Familiar	34,808	8	1.8
	Renter	Not Familiar	13,712	6	1.0
	Area Total		562,119	72	
EmPower	Owner	Familiar	853,698	46	1.0
	Owner	Not Familiar	138,974	9	0.8
	Renter	Familiar	174,665	20	1.1
	Renter	Not Familiar	26,200	4	0.8
	Area Total		2,086,828	79	
Massachusetts	Owner	Familiar	941,385	105	0.8
	Owner	Not Familiar	118,630	14	0.8
	Renter	Familiar	215,582	24	1.5
	Renter	Not Familiar	74,478	7	1.8
	Area Total		2,448,364	141	
New York City	Owner	Familiar	287,367	37	0.7
	Owner	Not Familiar	60,957	8	0.7
	Renter	Familiar	726,120	23	1.6
	Renter	Not Familiar	599,471	31	1.0
	Area Total		3,032,961	99	
New York State	Owner	Familiar	1,208,292	145	0.8
	Owner	Not Familiar	276,708	23	1.1
	Renter	Familiar	209,910	22	1.9
	Renter	Not Familiar	103,895	9	2.3
	Area Total		3,164,089	199	

Area	Owner/Renter	Familiarity with CFLs	Population	Sample Size	Weight
Rhode Island	Owner	Familiar	131,771	67	0.8
	Owner	Not Familiar	28,668	8	1.4
	Renter	Familiar	34,827	17	1.4
	Renter	Not Familiar	19,944	8	1.7
	Area Total		402,707	100	
Salt River Project	Owner	Familiar	626,954	59	1.1
	Owner	Not Familiar	49,311	9	0.6
	Renter	Familiar	100,126	28	0.8
	Renter	Not Familiar	45,218	5	2.0
	Area Total		1,448,679	101	
Houston, Texas	Owner	Familiar	325,076	60	0.7
	Owner	Not Familiar	141,195	15	1.2
	Renter	Familiar	145,803	15	1.7
	Renter	Not Familiar	87,945	10	1.6
	Area Total		1,360,297	100	
Indiana	Owner	Familiar	206,102	37	0.9
	Owner	Not Familiar	73,608	9	1.3
	Renter	Familiar	38,812	12	1.2
	Renter	Not Familiar	20,348	9	0.8
	Area Total		596,148	67	
Kansas	Owner	Familiar	374,301	65	0.9
	Owner	Not Familiar	61,666	13	0.7
	Renter	Familiar	67,824	15	1.5
	Renter	Not Familiar	9,974	2	1.7
	Area Total		883,697	95	
Pennington County, SD	Owner	Familiar	14,184	57	0.9
	Owner	Not Familiar	3,158	10	1.1
	Renter	Familiar	2,669	20	1.0
	Renter	Not Familiar	1,435	6	1.8
	Area Total		38,321	93	

Appendix B: Treatment of Program Variables in Modeling

When testing the impact of program variables on CFL purchases, use, and saturation, only the number of incented CFLs per household served as a significant predictor of CFL purchases. In the use and saturation models, the budget spent per household performed similarly to CFLs incented per household, but, in the interest of consistency, the team selected the CFLs incented per household for all models presented in the report. Various reviewers and advisors to this effort have expressed interest in understanding the process of building composite variables and of testing the numerous program variables in the models. This appendix describes these processes.

The multistate modeling team followed procedures for creating program variables as described by NMR and Shel Feldman for modeling the market share of ENERGY STAR appliances.[36] NMR and Feldman tested model specifications using individual program components and so-called "composite" program components in order to determine the following:

- Which individual program activities, if any, had the greatest impact on appliance market share, and
- Whether the entire suite of program activities (*i.e.*, amount of incentive, point-of-purchase displays, length of promotion, *etc*.,) combined into a "composite" had a collective impact that was greater than the sum of the parts

NMR and Feldman found that the individual program components did not explain appliance market share, but, when combined into a composite program variable, the results showed that program activity had a net positive impact on appliance market share.

The multistate modeling team mirrored the approach of NMR and Feldman by testing individual measures of program activity and composite program variables. Section 3.1 describes the development of the individual measures, while this appendix describes the development of the composite variables.

The process for combining the program variables began with testing their coherence as an index, using the Cronbach's alpha test. This test determines whether individual items correlate in a manner that allows them to be treated as components of a broader index variable. This effort found that only three of our potential program variables cohered into a broader index. The variables included:

- Number of CFLs per household
- Dollars spent per household
- Percent of budget allocated to incentives

While it would seem most straightforward to add these three variables together, this violates mathematical rules about combining different units of analysis. To overcome this barrier, we

[36] See NMR and Feldman (2005) *Statistical Analyses of Market Penetration of Energy Star-compliant Appliances*. Final delivered July 2005.

followed the accepted statistical procedure for combing measures with different units of analysis—we standardized them. In other words, based on the overall means and standard deviations for each variable, we assigned each area a z-score on that variable. We then summed these z-scores to form the composite program variable for each of the four time periods under consideration. However, despite their coherence in a scale, the composite program scores did not perform as well as the individual program components in any of our models.

This leads to the final issue concerning the program variables—how they were treated in the models. The entire modeling process was designed to determine if program activity boosted CFL purchases, use, and saturation. For this reason, our modeling specifications began with the inclusion of one program variable to which we added additional demographic, economic, social characteristics in the model. In the process, we included or excluded program and other contextual variables based on their statistical significance as well as diagnostics to make sure that the individual variables were not excessively collinear. In most cases, collinearity negated the use of two program variables in one model. In such cases, we chose the program variable with the strongest impact on purchases, use, and saturation.

In the end, all models performed best with the inclusion of a program variable. Moreover, CFLs incented per household was the only program variable found to perform well in every purchase, use, and saturation model presented in the full report. Although the budget spent per household performed equally well in the use and saturation models, the team preferred consistency across models and, therefore, used the CFLs incented per household in all models.

Appendix C: Comparison of Key Variables across Areas

Table C–1: Comparison of Key Variables across Areas – Homeownership and Home Size

	Own Home		Home Size (Sq. Ft.)					
	n	%	n	% Less than 2,000 sqft	n	%, between 2,000 and 3,999 sqft	n	% 4,000 or more sqft
Program Areas								
Ameren IL	91	74%	92	70%	92	25%	92	5%
Ameren MO	86	74%	86	69%	86	25%	86	6%
ComED	97	71%	98	60%	98	27%	98	13%
Consumers	58	74%	58	71%	58	28%	58	2%
DP&L	72	71%	72	75%	72	22%	72	3%
EmPower	79	68%	79	60%	79	39%	79	1%
Massachusetts	150	68%	150	68%	150	31%	150	3%
New York City	99	33%	100	87%	100	12%	100	1%
New York State	199	68%	200	68%	200	31%	200	2%
Rhode Island	100	63%	100	76%	100	23%	100	1%
SRP	101	69%	101	75%	101	25%	101	1%
Non-program Areas								
Houston	100	58%	100	61%	100	35%	100	4%
Indiana	67	69%	67	69%	67	28%	67	3%
Kansas	95	73%	95	65%	95	31%	95	4%
Pennington Cnty, SD	93	68%	93	70%	93	30%	93	0%
OVERALL	**1,487**	**66%**	**1,491**	**69%**	**1,491**	**28%**	**1,491**	**3%**

Table C–2: Comparison of Key Variables across Areas – Type of Home

	Single-Family Detached Home		Single-Family Attached Home		Apt. Building W/ 2-4 Units		Apt. Building w/ 5 or More Units		Mobile Home/Other	
	n	%	n	%	n	%	n	%	n	%
Program Areas										
Ameren IL	91	74%	91	3%	91	4%	91	9%	91	9%
Ameren MO	86	69%	86	11%	86	7%	86	9%	86	4%
ComED	97	55%	97	13%	97	10%	97	16%	97	6%
Consumers	58	71%	58	5%	58	7%	58	5%	58	12%
DP&L	72	84%	72	6%	72	1%	72	7%	72	3%
EmPower	79	55%	79	30%	79	1%	79	11%	79	3%
Massachusetts	150	58%	150	12%	150	14%	150	14%	150	1%
New York City	99	18%	99	16%	99	17%	99	46%	99	2%
New York State	199	67%	199	9%	199	11%	199	9%	199	5%
Rhode Island	100	56%	100	12%	100	15%	100	15%	100	2%
SRP	101	67%	101	6%	101	2%	101	19%	101	6%
Non-Program Areas										
Houston	100	69%	100	8%	100	7%	100	13%	100	3%
Indiana	67	73%	67	12%	67	5%	67	9%	67	2%
Kansas	94	70%	94	10%	94	5%	94	13%	94	2%
Pennington Cnty, SD	93	61%	93	10%	93	6%	93	11%	93	13%
OVERALL	**1,486**	**62%**	**1,486**	**11%**	**1,486**	**8%**	**1,486**	**14%**	**1,486**	**5%**

Table C–3: Comparison of Key Variables across Areas – Language, Race, and Gender

	English Primary Lang. Spoken at Home		White		Female	
	n	**%**	**N**	**%**	**n**	**%**
Program Areas						
Ameren IL	92	98%	92	80%	92	45%
Ameren MO	86	100%	85	85%	87	59%
ComED	98	96%	98	70%	98	35%
Consumers	55	100%	56	84%	58	47%
DP&L	71	100%	69	74%	72	58%
EmPower	77	95%	72	63%	78	55%
Massachusetts	150	95%	143	85%	150	51%
New York City	99	97%	95	62%	100	57%
New York State	200	97%	198	86%	200	50%
Rhode Island	100	94%	98	89%	100	76%
SRP	100	100%	96	85%	101	51%
Non-program Areas						
Houston	100	96%	97	66%	100	62%
Indiana	67	94%	66	62%	67	55%
Kansas	95	100%	95	86%	95	56%
Pennington Cnty, SD	93	99%	93	88%	93	55%
OVERALL	**1,483**	**97%**	**1,453**	**81%**	**1,491**	**54%**

Table C–4: Comparison of Key Variables across Areas – Age of Home

		% ≤1930's	% 1940's – 1950's	% 1960's – 1970's	% 1980's – 1990's	% 2000
Program Areas						
Ameren IL	65	17%	26%	29%	11%	18%
Ameren MO	67	19%	13%	27%	25%	17%
ComED	85	11%	19%	28%	31%	11%
Consumers	44	17%	27%	15%	26%	17%
DP&L	63	18%	26%	26%	17%	13%
EmPower	66	18%	27%	26%	17%	12%
Massachusetts	115	33%	22%	24%	17%	5%
New York City	34	46%	18%	14%	7%	14%
New York State	159	21%	23%	32%	18%	6%
Rhode Island	70	20%	25%	21%	26%	8%
SRP	70	0%	14%	28%	42%	16%
Non-program Areas						
Houston	82	4%	13%	38%	19%	26%
Indiana	55	13%	24%	20%	20%	22%
Kansas	78	18%	11%	20%	29%	22%
Pennington Cnty, SD	63	10%	19%	29%	24%	19%
OVERALL	**1,116**	**17%**	**20%**	**26%**	**22%**	**14%**

Table C–5: Comparison of Key Variables across Areas – Distance to Large Discount Store and Square Footage of Box Stores per Household in County

	Distance to Large Discount Store				Square Footage of Box Stores per Household in County			
	n	% < 15 miles	% 15-29 miles	% ≥ 30 miles	n	Wal-Mart Stores - Mean	n	Other Box Stores - Mean
Program Areas								
Ameren IL	92	57%	34%	10%	84	9.7	84	3.8
Ameren MO	86	62%	33%	5%	86	7.1	86	4.1
ComED	75	81%	17%	3%	98	3.9	98	4.0
Consumers	59	71%	19%	8%	52	6.1	52	5.1
DP&L	53	71%	22%	8%	71	7.6	71	3.7
EmPower	77	56%	30%	14%	78	4.2	78	2.7
Massachusetts	150	59%	34%	7%	150	2.1	150	2.9
New York City	97	31%	27%	42%	100	0.0	100	0.9
New York State	200	50%	35%	15%	199	4.4	199	3.9
Rhode Island	100	65%	28%	7%	100	2.9	100	3.6
SRP	100	81%	16%	3%	101	6.9	101	4.4
Non-program Areas								
Houston	100	81%	13%	6%	100	5.0	100	3.4
Indiana	67	58%	36%	6%	67	6.3	67	5.1
Kansas	95	57%	32%	12%	87	8.5	94	2.9
Pennington Cnty, SD	93	43%	45%	12%	93	8.2	93	5.5
OVERALL	**1,444**	**60%**	**29%**	**11%**	**1,466**	**5.2**	**1,473**	**3.7**

Table C–6: Comparison of Key Variables across Areas – Standard of Living and Income

	Standard of Living				Income				
	n	% Satisfied	% Neither Satisfied nor Dissatisfied	% Dissatisfied	n	% ≤ $19,999	% $20,000 to $49,999	% $50,000 to $99,999	% ≥ $100,000
Program Areas									
Ameren IL	91	78%	4%	17%	86	35%	42%	19%	4%
Ameren MO	86	78%	7%	15%	75	28%	42%	22%	8%
ComED	97	88%	4%	8%	95	37%	33%	17%	14%
Consumers	57	82%	7%	11%	47	43%	38%	17%	2%
DP&L	68	78%	6%	16%	64	49%	34%	15%	2%
EmPower	79	67%	14%	19%	70	33%	27%	31%	19%
Massachusetts	142	76%	10%	14%	124	22%	32%	31%	15%
New York City	100	74%	6%	20%	87	42%	36%	18%	5%
New York State	200	75%	8%	18%	184	36%	38%	20%	6%
Rhode Island	100	69%	11%	20%	81	31%	44%	20%	5%
SRP	100	68%	4%	28%	90	45%	36%	24%	6%
Non-program Areas									
Houston	99	82%	6%	12%	83	40%	35%	21%	5%
Indiana	67	81%	4%	15%	63	37%	36%	24%	3%
Kansas	94	67%	23%	10%	92	35%	45%	17%	3%
Pennington Cnty, SD	90	74%	10%	16%	87	30%	50%	17%	3%
OVER-ALL	**1,470**	**76%**	**8%**	**16%**	**1,328**	**35%**	**39%**	**20%**	**6%**

Appendix D: Comparison of Selected and Alternative Models

We have compiled this appendix in the interest of readers who desire more information on the choice of models. Specifically, this section compares the following:

- Selected eighteen-month purchase model with an alternative specification based on the selected 2010 purchase model.
- Selected 2010 purchase model with an alternative specification that includes energy price.
- Selected current use model with an alternative ZINB specification that includes CFL saturation at the beginning of 2010 in the logistic portion of the model.

In all cases we present the applicable diagnostics, including the maximum likelihood R^2, the probability associated with each coefficient, and, for the purchase models only, the ratio of predicted to observed purchases. We do not discuss the models at length, but do present them for those who are interested in the details of the model selection.

Eighteen-Month Purchase Model Comparison

The models in Table D–1 compare the selected eighteen-month purchase model and an alternative specification based on the 2010 purchase model. Immediately following the models, we present the diagnostics used to select between the two models—namely the maximum likelihood R^2 and the ratio of the predicted to self-reported actual purchases for both program and non-program areas, suppressing the names of the areas (Table D–2).

Table D–1: Eighteen-Month Purchase Model Comparison

Variables	Selected Model		Alternative Model	
	Coefficient	**Prob z**	**Coefficient**	**Prob z**
Logistic Model				
Intercept	-1.169	0.000	-1.574	<0.001
Homeownership (owner coded as 1)	0.023	<0.001		
CFL Saturation at Beginning of 2009	0.179	0.055	0.023	<0.001
Not expensive to reduce energy use (1 to 4, strongly agree coded as 1)	-1.169	0.000		
Revisit Household			-0.915	0.001
Likes to have new technology (1 to 4, strongly agree coded as 1)			0.286	0.006
Some college education or higher			-0.439	0.016
Negative Binomial				
Intercept	1.457	<0.001	1.333	<0.001
2010 Bulbs supported/household	0.062	0.012	0.043	0.163
CFL Saturation at the beginning of 2009	-0.012	<0.001	-0.007	0.003
County unemployment rate at the beginning of 2009	-0.050	0.006		
Size of home (by 2K sqft, ascending scale)	0.302	<0.001	0.278	<0.001
Satisfaction with standard of living (1 to 5, strongly agree coded as 5)	0.054	0.066		
Self-identify as white	0.328	<0.001		
Purchase CFLs at Warehouse Store**	0.858	<0.001		
Purchase CFLs at Home Improvement Store**	0.405	<0.001		
Purchase CFLs at Mass Merchandise Store**	0.279	0.002		
Years supporting CFLs			-0.024	0.008
Data Collection Protocol Treatment of Don't Know			-0.256	0.060
Homeowner			0.461	<0.001
Likes to have new technology (1 to 4, strongly agree coded as 1)			0.063	0.226
Revisit household			-0.341	0.009
Purchase CFLs at Big Box Store			0.542	<0.001

Table D–2: Eighteen-Month Purchase Model Diagnostics and Actual Purchases

Area	Ratio Predicted to Actual	
	Selected Model	Alternative Model
1	1.03	0.93
2	0.78	0.74
3	0.77	0.81
4	0.91	0.93
5	1.86	1.66
Massachusetts	1.13	0.93
7	1.06	1.19
8	0.78	0.78
9	0.83	0.85
10	0.88	1.17
11	1.28	1.39
12	0.84	0.91
13	0.98	1.11
14	0.85	0.85
15	0.82	0.70
Average Ratio	0.99	1.00
R^2	18%	14%

2010 Purchase Model Comparison

The next table compares the selected 2010 model with an alternative specification that includes electricity price (Table D–3). The team strongly considered using the alternative model, but found some of the relationships perplexing, namely the behavior of electricity price and of CFL saturation. After ascertaining that electricity price was serving as a proxy variable for the East Coast—and long-standing program—areas, we returned to our modeling effort, settling on the selected model. The table immediately following the model comparison presents the model diagnostics (Table D–4).

Table D–3: 2010 Purchase Model Comparison

Variables	Selected Model		Alternative Model	
	Coefficient	**Prob z**	**Coefficient**	**Prob z**
Logistic Model				
Intercept	-0.453	0.185	-0.547	0.050
Some college or higher education	-0.491	0.003	-0.456	0.001
Revisit (yes coded 1; to account for potential impact of our first visit as evidenced in some MA, NY, Houston data	-0.517	0.007	-0.476	0.008
CFL Saturation at Beginning of 2010	0.015	<0.001	0.018	<0.001
Like to have new technology (1 to 4, strongly agree coded as 1)	0.318	0.001	0.306	<0.001
Negative Binomial				
Intercept	1.000	<0.001	2.318	<0.001
2010 Bulbs supported/household	0.385	<0.001	0.264	0.014
CFL Saturation at the beginning of 2010	-0.015	<0.001		
Purchase CFLs at Big Box Store	0.441	0.008		
Years supporting CFLs**	-0.038	<0.001		
Data Collection Protocol treatment of Don't Know	-0.801	<0.001	-0.390	0.015
Homeowner	0.441	<0.001	0.316	0.008
Size of home (by 2K sqft, ascending scale)	0.353	<0.001	0.308	<0.001
Likes to have new technology (1 to 4, strongly agree coded as 1)	0.157	0.008	0.168	0.005
Revisit household	-0.403	0.009	-0.282	0.045
County unemployment rate at the beginning of 2009			-0.110	<0.001
2010 Area Electricity Rate			-0.048	0.019
Purchase CFLs at Warehouse Store			0.739	<0.001

Table D–4: 2010 Purchase Model Diagnostics and Actual Purchases

Area	Ratio Predicted to Actual	
	Selected Model	Alternative Model
1	0.98	1.40
2	0.76	0.86
3	0.66	0.82
4	1.20	1.61
5	0.87	1.05
Massachusetts	0.95	1.19
7	1.94	1.24
8	0.92	1.23
9	0.84	0.75
10	1.16	0.78
11	1.53	1.28
12	0.64	0.86
13	0.87	0.64
14	0.93	1.03
15	0.84	0.87
Average Ratio	1.01	1.04
R^2	12%	11%

Current Use Model Comparison

The most important decision the team made regarding the current use model was whether to use a ZINB model with saturation in the logistic portion. For the most part, the model made logical sense and had a strong maximum likelihood R^2 even for non-linear models applied to social phenomena (Table D–5. Yet, we could not help but think that the strength of the model reflected the tautology of the inclusion of saturation in the logistic portion of the model. Without saturation in the logistic portion, all other ZINB models we developed to explain current use performed nearly identically to similarly specified NBRM models. We discuss the choice of NBRM over ZINB in the full report, but compare the two models here.

Table D–5: Best-Fit Current Use Model

Variables	Selected Model		Alternative Model	
	Coefficient	Prob z	Coefficient	Prob z
Logistic				
Intercept			-0.776	0.048
CFL Saturation at the beginning of 2010			-0.619	0.002
Some college or higher			-0.682	0.011
Plan to take steps soon to reduce energy use soon			0.343	0.026
Negative Binomial				
Intercept	0.461	0.003	1.027	<0.001
2010 Bulbs supported/household	0.188	<0.001	0.155	0.001
Years supporting CFLs**	-0.023	<0.001	-0.023	<0.001
CFL Saturation at the beginning of 2010	0.025	<0.001	0.020	<0.001
Distance to a Big Box Store	-0.076	0.055	-0.083	0.018
Data Collection Protocol treatment of Don't Know	-0.372	<0.001	-0.320	<0.001
Homeowner	0.444	<0.001	0.418	<0.001
Size of home (by 2,000 sqft, ascending scale)	0.305	<0.001	0.309	<0.001
Number of members in household	0.054	0.006	0.056	<0.001
Some college or higher education	0.240	<0.001	0.204	<0.001
Purchase Bulbs at Big Box Store	0.727	<0.001	0.337	<0.001
Purchase Bulbs at Hardware Store	0.531	<0.001	0.224	0.002
R^2	46%		54%	

Massachusetts ENERGY STAR® Lighting Program 2010 Annual Report

Appendix D:

Lighting Supplier, Retailer Perspectives on the Massachusetts and Rhode Island ENERGY STAR® Lighting Programs

Lighting Supplier, Retailer Perspectives on the Massachusetts and Rhode Island ENERGY STAR® Lighting Programs

Final Report

May 6, 2011

Final Report, Madison, WI

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1. Executive Summary

KEMA, working as a subcontractor to the NMR Group (NMR) on the Massachusetts and Rhode Island Residential Retail Products evaluation teams, is pleased to submit this final report of the findings from supplier interviews conducted in support of the 2010 ENERGY STAR® Lighting Program. This executive summary highlights key findings from the report; the full report presents these and other findings in more detail.

This report contains the following recommended net-to-gross (NTG) ratios:

- Massachusetts
    - Standard CFLs – 39%
    - Standard CFLs (HTR) – 71%
    - Specialty CFLs – 49%
    - Specialty CFLs (HTR) – 77%
    - Overall CFLs – 41%
    - Overall HTR – 72%
- Rhode Island
    - Standard CFLs – 46%
    - Standard CFLs (HTR) – 67%
    - Specialty CFLs – 32%
    - Specialty CFLs (HTR) – No estimate (no specialty CFLs sales through HTR channels)
    - Overall CFLs – 44%
    - Overall HTR – 67%

1.1 Background

This report is based on in-depth interviews and Computer-Aided Telephone Interview (CATI) surveys we conducted with lighting market actors in Massachusetts and Rhode Island who had participated in the ENERGY STAR lighting program. These market actors included:

- 11 lighting manufacturers who accounted for over 95% of the sales by manufacturers identified in the program tracking databases;[1]
- 9 high-level lighting buyers who represented large national or regional retailers in the programs. Together they accounted for over 75% of the program sales;
- 181 Massachusetts store managers; [2] and
- 38 Rhode Island store managers.

We completed the in-depth interviews with the lighting manufacturers and high-level retail buyers from September through November 2010. The store manager CATI surveys were completed during November and December 2010.

1.2 Reasons for Joining the Program

The participating lighting manufacturers and high-level retail buyers most often cited the opportunity to increase sales among the reasons for joining the Massachusetts and Rhode Island programs. Some reasons were manufacture-specific such as the desire to find new retail partners and distribution networks and because an existing retail partner had asked them to join. Before joining the programs, some manufacturers had only sold CFLs in Massachusetts or Rhode Island through wholesale lighting distribution channels that primarily served C&I customers and builders. The retailers frequently cited the need to keep pace with their competition as a reason for participating.

[1] As discussed later, there was a large quantity of CFLs for which the name listed in the database as the manufacturer was actually a product brand belonging to one of the major retailers. After further inquiries we learned that this product brand is produced by a variety of manufacturers, but we were never able to obtain a list of these manufacturers and the volume of bulbs that each produced.

[2] We use the term “store manager” as a generalization. These were either the contact names for a given store listed in the program tracking database, if available, or the person identified when the surveyor asked to speak with “someone in your store who deals with stocking and supplying your lighting products such as light bulbs?” In smaller stores these individuals likely were the store managers. In larger stores they were likely the product managers for lighting and related products.

1.3 Program Efforts to Increase CFL Penetration in Hard-to-Reach Lighting Markets

- *Defining hard-to-reach lighting customers:* We asked the lighting market actors whether or not they agreed with the program definition of "hard-to-reach" (HTR) lighting markets as those that serve low-income, ethnic, non-English-speaking, and less educated customers.[3] Eighty-seven percent of the Massachusetts store managers, 66% of the Rhode Island store managers, and 73% of the lighting manufacturers agreed with this definition. However, only 38% of the high-level retail buyers did. Most of those who disagreed with the definition thought it should be expanded to include other factors such as age, geographic location, or knowledge of CFLs.

- *The prevalence of HTR lighting customers among program participants:* We asked all the lighting market actors to estimate what percentage of their customers would fall into three HTR categories: 1) low income; 2) English not their primary language, and 3) members of ethnic or racial minority groups. Most of the lighting manufacturers were unwilling to estimate these percentages. However, most of the retailer buyers and Massachusetts and Rhode Island store managers were willing to provide estimates.

    - *Percent of low income customers:* The average estimate across all retail channels was 33% for the Massachusetts store managers and 36% for the Rhode Island store managers. Among Massachusetts store managers, those from the Discount, HTR Grocery, and Mass Merchandise channels reported the highest average percentages.[4] Among the Rhode Island store managers, the Discount channel was significantly higher than the average.

    - *Percent of customers not having English as a primary language:* The average estimate across all retail channels was 16% for the Massachusetts store managers and 18% for the Rhode Island store managers. There was wide variation across both the Massachusetts and Rhode Island retail channels. Among both the

[3] The survey questionnaire and interview guide mentioned low-income customers. After the team developed and fielded the guides, we learned that moderate-income customers actually comprised the group "between 60% and 120% of the state median income" that we had included in our definition of low-income. The RDD/Onsite survey report discusses the impact of defining HTR as moderate income in detail.

[4] The evaluation team first came up with a list of grocery stores/chains that might be defined as HTR and then distributed it to the PAs and the EEAC for comment. The list was then adjusted based on these comments. The evaluation team had also requested a list of the HTR zip codes from the PAs, but only one of them provided this.

Massachusetts and Rhode Island store managers those in the Discount channel reported the highest average estimates (33% in both cases).

  - *Percent of customers in racial or ethnic minority groups:* The average estimate across all retail channels was 30% for the Massachusetts store managers and 29% for the Rhode Island store managers. Massachusetts store managers in the Discount and Miscellaneous channels reported the highest average estimates. Among the Rhode Island store managers, those in the Discount channel reported the highest average percentage.

- *Reaching HTR lighting customers:* We asked the lighting market actors whether they thought that discount stores and small grocery stores were the best ways to reach these HTR customers. While very few market actors said that discount stores and small grocery stores were *not* ways to reach HTR customers, the lighting manufacturers were much more likely than the high-level retailers to say that there were additional channels to reach HTR customers besides discount and small grocery. They pointed out that chain stores—including both national and regional chains—could be located in areas with low-income demographics. A couple of them mentioned Wal-Mart specifically as a chain store that serves many low-income customers. Eighty-eight percent of the Massachusetts store managers and 60% of the Rhode Island store managers thought that discount and small grocery stores were the best ways to reach HTR lighting customers.

- *Retail channel shifting:* One concern about program strategies that promote greater CFL sales in retail channels such as Discount to reach HTR customers is that such strategies may simply shift sales from national chain retailers such as Wal-Mart or Home Depot to these Discount stores, rather than create new sales. About half of the lighting manufacturers and high-level buyers said that there was no shifting of sales. One of the lighting manufacturers and one of the high-level retail buyers said there was a little shifting of sales, but not much. Only one respondent—one of the high-level buyers—said that there was significant shifting of sales. Among the store managers, 73% of the Massachusetts managers and 68% of the Rhode Island managers said that the program was both shifting CFL sales and creating new ones. Only two percent of the Massachusetts store managers and one percent of the Rhode Island store managers said that the program was only shifting sales.

- *The effectiveness of program HTR strategies:* Seventy-eight percent of high-level buyers said that the programs had increased their sales to HTR customers while only 18% of the lighting manufacturers did. Nearly half of the lighting manufacturers said that they simply did

not know what the effects were and 18% of the manufacturers said that the program had no effect.

- When asked to explain how the programs were increasing their CFL sales to HTR customers, most respondents cited the discounts that made CFLs accessible to a wider range of customers and helped increase foot traffic in their stores.

- Thirty-nine percent of the Massachusetts and 42% of the Rhode Island store managers said that the proportion of their sales to HTR customers had increased, and a similar percentage said their sales to these customers had stayed about the same. Only one percent of the Massachusetts store managers and none of the Rhode Island store managers said that the proportion of their sales to HTR customers had decreased in the past year. Massachusetts store managers in the Discount, Grocery HTR, Large Home Improvement (LHI), Mass Merchandise, and Membership Club channels were much more likely to report that the proportion of their CFL sales to HTR customers had increased in the past year.

1.4 Program Efforts to Increase Sales of Specialty CFLs

- *Percent of stores not selling specialty CFLs:* Twenty-four percent of the Massachusetts store managers and 13% of the Rhode Island store managers said that their stores do not sell specialty CFLs. Seventy percent of the Massachusetts store managers who did not sell specialty CFLs were in the Drug channel. All of the Rhode Island stores managers that did not sell them were in the Discount channel.

- *Why stores do not sell specialty CFLs:* Massachusetts store managers who did not sell specialty CFLs explained that they did not sell them because the decision was made at the corporate/retail buyer level or that their store or lighting section was too small to accommodate the specialty CFLs; others (36%) did not know the reason why they did not sell specialty CFLs. Of the five Rhode Island store managers that did not sell specialty CFLs, two said that the specialty products were too expensive for their customers and the remaining three did not know why their stores were not selling the specialty products.

- *Sales trends for specialty CFLs:* We asked the Massachusetts and Rhode Island store managers who sold specialty CFLs whether they would characterize their sales over the past year as “excellent,” “good,” fair,” or “poor.” The large majority of the store managers from both states characterized their sales as either “good” or “fair.” Massachusetts store managers in the Discount, Large Home Improvement, Membership Club, and Miscellaneous

retail lighting channels were more likely to say that their specialty CFLs sales were "excellent" or "good." Conversely store managers in the Drug and Grocery lighting channels were much more likely to say that their sales of specialty CFLs had been "fair" or "poor."

- *Barriers to specialty CFL sales:* The most-cited barrier to sales of specialty CFLs, by far, from both Massachusetts and Rhode Island store managers was the higher price point for the specialty products. The second-most-cited barrier was the need for more customer education about the existence of specialty CFLs, their features, and their appropriate applications.

- *Future specialty CFL prices:* When asked whether prices for specialty CFLs over the next few years will go up, go down, or stay about the same, the most common response was that prices would go down. However, the Massachusetts store managers were much more confident about this than their Rhode Island counterparts.

- *Assessing MA program efforts to promote specialty CFLs:* We told the Massachusetts store managers to rate the effectiveness of the program's efforts to promote specialty CFLs using a scale where 10 meant "very effective" and 0 meant "not very effective at all." They gave the program a middling rating with a mean rating of 5.4 and a median rating of 5.0.

- *Whether incentives for specialty CFLs are adequate:* We told Massachusetts and Rhode Island store managers what the average incentive levels offered by the program were and then asked them whether they thought these were adequate to move consumer demand for these products. Eighty percent of Massachusetts store managers and 76% of the Rhode Island store managers thought the incentives were adequate. However, store managers in the Small Hardware channel were much less satisfied with the specialty CFL incentive levels than store managers in other channels.

- *How the program can increase specialty CFL sales:* The most-cited recommendations from the Massachusetts store managers included increasing the incentive levels, providing more consumer education about specialty CFLs, and providing more general advertising of the specialty CFLs and the ENERGY STAR program. The top recommendations of the Rhode Island store managers were very similar except that a quarter of the Rhode Island store managers thought that the program should continue as it is.

1.5 Program Attribution for CFL Sales

The supplier interviews served as one of the five methods from which the Team is developing a net-to-gross (NTG) ratio.[5] The NTG ratios estimated from the supplier interviews for Massachusetts were 39% for standard CFLs and ranged from 47% to 51% for specialty CFLs depending on the sales weighting method.[6] For Rhode Island, the estimated NTG ratios from the supplier interviews ranged from 45% to 46% for standard CFLs and 31% to 33% for specialty CFLs. Once again the estimates varied depending on the sales weighting method. This section summarizes the estimation of the NTG ratios resulting from the supplier interviews.

1.5.1 Scope and Methodology

We estimated NTG ratios for standard CFLs and specialty CFLs. This report does not estimate NTG ratios for CFL fixtures or LED fixtures. In the development of the interview guides and surveys there was mutual decision by evaluators and the PAs and their consultants to remove the CFL fixture questions due to the length of the guides/surveys and concerns about respondent fatigue. CFL fixtures accounted for less than three percent of program unit sales during the 2009-June 2010 program period. Sales of LED fixtures through the program were virtually nonexistent during this period with only 107 units of LED fixtures sold in Massachusetts out of total product sales during this period of over 4.5 million.

To estimate NTG ratios for standard and specialty CFLs, we asked manufacturers, high-level retail buyers, and store managers a series of questions about what CFL sales would have been in the absence of the program. These questions, which we detail in the body of this report, first asked whether they would have sold any CFLs in the absence of the program. If they said no, then the CFLs they sold through the program would be given a NTG ratio estimate of 100%. If they said that they would have sold CFLs in the absence of the program, then we asked them whether their sales would have been lower, higher, or the same in the absence of the program. If they said sales would have been lower or higher we asked them to estimate by what

[5] The other methods include willingness to pay, multistate modeling, revealed preference, and conjoint analysis. A Delphi panel will also evaluate the NTG estimates that emerge from these various methodologies.

[6] The methodology section provides a more detailed description of the two weighting methods. Essentially the "program sales" weighting method uses the quantity of CFL bulbs that the market actors sold through the program as a weight for their NTG ratio estimates. The "total sales" weighting method uses estimates of total CFL bulb sales as weights. These estimates are derived from the market actors' estimates of what proportion of their total Massachusetts/Rhode Island 2009-2010 CFL sales the programs accounted for. The external reviewers of the draft report were divided as to which weighting method was the most appropriate, so results using both methods were included in this report.

percentage sales would have been lower or higher and then had a confirmation question to make sure we understood what they meant by the percentage increase/decrease. A separate battery of questions was adminis`tered for standard CFLs and specialty CFLs. Because most lighting manufacturers sold program CFLs through multiple retail channels, we asked these NTG questions separately for each retail channel they participated in. The methodology section of the main report discusses the various approaches we used for sales weighting the NTG estimates. It also provides guidance on interpreting the estimates.

One high-level buyer for a retailer in the Large Home Improvement channel claimed that his company's CFL sales would disappear (100% NTG ratio) in the absence of the Massachusetts and Rhode Island programs. This NTG estimate was a significant outlier compared to other NTG estimates provided both by manufacturers who supplied this retail buyer and the store managers who sold the CFLs provided by this buyer. Furthermore, we have interviewed other buyers for this same Large Home Improvement retailer for evaluations in other states (e.g., California, New Mexico, New Jersey) and none of these buyers claimed that their CFL sales would totally disappear absent program rebates. After consulting with the evaluation team, the EEAC consultants, and others, the decision was made to remove this outlier from the NTG estimates that were provided to the Delphi panel. The tables in this report show the estimates with the outlier removed although the impact of including the outlier estimate is indicated in the footnotes.

Like all NTG estimation methodologies, the supplier self-report NTG methodology has its limitations. Some of these limitations concern possible biases that the lighting market actors may have. These biases might cause them to provide NTG ratio estimates that are higher or lower than what they truly think the program deserves in terms of attribution. Other limitations concern gaps in market knowledge that certain market actors may have. We discuss these biases and gaps in market knowledge in the main body of the report.

1.5.2 Program-Wide NTG Ratio Estimates

This section summarizes the calculation of a program-wide NTG ratio estimate for Massachusetts and for Rhode Island. The main body of this report provides detailed breakdowns of the NTG ratio estimates not only by retail channel but also by supply stream, which the Team believes should be taken into account when making decisions about program design and delivery decisions for the Energy Star Lighting Program. Here, however, we focus only on the program-wide NTG ratio, as it is the estimate that the PAs specifically requested of the evaluation team. Table 1-1 shows the NTG ratio estimates by state, CFL product category and market category. For the market category we calculated separate NTG ratio estimates for

all retail channels combined as well as for the retail channels that are most likely to sell lighting to Hard-to-Reach (HTR) customers.[7] The HTR channels included Discount stores and small, ethnic grocery stores.

Table 1-1
Supplier Self-Report NTG Ratio Estimates
by State, CFL Product Category, Market Category

State	CFL Product Category	Market Category	# of Unique Net-to-Gross Estimates*	Net-to-Gross Ratios		
				Using Program Sales Weight Methodology	Using Total Sales Weight Methodology	Average NTG Ratio of Both Methodologies
Massachusetts	Standard CFLs	All retail channels	132-183	39%	39%	**39%**
		HTR	17-18	72%	69%	**71%**
	Specialty CFLs	All retail channels	94-131	51%	47%	**49%**
		HTR	14-17	79%	75%	**77%**
Rhode Island	Standard CFLs	All retail channels	31-43	46%	45%	**46%**
		HTR	11-12	68%	65%	**67%**
	Specialty CFLs	All retail channels	15-19	33%	31%	**32%**
		HTR	None	No program sales		

Note: * The lower number in the range indicates the number of estimates using the total sales weight methodology and the higher number indicates the number of estimates using the program sales weight methodology.

Table 1-2 summarizes the NTG ratio estimates by state and market category, but combines the standard CFL and specialty CFL NTG ratio estimates using their weighted average. Program sales figures were used as weights.

Table 1-2
Supplier Self-Report NTG Ratio Estimates

State	Market Category	Net-to-Gross Ratios
Massachusetts	All retail channels	**41%**
	HTR	**72%**
Rhode Island	All retail channels	**44%**
	HTR	**67%**

[7] For the purposes of this research we used a program definition of HTR lighting markets as those that serve low-income, ethnic, non-English-speaking, and less-educated customers.

1.5.2.1.1 Massachusetts Standard CFLs

Table 1-3 shows the channel-specific and program-wide NTG ratio estimates for Massachusetts standard CFLs using the program sales weights. The overall NTG ratio was 39%. The table also shows that the Discount/HTR lighting channel had the highest NTG ratio estimate of all the retail channels (72%). This affirms the current program strategy of encouraging more CFL sales through this Discount/HTR lighting channel.

Table 1-3
Channel-Specific and Program-Wide NTG Ratio Estimates
for Massachusetts Standard CFLs
Using Program Sales Weights

Lighting Retail Channel	Program Standard CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Program Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	309,876	18	74%	59%	89%	**72%**
Drug	200,961	41	32%	None	69%	**35%**
Grocery (non-HTR)	396,521	42	31%	None	55%	**34%**
Large Home Improvement	1,273,295	32	8%	Removed*	27%	**22%**
Mass Merchandise	134,970	12	100%	33%	27%	**37%**
Membership Club	787,316	7	46%	51%	56%	**49%**
Small Hardware	454,733	26	45%	50%	66%	**50%**
Miscell. Lighting Vendors	35,958	5	41%	70%	60%	**60%**
Program Totals/Averages	**3,593,630**	**183**				**39%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 54% instead of 39%.

Table 1-4 shows the channel-specific and program-wide ratio estimates for standard CFLs using the total sales weight methodology. The overall NTG ratio was the same as it was using the program sales weights methodology -- 39%.The Discount/HTR lighting channel had the highest NTG ratio at 69%.

Table 1-4
Channel-Specific and Program-Wide NTG Ratio Estimates
for Massachusetts Standard CFLs
Using Total Sales Weights

Lighting Retail Channel	Program Standard CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Total Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	309,876	17	74%	53%	83%	**69%**
Drug	200,961	26	33%	None	85%	**39%**
Grocery (non-HTR)	396,521	23	31%	None	57%	**32%**
Large Home Improvement	1,273,295	21	9%	Removed*	33%	**26%**
Mass Merchandise	134,970	7	100%	33%	42%	**39%**
Membership Club	787,316	7	43%	45%	55%	**44%**
Small Hardware	454,733	26	47%	45%	67%	**48%**
Miscell. Lighting Vendors	35,958	5	45%	64%	60%	**59%**
Program Totals/Averages	**3,593,630**	**132**				**39%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 52% instead of 39%.

1.5.2.1.2 Massachusetts Specialty CFLs

Using the program sales weighting methodology, the program-wide NTG ratio estimates for the Massachusetts specialty CFLs ranged was 51% (Table 1-5). Using the total sales weighting methodology, the program-wide NTG ratio estimates for the Massachusetts specialty CFLs was 47% (Table 1-6).

The program-wide NTG ratio estimates for the Massachusetts specialty CFLs were higher than those for the standard CFLs. This lends some support to Massachusetts program efforts to favor the specialty CFLs in their promotions. However, depending on the methodology, the differences between the program-wide specialty CFL NTG ratio estimates and those for the standard CFLs range between 8% and 12%. These differences are not so large that it would be considered obvious that the program should be funding specialty CFLs at the expense of the standard CFLs. Considering the smaller per-bulb discount required for the standard CFLs, it's likely that the standard CFLs will be found to be a more cost-effective component of the

ENERGY STAR lighting program portfolio. Yet it is important to note that this is an observation based solely on only one of the NTG methodologies being used in the evaluation.

Table 1-5
Channel-Specific and Program-Wide NTG Ratio Estimates
for Massachusetts Specialty CFLs
Using Program Sales Weights

Lighting Retail Channel	Program Specialty CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Program Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	124,006	14	97%	61%	75%	**79%**
Drug	2,237	4	38%	None	0%	**36%**
Grocery (non-HTR)	26,789	42	67%	None	77%	**34%**
Large Home Improvement	402,321	27	27%	Removed*	42%	**33%**
Mass Merchandise	4,042	9	None	33%	33%	**33%**
Membership Club	255,456	7	71%	67%	55%	**68%**
Small Hardware	35,827	23	38%	27%	78%	**45%**
Miscell. Lighting Vendors	35,958	5	41%	70%	60%	**60%**
Program Totals/Averages	**886,636**	**131**				**51%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 63% instead of 51%.

Table 1-6
Channel-Specific and Program-Wide NTG Ratio Estimates
for Massachusetts Specialty CFLs
Using Total Sales Weights

Lighting Retail Channel	Program Specialty CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Total Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	124,006	17	97%	57%	75%	**75%**
Drug	2,237	3	38%	None	0%	**37%**
Grocery (non-HTR)	26,789	22	57%	None	75%	**61%**
Large Home Improvement	402,321	17	27%	Removed*	38%	**32%**
Mass Merchandise	4,042	6	None	33%	12%	**32%**
Membership Club	255,456	6	66%	55%	29%	**61%**
Small Hardware	35,827	18	41%	15%	79%	**30%**
Miscell. Lighting Vendors	36,522	5	6%	63%	None	**38%**
Program Totals/Averages	**886,636**	**94**				**47%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 56% instead of 47%.

1.5.2.1.3 Rhode Island Standard CFLs

Using the program sales weighting methodology, the program-wide NTG ratio estimate for the Rhode Island standard CFLs was 46% (Table 1-7). Using the total sales weighting methodology, the program-wide NTG ratio estimate was 45% (Table 1-8).

The program-wide NTG ratio estimates for the Rhode Island standard CFLs were slightly higher (45-46% depending on methodology) than those for Massachusetts standard CFLs (39%), although the smaller sample sizes of Rhode Island respondents must be kept in mind when interpreting these results.

Table 1-7
Channel-Specific and Program-Wide NTG Ratio Estimates
for Rhode Island Standard CFLs
Using Program Sales Weights

Lighting Retail Channel	Program Standard CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Program Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	75,800	12	94%	46%	56%	**68%**
Drug	38,102	12	31%	None	90%	**40%**
Grocery (non-HTR)	19,650	6	None	None	73%	**73%**
Large Home Improvement	167,709	4	8%	Removed*	58%	**35%**
Mass Merchandise	14,748	3	None	33%	60%	**38%**
Membership Club	444	2	80%	35%	None	**58%**
Small Hardware	14,400	3	30%	70%	85%	**51%**
Miscell. Lighting Vendors	No sales					
Program Totals/Averages	**330,853**	**42**				**46%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 66% instead of 46%.

Table 1-8
Channel-Specific and Program-Wide NTG Ratio Estimates
for Rhode Island Standard CFLs
Using Total Sales Weights

Lighting Retail Channel	Program Standard CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Total Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	75,800	11	94%	50%	49%	**65%**
Drug	38,102	8	31%	None	95%	**37%**
Grocery (non-HTR)	19,650	2	None	None	100%	**100%**
Large Home Improvement	167,709	4	8%	Removed*	45%	**32%**
Mass Merchandise	14,748	2	None	33%	50%	**33%**
Membership Club	444	2	80%	35%	None	**53%**
Small Hardware	14,400	2	30%	70%	85%	**61%**
Miscell. Lighting Vendors	No sales					
Program Totals/Averages	**330,853**	**31**				**45%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 62% instead of 45%.

1.5.2.1.4 Rhode Island Specialty CFLs

A relatively small volume of specialty CFLs were sold through the Rhode Island program, with three channels (Discount, Grocery, and Miscellaneous) not selling any specialty CFLs from January 2009 through June 2010. Using the program sales weighting methodology, the program-wide NTG ratio estimates for the Rhode Island specialty CFLs was 33% (Table 1-9). Using the total sales weighting methodology, the program-wide NTG ratio estimates for the Rhode Island specialty CFLs was 31% (Table 1-10). The sample sizes for the NTG ratio estimates were proportionately small.

Table 1-9
Channel-Specific and Program-Wide NTG Ratio Estimates for Rhode Island Specialty CFLs Using Program Sales Weights

Lighting Retail Channel	Program Specialty CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Program Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	No sales					
Drug	278	7	38%	None	35%	**37%**
Grocery (non-HTR)	No sales					
Large Home Improvement	36,965	4	23%	Removed*	47%	**31%**
Mass Merchandise	1,776	3	None	33%	75%	**41%**
Membership Club	1,468	2	80%	35%	None	**58%**
Small Hardware	564	3	30%	70%	85%	**55%**
Miscell. Lighting Vendors	No sales					
Program Totals/Averages	**41,051**	**19**				**33%**

Note: *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. CFL sales figures are for the 2009 – June 2010 period.

Table 1-10
Channel-Specific and Program-Wide NTG Ratio Estimates
for Rhode Island Specialty CFLs
Using Total Sales Weights

Lighting Retail Channel	Program Specialty CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Total Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	No sales					
Drug	278	6	38%	None	44%	**39%**
Grocery (non-HTR)	No sales					
Large Home Improvement	36,965	4	25%	Removed*	38%	**29%**
Mass Merchandise	1,776	2	None	33%	100%	**33%**
Membership Club	1,468	2	80%	35%	None	**56%**
Small Hardware	564	2	30%	70%	85%	**62%**
Miscell. Lighting Vendors	No sales					
Program Totals/Averages	**41,051**	**16**				**31%**

Note: *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. CFL sales figures are for the 2009 – June 2010 period.

1.6 Possible CFL Market Effects

The Massachusetts and Rhode Island ENERGY STAR lighting programs have been administered since the late 1990s and there was interest by the PAs and the EEAC in exploring whether these programs have market effects.[8] These market effects might include influences on the lighting market outside Massachusetts or Rhode Island or effects on the Massachusetts or Rhode Island lighting markets that persist even when the program is not active.

1.6.1 Program Effects on the MA/RI Lighting Market Structure

We asked the participating lighting manufacturers and high-level retail buyers whether they were selling CFLs in Massachusetts or Rhode Island before joining the program. Sixty-four percent of the manufacturers were selling CFLs at retail before joining the program. Twenty-

[8] In this report we are defining "market effects" as changes in the behavior or structure of the market due to program influences.

seven percent of them were only or mostly selling CFLs through Massachusetts and Rhode Island wholesale and commercial and industrial channels before joining the program. Of the high-level buyers, only one of the eight was not selling CFLs before joining the program. When the manufacturers and high-level buyers who were not selling CFLs at retail before joining the program were asked to rate the significance of the program influence on their decision to enter the retail market, they gave very high ratings (eight to ten on a 10-point scale).

We also asked the lighting manufacturers whether the years of the Massachusetts and Rhode Island lighting rebate/discount programs had any influence on the types of retailers they sell CFLs to in those states. Seventy-three percent said that they had. Most of these effects concerned broadening the range of retailers who sell CFLs and who they make deals with.

1.6.2 Program Effects on Lighting Product Variety

We asked all the lighting market actors whether the years of the Massachusetts and Rhode Island lighting programs had any influence on the types of CFL or LED products they sell in those states. Forty-five percent of the manufacturers, 22% of the buyers, 39% of the Massachusetts store managers, and 44% of the Rhode Island store managers said that it had. When the lighting actors who had said that the programs had influenced their product variety were asked what these effects were, nearly all of them said that they sell a wider variety of CFLs, such as specialty CFLs, since joining the program. Other effects they cited included increasing the amount of store/shelf space devoted to CFLs, increasing the number of brands, increasing the bulb base sizes, and offering CFL fixtures for the first time.

1.6.3 Program Effects on Lighting Promotions

We asked the lighting market actors whether the years of the Massachusetts and Rhode Island lighting programs had any effect on the way that their company promotes, stocks, or displays its CFL or LED products. Seventy-three percent of the manufacturers, 56% of the retail buyers, 46% of the Massachusetts store managers, and 58% of the Rhode Island store managers said that they had. They noted how the program had encouraged them to give CFL products more prominent placement—such as on end caps—as well as increasing the prominence of CFL signage. With a few exceptions, CFL promotional practices seemed to be highly dependent on the availability of the program and its price discounts.

1.6.4 Program Effects on CFL Sales in Other New England States

We asked the lighting manufacturers and high-level buyers whether they thought the Massachusetts and Rhode Island programs had influenced the level of CFL sales in New England as a whole. Seventy-three percent of the manufacturers and 78% of the buyers said that they had. Some of their reasons for saying this included:

- The Massachusetts and Rhode Island programs helped develop and sustain some of the more cutting-edge lighting technologies that otherwise might have been neglected by the lighting industry;
- The Massachusetts program provided a program model for other New England states;
- Massachusetts and Rhode Island programs helped get larger retail chains involved in rebate programs which had spillover effects; and
- Massachusetts and Rhode Island programs have broad, regional consumer education effects.

1.6.5 Program Effects on CFL Quality, Performance and Innovation

We queried the lighting manufacturers and high-level retail buyers on whether the years of the Massachusetts and Rhode Island ENERGY STAR programs had influenced the quality and performance of the CFLs they sold in New England as a whole. Ninety-one percent of the manufacturers and 75% of the buyers said that they had. When asked to explain their reasons, the manufacturers and buyers usually mentioned the programs' requirements that bulbs meet ENERGY STAR standards.

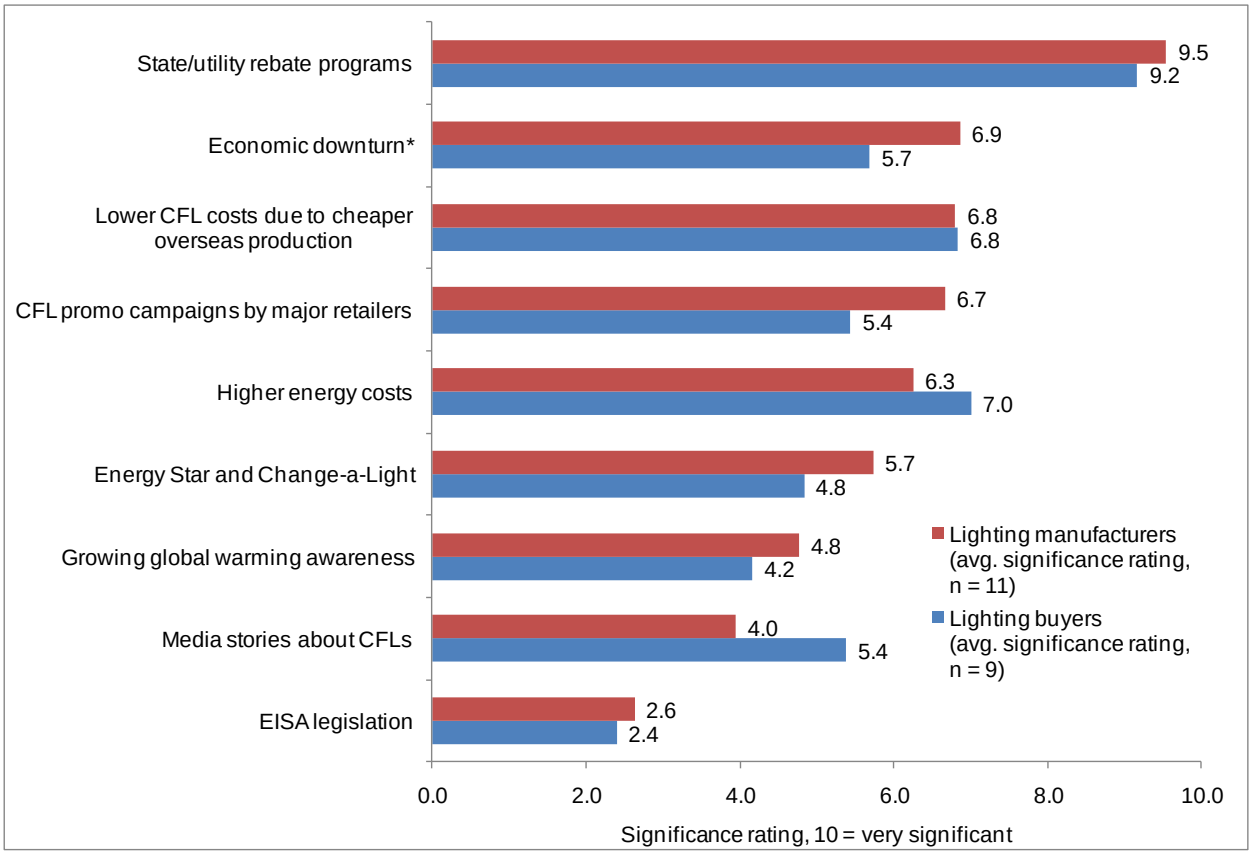
1.6.6 The Sustainability of CFL Sales in the Absence of the Program

We asked the lighting manufacturers and lighting buyers what would be the effects on CFL sales levels in Massachusetts and Rhode Island if these states eliminated their lighting discount programs starting in 2011. All of them said that CFL sales would drop in those states and most said that they would drop significantly. However, we did not ask them to quantify this drop in sales.

1.6.7 The Importance of the Program Compared to Other CFL Drivers

To get a better understanding of the relative importance of the lighting discount programs compared to other drivers of CFL sales, we asked the lighting manufacturers and high-level retail buyers to rate the relative significance of various potential drivers of increased CFL product sales in Massachusetts and Rhode Island during the 2009 to 2010 period. Figure 1-1 show these ratings. The main body of the report shows their explanations for these ratings. Overwhelmingly, the manufacturers and buyers rated rebate programs as the most important driver of sales.

Figure 1-1
The Relative Importance of
Various Drivers of CFL Sales
According to Lighting Manufacturers/Buyers



Note: *A few respondents thought that economic downturn was a negative driver of CFL sales – e.g., it caused some consumers to switch to the less expensive incandescent bulbs.

1.6.8 The Energy Independence and Security Act

In December 2007 Congress passed the Energy Independence and Security Act (EISA). One component of the bill calls for a gradual phase-out of inefficient lamps over time starting in 2012.[9]

[9] Recent legislation introduced to Congress seeks to overturn these provisions. For more information see http://www.usatoday.com/tech/news/2011-03-10-lightbulbs10_ST_N.htm.

Few manufacturers thought that CFL sales would increase in the period leading up to the phase-out. Their reasons included the continued availability of most incandescent wattages, consumer ignorance of EISA and its implications, and the fact that some consumers simply do not like CFLs. The 2012-2014 period is when the manufacturers thought that CFL sales would increase the most. This would be due not only to the incandescent phase-out but also because they thought that LEDs would not yet be viable replacements. However, they also thought that CFL sales growth during this period would be restrained somewhat by consumers staying with incandescent but just being satisfied with lower wattages; the continued availability of some incandescent bulbs due to loopholes in the EISA law; some market share gained by qualifying halogens; and some consumers not buying CFLs because they are working their way through their stockpiles of incandescent bulbs. In general, the high-level buyers gave similar responses to the manufacturers with a few exceptions.

Forty-eight percent of the Massachusetts store managers and 53% of the Rhode Island store managers said they were aware of the federal phase out. Among those who said that they were aware of the phase out, 54% of the EISA-aware Massachusetts store managers and 55% of the EISA-aware Rhode Island store managers thought that it would increase their sales of CFLs. A significant portion of the Rhode Island store managers also thought that there would be a spike in incandescent sales due to consumers hoarding them.

1.7 Program Satisfaction and Participant Recommendations for Program Improvements

We asked participating lighting market actors to provide feedback on their satisfaction with the programs and ways that the programs could be improved.

1.7.1 The Manufacturer and High-Level Buyer Perspectives

Lighting manufacturers and high-level buyers rated their satisfaction with the ENERGY STAR lighting program using a scale of zero to ten where ten was “very satisfied” and zero was “very dissatisfied.” The average satisfaction ratings of the manufacturers (8.3) and high-level buyers (8.2) were high.

The most-cited recommendations from manufacturers to improve the Massachusetts and Rhode Island programs included: offering discounts on standard CFLs, giving suppliers and retailers more lead time for notification of program promotions (at least 3-4 months), having more flexible

programs to accommodate lighting retail cycles/practices, offering larger incentives for specialty CFLs, and having a more consistent and uniform program design.

We asked the lighting manufacturers and high-level buyers for their suggestions about ways to improve program marketing, particularly ways that would get the participating retailers more involved. They had about two dozen suggestions (the main body of the report contains the full list) with the most common including more co-op advertising and more promotion of the program through bill stuffers, radio ads, and television ads.

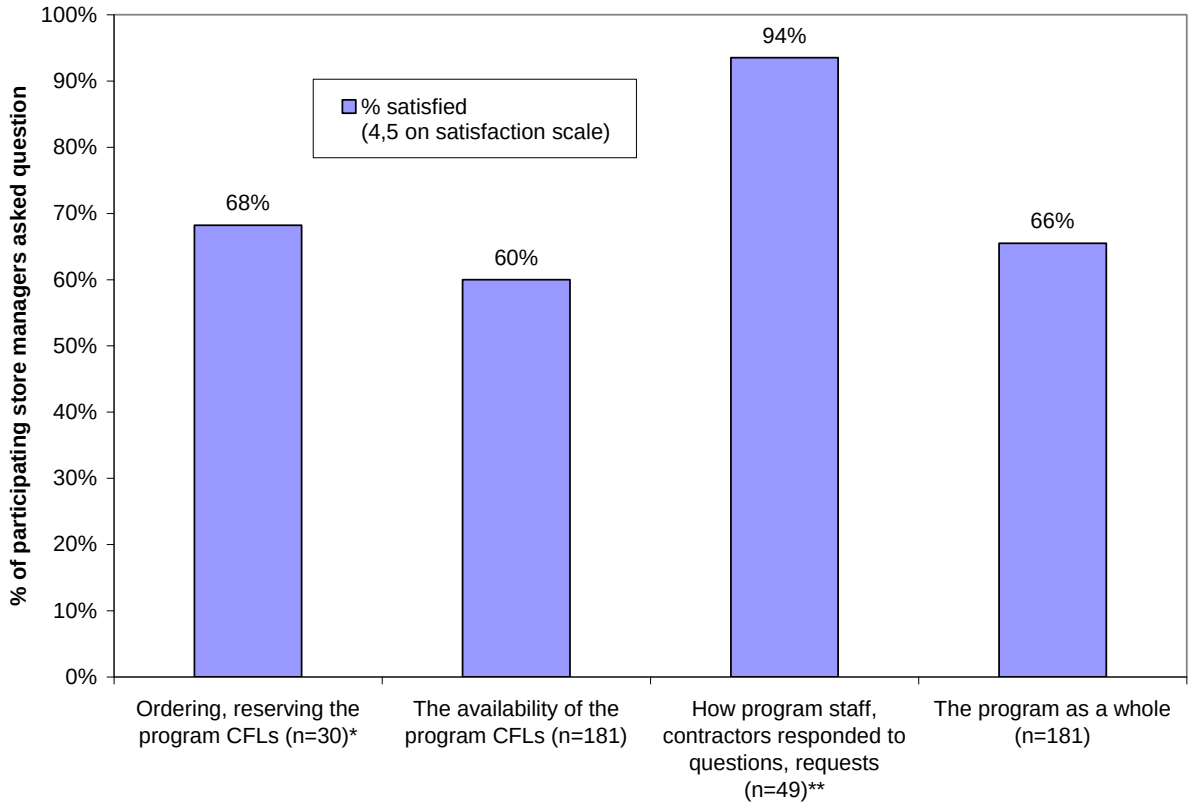
1.7.2 The Store Manager Perspectives

We asked the Massachusetts and Rhode Island store managers about their satisfaction with various aspects of the ENERGY STAR lighting program as well as with the program as a whole. The store managers were told to use a five-point satisfaction scale in which five equaled “very satisfied” and one equaled “very dissatisfied.”

1.7.2.1 Massachusetts

Figure 1-2 shows the program satisfaction ratings from the Massachusetts store managers. While almost all the store managers who had interacted with program staff or contractors were satisfied (four or five on the satisfaction scale) with these interactions, the other satisfaction ratings were much lower than we are used to seeing for lighting discount programs (which usually have satisfaction ratings in the 80’s or 90’s percentages).

Figure 1-2
Program Satisfaction Ratings
from Massachusetts Store Managers



Note: *This question was only asked of store managers who identified themselves as the primary person who decided how many program-discounted CFLs their store received in shipments.
**This question was only asked of store managers who said that they had interacted with program staff or contractors.

We asked the Massachusetts program managers who were less-than-satisfied (one to three on the satisfaction scale) with the program processes and the program in general why they were dissatisfied. The following were some of their reasons:

- *Dissatisfaction with CFL ordering/reservation process:* The dissatisfied store managers complained about slow approval of applications (one manager said it took six months from application to approval), suppliers wanting them to buy more CFLs than they needed, not receiving enough information about the program, and having their applications rejected.

- *Dissatisfaction with CFL availability:* We asked the store managers who were less-than-satisfied with the availability of program CFLs whether there were types of CFLs that they had greater concern about than others. Only five percent of them said that they did. These store managers mentioned specialty CFLs in general, GU-24 CFLs in particular, and CFLs that replace 40 or 60 watt incandescents since these tend to sell out quickest.

- *Dissatisfaction with the program in general:* Most of those who were dissatisfied with the program in general said either that they did not know how the program worked (*e.g.,* its rules), that the program was inadequately advertised, or that availability of program CFLs were inadequate.

We also asked all the Massachusetts store managers we surveyed (n=181): "Are the rules for participating in the Massachusetts ENERGY STAR lighting program clear?" Sixty-six percent said that they were.

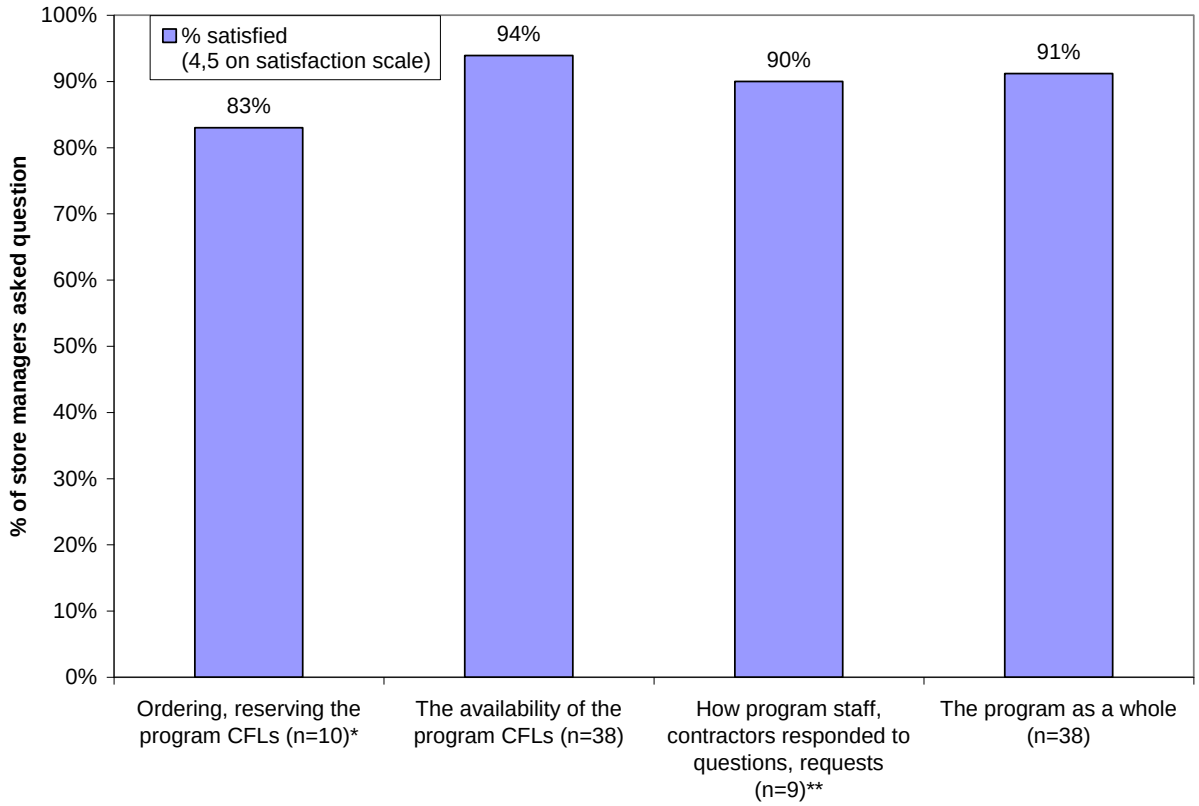
Almost half of Massachusetts store managers volunteered ideas on how to better market the program. Of their three dozen suggestions (the full list appears in the body of the report) the most common included more general advertising of the program, the program should work more with the retailer's corporate office, and more in-store promotions.

Finally we asked the Massachusetts store managers whether they had any other recommendations for improving the program. The most-cited suggestions including conducting more advertising and providing more consumer education.

1.7.2.2 Rhode Island

The Rhode Island store managers were much more satisfied with the ENERGY STAR lighting program than their Massachusetts counterparts. Figure 1-3 shows that 90% or more of the Rhode Island store managers were satisfied with the availability of program CFLs, with the program staff and with the program as a whole. However, the sample sizes were much smaller than those for the Massachusetts store managers.

Figure 1-3
Program Satisfaction Ratings
from Rhode Island Store Managers



Note: *This question was only asked of store managers who identified themselves as the primary person who decided how many program-discounted CFLs their store received in shipments.
**This question was only asked of store managers who said that they had interacted with program staff or contractors.

The Rhode Island store managers were also more satisfied with the program information than the Massachusetts store managers were. Eighty-five percent of them said that the program rules were clear (compared to 66% for the Massachusetts store managers).

1.8 Conclusions

Some high-level conclusions from these interviews/surveys with lighting manufacturers, high-level retail lighting buyers, and store managers included:

- *The lighting market actors generally thought that the MA/RI programs were following the right HTR strategies although there was room for expansion/improvement:* Most of the

lighting market actors agreed with a definition of HTR lighting customers that included low-income, ethnic, non-English-speaking, and less educated customers. Most of them also agreed that discount stores and small grocery stores were good ways to reach HTR customers and store managers in the Discount channel reported the highest percentage of HTR customers. Yet some market actors suggested that national/regional chain stores located in areas with low-income demographics should be additional HTR channels. Only a small minority of lighting manufacturers and retail buyers thought that promoting CFL sales in retail channels such as Discount to reach HTR customers would significantly shift sales away from national chain retailers such as Wal-Mart or Home Depot rather than create new sales. Seventy-eight percent of high-level buyers, 39% of the Massachusetts store managers and 42% of the Rhode Island store managers said that the programs had increased their lighting sales to HTR customers.

- *The lighting market actors gave MA/RI lighting programs mixed reviews for the promotion of specialty CFLs:* On the positive side, 80% of Massachusetts store managers and 76% of the Rhode Island store managers thought the program incentives for specialty CFLs were adequate. Yet when the Massachusetts store managers were asked to rate the effectiveness of the program's efforts to promote specialty CFLs, they gave the program a middling rating with a mean rating of 5.4 and a median rating of 5.0 (using a 0-to-10 scale where 10 equaled "very effective"). The most-cited recommendations from the store managers to increase specialty CFL sales included increasing the incentive levels, providing more consumer education about specialty CFLs, and providing more general advertising of the specialty CFLs and the ENERGY STAR program.

- *The NTG ratio estimates provided by the lighting market actors varied significantly depending on the retail channel, with the Discount/HTR channel having the highest ratios.* This finding indicates that program delivery strategies should focus greater attention on promoting CFL sales in retail channels where the program is likely to produce the greatest "lift." The higher NTG ratio estimates for the HTR sector (for Massachusetts the NTG ratio estimate for the HTR sector was 72% compared to 41% for the program-wide estimate; for Rhode Island the NTG ratio estimate for the HTR sector was 67% compared to 44% for the program-wide estimate) also indicate that the programs are right to focus special attention on increasing CFL sales in the Discount/HTR channel.

- *There was some evidence that the MA/RI programs are producing market effects:*

    - *Effects on market structure:* Seventy-three percent of the lighting manufacturers said that the years of the lighting rebate/discount programs had influenced the types of

retailers they sell CFLs to in those states. Most of these effects concerned broadening the range of retailers who sell CFLs and who they make deals with. Twenty-seven percent of the manufacturers said that they had not been selling CFLs at retail in these states before joining the program.

- *Effects on product variety:* Forty-five percent of the manufacturers, 22% of the buyers, 39% of the Massachusetts store managers, and 44% of the Rhode Island store managers said that the programs had affected their product variety over the years. Nearly all of them said that they sell a wider variety of CFLs, such as specialty CFLs, since joining the program.

- *Effects on product promotions:* Seventy-three percent of the manufacturers, 56% of the retail buyers, 46% of the Massachusetts store managers, and 58% of the Rhode Island store managers said that the years of programs had affected how they promote their CFLs. Yet it was not clear if any of these extra promotional practices would be sustained if the program discounts were discontinued.

- *Effects on CFL sales in other New England states:* Seventy-three percent of the manufacturers and 78% of the buyers said that the programs had affected sales of CFLs in other New England states. They explained that these programs had helped develop and sustain cutting-edge lighting technologies, provided program models for other states, got large retail chains involved in rebate programs, and had regional consumer education effects.

- *Program effects on CFL quality, performance and innovation:* Ninety-one percent of the manufacturers and 75% of the buyers said that the programs had influenced the quality and performance of the CFLs they sold in New England as a whole. When asked to explain their reasons, they usually mentioned the programs' requirements that bulbs meet ENERGY STAR standards.

- *The sustainability of CFL sales in the absence of the program:* All of the lighting manufacturers and lighting buyers said that their CFL sales would drop in Massachusetts and Rhode Island if these states eliminated their lighting discount programs starting in 2011. Most said that they would drop significantly although we did not ask them to quantify this decrease.

- *Program satisfaction:* The lighting manufacturers, high-level retail buyers, and the Rhode Island store managers generally provided high satisfaction ratings for most of the program

attributes. However, the Massachusetts store managers were much less satisfied with the program with only two thirds saying that they were satisfied with the program as a whole (we usually see satisfaction ratings in the 80's or 90's percentages for most rebate programs).

2. Background and Methodology

KEMA, working as a subcontractor to the NMR Group (NMR) on the Massachusetts and Rhode Island Residential Retail Products evaluation teams, is pleased to submit this final report of the findings from supplier interviews conducted in support of the 2010 ENERGY STAR® Lighting Program. We prepared this report for the Energy Efficiency Advisor Council (EEAC) consultants and the ENERGY STAR® Lighting Program Administrators (PAs) comprised of the Cape Light Compact, NSTAR, National Grid (MA), National Grid (RI), Unitil, and Western Massachusetts Electric.

This report summarizes the findings from supplier interviews, and addresses a wide range of topics related to program impact and process including, but not limited to:

- Program impact on CFL sales;
- Hard-to-reach (HTR) customers;
- Net-to-gross (NTG) ratios;
- Market effects within Massachusetts and Rhode Island;
- Market effects throughout New England; and
- Satisfaction with the program

This report is based on in-depth interviews and Computer-Aided Telephone Interview (CATI) surveys we conducted with lighting market actors in Massachusetts and Rhode Island who had participated in the ENERGY STAR lighting program. These market actors included:

- 11 lighting manufacturers who together accounted for over 95% of the sales by manufacturers identified in the program tracking databases;
- 9 high-level lighting buyers who represented large national or regional retailers in the programs. Together they accounted for over 75% of the program sales;
- 181 Massachusetts store managers; and
- 38 Rhode Island store managers.

We completed the in-depth interviews with the lighting manufacturers and high-level retail buyers during the September – November 2010 time period. The store manager CATI surveys were completed during the November – December 2010 time period.

For the in-depth interviews our sampling strategy was to try to complete interviews with 20 of the lighting manufacturers and high-level lighting buyers that represented the largest volume of program sales. We largely succeeded in this effort with 20 completed interviews representing nearly all the significant manufacturers and the large majority of the large high-level buyers. Our sampling approach for the Massachusetts and Rhode Island store managers was explained in more detail in an October 8, 2010 memorandum to the PAs and the EEAC consultants. This sampling approach considered a number of criteria in assigning strata targets including:

- What proportion of total program standard or specialty CFLs they accounted for;
- How many stores were in the strata to begin with;
- How important the strata were to the research objectives (e.g. HTR);
- Insuring that each key retail channel had a certain critical mass of respondents; and
- What was a realistic target for survey completions based on the size of the population in a given stratum.

Table 2-1 shows for Massachusetts store managers, by retail channel, our sampling targets and the actual number of completed surveys. For some channels such as Discount and Membership Club we had difficulty completing our initial targets so after having the CATI surveyors make at least six attempts in these strata, we allowed the surveys to fill the remaining quota with completes from more populous channels such as Drug and Grocery. We then used strata weights (based on CFL sales) to weight the responses of the store managers from the sample up to the full sample frame.

Table 2-1
Massachusetts Store Manager Survey
Sample Frame and Disposition

Retail Channel	Stratum	Types of program-discounted CFLs sold	% of program-discounted standard CFL sales/ shipments	% of program-discounted specialty CFL sales/ shipments	# of unique stores	Target # of completes based on sales volume	Adjusted targets based on strata size, HTR goals, & channel quotas	# of completed surveys
Discount	1	Stand. & spec. CFLs	6.0%	9.9%	59	14	42	**16**
	2	Specialty CFLs only	0.0%	3.4%	6	3	5	
	3	Standard CFLs only	2.4%	0.0%	14	2	7	
Drug	4	Stand. & spec. CFLs	0.4%	0.3%	50	1	2	**44**
		Specialty CFLs only	0.0%	0.0%	1	0	0	
	5	Standard CFLs only	5.2%	0.0%	385	5	12	
Grocery	6	Stand. & spec. CFLs	10.3%	1.5%	204	11	18	**50**
		Standard CFLs only	0.1%	0.0%	18	0	0	
	7	HTR	0.6%	1.2%	5	2	13	**2**
Large home improvement	8	Stand. & spec. CFLs	35.4%	45.3%	42	73	30	**31**
		Specialty CFLs only	0.0%	0.0%	1	0	0	
		Standard CFLs only	0.0%	0.0%	7	0	0	
Lighting/ Electronics		Stand. & spec. CFLs	0.1%	0.1%	2	0	0	**0**
Mass merchandise	9	Stand. & spec. CFLs	3.8%	0.5%	28	4	15	**10**
Membership club	10	Stand. & spec. CFLs	21.9%	28.8%	21	46	16	**4**
Miscellaneous	11	Stand. & spec. CFLs	0.6%	4.0%	5	4	4	**2**
		Standard CFLs only	0.1%	0.0%	5	0	0	
Small hardware	12	Stand. & spec. CFLs	11.0%	4.1%	84	14	14	**22**
		Specialty CFLs only	0.0%	1.0%	3	1	1	
	13	Standard CFLs only	1.9%	0.0%	31	2	2	
			100.0%	**100.0%**	**971**	**180**	**180**	**181**

Table 2-2 shows the sample frame and disposition of completed surveys for the Rhode Island store managers. In this case the CATI surveyors were able to come closer to their strata targets for channels such as Discount and therefore had to rely less on the more populous Drug and Grocery channels to fill the remaining quota.

Table 2-2
Rhode Island Store Manager Survey
Sample Frame and Disposition

Retail Channel	Stratum	Types of program-discounted CFLs sold	% of program-discounted standard CFL sales/ shipments	% of program-discounted specialty CFL sales/ shipments	# of unique stores	Target # of completes based on sales volume	Adjusted targets based on strata size, HTR goals, & channel quotas	# of completed surveys
Discount	1	Standard CFLs only	23.0%	0.0%	22	4	11	**9**
Drug		Stand. & spec. CFLs	0.5%	0.7%	6	0	0	**13**
	2	Standard CFLs only	11.1%	0.0%	45	2	5	
Grocery	3	Standard CFLs only	5.9%	0.0%	24	1	5	**7**
Large home	4	Stand. & spec. CFLs	50.6%	90.0%	8	25	6	**4**
Mass merchandise	5	Stand. & spec. CFLs	4.5%	4.3%	9	2	4	**2**
Membership club	6	Stand. & spec. CFLs	0.1%	2.8%	3	1	2	**1**
		Specialty CFLs only	0.0%	0.8%	1	0	0	
Small hardware	7	Stand. & spec. CFLs	4.4%	1.4%	3	1	2	**2**
			100%	**100%**	**121**	**35**	**35**	**38**

3. Program Efforts to Increase CFL Penetration in Hard-to-Reach Lighting Markets

This section discusses the findings from the lighting market actor interviews concerning:

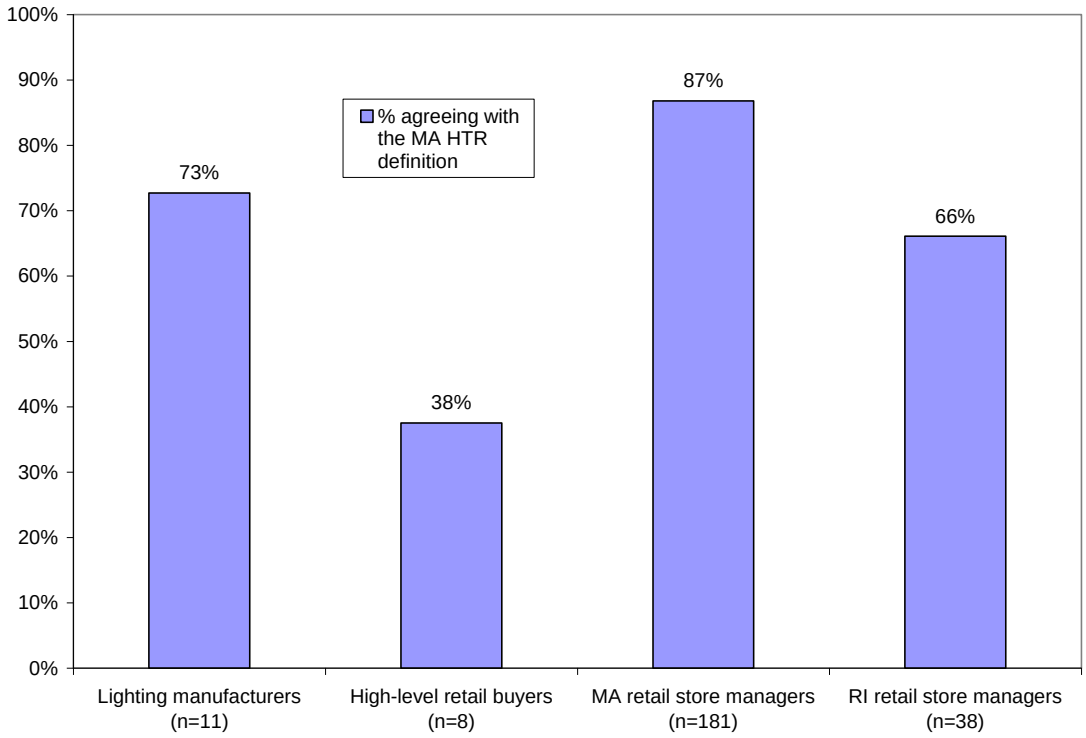
- How to define HTR lighting customers;
- The prevalence of HTR lighting customers among program participants;
- How the ENERGY STAR lighting program is trying to increase CFL sales among HTR customers and whether the lighting market actors think these are the right strategies;
- Whether the program's efforts to encourage more CFLs sales in the Discount and HTR Grocery sectors is taking away CFL sales from national retailers, creating new sales, or doing a bit of both; and
- How effective the lighting market actors think the program's HTR strategies have been.

3.1 Defining hard-to-reach lighting customers

The Massachusetts ENERGY STAR lighting program defines the HTR lighting markets as those that serve low-income, ethnic, non-English-speaking, and less educated customers.[10] We asked the lighting market actors whether or not they agreed with that definition. Figure 3-1 shows that large majority of lighting manufacturers and retail store managers agreed with this definition but only 38% of the high-level retail buyers did.

[10] The survey questionnaire and interview guide mentioned low-income customers. After the team developed and fielded the guides, we learned that the moderate-income customers actually comprised the group "between 60% and 120% of the state median income". The RDD/Onsite survey report discusses the impact of defining HTR as moderate income in detail.

Figure 3-1
Whether Lighting Market Actors
Agreed with the MA HTR Definition



We asked the high-level retail buyers and lighting manufacturers who disagreed with the definition about their reasons for doing so. Most of those who disagreed with the definition thought it should be expanded to include other factors such as age, geographic location, or knowledge of CFLs. Those who disagreed with the definition made the following comments:

- *Geographic considerations:*
    - *"I would have to add rural locations as well, not just demographics but also geographic."*
    - *"I would think of [HTR] more as consumers that have to travel a lot further to get to a store, so geographically wise, they're more challenged at being able to get out to a store to get products."*

- *Age considerations:*
    - *"Senior citizen type markets are usually hard to get and penetrate."*
    - *"The other hard-to-reach persons would be the 22- to 29-year-olds."*
- *CFL knowledge considerations: "I think it's more lack of knowledge than it is low income. Because low income is at Wal-Mart, and we do really well in the Wal-Mart stores. I think it's education and knowing about the bulbs."*
- *Other comments on or objections to the Massachusetts HTR definition:*
    - *"You know, there are ethnic markets that are very well to do and they're not low income."*
    - *"I think that there are … a variety of factors that can sort of influence why people do or don't buy compact fluorescents, or how many they buy or don't buy. And I don't really think anybody necessarily has a great handle on that."*

3.2 The prevalence of HTR lighting customers among program participants

We asked all the lighting market actors to estimate what percentage of their customers would fall into three HTR categories:

1) Being low income;
2) Not having English as their primary language, and
3) Being members of ethnic or racial minority groups.

Most of the lighting manufacturers were unwilling to estimate what percentage of their customers would fall into these three HTR categories. While they said they were familiar with CFL sales data for Massachusetts and Rhode Island, they also said they had not seen any shopper demographic data for these states. Most of the lighting manufacturers were also located in offices outside of Massachusetts and Rhode Island and therefore had no opportunity to see the Massachusetts and Rhode Island CFL shoppers firsthand. Of the 11 lighting manufacturers only one was willing to provide an estimate (she estimated that 10% of her Massachusetts customers fell into each of the HTR categories).

The high-level retail lighting buyers were more willing than the lighting manufacturers to estimate what percentage of their customers would fall into these three HTR categories. Five of the nine high-level buyers we interviewed provided a percentage estimate for at least one of these three HTR categories, although some expressed these estimates in ranges. Table 3-1 shows their estimates.

Table 3-1
Average Estimate of % of Customers that Are HTR
as Estimated by High-Level Retail Buyers
by Retail Channel

Retail Channel Represented by High-Level Buyer	Avg. % estimate of their customers that are low income	Avg. % estimate of their customers w/o English as their primary language	Avg. % estimate of their customers who are in racial/ethnic minorities
Discount (n=2)*	25%	26%	No % estimate**
Small hardware (n=2)	20%	10%	34%
Membership club (n=1)	Under 20%	Under 20%	No % estimate

Note: One of the high-level Discount buyers provided a range of % estimates for each HTR category and for these we used the midpoint estimate. *Both high-level Discount buyers only provided % estimates for the low-income HTR category. **One of the high-level Discount buyers said that the percentage depends on the store location and the other said the percentage was “very small.”

The large majority of Massachusetts and Rhode Island store managers were willing to provide estimates of the percentage of their customers that fell into these HTR categories. This is likely because they have closer and more frequent contact with CFL shoppers than the lighting manufacturers or high-level lighting buyers do. The following subsections present the estimates they provided broken down by retail channel.

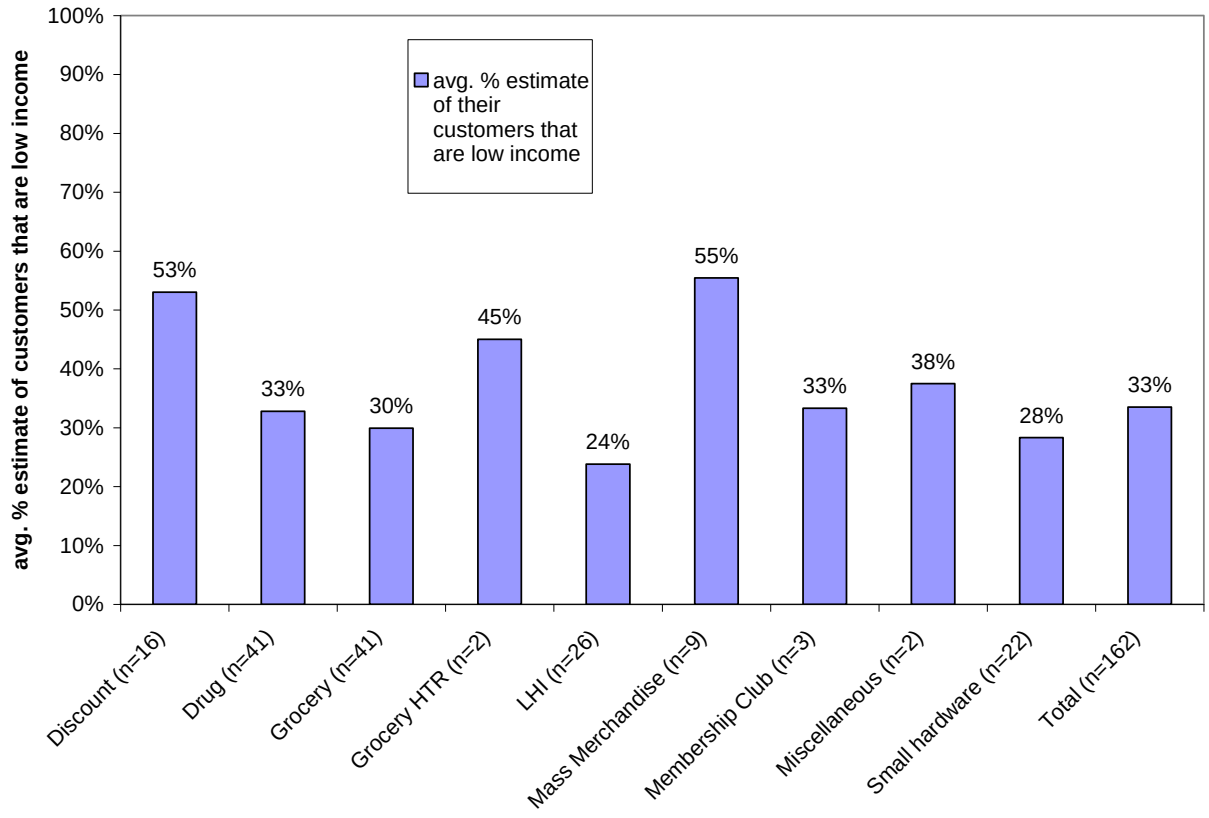
3.2.1 Low-income customers

We asked the Massachusetts and Rhode Island store managers to estimate what percentage of their customers they would consider to be low income. The average estimate across all retail channels was 33% for the Massachusetts store managers and 36% for the Rhode Island store managers. There was wide variation across the different Massachusetts channels (Figure 3-2) with less variation across the Rhode Island channels (Figure 3-3). Among Massachusetts store managers those with the Discount, HTR Grocery, and Mass Merchandise channels reported the highest average estimates for percentage of low-income customers, although the sample size for the HTR Grocery channel was very small. For the Rhode Island store managers the

Discount channel was the only one significantly higher than the average. Most of the channel-specific sample sizes for the Rhode Island store managers were very small.

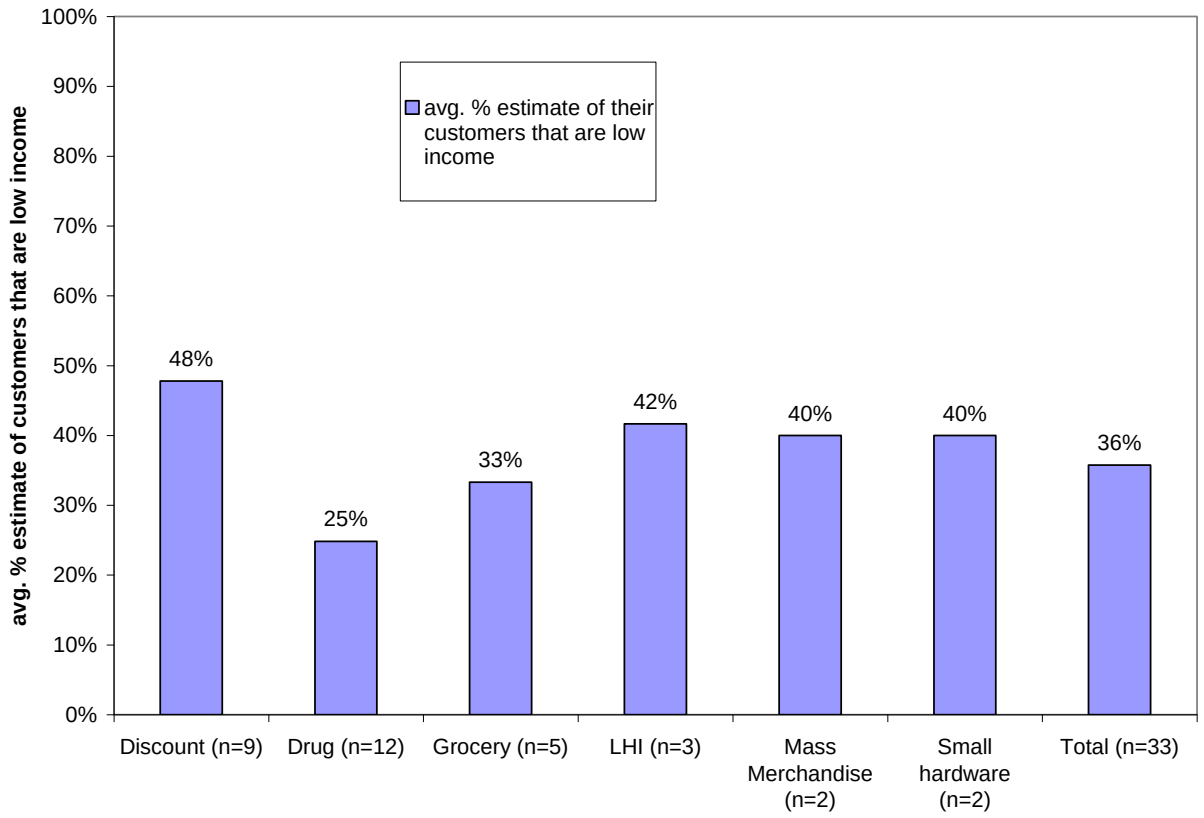
These responses indicate that the ENERGY STAR lighting program's strategy of using the Discount and the HTR Grocery channels to reach HTR customers is a reasonable one. Yet they also suggest that the Mass Merchandise channel – which is primarily Wal-Mart – would be another way to reach HTR customers.

Figure 3-2
Average Estimate of % of Customers that Are Low Income
as Estimated by MA Store Managers
by Retail Channel



Note: LHI stands for "Large Home Improvement" and includes stores such as Home Depot and Lowe's. The sample sizes in the chart represent the number of respondents who provided estimates (as opposed to saying they didn't know or refusing to answer). Across all retail channels 12% of the respondents said they did not know what percentage of their customers were low income or refused to provide an estimate.

Figure 3-3
Average Estimate of % of Customers that Are Low Income
as Estimated by RI Store Managers
by Retail Channel



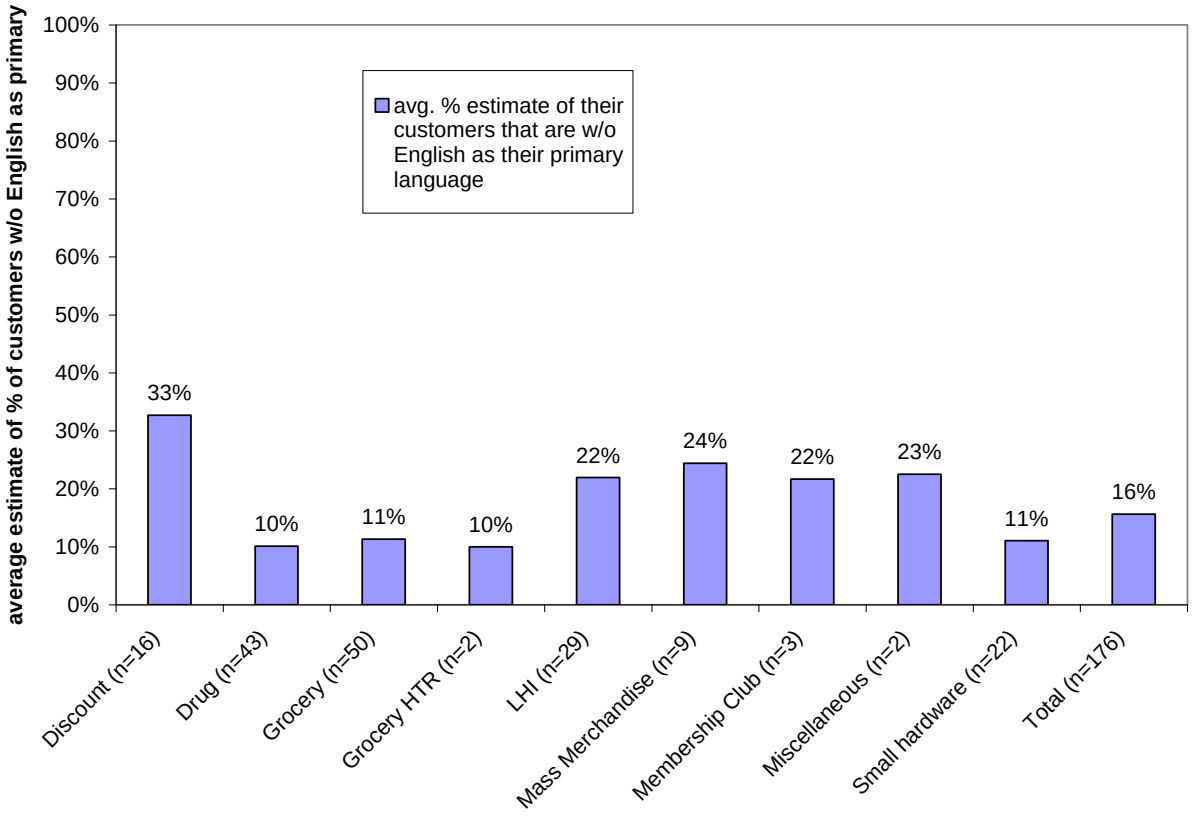
Note: The sample sizes in the chart represent the number of respondents who provided estimates (vs. saying they didn't know or refusing to answer). Across all retail channels 16% of the respondents said they did not know what percentage of their customers were low income or refused to provide an estimate. One survey was completed with a Membership Club representative, but because he/she was unable to estimate what percentage of their customers were low income, they are not represented in the chart.

3.2.2 Customers Not Having English as a Primary Language

We also asked the Massachusetts and Rhode Island retail store managers to estimate what percentage of their customers do not use English as a primary language. The average estimate across all retail channels was 16% for the Massachusetts store managers and 18% for the Rhode Island store managers. There was wide variation across both the Massachusetts (Figure 3-4) and Rhode Island retail channels (Figure 3-5). Among both the Massachusetts and Rhode Island store managers those in the Discount channel reported the highest average estimates

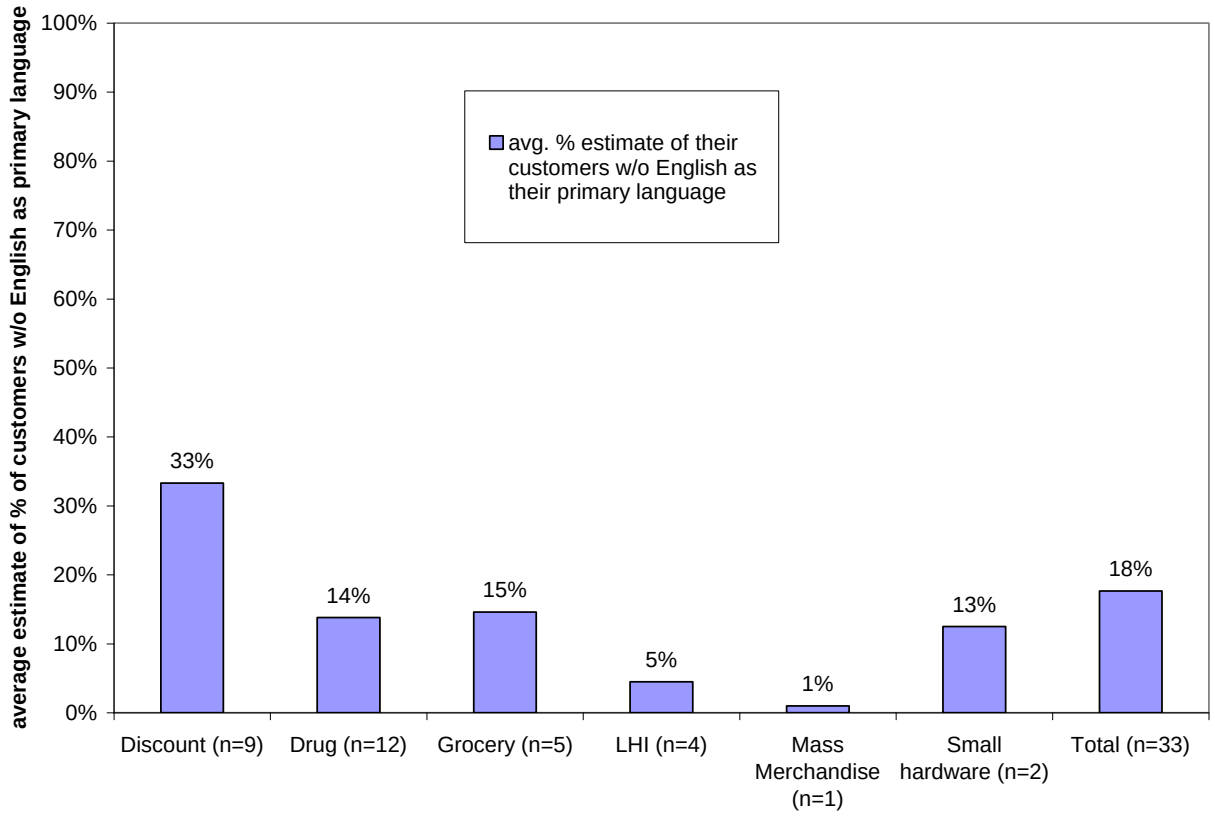
(33% in both cases) for the percentage of customers that did not have English as a primary language.

Figure 3-4
Average Estimate of % of Customers without English as a Primary Language as Estimated by MA Store Managers by Retail Channel



Note: The sample sizes in the chart represent the number of respondents who provided estimates (vs. saying they didn't know or refusing to answer). Across all retail channels six percent of the respondents said they did not know what percentage of their customers did not have English as their primary language or refused to provide an estimate.

Figure 3-5
Average Estimate of % of Customers without English as a Primary Language as Estimated by RI Store Managers by Retail Channel



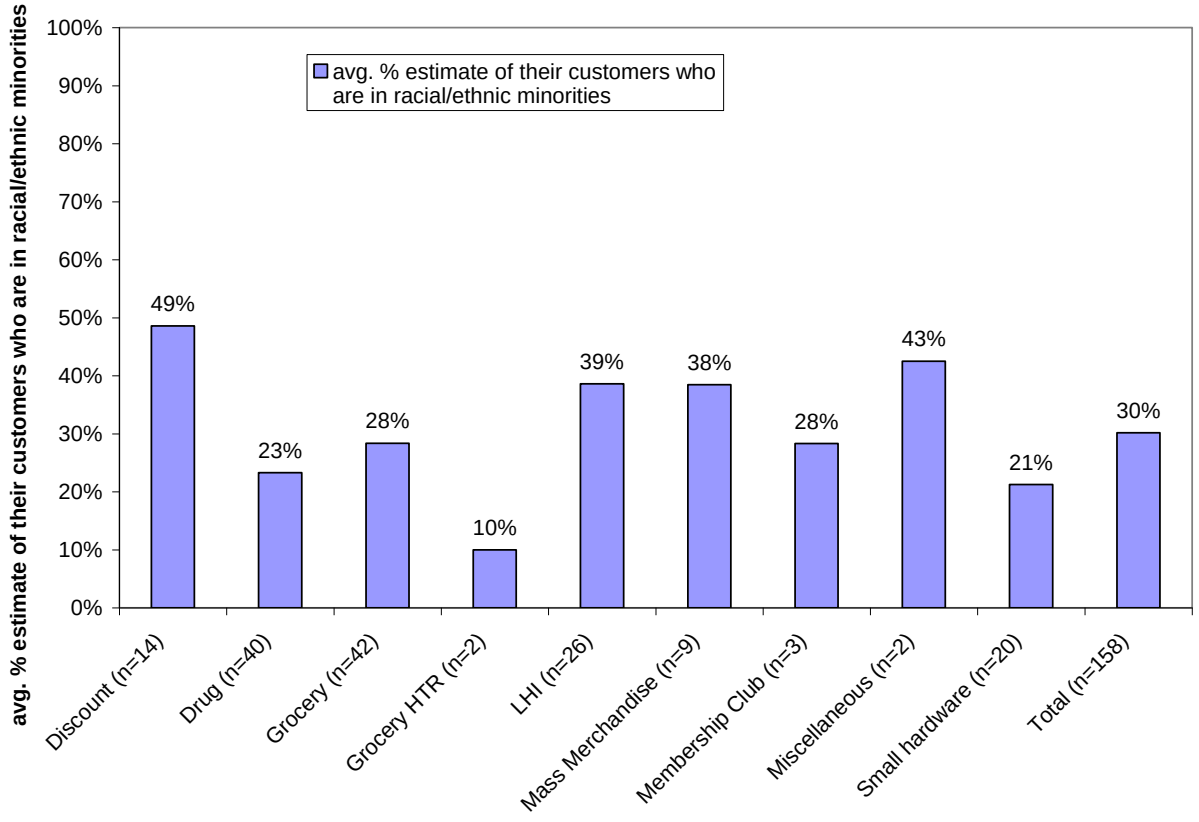
Note: The sample sizes in the chart represent the number of respondents who provided estimates (vs. saying they didn't know or refusing to answer). Across all retail channels 13% of the respondents said they did not know what percentage of their customers did not have English as their primary language or refused to provide an estimate.

3.2.3 Customers in Racial or Ethnic Minority Groups

Finally we the Massachusetts and Rhode Island retail store managers to estimate what percentage of their customers are members of a racial or ethnic minority group. The average estimate across all retail channels was 30% for the Massachusetts store managers and 29% for the Rhode Island store managers. There was wide variation across both the Massachusetts (Figure 3-6) and Rhode Island retail channels (Figure 3-7). Massachusetts store managers in the Discount and Miscellaneous channels reported the highest average estimates, although the sample size for the Miscellaneous channel was very small. Among the Rhode Island store

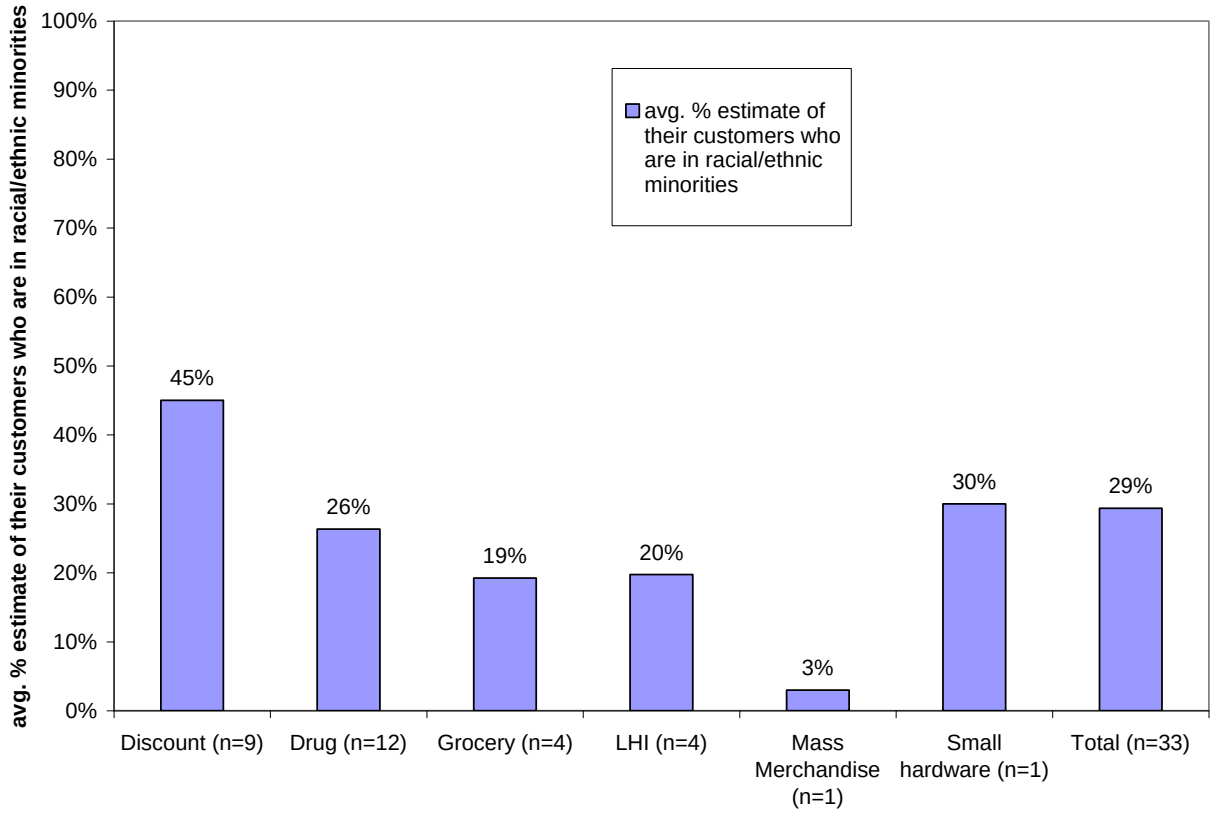
managers, those in the Discount channel were the only one to provide estimates of the percentage of their customers who are members of a racial or ethnic minority group that were substantially higher than those reported by other Rhode Island store managers.

Figure 3-6
Average Estimate of % of Customers
Who are Members of Ethnic/Racial Minorities
as Estimated by MA Store Managers
by Retail Channel



Note: The sample sizes in the chart represent the number of respondents who provided estimates (vs. saying they didn't know or refusing to answer). Across all retail channels 25% of the respondents said they did not know what percentage of their customers were in ethnic/racial minorities.

Figure 3-7
Average Estimate of % of Customers
Who are Members of Ethnic/Racial Minorities
as Estimated by RI Store Managers
by Retail Channel



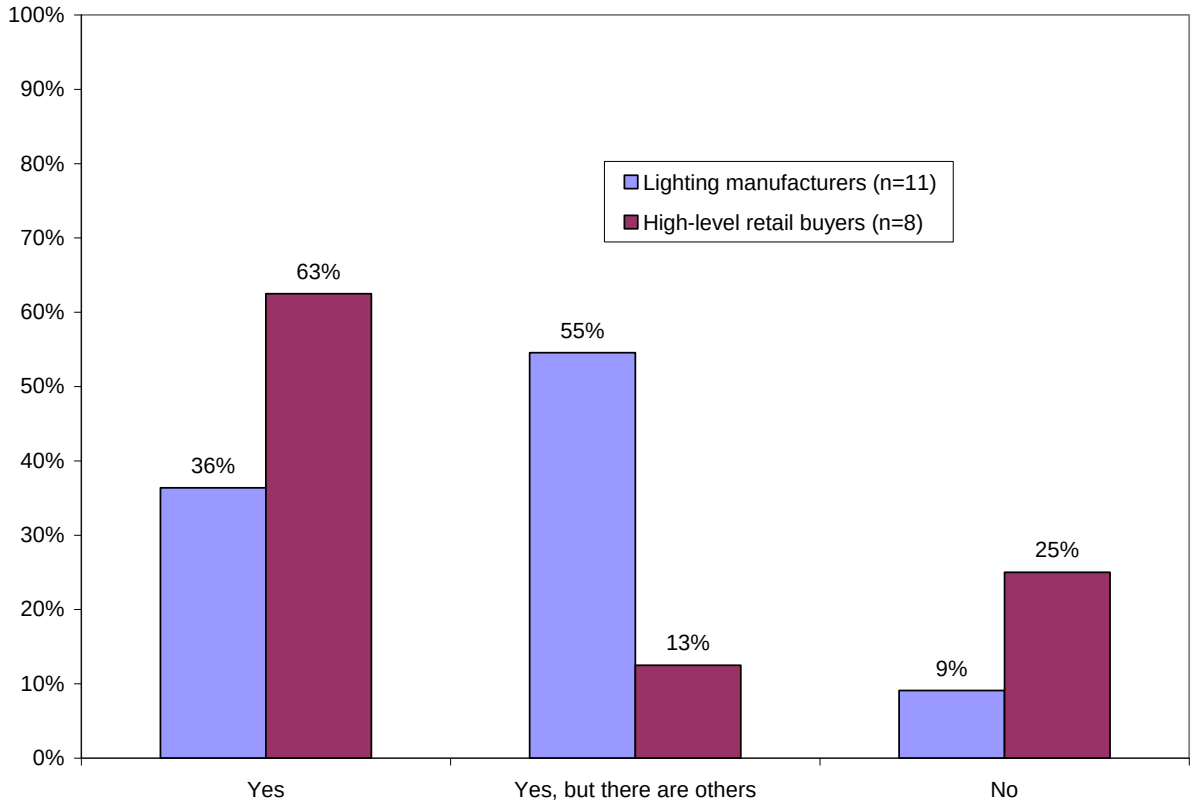
Note: The sample sizes in the chart represent the number of respondents who provided estimates (vs. saying they didn't know or refusing to answer). Across all retail channels 14% of the respondents said they did not know what percentage of their customers were in ethnic/racial minorities.

3.3 Reaching hard-to-reach customers

The Massachusetts program is trying to promote energy-efficient lighting technologies to the these HTR sectors primarily by encouraging sales through discount stores with some small additional sales through small and ethnic grocery stores. We asked the lighting market actors whether they thought that discount stores and small grocery stores were the best ways to reach these HTR customers. Figure 3-8 shows that while very few of these market actors said that discount stores and small grocery stores were *not* ways to reach HTR customers, the lighting manufacturers were much more likely than the high-level retailers to say that there were

additional channels to reach HTR customers besides discount and small grocery. Most of the respondents who said that there were additional channels pointed out that chain stores – including both national and regional chains – could be located in areas with low-income demographics. A couple of them mentioned Wal-Mart specifically as a chain store that served many low-income customers.

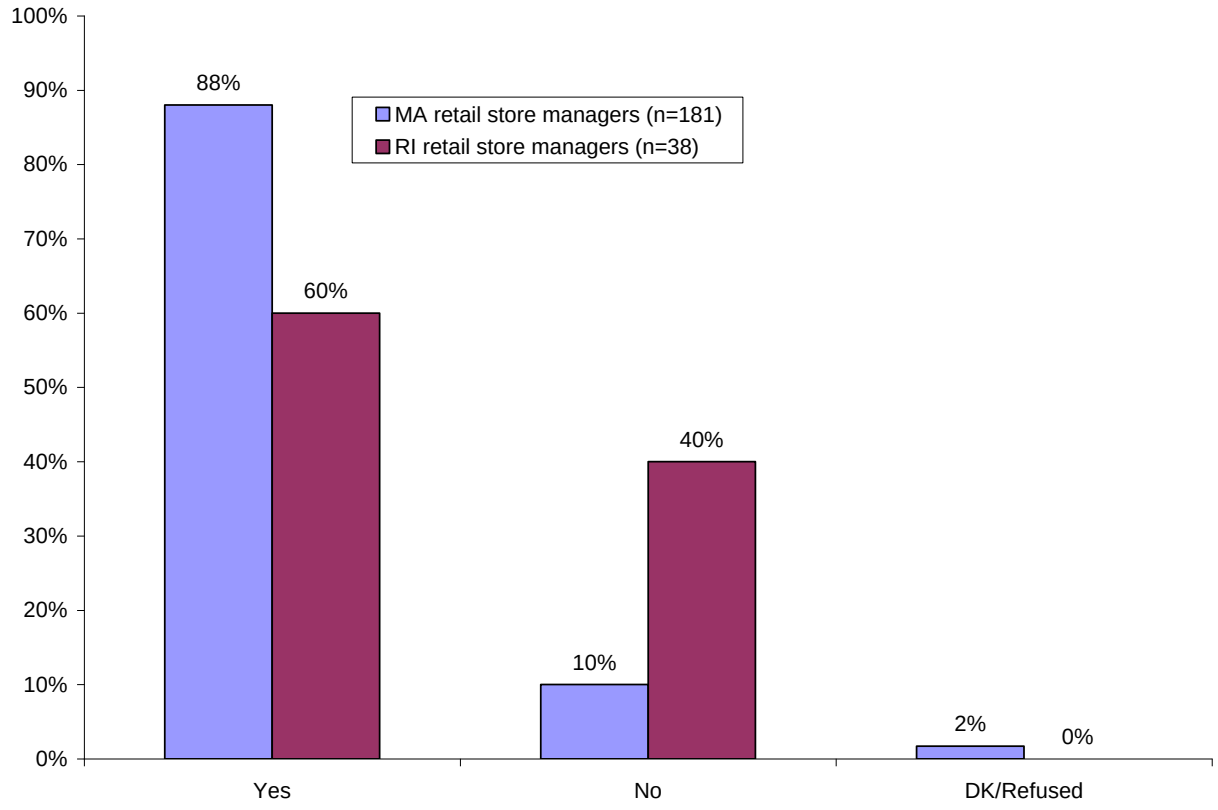
Figure 3-8
Whether Lighting Manufacturers and High-Level Retail Buyers Thought That Discount and Small Grocery Stores Were Best Way to Reach HTR Lighting Customers



We also asked the store managers whether discount stores and small grocery stores were the best ways to reach the HTR sector.[11] A majority of store managers in Massachusetts and Rhode Island said that they were, although the Massachusetts store managers were much more likely to do so (Figure 3-9).

[11] The exact question wording was: "Do you think discount stores and small grocery stores are the right kinds of retailers that the program should be working with to make CFLs more accessible to hard-to-reach customers?"

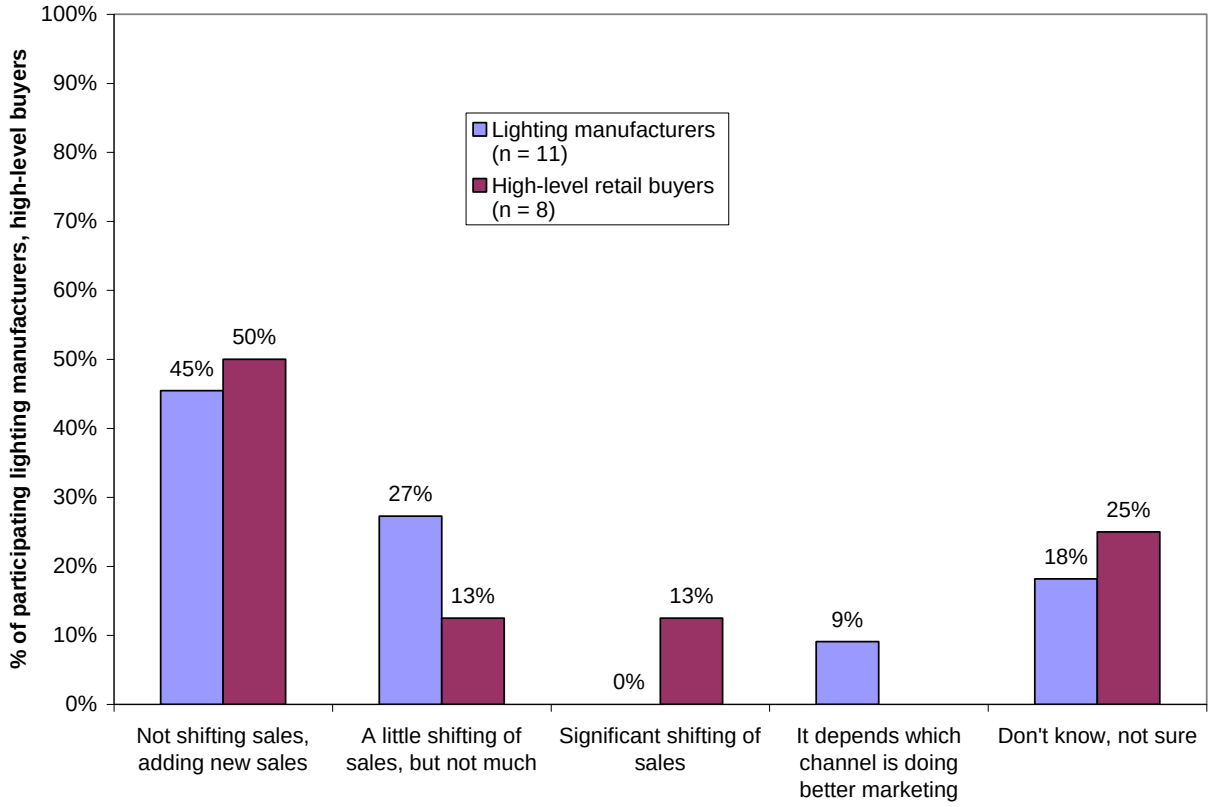
Figure 3-9
Whether Store Managers
Thought That Discount and Small Grocery Stores
Were Best Way to Reach HTR Lighting Customers



3.4 Retail Channel Shifting

One concern about program strategies that promote greater CFL sales in retail channels such as discount stores in an effort to reach HTR customers is that such strategies may simply shift sales from national chain retailers such as Wal-Mart or Home Depot to these discount stores, rather than create new sales. This phenomenon is sometimes called “retail channel shifting” or even “retail cannibalization.” We asked the lighting manufacturers and high-level retail buyers whether they think these discount and small grocery stores are creating new ENERGY STAR CFL product sales or taking away ENERGY STAR CFL sales that otherwise would have gone to national chain retailers. About half of the lighting manufacturers and high-level buyers said that there was no shifting of sales (Figure 3-10). One of the lighting manufacturers and one of the high-level retail buyers said there was a little shifting of sales, but not much. Only one respondent – one of the high-level buyers – said that there was significant shifting of sales.

Figure 3-10
Whether Lighting Manufacturers and High-Level Retail Buyers Thought That the Program was Creating New Sales or Shifting Sales from National Chain Retailers



The respondents who said that the program was mostly creating new sales instead of shifting sales provide a number of explanations including:

- *The new channels being impulse-buying rather than CFL destination stores:*
    - *"They're probably creating some new sales, but they're probably not taking away sales from [national chain retailers such as Wal-Mart, Home Depot, or Lowe's] because a person who is going to go and look for their lighting is going to go there,"* said one high-level retail buyer. *"Only if they just happen to go to the other [new program retailers such as grocery] and see something on sale they might buy it."*
    - *"I don't think that there has to be such an emphasis on grocery and drugstores,"* said one lighting manufacturer. *"They are not necessarily destinations, they're impulse*

buying. I think they might be picking up a few percentages of customers, but most customers still tend to go to the hardware store or the DIY or big box retailers."

- *Limited overlap between customer types:*
    - *"There might be a little bit of cannibalization,"* said one lighting manufacturer, *"but there's not enough overlap between customers who shop at a dollar store and a Wal-Mart."*
    - *"Oh, 100%, almost 100% [new sales]"* said one lighting manufacturer. *"These are people that would only buy an incandescent. This is not taking away any sales from a major retailer."*
- *Customer loyalty: "I don't think we can assume that it's taking sales away, because certain customers have their loyalties to certain stores and I don't think you can say for sure that they're going to a particular store just to take advantage of the promotions,"* said one lighting manufacturer.
- *The diversity of program channels: "I wouldn't say there was much [switching] because I think the program is pretty widespread,"* said one lighting manufacturer.

We asked the Massachusetts and Rhode Island store managers a similar question about possible channel shifting.[12] A large majority of the Massachusetts and Rhode Island store managers said that the program was both shifting CFL sales and creating new ones (Figure 3-11). Only one to two percent of the store managers said that the program was only shifting sales. The responses did vary depending on which retail channel the store manager represented. Figure 3-12 breaks down the responses of the Massachusetts store managers by retail channel. It shows that the store managers from the Discount and Grocery HTR channels were more likely than their counterparts in other channels to say that no channel shifting was going on (e.g., the program's HTR strategy was only creating new sales).

[12] The question asked of the store managers was: "By making ENERGY STAR® CFLs available in the discount and small grocery stores, do you think the Massachusetts/Rhode Island ENERGY STAR lighting administrators are creating new CFL sales that didn't exist before, taking away CFL sales from other retailers, or doing a bit of both?" This compares to the question asked of the lighting manufacturers and high-level retail buyers: "As we noted earlier, the Massachusetts ENERGY STAR® Lighting Program is trying to encourage more sales of CFLs among discount stores and small grocery stores in order to increase CFL purchases among the "hard-to-reach" part of the Massachusetts population. To what degree do you think these discount and small grocery stores are creating new ENERGY STAR CFL product sales as opposed to taking away ENERGY STAR CFL sales that otherwise would have gone to national chain retailers such as Wal-Mart, Home Depot, or Lowe's?"

Figure 3-11
Whether Store Managers
Thought That the Program was Creating New Sales
or Shifting Sales from National Chain Retailers
Massachusetts vs. Rhode Island

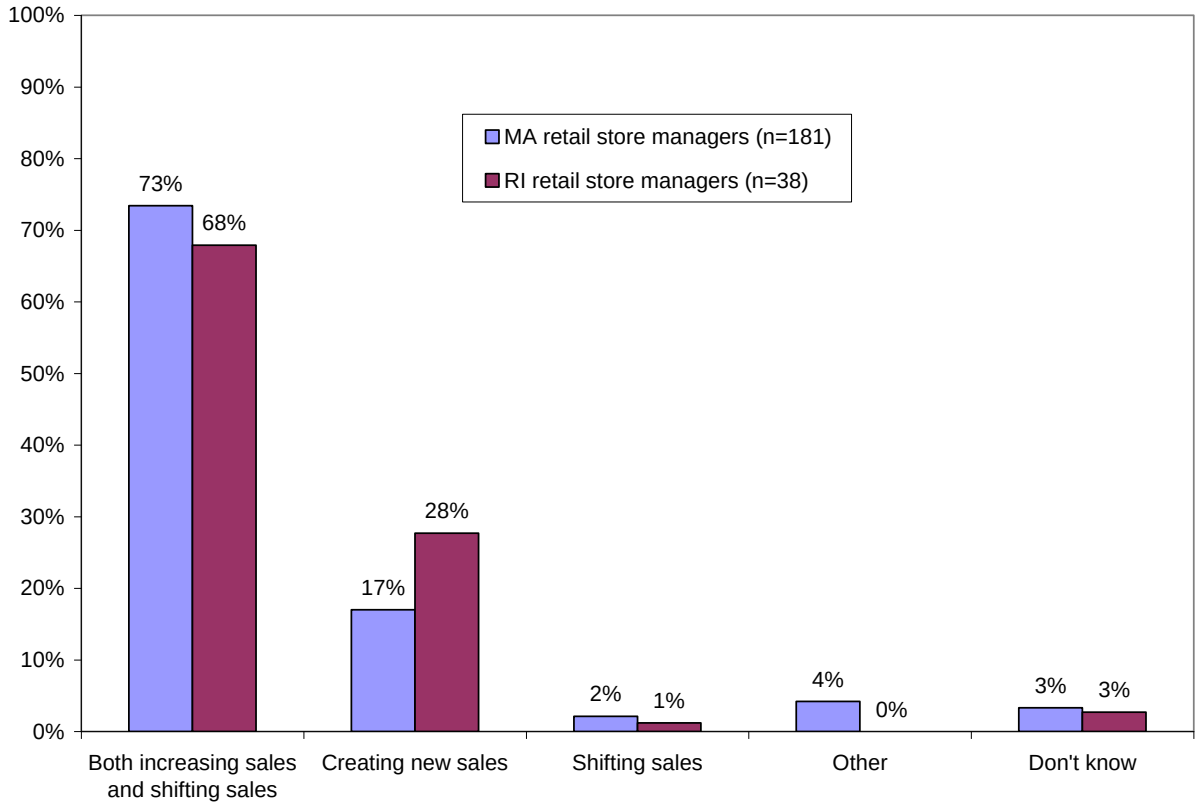
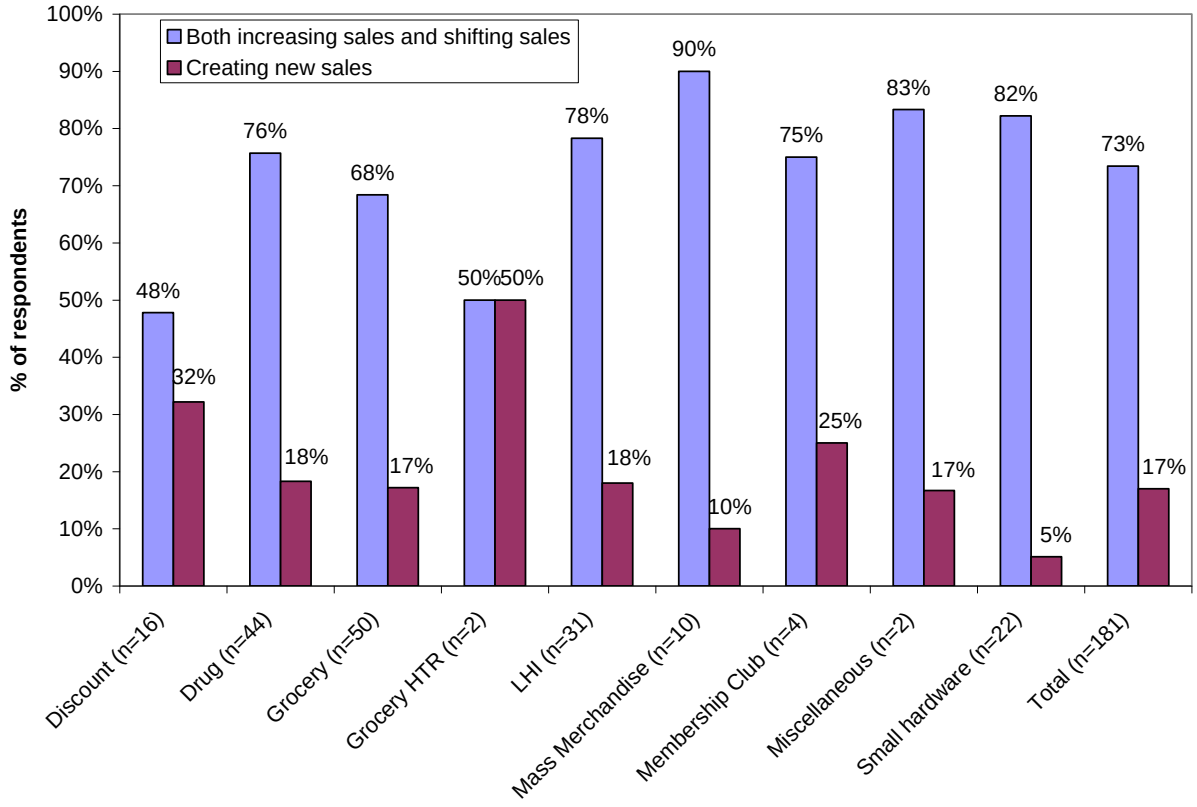


Figure 3-12
Whether MA Store Managers
Thought That the Program was Creating New Sales
or Shifting Sales from National Chain Retailers
by MA Retail Channel



Note: The chart only shows the two most common question responses and therefore the percentages for each retail channel do not add up to 100% in most cases.

Finally we asked the store managers who had said that there was at least some retail switching going on, "from which retailers do you think these discount and small grocery stores are taking away CFL sales?" The three most cited retailers were Home Depot, Wal-Mart, and Lowe's.[13]

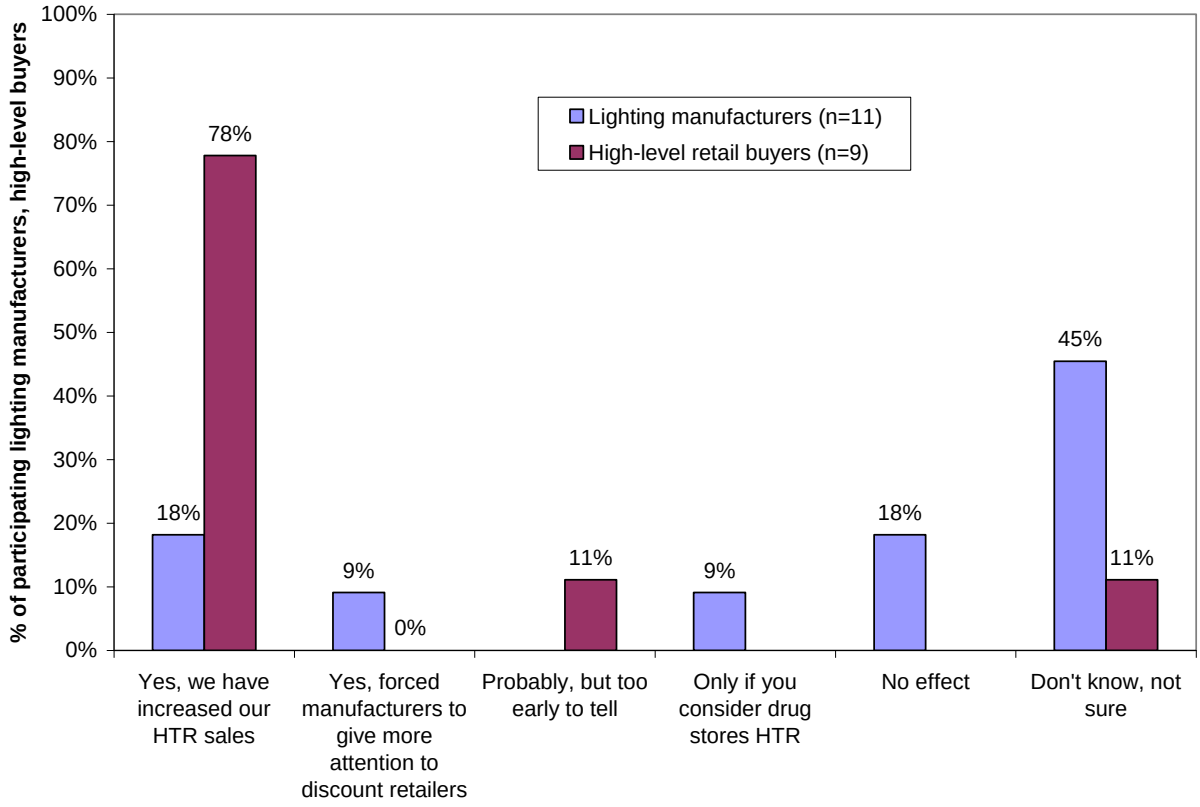
[13] 22% of the Massachusetts store managers and 35% of the RI ones cited Home Depot, 21% of the Massachusetts store managers and 15% of the RI ones cited Wal-Mart, and 20% of the Massachusetts store managers and 25% of the RI ones cited Lowe's.

3.5 The Effectiveness of Program HTR Strategies

We asked the lighting manufacturers and high-level lighting buyers whether the programs had any effects on the proportion of their company's CFL sales that were going to individuals in these HTR demographic groups. The large majority (78%) of high-level buyers said that the programs had increased their sales to these groups while only 18% of the lighting manufacturers did. Yet, as Figure 3-13 shows, only 18% of the manufacturers said that the program had *no effect*. Nearly half of the lighting manufacturers said that they simply did not know what the effects were. This is consistent with their previous unwillingness to estimate the proportion of their CFL sales going to HTR customers due to their lack of access to or familiarity with shopper demographic data.

When asked to explain how the programs were increasing their CFL sales to HTR customers, most of the respondents cited the discounts which made CFLs accessible to a wider range of customers and help increase foot traffic in their stores. *"The reason why they shop our stores are to get a discount,"* said a buyer for a participating discounter, *"and typically in those [HTR] communities word-of-mouth spreads." "As much as we talk features and benefits on bulbs, for a lot of folks the bottom line is what's it going to cost me,"* said another buyer. *"So the fact that a lot of these bulbs in single packs are out there for $.99 or less makes them pretty attractive to those demographics."* One buyer mentioned a program flyer written in Spanish that had been mailed to 36,000 Hispanic customers and which had started to generate calls. Finally one manufacturer claimed that the program encourages manufacturers to work with discounters and other HTR retailers that they might not otherwise deal with.

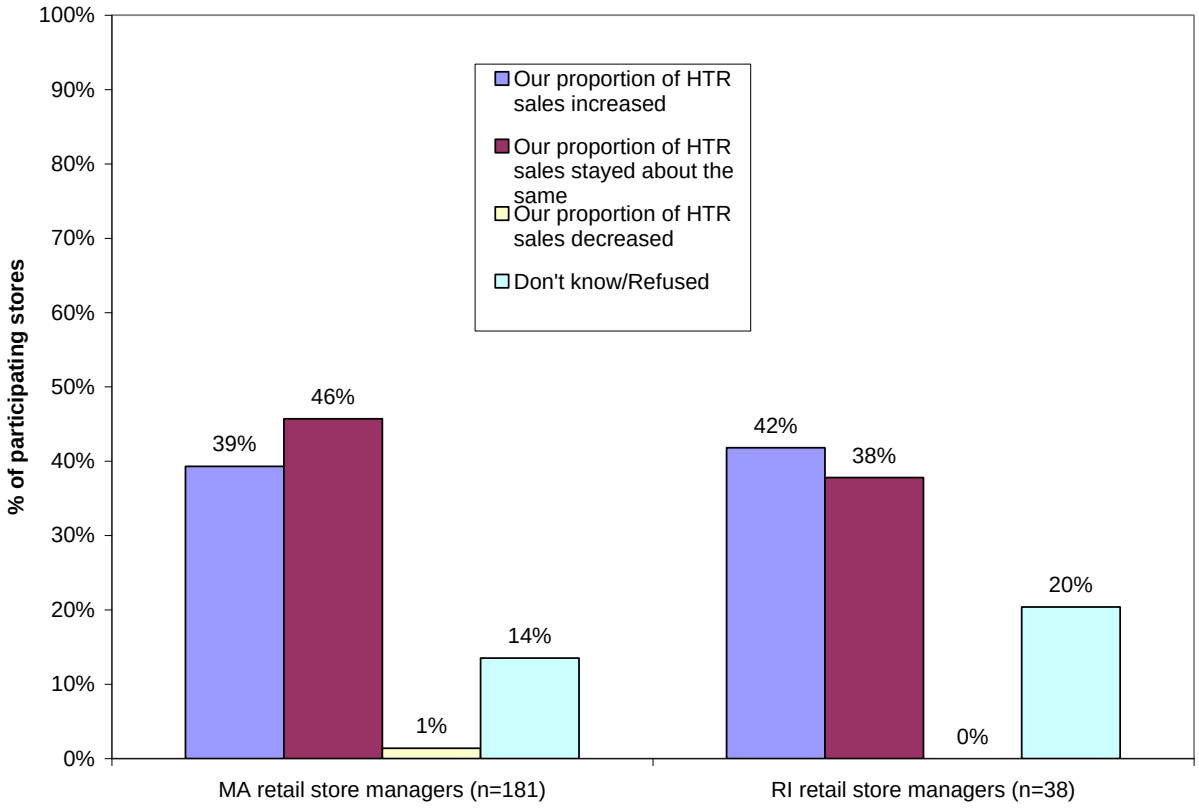
Figure 3-13
Whether Lighting Manufacturers and High-Level Retail Buyers Thought the Programs Had Effects On the Proportion of Their CFL Sales Going to HTR Customers



We also asked the Massachusetts and Rhode Island store managers: "In the past year do you think the proportion of your company's CFL sales that are going to individuals in these hard-to-reach demographic groups has increased, decreased, or stayed about the same?"[14] Figure 3-14 shows that about 40% of the Massachusetts and Rhode Island store managers said that the proportion of their sales to HTR customers had increased with a similar percentage saying their sales to these customers had stayed about the same. Only one percent of the Massachusetts store managers and none of the Rhode Island store managers said that the proportion of their sales to HTR customers had decreased in the past year.

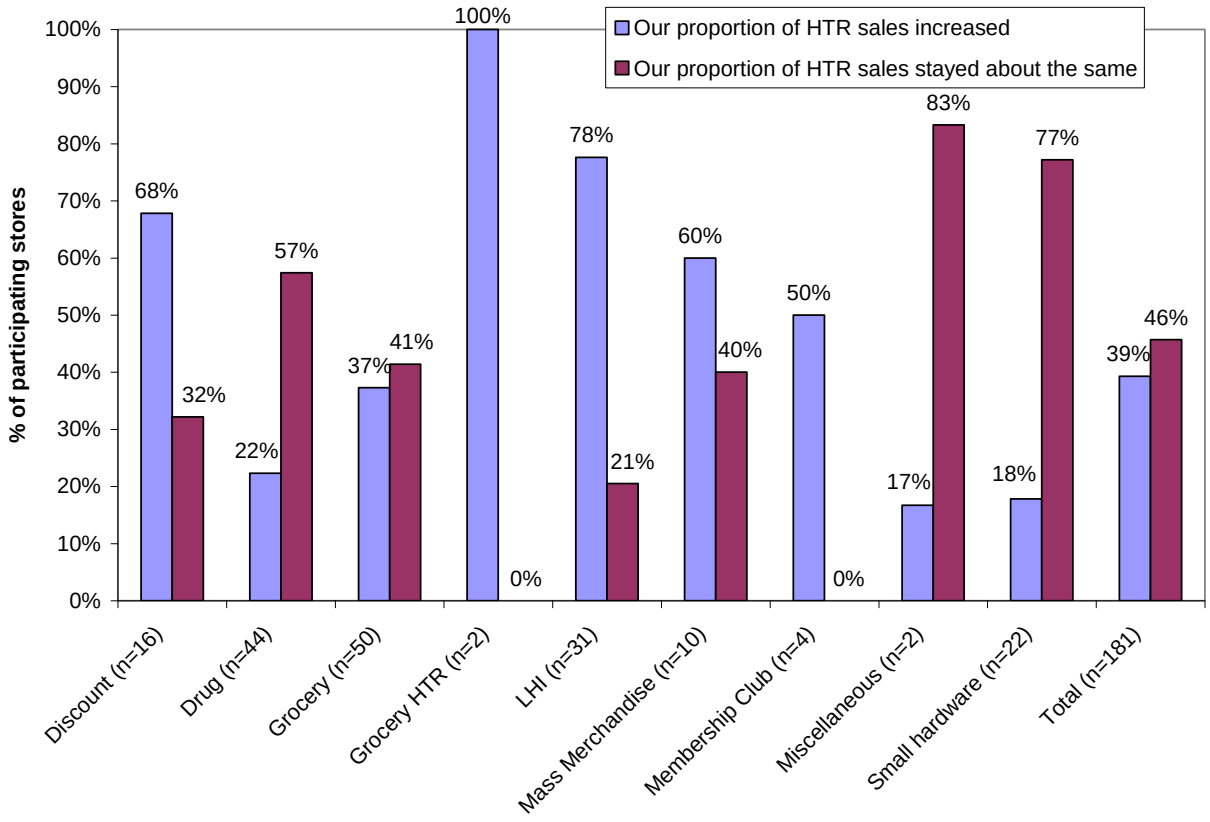
[14] The CATI surveys of the Massachusetts and Rhode Island store managers began in late October 2010 and were finished in early December 2010.

Figure 3-14
Whether Store Managers Reported the Proportion of Their CFL Sales Changing in the Past Year
Massachusetts vs. Rhode Island



When we broke down the store manager responses by their respective retail channels, some variation emerged. Figure 3-15 shows that Massachusetts store managers in the Discount, Grocery HTR, LHI, Mass Merchandise, and Membership Club channels were much more likely to report that the proportion of their CFL sales to HTR customers had increased in the past year than those in the Drug, Grocery, Miscellaneous, or Small Hardware channels.

Figure 3-15
Whether MA Store Managers Reported
the Proportion of Their CFL Sales Changing in the Past Year
by MA Retail Channel



4. Program Efforts to Increase Sales of Specialty CFLs

This section summarizes the lighting market actor findings concerning program efforts to increase sales of specialty CFLs. In the interviews/surveys we defined specialty CFLs as bulbs "such as dimmable, 3-way, or reflector CFLs." This section first discusses barriers to specialty CFL sales and then describes the lighting market actors' assessment of program efforts (promotions, incentives, etc.) to mitigate specialty CFL barriers. Finally it summarizes the recommendations made by these lighting market actors on how to increase specialty CFL sales.

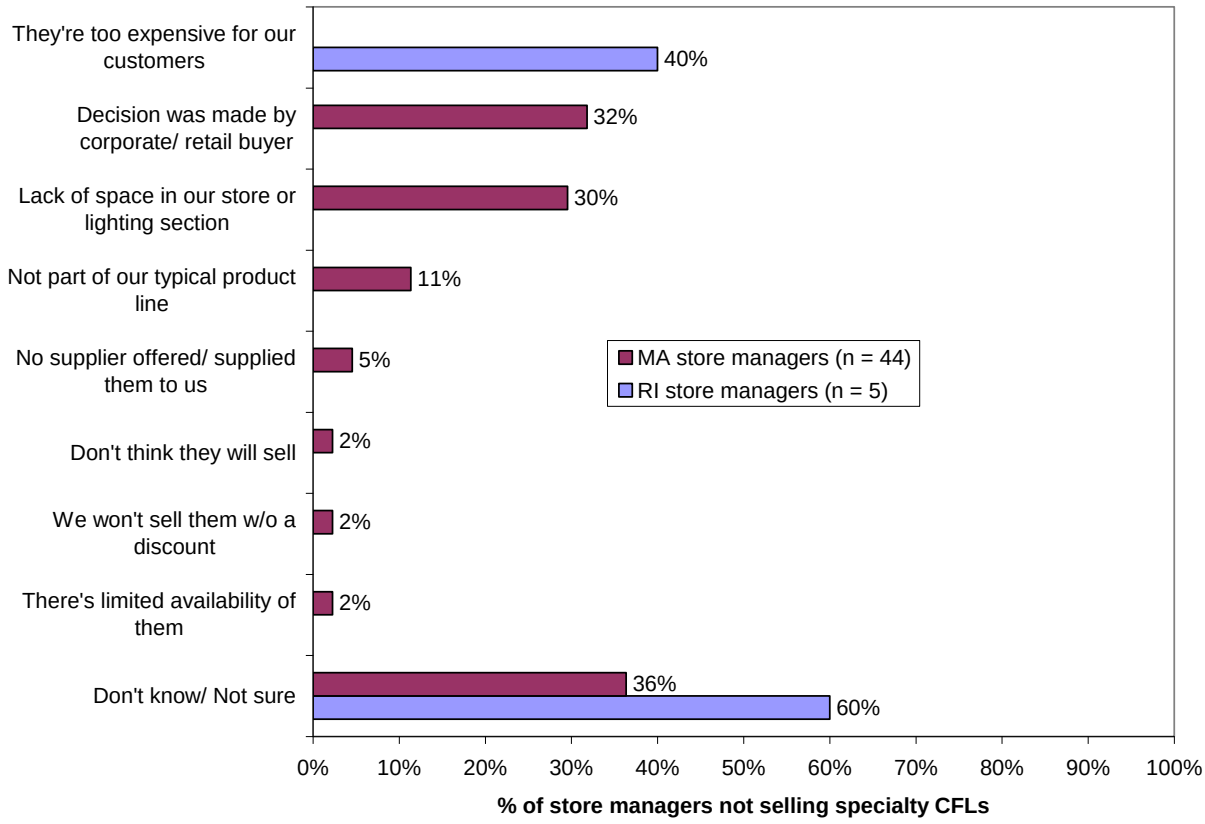
4.1 Barriers to Specialty CFL Sales

Forty-four of the 181 participating Massachusetts (24%) store managers and five of the 38 participating Rhode Island store managers (13%) that we surveyed said that their stores do not sell specialty CFLs. The large majority (70%) of the Massachusetts store managers who did not sell specialty CFLs were in the Drug retail lighting channel. All five of the Rhode Island stores managers that did not sell them were in the Discount retail lighting channel.

We asked the store managers who did not sell specialty CFLs why they did not sell them. For the Massachusetts store managers the two most common responses (not counting those who said they did not know) were either that the decision was made at the corporate/retail buyer level (which could also be categorized as "don't know") or that their store or lighting section was too small to accommodate the specialty CFLs (Figure 4-1). As noted, most of the Massachusetts store managers who did not sell specialty CFLs were in the Drug lighting channel and these stores typically do not have large lighting sections.

Since all five of the Rhode Island store managers that did not sell the specialty CFLs were in the Discount channel, it is not surprising that two of them said that the specialty products were too expensive for their customers. The remaining three did not know why their stores were not selling the specialty products.

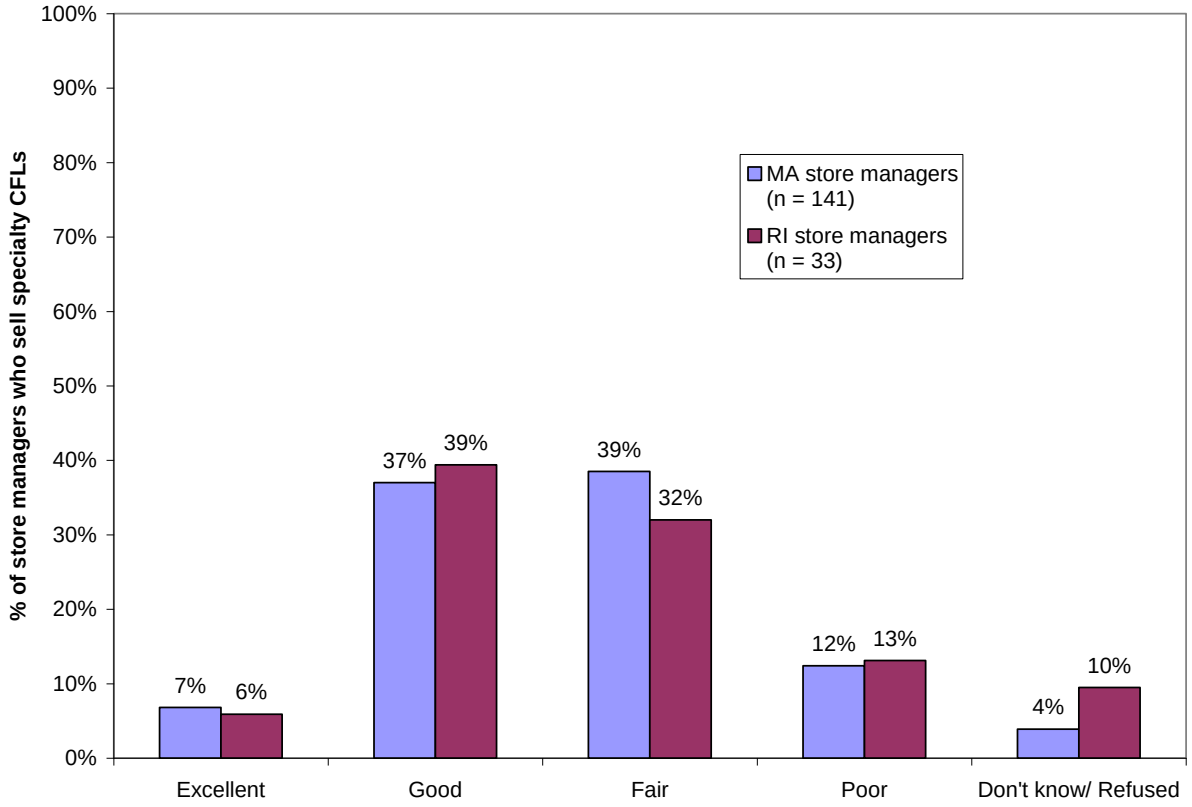
Figure 4-1
Why MA/RI Store Managers
Do Not Sell Specialty CFLs



Note: The totals may exceed 100% because respondents were allowed to provide multiple responses.

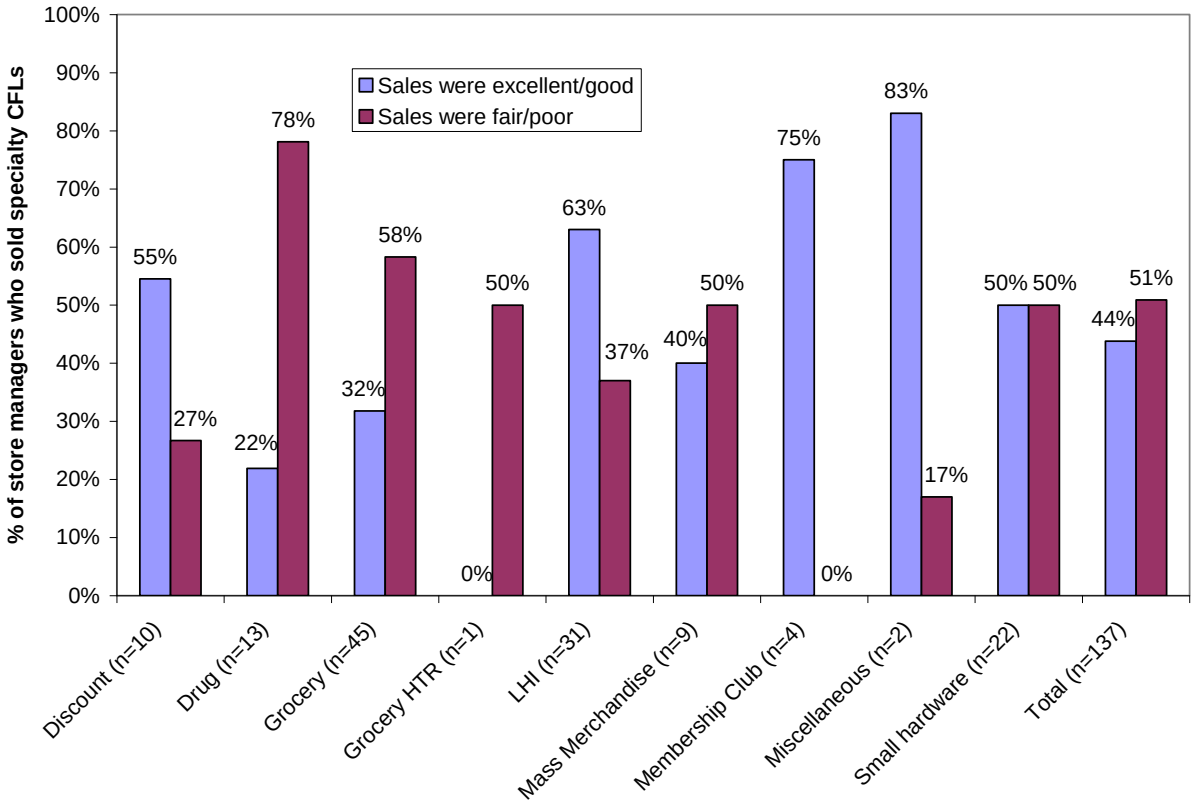
We also asked the 137 Massachusetts store managers and 33 Rhode Island store managers who did sell specialty CFLs whether they would characterize their sales of these specialty products over the past year as “excellent,” “good,” “fair,” or “poor.” Figure 4-2 shows that the large majority of the store managers from both states characterized their sales as either “good” or “fair.”

Figure 4-2
How Store Managers
Characterized Specialty CFL Sales
Over the Past Year
Massachusetts vs. Rhode Island



When we broke down the Massachusetts store manager responses by retail channel, however, some differences emerged. Figure 4-3 shows that store managers in the Discount, Large Home Improvement, Membership Club, and Miscellaneous retail lighting channels were more likely to say that their specialty CFLs sales were “excellent” or “good” (although these last two channels had very small sample sizes). Conversely store managers in the Drug and Grocery lighting channels were much more likely than those from other channels to say that their sales of specialty CFLs had been “fair” or “poor.”

Figure 4-3
How Massachusetts Store Managers Characterized Specialty CFL Sales Over the Past Year by Retail Channel

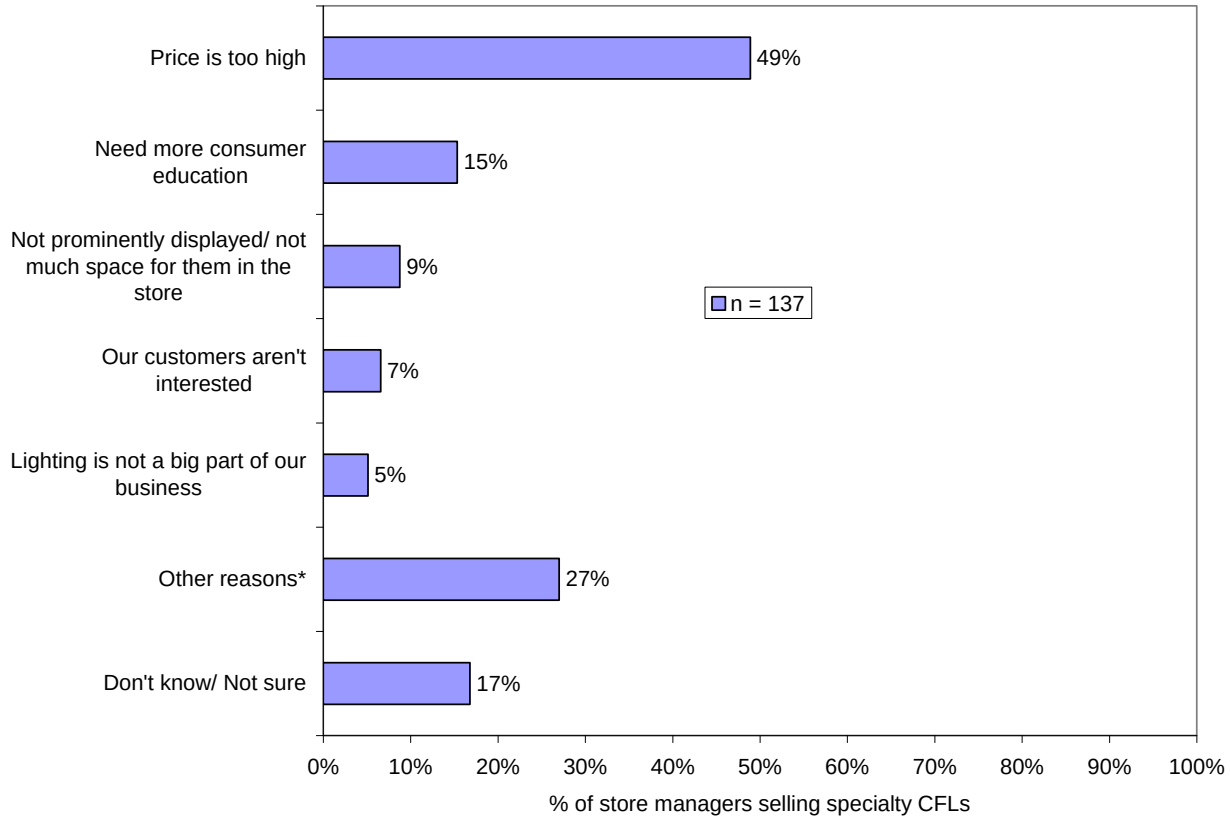


Note: The percentages for a given retail channel will usually not add up to 100% due to "don't know" responses not being shown.

We also asked the store managers who sold specialty CFLs: "What factors or barriers prevent more of these specialty CFLs from being sold?" The most-cited barrier, by far, was the higher price point for the specialty products. Figure 4-4 shows the responses from the Massachusetts store managers. The store managers from the Small Hardware channel were much more likely than store managers from other channels to cite price as being a barrier.

The Rhode Island store managers' assessment of the barriers to sales of specialty CFLs was very similar. Once again the most-cited barrier, by far, was the specialty CFLs being too expensive, with all other barriers being cited much less often.

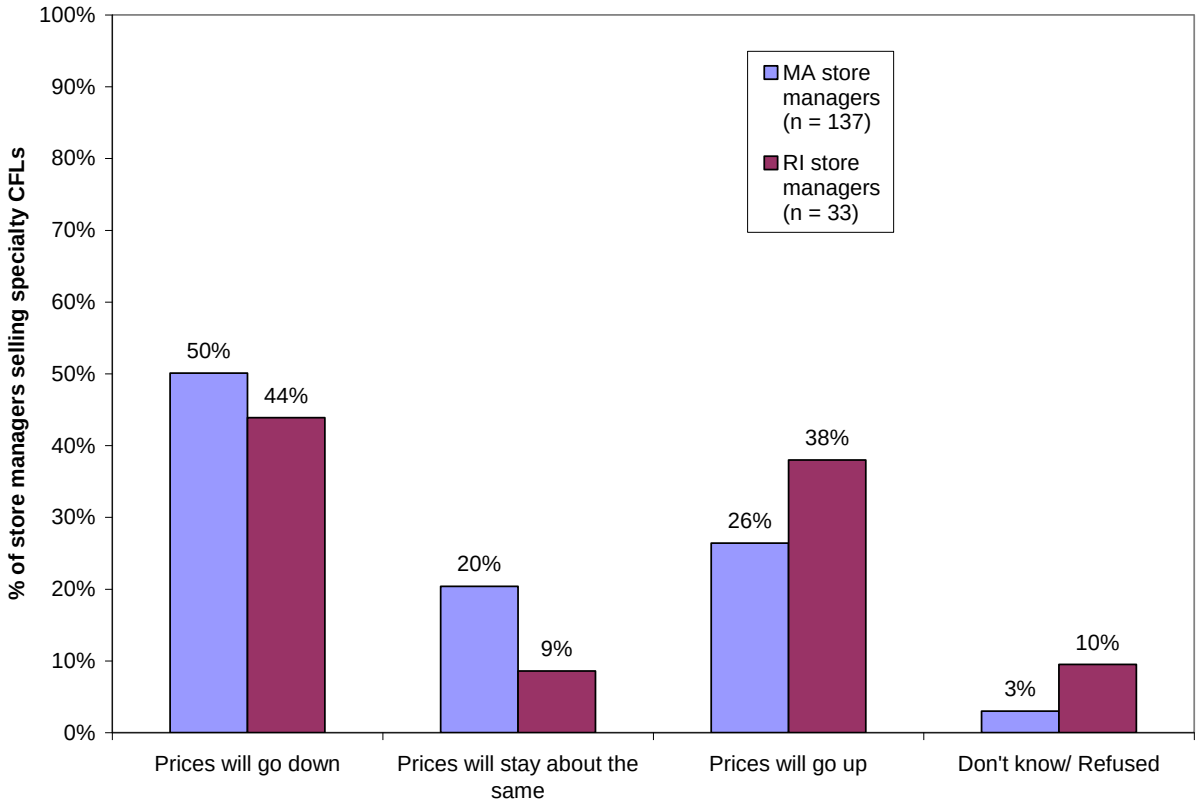
Figure 4-4
Barriers to Sales of Specialty CFLs
According to Massachusetts Store Managers



Note: *Other reasons included not enough need/sockets for them, product quality problems, not enough advertising for them, not enough product variety, consumer dissatisfaction with the light color, fear of mercury contamination among many others. The total exceeds 100% because respondents were allowed to provide multiple responses.

Although the Massachusetts and Rhode Island store managers cited high specialty CFL prices as the biggest barriers to their sale, many held out hope that prices for specialty CFLs will be going down shortly. We asked them: “Do you think retail prices for specialty CFLs over the next few years will go up, go down, or stay about the same?” The most common response was that prices would go down (Figure 4-5) although the Massachusetts store managers seemed more confident about this than their Rhode Island counterparts.

Figure 4-5
Specialty CFLs Price Trends Over the Next Few Years
According to Store Managers
Massachusetts vs. Rhode Island



4.2 Assessing Program Efforts to Mitigate Specialty CFL Barriers

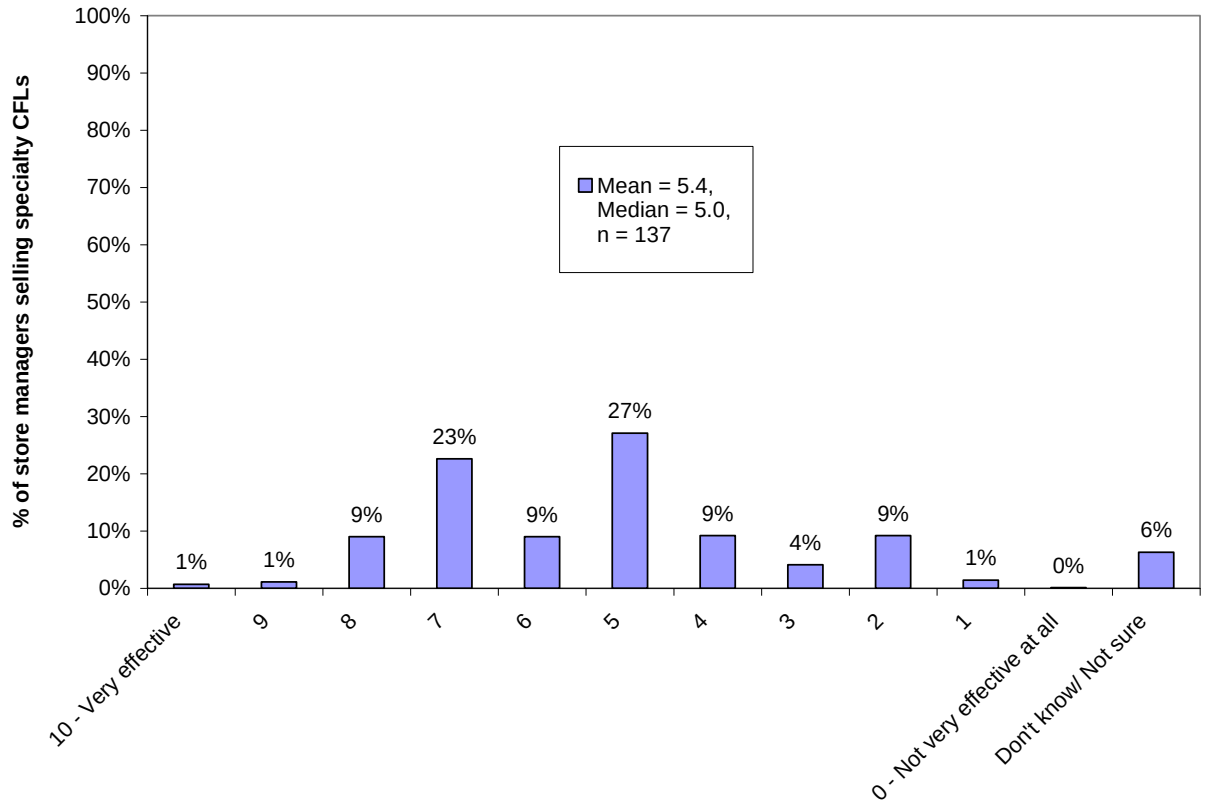
This section summarizes what the lighting market actors thought about the efforts of the ENERGY STAR lighting program to promote specialty CFLs, whether they thought the program incentive levels for specialty CFLs were adequate, and what they think the program should do to help encourage sales of specialty CFLs.

4.2.1 Program Promotional Efforts

We asked the Massachusetts store managers who sold specialty CFLs to rate the effectiveness of the Massachusetts ENERGY STAR lighting program in promoting specialty CFLs in recent years. We told them to use a scale of 0 to 10 where 10 meant “very effective” and 0 meant “not

very effective at all." They give the program a very middling rating with a mean rating of 5.4 and a median rating of 5.0. Figure 4-6 shows the full range of responses.

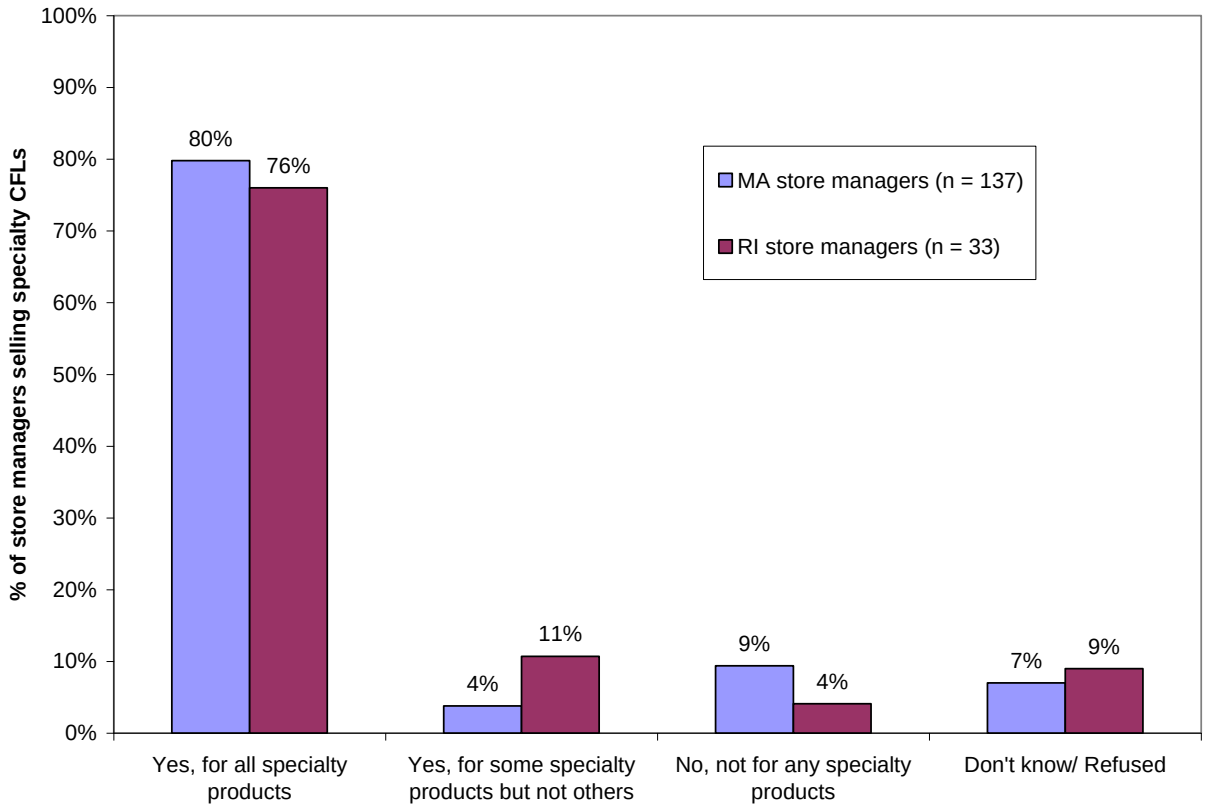
Figure 4-6
The Effectiveness of the MA ENERGY STAR Lighting Program in Promoting Specialty CFLs According to Massachusetts Store Managers



4.2.2 Program Incentive Levels

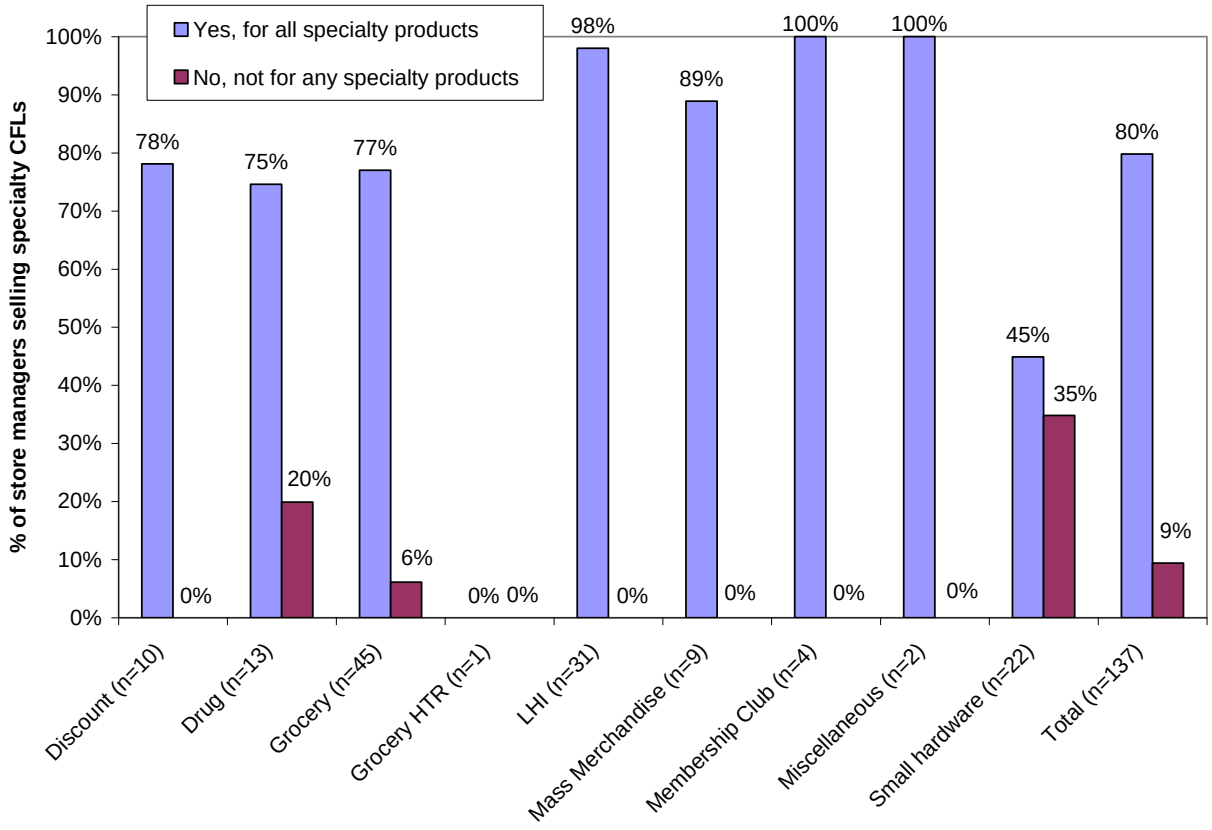
To assess the adequacy of program incentive levels for specialty CFLs, we told the Massachusetts and Rhode Island store managers what the average incentive levels offered by the program were and then asked them whether they thought these were adequate to move consumer demand for these products. The large majority of the store managers from both states thought the incentives were adequate (Figure 4-7). This response is somewhat surprising considering that these same store managers thought that the biggest barrier to greater specialty CFL sales was high prices. One possible explanation is that the store managers were referring to specialty CFL prices when the program discounts were not available.

Figure 4-7
The Adequacy of Program Incentive Levels for Specialty CFLs According to Store Managers Massachusetts vs. Rhode Island



It should also be noted that store managers in the Small Hardware and Drug retail lighting channels were less happy with the specialty CFL incentive levels than others. Figure 4-8 breaks down the two most common responses of the Massachusetts store managers in Figure 4-7 by retail channel.

Figure 4-8
The Adequacy of Program Incentive Levels for Specialty CFLs According to Store Managers by MA Retail Channel



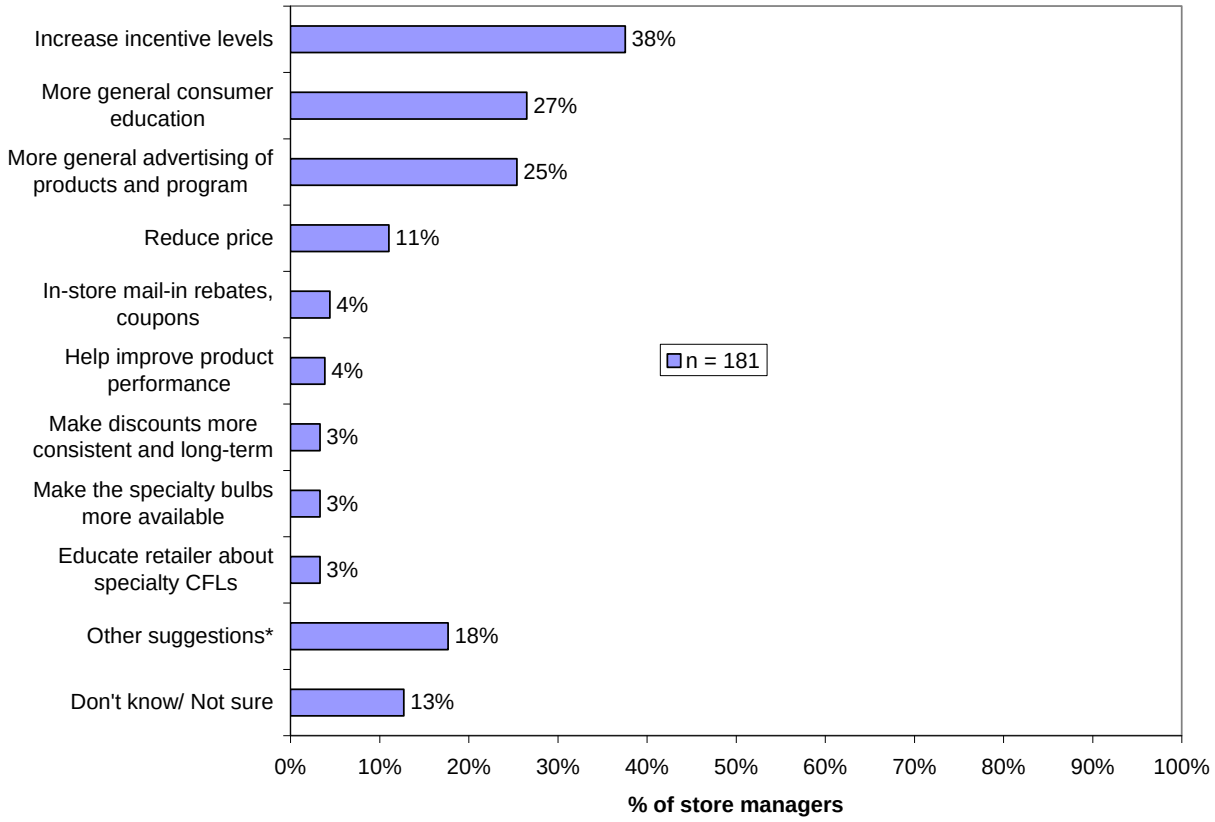
Note: The percentages for a given retail channel will usually not add up to 100% due to the "Yes, for some specialty products but not others" and "Don't know" responses not being shown.

4.3 Recommendations for Increasing Specialty CFL Sales

We asked all the Massachusetts and Rhode Island store managers we surveyed – whether they sold specialty CFLs or not – about the best ways that the program administrators could increase sales of specialty CFLs over the next few years. Figure 4-9 shows that the most-cited recommendations from the Massachusetts store managers included increasing the incentive levels, providing more consumer education about specialty CFLs, and providing more general advertising of the specialty CFLs and the ENERGY STAR program.

In terms of consumer education they recommended more information on how much energy the bulbs could save, on how the longer life of the bulbs means you don't have to change them as often, how the bulbs benefit the environment, and how to properly dispose of the bulbs. They recommended a wide variety of advertising methods including store circulars, television, radio, newspapers, and Internet.

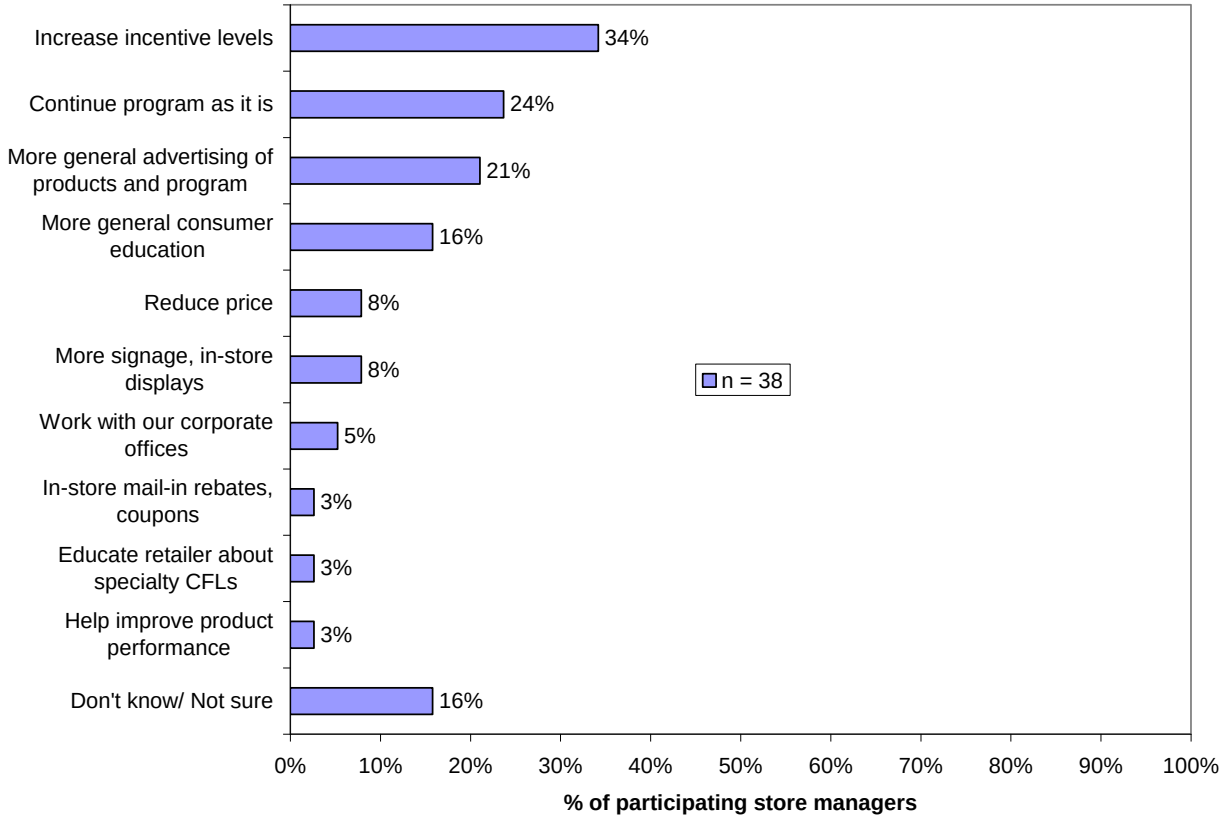
Figure 4-9
Recommendations from Massachusetts Store Managers on How Program Administrators Could Increase Specialty CFL Sales



Note: *Other suggestions included targeting the program in hard-to-reach areas (low income, rural), doing more promotions in Home Depot or Lowe's (some argued that this is where most people look for specialty CFLs), give customers free samples of specialty CFLs, make the specialty CFLs available in multipacks, increase product variety, and many others. The total exceeds 100% because respondents were allowed to provide multiple responses.

Figure 4-10 shows the recommendations for increasing specialty CFLs from the Rhode Island store managers. The top recommendations of the Rhode Island store managers were very similar to those of the Massachusetts store managers. The one exception was that a quarter of the Rhode Island store managers thought that the program should continue as it is.

Figure 4-10
Recommendations from Rhode Island Store Managers
on How Program Administrators
Could Increase Specialty CFL Sales



Note: The total exceeds 100% because respondents were allowed to provide multiple responses.

5. Program Attribution of CFL Sales

This section discusses the findings from the lighting supplier/retailer interview guides and surveys concerning program attribution (net-to-gross (NTG) ratio estimates) for CFLs.

5.1 Scope

We estimated NTG ratios for standard CFLs and specialty CFLs. In the surveys we defined standard CFLs as “bulbs such as basic spirals or mini-spirals that are not covered and do not have any special features such as dimmability or three-way capability.” We defined specialty CFLs as bulbs “such as dimmable, 3-way, or reflector CFLs.”

This report does not estimate NTG ratios for CFL fixtures or LED fixtures. In the development of the interview guides and surveys there was mutual decision by evaluators and the PAs and their consultants to remove the CFL fixture questions due to the length of the guides/surveys and concerns about respondent fatigue. CFL fixtures accounted for less than three percent of program unit sales during the 2009-June 2010 program period. Sales of LED fixtures through the program were virtually nonexistent. According to the 2009-June 2010 tracking data there were only 107 units of LED fixtures sold in Massachusetts out of total products sales during this period of over 4.5 million.

5.2 Methodology

This section describes our approach for calculating and weighting the NTG ratios.

5.2.1 Calculating the NTG Ratios

To estimate NTG ratios for standard and specialty CFLs, we asked manufacturers, high-level retail buyers, and store managers a series of questions about what CFL sales would have been in the absence of the program. Table 5-1 shows the main NTG questions from the store manager survey. The questions in the interview guides for lighting manufacturers and high-level retail buyers were similar.

Table 5-1
CFL NTG Questions from Store Manager Survey

A3. During the 2009-2010 period the [STATE] ENERGY STAR program provided average buy down discounts of [DISCOUNT AMOUNT] for every standard CFL bulb sold through the program. If these discounts had not been available, do you think your store(s) would have sold any such standard CFLs in the 2009-2010 period?
A4. If these average buy down discounts offered by the program of [DISCOUNT AMOUNT] per standard CFL bulb were not available, do you think your sales of these CFL bulbs would be about the same, lower, or higher?
A5. By what percentage do you estimate your store's sales of these standard CFLs would be lower during this 2009-2010 period if > the [STATE] ENERGY STAR program discounts averaging [DISCOUNT AMOUNT] per standard CFL bulb were not available?
A6. I want to make sure I understand you correctly when you say your store's sales of standard CFLs would be [%FROM QUESTION A5] lower without the program buy down discounts. So you're saying that if you sold 100 CFLs in a given week with the program discounts, you would have only sold [100 - (%FROM QUESTION A5 * 100)] that week without the program discounts. Is this correct?

If respondents said “No” to question A3 – e.g., they would not have selling standard CFLs in the absence of the program – then we assumed that their NTG ratio was 100% and therefore skipped them past questions A4-A6. If the response to question A4 was that their sales would have been *higher* without the program, we asked them follow-up questions similar to A5-A6 (e.g. question A7B was equivalent to A5) only this time probing about the size of the increased sales absent the program. None of the lighting manufacturers or high-level retail buyers said that their CFL sales would be higher in the absence of the program. Four of the 181 Massachusetts store managers (2%) did say that their sales would have increased absent the program but none of the 38 Rhode Island store managers said this.

If a given market actor sold both standard CFLs and specialty CFLs through the program, then we asked this battery of NTG questions separately for standard CFLs and specialty CFLs. Because most lighting manufacturers sold program CFLs through multiple retail channels, we asked these NTG questions separately for each retail channel they participated in.

Table 5-2
Assignment of Store Manager NTG Ratios
Depending on Responses to NTG Questions

o If A3 = "No" then NTG ratio = 100% o If A3 = "Yes" and A4 = "Same" then NTG ratio = 0% o If A3 = "Yes" and A4 = "Lower" then NTG ratio = % from A5 o If A3 = "Yes" and A4 = "Higher" than NTG ratio = -% from A7B o If A3 = "Don't know" respondents were still asked A4 but if they said "Don't know" to either A4 or A5 they were marked as not being able to provide a NTG ratio

5.2.2 Weighting the NTG Ratios

To weight the NTG ratios provided by individual respondents up to a retail channel level or a program-wide level, we considered a variety of approaches. One approach is to simply use the quantity of bulbs that the market actor sold through the program as a weight for their NTG ratio estimate. The advantage of this approach is that this quantity of bulbs is known from the program tracking data.

The disadvantage of this approach is that it does not account for the fact that many retailers sell both program and non-program CFLs. Many retailers classify their bulb sales into two groups: 1) “promotional” and 2) “mainline.” The promotional bulbs are those they sell through the ENERGY STAR lighting programs. Because of their discounted prices and more prominent placement and signage, manufacturers and retailers generally report that the promotional bulbs sell more quickly than the mainline bulbs. Yet the ENERGY STAR lighting programs are not available year round and when they are not, these stores sell a certain quantity of mainline bulbs. Even though these bulbs are more expensive, some customers may need a CFL because they do not have any storage and cannot wait for the next promotion. When question A4 is asking about the decline of sales of standard CFLs absent the discounts, it is reasonable to assume that the respondent is talking about how their total CFL sales (both program and non-program bulbs) would decline absent the program discounts.

In theory weighting NTG ratios by total CFLs sales rather than total program sales may lead to lower NTG ratios. The reason for this is that one can assume that there will be some similarity between the proportion of a market actor’s total CFL sales that are currently sold through the program and their estimate of the percentage decline in the sales in absence of the program. Therefore the market actors that will estimate the largest declines in sales absent the program will also likely be the ones that will have the high proportion of their total CFL sales through the program. However, as the NTG ratio estimates from this evaluation show, weighting based on

total sales do not necessarily produce lower NTG ratios. The reasons for this are discussed later in this section.

It is important to point out that while these proportions – the proportion of a market actor's total CFL sales that are currently sold through the program and their estimate of the percentage decline in the sales in absence of the program – are likely to be similar, it does not necessarily follow that they are the same. The reason for this is that if the discount lighting program went away, while these manufacturers and retailers would lose their program sales, they would gain back a certain quantity of sales (many of the customers who had purchased program CFLs would still need to purchase CFLs). The exception to this would be retailers who only sell CFLs when the program is available. In these cases both their proportions would be 100%.

The complexities of the interaction of the program and non-program bulbs are another reason why the proportions of a market actor's total CFL sales that are currently sold through the program and their estimates of the percentage decline in the sales in absence of the program would not necessarily be the same. The in-depth interviews with lighting manufacturers and high-level retailers we conducted for this evaluation, as well as similar interviews we conducted in past years for other programs, have shed light on these complexities. Some of these market actors believe that program CFL sales can help sales of non-program CFLs sales. They hypothesize that bargain prices can lead shoppers to the lighting section where they can see non-program CFLs are also available for some of the less common fixtures or sockets in their homes.[15] Others believe that because program bulbs have much lower prices they can "cannibalize" the sales of mainline bulbs. One variable seems to be the similarity between the program and non-program bulbs. If these are very similar then more cannibalization is likely, if they are less similar than cannibalization is reduced.

The following hypothetical example shows the difference between using total sales weights vs. program sales weights on calculating NTG ratios. Table 5-3 shows that Retailer A and B both sold the same total volume of CFL sales in Massachusetts and Rhode Island, yet Retailer A sold two thirds of his/her CFLs through the program while Retailer B only sold a third of his/her

[15] Our interviews with manufacturers over the years have revealed that, left to their own devices, most would choose their more popular SKUs of CFLs for program participation. These are usually basic spiral CFLs of common wattages – e.g. replacements for 40 or 60 Watt incandescents. Some do this because ENERGY STAR qualification can be expensive and they want to insure that this qualification expense is paid back via a higher bulb sales volume. Of course, the managers of lighting discount programs can curb these strategies by prescribing certain product mixes, as Massachusetts did in 2010 with its emphasis on specialty CFLs.

CFLs through the program. Because of this difference, when program sales weights are used Retailer A's larger estimate of sales decline has a bigger weight in the overall NTG ratio.

Table 5-3
Hypothetical Example
of Difference on NTG Ratio Estimates
of Using Program Sales vs. Total Sales Weights

Market Actor	CFL Bulb Sales Through Program	CFL Bulb Sales Outside Program	Total MA/RI CFL Bulb Sales	Estimated Decline in Sales Absent Program	Sales Disappearing Absent Program
Retailer A	80,000	40,000	120,000	60%	72,000
Retailer B	40,000	80,000	120,000	25%	30,000
Total	**120,000**	**120,000**	**240,000**		**102,000**
NTG ratio using program sales weights				**48%**	
NTG ratio using total sales weights				**43%**	

The example also shows how NTG ratio estimates (in this example called "Estimated Decline in Sales Absent Program") can appear very different even though they are telling similar stories. Retailer A is essentially saying that if the program went away he/she would lose 80,000 in program sales and gain back 8,000 of these (120,000 – 72,000 = 48,000). Retailer B is saying that the absence of the program would lead to a loss of 40,000 in program sales and a recovery of 10,000 (120,000 – 30,000 = 90,000).

This point deserves reemphasis. Reviewers of the supply-side self-report NTG method sometimes make the mistake of interpreting very different estimates of sales decline (the 60% and the 25% in the previous example) within the same retail channel as evidence of inconsistent estimates and therefore less reliable results. Yet these differences are often simply due to differences in how important the discount programs are to the manufacturer's or retailer's overall sales strategy. Some manufacturers and retailers only or mostly sell CFLs in a given state when the program is available. Therefore their estimates of the decline in sales absent the program will be larger than manufacturers and retailers who sell both promotional and mainline CFLs.

The main challenge of using total sales weights is coming up with an estimate of total sales for individual manufacturers and retailers. While we had access to data on CFL sales through the program, we did not have access to data for non-program sales.

To try to overcome this barrier, we asked the manufacturers and retailers to estimate what proportion of their 2009-2010 Massachusetts and Rhode Island CFLs were sold through the program vs. outside the program.[16] Since we knew what their CFL sales were through the program, we could use this proportion to extrapolate their total sales. Fortunately all the lighting manufacturers and high-level buyers provided estimates of the proportion of their standard CFLs that were sold through the program and most provided these proportions for their specialty CFL sales also.

One way to test whether this market sizing approach is reasonable is to see whether the market size estimates of market actors at different levels of the supply align. For example, the estimates of the 2009-2010 Massachusetts market size for standard CFLs in the Membership Club channels should be similar for manufacturers, retail buyers, and store managers – assuming that these market actors each represent a reasonably large proportion of state CFL sales.

We believe that a necessary first screener for such a comparison is the proportion of program sales represented by the market size estimators. It is reasonable to assume that market actors that are big players in the ENERGY STAR lighting program are also big players in the state lighting market as a whole. For example, all of the Big Three lighting manufacturers – General Electric, Philips, and Sylvania – are participating in the ENERGY STAR lighting program, and these manufacturers are also well known to be major producers of "mainline' (non-program) bulbs. A corollary to this assumption is that estimates of state market size for a given channel will be less reliable if they are extrapolated from market actors whose sales represent only a small proportion of program sales.

Therefore we pulled out cases where a group of market actors accounted for the majority (more than 50%) of program sales and then compared their estimates of market sizes to those of other market actors (who also met these screening criteria) in the same market channel. Table 5-4 shows the results. In five out of the six cases the market size estimates are reasonably close, which lends credence to this market sizing methodology.

[16] The store manager survey question was "P3. Roughly what percent of the standard CFLs that your store sold during the 2009-2010 period were discounted by the ENERGY STAR lighting program and what percent were not?" The manufacturer and high-level buyer interview guide asked respondents to estimate the size of three slices of a pie representing 2009-2010 MA/RI standard CFLs sales (a similar question was asked separately for specialty CFLs). The first slice was program CFL sales, the second slice was non-program sales of ENERGY STAR CFLs and the third slice was non-program sales of non-Energy-Star CFLs (some respondents were only asked about two slices because they did not sell non-ENERGY STAR CFLs).

Table 5-4
Comparing CFL Market Size Estimates for Massachusetts
in Cases Where At Least Two Market Actor Categories in a Given Channel
Accounted for > 50% of Program Sales

Channel - CFL Type	Market Actor Category (% of program sales represented by estimators)	Estimate of 2009-2010 Massachusetts Market Size (# of bulbs)
Discount - Specialty CFLs	Manufacturers (65%)	85,227
	Buyers (64%)	101,055
LHI - Specialty CFLs	Manufacturers (95%)	741,007
	Buyers (100%)	526,037
	Store managers (55%)	620,567
Membership Club - Standard CFLs	Manufacturers (97%)	1,390,979
	Buyers (100%)	1,510,522
Membership Club - Specialty CFLs	Manufacturers (92%)	510,912
	Buyers (100%)	410,376
Small Hardware - Standard CFLs	Manufacturers (74%)	363,616
	Buyers (56%)	1,045,340
Miscellaneous Light Vendors - Specialty CFLs	Manufacturers (72%)	26,150
	Buyers (78%)	28,499

However, there are also some limitations to this total sales weighting methodology. While almost all the lighting manufacturers and retail buyers we interviewed were willing to estimate what proportion of their state CFL sales were program vs. non-program CFLs, 66 of the 181 (37%) of the surveyed Massachusetts store managers did not provide these estimates. Another limitation of the proportion information is that while we asked manufacturers what proportion of their 2009-2010 Massachusetts/Rhode Island CFL sales were sold through the program, we did not (due to respondent fatigue concerns) ask for these proportions separately for each retail channel they served. So if a given manufacturer sold a much higher proportion of their CFLs through the program in one retail channel vs. another one, we did not have the information to disaggregate this.

Due to these limitations and concerns, as well as our desire to show the complete set of NTG estimates (e.g., including NTG estimates from store managers who did not estimate what proportion of their CFL sales were through the program), we have chosen in this report to present the NTG ratio estimates for each retail channel twice. The first table will show NTG ratio

estimates based on program sales weights and the second table will show NTG ratio estimates based on estimated total sales weights.

5.2.3 Threats to Validity: Assessing Market Actor Biases and Other Limitations

Like all NTG estimation methodologies, the supplier self-report NTG methodology has its limitations. Some of these limitations concern possible biases that the lighting market actors may have. These biases might cause them to provide NTG ratio estimates that are higher or lower than what they truly think the program deserves in terms of attribution. Other limitations concern gaps in market knowledge that certain market actors may have.[17]

Two types of potential bias that may affect the supplier self-report NTG methodology include:

- *The gaming or "don't kill the golden goose" bias:* This potential bias occurs when market actors purposely exaggerate how much their lighting product sales would drop in the absence of the program. Their motivations for doing this would be to insure that they continue receiving the program discounts/rebates.

- *The green retailer bias:* This potential bias, which was described in California's 2008 DEER update study, occurs when market actors underestimate how much their sales would drop in the absence of the program. Their motivations for doing so might be because they have exaggerated confidence in their company's ability to market environmentally-friendly products. This bias might be considered a variation of the "social desirability bias" well known in program evaluation literature.

In theory the gaming bias and the green retailer bias work in opposite directions – with the gaming bias tending to overestimate program attribution and the green retailer bias tending to underestimate it. However, it is not clear what the relative strengths of these biases are and to what degree they offset each other.

In the Massachusetts and Rhode Island programs the market actors with the strongest motives to engage in the gaming bias are those that receive the most direct benefits of the program

[17] This discussion of threats to the validity of the supplier self report method is adopted from one we wrote for the California Public Utilities Commission for our evaluation of their 2006-2008 Upstream Lighting Program.

discounts. For program CFLs that receive buydown discounts this would be the manufacturer and for program CFLs that receive markdown discounts this would be the retailer.

Of course the gaming bias depends on the market actor knowing what the "game" is – e.g., that overestimating the decline of sales of lighting product X in the absence of the program will increase the chance that product X continues to receive program rebates/discounts. Since nearly all the lighting manufacturers and high-level retail buyers whom we interviewed are participating in multiple lighting rebate/discount programs across the country, we are pretty sure that they are sophisticated enough to know what the "game" is, even if they may not choose to play it. We believe that most store managers, however, do not know what the "game" is.

By definition, retailers would be the market actors most likely to engage in the green retailer bias. Of the two types of retailer representatives that we interviewed for this evaluation – retail buyers and retail store managers – we would theorize that the retail buyers would be most likely to engage in the green retailer bias. One reason for this is that retail buyers would likely be more knowledgeable of corporate environmental campaigns than store managers, even if they both worked for the same company. Some store managers also may represent independent stores or small chains that do not have corporate green policies.

Another threat to validity is the consideration that some market actors simply lack the broader market knowledge to competently assess what would happen to product sales in the absence of the rebate. We believe that lighting manufacturers have the greatest potential to accurately predict what would happen to their sales in the absence of a lighting discount program. We explained our reasons for believing this in our evaluation of the California Upstream Lighting Program:

> *This is because for [manufacturers] this is not an academic exercise, they have good practical reasons for making such predictions accurately. Every year, and in some cases multiple times per year, lighting manufacturers submit proposals to the Upstream Lighting Program managers indicating how many CFL products they think they can sell of what product type and through which retail channels. If they overestimate the sales effects of these rebates, they must deal with unhappy retail partners and Upstream Lighting Program managers. Retailers in general do not like allocating limited store space to products that do not sell and overstocks can be particularly burdensome for smaller retailers, as the evaluation of the 2004-2005 Upstream Lighting Program indicated. Upstream Lighting Program managers dislike overstocks because it*

increases the chances that store managers might ship their excess CFLs outside the program, resulting in CFL "leakage."[18]

Since the Massachusetts and Rhode Island ENERGY STAR lighting programs are similar in design to the California Upstream Lighting Program, we think that this would still hold true for these programs. Of course, just because lighting manufacturers are best qualified to accurately predict what their CFL sales would do in the absence of the program does not mean they will do so (see discussion of the gaming bias above).

Our California evaluation provided a good example of how a lack of broader market knowledge can threaten the validity of NTG estimates:

In the in-depth interviews a number of manufacturers provided estimates of their costs for producing a typical ENERGY STAR CFL and none of these estimates were less than $1.20 per bulb. Since many discount stores operate with $1 or 99 cent price caps it is likely that these stores would not be able to sell ENERGY STAR CFLs without the manufacturer buydowns. All the manufacturers who supplied these $1/99 cent stores confirmed this was the case. Retail buyers with two largest chains of $1/99 cent stores also said that they would not be able to sell ENERGY STAR CFLs without the Upstream Lighting Program incentives and that they stop selling them when the Upstream Lighting Program rebates run out. And yet when we interviewed store managers with some of these $1/99 cent stores, they estimated that their sales of basic ENERGY STAR CFLs would only go down 60% to 86% if the Upstream Lighting Program discounts went away. Because of limited market knowledge they did not know what the manufacturers and retail buyers knew – that is, if these Upstream Lighting Program incentives disappeared they would no longer receive shipments of these products.[19]

As discussed below, our evaluation of the Massachusetts and Rhode Island lighting programs encountered a similar phenomenon. For the CFL supply stream that went to stores with a $1 price limit, both the lighting manufacturer and the high-level retail buyer for this stream said that CFL sales would have gone away without the program discounts. Yet a few of the store

[18] See *Final Evaluation Report: Upstream Lighting Program*, Prepared by: KEMA, Inc. Prime Contractor: The Cadmus Group, Inc. Supported by: The Cadmus Group, Inc., Itron, Inc., PA Consulting Group, Jai J. Mitchell Analytics, Prepared for: California Public Utilities Commission, Energy Division February 8, 2010, p. 25.

[19] Ibid, p. 25.

managers thought that some of their CFL sales would have continued in the absence of these discounts.

5.3 Net-to-Gross Ratio Estimates by Retail Channel

This subsection shows our calculations for the NTG ratios for standard and specialty CFLs. We present the ratios and discuss the results for each retail lighting channel separately.

5.3.1 The Discount/HTR Lighting Channel

As discussed previously, the ENERGY STAR lighting programs in Massachusetts and Rhode Island have encouraged CFL sales in HTR lighting markets through discount and ethnic grocery stores. One of the objectives of this evaluation was to come up with a separate NTG ratio estimate for this Discount/HTR lighting channel.

5.3.1.1 Standard CFL NTG Ratio Estimates—Massachusetts

The vast majority (97%) of the Massachusetts program sales of standard CFLs through this Discount/HTR lighting channel came through Discount stores with the remaining 3% coming through HTR Grocery stores. Table 5-5 shows the NTG ratio estimates for the Discount/HTR lighting channel using program sales weights. We disaggregated the sales data so that in each case where we had a retail-level NTG ratio estimate – whether it came from a high-level buyer representing a chain of stores or a store manager representing a single store – we represented it as a separate row in the table. If we obtained no retail-level NTG ratio estimates – as was the case with “Other HTR Grocery Retailers” – then we aggregated the retailers to a single row. The store manager NTG estimates in a given row represents the sale-weighted NTG ratio estimate for all the store managers in that row that provided estimates. The table shows that we were able to obtain manufacturer NTG ratio estimates from both manufacturers that supplied this retail lighting channel, two of the high-level buyers (representing 50% of program sales) and fourteen store managers (representing 32% of program sales).

Table 5-5
Standard CFL NTG Ratio Estimates
for the Massachusetts Discount/HTR Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manager Estimators
Manufact. 1	Discount Retailer 1	67,680	50%	None	91%	22,680	4
Manufact. 1	Discount Retailer 2	61,848	50%	None	100%	61,848	1
Manufact. 1	Discount Retailer 3	16,848	50%	None	None	None	None
Manufact. 2	Discount Retailer 4	91,200	93%	30%	15%	5,600	2
Manufact. 2	Discount Retailer 5	64,300	100%	100%	60%	8,400	6
Manufact. 2	Other HTR Grocery Retailers	4,000	93%	None	None	None	None
Manufact. 2	HTR Grocery Retailer 1	4,000	93%	None	50%	2,000	1
Total bulb quantity for channel/estimators		**309,876**	**309,876**	**155,500**		**100,528**	
% of channel accounted for by NTG estimators			**100%**	**50%**		**32%**	
Number of unique NTG estimators			**2**	**2**			**14**
Sales-weighted NTG ratios by market actor			**74%**	**59%**	**89%**		
Overall NTG ratio for retail channel		**72%**					

Discount Retailer 5 was a retailer with a dollar price limit and therefore its supplier, its high-level retail buyer, and four of its six store managers thought that no CFL sales would have occurred without the program discounts. The sales-weighted NTG ratio for store managers for this retailer was only 60% because one store manager thought standard CFLs sales would actually increase in the absence of the program and another thought that sales would be unchanged absent the program. One limitation of the store manager NTG ratio estimates, as we discuss elsewhere in this report, is that they may not have information on their CFL wholesale costs (and therefore may not realize that ENERGY STAR CFLs could not be supplied to them at less than a $1 retail cost without the program discounts).

Table 5-6 shows the NTG ratio estimates for the Massachusetts Discount/HTR lighting channel this time using total sales weights. The overall NTG ratio decreased from 72% to 69% using this alternative methodology.

Table 5-6
Standard CFL NTG Ratio Estimates
for the Massachusetts Discount/HTR Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufact. 1	Discount Retailer 1	71,242	50%		None	22,680	91%
Manufact. 1	Discount Retailer 2	65,103	50%		None	61,848	100%
Manufact. 1	Discount Retailer 3	17,735	50%		None	None	None
Manufact. 2	Discount Retailer 4	96,000	93%	130,286	30%	5,911	16%
Manufact. 2	Discount Retailer 5	67,684	100%	64,300	100%	10,900	17%
Manufact. 2	Other HTR Grocery Retailers	4,211	93%		None	None	None
Manufact. 2	HTR Grocery Retailer 1	4,211	93%		None	2,000	50%
Total bulb quantity for estimators		**326,185**		**194,586**		**103,339**	
Number of unique NTG estimators			**2**		**2**		**13**
Sales-weighted NTG ratios by market actor			**74%**		**53%**		**83%**
Overall NTG ratio for retail channel		**69%**					

5.3.1.2 Standard CFL NTG Ratio Estimates—Rhode Island

The standard CFL NTG ratio estimates for Rhode Island's Discount lighting channel appear in Table 5-7 and Table 5-8. While the Massachusetts tables included not only discount stores but also HTR grocery stores, the Rhode Island program did not have any participating grocery stores that the PAs considered to be HTR. In the case of the Manufacturer 2 – Discount Retailer 5 stream – all three market actor groups gave the program full credit for their CFL sales. In the other stream, the retail buyers and store managers gave the program much less attribution for sales than the manufacturers did. As noted, Discount Retailer 5 sells all items for a dollar or less while Discount Retailer 4 does not have a dollar price limit.

Table 5-7
Standard CFL NTG Ratio Estimates
for the Rhode Island Discount/HTR Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 2	Discount Retailer 4	59,000	93%	30%	40%	22,700	5
Manufacturer 2	Discount Retailer 5	16,800	100%	100%	100%	8,400	4
Total bulb quantity for channel/estimators		**75,800**	**75,800**	**75,800**		**31,100**	
% of channel accounted for by NTG estimators			**100%**	**100%**		**41%**	
Number of unique NTG estimators			**1**	**2**			**9**
Sales-weighted NTG ratios by market actor			**94%**	**46%**	**56%**		
Overall NTG ratio for retail channel		**68%**					

Table 5-8
Standard CFL NTG Ratio Estimates
for the Rhode Island Discount/HTR Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 2	Discount Retailer 4	62,105	93%	84,286	40%	37,833	40%
Manufacturer 2	Discount Retailer 5	17,684	100%	16,800	100%	6,300	100%
Total bulb quantity for channel/estimators		**79,789**		**101,086**		**44,133**	
Number of unique NTG estimators			**1**		**2**		**8**
Sales-weighted NTG ratios by market actor			**94%**		**50%**		**49%**
Overall NTG ratio for retail channel		**65%**					

5.3.1.3 Specialty CFL NTG Ratio Estimates

Table 5-9 and Table 5-10 show the NTG ratios estimates for specialty CFLs for the Massachusetts Discount lighting channel. The channel-wide NTG ratio estimates for the specialty CFLs – 75% or 79% depending on the weighting methodology – are slightly higher than those for the standard CFLs (69% or 72%). The Rhode Island program did not sell any specialty CFLs through the Discount lighting channel.

Table 5-9
Specialty CFL NTG Ratio Estimates
for the Massachusetts Discount/HTR Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 2	Discount Retailer 4	51,200	98%	40%	15%	4,400	2
Manufacturer 2	Manufacturer 2 Discounters	29,820	None	None	None		
Manufacturer 2	Discount Retailer 5	27,912	100%	100%	49%	4,728	6
Manufacturer 2	Discount Retailer 2	6,960	None	None	100%	6,960	1
Manufacturer 2	Discount Retailer 6	6,260	None	None	100%	6,260	1
Manufacturer 1	Discount Retailer 2	1,854	50%	None	100%	1,854	1
Total bulb quantity for channel/estimators		**124,006**	**80,966**	**79,112**		**24,202**	
% of channel accounted for by NTG estimators			**65%**	**64%**		**20%**	
Number of unique NTG estimators			**2**	**2**			**10**
Sales-weighted NTG ratios by market actor			**97%**	**61%**	**75%**		
Overall NTG ratio for retail channel		**79%**					

Table 5-10
Specialty CFL NTG Ratio Estimates
for the Massachusetts Discount/HTR Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 2	Discount Retailer 4	53,895	98%	73,143	40%	4,400	15%
Manufacturer 2	Manufacturer 2 Discounters		None		None		None
Manufacturer 2	Discount Retailer 5	29,381	100%	27,912	100%	4,728	49%
Manufacturer 2	Discount Retailer 2		None		None	6,960	100%
Manufacturer 2	Discount Retailer 6		None		None	6,260	100%
Manufacturer 1	Discount Retailer 2	1,952	50%		None	1,854	100%
Total bulb quantity for channel/estimators		**85,227**		**101,055**		**24,202**	
Number of unique NTG estimators			**2**		**2**		**10**
Sales-weighted NTG ratios by market actor			**97%**		**57%**		**75%**
Overall NTG ratio for retail channel		**75%**					

5.3.2 The Drug Lighting Channel

Interviews with drugstore retailers and their lighting suppliers indicate that this channel will never represent a large share of program sales. One reason for this is that most drugstores only allocate a small amount of shelf space to lighting products. Another reason is that these lighting market actors regard drugstores, along with grocery stores, as places where consumers may

occasionally buy lighting products on “impulse” – e.g., they notice them on sale – but not as “destination stores” for the purpose of fulfilling their lighting needs. Therefore while the Drug lighting channel accounted for a high percentage of the stores participating in the program, its cumulative volume of sales was a much smaller percentage of total program sales.

5.3.2.1 Standard CFL NTG Ratio Estimates—Massachusetts

Table 5-11 shows the standard CFL NTG ratio estimates for the Massachusetts Drug lighting channel using program sales weights. The table shows that we were able to obtain manufacturer NTG ratio estimates from two of the three manufacturers that supplied the Drug lighting channel (accounting for 77% of program sales) and that their NTG ratio estimates were very similar.

We were also able to obtain NTG ratio estimates from 39 store managers although their cumulative sales only accounted for eight percent of total program sales through the channel. Two of the three drug retailers had store manager NTG ratio estimates that were close to each other with the third (Drug Retailer 1) coming out much higher. The store manager NTG ratio estimates were higher than those from the manufacturers, but because their program sales weights were so small, the overall channel NTG ratio (35%) was in the range of those provided by the manufacturers. We were not able to obtain any NTG ratio estimates from the high-level retail buyers for this channel.

Table 5-11
Standard CFL NTG Ratio Estimates
for the Massachusetts Drug Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity Represented by Store Manager Estimators	Number of Store Manager Estimators
Manufacturer 1	Drug Retailer 1	117,960	30%	None	78%	10,872	14
Manufacturer 3	Drug Retailer 2	45,968	None	None	52%	3,547	13
Manufacturer 4	Drug Retailer 3	37,033	38%	None	51%	1,673	12
Total bulb quantity for channel/estimators		**200,961**	**154,993**			**16,092**	
% of channel accounted for by NTG estimators			**77%**	**0%**		**8%**	
Number of unique NTG estimators			**2**				**39**
Sales-weighted NTG ratios by market actor			**32%**	**None**	**69%**		
Overall NTG ratio for retail channel		**35%**					

Table 5-12 shows the NTG ratio estimates for the Massachusetts Drug lighting channel using total sales weights. The overall NTG ratio actually increased from 35% to 39% using this

weighting approach. The main reason for this was an increase in the store manager NTG ratio estimates for two of the three retailers. This increase was an effect of severe attrition in the number of store manager NTG ratio estimates from the 39 that were used for the program sales weight methodology to the 24 that were used for total sales weights. These 15 estimates were dropped because the store managers were unable or unwilling to estimate what proportion of their total 2009-2010 CFL sales the program sales accounted for. This is one drawback of the total sales weighting approach, as discussed previously.

Table 5-12
Standard CFL NTG Ratio Estimates
for the Massachusetts Drug Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 1	Drug Retailer 1	124,168	30%		None	19,742	94%
Manufacturer 3	Drug Retailer 2		None		None	3,421	40%
Manufacturer 4	Drug Retailer 3	61,722	38%		None	1,056	63%
Total bulb quantity for estimators		**185,890**				**24,219**	
Number of unique NTG estimators			**2**				**24**
Sales-weighted NTG ratios by market actor			**33%**		**None**		**85%**
Overall NTG ratio for retail channel		**39%**					

5.3.2.2 Standard CFL NTG Ratio Estimates—Rhode Island

Table 5-13 and Table 5-14 show the standard CFL NTG ratio estimates for the Rhode Island Drug channel. The channel-wide NTG ratio estimates were similar to those of Massachusetts. As was the case with their Massachusetts counterparts, the Rhode Island store managers with Drug Retailer 1 gave the program much more credit than did the store managers with Drug Retailer 3.

Table 5-13
Standard CFL NTG Ratio Estimates
for the Rhode Island Drug Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 1	Drug Retailer 1	35,496	30%	None	93%	6,696	6
Manufacturer 4	Drug Retailer 3	2,606	38%	None	39%	326	4
Total bulb quantity for channel/estimators		**38,102**	**38,102**			**7,022**	
% of channel accounted for by NTG estimators			**100%**	**0%**		**18%**	
Number of unique NTG estimators			**2**				**10**
Sales-weighted NTG ratios by market actor			**31%**		**90%**		
Overall NTG ratio for retail channel		**40%**					

Table 5-14
Standard CFL NTG Ratio Estimates
for the Rhode Island Drug Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 1	Drug Retailer 1	37,364	30%		None	4,320	97%
Manufacturer 4	Drug Retailer 3	4,343	38%		None	223	57%
Total bulb quantity for estimators		**41,708**				**4,543**	
Number of unique NTG estimators			**2**				**6**
Sales-weighted NTG ratios by market actor			**31%**				**95%**
Overall NTG ratio for retail channel		**37%**					

5.3.2.3 Specialty CFL NTG Ratio Estimates—Massachusetts

The Massachusetts and Rhode Island programs only sold a small volume of specialty CFLs through the Drug channel. As mentioned, drugstores typically have very small lighting sections and drugstore managers said that they preferred to use this limited space for the more popular standard CFLs. Table 5-15 and Table 5-16 show that the Massachusetts NTG ratio estimates for specialty CFLs were very similar to those for the standard CFLs.

Table 5-15
Specialty CFL NTG Ratio Estimates for the Massachusetts Drug Channel Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 4	Drug Retailer 3	2,204	38%	None	0%	98	2
Manufacturer 1	Drug Retailer 3	33	30%	None	None	None	
Total bulb quantity for channel/estimators		**2,237**	**2,237**			**98**	
% of channel accounted for by NTG estimators			**100%**	**0%**		**4%**	
Number of unique NTG estimators			**2**				**2**
Sales-weighted NTG ratios by market actor			**38%**		**0%**		
Overall NTG ratio for retail channel		**36%**					

Table 5-16
Specialty CFL NTG Ratio Estimates for the Massachusetts Drug Channel Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 4	Drug Retailer 3	4,408	38%	None	0	64	0%
Manufacturer 1	Drug Retailer 3	35	30%	None	None	None	
Total bulb quantity for estimators		**4,443**				**64**	
Number of unique NTG estimators			**2**				**1**
Sales-weighted NTG ratios by market actor			**38%**				**0%**
Overall NTG ratio for retail channel		**37%**					

5.3.2.4 Specialty CFL NTG Ratio Estimates—Rhode Island

The specialty CFL NTG ratio estimates provided by the lighting market actors for the Rhode Island Drug channel were very similar to those provided for Massachusetts (Table 5-17 and Table 5-18).

Table 5-17
Specialty CFL NTG Ratio Estimates
for the Rhode Island Drug Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 4	Drug Retailer 3	278	38%	None	35%	184	6
Total bulb quantity for channel/estimators		**278**	**278**			**184**	
% of channel accounted for by NTG estimators			**100%**	**0%**		**66%**	
Number of unique NTG estimators			**1**	**None**			**6**
Sales-weighted NTG ratios by market actor			**38%**	**None**	**35%**		
Overall NTG ratio for retail channel		**37%**					

Table 5-18
Specialty CFL NTG Ratio Estimates
for the Rhode Island Drug Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 4	Drug Retailer 3	463	38%		None	146	44%
Total bulb quantity for estimators		**463**				**146**	
Number of unique NTG estimators			**1**				**5**
Sales-weighted NTG ratios by market actor			**38%**		**None**		**44%**
Overall NTG ratio for retail channel		**39%**					

5.3.3 The Grocery Channel (non-HTR) Lighting Channel

Like the Drug channel, the Grocery channel is not viewed by market actors as a “destination” for lighting purchases but as a place where shoppers will buy light bulbs on impulse or when they are on sale. Also like drugstores, groceries typically do not allocate a lot of shelving space for lighting products. Therefore while many grocery stores participated in the Massachusetts and

Rhode Island ENERGY STAR lighting programs, the average sales per store were relatively low.

5.3.3.1 Standard CFL NTG Ratio Estimates—Massachusetts

Table 5-19 shows the standard CFL NTG ratio estimates for the Massachusetts Grocery (non-HTR) lighting channel using program sales weights. We collected manufacturer NTG ratio estimates from three of the four manufacturers that sold CFLs through the Grocery (non-HTR) lighting channel. Together their standard CFLs accounted for 96% of the program sales through this channel.

This channel provides a good illustration of our earlier point – that differences in NTG ratio estimates reflect differences in the relative importance of the program in a market actor's overall supply commitments. For example, Manufacturer 5, who provided the lowest NTG ratio estimate for this channel (30%), is a large manufacturer that is known for being a big provider of mainline CFL bulbs. When asked what percentage of their 2009-2010 Massachusetts/Rhode Island CFLs were program bulbs, they said 50%, which was a lower percentage than most other manufacturers. Therefore their low NTG ratio reflected the fact that they had large non-program CFL supply commitments that would continue after the program went away. Conversely Manufacturer 6 said that 80% of their 2009-2010 Massachusetts/Rhode Island CFLs were program bulbs. This large dependence on the ENERGY STAR lighting program explains his/her much higher (75%) NTG ratio estimate.

In addition to these manufacturer estimates, we also obtained NTG ratio estimates from 39 store managers who together accounted for 11% of program CFL sales through the Grocery (non-HTR) lighting channel. The store managers with the three largest grocery chains in the program had very similar NTG ratio estimates. Yet since they were being supplied by Manufacturer 5 their NTG ratio estimates were much higher than those of their supplier. We were not able to obtain any NTG ratio estimates from the high-level retail buyers for this channel.

Table 5-19
Standard CFL NTG Ratio Estimates
for the Massachusetts Grocery (non-HTR) Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manager Estimators
Manufacturer 5	Grocery Retailer 1	200,723	30%	None	60%	17,701	3
Manufacturer 5	Grocery Retailer 2	130,236	30%	None	51%	17,139	19
Manufacturer 5	Grocery Retailer 3	42,870	30%	None	57%	6,184	13
Manufacturer 3	Grocery Retailer 4	13,210	None	None	39%	3,051	3
Manufacturer 6	Grocery Retailer 5	4,308	75%	None	35%	176	1
Manufacturer 2	Other Grocery Retailers	3,400	93%	None	None	None	
Manufacturer 6	Grocery Retailer 6	1,694	75%	None	None	None	
Manufacturer 3	Grocery Retailer 7	80	None	None	None	None	
Total bulb quantity for channel/estimators		**396,521**	**381,537**			**44,251**	
% of channel accounted for by NTG estimators			**96%**	**0%**		**11%**	
Number of unique NTG estimators			**3**				**39**
Sales-weighted NTG ratios by market actor			**31%**	**None**	**55%**		
Overall NTG ratio for retail channel		**34%**					

The NTG ratio estimates for the Massachusetts Grocery (non-HTR) lighting channel using total sales weights appear in Table 5-20. The NTG ratio estimate for this channel decreased slightly from 34% to 32% using this weighting approach. As was the case with the Drug lighting channel, applying this methodology led to a large reduction in store manager estimates – from 39 to 20 – due to store managers being unable or unwilling to estimate what proportion of their total 2009-2010 CFL sales the program sales accounted for. In this case, however, the attrition caused only a slight change in the overall store manager ratio estimate (it increased from 55% to 57%).

Table 5-20
Standard CFL NTG Ratio Estimates
for the Massachusetts Grocery (non-HTR) Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 5	Grocery Retailer 1	401,446	30%		None	22,032	58%
Manufacturer 5	Grocery Retailer 2	260,472	30%		None	8,022	66%
Manufacturer 5	Grocery Retailer 3	85,740	30%		None	7,510	53%
Manufacturer 3	Grocery Retailer 4		None		None	2,625	29%
Manufacturer 6	Grocery Retailer 5	5,385	75%		None	293	35%
Manufacturer 2	Other Grocery Retailers	3,579	93%		None		None
Manufacturer 6	Grocery Retailer 6	2,118	75%		None		None
Manufacturer 3	Grocery Retailer 7		None				
Total bulb quantity for estimators		**758,739**				**40,482**	
Number of unique NTG estimators			**3**				**20**
Sales-weighted NTG ratios by market actor			**31%**		**None**		**57%**
Overall NTG ratio for retail channel		**32%**					

5.3.3.2 Standard CFL NTG Ratio Estimates—Rhode Island

The Rhode Island Grocery channel only had a single supply stream and we were not able to obtain NTG ratio estimates from the manufacturer and high-level retail buyer that represented this stream. We were able to obtain estimates from six store managers for the program sales weighting method and two store managers for the total sales weighting method. Although we report these estimates here (Table 5-21 and Table 5-22), we acknowledge that the small sample sizes and lack of market actor diversity makes these channel-wide estimates less reliable than others that appear in the report.

Table 5-21
Standard CFL NTG Ratio Estimates
for the Rhode Island Grocery Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 3	Grocery Retailer 2	19,650	None	None	73%	4,427	6
Total bulb quantity for channel/estimators		**19,650**	**0**			**4,427**	
% of channel accounted for by NTG estimators			**0%**	**0%**		**23%**	
Number of unique NTG estimators			**None**	**None**			**6**
Sales-weighted NTG ratios by market actor			**None**	**None**	**73%**		
Overall NTG ratio for retail channel		**73%**					

Table 5-22
Standard CFL NTG Ratio Estimates
for the Rhode Island Grocery Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
GE	Stop & Shop		None		None	3,318	73%
Total bulb quantity for estimators		**0**	**0**		**0**	**3,318**	
Number of unique NTG estimators			**None**		**None**		**2**
Sales-weighted NTG ratios by market actor			**None**		**None**		**100%**
Overall NTG ratio for retail channel		**100%**					

5.3.4 Specialty CFL NTG Ratio Estimates

As was the case with the drugstores, the limited shelf space for lighting in grocery stores meant that store managers preferred selling the more popular standard CFLs as opposed to the specialty brands. Therefore the Massachusetts program's sales of specialty CFLs through the Grocery channel were relatively small. The Rhode Island program did not sell any specialty CFLs through the Grocery channel during the 2009-June 2010 period. Table 5-23 and Table 5-24 show that the Massachusetts NTG ratios estimates for specialty CFLs from both lighting manufacturers and store managers were much higher than they were for the standard CFLs.

Table 5-23
Specialty CFL NTG Ratio Estimates
for the Massachusetts Grocery (non-HTR) Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 5	Grocery Retailer 2	6,231	30%	None	76%	1,078	20
Manufacturer 5	Grocery Retailer 1	5,001	30%	None	60%	405	3
Manufacturer 2	Grocery Retailer 8	3,980	98%	None	100%	3,980	1
Manufacturer 2	Grocery Retailer 9	3,980	98%	None	50%	3,980	1
Manufacturer 2	Other Grocery Retailers	3,764	98%	None	None	None	
Manufacturer 3	Grocery Retailer 4	1,956	None	None	97%	500	3
Manufacturer 5	Grocery Retailer 3	1,877	30%	None	76%	242	12
Total bulb quantity for channel/estimators		**26,789**	**22,956**			**9,943**	
% of channel accounted for by NTG estimators			**86%**	**0%**		**37%**	
Number of unique NTG estimators			**2**				**40**
Sales-weighted NTG ratios by market actor			**67%**		**77%**		
Overall NTG ratio for retail channel		**70%**					

Table 5-24
Specialty CFL NTG Ratio Estimates
for the Massachusetts Grocery (non-HTR) Channel
Using Total Sales Weights

`	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 5	Grocery Retailer 2	12,462	30%		None	291	88%
Manufacturer 5	Grocery Retailer 1	10,002	30%		None	117	100%
Manufacturer 2	Grocery Retailer 8	4,189	98%		None	3,980	100%
Manufacturer 2	Grocery Retailer 9	4,189	98%		None	3,980	50%
Manufacturer 2	Other Grocery Retailers	3,962	98%		None	293	None
Manufacturer 3	Grocery Retailer 4		None		None	400	100%
Manufacturer 5	Grocery Retailer 3	3,754	30%		None	187	81%
Total bulb quantity for estimators		**34,805**				**9,248**	
Number of unique NTG estimators			**2**				**20**
Sales-weighted NTG ratios by market actor			**57%**				**75%**
Overall NTG ratio for retail channel		**61%**					

5.3.5 The Large Home Improvement Lighting Channel

The Large Home Improvement (LHI) lighting channel was the most challenging lighting channel to estimate NTG ratios for. This was because one high-level buyer for a large-volume program participant in this channel claimed that his company's CFL sales would disappear (100% NTG

ratio) in the absence of the Massachusetts and Rhode Island programs. This NTG estimate was a significant outlier compared to other NTG estimates provided both by manufacturers who supplied this retail buyer and the store managers who sold the CFLs provided by this buyer. Furthermore, we have interviewed other buyers for this same Large Home Improvement retailer for evaluations in other states (e.g., California, New Mexico, New Jersey) and none of these buyers claimed that their CFL sales would totally disappear absent program rebates. After consulting with the evaluation team, the EEAC consultants, and others, the decision was made to remove this outlier from the NTG estimates that were provided to the Delphi panel. The tables in this report show the estimates with the outlier removed although the impact of including the outlier estimate is indicated in the footnotes.

One additional complication to the calculations, besides the retail buyer outlier estimate, is that the program tracking database did not identify who manufactured a large portion of the CFLs sold by LHI Retailer 1. The name listed in the database as the manufacturer for many of LHI Retailer 1's sales was actually a product brand belonging to LHI Retailer 1. After further inquiries we did find out that this product brand is produced by a variety of manufacturers but we were never able to obtain a list of these manufacturers and which volume of bulbs they each produced. As a result we were only able to obtain manufacturer NTG ratio estimates that accounted for 22% of channel program sales. If this manufacturer sales share had been larger it could have helped dilute the effects of the outlier estimate from the retail buyer.

5.3.5.1 Standard CFL NTG Ratio Estimates—Massachusetts

The NTG ratio estimates for the Large Home Improvement lighting channel with the retail buyer outlier estimate removed appear in Table 5-25 (program sales weighted) and Table 5-26 (total sales weighted). With the exception of the estimate of one manufacturer who produced a small quantity of bulbs for this channel, the other NTG ratio estimates are fairly close to each other.

Table 5-25
Standard CFL NTG Ratio Estimates for the Massachusetts LHI Channel Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Unspecified*	LHI Retailer 1	995,536	Unindentified*	Removed	28%	572,384	23
Manufacturer 7	LHI Retailer 1	267,026	8%	Removed	25%	144,075	23
Manufacturer 8	LHI Retailer 1	10,477	30%	Removed	25%	5,593	24
Manufacturer 9	LHI Retailer 2	235	67%	None	25%	202	5
Manufacturer 9	LHI Retailer 1	21	67%	Removed	15%	21	1
Total bulb quantity for channel/estimators		**1,273,295**	**277,526**	**Removed**		**722,275**	
% of channel accounted for by NTG estimators			**22%**	**Removed**		**57%**	
Number of unique NTG estimators			**3**	**0**			**29**
Sales-weighted NTG ratios by market actor			**8%**	**Removed**	**27%**		
Overall NTG ratio for retail channel		**22%**					

Note: *The program tracking database listed a branded product name as the manufacturer for the CFL bulbs in this stream. We were unable to obtain information on which companies manufactured this branded product (although we did find out it was produced by multiple manufacturers) and which volume of bulbs each manufacturer accounted for. If the outlier estimate from the retail buyer had been included, the NTG ratio estimate for this channel would have increased from 22% to 66%.

Table 5-26
Standard CFL NTG Ratio Estimates for the Massachusetts LHI Channel Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Unspecified*	LHI Retailer 1		Unindentified*		Removed	705,038	34%
Manufacturer 7	LHI Retailer 1	381,466	8%		Removed	177,590	31%
Manufacturer 8	LHI Retailer 1	34,923	30%		Removed	7,642	35%
Manufacturer 9	LHI Retailer 2	336	67%		None	72	23%
Manufacturer 9	LHI Retailer 1	30	67%		Removed		None
Total bulb quantity for estimators		**416,755**		**Removed**		**890,342**	
Number of unique NTG estimators			**3**	**0**			**18**
Sales-weighted NTG ratios by market actor			**9%**	**Removed**			**33%**
Overall NTG ratio for retail channel		**26%**					

Note: *The program tracking database listed a branded product name as the manufacturer for the CFL bulbs in this stream. We were unable to obtain information on which companies manufactured this branded product (although we did find out it was produced by multiple manufacturers) and which volume of bulbs each manufacturer accounted for.

If the outlier estimate from the retail buyer had been included, the NTG ratio estimate for this channel would have increased from 26% to 64%.

5.3.5.2 Standard CFL NTG Ratio Estimates—Rhode Island

The standard CFL NTG ratio estimates for Rhode Island's Large Home Improvement channel appear below.

Table 5-27
Standard CFL NTG Ratio Estimates
for the Rhode Island LHI Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Unspecified*	LHI Retailer 1	116,524	Unindentified*	Removed	59%	42,946	24
Manufacturer 7	LHI Retailer 1	50,585	8%	Removed	56%	19,384	23
Total bulb quantity for channel/estimators		**167,109**	**50,585**	**Removed**		**62,330**	
% of channel accounted for by NTG estimators			**30%**	**Removed**		**37%**	
Number of unique NTG estimators			**1**	**0**			**3**
Sales-weighted NTG ratios by market actor			**8%**	**Removed**	**58%**		
Overall NTG ratio for retail channel		**35%**					

Note: *The program tracking database listed a branded product name as the manufacturer for the CFL bulbs in this stream. We were unable to obtain information on which companies manufactured this branded product (although we did find out it was produced by multiple manufacturers) and which volume of bulbs each manufacturer accounted for. If the outlier estimate from the retail buyer had been included, the NTG ratio estimate for this channel would have increased from 35% to 74%.

Table 5-28
Standard CFL NTG Ratio Estimates
for the Rhode Island LHI Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Unspecified*	LHI Retailer 1		Unindentified*		Removed	90,587	46%
Manufacturer 7	LHI Retailer 1	72,264	8%		Removed	41,527	43%
Total bulb quantity for estimators		**72,264**		**Removed**		**132,114**	
Number of unique NTG estimators			**1**	**0**			**3**
Sales-weighted NTG ratios by market actor			**8%**	**Removed**			**45%**
Overall NTG ratio for retail channel		**32%**					

Note: *The program tracking database listed a branded product name as the manufacturer for the CFL bulbs in this stream. We were unable to obtain information on which companies manufactured this branded product (although we did find out it was produced by multiple manufacturers) and which volume of bulbs each manufacturer accounted for. If the outlier estimate from the retail buyer had been included, the NTG ratio estimate for this channel would have increased from 32% to 64%.

5.3.5.3 Specialty CFL NTG Ratio Estimates—Massachusetts

The Large Home Improvement channel was the top source of program specialty CFL sales for both Massachusetts and Rhode Island. The following tables show the Massachusetts specialty CFL NTG ratio estimates for the Large Home Improvement channel. The channel-wide NTG ratio estimates for specialty CFLs in the Large Home Improvement channel were actually lower than the comparable estimates for the standard CFLs. Although the store managers gave higher NTG ratio estimates for the specialty CFLs than they did for the standard CFLs, this was offset by the fact that the program sales weights (381,974 bulbs) of the lighting manufacturers who gave lower NTG ratio estimates were closer to the program sales weights of the retail buyer (402,321 bulb) who provided a 100% NTG ratio estimate. This had not been the case for the standard CFLs where the manufacturer sales weights had been much smaller.

Table 5-29
Specialty NTG Ratio Estimates for the Massachusetts LHI Channel Using Total Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 7	LHI Retailer 1	287,378	25%	Removed	42%	155,746	23
Manufacturer 8	LHI Retailer 1	86,803	30%	Removed	42%	48,446	24
Unspecified*	LHI Retailer 1	15,186	Unspecified*	Removed	36%	9,692	24
Manufacturer 9	LHI Retailer 1	7,793	88%	Removed	42%	4,359	21
Manufacturer 3	LHI Retailer 1	5,161	None	Removed	41%	2,853	24
Total bulb quantity for channel/estimators		**402,321**	**381,974**	**Removed**		**221,096**	
% of channel accounted for by NTG estimators			**95%**	**0%**		**55%**	
Number of unique NTG estimators			**3**	**Removed**			**24**
Sales-weighted NTG ratios by market actor			**27%**	**Removed**	**42%**		
Overall NTG ratio for retail channel		**33%**					

Note: *The program tracking database listed a branded product name as the manufacturer for the CFL bulbs in this stream. We were unable to obtain information on which companies manufactured this branded product (although we did find out it was produced by multiple manufacturers) and which volume of bulbs each manufacturer accounted for. If the outlier estimate from the retail buyer had been included, the NTG ratio estimate for this channel would have increased from 33% to 60%.

Table 5-30
Specialty CFL NTG Ratio Estimates for the Massachusetts LHI Channel Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 7	LHI Retailer 1	638,618	25%		Removed	455,926	38%
Manufacturer 8	LHI Retailer 1	86,803	30%		Removed	130,235	34%
Unspecified*	LHI Retailer 1		Unidentified*		Removed	23,585	43%
Manufacturer 9	LHI Retailer 1	15,586	88%		Removed	7,968	49%
Manufacturer 3	LHI Retailer 1		None		Removed	2,853	41%
Total bulb quantity for estimators		**741,007**		**0**	**0%**	**620,567**	
Number of unique NTG estimators			**3**		**Removed**		**14**
Sales-weighted NTG ratios by market actor			**27%**		**Removed**		**38%**
Overall NTG ratio for retail channel		**32%**					

Note: *The program tracking database listed a branded product name as the manufacturer for the CFL bulbs in this stream. We were unable to obtain information on which companies manufactured this branded product (although we did find out it was produced by multiple manufacturers) and which volume of bulbs each manufacturer accounted for.

If the outlier estimate from the retail buyer had been included, the NTG ratio estimate for this channel would have increased from 32% to 51%.

5.3.5.4 Specialty CFL NTG Ratio Estimates—Rhode Island

The Rhode Island specialty CFL NTG ratio estimates for the Large Home Improvement channel appear below.

Table 5-31
Specialty NTG Ratio Estimates
for the Rhode Island LHI Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 7	LHI Retailer 1	34,615	25%	Removed	47%	15,397	23
Unspecified*	LHI Retailer 1	2,350	Undetermined*	Removed	48%	870	24
Total bulb quantity for channel/estimators		**36,965**	**36,965**	**Removed**		**16,267**	
% of channel accounted for by NTG estimators			**100%**	**0%**		**44%**	
Number of unique NTG estimators			**1**	**Removed**			**2**
Sales-weighted NTG ratios by market actor			**23%**	**Removed**	**47%**		
Overall NTG ratio for retail channel		**31%**					

Note: *The program tracking database listed a branded product name as the manufacturer for the CFL bulbs in this stream. We were unable to obtain information on which companies manufactured this branded product (although we did find out it was produced by multiple manufacturers) and which volume of bulbs each manufacturer accounted for. If the outlier estimate from the retail buyer had been included, the NTG ratio estimate for this channel would have increased from 31% to 61%.

Table 5-32
Specialty NTG Ratio Estimates
for the Rhode Island LHI Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 7	LHI Retailer 1	49,450	25%		Removed	19,272	38%
Unspecified*	LHI Retailer 1		Undetermined*		Removed	1,212	43%
Total bulb quantity for estimators		**49,450**		**0**	**0%**	**20,484**	
Number of unique NTG estimators			**1**		**Removed**		**2**
Sales-weighted NTG ratios by market actor			**25%**		**Removed**		**38%**
Overall NTG ratio for retail channel		**29%**					

Note: *The program tracking database listed a branded product name as the manufacturer for the CFL bulbs in this stream. We were unable to obtain information on which companies manufactured this branded product (although we did find out it was produced by multiple manufacturers) and which volume of bulbs each manufacturer accounted for. If the outlier estimate from the retail buyer had been included, the NTG ratio estimate for this channel would have increased from 29% to 60%.

5.3.6 The Mass Merchandise Lighting Channel

The Mass Merchandise lighting channel was a relatively small one for the ENERGY STAR lighting program in terms of sales volume. It was also dominated by a single larger retailer. Both the buyer and the store managers for this large retailer said that they sold a large volume of non-program bulbs year round and therefore the disappearance of the program would not have had a huge impact on their CFL sales.

5.3.6.1 Standard CFL NTG Ratio Estimates—Massachusetts

Table 5-33 shows the NTG ratio estimates for the Massachusetts Mass Merchandise lighting channel using program sales weights. We collected a NTG ratio estimates from the retail buyer for the only participating retailer that served this channel as well as one of the two manufacturers that supplied them. We also obtained NTG ratio estimates from 10 store managers accounting for almost a third of channel sales. The table shows that the estimates for the retail buyer and the store managers were very close (27 -33 %) while the manufacturer gave a NTG ratio estimate of 100%. In the interview this manufacturer said that while Mass Merchandise Retailer 1 might have been selling other CFLs without the program, it would not have been selling theirs. However, because they only accounted for 11% of the retailer's sales, their estimate did not increase the overall channel estimate that much.

Table 5-33
Standard CFL NTG Ratio Estimates
for the Massachusetts Mass Merchandise Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 3	Mass Merchandise Retailer 1	119,811	None	33%	30%	36,558	10
Manufacturer 10	Mass Merchandise Retailer 1	15,159	100%	33%	3%	4,820	3
Total bulb quantity for channel/estimators		**134,970**	**15,159**	**134,970**		**41,378**	
% of channel accounted for by NTG estimators			**11%**	**100%**		**31%**	
Number of unique NTG estimators			**1**	**1**			**10**
Sales-weighted NTG ratios by market actor			**100%**	**33%**	**27%**		
Overall NTG ratio for retail channel		**37%**					

The NTG ratio estimates using the total sales method appear in Table 5-33. The overall NTG ratio estimate for the channel increased slightly from 37% to 39%.

Table 5-34
Standard CFL NTG Ratio Estimates
for the Massachusetts Mass Merchandise Channel
Using Total Sale Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 3	Mass Merchandise Retailer 1		None	199,685	33%	72,364	43%
Manufacturer 10	Mass Merchandise Retailer 1	20,212	100%	25,265	33%	1,400	0%
Total bulb quantity for estimators		**20,212**		**224,950**		**73,764**	
Number of unique NTG estimators			**1**	**1**			**5**
Sales-weighted NTG ratios by market actor			**100%**		**33%**		**42%**
Overall NTG ratio for retail channel		**39%**					

5.3.6.2 Standard CFL NTG Ratio Estimates—Rhode Island

The standard CFL NTG ratio estimates for Rhode Island's Mass Merchandise channel were similar to those for Massachusetts, although the sample sizes were much smaller. Table 5-35 and Table 5-36 show these estimates.

Table 5-35
Standard CFL NTG Ratio Estimates
for the Rhode Island Mass Merchandise Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 9	Mass Merchandise Retailer 1	14,748	None	33%	60%	3,288	2
Total bulb quantity for channel/estimators		**14,748**	**None**	**14,748**		**3,288**	
% of channel accounted for by NTG estimators			**0%**	**100%**		**22%**	
Number of unique NTG estimators			**0**	**1**			**2**
Sales-weighted NTG ratios by market actor			**None**	**33%**	**60%**		
Overall NTG ratio for retail channel		**38%**					

Table 5-36
Standard CFL NTG Ratio Estimates
for the Rhode Island Mass Merchandise Channel
Using Total Sale Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 9	Mass Merchandise Retailer 1		None	294,960	33%	3,288	50%
Total bulb quantity for estimators		**0**	**None**	**294,960**		**3,288**	
Number of unique NTG estimators			**0**	**1**			**1**
Sales-weighted NTG ratios by market actor			**None**	**33%**			**50%**
Overall NTG ratio for retail channel		**33%**					

5.3.6.3 Specialty CFL NTG Ratio Estimates—Massachusetts

The ENERGY STAR lighting programs in both Massachusetts and Rhode Island only did a small volume of specialty CFL sales through the Mass Merchandise channel. Table 5-37 shows that the retail buyer and Massachusetts store managers for Mass Merchandise Retailer 1 gave the same NTG ratio estimate when program sales weights were used. Table 5-38 shows the NTG ratio estimate based on the total sales weights.

Table 5-37
Specialty CFL NTG Ratio Estimates
for the Massachusetts Mass Merchandise Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 3	Mass Merchandise Retailer 1	4,042	None	33%	33%	842	8
Total bulb quantity for channel/estimators		**4,042**	**0**	**4,042**		**842**	
% of channel accounted for by NTG estimators			**0%**	**100%**		**21%**	
Number of unique NTG estimators			**None**	**1**			**8**
Sales-weighted NTG ratios by market actor				**33%**	**33%**		
Overall NTG ratio for retail channel		**33%**					

Table 5-38
Specialty CFL NTG Ratio Estimates
for the Massachusetts Mass Merchandise Channel
Using Total Sale Weights

Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Mass Merchandise Retailer 1		None	26,947	33%	1,125	12%
ıtity for estimators	**0**		**26,947**		**1,125**	
ue NTG estimators		**0**	**1**			**5**
NTG ratios by market actor				**33%**		**12%**
io for retail channel	**32%**					

5.3.6.4 Specialty CFL NTG Ratio Estimates—Rhode Island

The Rhode Island program only sold a small volume of specialty CFLs through the Mass Merchandise Channel. Table 5-39 and Table 5-40 show the NTG ratio estimates for this channel.

Table 5-39
Specialty CFL NTG Ratio Estimates
for the Rhode Island Mass Merchandise Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 9	Mass Merchandise Retailer 1	1,776	None	33%	75%	396	2
Total bulb quantity for channel/estimators		**1,776**	**None**	**1,776**		**396**	
% of channel accounted for by NTG estimators			**0%**	**100%**		**22%**	
Number of unique NTG estimators			**0**	**1**			**2**
Sales-weighted NTG ratios by market actor			**None**	**33%**	**75%**		
Overall NTG ratio for retail channel		**41%**					

Table 5-40
Specialty CFL NTG Ratio Estimates
for the Rhode Island Mass Merchandise Channel
Using Program Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 9	Mass Merchandise Retailer 1		None	35,520	33%	204	100%
Total bulb quantity for estimators		**0**	**None**	**35,520**		**204**	
Number of unique NTG estimators			**0**	**1**			**1**
Sales-weighted NTG ratios by market actor			**None**		**33%**		**100%**
Overall NTG ratio for retail channel		**33%**					

5.3.7 The Membership Club Lighting Channel

The Membership Club channel was the second most active lighting channel (after Large Home Improvement) in the ENERGY STAR lighting program. For this channel we were able to obtain NTG ratio estimates from the retail buyers for both participating Membership Clubs. Although these two buyers told very different stories as to what would happen to their standard CFL sales in the absence of the program, their stories were internally consistent within their product stream. In other words, their respective manufacturers provided NTG ratio estimates that were very close to their own.

5.3.7.1 Standard CFL NTG Ratio Estimates—Massachusetts

Table 5-41 shows the Massachusetts NTG ratio estimates for standard CFLs using the program sales weighting method. There was only one small "stream" of Membership Club CFLs (Manufacturer 9 and Membership Club 1) where the NTG ratio estimates across market actor categories were not fairly closely aligned. The sales-weighted NTG ratios at the market actor level were also very close (46-56%).

Table 5-41
Standard CFL NTG Ratio Estimates
for the Massachusetts Membership Club Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 5	Membership Club 1	518,363	30%	35%	54%	89,511	3
Manufacturer 9	Membership Club 2	245,241	80%	85%	None		None
Manufacturer 3	Membership Club 1	20,400	None	35%	44%	3,100	3
Manufacturer 9	Membership Club 1	2,736	80%	35%	79%	1,307	3
Manufacturer 8	Membership Club 1	576	None	35%	None		None
Total bulb quantity for channel/estimators		**787,316**	**766,340**	**787,316**		**90,818**	
% of channel accounted for by NTG estimators			**97%**	**100%**		**12%**	
Number of unique NTG estimators			**2**	**2**			**3**
Sales-weighted NTG ratios by market actor			**46%**	**51%**	**56%**		
Overall NTG ratio for retail channel		**49%**					

Table 5-42 shows the NTG ratio estimates using the total sales weights. The channel-wide NTG ratio decreased from 49% to 44% using this method.

Table 5-42
Standard CFL NTG Ratio Estimates
for the Massachusetts Membership Club Channel
Using Total Sale Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 5	Membership Club 1	1,036,726	30%	1,151,918	35%	105,775	55%
Manufacturer 9	Membership Club 2	350,344	80%	306,551	85%		None
Manufacturer 3	Membership Club 1		None	45,333	35%	3,535	46%
Manufacturer 9	Membership Club 1	3,909	80%	6,080	35%	1,423	80%
Manufacturer 8	Membership Club 1		None	640	35%		None
Total bulb quantity for estimators		**1,390,979**		**1,510,522**		**110,733**	
Number of unique NTG estimators			**2**		**2**		**3**
Sales-weighted NTG ratios by market actor			**43%**		**45%**		**55%**
Overall NTG ratio for retail channel		**44%**					

5.3.7.2 Standard CFL NTG Ratio Estimates—Rhode Island

The Rhode Island ENERGY STAR lighting program only sold a few hundred bulbs through the Membership Club channel. Table 5-43 and Table 5-44 show the NTG ratio estimates provided by the lighting market actors using both weighting methods.

Table 5-43
Standard CFL NTG Ratio Estimates
for the Rhode Island Membership Club Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 9	Membership Club 1	444	80%	35%	None		
Total bulb quantity for channel/estimators		**444**	**444**	**444**			
% of channel accounted for by NTG estimators			**100%**	**100%**			
Number of unique NTG estimators			**1**	**1**			**0**
Sales-weighted NTG ratios by market actor			**80%**	**35%**	**None**		
Overall NTG ratio for retail channel		**58%**					

Table 5-44
Standard CFL NTG Ratio Estimates
for the Rhode Island Membership Club Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 9	Membership Club 1	634	80%	987	35%		None
Total bulb quantity for estimators		**634**		**987**			
Number of unique NTG estimators			**1**	**1**			**0**
Sales-weighted NTG ratios by market actor			**80%**		**35%**		
Overall NTG ratio for retail channel		**53%**					

5.3.7.3 Specialty CFL NTG Ratio Estimates—Massachusetts

The Massachusetts NTG ratio estimates for specialty CFLs in the Membership Club channel were higher than those for the standard CFLs. This was primarily due to the supply stream involving Manufacturer 5 and Membership Club 1 having a much smaller program presence (29% of sales) among the specialty CFLs than they did among the standard CFLs (66% of sales). Since this supply stream had provided the lowest NTG estimates, its reduced sales weights in the specialty CFL calculations increased the overall channel NTG ratio. Table 5-45 shows the specialty CFL NTG ratio estimates using the program sales weights and

Table 5-46 shows them using the total sales weights.

Table 5-45
Specialty CFL NTG Ratio Estimates
for the Massachusetts Membership Club Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 9	Membership Club 2	161,798	80%	85%	None	None	
Manufacturer 5	Membership Club 1	74,032	30%	35%	55%	10,611	3
Manufacturer 9	Membership Club 1	19,626	80%	35%	56%	2,802	3
Total bulb quantity for channel/estimators		**255,456**	**235,830**	**255,456**		**13,413**	
% of channel accounted for by NTG estimators			**92%**	**100%**		**5%**	
Number of unique NTG estimators			**2**	**2**			**3**
Sales-weighted NTG ratios by market actor			**71%**	**67%**	**55%**		
Overall NTG ratio for retail channel		**68%**					

Table 5-46
Specialty CFL NTG Ratio Estimates
for the Massachusetts Membership Club Channel
Using Total Sale Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 9	Membership Club 2	323,596	80%	202,248	35%		None
Manufacturer 5	Membership Club 1	148,064	30%	164,516	85%	6,660	29%
Manufacturer 9	Membership Club 1	39,252	80%	43,613	35%	1,775	30%
Total bulb quantity for estimators		**510,912**		**410,376**		**8,435**	
Number of unique NTG estimators			**2**	**2**			**2**
Sales-weighted NTG ratios by market actor			**66%**		**55%**		**29%**
Overall NTG ratio for retail channel		**61%**					

5.3.7.4 Specialty CFL NTG Ratio Estimates—Rhode Island

Compared to the Massachusetts program, the Rhode Island program only sold a small quantity of specialty CFLs through the Membership Club channel. Table 5-47 and Table 5-48 show the NTG ratio estimates for this channel.

Table 5-47
Specialty CFL NTG Ratio Estimates
for the Rhode Island Membership Club Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 9	Membership Club 1	1,468	80%	35%	None		
Total bulb quantity for channel/estimators		**1,468**	**1,468**	**1,468**			
% of channel accounted for by NTG estimators			**100%**	**100%**			
Number of unique NTG estimators			**1**	**1**			**0**
Sales-weighted NTG ratios by market actor			**80%**	**35%**	**None**		
Overall NTG ratio for retail channel		**58%**					

Table 5-48
Specialty CFL NTG Ratio Estimates
for the Rhode Island Membership Club Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 9	Membership Club 1	2,936	80%	3,262	35%		None
Total bulb quantity for estimators		**2,936**		**3,262**			
Number of unique NTG estimators			**1**	**1**			**0**
Sales-weighted NTG ratios by market actor			**80%**		**35%**		**None**
Overall NTG ratio for retail channel		**56%**					

5.3.8 The Small Hardware Lighting Channel

The Small Hardware lighting channel has the most complex structure of all the lighting channels participating in the ENERGY STAR lighting program. There are a number of reasons for this. First, because hardware stores like to offer a wide range of lighting products, they often make use of multiple suppliers. Second, hardware stores that are affiliated with ACE or True Value often will use both: 1) a lighting supplier that ACE or True Value has chosen to partner with, and 2) make separate deals with lighting suppliers not affiliated with ACE or True Value. Third, while other retail lighting channels participating in the program are dominated by chain stores, the Small Hardware channel still has a number of independent stores. Since this report presents NTG ratio estimates at the retailer level, this multiplies the number of product supply "streams."

5.3.8.1 Standard CFL NTG Ratio Estimates—Massachusetts

This complex market structure of the Small Hardware channel is apparent in Table 5-49, which shows NTG ratio estimates for standard CFLs in the Small Hardware channel. The table shows that the manufacturer NTG ratio estimates account for about three quarter of program sales through this channel and the retail buyer estimates account for over half of these sales. It also shows that channel sales-weighted NTG ratio estimates for the manufacturers and retail buyers were very close with the store manager estimate being somewhat higher. The one negative NTG ratio estimate was due to one store manager saying that his/her standard CFL sales would increase in the absence of the program.

Table 5-49
Standard CFL NTG Ratio Estimates for the Massachusetts Small Hardware Channel Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 1	Hardware Retailer 1	125,824	30%	70%	57%	23,118	4
Manufacturer 3	Hardware Retailer 2	71,836	None	None	79%	12,758	6
Manufacturer 1	Hardware Retailer 3	53,436	30%	13%	50%	19,534	1
Manufacturer 3	Hardware Retailer 1	40,111	None	70%	51%	659	2
Manufacturer 1	Misc. hardware for Manufacturer 1	28,902	30%	None	None		
Manufacturer 6	Misc. hardware for Manufacturer 6	22,667	100%	None	None		
Manufacturer 2	Hardware Retailer 3	22,000	93%	13%	None		
Manufacturer 1	Hardware Retailer 4	19,710	30%	None	60%	19,710	1
Manufacturer 1	Hardware Retailer 5	18,768	30%	None	100%	18,768	1
Manufacturer 2	Hardware Retailer 4	12,000	93%	None	60%	12,000	1
Manufacturer 9	Hardware Retailer 3	8,010	90%	13%	70%	3,498	1
Manufacturer 1	Hardware Retailer 2	7,920	30%	None	54%	7,658	2
Manufacturer 6	Hardware Retailer 3	5,245	100%	13%	-100%	600	1
Manufacturer 2	Misc. hardware for Manufacturer 2	4,000	93%	None	None		
Manufacturer 3	Misc. hardware for Manufacturer 3	3,624	None	None	None		
Manufacturer 1	Hardware Retailer 6	2,880	30%	None	63%	2,880	2
Manufacturer 9	Misc. hardware for Manufacturer 9	2,736	90%	None	None		
Manufacturer 3	Hardware Retailer 3	1,852	None	13%	None		
Manufacturer 3	Hardware Retailer 5	1,440	None	None	100%	1,440	1
Manufacturer 9	Hardware Retailer 7	1,200	90%	None	80%	1,200	1
Manufacturer 6	Hardware Retailer 7	537	100%	None	80%	537	1
Manufacturer 11	Hardware Retailer 8	35	None	None	None		
Total bulb quantity for channel/estimators		**454,733**	**335,835**	**256,478**		**124,360**	
% of channel accounted for by NTG estimators			**74%**	**56%**		**27%**	
Number of unique NTG estimators			**4**	**2**			**20**
Sales-weighted NTG ratios by market actor			**45%**	**50%**	**66%**		
Overall NTG ratio for retail channel		**50%**					

Table 5-50 shows the NTG ratio estimates using total sales weights. The channel-level NTG ratio estimate decreased slightly – from 50% to 48% – when this alternative weighting scheme was applied.

Table 5-50
Standard CFL NTG Ratio Estimates
for the Massachusetts Small Hardware Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 1	Hardware Retailer 1	132,446	30%	449,371	70%	27,647	66%
Manufacturer 3	Hardware Retailer 2		None		None	13,947	79%
Manufacturer 1	Hardware Retailer 3	56,248	30%	267,180	13%	26,045	50%
Manufacturer 3	Hardware Retailer 1		None	143,254	70%	5,463	80%
Manufacturer 1	Misc. hardware for Manufacturer 1	30,423	30%		None		
Manufacturer 6	Misc. hardware for Manufacturer 6	28,334	100%		None		
Manufacturer 2	Hardware Retailer 3	23,158	93%	110,000	13%		
Manufacturer 1	Hardware Retailer 4	20,747	30%		None	24,638	60%
Manufacturer 1	Hardware Retailer 5	19,756	30%		None	18,958	100%
Manufacturer 2	Hardware Retailer 4	12,632	93%		None	15,000	60%
Manufacturer 9	Hardware Retailer 3	11,443	90%	40,050	13%	4,373	70%
Manufacturer 1	Hardware Retailer 2	8,337	30%		None	7,954	55%
Manufacturer 6	Hardware Retailer 3	6,556	100%	26,225	13%	1,000	-100%
Manufacturer 2	Misc. hardware for Manufacturer 2	4,211	93%		None		
Manufacturer 3	Misc. hardware for Manufacturer 3		None		None		
Manufacturer 1	Hardware Retailer 6	3,032	30%		None	5,037	68%
Manufacturer 9	Misc. hardware for Manufacturer 9	3,909	90%		None		
Manufacturer 3	Hardware Retailer 3		None	9,260	13%		
Manufacturer 3	Hardware Retailer 5		None		None	1,455	100%
Manufacturer 9	Hardware Retailer 7	1,714	90%		None	1,500	80%
Manufacturer 6	Hardware Retailer 7	671	100%		None	671	80%
Manufacturer 11	Hardware Retailer 8		None		None		
Total bulb quantity for channel/estimators		**363,616**		**1,045,340**		**153,016**	
Number of unique NTG estimators			**4**		**2**		**20**
Sales-weighted NTG ratios by market actor			**47%**		**45%**		**67%**
Overall NTG ratio for retail channel		**48%**					

5.3.8.2 Standard CFL NTG Ratio Estimates—Rhode Island

The Rhode Island program structure, with only a couple of supply streams, was much less complicated than the Massachusetts program structure. Table 5-50 and Table 5-51 show the NTG ratio estimates for these two streams and for the channel as a whole.

Table 5-51
Standard CFL NTG Ratio Estimates
for the Rhode Island Small Hardware Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 1	Hardware Retailer 9	2,040	30%	None	85%	2,040	1
Manufacturer 1	Hardware Retailer 1	12,360	30%	70%	None		None
Total bulb quantity for channel/estimators		**14,400**	**14,400**	**12,360**		**2,040**	
% of channel accounted for by NTG estimators			**100%**	**86%**		**14%**	
Number of unique NTG estimators			**1**	**1**			**1**
Sales-weighted NTG ratios by market actor			**30%**	**70%**	**85%**		
Overall NTG ratio for retail channel		**51%**					

Table 5-52
Standard CFL NTG Ratio Estimates
for the Rhode Island Small Hardware Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 1	Hardware Retailer 9	2,147	30%	None	None	2,267	85%
Manufacturer 1	Hardware Retailer 1	13,011	30%	44,143	70%		None
Total bulb quantity for channel/estimators		**15,158**		**44,143**		**2,267**	
Number of unique NTG estimators			**1**		**1**		**1**
Sales-weighted NTG ratios by market actor			**30%**		**70%**		**85%**
Overall NTG ratio for retail channel		**61%**					

5.3.8.3 Specialty CFL NTG Ratio Estimates—Massachusetts

The NTG ratio estimates for Massachusetts specialty CFLs in the Small Hardware retail lighting channel appear in Table 5-53 and Table 5-54. In general, the NTG ratio estimates provided by the store managers were much higher than those provided by the manufacturers and retail buyers.

Table 5-53
Specialty CFL NTG Ratio Estimates for the Massachusetts Small Hardware Channel Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 3	Hardware Retailer 2	10,756	None	None	85%	3,588	7
Manufacturer 1	Hardware Retailer 3	8,824	30%	8%	80%	6,615	1
Manufacturer 1	Hardware Retailer 1	5,823	30%	80%	70%	1,452	4
Manufacturer 1	Hardware Retailer 5	2,878	30%	None	100%	2,020	1
Manufacturer 2	Other Manufacturer 2 Hardware	1,968	98%	None	None	None	
Manufacturer 9	Hardware Retailer 3	1,806	None	8%	70%	930	1
Manufacturer 1	Hardware Retailer 4	1,284	30%	None	40%	1,284	1
Manufacturer 2	Hardware Retailer 3	784	98%	8%	None	None	
Manufacturer 6	Hardware Retailer 3	784	100%	8%	None	None	
Manufacturer 3	Hardware Retailer 3	359	None	8%	None	None	
Manufacturer 1	Hardware Retailer 6	324	30%	None	47%	324	2
Manufacturer 9	Other Manufacturer 9 Hardware	120	None	None	None	None	
Manufacturer 3	Hardware Retailer 1	95	None	80%	30%	61	1
Manufacturer 16	Hardware Retailer 8	22	None	None	None	None	
Total bulb quantity for channel/estimators		**35,827**	**24,125**	**21,160**		**16,274**	
% of channel accounted for by NTG estimators			**67%**	**59%**		**45%**	
Number of unique NTG estimators			**3**	**2**			**18**
Sales-weighted NTG ratios by market actor			**38%**	**27%**	**78%**		
Overall NTG ratio for retail channel		**45%**					

Table 5-54
Specialty CFL NTG Ratio Estimates
for the Massachusetts Small Hardware Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 3	Hardware Retailer 2		None		None	3,640	94%
Manufacturer 1	Hardware Retailer 3	9,288	30%	88,240	8%	26,640	80%
Manufacturer 1	Hardware Retailer 1	6,129	30%	14,558	80%	1,511	64%
Manufacturer 1	Hardware Retailer 5	3,029	30%		None	2,040	100%
Manufacturer 2	Other Manufacturer 2 Hardware	2,072	98%		None	None	
Manufacturer 9	Hardware Retailer 3		None	18,060	8%	1,860	64%
Manufacturer 1	Hardware Retailer 4	1,352	30%		None	2,140	40%
Manufacturer 2	Hardware Retailer 3	825	98%	7,840	8%	None	
Manufacturer 6	Hardware Retailer 3	871	100%	7,840	8%	None	
Manufacturer 3	Hardware Retailer 3		None	3,590	8%	None	
Manufacturer 1	Hardware Retailer 6	341	30%		None	1,200	100%
Manufacturer 9	Other Manufacturer 9 Hardware		None		None	None	
Manufacturer 3	Hardware Retailer 1		None	238	80%	122	30%
Manufacturer 16	Hardware Retailer 8		None		None	None	
Total bulb quantity for channel/estimators		**23,908**		**140,365**		**39,153**	
Number of unique NTG estimators			**3**	**2**			**15**
Sales-weighted NTG ratios by market actor			**41%**		**15%**		**79%**
Overall NTG ratio for retail channel		**30%**					

5.3.8.4 Specialty CFL NTG Ratio Estimates—Rhode Island

The Rhode Island program only sold a few hundred specialty CFLs through the Small Hardware channel. The NTG ratio estimates for this channel appear in Table 5-55 and Table 5-56.

Table 5-55
Specialty CFL NTG Ratio Estimates
for the Rhode Island Small Hardware Channel
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 1	Hardware Retailer 9	360	30%	None	85%	360	1
Manufacturer 1	Hardware Retailer 9	204	30%	70%	None		None
Total bulb quantity for channel/estimators		**564**	**564**	**204**		**360**	
% of channel accounted for by NTG estimators			**100%**	**36%**		**64%**	
Number of unique NTG estimators			**1**	**1**			**1**
Sales-weighted NTG ratios by market actor			**30%**	**70%**	**85%**		
Overall NTG ratio for retail channel		**55%**					

Table 5-56
Specialty CFL NTG Ratio Estimates
for the Rhode Island Small Hardware Channel
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 1	Hardware Retailer 9	379	30%	None	None	640	85%
Manufacturer 1	Hardware Retailer 9	215	30%	510	70%		None
Total bulb quantity for channel/estimators		**594**		**510**		**640**	
Number of unique NTG estimators			**1**		**1**		**1**
Sales-weighted NTG ratios by market actor			**30%**		**70%**		**85%**
Overall NTG ratio for retail channel		**62%**					

5.3.9 Miscellaneous Lighting Vendors

The final lighting retail channel is a miscellaneous collection of Massachusetts vendors which includes online lighting retailers, electric suppliers, housewares retailers, and even nonprofit organizations. These vendors did not sell a lot of standard CFLs through the program but had a larger share of the specialty CFL component of the program. There were no such equivalent vendors selling through the Rhode Island program.

5.3.9.1 Standard CFL NTG Ratio Estimates

Table 5-57 shows that we gathered NTG ratio estimates from two lighting manufacturers, two online lighting suppliers and one store manager for a housewares retailer. The concept of a store manager did not apply to much of this part of the program because most of the supplier-vendor "streams" were for the online suppliers. Table 5-58 shows the NTG ratio estimates of the miscellaneous lighting vendors using the total sales weighting method.

Table 5-57
Standard CFL NTG Ratio Estimates
for Miscellaneous Massachusetts Lighting Vendors
Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 1	Online supplier 1	8,814	30%	63%	Not applicable		
Manufacturer 3	Online supplier 1	7,257	None	63%	Not applicable		
Manufacturer 1	Other miscellaneous	7,205	None	None	None		
Manufacturer 12	Electrical supplier 1	3,552	None	None	None		
Manufacturer 13	Online supplier 1	3,010	None	63%	Not applicable		
Manufacturer 9	Housewares retailer 1	1,802	98%	None	60%	212	1
Manufacturer 1	Electrical supplier 1	1,692	None	None	None		
Manufacturer 13	Nonprofit 1	1,000	None	None	Not applicable		
Manufacturer 14	Online supplier 2	833	None	90%	Not applicable		
Manufacturer 7	Online supplier 2	407	None	90%	Not applicable		
Manufacturer 15	Online supplier 2	241	None	90%	Not applicable		
Manufacturer 3	Online supplier 2	91	None	90%	Not applicable		
Manufacturer 6	Online supplier 2	37	None	90%	Not applicable		
Manufacturer 12	Online supplier 2	17	None	90%	Not applicable		
Total bulb quantity for channel/estimators		**35,958**	**10,616**	**19,081**		**212**	
% of channel accounted for by NTG estimators			**30%**	**53%**		**1%**	
Number of unique NTG estimators			**2**	**2**			**1**
Sales-weighted NTG ratios by market actor			**41%**	**70%**	**60%**		
Overall NTG ratio for retail channel		**60%**					

Table 5-58
Standard CFL NTG Ratio Estimates
for Miscellaneous Massachusetts Lighting Vendors
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 1	Online supplier 1	9,278	30%	17,628	63%		Not applicable
Manufacturer 3	Online supplier 1		None	14,514	63%		Not applicable
Manufacturer 1	Other miscellaneous		None		None		None
Manufacturer 12	Electrical supplier 1		None		None		None
Manufacturer 13	Online supplier 1		None	6,020	63%		Not applicable
Manufacturer 9	Housewares retailer 1	2,574	98%		None	212	60%
Manufacturer 1	Electrical supplier 1		None		None		None
Manufacturer 13	Nonprofit 1		None		None		Not applicable
Manufacturer 14	Online supplier 2		None	926	90%		Not applicable
Manufacturer 7	Online supplier 2		None	452	90%		Not applicable
Manufacturer 15	Online supplier 2		None	268	90%		Not applicable
Manufacturer 3	Online supplier 2		None	101	90%		Not applicable
Manufacturer 6	Online supplier 2		None	41	90%		Not applicable
Manufacturer 12	Online supplier 2		None	19	90%		Not applicable
Total bulb quantity for channel/estimators		**11,852**		**39,969**		**212**	
Number of unique NTG estimators			**2**		**2**		**1**
Sales-weighted NTG ratios by market actor			**45%**		**64%**		**60%**
Overall NTG ratio for retail channel		**59%**					

5.3.9.2 Specialty CFL NTG Ratio Estimates

Table 5-59 and Table 5-60 show the specialty CFL NTG ratio estimates for the miscellaneous lighting vendors using both weighting methods.

Table 5-59
Specialty CFL NTG Ratio Estimates for Miscellaneous Massachusetts Lighting Vendors Using Program Sales Weights

Manufacturer	Retailers	Quantity of Program CFL Bulbs in Stream 2009-June 2010	Manufacturer NTG Estimate	Retail Buyer NTG Estimate	Store Manager NTG Estimate	Quantity of Program CFL Bulbs Represented by Store Manager Estimators	Number of Store Manger Estimators
Manufacturer 6	Online supplier 1	20,506	0%	63%	Not applicable	Not applicable	
Manufacturer 1	Online supplier 1	5,625	30%	63%	Not applicable	Not applicable	
Manufacturer 3	Online supplier 1	4,360	None	63%	Not applicable	Not applicable	
Manufacturer 1	Other miscellaneous	2,575	None	None	Not applicable	Not applicable	
Manufacturer 9	Online supplier 1	2,368	None	63%	Not applicable	Not applicable	
Manufacturer 12	Electrical supplier 1	624	None	None	None	None	
Manufacturer 7	Online supplier 2	247	None	100%	Not applicable	Not applicable	
Manufacturer 3	Online supplier 2	123	None	100%	Not applicable	Not applicable	
Manufacturer 6	Online supplier 2	28	None	100%	Not applicable	Not applicable	
Manufacturer 9	Online supplier 2	27	None	100%	Not applicable	Not applicable	
Manufacturer 9	Housewares retailer 1	19	98%	None	None	None	
Manufacturer 1	Electrical supplier 1	12	None	None	None	None	
Manufacturer 17	Online supplier 2	8	None	100%	Not applicable	Not applicable	
Total bulb quantity for channel/estimators		**36,522**	**26,150**	**28,499**		**0**	
% of channel accounted for by NTG estimators			**72%**	**78%**		**0%**	
Number of unique NTG estimators			**3**	**2**			**None**
Sales-weighted NTG ratios by market actor			**7%**	**74%**	**None**		
Overall NTG ratio for retail channel		**41%**					

Table 5-60
Specialty CFL NTG Ratio Estimates
for Miscellaneous Lighting Vendors
Using Total Sales Weights

Manufacturer	Retailers	Estimated Manufacturer Quantity of 2009-2010 State Bulbs	Manufacturer NTG Estimate	Estimated Buyer Quantity of 2009-2010 State Bulbs	Retail Buyer NTG Estimate	Estimated Store Manager Quantity of 2009-2010 State Bulbs	Store Manager NTG Estimate
Manufacturer 6	Online supplier 1	22,784	0%	22,784	63%	Not applicable	Not applicable
Manufacturer 1	Online supplier 1	5,921	30%	6,250	63%	Not applicable	Not applicable
Manufacturer 3	Online supplier 1		None	4,844	63%	Not applicable	Not applicable
Manufacturer 1	Other miscellaneous		None		None	Not applicable	Not applicable
Manufacturer 9	Online supplier 1		None	2,631	63%	Not applicable	Not applicable
Manufacturer 12	Electrical supplier 1		None		None	None	None
Manufacturer 7	Online supplier 2		None	247	100%	Not applicable	Not applicable
Manufacturer 3	Online supplier 2		None	123	100%	Not applicable	Not applicable
Manufacturer 6	Online supplier 2		None	28	100%	Not applicable	Not applicable
Manufacturer 9	Online supplier 2		None	27	100%	Not applicable	Not applicable
Manufacturer 9	Housewares retailer 1	38	98%		None	None	None
Manufacturer 1	Electrical supplier 1		None		None	None	None
Manufacturer 17	Online supplier 2		None	8	100%	Not applicable	Not applicable
Total bulb quantity for channel/estimators		**28,743**		**36,943**		**0**	
Number of unique NTG estimators			**3**		**2**		**None**
Sales-weighted NTG ratios by market actor			**6%**		**63%**		**None**
Overall NTG ratio for retail channel		**38%**					

5.3.10 Program-Wide NTG Ratio Estimates

While we believe that program design and delivery decisions for the ENERGY STAR lighting program should be made with the unique characteristics of the various retail lighting channels in mind, we realize that there is also interest in the calculation of a program-wide NTG ratio estimate.

5.3.10.1 Massachusetts Standard CFLs

Table 5-61 shows the channel-specific and program-wide ratio estimates for Massachusetts standard CFLs using the program sales weights. The overall NTG ratio estimate was 39%.

Table 5-61
Channel-Specific and Program-Wide NTG Ratio Estimates
for Massachusetts Standard CFLs
Using Program Sales Weights

Lighting Retail Channel	Program Standard CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Program Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	309,876	18	74%	59%	89%	**72%**
Drug	200,961	41	32%	None	69%	**35%**
Grocery (non-HTR)	396,521	42	31%	None	55%	**34%**
Large Home Improvement	1,273,295	32	8%	Removed*	27%	**22%**
Mass Merchandise	134,970	12	100%	33%	27%	**37%**
Membership Club	787,316	7	46%	51%	56%	**49%**
Small Hardware	454,733	26	45%	50%	66%	**50%**
Miscell. Lighting Vendors	35,958	5	41%	70%	60%	**60%**
Program Totals/Averages	**3,593,630**	**183**				**39%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 54% instead of 39%.

Table 5-62 shows the channel-specific and program-wide ratio estimates for standard CFLs using the total sales weight methodology.

Table 5-62
Channel-Specific and Program-Wide NTG Ratio Estimates
for Massachusetts Standard CFLs
Using Total Sales Weights

Lighting Retail Channel	Program Standard CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Total Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	309,876	17	74%	53%	83%	**69%**
Drug	200,961	26	33%	None	85%	**39%**
Grocery (non-HTR)	396,521	23	31%	None	57%	**32%**
Large Home Improvement	1,273,295	21	9%	Removed*	33%	**26%**
Mass Merchandise	134,970	7	100%	33%	42%	**39%**
Membership Club	787,316	7	43%	45%	55%	**44%**
Small Hardware	454,733	26	47%	45%	67%	**48%**
Miscell. Lighting Vendors	35,958	5	45%	64%	60%	**59%**
Program Totals/Averages	**3,593,630**	**132**				**39%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 52% instead of 39%.

5.3.10.2 Massachusetts Specialty CFLs

Using the program sales weighting methodology, the program-wide NTG ratio estimates for the Massachusetts specialty CFLs ranged was 51%. Using the total sales weighting methodology, the program-wide NTG ratio estimates for the Massachusetts specialty CFLs was 47%.The program-wide NTG ratio estimates for the Massachusetts specialty CFLs were higher than those for the standard CFLs. This lends some support to Massachusetts program efforts to favor the specialty CFLs in their promotions. However, depending on the methodology, the differences between the program-wide specialty CFL NTG ratio estimates and those for the standard CFLs range between 8-12%. These differences are not so large that it would be considered obvious that the program should be funding specialty CFLs at the expense of the standard CFLs. Considering the smaller per-bulb discount required for the standard CFLs, it's likely that the standard CFLs will be found to be a more cost-effective component of the

ENERGY STAR lighting program portfolio. Yet it is important to note that this is an observation based solely on only one of the NTG methodologies being used in the evaluation.

Table 5-63
Channel-Specific and Program-Wide NTG Ratio Estimates
for Massachusetts Specialty CFLs
Using Program Sales Weights

Lighting Retail Channel	Program Specialty CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Program Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	124,006	14	97%	61%	75%	**79%**
Drug	2,237	4	38%	None	0%	**36%**
Grocery (non-HTR)	26,789	42	67%	None	77%	**34%**
Large Home Improvement	402,321	27	27%	Removed*	42%	**33%**
Mass Merchandise	4,042	9	None	33%	33%	**33%**
Membership Club	255,456	7	71%	67%	55%	**68%**
Small Hardware	35,827	23	38%	27%	78%	**45%**
Miscell. Lighting Vendors	35,958	5	41%	70%	60%	**60%**
Program Totals/Averages	**886,636**	**131**				**51%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 63% instead of 51%.

Table 5-64
Channel-Specific and Program-Wide NTG Ratio Estimates
for Massachusetts Specialty CFLs
Using Total Sales Weights

Lighting Retail Channel	Program Specialty CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Total Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	124,006	17	97%	57%	75%	**75%**
Drug	2,237	3	38%	None	0%	**37%**
Grocery (non-HTR)	26,789	22	57%	None	75%	**61%**
Large Home Improvement	402,321	17	27%	Removed*	38%	**32%**
Mass Merchandise	4,042	6	None	33%	12%	**32%**
Membership Club	255,456	6	66%	55%	29%	**61%**
Small Hardware	35,827	18	41%	15%	79%	**30%**
Miscell. Lighting Vendors	36,522	5	6%	63%	None	**38%**
Program Totals/Averages	**886,636**	**94**				**47%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 56% instead of 47%.

5.3.10.3 Rhode Island Standard CFLs

Using the program sales weighting methodology, the program-wide NTG ratio estimate for the Rhode Island standard CFLs was 46%. Using the total sales weighting methodology, the program-wide NTG ratio estimate was 45%.

The program-wide NTG ratio estimates for the Rhode Island standard CFLs were slightly higher (45-46% depending on methodology) than those for Massachusetts standard CFLs (39%), although the smaller sample sizes of Rhode Island respondents must be kept in mind when interpreting these results.

Table 5-65
Channel-Specific and Program-Wide NTG Ratio Estimates for Rhode Island Standard CFLs Using Program Sales Weights

Lighting Retail Channel	Program Standard CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Program Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	75,800	12	94%	46%	56%	**68%**
Drug	38,102	12	31%	None	90%	**40%**
Grocery (non-HTR)	19,650	6	None	None	73%	**73%**
Large Home Improvement	167,709	4	8%	Removed*	58%	**35%**
Mass Merchandise	14,748	3	None	33%	60%	**38%**
Membership Club	444	2	80%	35%	None	**58%**
Small Hardware	14,400	3	30%	70%	85%	**51%**
Miscell. Lighting Vendors	No sales					
Program Totals/Averages	**330,853**	**42**				**46%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 66% instead of 46%.

Table 5-66
Channel-Specific and Program-Wide NTG Ratio Estimates
for Rhode Island Standard CFLs
Using Total Sales Weights

Lighting Retail Channel	Program Standard CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Total Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	75,800	11	94%	50%	49%	**65%**
Drug	38,102	8	31%	None	95%	**37%**
Grocery (non-HTR)	19,650	2	None	None	100%	**100%**
Large Home Improvement	167,709	4	8%	Removed*	45%	**32%**
Mass Merchandise	14,748	2	None	33%	50%	**33%**
Membership Club	444	2	80%	35%	None	**53%**
Small Hardware	14,400	2	30%	70%	85%	**61%**
Miscell. Lighting Vendors	No sales					
Program Totals/Averages	**330,853**	**31**				**45%**

Note: CFL sales figures are for the 2009 – June 2010 period. *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. If the outlier estimate had been included, the program-wide NTG estimate would have been 62% instead of 45%.

5.3.10.4 Rhode Island Specialty CFLs

Only a relatively small volume of specialty CFLs were sold through the Rhode Island program with three channels (Discount, Grocery, and Miscellaneous) not selling any specialty CFLs during the 2009-June 2010 time period. The sample sizes for the NTG ratio estimates were proportionately small. Table 5-67 and Table 5-68 show the channel-specific and program-wide NTG ratio estimates for the Rhode Island specialty CFLs using the two different weighting methods.

Table 5-67
Channel-Specific and Program-Wide NTG Ratio Estimates for Rhode Island Specialty CFLs Using Program Sales Weights

Lighting Retail Channel	Program Specialty CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Program Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	No sales					
Drug	278	7	38%	None	35%	**37%**
Grocery (non-HTR)	No sales					
Large Home Improvement	36,965	4	23%	Removed*	47%	**31%**
Mass Merchandise	1,776	3	None	33%	75%	**41%**
Membership Club	1,468	2	80%	35%	None	**58%**
Small Hardware	564	3	30%	70%	85%	**55%**
Miscell. Lighting Vendors	No sales					
Program Totals/Averages	**41,051**	**19**				**33%**

Note: *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. CFL sales figures are for the 2009 – June 2010 period.

Table 5-68
Channel-Specific and Program-Wide NTG Ratio Estimates for Rhode Island Specialty CFLs Using Total Sales Weights

Lighting Retail Channel	Program Specialty CFL Sales Represented by Retail Channel	# of Unique NTG Estimates	NTG Ratio Estimate (Total Sales-Weighted)			
			Manufacturers	Retail Buyers	Store Managers	Overall Retail Channel
Discount/HTR	No sales					
Drug	278	6	38%	None	44%	**39%**
Grocery (non-HTR)	No sales					
Large Home Improvement	36,965	4	25%	Removed*	38%	**29%**
Mass Merchandise	1,776	2	None	33%	100%	**33%**
Membership Club	1,468	2	80%	35%	None	**56%**
Small Hardware	564	2	30%	70%	85%	**62%**
Miscell. Lighting Vendors	No sales					
Program Totals/Averages	**41,051**	**16**				**31%**

Note: *The NTG ratio estimate from one high-level buyer from this channel was removed for being a significant outlier. CFL sales figures are for the 2009 – June 2010 period.

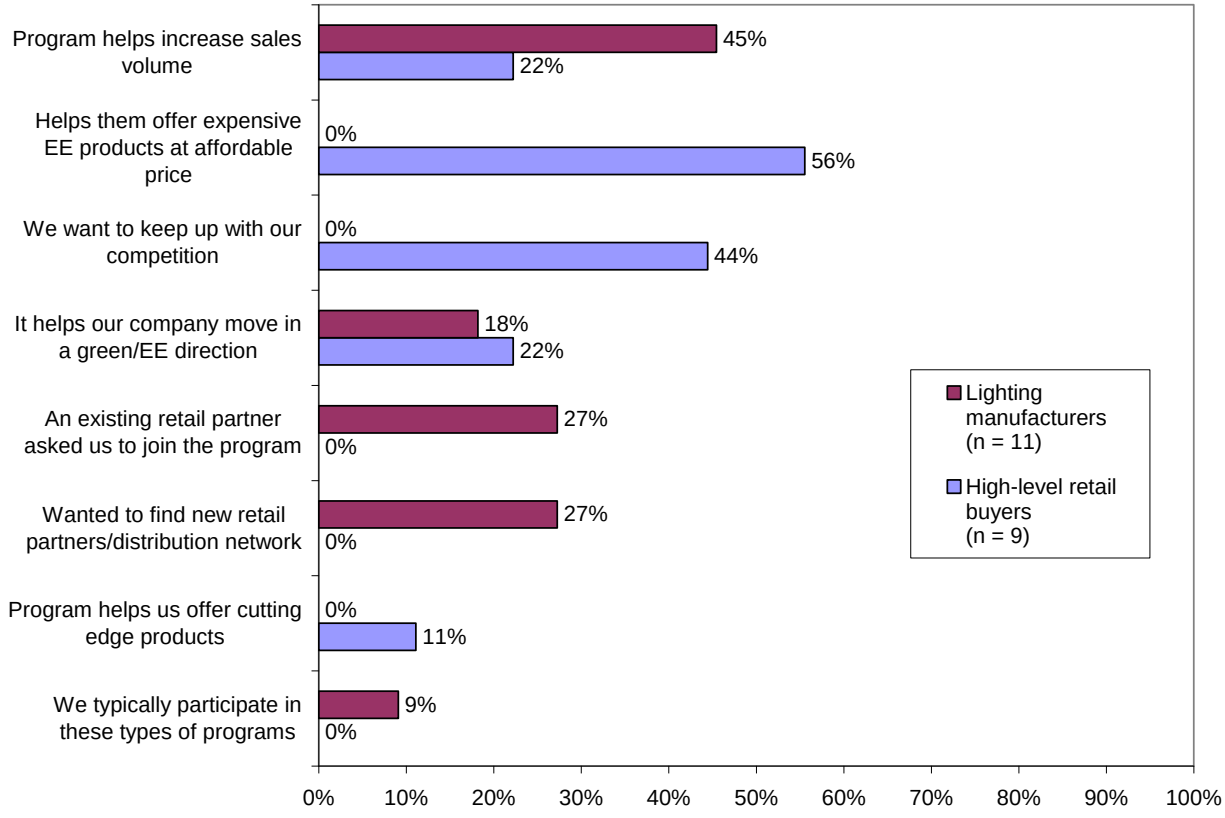
6. CFL Program Market Effects

Because the Massachusetts ENERGY STAR lighting program has been in effect since the late 1990s and the Rhode Island program has been in effect since the early 2000s, there was interest by the PAs and the EEAC in exploring whether these programs might be having market effects. These market effects might include effects from the programs on lighting markets outside Massachusetts or Rhode Island or effects on the Massachusetts or Rhode Island lighting markets that persist even when the program is not active.

6.1 Program Effects on the MA/RI Lighting Market Structure

We asked the participating lighting manufacturers and high-level retail buyers why they decided to join the Massachusetts or Rhode Island programs. They cited a wide variety of reasons for joining (Figure 6-1). The most cited reasons concerned the opportunity to increase sales, with the retailers pointing out that the program discounts helped to reduce the prices of the normally more expensive ENERGY STAR products, making them easier to promote. Some of the reasons were manufacture-specific, such as the desire to find new retail partners and distribution networks or because an existing retail partner had asked them to join. The retailers frequently cited the need to keep pace with their competition.

Figure 6-1
Reasons Why Lighting Manufacturers and High Level Retail Buyers Chose to Participate in the Programs



Note: The total exceeds 100% because the respondents were allowed to cite multiple reasons for joining

We asked the participating lighting manufacturers and high-level retail buyers whether they were selling CFLs in Massachusetts or Rhode Island before joining the program. Figure 6-2 shows that almost two-thirds of the manufacturers were selling CFLs at retail before joining the program. Slightly over a quarter of them were only or mostly selling CFLs through Massachusetts and Rhode Island wholesale and commercial and industrial channels before joining the program. Of the high-level retail buyers, only one of the eight was not selling CFLs before joining the program (Figure 6-2). When the manufacturers and high-level buyers who were not selling CFLs at retail before joining the program were asked to rate the significance of the program influence on their decision to enter the retail market, they gave very high ratings (8-10 on a 10-point scale).

Figure 6-2
Whether Participating Lighting Manufacturers
Sold CFLs in Massachusetts/Rhode Island
Before Joining the ENERGY STAR Program

n = 11

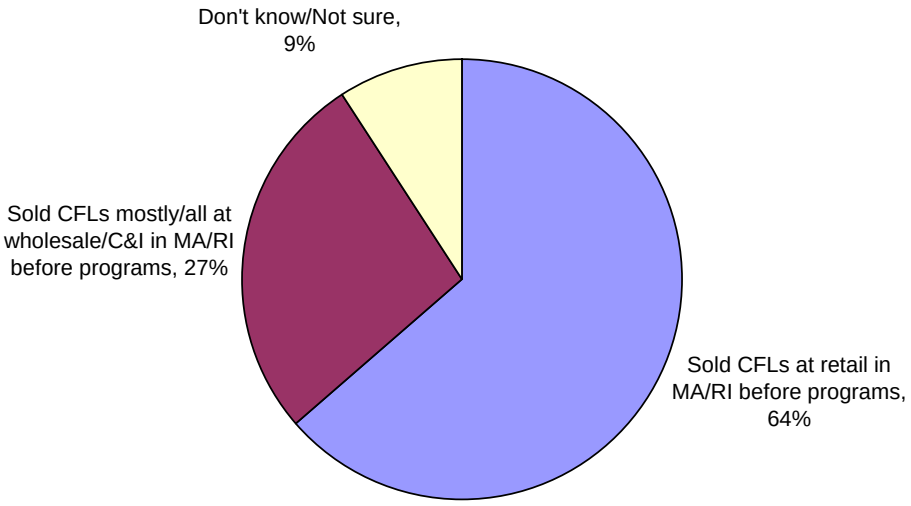
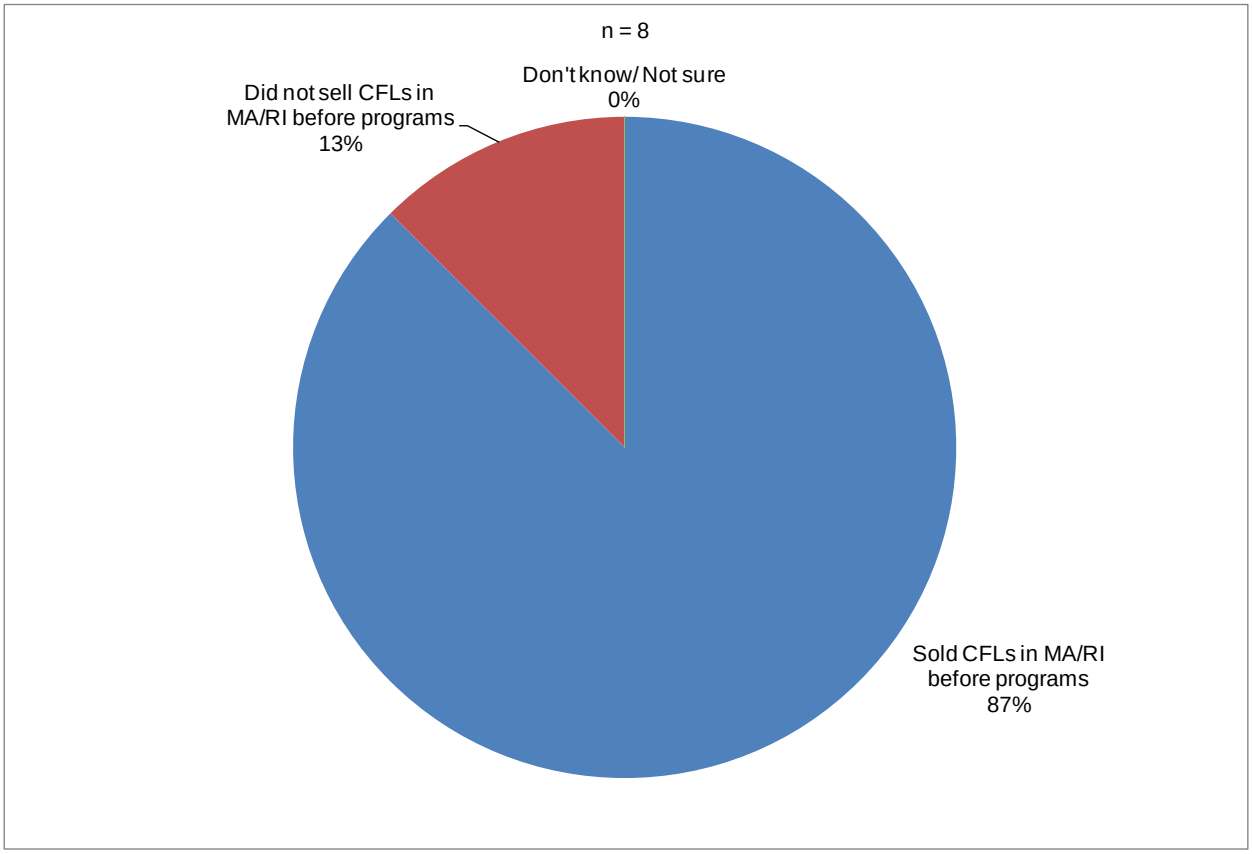


Figure 6-3
Whether Participating Retail Buyers
Sold CFLs in Massachusetts/Rhode Island
Before Joining the ENERGY STAR Program



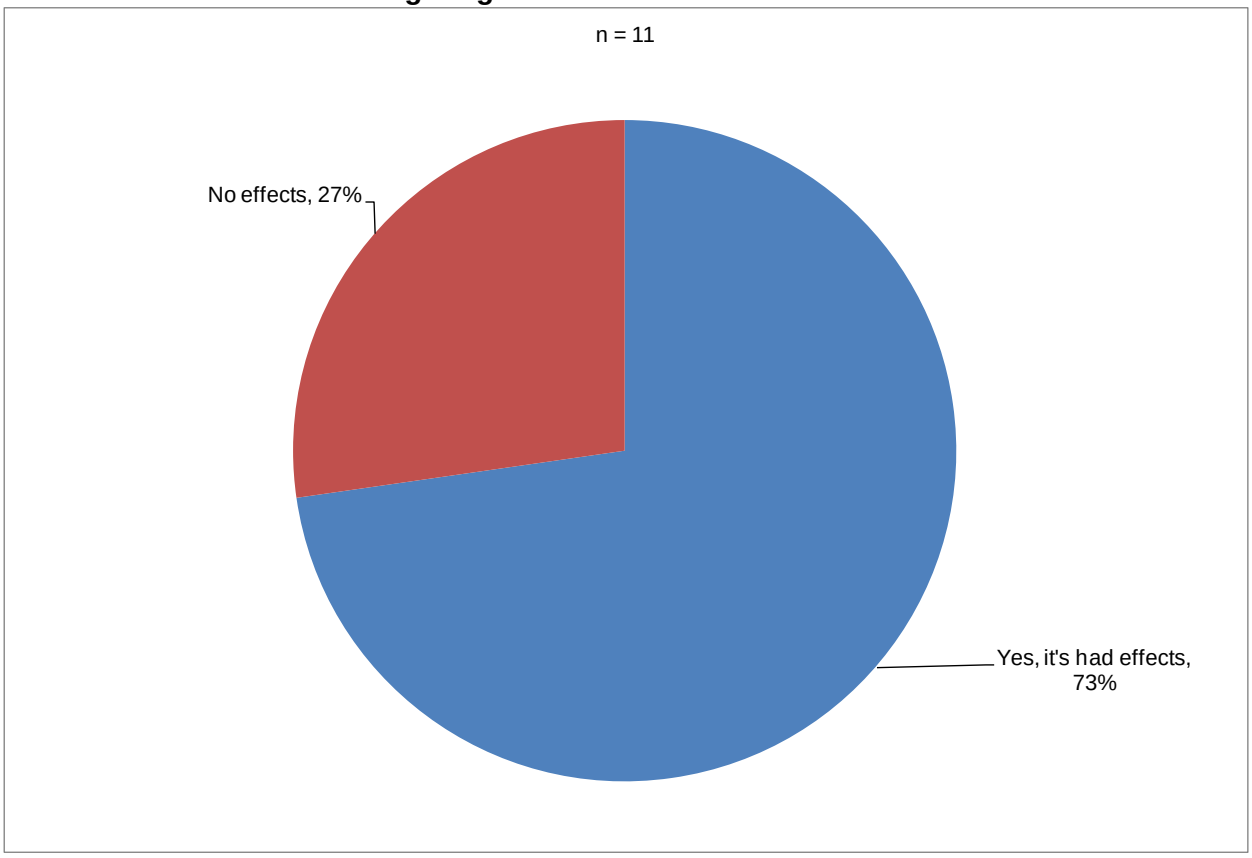
We also asked the lighting manufacturers whether the years of the Massachusetts and Rhode Island lighting rebate/discount programs had any effects on the types of retailers they use to sell CFLs in those states. Nearly three quarters of them said that these programs had effects (Figure 6-4). Most of these effects concerned simply broadening the range of retailers who sell CFLs and who they can make deals with. The following are some representative quotes from four of these manufacturers:

- *"I think it's had a positive impact across all trade classes in raising the awareness of CFLs and getting the retailers interested in selling them … I think home centers and hardware stores were the earliest to react to it and have taken the best advantage of the programs . . . I think food and drug have jumped on the bandwagon, not to the same extent, but at least they're now all carrying the product … without the programs, I don't think that CFLs would*

have penetrated the marketplace nearly as quickly as they have and to the extent that they have."

- *"I can tell you that more channels are carrying CFLs because of primarily the Massachusetts program than would have ever sold CFLs, which is creating a broader market for all customers, including hard-to-reach."*
- *"We wouldn't even be working with some of these smaller retailers. They would never ever get offers. It would be just too much of a reach to even get a hold of these salt-of-the-earth type retailers without these kinds of programs."*
- *"I think it has opened the door for us to talk to more retailers than we would normally talk to. Just because it offers such an attractive environment for the retailers to get involved to buy those types of products."*

Figure 6-4
Whether the Years of MA/RI Lighting Rebate/Discount Programs Have Had Effects on the Types of Retailers That Lighting Manufacturers Use to Sell CFLs



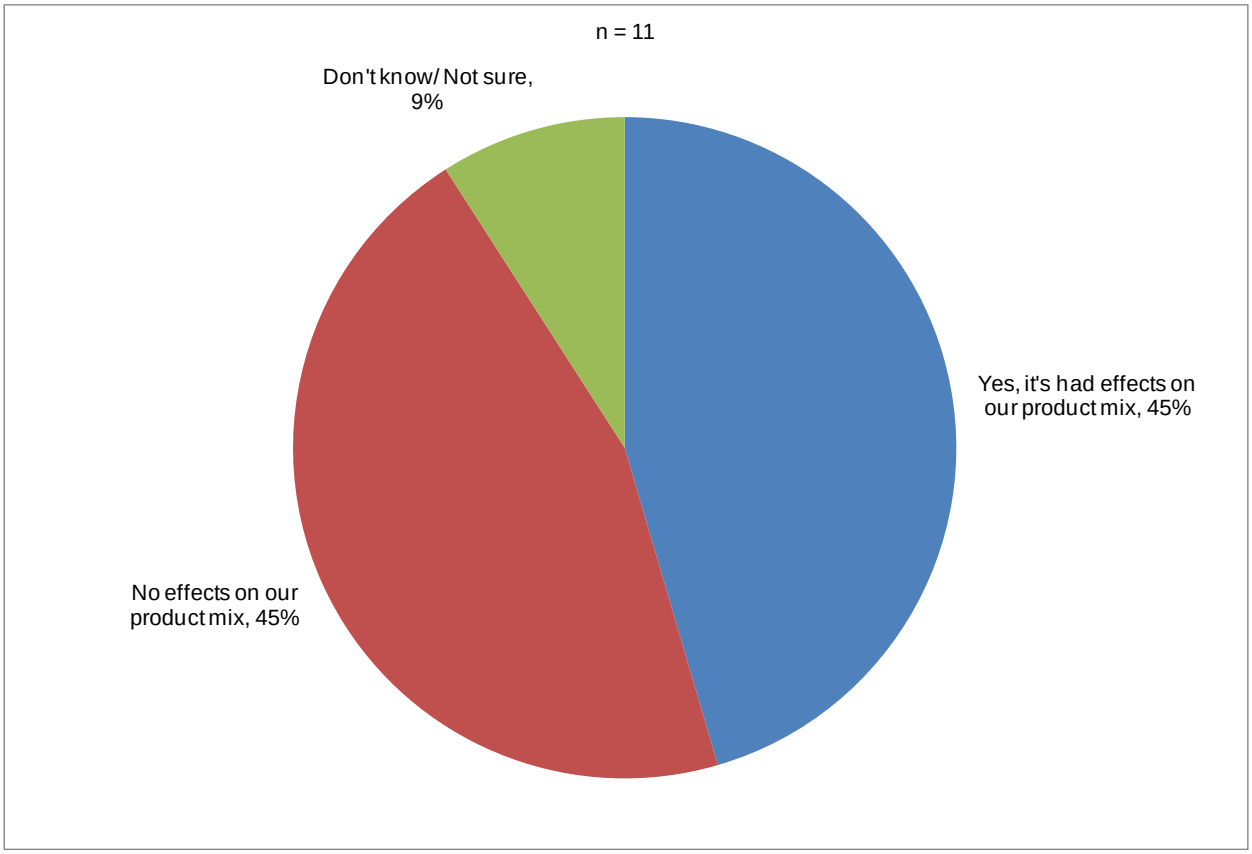
6.2 Program Effects on Lighting Product Variety

While most lighting manufacturers had said that the program had affected which retailers they partner with, they were more evenly divided in terms of the long-term program effects on product offerings. We asked the lighting manufacturers and high-level retail buyers whether the years of the Massachusetts and Rhode Island lighting programs had any influence on the types of CFL or LED products they sell in those states. Figure 6-5 shows the responses of the lighting manufacturers. *"We're selling more of the specialty products than if the program hadn't been around,"* said one manufacturer. *"I think that the mix is definitely more varied than it might have been,"* said another.

A number of manufacturers explained that they change their product mix depending on what the program is providing discounts for. *"It comes down to the incentive,"* said one manufacturer.

"What the incentive is tells us what we're going to be able to afford to put into the program and what the mix is." "Where the incentives are – are generally what we try to offer people," said another manufacturer. *"So obviously we are losing out on regular CFL sales in Massachusetts this year and we're missing out completely in Rhode Island this year."*

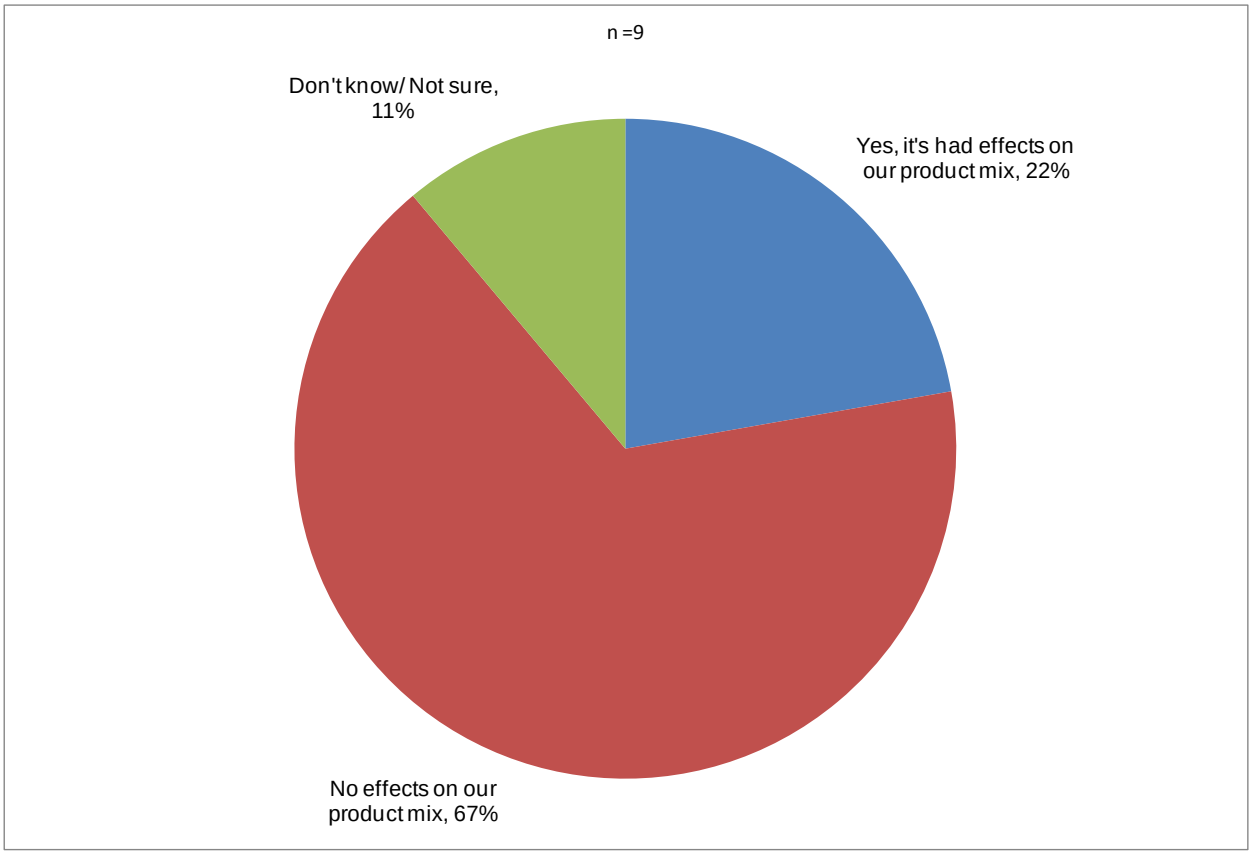
Figure 6-5
Whether the Years of MA/RI Lighting Rebate/Discount Programs Have Had Effects on the Types of CFL/LED Products That Lighting Manufacturers Sell



Most of the high-level retail lighting buyers said that the years of the Massachusetts and Rhode Island lighting programs had *not* influenced the types of CFL or LED products they sell in those states (Figure 6-6). *"I don't think it has an effect,"* commented one buyer. *"I'm only going to buy what I know sells." "I would say that the program doesn't influence what we sell so much as the reverse,"* said another buyer. *"We are constantly updating our product mix, and then as we submit our [program] proposals, we include [these] new SKUs in them."* One buyer who did say that the Massachusetts program had influenced their product mix noted the program had required them not only to offer ENERGY STAR products, but also products that had been tested

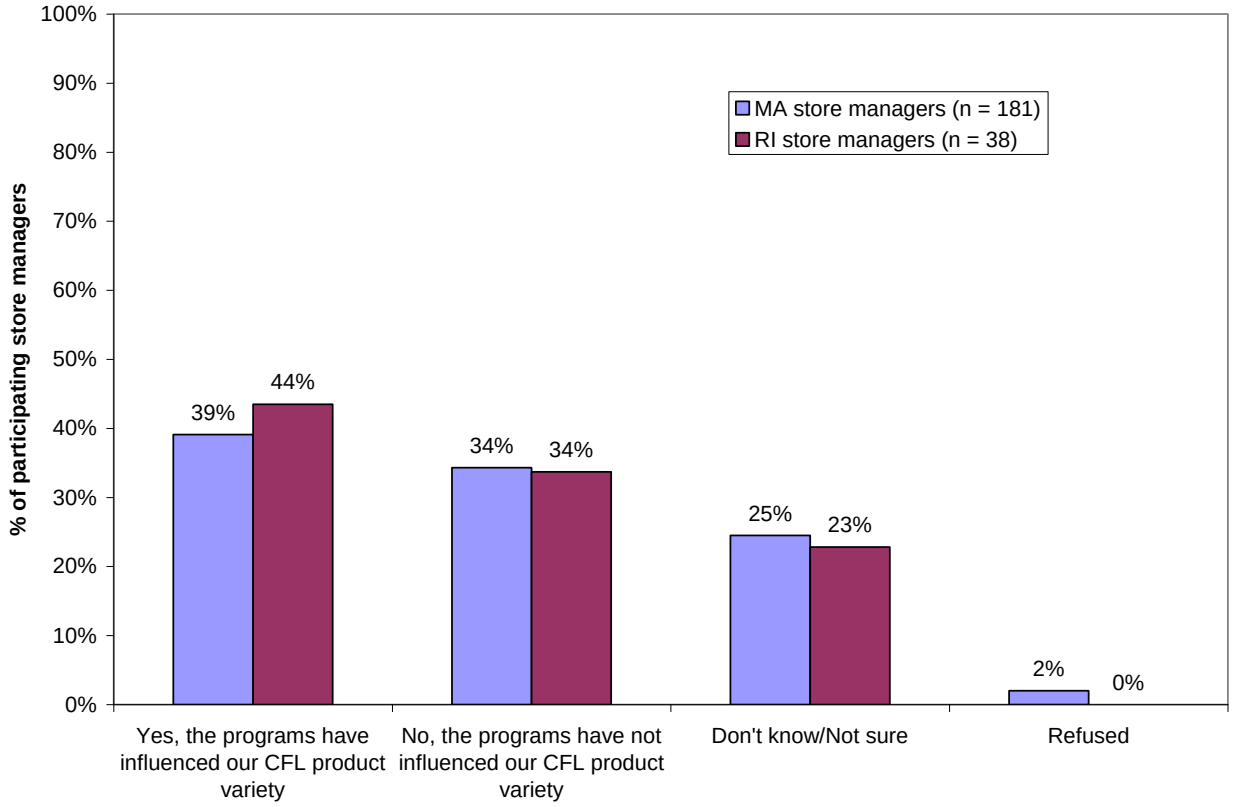
by the Pacific National Northwest Labs and by the Program for Evaluation and Analysis of Residential Lighting (PEARL).

Figure 6-6
Whether the Years of MA/RI Lighting Rebate/Discount Programs Have Had Effects on the Types of CFL/LED Products That High-Level Retail Buyers Sell



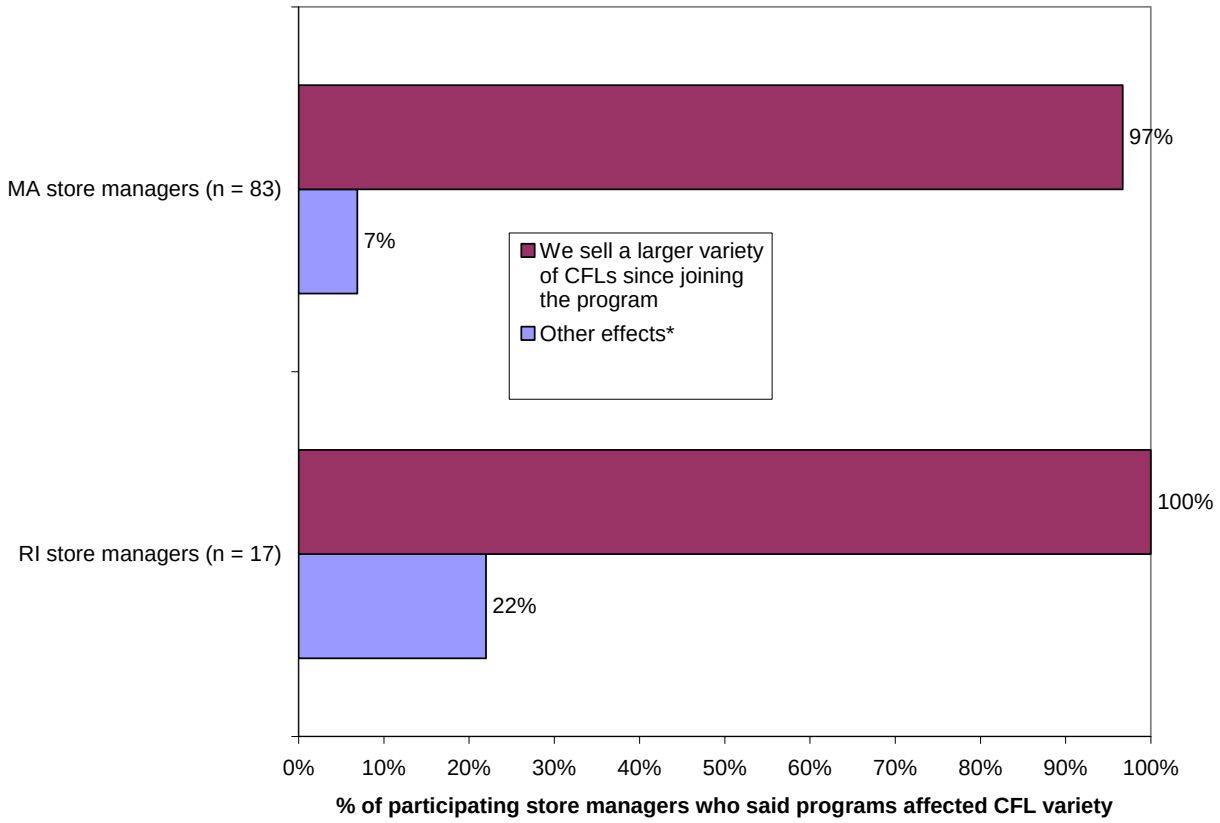
Finally we asked the Massachusetts and Rhode Island store managers: "[STATE] ENERGY STAR lighting program has been in effect since [1998/2003]. Have the years of [STATE] lighting rebate and discount programs had any effects on the variety of CFL products that you sell in [STATE]?" Figure 6-7 shows that about 40% of store managers in both states said that the programs had effects on product variety.

Figure 6-7
Whether the MA/RI Store Managers
Thought That the ENERGY STAR Lighting Program
Had Any Effects on the Variety of CFL They Sell in MA/RI



We then asked the respondents who said that the programs had affected their product variety: "What effects has the program had on the types of CFL products you sell?" Figure 6-8 shows that nearly all of them said that they sell a wider variety of CFLs since joining the program. Other effects they cited included increasing amount of store/shelf space devoted to CFLs, increasing the number of brands, increasing the bulb base sizes, and offering CFL fixtures for the first time.

Figure 6-8
What MA/RI Store Managers
Said Were the Effects of the ENERGY STAR Programs
On Their CFL Product Offerings

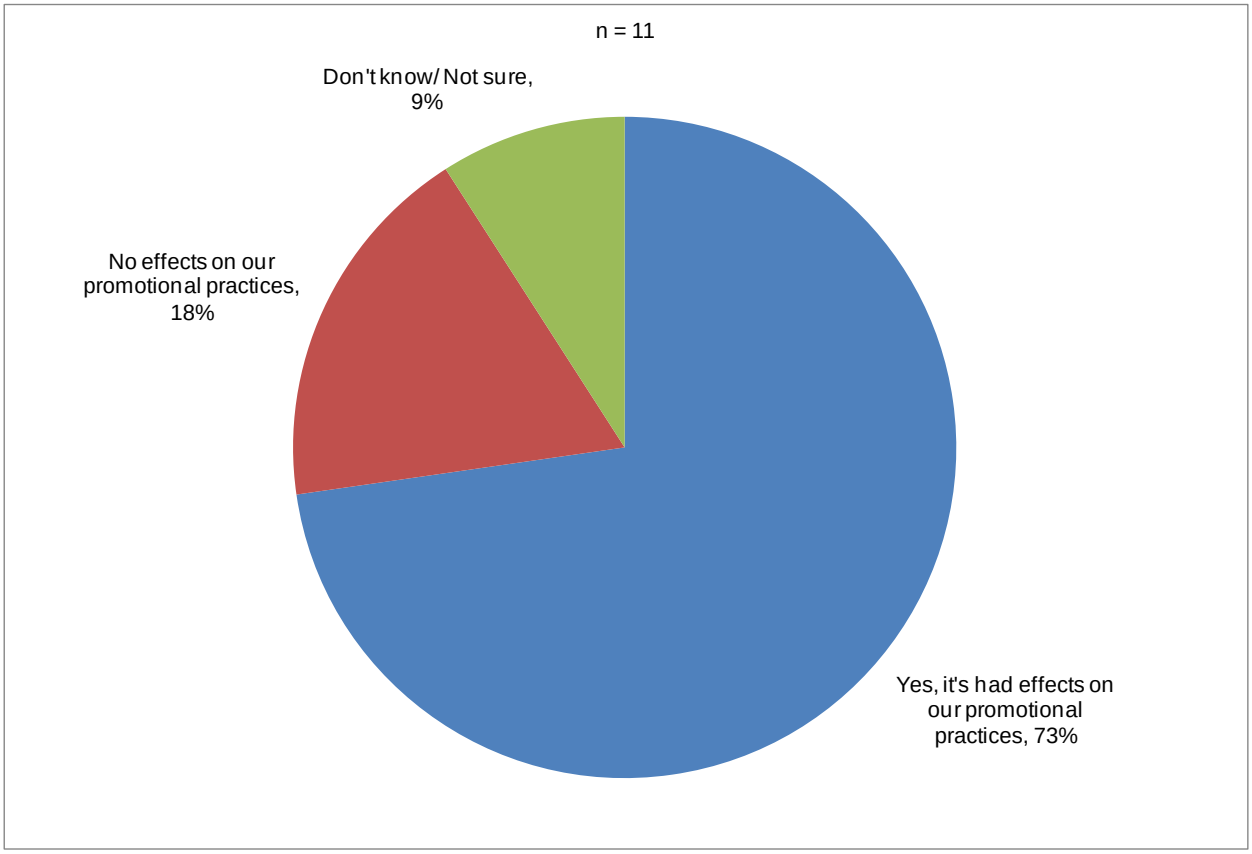


Note: *Other effects include increasing amount of store/shelf space devoted to CFLs, increasing the number of brands, increasing the bulb base sizes, and offering CFL fixtures for the first time.

6.3 Program Effects on Lighting Promotions

We asked the lighting manufacturers whether the years of the Massachusetts and Rhode Island lighting rebate/discount programs had any effects on the way that their company promotes, stocks, or displays its CFL or LED products. Nearly three quarters of them said that they had (Figure 6-9). They noted how the program had encouraged them to give the CFL products more prominent placement than they normally do – such as end caps – as well as more prominent signage.

Figure 6-9
Whether the Years of MA/RI Lighting Rebate/Discount Programs Have Had Effects on How Lighting Manufacturers Promote, Stock, or Display Their CFL/LED Products

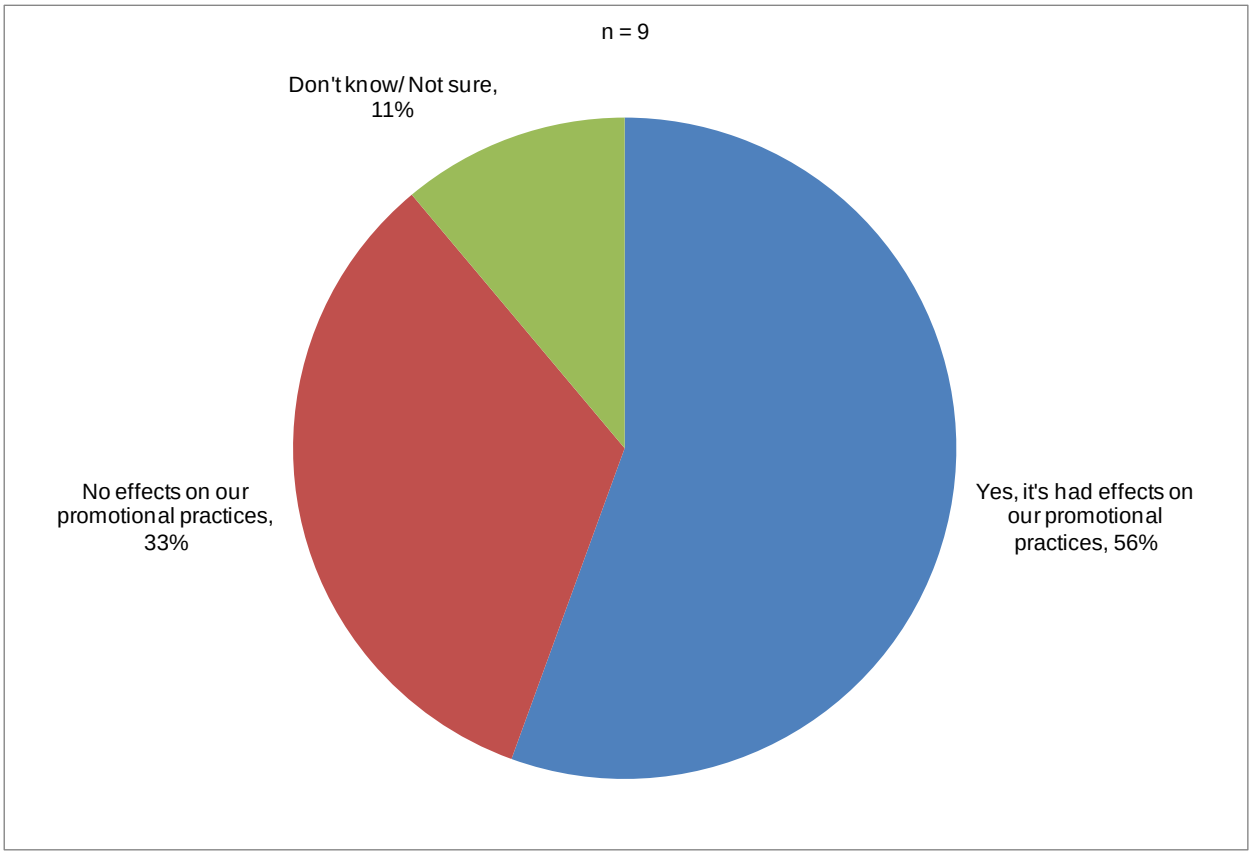


However, once again it wasn't clear if any of these extra promotional practices would be sustained when the program discounts were not available – which would be one criterion for market effects. One manufacturer also claimed that the more prominent product placement and promotions that they do with one of their retailers through the programs was not that different from what this retailer does normally as part of "seasonal promotions." In fact when the Massachusetts program is active at the same time as this retailer's normal seasonal promotion, the manufacturer said that the retailer simply uses the program as a substitute for their normal seasonal promotion.

Some of the high-level buyers, however, did report some program-influenced changes in promotional practices that appeared to be more sustainable. *"Over time [the customer sales information from the program promotions] feeds into our evaluation of how we present products,*

which products we continue to offer, and, occasionally, which products we sort of stop offering," said one retail buyer. Another buyer who represents a franchise retailer noted how the program has encouraged their franchisees to do more cooperative advertising and other promotions for CFLs, even when the program is not available. Yet like the manufacturers, many of the retail buyers did describe changes in promotional practices that seemed to be highly dependent on the availability of the program and its price discounts. Figure 6-10 shows that slightly over half the retail buyers said that the programs have affected their promotional practices.

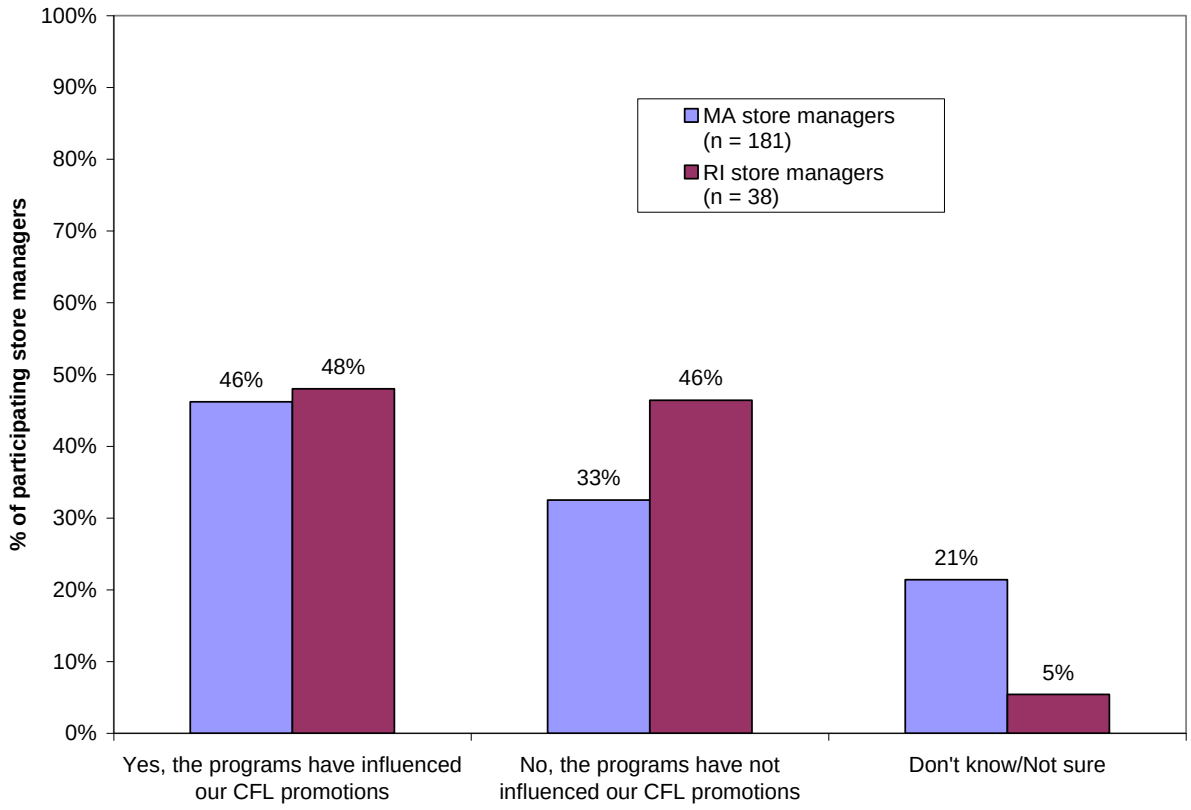
Figure 6-10
Whether the Years of MA/RI Lighting Rebate/Discount Programs Have Had Effects on How Lighting Manufacturers Promote, Stock, or Display Their CFL/LED Products



Finally we asked the Massachusetts and Rhode Island store managers: "Have the years of [STATE] lighting rebate and discount programs had any effects on how you promote the CFL products that you sell in [STATE]?" Figure 6-11 shows that nearly half of the store managers from both states said that the program had influenced how they promote their CFLs. However,

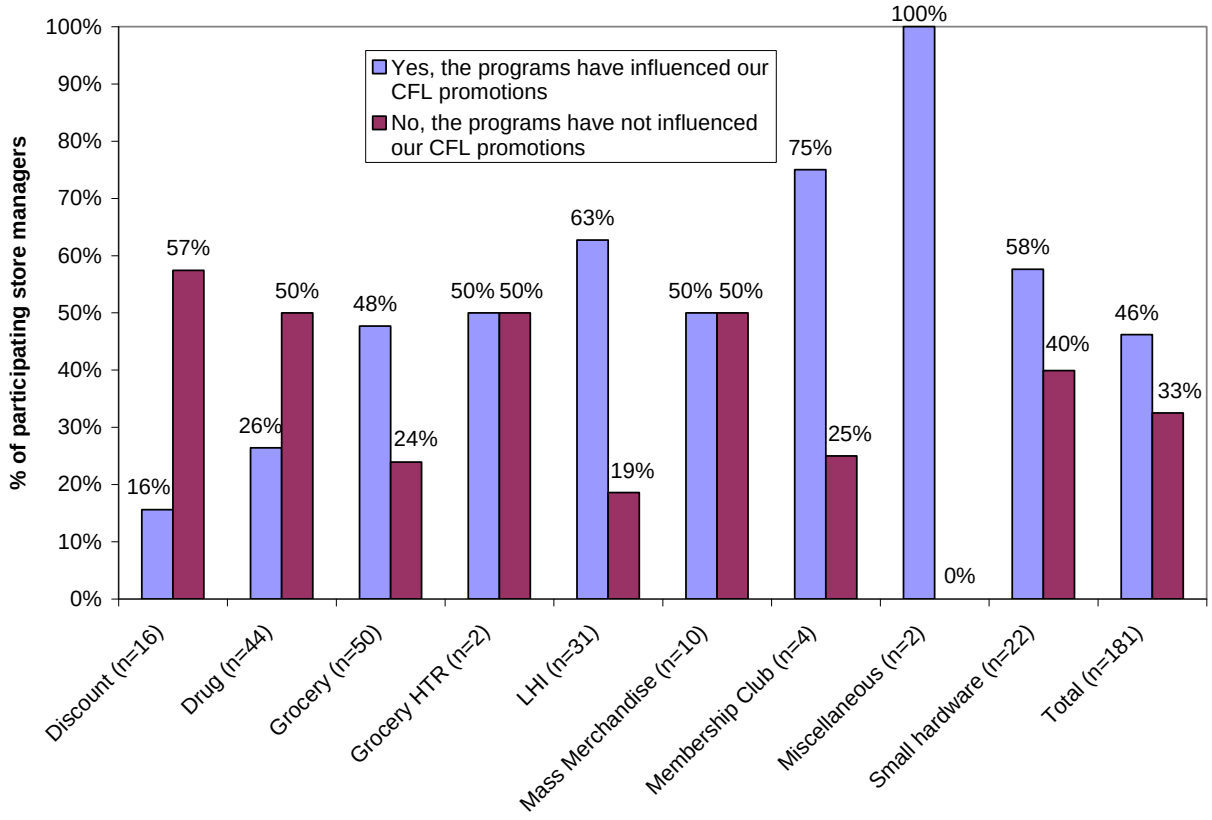
the Rhode Island store managers were much more likely than the Massachusetts store managers to say that the programs had *not* influenced their promotional practices.

Figure 6-11
Whether the MA/RI Store Managers
Thought That the ENERGY STAR Lighting Program
Had Any Effects on How They Promote CFLs in MA/RI



There was some variation in the responses depending on which retail channel a store manager belonged to. Figure 6-12 shows that the store managers in the Discount, Drug, Grocery HTR, and Mass Merchandise channels were much more likely than those in other channels to say that the programs had *not* influenced their CFL promotional practices.

Figure 6-12
Whether the Massachusetts Store Managers Thought That the ENERGY STAR Lighting Program Had Any Effects on How They Promote CFLs in Massachusetts by Retail Channel

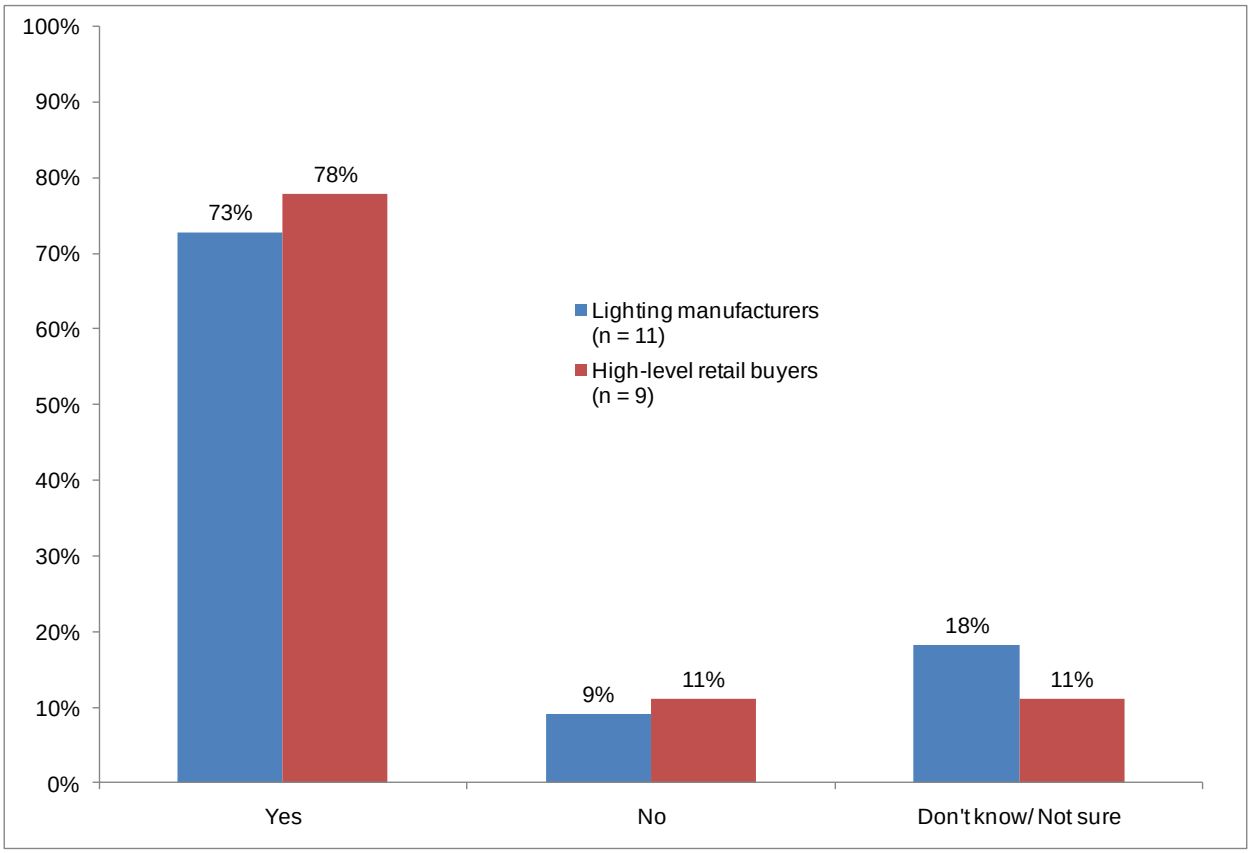


At first glance this seems surprising, since three of these four channels have been associated with HTR customers and the Massachusetts program has tried to increase sales in the HTR market. Yet there are a few possible explanations for this. First, as discussed earlier in this report, some stores simply have limited space for lighting products. Drug stores and small grocery stores, for example, naturally have a small footprint for lighting products and therefore are likely constrained as to how much space they can allocate for special lighting placements or promotions. Second many of the in-store promotional strategies that have proven successful for CFL discount programs – like giving the CFLs greater prominence through end caps, etc. – are already standard practice in Discount stores for a wide range of products. Therefore store managers may not view promoting CFLs in this way as anything new or different. Finally, as discussed in the net-to-gross section of this report, some managers of stores with dollar limits may not realize that the program discounts are needed for the promotion of any CFLs.

6.4 Impact of Lighting Programs on Other New England States

We asked the lighting manufacturers and high-level buyers whether they thought the Massachusetts and Rhode Island programs had influenced the level of sales of CFLs in New England *as a whole.* Figure 6-13 shows that about three quarters of them thought they had.

Figure 6-13
Whether Lighting Manufacturers and Retail Buyers Thought That the MA/RI Programs Had Influenced CFL Sales Levels in New England as a Whole



When asked to explain their reasoning, the lighting manufacturers and high-level retailers gave some of the following explanations:

- *The MA/RI programs helped develop and sustain some of the more cutting-edge lighting technologies that otherwise might have been neglected by the lighting industry:* "I think

they've had a huge impact. … I really think without utility encouragement throughout the '80s and '90s, I almost question whether the higher technologies just would have died. … If sales hadn't developed -- and they certainly weren't very strong for the initial decade they were in the market -- it would be sort of a cycle. [The lighting industry] wouldn't have invested in improving the technology, which means they would have continued to have barriers, performance and quality issues, or the consumer's price points would have remained high, which meant that people wouldn't buy them, which meant that they wouldn't have the revenues to justify R&D to improve the products, which meant the products wouldn't get better, which meant consumers wouldn't buy them, because the price had stayed high, etc."

- *The MA program provided a program model for other New England states:* "I think the Massachusetts programs have taken a leadership role in the region, and I think without the success of the Massachusetts programs, then some of the other states may not have followed or wouldn't have modeled their programs as closely to the Massachusetts programs."

- *The MA/RI programs helped get larger retail chains involved in rebate programs which can have spillover effects:* "I'd say they've definitely helped … in New England and I would say even outside of New England a bit in gathering some of the national chains onto the program. It helps to affect the price points that those places go out at within their grouping. I know that ... Lowe's doesn't necessarily just limit the group of stores to Massachusetts, and they may have to run price points outside of Massachusetts. So I'd say in that respect that it's probably helping some of the other states by us having a program."

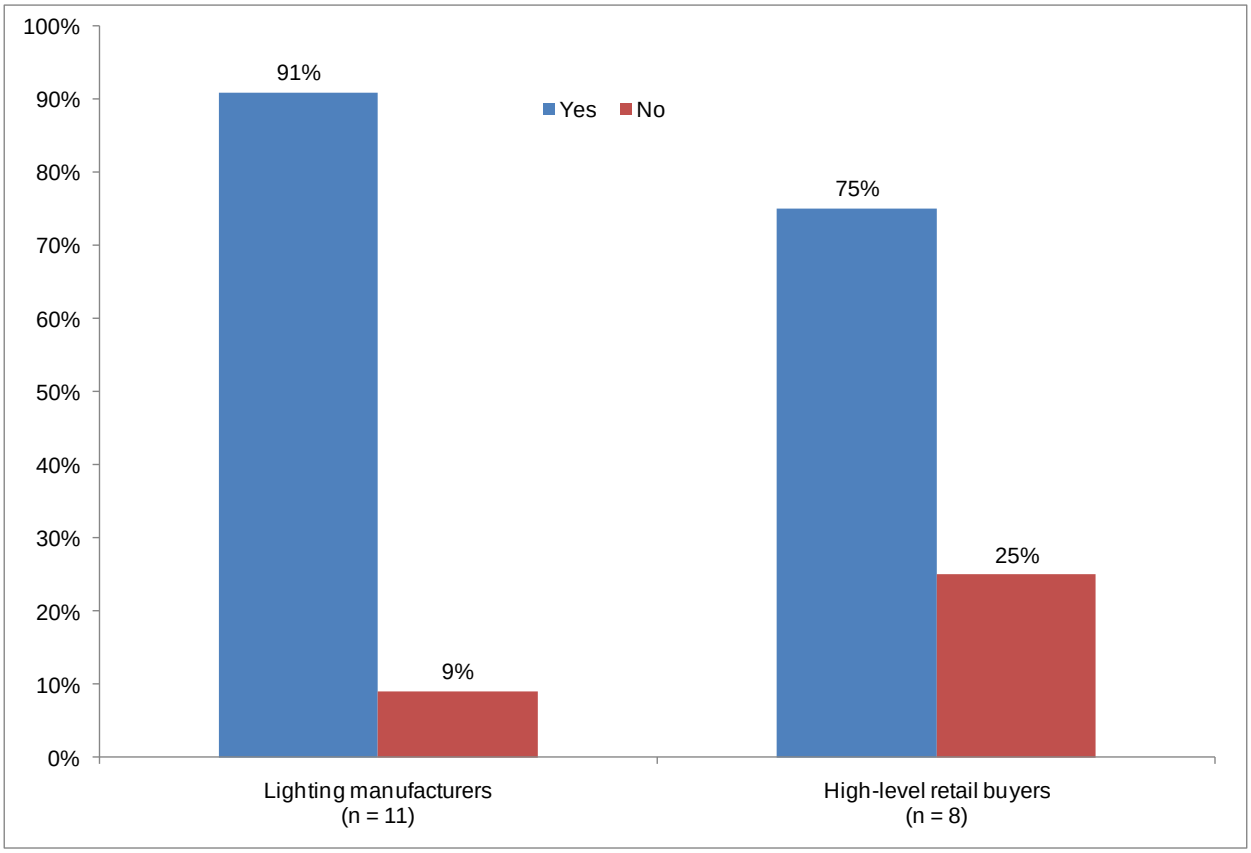
- *The MA/RI programs have broader consumer education effects:* "What we found, with more education, more marketing to consumers -- so the what, whys, wheres, hows, and stuff like that -- the more, the greater impact it does have for a territory."

6.5 The Effects of the Programs on CFL Quality, Performance and Innovation

We queried the lighting manufacturers and high-level retail buyers on whether the years of the Massachusetts and Rhode Island ENERGY STAR programs had influenced the quality and performance of the CFLs they sold in New England as a whole. Figure 6-14 shows that a large

majority from both market actor groups said that the programs had affected CFL quality and performance.

Figure 6-14
Whether Lighting Manufacturers and Retail Buyers Thought That the MA/RI Programs Had Influenced the Quality and Performance of the CFLs They Sell in New England as a Whole



When asked to explain their reasons for saying that the Massachusetts and Rhode Island programs had influenced CFL quality and performance, the manufacturers and buyers usually mentioned the programs' requirements that bulbs meet ENERGY STAR standards. One manufacturer also claimed that the additional revenue created by the program-driven CFLs sales gave manufacturers more money to spend on R&D for product improvements. The following are some representative quotes:

- *"I think some of the product requirements that existed early on in the Massachusetts programs helped to set a tone and a standard for the quality of products that are sold here in this state."*

- *"It's helped improve quality because you have to meet all the stringent tests of ENERGY STAR, and then ENERGY STAR also goes out and randomly checks your product to make sure it meets the guidelines because if it doesn't, they'll pull it."*

- *"I think it definitely has elevated everyone's game, especially on the ENERGY STAR 4.0."*

- *"The program requirements to being ENERGY STAR probably have a larger effect on the manufacturers themselves because they know that, in order to play in the utility game, it has to be ENERGY STAR. And what those specs have done is, to a point, has standardized or at least provided that minimum floor of quality."*

6.6 The Sustainability of CFL Sales in the Absence of the Program

We asked the lighting manufacturers and lighting buyers what the effects on CFL sales levels in Massachusetts and Rhode Island if these states eliminated their lighting discount programs starting in 2011. All of them said that CFL sales would drop in those states and most said that they would drop significantly. "It will kill them for years," said one manufacturer. "There's no market transformation, and I see market transformation maybe in five years as soon as work-arounds and incandescents become more scarce, but that's still years away." "It would be detrimental. It happened for us in Texas," said one retail buyer. "Texas did a one-year program. We sold thousands of bulbs, and then they said: 'We're not going to do that again.' And we went from … selling 2,000 to 3,000 bulbs a month to 10."

6.7 Other Influences on Lighting Market

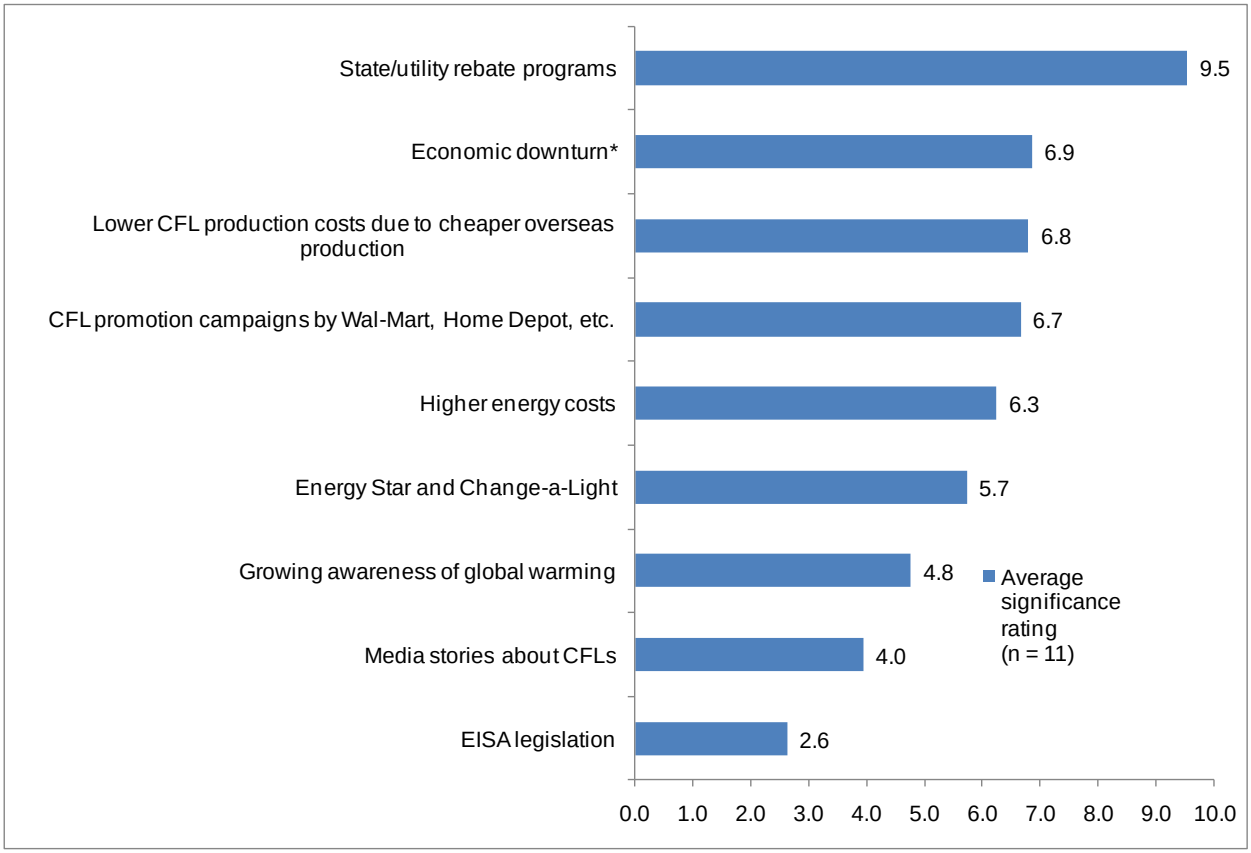
Other factors can drive CFL sales in Massachusetts and Rhode Island besides the ENERGY STAR lighting program. Energy prices, media stories, national programs such as ENERGY STAR's Change-a-Light promotions, concerns about global warming, and independent promotional campaigns by large national retailers are just some of the factors that could be driving CFLs sales in addition to the Massachusetts and Rhode Island discount programs.

To get a better understanding of the relative importance of the lighting discount programs compared to these other drivers of CFL sales, we asked the lighting manufacturers and high-level retail buyers to rate their relative importance. We asked them the following question:

> *Lighting rebate and discount programs are only some of the factors that may be encouraging sales of CFL bulbs and fixtures in Massachusetts [AND RI]. I'm going to name a number of possible drivers of increased CFL bulbs and fixtures. For each one I identify, please indicate how significant you think it is as a driver of increased CFL product sales in Massachusetts [AND RI] during the 2009-2010 period. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.*

Figure 6-15 shows that the lighting manufacturers considered the state or utility rebate programs to be the most important drivers of CFL sales. Lower overseas CFL production costs, high energy costs, independent CFL promotional campaigns by national retailers, and the economic downturn were also considered to be important factors. It should be noted, however, that some of the respondents thought that the economic downturn was actually a *negative* driver of CFL sales by encouraging some consumers to purchase incandescent lamps which were less expensive than even the program-discounted CFLs.

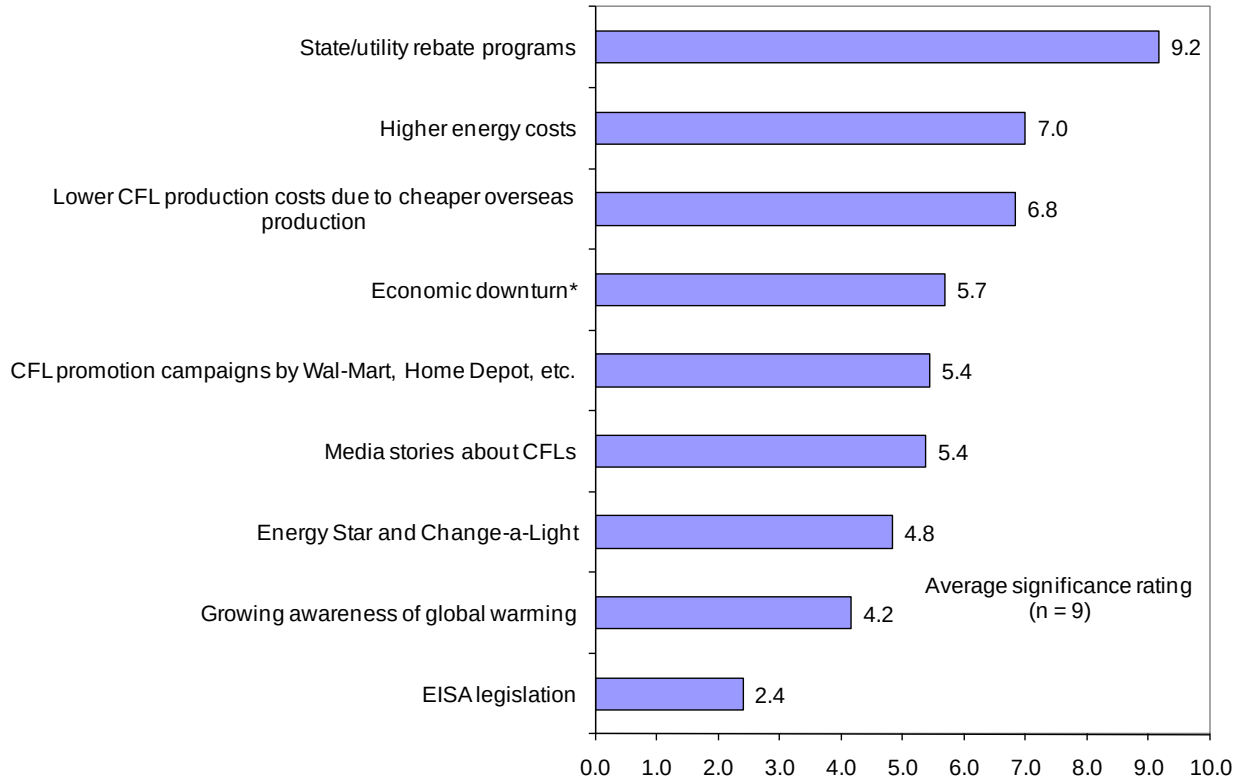
Figure 6-15
The Relative Importance of
Various Drivers of CFL Sales
According to Lighting Manufacturers



Note: *A few respondents thought that economic downturn was a negative driver of CFL sales – e.g., it caused some consumers to switch to the less expensive incandescent bulbs.

Figure 6-16 shows the significance ratings provided by the high-level retail lighting buyers. As the manufacturers did, they considered the state or utility rebate/discount programs to be the most significant driver and they considered energy prices and lower overseas CFL production costs to also be important factors. They were less likely than the manufacturers to declare that the independent CFL promotional campaigns by national retailers and the economic downturn to be significant factors.

Figure 6-16
The Relative Importance of
Various Drivers of CFL Sales
According to Retail Lighting Buyers



Note: *A few respondents thought that economic downturn was a negative driver of CFL sales – e.g., it caused some consumers to switch to the less expensive incandescent bulbs.

In addition to asking the lighting manufacturers and high-level lighting buyers to rate the relative significance of these drivers of CFL sales, we also asked them to explain their ratings. Table 6-1 shows some representative quotes from the manufacturers and retail buyers explaining why they gave high or low significance ratings for certain potential CFL drivers.

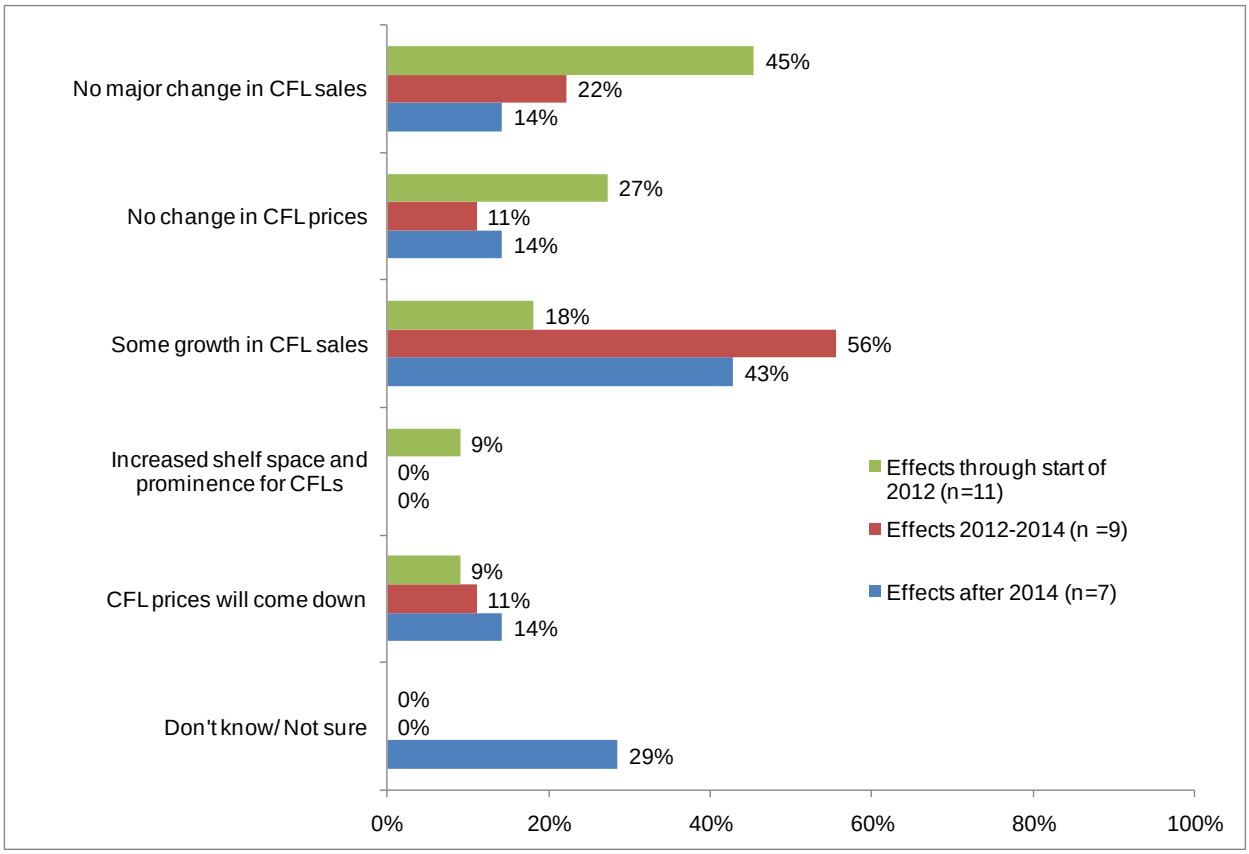
Table 6-1
Reasons Why Lighting Manufacturers/Buyers Considered Various Drivers of CFL Sales to Be Significant or Not

Possible CFL Drivers	Sample Reasons for Positive Ratings	Sample Reasons for Negative Ratings
State or utility rebate and discount programs?	o "Having that program there helped very much, getting the product in the stores and getting special placement as well." o "The cost difference between what a CFL could be and what it is through the program I think drives quite a few sales." o "The utilities are "putting their money where their mouth is."	
The Energy Star program including its Change-a-Light campaign?	o "You just see [Energy Star] everywhere now, and people know what the brand is." o "We do the Change-a-Light every year."	o "I don't think it's quite as exciting as some of the marketing materials we used to use in the past." o "I think it's actually in a wrong time period. In my opinion, it should be more in the winter, January and February. It's too close to holiday time for retailers."
CFL promotion campaigns by some large retailers such as Wal-Mart, Home Depot, and Lowe's that are being done independently of any state or utility energy efficiency programs?	o "When Wal-Mart gets all the press, whether they're for the same programs or not, that just has such an immeasureable impact." o"They are really doing a great campaign around it, whether it is including breast awareness with the CFLs or a loss leader in their stores for the month of October for peak lighting season. And they really do drive a tremendous amount of volume in sales."	"They're not going to promote CFLs on their own without manufacturer help."
Media stories promoting the use of CFLs?	"Again, just driving awareness to the public. Television, I think, reaches more folks these days than something in a print campaign would."	o I can't see it, you know, seeing a commercial and running out and buying a CFL bulb. I just don't see that happening that often." o "It helps, you know, when it gets on Oprah or Leonardo DiCaprio comes on ... you get a little bit of buzz about it, but it's just not going to be an everyday item for the consumer."
Reductions in CFL production costs and price points due to lower-cost overseas manufacturing and increases in CFL production capacity?	"When CFLs dropped from costing $8 to $10 to costing $2 to $3, it made a huge difference."	"There's just people that just don't like CFLs, won't buy CFLs, regardless of the pricing."
Growing consumer awareness about global warming?	"Because of global warming, you start talking about energy efficiency and how we can conserve energy and things of that nature … And so once they start talking about lighting, they have a CFL there."	o "I don't think customers look at light bulbs from a global warming perspective." o "The public rates global warming way down the list."
Higher energy costs?	"There's going to be a huge driver for people to put in energy efficiency products and save money on their electric bill."	

6.8 The Energy Independence and Security Act

In December 2007 Congress passed an energy bill called the Energy Independence and Security Act (EISA). One component of the bill calls for a gradual phase-out of inefficient lamps over time starting in 2012. We asked the lighting manufacturers and high-level buyers what they thought the impact of EISA would be on CFL sales and prices for three different time periods: 1) through the start of 2012; 2) 2012-2014; and 3) after 2014. The questions were open-ended. Figure 6-17 shows the responses of the lighting manufacturers.

Figure 6-17
EISA Impacts on CFL Sales/Prices
According to Lighting Manufacturers



The chart shows that few manufacturers thought that CFL sales would increase in the period leading up to the phase-out. Their reasons included the continued availability of most incandescent wattages, consumer ignorance of EISA and its implications, and the fact that some consumers simply do not like CFLs. The 2012-2014 period is when the manufacturers

thought that CFL sales would increase the most. This would be due not only to the incandescent phase-out but also because they thought that LEDs would not yet be viable replacements. However, they also thought that CFL sales growth during this period would be restrained somewhat by:

1) Some consumers staying with incandescent but just being satisfied with lower wattages;

2) The continued availability of some incandescent bulbs due to loopholes in the EISA law;

3) Some market share gained by qualifying halogens; and

4) Some consumers not buying CFLs because they are working their way through their stockpiles of incandescent bulbs.

After 2014 many manufacturers thought that CFLs would continue to increase, but a few thought that CFLs at this point would start to lose market share to LED lighting products.

In general, the high-level buyers gave similar responses to the manufacturers with a few exceptions. These exceptions included:

- They were less likely to think that CFL sales or prices would change in the period through the start of 2012;
- They were more likely to think that consumers would be hoarding incandescents during the phase-out; and
- They thought that halogens would play a bigger role in the post 2014 period.

We also asked the manufacturers and high-level retailers about the impact of EISA on incandescent bulbs. Some high-level takeaways include:

- Incandescent production is already being curtailed and this is putting some upward pressure on prices for incandescent bulbs;
- Manufacturers of incandescent bulbs are actively exploring EISA-compliant alternatives, but these will likely take the form of energy-efficient halogen products (there was general consensus that conventional incandescent bulbs will not be able to meet EISA standards) or some of these manufacturers will shift production capacity to CFLs or LEDs;

- Some retailers have already stopped promoting incandescent bulbs, some plan to stop a few months before the phase-out, and some plan to keep selling them until they are phased out;

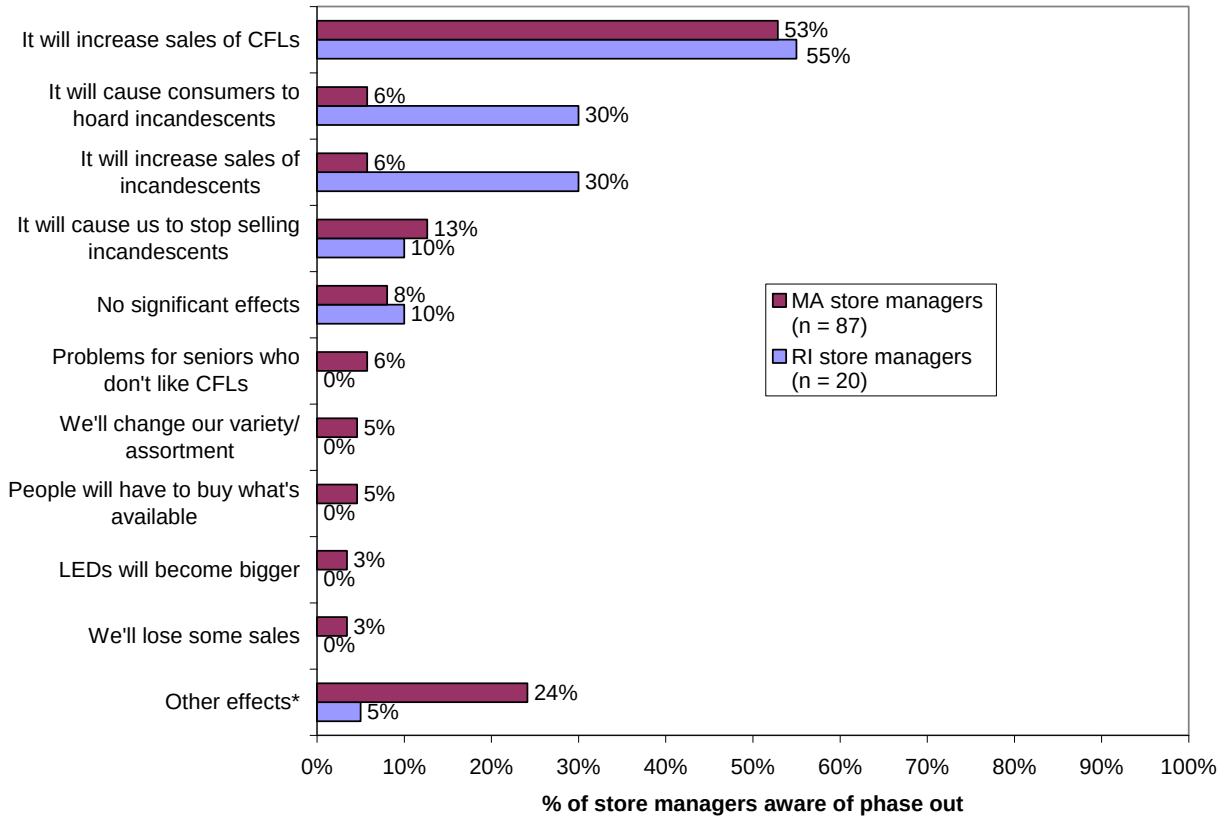
- Discounters expect to have a flood of incandescent bulbs as they acquire close-out/liquidation supplies from mainstream retailers; and

- Consumers will likely do some hoarding of incandescent bulbs but it likely will not start until the EISA phase-out gets more publicity and it will likely not involve the 100-Watt bulbs because this has not been a very popular bulb to begin with.

We also asked the Massachusetts and Rhode Island store managers whether they were aware of the federal phase out.[20] Forty-eight percent of the Massachusetts store managers and 53% of the Rhode Island store managers said they were aware of the phase out. We then asked those who said that they were aware of the phase out what effects they thought it would have on the lighting they sell. Figure 6-18 shows that over half of the Massachusetts and Rhode Island store managers who were aware of the phase out thought that it would increase their sales of CFLs. A significant portion of the Rhode Island store managers also thought that there would be a spike in incandescent sales due to consumers hoarding them.

[20] The full survey question was: "In December 2007 Congress passed an energy bill called the Energy Independence and Security Act. One component of the bill calls for a gradual phase-out of inefficient lamps over time starting in 2012. Before now were you aware of this federal phase out of inefficient lamps?"

Figure 6-18
What MA/RI Store Managers Thought
Would be the Effects of EISA Lamp Phase Out



Note: *Other effects include cutting out some of their products, CFL prices will go down, they'll sell more specialty CFLs, they're already phasing out their incandescents, consumers will panic, consumers will be angry, it will increase consumer knowledge of CFLs, we'll sell more CFL-ready fixtures, et al.

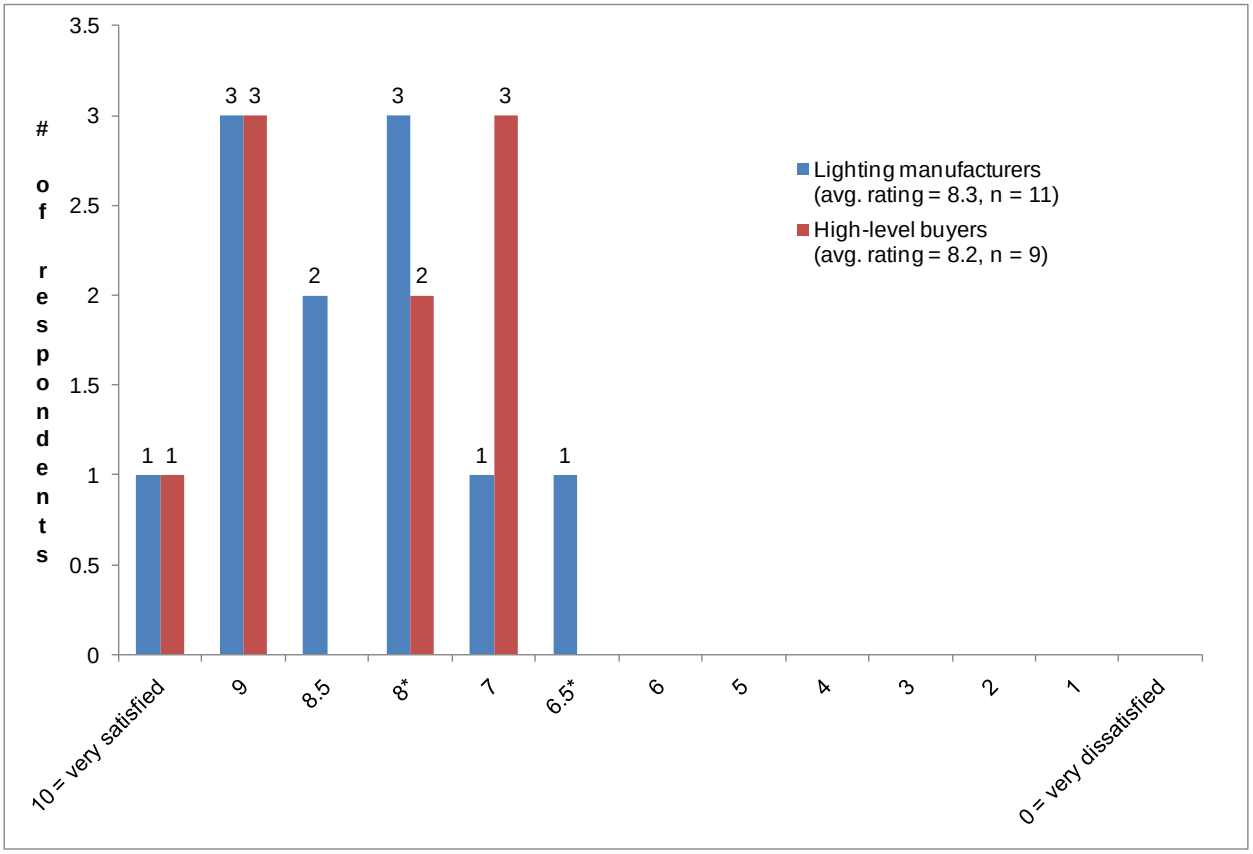
7. Program Satisfaction and Participant Recommendations for Program Improvements

We asked all the participating lighting market actors to provide feedback on their satisfaction with the programs. In the case of the lighting manufacturers and high-level buyers, we asked them for a single program satisfaction rating. For the store managers we asked them about their satisfaction with the process of ordering/reserving the program CFLs, with the availability of the program CFLs, with their interactions with program staff, and with the program as a whole.

7.1 The Manufacturer and High-Level Buyer Perspectives

We asked the lighting manufacturers and high-level buyers to rate their satisfaction with the Energy star lighting program using a scale of 0 to 10 where 10 = very satisfied and 0 = very dissatisfied. Figure 7-1 shows that the average satisfaction ratings of the manufacturers (8.3) and high-level buyers (8.2) were very similar.

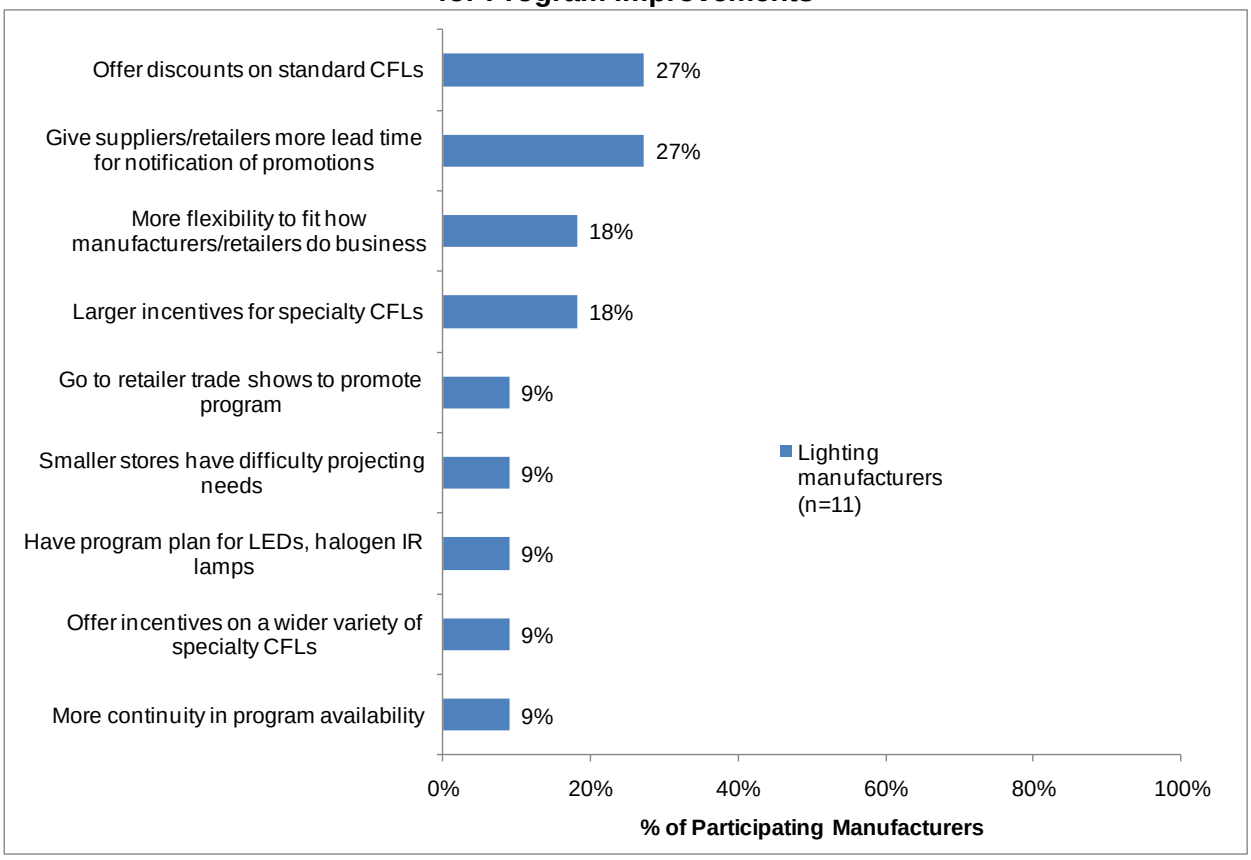
Figure 7-1
Program Satisfaction Ratings
from Participating Manufacturers and High-Level Retail Buyers



Note: *Two of the 8 point satisfaction ratings are averages of Massachusetts and Rhode Island program ratings. In both cases, the manufacturers gave ratings of 9 for the Rhode Island program and 7 for the Massachusetts program. The 6.5 rating was an average of a 10 rating for the Massachusetts program and 3 for the Rhode Island program. None of the retail buyers provided separate Massachusetts and Rhode Island satisfaction ratings.

We also asked the lighting manufacturers and high-level retailers about ways that the Massachusetts and Rhode Island programs could be improved. Figure 7-2 shows that the most-cited recommendations from manufacturers was to offer discounts on standard CFLs and to give suppliers and retailers more lead time for notification of program promotions.

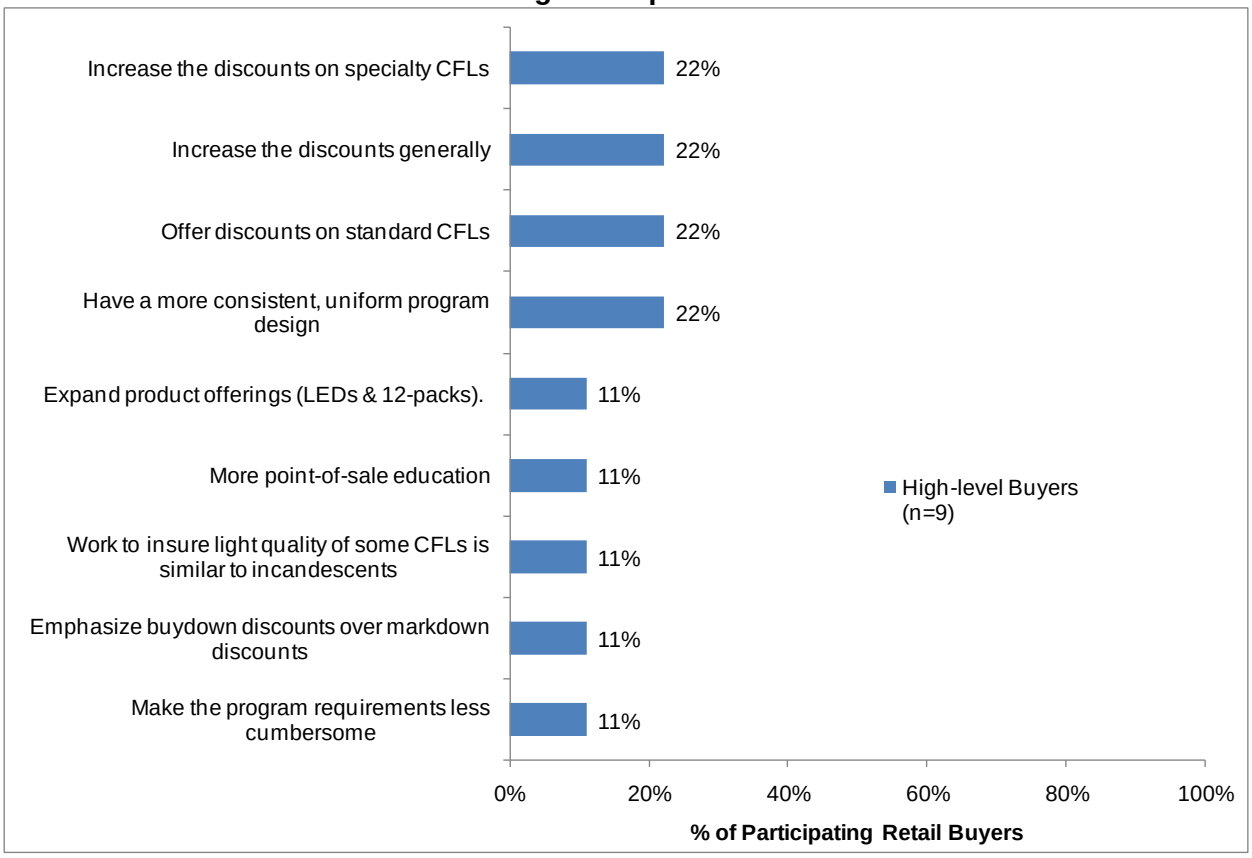
Figure 7-2
Lighting Manufacturer Recommendations
for Program Improvements



Note: The total exceeds 100% because the respondents were allowed to cite multiple suggestions.

Figure 7-3 shows the recommendations for program improvements from the high-level buyers. Increasing the discounts on specialty CFLs, increasing discount levels generally, offering discounts on standard CFLs, and having a more consistent and uniform program design were recommendations that were cited by multiple buyers.

Figure 7-3
High-Level Buyer Recommendations
for Program Improvements



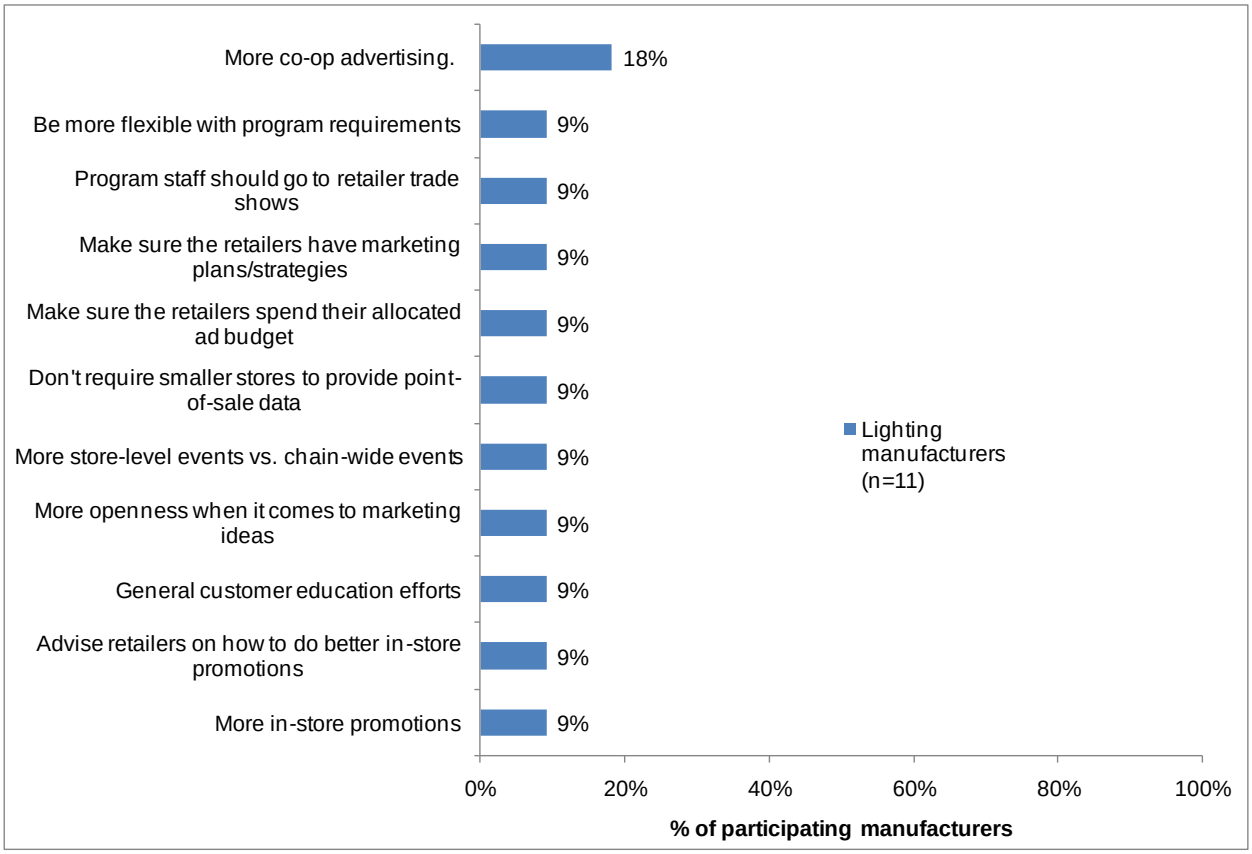
Note: The total exceeds 100% because the respondents were allowed to cite multiple suggestions.

One of the PAs was interested in learning about ways to improve program marketing, particularly ways that would get the participating retailers more involved. We asked the lighting manufacturers and high-level buyers for their suggestions. The lighting manufacturers had many suggestions (Figure 7-4) with only one – doing more co-op advertising – being named by more than one respondent.

One manufacturer thought that program staff should be visiting retailer trade shows to promote the program. *"Let's figure out where these retailers go and go there,"* she said. *"It's about creating better partnerships. I think the utilities should take a trip and go to these shows."* She noted that some of these retailer trade shows have product themes (e.g., hardware, housewares), while the large retailers also have their own trade shows. Another manufacturer liked promotional events that focused on individual stores. *"I like events at a store level as*

opposed to chain-wide events," he explained. *"I like events where store managers are involved … The owner, the owner's son, or something like that."* He said that if the program preferred to do chain promotions rather than individual store promotions he preferred smaller-scale promotions. *"Where you're going with chains, I like events where you do five stores, and you do a special promotion. You plan it several months in advance, and then you make a big impact at least in those stores,"* he said.

Figure 7-4
Lighting Manufacturer Recommendations for Improving Program Marketing

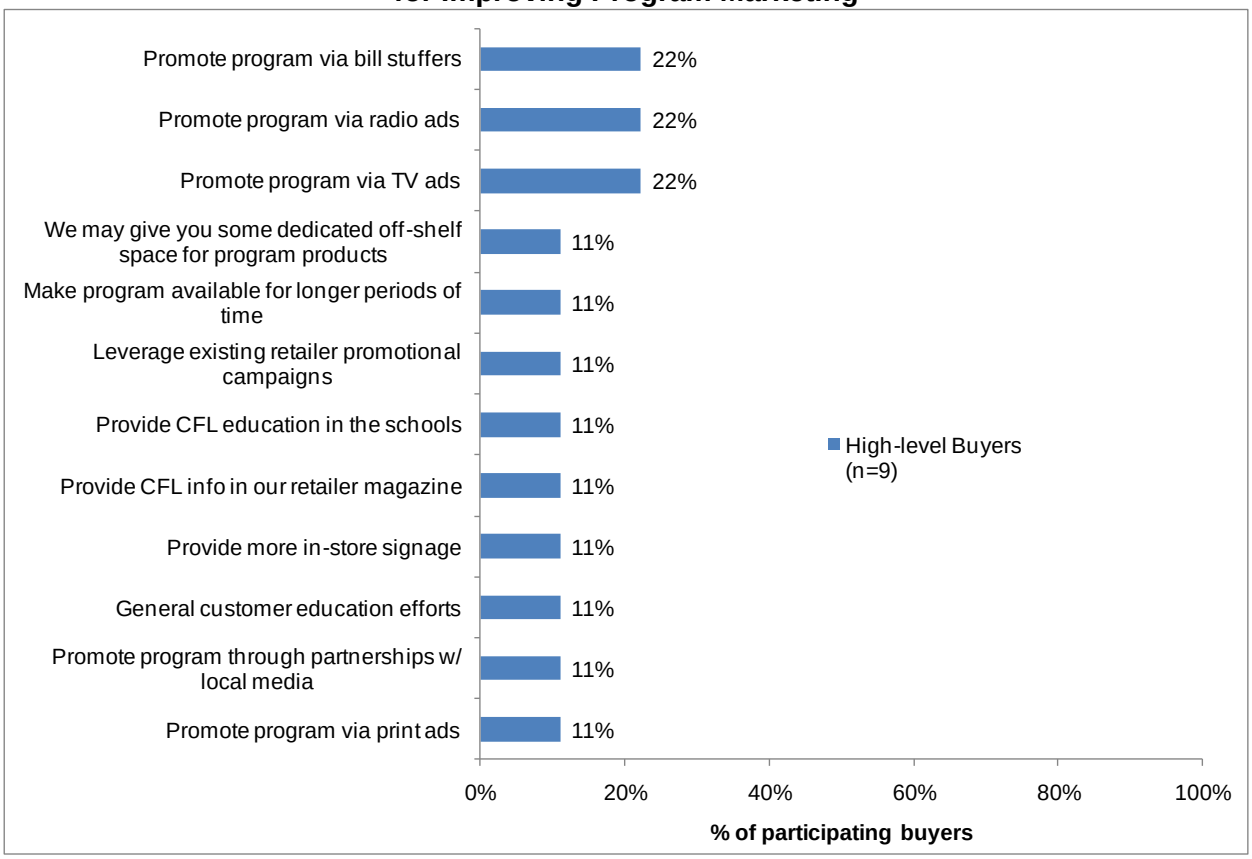


Note: The total exceeds 100% because the respondents were allowed to cite multiple suggestions.

The high-level retailer buyers also had many suggestions on how to improve program marketing (Figure 7-5). Bill stuffers, radio ads, and TV ads were named by multiple respondents. One buyer emphasized that any program advertising should not only mention the program but tell consumers what stores in their area offer the product. Another buyer cautioned that trying to leverage existing retailer promotional campaigns can be tricky since many retailers due regional advertising and this can complicate things if a CFL promotion is only available in a single state.

A third buyer said that the “off again, on again” nature of the program make it difficult for his member stores to develop program-focused ad campaigns.

Figure 7-5
High-Level Buyer Recommendations
for Improving Program Marketing



Note: The total exceeds 100% because the respondents were allowed to cite multiple suggestions.

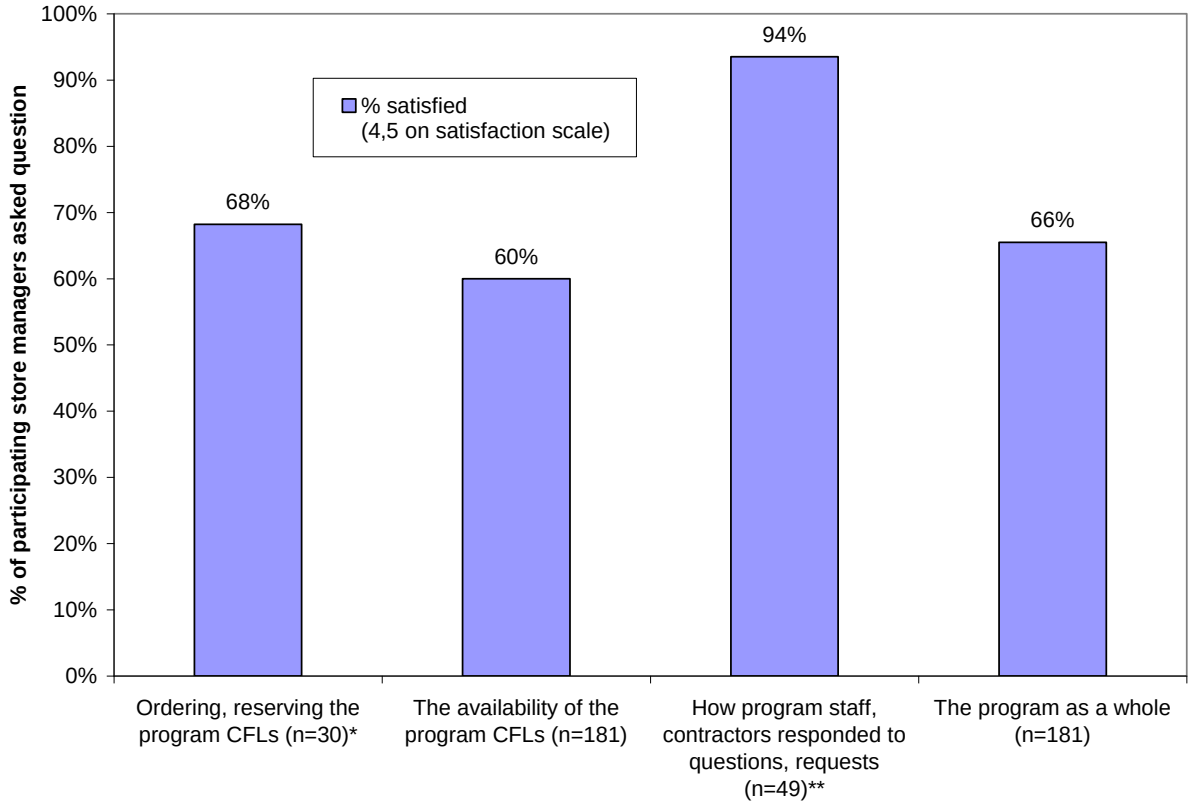
7.2 The Store Manager Perspectives

We asked the Massachusetts and Rhode Island store managers about their satisfaction with various aspects of the ENERGY STAR lighting program as well as with the program as a whole. The store managers were told to use a five-point satisfaction scale in which five equaled “very satisfied” and one equaled “very dissatisfied.”

7.2.1 Massachusetts

Figure 7-6 shows the program satisfaction ratings from the Massachusetts store managers. While almost all the store managers who had interacted with program staff or contractors were satisfied (4 or 5 on the satisfaction scale) with these interactions, the other satisfaction ratings were much lower than we are used to seeing for lighting discount programs (which usually have satisfaction ratings in the 80's or 90's percentages).

Figure 7-6
Program Satisfaction Ratings
from Massachusetts Store Managers



Note: *This question was only asked of store managers who identified themselves as the primary person who decided how many program-discounted CFLs their store received in shipments. **This question was only asked of store managers who said that they had interacted with program staff or contractors.

We asked the Massachusetts program managers who were less-than-satisfied (1-3 on the satisfaction scale) with the program processes and the program in general why they were dissatisfied. The following were some of their reasons:

- *Dissatisfaction with CFL ordering/reservation process:* The dissatisfied store managers complained about slow approval of applications (one manager said it took six months from application to approval), suppliers wanting them to buy more CFLs than they needed, not receiving enough information about the program, and having their applications being rejected.

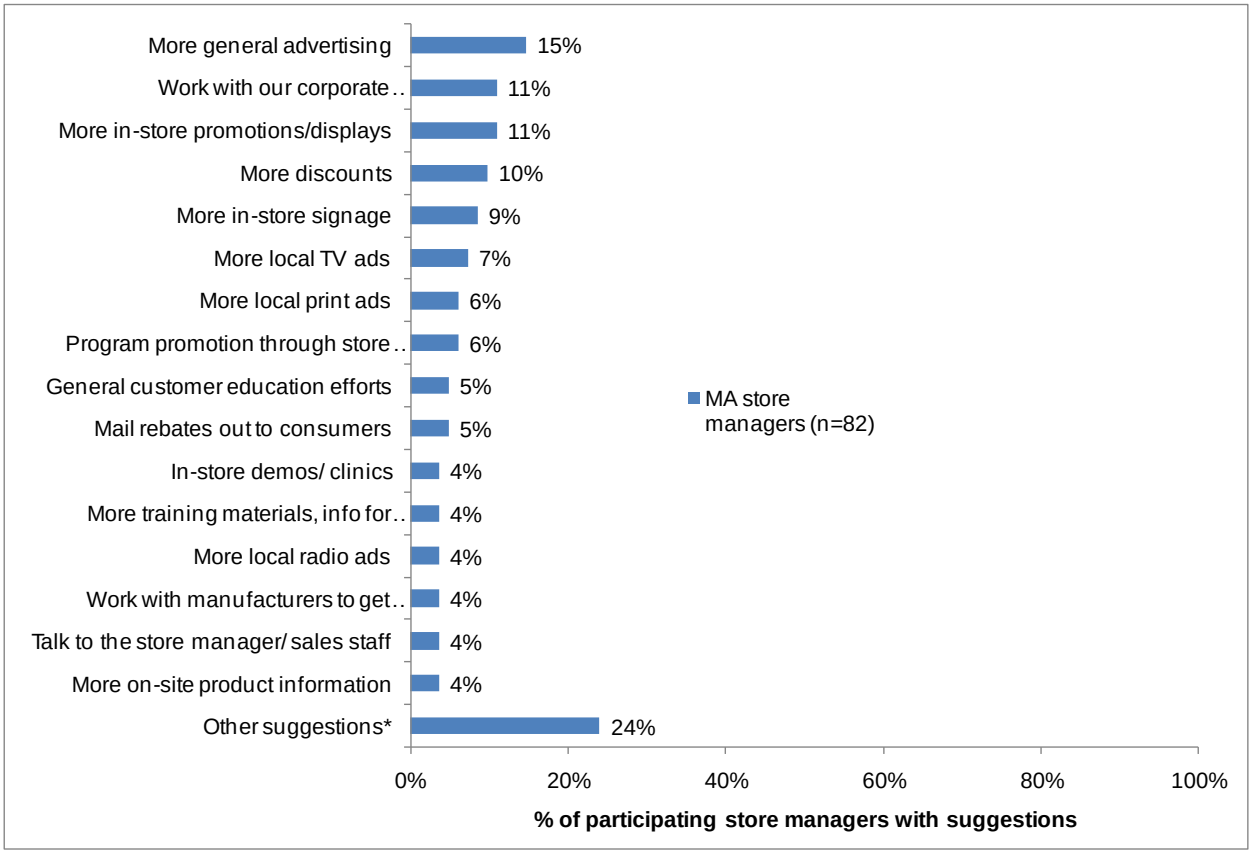
- *Dissatisfaction with CFL availability:* We asked the store managers who were less-than-satisfied with the availability of program CFLs whether there were types of CFLs that they had greater concern about than others. Only five percent of them said that they did. These store managers mentioned specialty CFLs in general, GU-24 CFLs in particular, and CFLs that replace 40 or 60 Watt incandescents since these tend to sell out quickest.

- *Dissatisfaction with the program in general:* Most of those who were dissatisfied with the program in general said either that they did not know about how the program worked – it's rules, etc., that the program was inadequately advertised, or that the program CFLs were not available enough.

We also asked all the Massachusetts store managers we surveyed (n=181): "Are the rules for participating in the Massachusetts ENERGY STAR lighting program clear?" Sixty-six percent said that they were.

We asked the Massachusetts store managers whether they had any suggestions on how to better market the program. Almost half of them volunteered ideas. Figure 7-7 shows suggestions that were made by at least three different store managers and the chart note lists other suggestions.

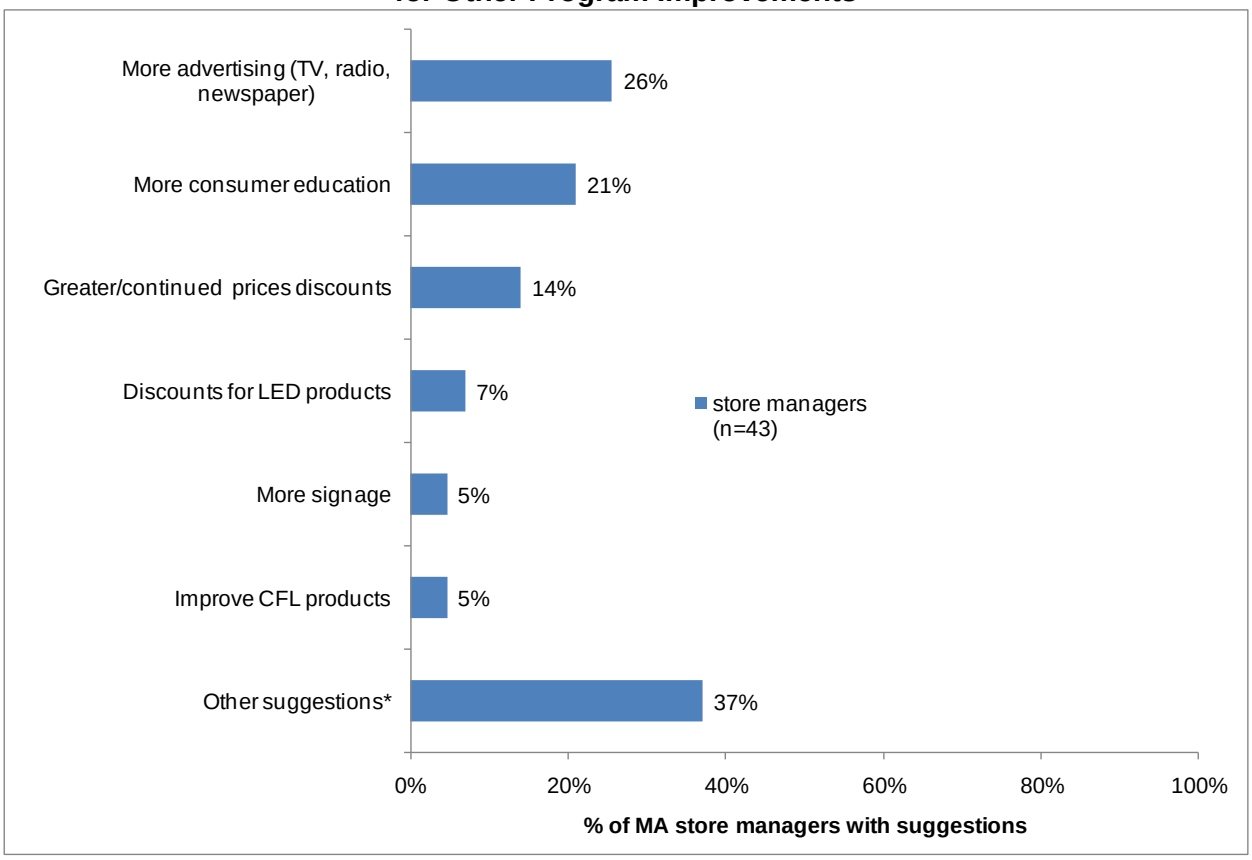
Figure 7-7
Massachusetts Store Manager Recommendations for Improving Program Marketing



Note: *Other suggestions include bring ENERGY STAR reps to store, better advertising in general, buy more shelf space, online advertising, promotion through PA, upstream incentives to participating stores, give retail salespeople advanced notice of promotions, work more with our product buyer, market like Home Depot, more point-of-sale promotions, do one-day promo events, co-op advertising, in-store sales training, a kit that we could bring to community events, program staff need more training in marketing, offer CFL recycling, free CFL samples, work with retailer trade associations for volume discounts, and promote through mailings.

Finally we asked the Massachusetts store managers whether they had any other recommendations for improving the program. Forty-three of them did and their additional suggestions appear in Figure 7-8. The most-cited suggestions including conducting more advertising and providing more consumer education.

Figure 7-8
Massachusetts Store Manager Recommendations for Other Program Improvements

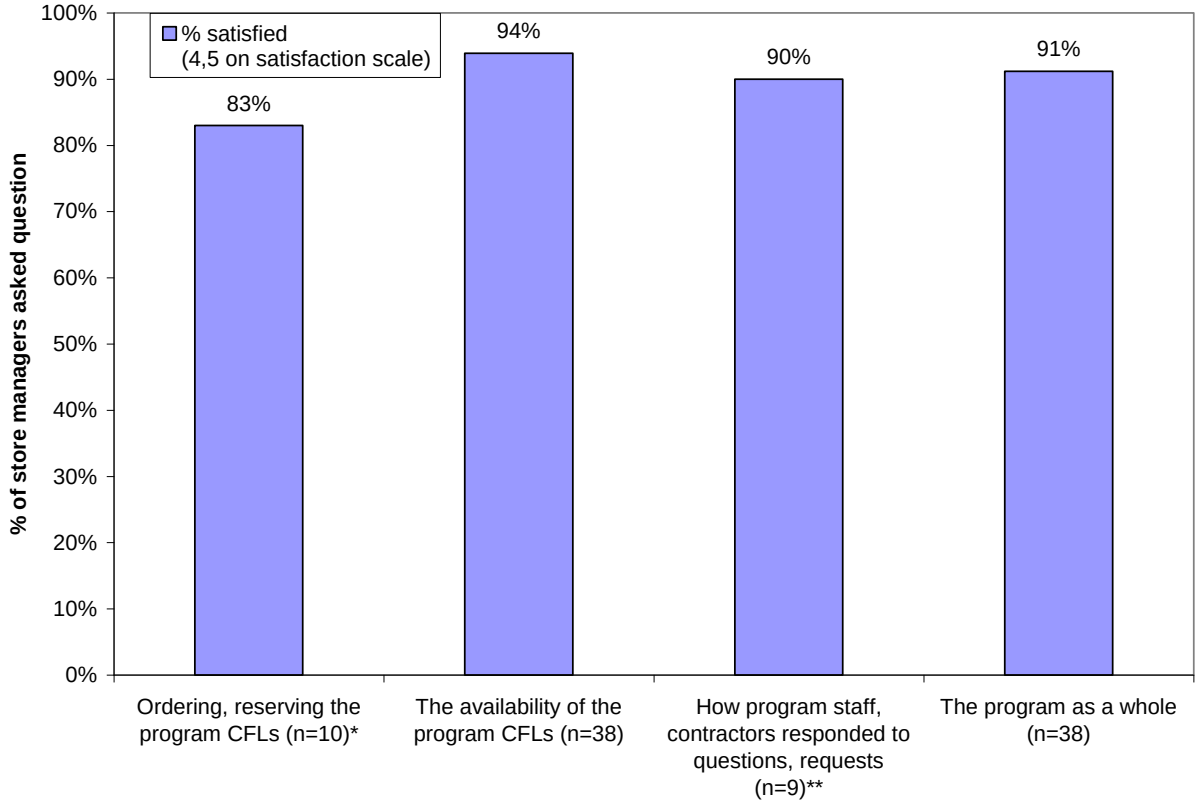


Note: *Other suggestions include Information about CFL disposal, get more manufacturers to help promote the program, salesperson education, more PA involvement in program promotion, discounts for fluorescent tubes, free samples, parking lot sales, have expert teach retailers how to sell CFLs, greater diversity of fixtures, CFL disposal assistance, have program staff who know more about product and market, more variety in discounted bulbs, In-store consumer education, direct mail coupons, rebate standard CFLs again, and have multilingual program information.

7.2.2 Rhode Island

The Rhode Island store managers were much more satisfied with the ENERGY STAR lighting program than their Massachusetts counterparts. Figure 7-9 shows that 90% or more of the Rhode Island store managers were satisfied with the availability of program CFLs, with the program staff and with the program as a whole.

Figure 7-9
Program Satisfaction Ratings
from Rhode Island Store Managers



Note: *This question was only asked of store managers who identified themselves as the primary person who decided how many program-discounted CFLs their store received in shipments. **This question was only asked of store managers who said that they had interacted with program staff or contractors.

The Rhode Island store managers were also more satisfied with the program information than the Massachusetts store managers were. Eighty-five percent of them said that the program rules were clear (compared to 66% for the Massachusetts store managers).

8. Conclusions

Some high-level conclusions from these interviews/surveys with lighting manufacturers, high-level retail lighting buyers, and store managers included:

- *The lighting market actors generally thought that the MA/RI programs were following the right HTR strategies although there was room for expansion/improvement:* Most of the lighting market actors agreed with a definition of HTR lighting customers that included low-income, ethnic, non-English-speaking, and less educated customers. Most of them also agreed that discount stores and small grocery stores were good ways to reach HTR customers and store managers and the Discount channel reported the highest percentage of HTR customers. Yet some market actors suggested that national/regional chain stores located in areas with low-income demographics should be additional HTR channels. Only a small minority of lighting manufacturers and retail buyers thought that promoting CFL sales in retail channels such as Discount to reach HTR customers would significantly shift sales away from national chain retailers such as Wal-Mart or Home Depot rather than create new sales. Seventy-eight percent of high-level buyers, 39% of the Massachusetts store managers and 42% of the Rhode Island store managers said that the programs had increased their lighting sales to HTR customers.

- *The lighting market actors gave MA/RI lighting programs mixed reviews for the promotion of specialty CFLs:* On the positive side, 80% of Massachusetts store managers and 76% of the Rhode Island store managers thought the program incentives for specialty CFLs were adequate. Yet when the Massachusetts store managers were asked to rate the effectiveness of the program's efforts to promote specialty CFLs, they gave the program a middling rating with a mean rating of 5.4 and a median rating of 5.0 (using a 0-to-10 scale where 10 equaled "very effective"). The most-cited recommendations from the store managers to increase specialty CFL sales included increasing the incentive levels, providing more consumer education about specialty CFLs, and providing more general advertising of the specialty CFLs and the ENERGY STAR program.

- *The NTG ratio estimates provided by the lighting market actors varied significantly depending on the retail channel, with the Discount/HTR channel having the highest ratios.* This finding indicates that program delivery strategies should focus greater attention on promoting CFL sales in retail channels where the program is likely to produce the greatest "lift." It also suggests that the programs are right to focus special attention on increasing CFL sales in the Discount/HTR channel.

- *There was some evidence that the MA/RI programs are producing market effects:*

    - *Effects on market structure:* Seventy-three percent of the lighting manufacturers said that the years of the lighting rebate/discount programs had influenced the types of

retailers they sell CFLs to in those states. Most of these effects concerned broadening the range of retailers who sell CFLs and who they make deals with. Twenty-seven percent of the manufacturers said that they had not been selling CFLs at retail in these states before joining the program.

- *Effects on product variety:* Forty-five percent of the manufacturers, 22% of the buyers, 39% of the Massachusetts store managers, and 44% of the Rhode Island store managers said that the programs had affected their product variety over the years. Nearly all of them said that they sell a wider variety of CFLs, such as specialty CFLs, since joining the program.

- *Effects on product promotions:* Seventy-three percent of the manufacturers, 56% of the retail buyers, 46% of the Massachusetts store managers, and 58% of the Rhode Island store managers said that the years of programs had affected how they promote their CFLs. Yet it was not clear if any of these extra promotional practices would be sustained if the program discounts were discontinued.

- *Effects on CFL sales in other New England states:* Seventy-three percent of the manufacturers and 78% of the buyers said that the programs had affected sales of CFLs in other New England states. They explained that these programs had helped develop and sustain cutting-edge lighting technologies, provided program models for other states, got large retail chains involved in rebate programs, and had regional consumer education effects.

- *Program effects on CFL quality, performance and innovation:* Ninety-one percent of the manufacturers and 75% of the buyers said that the programs had influenced the quality and performance of the CFLs they sold in New England as a whole. When asked to explain their reasons, they usually mentioned the programs' requirements that bulbs meet ENERGY STAR standards.

- *The sustainability of CFL sales in the absence of the program:* All of the lighting manufacturers and lighting buyers said that their CFL sales would drop in Massachusetts and Rhode Island if these states eliminated their lighting discount programs starting in 2011. Most said that they would drop significantly.

- *Program satisfaction:* The lighting manufacturers, high-level retail buyers, and the Rhode Island store managers generally provided high satisfaction ratings for most of the program attributes. However, the Massachusetts store managers were much less satisfied with the

program with only two thirds saying that they were satisfied with the program as a whole (we usually see satisfaction ratings in the 80's or 90's percentages for most rebate programs).

Appendix A: MA Lighting Manufacturer Interview Guide

Program Attribution, Market Effects, and Market Characterization Final Interview Guide for Lighting Manufacturers Participating in the Massachusetts and Rhode Island ENERGY STAR® Lighting Programs

I. Introduction

A. Contact Protocol

B. Call potential interviewees to ascertain most appropriate interviewee. Obtain email address(es) of appropriate interviewees. If company refuses interview, determine reasons for refusal and if it's logistical in nature, try to find workaround.

C. Send email interview invitation to appropriate interviewee. This invitation will include:

Explanation of purpose and scope of interview.

A high-level outline of the interview topics

Explanation of time frame within which the interview will need to be completed.

Explanation of expected duration of interview and flexibility to complete interview over multiple sessions.

Instructions to propose a convenient interview time.

Contact information for interviewers.

Assurances of confidentiality.

A letter attachment from the Massachusetts PAs explaining the importance of the interview.

D. If target interviewee does not respond to the email invitation within a week, a follow-up call will be made to try to schedule an interview time, find an alternate interview target, or determine reasons for refusal.

E. Once an interview time has been arranged, the interviewee will be emailed a couple days in advance of the interview. In addition to serving as a reminder, this email will contain (if feasible) a table that summarizes the interview's 2009-2010 sales through the Massachusetts [AND RHODE ISLAND] ENERGY STAR® Lighting Program by retail channel and product type.

II. Program Participation Confirmation and Reasons for Participation

[NOTES TO INTERVIEWER:
1) THROUGHOUT THIS SURVEY THE UNDERLINED WORDS IN THE QUESTIONS ARE SUBHEADINGS AND SHOULD NOT BE READ.

2) A FEW RETAILERS ARE PARTICIPATING IN BOTH THE MA AND RI PROGRAMS AND SO THE QUESTION LANGUAGE MUST BE ADJUSTED AS INDICATED WITH INTERVIEWER PLURALIZING QUESTION LANGUAGE AS NEEDED

3) WHEN INTERVIEWING RETAILERS THAT ARE PARTICIPATING IN BOTH THE MA AND RI PROGRAMS, REMIND THEM POINT OUT ANY DIFFERENCES BETWEEN RI AND MA AT ANY POINT DURING THE SURVEY]

A. Participation confirmation: According to our records your company has supplied lighting products that have received upstream incentives from the Massachusetts [AND/OR RHODE ISLAND] ENERGY STAR® Lighting Program(s) during the 2009-2010 period. This [THESE PROGRAMS IF RI ALSO] have since 2003 offered upstream buydown or markdown discounts for CFL and LED products that are sold through various Massachusetts [AND RHODE ISLAND] retailers. Are you familiar with your company's participation in this program? [IF UNAWARE, FIND SOMEONE WITH THE COMPANY WHO IS AWARE.]

B. Other program support besides discounts: Besides these upstream buydown or markdown discounts has your company received any other assistance from this/these Massachusetts [AND RHODE ISLAND] program(s) that might help with the sales of your CFL and LED products?

    1. [IF YES] What was the nature of this assistance? [POSSIBLE RESPONSES MIGHT INCLUDE MASS ADVERTISING, IN-STORE PROMOTIONAL SUPPORT (E.G. SIGNAGE)]

C. Timing of participation:

    1. About what year did your company first get involved with the current version of the Massachusetts ENERGY STAR® Lighting Program which offers upstream buydown or markdown discounts on CFL and LED products? [IF THEY PARTICIPATED IN THE RI PROGRAM ALSO, ASK SIMILAR QUESTION FOR THIS PROGRAM]

    2. Before offering these upstream buydown and markdown discounts, starting in about 2003, the Massachusetts ENERGY STAR® Lighting

Program had a more of a downstream structure. For example, it offered in-store coupons to consumers for energy-efficient lighting products. Was your company involved in this version of the program?

D. MA CFL sales before program involvement: Was your company selling CFLs or CFL fixtures in Massachusetts before getting involved with any of these Massachusetts lighting rebate or discount programs? [IF THEY SAY YES, CLARIFY IF THIS WAS BEFORE THE UPSTREAM VERSION OF THE PROGRAM (CIRCA 2003) OR BEFORE THE MASSACHUSETTS ENERGY STAR® LIGHTING PROGRAM IN GENERAL]

E. Reasons for program participation: What were your reasons for getting involved with the Massachusetts [AND RI] ENERGY STAR® Lighting Program(s)?

F. Confirming retailer mix: [IF DETAILED TRACKING DATA AVAILABLE] According to my records, during the [2009-2010 period] you have been selling CFLs through this Massachusetts [AND RHODE ISLAND] lighting program through the following retail channels [NAME ALL RETAIL CHANNELS AND CITE STORE NAMES WITH HIGHER VOLUMES SALES IN CHANNEL AS EXAMPLES]. Does this information sound correct?

    1. [IF INFORMATION IS INCORRECT, RECORD ADDITIONAL CHANNELS. REMEMBER ONLY NEED TO CONFIRM RETAIL CHANNELS AND STORE NAMES WITH HIGHER VOLUMES SALES IN CHANNEL. DON'T NEED TO CONFIRM EVERY STORE THAT MANUFACTURER IS SELLING CFLS THROUGH THE PROGRAM]

G. Reasons for retailer mix: Why did you choose to participate in the Massachusetts [AND RHODE ISLAND] lighting program with this mix of retailers?

H. Program influence on retailer mix: Are there certain types of retailers that the Massachusetts [AND RHODE ISLAND] ENERGY STAR® Lighting Program has been encouraging lighting manufacturers to partner with more than other retailer types?

    1. [IF YES] Which retailers are these?

    2. [IF YES] Do you agree with an emphasis on these retailers?

        a. Why do you say this?

I. Possible neglected retailer types Are there certain types of retailers that you think the Massachusetts [AND RHODE ISLAND] ENERGY STAR® Lighting Program should be focusing on more to encourage their sales of energy-efficient lighting products?

    1. [IF YES] Which retailers are these?

J. Hard-to-reach retailers: The Massachusetts ENERGY STAR® Lighting Program is trying to increase the penetration of CFLs in so-called 'hard-to-reach" lighting markets. The program is currently defining these 'hard-to-reach' lighting markets as those that serve low-income, ethnic, non-English-speaking, and less educated customers. The program is trying to reach these customers through discount stores and small grocery stores.
    1. First of all do you agree with that definition of hard-to-reach lighting markets?

        I. [IF NO] How would you define the hard-to-reach lighting markets in Massachusetts?

    2. Do you think these are the right kinds of retailers that the program should be working with to make CFLs more accessible to hard-to-reach customers?

        a. [IF NOT] Why not? [PROBE FOR WHICH ALTERNATIVE RETAILERS THEY SUGGEST]

    3. If you're not doing so already, would you be willing to sell Massachusetts program-discounted CFLs through retailers that serve these hard-to-reach lighting markets? [NOTE: WHETHER THEY ARE DOING SO ALREADY WILL DEPEND ON HOW THEY DEFINE HTR AND ALSO WHAT THEY SELL THROUGH NON-PROGRAM RETAILERS, WHICH WE CURRENTLY HAVE NO RECORD OF. SO IF THEY SAY THEY'RE DOING THIS ALREADY, WE NEED TO PROBE AS TO WHAT RETAILER TYPES THEY'RE TALKING ABOUT]

        a. [IF NOT] Why not?

K. Confirming program sales volume: [IF DETAILED TRACKING DATA AVAILABLE] Our information indicates that your company supplied [# OF DISCOUNTED CFLs FROM PROGRAM TRACKING DATABASE FOR 2009-2010 TIME PERIOD AVAILABLE] that received buydown or markdown discounts from the Massachusetts ENERGY STAR® Lighting Program [DURING 2009-2010

TIME PERIOD AVAILABLE]. Does this sound correct? [ASK SAME QUESTION FOR RI PROGRAM, IF RELEVANT]

L. Confirming product mixture: Our information indicates that the types of CFLs your company supplied to the Massachusetts ENERGY STAR® Lighting Program during the 2009-2010 period included were [NAME ALL PRODUCT TYPES UNLESS LIST IS PARTICULARLY LONG, IN WHICH CASE NAME 5 TOP-VOLUME STANDARD AND 5 TOP-VOLUME SPECIALTY BULB TYPES]. Does our information on your mix of products through this Massachusetts program sound correct? [ASK SAME QUESTION FOR RI PROGRAM, IF RELEVANT]

M. Reasons for product mixture: What were your reasons for choosing this mix of CFL products to sell through this Massachusetts [AND RI] program?

N. Program influence on product mixture: Are there certain types of CFLs that the Massachusetts [AND RI] ENERGY STAR® Lighting Program has been encouraging your company to sell through the program more than others?

    1. [IF YES] Which products are these?

    2. [IF YES] Do you agree with an emphasis on these products?

        a. Why do you say this?

O. Possible neglected CFL product types: Are there certain types of the energy-efficient lighting products that you think the Massachusetts [AND RI] ENERGY STAR® Lighting Program should be promoting through the program that they are not currently promoting?

    1. [IF YES] Which products are these?

P. The sale of non-ENERGY STAR CFLs: During the 2009-2010 period did you sell CFL bulbs in Massachusetts [OR RI] that were not ENERGY STAR qualified?

    1. [IF YES] What sorts of bulb types and packages were these non-ENERGY STAR bulbs?

    2. [IF YES] What sorts of retail channels do you sell them through? [MAKE SURE TO CLARIFY WHICH BULB TYPES/PACKAGES WERE SOLD THROUGH WHICH RETAIL CHANNELS]

Q. CFLs that exceed ENERGY STAR: Did you sell any CFLs in Massachusetts [OR RI] during the 2009-2010 period that you believe exceeded the current ENERGY STAR specifications?

1. [IF YES] In what ways did these bulbs exceed ENERGY STAR specification? [NOTE TO INTERVIEWER: MOST COMMON RESPONSES ARE LIKELY TO BE LONGER BULB LIFE OR HIGHER LUMENS PER WATT]

III. Program Attribution – Non-Program Sales

A. Non-Program CFL Sales – Standard

During the 2009-2010 period did you sell standard ENERGY STAR CFL bulbs in Massachusetts [OR RI] that **did not** receive discounts from the Massachusetts [OR RI] ENERGY STAR® Lighting Program? By standard CFL bulbs I mean bulbs such as basic spirals or mini-spirals that are not covered and do not have any special features such as dimmability.

1. [IF YES] Are the bulb types and packages different from those you sell through the Massachusetts [OR RI] ENERGY STAR® Lighting Program?

    a. [IF YES] How so?

2. [IF YES] What sorts of distribution channels did you sell these non-program standard ENERGY STAR CFLs through?

3. [IF YES] Why didn't you sell these bulbs through the Massachusetts [OR RI] ENERGY STAR® Lighting Program?

B. Distribution of MA [AND RI] Standard CFL Sales – [IF MANUFACTURER PARTICIPATES IN BOTH THE MA AND RI PROGRAMS, FIRST ASK THEM IF THEY'RE ABLE TO DISTINGUISH THEIR MA CFL SALES FROM THEIR RI SALES. IF SO, ASK B. 1-3 SEPARATELY FOR MA AND RI] Imagine there is a pie that represents your sales of standard CFLs in Massachusetts [AND RI] during the 2009-2010 time period. What would be the size, in percentage terms, of the following slices of this pie:

1. Your 2009-2010 sales of standard CFLs through the Massachusetts [AND RI] ENERGY STAR® Lighting Program? ___%

2. [NOTE: IF THEY SAID EARLIER (III. A. 1) THAT THEY DID NOT SELL NON-PROGRAM BULBS, YOU NEED TO CONFIRM THAT THIS % IS ZERO.] Your 2009-2010 sales of *ENERGY STAR standard*

CFLs in Massachusetts [AND RI] that were not through the program? ___%

3. [NOTE: ONLY ASK IF THEY INDICATED ABOVE THAT THEY SELL NON-PROGRAM CFLS AND THEY SELL NON-ENERGY-STAR CFLS] Your 2009-2010 sales of standard *non-ENERGY STAR CFLs* in Massachusetts [AND RI] that were not through the program? __%
[NOTE: MAKE SURE THAT THE TOTAL OF THE "SLICES" = 100%]

C. Non-Program CFL Sales –Specialty Now I'm going to ask you some similar questions, but this time concerning what I'll call specialty CFLs. These include covered CFLs as well as CFLs that have special functions or features such as reflectors, dimmability, and three-way light levels. During the 2009-2010 period did you sell specialty ENERGY STAR CFL bulbs in Massachusetts [OR RI] that **did not** receive discounts from the Massachusetts [OR RI] ENERGY STAR® Lighting Program?

1. [IF YES] Are the bulb types and packages different from those specialty CFLs you sell through the Massachusetts [OR RI] ENERGY STAR® Lighting Program?
    a. [IF YES] How so?

2. [IF YES] What sorts of distribution channels did you sell these non-program specialty ENERGY STAR CFLs through?

3. [IF YES] Why didn't you sell these bulbs through the Massachusetts [OR RI] ENERGY STAR® Lighting Program?

D. Distribution of MA Specialty CFL sales –[IF MANUFACTURER PARTICIPATES IN BOTH THE MA AND RI PROGRAMS AND INDICATED ABOVE THAT HE/SHE CAN DISTINGUISH THEIR MA CFL SALES FROM THEIR RI SALES. IF SO, ASK D. 1-3 SEPARATELY FOR MA AND RI] - Imagine there is a pie that represents your sales of specialty CFLs in Massachusetts [AND RI] during the 2009-2010 time period. What would be the size, in percentage terms, of the following slices of this pie:
1. Your 2009-2010 specialty CFL sales through the Massachusetts [AND RI] ENERGY STAR® Lighting Program? ___%

2. [NOTE: IF THEY SAID EARLIER (III. A. 1) THAT THEY DID NOT SELL NON-PROGRAM BULBS, YOU NEED TO CONFIRM THAT THIS % IS ZERO.] Your 2009-2010 sales of *ENERGY STAR specialty*

CFLs in Massachusetts [AND RI] that were not through the program? ___%

3. [NOTE: ONLY ASK IF THEY INDICATED ABOVE THAT THEY SELL NON-PROGRAM CFLS AND THEY SELL NON-ENERGY-STAR CFLS] Your 2009-2010 sales of *non-ENERGY STAR specialty CFLs* in Massachusetts [AND RI] that were not through the program. __%

   [NOTE: MAKE SURE THAT THE TOTAL OF THE "SLICES" = 100%]

IV. Program Attribution – Sales, Product Mix, and Promotions in the Absence of the Program

A. Whether retailers would be selling CFLs without program: –[IF MANUFACTURER PARTICIPATES IN BOTH THE MA AND RI PROGRAMS AND INDICATED ABOVE THAT HE/SHE CAN DISTINGUISH THEIR MA CFL SALES FROM THEIR RI SALES ASK A. 1. 2, 3 SEPARATELY FOR MA AND RI] My next questions are about the impact that the 2009-2010 Massachusetts [AND RI] ENERGY STAR® Lighting Program may have had on your Massachusetts [AND RI] products sales. Are there any retailers or retailer categories that you worked with through the 2009-2010 Massachusetts [OR RI] ENERGY STAR® Lighting Program that you think would not have been selling any CFL products during this 2009-2010 time period if this program with its average buydown or markdown discounts of $1.35 per standard CFL bulb and $3.24 per specialty CFL bulb [AND OTHER POSSIBLE PROGRAM ASSISTANCE IDENTIFIED IN II B.] had not been available?

   1. [IF YES] Which retailers or retailer categories?

      a) If these retailers stopped selling CFL products in Massachusetts [OR RI] due to the absence of the Massachusetts ENERGY STAR® Lighting Program, do you think the majority of their customers would buy incandescent or halogen lighting products instead or just buy their CFLs from some other retailer?

         i. [IF SHOPPERS WOULD BUY CFLS FROM OTHER RETAILERS] What kind of retailers would these shoppers get their CFL products from instead?

   2. Why do you say this?

3. Would your answer change depending on if we were talking about standard vs. specialty CFLs?

    a) [IF YES] How so?

B. Whether retailers would be selling a different product mix without the program Are there any retailers or retailer categories that you worked with through the 2009-2010 Massachusetts [OR RI] ENERGY STAR® Lighting Program that you think would have been selling a different assortment of CFL bulbs or fixtures in Massachusetts [OR RI] during the 2009-2010 period if this program with its average buydown or markdown discounts of $1.35 per standard CFL bulb and $3.24 per specialty CFL bulb [AND OTHER POSSIBLE PROGRAM ASSISTANCE IDENTIFIED IN II B.] had not been available?

1. [IF YES] Which retailers/retailer categories?

2. [IF YES] How would their product mix be different?

3. [IF YES AND NOT ALREADY EXPLAINED] How does the Massachusetts [OR RI] ENERGY STAR® Lighting Program affect this/these retailer(s)' product mix?

C. Whether retailers would be promoting lighting products differently without program Are there any retailers or retailer categories that you worked with through the 2009-2010 Massachusetts [OR RI] ENERGY STAR® Lighting Program that you think would be promoting their CFL bulbs or fixtures differently in Massachusetts during the 2009-2010 period – whether inside or outside the stores -- if this program with its average buydown discounts of $1.35 per standard CFL bulb and $3.24 per specialty CFL bulb [AND OTHER POSSIBLE PROGRAM ASSISTANCE IDENTIFIED IN II B.] had not been available?

1. [IF YES] Which retailers/retailer categories?

2. [IF YES] How would their promotional practices be different?

3. [IF YES AND NOT ALREADY EXPLAINED] How does the Massachusetts [OR RI] ENERGY STAR® Lighting Program affect this/these retailer(s)' promotional practices?

[SURVEYORS: FOR THE NEXT SECTION, PLEASE FOLLOW THE FOLLOWING INSTRUCTIONS].

- FIRST ASK THE IV D. SALES IN THE ABSENCE OF THE PROGRAM QUESTION BATTTERY FOR THE RETAILER

CATEGORY THROUGH WHICH THEY SOLD THE **MOST** CFLS THROUGH THE PROGRAM (SEE MATRIX). **HOWEVER, EXCLUDE ANY RETAILER CATEGORIES THAT THEY IDENTIFIED IN IV. A. AS NOT SELLING ANY CFL PRODUCTS AT ALL WITHOUT THE BUYDOWNS**]

- SECOND ASK THE MANUFACTURER SALES IN THE ABSENCE OF THE PROGRAM QUESTION BATTTERY FOR THE RETAILER CATEGORY THROUGH WHICH THEY SOLD THE **SECOND MOST** CFLS THROUGH THE PROGRAM (SEE MATRIX). **HOWEVER, AS BEFORE, EXCLUDE ANY RETAILER CATEGORIES THAT THEY IDENTIFIED IN IV. A AS NOT SELLING ANY CFL PRODUCTS AT ALL WITHOUT THE BUYDOWNS**]
- [IF THEY SOLD DISCOUNTED CFLS THROUGH ADDITIONAL RETAILER CATEGORIES BESIDES THOSE ALREADY ADDRESSED IN IV. A. OR IV.D.1 OR IV.D.2] THEN SAY: "You also sold CFL products through [LIST OTHER RETAILER CATEGORIES, IF ANY, BESIDES THOSE ALREADY IDENTIFIED]."Would your responses regarding the effect of the manufacturer buydowns on CFL product sales in these types of retailers be different, in a non-trivial way than for the retailer categories we already discussed?
    1. [IF YES, OR THEY RESPOND IN A WAY THAT WOULD INDICATE SOME NON-TRIVIAL DIFFERENCE (THIS IS A JUDGEMENT CALL)] For which types of retailers would your responses be different? ASK A NEW FREE RIDERSHIP QUESTION SEQUENCE FOR EACH ADDITIONAL RETAILER CATEGORY THAT THEY IDENTIFY ABOVE.

D. <u>Retailer sales levels in the absence of the program.</u> Standard **CFL bulbs** [ASK ONLY IF SOLD SPECIALTY CFL BULBS THROUGH THE PROGRAM – OTHERWISE SKIP TO IV.E] According to our records in the 2009-2010 period you received buydown discounts that averaged $1.35 per standard CFL bulb and $3.24 per specialty CFL bulb from the Massachusetts [AND RI] ENERGY STAR® Lighting Program for the sale of the following types of standard ENERGY STAR CFL bulbs [NAME REPRESENTATIVE WATTAGES] through [RETAILER CATEGORY] such as [NAME RETAILER EXAMPLE]. [IF OTHER PROGRAM ASSISTANCE BESIDES THE BUYDOWNS WAS IDENTIFIED IN II B, MENTION THIS ALSO]. If these upstream buydown or markdown discounts [AND OTHER PROGRAM ASSISTANCE IF RELEVANT] had not been available during this 2009-2010 period, do you think your sales of these types of standard ENERGY STAR CFL bulbs through [RETAILER CATEGORY] stores would have been about the same, lower, or higher?

1. [IF LOWER] Why do you say this?

2. [IF LOWER] By what percentage do you estimate your sales of these types of standard ENERGY STAR CFL bulbs through [RETAILER CATEGORY] stores would be lower during this 2009-2010 period if these upstream buydown or markdown discounts [AND OTHER PROGRAM ASSISTANCE IF RELEVANT] had not been available from the Massachusetts [AND RI] program? [RECORD % DECREASE]

3. [IF LOWER] I want to make sure I understand your response. You estimate that your sales of these standard CFLs would have been [PERCENTAGE FROM QUESTION IV.D.2] % lower without the upstream buydown or markdown discounts [AND OTHER PROGRAM ASSISTANCE IF RELEVANT]. So if you actually sold 100 standard ENERGY STAR CFLs in a given week, you think you'd have sold about [100 - (PERCENTAGE FROM QUESTION IV.D.2 * 100)] in that period if the upstream buydowns or markdowns [AND OTHER PROGRAM ASSISTANCE IF RELEVANT] had not been available from the Massachusetts [AND RI] program? [IF RESPONSE IS ≠ YES THEN CLARIFY ESTIMATED SALES DECREASE]

4. [IF LOWER] What is your basis for making this estimate? [IF THEY MENTION OBSERVING SALES TRENDS, TRY TO GET PARTICULARS –E.G. WHETHER THEY ARE COMPARING PROGRAM VS. NON-PROGRAM PERIODS; PROGRAM-PARTICIPATING VS. NON-PARTICIPATING STORES; OR STATE VS. REGIONAL OR NATIONAL SALE TRENDS]

5. [IF HIGHER] Why do you say this?

6. [IF HIGHER] By what percentage do you estimate your sales of these types of standard ENERGY STAR CFL bulbs through [RETAILER CATEGORY] stores would be higher during this 2009-2010 period if these upstream buydown or markdown discounts [AND OTHER PROGRAM ASSISTANCE IF RELEVANT] had not been available from the Massachusetts [AND RI] program? [RECORD % INCREASE]

7. [IF HIGHER] I want to make sure I understand you correctly. You estimate that your sales of these standard CFLs would have been [PERCENTAGE FROM QUESTION IV.D. 6.] % higher without the upstream buydown or markdown discounts [AND OTHER PROGRAM ASSISTANCE IF RELEVANT]. So if you actually sold 100 standard ENERGY STAR CFLs in a given week, you think you'd have sold about [100 + (PERCENTAGE FROM QUESTION IV.D.6 * 100)] in that period

if the upstream buydown or markdown discounts hadn't been available? [IF RESPONSE IS ≠ YES THEN CLARIFY ESTIMATED SALES INCREASE]

8. [IF HIGHER] What is your basis for making this estimate? [IF THEY MENTION OBSERVING SALES TRENDS, TRY TO GET PARTICULARS –E.G. WHETHER THEY ARE COMPARING PROGRAM VS. NON-PROGRAM PERIODS; PROGRAM-PARTICIPATING VS. NON-PARTICIPATING STORES; OR STATE VS. REGIONAL OR NATIONAL SALE TRENDS]

[REMEMBER TO REPEAT QUESTIONS FOR EACH RETAILER CATEGORY THAT MANUFACTURER HAD SOLD A SIGNIFICANT VOLUME OF PRODUCTS THROUGH THE PROGRAM]

E. Retailer sales levels in the absence of the program. Specialty CFL bulbs [ASK ONLY IF SOLD SPECIALTY CFL BULBS THROUGH THE PROGRAM – OTHERWISE SKIP TO IV.F] (REPEAT THE IV.D. QUESTION BATTERY BUT THIS TIME SUBSTITUTE SPECIALTY CFLS FOR STANDARD CFLS)

V. Other Possible Program Effects

A. Add-on discounts – standard CFLs: When the Massachusetts [OR RI] ENERGY STAR® Lighting Program was providing upstream buydown or markdown discounts for standard CFLs, did your company ever provide any of its own price discounts in addition to those provided by the program?

1. [IF NO] Why not?

2. [IF YES] What were your reasons for providing these additional price discounts?

3. [IF YES] What was the typical range of these additional discounts on a $ per bulb basis?

a) [IF YES] Were there particular types of bulbs that you offered these additional discounts on?

a. [IF YES] What types of bulbs were these?

B. Add-on discounts – specialty CFLs: When the Massachusetts [OR RI] ENERGY STAR® Lighting Program was providing upstream buydown or markdown discounts

for specialty CFLs, did your company ever provide any of its own price discounts in addition to those provided by the program?

1. [IF NO] Why not?

2. [IF YES] What were your reasons for providing these additional price discounts?

3. [IF YES] What was the typical range of these additional discounts on a $ per bulb basis?

4. [IF YES] Were there particular types of bulbs that you offered these additional discounts on?

    I. [IF YES] What types of bulbs were these?

C. Program effects on non-discounted CFLs [IF THEY SAID EARLIER (III.A.) THAT THEY SOLD NON-PROGRAM CFL PRODUCTS IN MASSACHUSETTS [OR RI] IN 2009-2010 ELSE SKIP TO SECTION VI.]
    1. General effects on non-program CFL products: You said earlier that in addition to the CFL products you sold through the Massachusetts [AND RI] ENERGY STAR® Lighting Program, you also sold CFL products that did not receive discounts from this program. What effects, if any, do the program-discounted CFL bulbs or fixtures have on your sales levels of these non-program-discounted CFL bulbs or fixtures? [IF MECHANISM FOR THESE EFFECTS IS NOT EXPLAINED, PROBE FOR MECHANISM]

D. Effects of standard CFLs on specialty CFLs [IF THEY SOLD BOTH SPECIALTY AND STANDARD CFLS THROUGH THE PROGRAM] According to our records during the 2009-2010 period, you sold both standard and specialty CFL bulbs through the Massachusetts [AND RI] ENERGY STAR® Lighting Program. What effects, if any, do the program-discounted standard CFL bulbs have on your sales levels of program-discounted standard CFL bulbs? [IF MECHANISM FOR THESE EFFECTS IS NOT EXPLAINED, PROBE FOR MECHANISM]

E. Channel shift effects: As we noted earlier, the Massachusetts ENERGY STAR® Lighting Program is trying to encourage more sales of CFLs among discount stores and small grocery stores in order to increase CFL purchases among the "hard-to-reach" part of the Massachusetts population. To what degree do you think these discount and small grocery stores are creating new ENERGY STAR CFL product sales as opposed to taking away ENERGY STAR CFL sales that otherwise would have gone to national chain retailers such as Wal-Mart, Home Depot, or Lowe's?

F. Hard-to-reach customer representation: Can you provide your best estimate, or range of estimates, for the percentage of your company's customers that fall into the following "hard-to-reach" demographic categories as defined by the Massachusetts program. [NOTE: IF IN RESPONSE TO I. J. THEY HAD A DIFFERENT DEFINITION OF HARD-TO-REACH THAN THE PROGRAM, PLEASE ASK THE % FOR THEIR OWN HTR CUSTOMER CATEGORIES]

1. Low income?

2. Those that do not speak English as a primary language?

3. Those that are members of a racial or ethnic minority group?

G. Hard-to-reach customer effects: Do you think the Massachusetts ENERGY STAR® Lighting Program has had any effects on the proportion of your company's CFL or LED sales that are going to individuals in these hard-to-reach demographic groups?

1. [IF YES] What effects have you seen? [PROBE FOR WHICH DEMOGRAPHIC GROUP AND DIRECTION AND MAGNITUDE OF SALES EFFECT. IF THEY PROVIDED A DIFFERENT DEFINITION OF HTR IN RESPONSE TO QUESTION I.J., ADJUST THE QUESTIONS ACCORDINGLY.]

   [IF NOT ALREADY SPECIFIED] How has the Massachusetts ENERGY STAR® Lighting Program produced these effects?

VI. Possible Market Effects–

A. Effects on retailer channels: Have the years of Massachusetts [AND RI] lighting rebate and discount programs had any effects on the types of retailers you use to sell CFL products in Massachusetts [AND RI]?

1. [IF YES] How so?

B. Effects on product mix: Have the years of Massachusetts [AND RI] lighting rebate and discount programs had any effects on the types of CFL or LED products that you sell in Massachusetts [AND RI]?

1. [IF YES] How so?

C. Effects on promotional practices: Have the years of Massachusetts [AND RI] lighting rebate and discount programs had any effects on the way that your company promotes, stocks, or displays its CFL or LED products in Massachusetts [AND RI]?

    1. [IF YES] How so?

D. Influence of rebate and discount programs on decision to enter MA lighting market: [IF THEY SAID THAT THEY HAD NOT BEEN SELLING CFL PRODUCTS IN MASSACHUSETTS BEFORE BECOMING INVOLVED IN THE UPSTREAM VERSION OF THE MASSACHUSETTS ENERGY STAR® LIGHTING PROGRAM (QUESTION II.E).] Earlier you said that your company was not selling CFL products in Massachusetts before getting involved with the upstream version of the Massachusetts ENERGY STAR® Lighting Program. How significant was the existence of the Massachusetts lighting rebate or discount programs in your company's decision to enter the Massachusetts lighting market? Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.

E. Effects on CFL sales in other states: Massachusetts [AND RI] energy efficiency programs have been offering rebates and discounts on CFL bulbs for many years. Do you think these Massachusetts [AND RI] programs have influenced the level of sales of CFLs in New England as a whole?

    1. Why do you say this?

        a) [IF NOT EXPLAINED IN THEIR ANSWER TO E1] How have the Massachusetts [AND RI] lighting rebate and discount programs influenced the level of sales of CFLs in New England as a whole?

F. Effects on CFL quality and performance and innovation

    1. For years Massachusetts [AND RI] utilities have required that the CFLs that they promote meet ENERGY STAR standards. What influences, if any, have these program requirements had on the quality and performance of the CFLs that you sell in New England as a whole?

G. CFL sales sustainability in the absence of the program: If Massachusetts [AND RI] eliminated its CFL rebate and discount programs starting in 2011 what effects would this have on the sales levels of CFL products in Massachusetts [AND RI]?

VII. Endogenous (Non-Program) Effects on CFL Sales:

A. EISA impacts: In December 2007 Congress passed an energy bill called the Energy Independence and Security Act. One component of the bill calls for a gradual phase-out of inefficient lamps over time starting in 2012. [IF NECESSARY: The phase-out begins for 100 Watt general service lamps on January 1, 2012, for 75-Watt lamps starting in 2013, and for 60 and 40 Watt lamps in 2014.]

1. [IF YES] What do you think will be the impact of this 2007 Energy Bill on CFL sales and prices through the beginning of 2012?

    a) How about from 2012 to 2014?

    b) How about beyond 2014?

2. Does your company manufacture incandescent lamps?

    a) [IF YES] Has the legislation affected how you plan to manufacture incandescent lamps over the next several years?

        a. [IF YES] How so?

    b) [IF YES AND NOT ALREADY MENTIONED] Have you begun manufacturing higher-efficacy incandescents such as Halogen-IR lamps?

        a. [IF YES] Do you market these products differently than you do your standard incandescents?

3. How do you think this legislation will affect production of incandescent lamps? [PROBE: Do you think incandescent bulb manufacturers will stop producing them by a certain date or phase out production? When do you think this will occur?]

4. How do you think the legislation will affect retailers who carry incandescent lamps? [PROBE: Do you think they'll continue to sell incandescents until they sell through their stocks? Any other effects?]

5. Do you think consumers will stockpile incandescent lamps in anticipation of the phaseout?

B. Other possible CFL sales drivers Lighting rebate and discount programs are only some of the factors that may be encouraging sales of CFL bulbs and fixtures in Massachusetts [AND RI]. I'm going to name a number of possible drivers of

increased CFL bulbs and fixtures. For each one I identify, please indicate how significant you think it is as a driver of increased CFL product sales in Massachusetts [AND RI] during the 2009-2010 period. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.

1. Lighting rebate and discount programs? [RECORD RATING]

    a) Why do you give this rating?

2. The national legislation I just mentioned phasing out inefficient lamps [RECORD RATING]

    a) Why do you give this rating?

3. The national ENERGY STAR program including its Change-a-Light campaign? [RECORD RATING]

    a) Why do you give this rating?

4. CFL promotion campaigns by some large retailers such as Wal-Mart, Home Depot, and Lowe's that are being done independently of any state or utility energy efficiency programs? [RECORD RATING]

    a) Why do you give this rating?

5. Media stories promoting the use of CFLs? [RECORD RATING]

    a) Why do you give this rating?

6. Reductions in CFL production costs and price points due to lower-cost overseas manufacturing and increases in CFL production capacity? [RECORD RATING]

    a) Why do you give this rating?

7. Growing consumer awareness about global warming? [RECORD RATING]

    a) Why do you give this rating?

8. Higher energy costs? [RECORD RATING]

    a) Why do you give this rating?

9. The current economic downturn

    a) Why do you give this rating?

C. Effects of economic downturn:

1. What has happened to your company's CFL sales during the economic downturn?

    a) [IF DECLINE IN SALES REPORTED] What has been your company's strategic response to this decline in sales?

        a. [IF SPECIAL ACTIONS TAKEN TO IMPROVE CFL SALES] How effective have these actions been?

    b) [IF DECLINE IN SALES REPORTED] Do you expect your company's CFL sales to return to previous levels once the economy improves?

VIII. Increasing Specialty CFL Sales, Increasing CFL Penetration in Hard-to-Reach Markets

A. Specialty CFL price trends: What do you think will be the trend for retail prices for specialty CFLs over the next few years? Do you think retail prices for specialty CFLs will go up, go down, or stay about the same?

    1. Why do you say that?

B. The Massachusetts ENERGY STAR® Lighting Program has made efforts to promote specialty CFLs in recent years. Using a scale of one to ten where ten means "very effective" and one means "not very effective at all", what would you rate the effectiveness of these efforts?

    1. Why do say that?

C. Adequacy of specialty CFL buydowns: The Massachusetts ENERGY STAR® Lighting Program currently offers buydown discounts for specialty CFLs of [CITE MOST RECENT INCENTIVE LEVELS]. Do you think these incentive levels are adequate to move consumer demand for these products?

1. [IF THEY SAY THE INCENTIVE LEVELS ARE ADEQUATE FOR SOME SPECIALTY CFL TYPES BUT NOT OTHERS] For which types of specialty CFL types do you think the buydown discounts need to be increased?

2. [IF NO] What buydown discount levels are needed to move consumer demand?

D. Ways to increase specialty CFL sales: If the Massachusetts utilities wanted to increase sales for specialty CFLs over the next few years, what would be the best way for them to leverage their resources to accomplish this?

E. Increasing HTR market penetration: The Massachusetts ENERGY STAR® Lighting Program is currently trying to increase the penetration of CFLs in so-called 'hard-to-reach" lighting markets. As noted, they define these as markets that serve low-income, ethnic, non-English-speaking, and less educated customers. Do you have any suggestions on what the Massachusetts utilities could do to encourage greater sales of CFLs in these hard-to-reach lighting markets? [NOTE: IF THEY PROVIDED A DIFFERENT DEFINITION OF HTR IN RESPONSE TO QUESTION I.J., ADJUST THE QUESTION ACCORDINGLY.]

IX. Market Barriers, Effects of EISA

A. Supply-side barriers: Are there factors inherent in the manufacturing, importing or distributing processes that have restricted the production and supply of CFL products in the past year or so? Please describe: [IF RESPONDENT CAN'T THINK OF ANYTHING, PROMPT WITH EXAMPLES SUCH AS SHORTAGES OF INPUTS USED IN MANUFACTURING PROCESSES (LABOR, CAPITAL, RAW MATERIALS), INADEQUATE INFRASTRUCTURE TO PRODUCE OR IMPORT PRODUCTS, OR BRING THEM TO MARKET, ETC.]

1. To what degree have these production and supply restrictions varied with the type of CFL product?

2. How do these supply-side barriers compare to those for non-CFL products?

3. [IF SUPPLY BARRIERS IDENTIFIED] Has there been any progress recently to reduce these barriers?

   a) [IF YES] What factors led to the reduced barriers?

b) [IF NOT ALREADY MENTIONED] Did the 2009-2010 Massachusetts [OR RI] ENERGY STAR® Lighting Program play a role in reducing these barriers?

a. [IF YES] What role did it play?

c) Are there any supply-side barriers that have been increased due to the structure or timing of the Massachusetts [OR RI] lighting rebate and discount programs?

a. [IF YES] What are these?

b. [IF YES] How did/does the Massachusetts programs create or increase these barriers?

4. [IF SUPPLY BARRIERS IDENTIFIED] What, if anything, needs to happen to overcome the remaining supply-side restrictions?

B. Demand-side barriers: What are the most important factors that are limiting customer demand for CFL products? Please explain. [IF RESPONDENT CAN'T THINK OF ANYTHING, PROMPT WITH EXAMPLES SUCH AS LACK OF AWARENESS, PRODUCT PRICING, AND PERCEPTIONS REGARDING PRODUCT PERFORMANCE, BULB FIT, APPEARANCE, EARLY BURN-OUT, ETC. RECORD WHETHER ONE HAD TO PROMPT AND RANDOMLY ROTATE THE EXAMPLES USED IN THE PROMPT.]

1. To what degree do these demand barriers vary with the type of CFL product?

2. [IF DEMAND BARRIERS IDENTIFIED] Has there been any progress recently to reduce these barriers?

a) [IF YES] What factors lead to the reduced barriers?

b) [IF NOT ALREADY MENTIONED] Did the 2009-2010 Massachusetts [OR RI] ENERGY STAR® Lighting Program play a role in reducing these barriers?

a. [IF YES] What role did it play?

c) Are there any demand-side barriers that have been increased due to the structure or timing of the Massachusetts [OR RI] lighting rebate and discount programs?

a. [IF YES] What are these?

b. [IF YES] How did/does the Massachusetts [OR RI] programs create or increase these barriers?

3. [IF DEMAND BARRIERS IDENTIFIED] What needs to happen to overcome these demand-side barriers through the beginning of 2012?

a) How about from 2012 to 2014?

b) How about beyond 2014??

X. Program Satisfaction and Retailer Marketing Involvement

1. Using a scale of 0 to 10 where 10 = very satisfied and 0 = very dissatisfied, how satisfied have you been with the Massachusetts ENERGY STAR® Lighting Program? [IF THEY PARTICIPATED IN THE RI PROGRAM, ASK SEPARATE SATISFACTION QUESTION FOR RI ALSO]

a) Why do you say that?

2. In what way could the program be improved?

3. Are you planning to participate in the program going forward?

4. Finally the Massachusetts [AND RI] ENERGY STAR® Lighting Program are looking for ways that lighting retailers could become more involved in marketing this program. Do you have any ideas on how this might be done?

Appendix B: MA_RI Store Manager Codebook

Massachusetts/Rhode Island ENERGY STAR Retail Store/Product Manager Codebook

NOTES:

1 Variable names are in bold type.

2 A code of -8 means the respondent answered don't know.

3 A code of -9 means the respondent refused to answer the question.

4 Response categories are never read unless the question has an instruction to specifically read the response categories.

Finding the Decision Maker

I1 Hello, may I please speak with *[USE CONTACT NAME, IF AVAILABLE]*?*[<IF CONTACT NAME> IS BLANK THEN SKIP TO I2]*

1 Contact available *[SKIP TO I4]*

2 Contact currently unavailable *[ARRANGE CALL BACK]*

I2 I'd like to speak with someone in your store who deals with stocking and supplying your lighting products such as light bulbs?

[IF THEY ASK WHY, SAY: "ACCORDING TO OUR RECORDS, YOUR STORE HAS RECENTLY PARTICIPATED IN THE [STATE] ENERGY STAR LIGHTING PROGRAM. THE [STATE] ADMINISTRATORS OF THIS PROGRAM HAD SOME QUESTIONS ABOUT YOUR STORE'S PARTICIPATION IN THIS PROGRAM."]

[IF THEY WANT VERIFICATION OF THE LEGITIMACY OF THE RESEARCH, TELL THEM TO CALL BIRUD JHAVERI OF NSTAR AT (781) 441-3456]

[IF THEY ASK WHO THE ADMINISTRATORS ARE, READ 'CAPE LIGHT COMPACT, NATIONAL GRID, NSTAR, UNITIL AND WESTERN MASSACHUSETTS ELECTRIC.']

1 Person responsible available *[SKIP TO I4]*
2 Person responsible currently unavailable *[ARRANGE CALL BACK]*
3 No person responsible for stocking or management of lighting products *[ASK: "MAY I SPEAK TO THE STORE MANAGER."]*
-8 Don't know *[ASK: "May I speak to the store manager."]*
-9 Refused *[THANK AND TERMINATE]*

I2A May I speak with the store manager?

1 Yes
2 Not available *[SET CALLBACK]*
-8 Don't Know *[THANK AND TERMINATE]*
-9 Refused *[THANK AND TERMINATE]*

I3 I understand you're the store manager. Are you familiar with the stocking patterns or sales trends for the lighting products that you sell?

[IF THEY ASK WHY, SAY: "ACCORDING TO OUR RECORDS, YOUR STORE HAS RECENTLY PARTICIPATED IN THE [MASSACHUSETTS/RHODE ISLAND] ENERGY STAR LIGHTING PROGRAM. THE [MASSACHUSETTS/RHODE ISLAND] ELECTRIC UTILITIES AND CAPE LIGHT COMPACT RUN THIS PROGRAM

[IF THEY WANT VERIFICATION OF THE LEGITIMACY OF THE RESEARCH, TELL THEM TO CALL BIRUD JHAVERI OF NSTAR AT (781) 441-3456]

1 Yes *[SKIP TO I4]*
2 No *[ASK: "WHO WOULD BE FAMILIAR WITH SALES AND STOCKING TRENDS FOR LIGHTING PRODUCTS IN YOUR STORE?". IF NAME RECEIVED OBTAIN PHONE NUMBER AND CONTACT THAT PERSON (STARTING WITH I4). IF NO NAME RECEIVED, THANK AND TERMINATE]*

-8 Don't know
-9 Refused

I3A Who would be familiar with sales and stocking trends for lighting products in your store?

1 Contact Name and Number Given
[SPECIFY; SKIP TO I4 WITH NEW CONTACT]
2 No Contact Info Provided *[THANK AND TERMINATE]*

I4 Hello I am _____ from Tetra Tech. I am calling on behalf of the *[STATE]* ENERGY STAR lighting program. According to our records, your store recently participated in this program by selling discounted compact fluorescent light bulbs from *[SUPPLIER]*. The program paid *[SUPPLIER]* an incentive ranging from about $2.43 to $4.22 per compact fluorescent bulb so that you could sell them at a discounted price. The *[STATE]* ENERGY STAR lighting program is trying to improve their lighting rebate program and was hoping you could help us out by answering a few questions. Are you familiar with this program?

1 Yes *[SKIP TO INTRO 3]*
2 No
-8 Don't know
-9 Refused *[THANK AND TERMINATE]*

I5 Who would be familiar with this program?
[RECORD NAME AND PHONE NUMBER]

[IF ALTERNATE CONTACT, THANK AND TERMINATE. THEN CALL BACK CONTACT IDENTIFIED IN RESPONSE TO QUESTION I5 AND REPEAT QUESTION I4]

1 Record Name And Phone, Callback Now
[SKIP TO I4 AND REPEAT]

2 Record Name And Phone, Callback Later *[SKIP DISPOSCR]*
3 No Additional Contact Information *[THANK AND TERMINATE]*
-8 Don't know *[THANK AND TERMINATE]*
-9 Refused *[THANK AND TERMINATE]*

INTRO3 For quality control and training purposes this call will be recorded.

[VERIFICATION? If they want verification of the legitimacy of the research, tell them to call Birud Jhaveri of NSTAR at (781) 441-3456]

[WHO? If they ask who the administrators are, read 'Cape Light Compact, National Grid, NSTAR, Unitil and Western Massachusetts Electric.']

[WHY? If they ask why, say: "According to our records, your store has recently participated in the _____ ENERGY STAR Lighting program. The _____ electric utilities and Cape Light Compact run this program."]

[PRESS 1 TO CONTINUE]

I6 What is your job title? *[RECORD]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

I6 About how many months or years have you been working with the sale of lighting products?

I6A _____ Record number of months
-8 Don't know
-9 Refused

I6B _____ Record number of years
-8 Don't know
-9 Refused

I7 Now I'm going to use the abbreviation "CFL" to refer to compact fluorescent lamps. Are you the primary person who decides how many discounted CFLs your store(s) receives in shipments from *[SUPPLIER]* as part of this *[STATE]* ENERGY STAR lighting program?

1 Yes *[SKIP TO P1]*
2 No
-8 Don't know
-9 Refused

I8 Who is the primary decision-maker?
[RECORD NAME AND PHONE NUMBER]

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

Participation Information

P1 *[IF <ST CFL DB> IS BLANK ELSE SKIP TO P2]* Does your store currently sell standard CFLs? By standard CFLs I mean bulbs such as basic spirals or mini-spirals that are not covered and do not have any special features such as dimmable or three-way capability?

1 Yes
2 No *[SKIP TO P4]*
-8 Don't know *[SKIP TO P4]*
-9 Refused *[SKIP TO P4]*

P2 Does your store currently sell standard CFLs that have not been discounted by the *[STATE]* ENERGY STAR lighting program?

1 Yes

2 No
-8 Don't know
-9 Refused

P3 *[IF <ST CFL DB> IS NOT BLANK AND P2 =1 ELSE SKIP TO P4]* Roughly what percent of the standard CFLs that your store sold during the 2009-2010 period were discounted by the ENERGY STAR lighting program and what percent were not?
[NOTE: THE TWO PERCENTAGES NEED TO ADD UP TO 100%]

_____ Percent discounted by MA/RI ES Program
-8 Don't know
-9 Refused

P3A _____ Percent not program discounted
-8 Don't know
-9 Refused

P4 *[IF <SP CFL DB> IS BLANK ELSE SKIP TO P5]* Does your store currently sell specialty CFLs such as dimmable, 3-way, or reflector CFLs?

1 Yes
2 No *[SKIP TO A3]*
-8 Don't know *[SKIP TO A3]*
-9 Refused *[SKIP TO A3]*

P5 Does your store currently sell specialty CFLs that have not been discounted by the *[STATE]* ENERGY STAR lighting program?

1 Yes
2 No
-8 Don't know
-9 Refused

P6 *[IF <SP CFL DB> IS NOT BLANK AND P5 =1 ELSE SKIP TO A3]* Roughly what percent of the specialty CFLs that your store sold during the 2009-2010 period were discounted by the *[STATE]* ENERGY STAR lighting program and what percent were not?
[NOTE THE TWO PERCENTAGES SHOULD ADD UP TO 100%]

_____ Percent discounted by MA/RI ES Program
-8 Don't know
-9 Refused

P6A _____ Percent not program discounted
-8 Don't know
-9 Refused

Sales Trends and Program Attribution Questions

A3 *[IF <ST CFL DB> IS NOT BLANK ASK A3 ELSE SKIP TO A8]* During the 2009-2010 period the *[STATE]* ENERGY STAR program provided average buy down discounts of $2.43 for every standard CFL bulb sold through the program. If these discounts had not been available, do you think your store(s) would have sold any such standard CFLs in the 2009-2010 period?

1 Yes
2 No *[SKIP TO A8]*
-8 Don't know
-9 Refused

A4 If these average buy down discounts offered by the program of $2.43 per standard CFL bulb were not available, do you think your sales of these CFL bulbs would be about the same, lower, or higher?

1 Same *[SKIP TO A8]*
2 Lower
3 Higher *[SKIP TO A7A]*
-8 Don't know *[SKIP TO A8]*
-9 Refused *[SKIP TO A8]*

A5 By what percentage do you estimate your store's sales of these standard CFLs would be lower during this 2009-2010 period if > the *[STATE]* ENERGY STAR program discounts averaging $2.43 per standard CFL bulb were not available?

_____ Number in percentage *[RECORD]*
-8 Don't know
-9 Refused

A6 *[IF A5 = -8 OR -98 THEN SKIP TO A8]* I want to make sure I understand you correctly when you say your store's sales of standard CFLs would be *[%FROM QUESTION A5]* lower without the program buy down discounts. So you're saying that if you sold 100 CFLs in a given week with the program discounts, you would have only sold *[100 - (%FROM QUESTION A5 * 100)]* that week without the program discounts.

Is this correct?

1 Yes
2 No *[SPECIFY]*
-8 Don't know
-9 Refused

*[PROGRAMMERS: AS AN EXAMPLE, IF THE PERCENTAGE FROM A5 WAS 40% THEN THE CALCULATION SHOULD BE 100 – (60% * 100) = 40 CFLS PER WEEK. SURVEYORS: IF RESPONSE IS ≠ YES THEN CLARIFY RESPONSE TO A5]*

A7A *[IF A4 ≠ 3 THEN SKIP TO A8]* Please explain why you think your sales of standard CFLs would be higher in the absence of the *[STATE]* ENERGY STAR program

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

A7B By what percentage do you estimate your store's sales of these standard CFLs would be higher during this 2009-2010 period if the *[STATE]* ENERGY STAR program discounts averaging $2.43 per standard CFL bulb were not available?

_____ Number in percentage *[RECORD]*
-8 Don't know
-9 Refused

A7C *[IF A7B = -8 OR -9 THEN SKIP TO A8]* I want to make sure I understand you correctly when you say your store's sales of standard CFLs would be *[%FROM QUESTION A7B]* higher without the program buy down discounts. So you're saying that if you sold 100 standard CFLs in a given week with the program discounts, you would have sold *[100 + (% FROM QUESTION A7B * 100)]* that week without the program discounts. *[IF RESPONSE IS ≠ YES THEN CLARIFY RESPONSE TO A7B]*

Is this correct?

1 Yes
2 No *[SKIP TO A7B TO CORRECT]*

A8 *[IF <SP CFL DB> IS NOT BLANK ASK A8 ELSE SKIP TO A13]* Now I'm going to ask you about the effect of the *[STATE]* ENERGY STAR program buy down discounts on your sales of specialty CFLs such as dimmable, 3-way, or reflector CFLs. Throughout the whole program there was an average buy down discount of $4.22 per specialty CFL bulb. If these buy down discounts had not been available, do you think your store(s) would have sold these specialty CFLs in the 2009-20010 period?

1 Yes
2 No *[SKIP TO A13]*
-8 Don't know
-9 Refused

A9 If these average buy down discounts offered by the program of $4.22 per specialty CFL bulb were not available, do you think your sales of these specialty CFL bulbs would be about the same, lower, or higher?

1 Same *[SKIP TO A13]*
2 Lower
3 Higher *[SKIP TO A12A]*
-8 Don't know *[SKIP TO A13]*
-9 Refused *[SKIP TO A13]*

A10 By what percentage do you estimate your store's sales of these specialty CFLs would be lower during this 2009-2010 period if the average *[STATE]* ENERGY STAR program discounts of $4.22 per specialty CFL bulb were not available?

_____ Number in percentage *[RECORD]*
-8 Don't know
-9 Refused

A11 *[IF A10 = -8 OR -9 THEN SKIP TO A13]* I want to make sure I understand you correctly when you say your store's sales of specialty CFLs would be *[% FROM*

QUESTION A10] lower without the program buy down discounts. So you're saying that if you sold 100 specialty CFLs in a given week with the program discounts, you would have only sold *[100 - (%FROM QUESTION A10 * 100)]* that week without the program discounts.
[IF RESPONSE IS ≠ YES THEN CLARIFY RESPONSE TO A10]

Is this correct?

1 Yes
2 No *[SKIP TO A10 TO CORRECT]*

A12A *[IF A9 ≠ 3 THEN SKIP TO A13]* Please explain why you think your sales of specialty CFLs would be higher in the absence of the *[STATE]* ENERGY STAR program?

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

A12B By what percentage do you estimate your store's sales of these specialty CFLs would be higher during this 2009-2010 period if the *[STATE]* ENERGY STAR program discounts averaging $4.22 per specialty CFL bulb were not available?

_____ Number in percentage *[RECORD]*
-8 Don't know
-9 Refused

A12C *[IF A12B = -8 OR -9 THEN SKIP TO A13]* I want to make sure I understand you correctly when you say your store's sales of specialty CFLs would be *[% FROM QUESTION A12B]* higher without the program buy down discounts. So you're saying that if you sold 100 specialty CFLs in a given week with the program discounts, you would have sold *[100 + (% FROM QUESTION A12B * 100)]* that week without the program discounts.
[IF RESPONSE IS ≠ YES THEN CLARIFY RESPONSE TO A12B]

Is this correct?

1 Yes
2 No *[SKIP TO A12TO CORRECT]*

A13 Besides the discounts, do you think the *[STATE]* ENERGY STAR program does anything else to help you sell energy efficient lighting products?

1 Yes
2 No *[SKIP TO A15]*
-8 Don't know *[SKIP TO A15]*
-9 Refused *[SKIP TO A15]*

A14 What else does the *[STATE]* ENERGY STAR program do to help sell energy-efficient lighting products?
[ACCEPT MULTIPLE RESPONSES. DO NOT READ]

For A14_1 through A14_7

0 Not mentioned
1 Mentioned

A14_1 Provide in-store signage
A14_2 Provide co-op advertising support
A14_3 Provide other marketing support
A14_4 Provide customer education
A14_5 Other *[RECORD RESPONSE]*
A14_6 Don't know/Not sure/Can't remember
A14_7 Refused

A14_5 Other *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

A15 Does *[RETAILER]* do anything on its own, without the *[STATE]* ENERGY STAR program's help, to help sell energy-efficient lighting products?

1 Yes
2 No *[SKIP TO H1]*
-8 Don't know *[SKIP TO H1]*
-9 Refused *[SKIP TO H1]*

A16 That does *[RETAILER]* do on its own to help sell energy-efficient lighting products?
[DO NOT READ RESPONSES. ALLOW MULTIPLE RESPONSES]

For A16_1 through A16_7

0 Not mentioned
1 Mentioned

A16_1 Provide in-store signage
A16_2 Place products in end caps/ more prominent store locations
A16_3 Provide lighting displays
A16_4 Provide advertising flyers
A16_5 Other *[RECORD RESPONSE]*
A16_6 Don't know
A16_7 Refused

A16_5 Other *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

Hard-to-Reach Lighting Customers

H1 The Massachusetts ENERGY STAR Lighting Program is trying to increase the penetration of CFLs in so-called 'hard-to-reach" energy efficient lighting markets. The program is currently defining these markets as those that serve low-income, ethnic, non-English-speaking, and less educated customers. The program is trying to reach these customers through discount stores and small grocery stores. First of all do you agree with that definition of hard-to-reach lighting markets?

1	Yes
2	No
-8	Don't know
-9	Refused

H2 *[IF H1=2 ELSE SKIP TO H3]* How would you define the hard-to-reach lighting markets in Massachusetts? *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

H3 Do you think discount stores and small grocery stores are the right kinds of retailers that the program should be working with to make CFLs more accessible to hard-to-reach customers?

1	Yes
2	No
-8	Don't know
-9	Refused

H3A *[IF H3=2 ELSE SKIP TO H4A]* Why do you say that? *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

H4 What types of retailers should the program be working with to reach these hard-to-reach customers? *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

H4A By making ENERGY STAR CFLs available in the discount and small grocery stores, do you think the Massachusetts ENERGY STAR lighting administrators are creating new CFL sales that didn't exist before, taking away CFL sales from other retailers, or doing a bit of both?

1	Creating new sales
2	Taking away sales from other retailers
3	A bit of both
4	Other *[SPECIFY]*
-8	Don't know
-9	Refused

H4A_4 Other *[SPECIFY]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

H4B *[IF H4A = 2 OR 3 ELSE SKIP TO H5]* From which retailers do you think these discount and small grocery stores are taking away CFL sales? *[ALLOW MULTIPLE RESPONSES]*

For H4B_1 through H4B_6

0 Not mentioned
1 Mentioned

H4B_1 Wal-Mart
H4B_2 Home Depot
H4B_3 Lowe's
H4B_4 Other *[SPECIFY]*
H4B_5 Don't know
H4B_6 Refused

H4B_4 Other *[SPECIFY]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

H5 In the past year do you think the proportion of your company's CFL sales that are going to individuals in these hard-to-reach demographic groups has increased, decreased, or stayed about the same?

1 Increased
2 Decreased
3 Stay about the same
-8 Don't know
-9 Refused

H6 Why do you say this? *[PROBE FOR SPECIFICS]*
[RECORD RESPONSE]

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

H7 Do you have any suggestions on what the administrators of the Massachusetts ENERGY STAR program(s) could do to increase the sales of CFLs in the "hard-to-reach" lighting markets?

1 Yes
2 No *[SKIP TO H9]*
-8 Don't know *[SKIP TO H9]*
-9 Refused *[SKIP TO H9]*

H8 What suggestions do you have? *[ALLOW MULTIPLE RESPONSES]*

For H8_1 through H8_9

0 Not mentioned
1 Mentioned

H8_1 Offer larger rebates/incentives on CFLs
H8_2 Provide customer education
H8_3 Provide retailer education
H8_4 Provide more multilingual information
H8_5 Get more discount stores into program
H8_6 Get more small, ethnic grocery stores into program
H8_7 Other *[SPECIFY]*
H8_8 Don't know
H8_9 Refused

H8_7 Other *[SPECIFY]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

H9 Please estimate what percentage of your customers you would consider low-income?

_____ Number in percentage *[RECORD]*
-8 Don't know
-9 Refused

H10 Please estimate what percentage of your customers do not speak English as a primary language?

_____ Number in percentage *[RECORD]*
-8 Don't know
-9 Refused

H11 Please estimate what percentage of your customers are members of a racial or ethnic minority group?

_____ Number in percentage *[RECORD]*
-8 Don't know
-9 Refused

Promoting Specialty CFLs

SP1 *[IF <SP CFL DB> IS BLANK AND P4 ≠ 1 ELSE SKIP TO SP2]* According to our records and your previous responses your store currently does not sell any specialty CFLs such as dimmable, 3-way, or reflector CFLs? Why doesn't your store offer this product? *[ALLOW MULTIPLE RESPONSES]*

For SP1_1 through SP1_11

0 Not mentioned
1 Mentioned

SP1_1 They are too expensive for our customers
SP1_2 They don't fit well with the rest of our product line
SP1_3 They don't sell well
SP1_4 We've had quality/performance problems with them in the past
SP1_5 Our customers are not interested in them
SP1_6 We're not familiar/comfortable enough with these products
SP1_7 There's limited availability of them
SP1_8 Your info is incorrect, I do sell specialty CFLS *[SKIP TO SP2]*
SP1_9 Other *[SPECIFY]*
SP1_10 Don't know
SP1_11 Refused

SP1_9 Other *[SPECIFY]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

SP2 *[IF <SP CFL DB> IS BLANK AND P4 ≠ 1 AND SP1 ≠8 SKIP TO SP9]* According to our records and your previous responses your store currently sells specialty CFLs such as dimmable, 3-way, or reflector CFLs? Within the past year would you characterize sales of these products as being excellent, good, fair, or poor?

1 Excellent
2 Good
3 Fair
4 Poor
5 Your info is incorrect, I do not sell specialty CFLS *[GO BACK TO SP1]*
-8 Don't know
-9 Refused

SP2_1CO According to our records and your previous responses, your store currently does not sell any specialty CFLs such as dimmable, 3-way, or reflector CFLs. Why doesn't your store offer this product? *[ALLOW MULTIPLE RESPONSES]*

For SP2_1CO1 through S2_1CO10

0 Not mentioned
1 Mentioned

SP2_1CO1 They are too expensive for our customers
SP2_1CO2 They don't fit well with the rest of our product line
SP2_1CO3 They don't sell well
SP2_1CO4 We've had quality/performance problems with them in the past
SP2_1CO5 Our customers are not interested in them
SP2_1CO6 We're not familiar/comfortable enough with these products
SP2_1CO7 There's limited availability of them
SP2_1CO8 Other *[SPECIFY]*
SP2_1CO9 Don't know
SP2_1CO10 Refused

SP2_1CO8 Other *[SPECIFY]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

SP2A What factors or barriers prevent more of these specialty CFLs from being sold? *[DO NOT READ LIST. ALLOW MULTIPLE RESPONSES]*

SP2A_1 through SP2A_10

0 Not mentioned
1 Mentioned

SP2A_1 They are too expensive for our customers
SP2A_2 They don’t fit well with the rest of our product line

SP2A_3 They don't sell well
SP2A_4 We've had quality/performance problems with them in the past
SP2A_5 Our customers are not interested in them
SP2A_6 We're not familiar/comfortable enough with these products
SP2A_7 There's limited availability of them
SP2A_8 Other *[SPECIFY]*
SP2A_9 Don't know
SP2A_10 Refused

SP2A_8 Other *[RECORD]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

SP2B Do you think retail prices for specialty CFLs over the next few years will go up, go down, or stay about the same?

1 Prices will go up
2 Prices will go down
3 Prices will stay the same
-8 Don't know
-9 Refused

SP3 *[IF SP2B = 1, 2 ELSE SKIP TO SP4]* Why do you say this?
[RECORD RESPONSE]

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

SP4 *[IF [STATE] = RI SKIP TO SP6]* The Massachusetts ENERGY STAR lighting program has tried to promote specialty CFLs in recent years. Using a scale of zero to ten where ten means "very effective" and zero means "not very effective at all", what would you rate the effectiveness of these efforts?

_____ Number from 0 to 10 *[RECORD]*

-8 Don't know
-9 Refused

SP5 Why do you say this? *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

SP6 The *[STATE]* ENERGY STAR lighting program currently offers average buy down discounts for specialty CFLs of *[MOST RECENT INCENTIVE LEVELS]*. Do you think these incentive levels are adequate to move consumer demand for these products?

1 Yes, for all specialty CFL products
2 Yes for some specialty CFL products, not for others
3 No, not for any specialty CFL products
-8 Don't know
-9 Refused

SP7 *[IF SP6 = 2 ELSE SKIP TO SP8]* For which types of specialty CFL do you think the buy down discounts need to be increased?

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

SP8 *[IF SP6 = 3 ELSE SKIP TO SP9]* What incentive levels do you think are needed to move consumer demand for these products?
[IF NEEDED, REMIND THAT THE CURRENT AVERAGE BUYDOWN AMOUNT IS [MOST RECENT INCENTIVE LEVELS].]

_____ Amount in buy down per bulb *[RECORD]*
-8 Don't know
-9 Refused

SP9 If the *[STATE]* ENERGY STAR Lighting Program Administrators wanted to increase retail sales of specialty CFLs over the next few years, what would be the best ways for them to do this?
[ALLOW MULTIPLE RESPONSES]

For SP9_1 through SP9_8

0 Not mentioned
1 Mentioned

SP9_1 Offer larger rebates/incentives on specialty CFLs
SP9_2 Provide customer education about specialty CFLs
SP9_3 Provide retailer education about specialty CFLs
SP9_4 Improve the quality/performance of these specialty CFLs
SP9_5 Make these specialty CFLs more available
SP9_6 Other *[RECORD]*
SP9_7 Don't know
SP9_8 Refused

SP9_6 Other *[RECORD]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

CFL Pricing

C1 Now I would like to ask you a few questions about your CFL pricing. For the CFLs that you sell through the *[STATE]* ENERGY STAR lighting program, do you know how your company determines the retail prices for these products?

1 Yes
2 No *[SKIP TO C3]*
-8 Don't know *[SKIP TO C3]*
-9 Refused *[SKIP TO C3]*

C2 How are these retail CFL prices determined?
[ALLOW MULTIPLE RESPONSES]

For C2_1 through C2_7

0 Not mentioned
1 Mentioned

C2_1 Based on competitor's pricing
C2_2 $1 or 99 cents price cap
C2_3 Standard discount off CFLs not discounted by program
C2_4 Doubling the wholesale price (keystone pricing)
C2_5 Other *[RECORD]*
C2_6 Don't know
C2_7 Refused

C2_5 Other *[RECORD]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

C3 *[IF P5 = 1 ASK C3 ELSE SKIP TO C5]* You said earlier that you sell CFLs that do not receive discounts from the *[STATE]* ENERGY STAR lighting program. Are these "non-program" CFLs typically sold at higher, lower, or the same prices as the CFLs discounted by the program?

1 Higher
2 Lower *[SKIP TO C4A]*
3 Same price *[SKIP TO C5]*
-8 Don't know *[SKIP TO C5]*
-9 Refused *[SKIP TO C5]*

C4 On a per-bulb basis, on average how much higher are the retail prices for these non-program CFLs than the CFLs that you sell through the *[STATE]* ENERGY STAR lighting program?

_____ Amount estimated in dollars per bulb *[RECORD]*
-8 Don't know
-9 Refused

C4A On a per-bulb basis, on average how much lower are the retail prices for these non-program CFLs than the CFLs that you sell through the *[STATE]* ENERGY STAR lighting program?

_____ Amount estimated in dollars per bulb *[RECORD]*
-8 Don't know
-9 Refused

C5 When the *[STATE]* ENERGY STAR lighting program is providing upstream buy down or markdown discounts for the CFLs that you sell, does your company ever provide any of its own price discounts in addition to those provided by the program?

1 Yes
2 No *[SKIP TO E1]*
-8 Don't know *[SKIP TO E1]*
-9 Refused *[SKIP TO E1]*

C5A Are these additional discounts just provided for standard CFLs, just for specialty CFLs, or for both types?

1 Just standard CFLs
2 Just specialty CFLs
3 Both standard and specialty CFLs
-8 Don't know *[SKIP TO E1]*
-9 Refused *[SKIP TO E1]*

C6A What is the typical range of these additional discounts on a dollar per bulb basis for standard bulb?
[IF C5A = 3, OBTAIN SEPARATE ESTIMATES FOR STANDARD AND SPECIALTY CFLS]

_____ Amount estimated in dollars per bulb *[RECORD]*
-8 Don't know
-9 Refused

C6B What is the typical range of these additional discounts on a dollar per bulb basis for specialty bulb?

_____ Amount estimated in dollars per bulb *[RECORD]*
-8 Don't know
-9 Refused

Other Possible Program/Market Effects

E1 The *[STATE]* ENERGY STAR lighting program has been in effect since [1998/2003]. Have the years of *[STATE]* lighting rebate and discount programs had any effects on the variety of CFL products that you sell in *[STATE]*?

1 Yes
2 No *[SKIP TO E3]*
-8 Don't know *[SKIP TO E3]*
-9 Refused *[SKIP TO E3]*

E2 What effects has the program had on the types of CFL products you sell? *[ALLOW MULTIPLE RESPONSES]*

For E2_1 through E2_5

0 Not mentioned
1 Mentioned

E2_1 We sell a greater variety of CFL products since joining the program
E2_2 We sell a lesser variety of CFL products since joining the program
E2_3 Other *[RECORD]*
E2_4 Don't know
E2_5 Refused

E3 Have the years of *[STATE]* lighting rebate and discount programs had any effects on how you promote the CFL products that you sell in *[STATE]*?

1 Yes
2 No *[SKIP TO E5]*
-8 Don't know *[SKIP TO E5]*
-9 Refused *[SKIP TO E5]*

E4 *[IF E3=1 ELSE SKIP TO E5]* How have these lighting rebate and discount programs affected the way you promote these CFL products?

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

E5 In December 2007 Congress passed an energy bill called the Energy Independence and Security Act. One component of the bill calls for a gradual phase-out of inefficient lamps over time starting in 2012.
[IF NECESSARY: The phase-out begins for 100 Watt general service lamps on January 1, 2012, for 75-Watt lamps starting in 2013, and for 60 and 40 Watt lamps in 2014.]

Before now were you aware of this federal phase out of inefficient lamps?

1 Yes
2 No *[SKIP TO S1]*
-8 Don't know *[SKIP TO S1]*
-9 Refused *[SKIP TO S1]*

E6 What effects do you think this federal phase-out will have on the lighting you sell? *[ALLOW MULTIPLE RESPONSE]*

For E6_1 through E6_7

0 Not mentioned
1 Mentioned

E6_1 It will increase sales of incandescent lamps
E6_2 It will increase prices of incandescent lamps
E6_3 It will cause consumers to hoard incandescent lamps
E6_4 It will cause us to stop selling incandescent lamps
E6_5 It will increase sales of CFLs
E6_6 It will increases sales of halogen lamps
E6_7 Other *[RECORD]*
E6_8 Don't know *[SKIP TO S3]*
E6_9 Refused *[SKIP TO S3]*

E6_7 Other *[RECORD]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

Program Satisfaction

INTROS1 We're almost done here. Finally I want to get your feedback on this *[STATE]* ENERGY STAR lighting program.

S1 *[IF I7 = 1 ELSE SKIP TO S3]* Using a scale of one to five where five equals "very satisfied" and one equals "very dissatisfied," how satisfied have you been with the process of reserving and ordering these program-discounted CFLs?

1 Very dissatisfied
2
3
4 *[SKIP TO S3]*
5 Very satisfied *[SKIP TO S3]*
-8 Don't know *[SKIP TO S3]*
-9 Refused *[SKIP TO S3]*

S2 Why are you less than satisfied with this process?
[RECORD RESPONSE]

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

S3 Using this same five-point satisfaction scale, how satisfied have you been with the availability of these program-discounted CFLs?
[REMIND RESPONDENT OF SATISFACTION SCALE, IF NECESSARY]

1 Very dissatisfied
2
3
4 *[SKIP TO S7]*
5 Very satisfied *[SKIP TO S7]*
-8 Don't know *[SKIP TO S7]*
-9 Refused *[SKIP TO S7]*

S5 Are there certain types of CFLs that you have greater concern about availability than others?

1 Yes
2 No *[SKIP TO S7]*
-8 Don't know *[SKIP TO S7]*
-9 Refused *[SKIP TO S7]*

S6 Which types? *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

S7 Are the rules for participating in the *[STATE]* ENERGY STAR lighting program, clear?

1 Yes *[SKIP TO S9]*
2 No
-8 Don't know *[SKIP TO S9]*
-9 Refused *[SKIP TO S9]*

S8 Which program rules are not clear? *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

S9 Have you ever interacted with the staff or contractors who work with the *[STATE]* ENERGY STAR lighting program?

1 Yes
2 No *[SKIP TO S12]*
-8 Don't know *[SKIP TO S12]*
-9 Refused *[SKIP TO S12]*

S10 Using a scale of one to five where five equals “very satisfied” and one equals “not satisfied at all,” how satisfied have you been with the way that program staff or contractors responded to your questions and requests?

1 Not satisfied at all
2
3
4 *[SKIP TO S12]*
5 Very satisfied *[SKIP TO S12]*
-8 Don't know *[SKIP TO S12]*
-9 Refused *[SKIP TO S12]*

S11 Why are you less than satisfied with the program staff or contractors?
[RECORD RESPONSE]

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

S12 Using this same 5-point satisfaction scale, how satisfied have you been with the *[STATE]* ENERGY STAR lighting program as a whole?
[IF NECESSARY, REMIND RESPONDENT OF SATISFACTION SCALE]

1 Not satisfied at all
2
3
4 *[SKIP TO S13A]*
5 Very satisfied *[SKIP TO S13A]*
-8 Don't know *[SKIP TO S13A]*
-9 Refused *[SKIP TO S13A]*

S13 Why are you less than satisfied with the program?
[RECORD RESPONSE]

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

S13A The *[STATE]* ENERGY STAR lighting program is looking for ways that lighting retailers could become more involved in marketing this program. Do you have any ideas on how this might be done?

1 Yes
2 No *[SKIP TO S14]*
-8 Don't know *[SKIP TO S14]*
-9 Refused *[SKIP TO S14]*

S13B What ideas do you have? *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

S14 Do you have any other suggestions on how this *[STATE]* ENERGY STAR lighting program could be improved?

1 Yes
2 No *[SKIP TO S16]*
-8 Don't know *[SKIP TO S16]*
-9 Refused *[SKIP TO S16]*

S15 What suggestion do you have? *[RECORD]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

S16 Will you participate in this program in the future?

1 Yes *[THANK AND TERMINATE]*
2 No
-8 Don't know

-9 Refused

S17 Why not? *[RECORD RESPONSE]*

[SEE RESPONSES IN OPEN ENDS SPREADSHEET]

END THANK AND TERMINATE

Sample Variables	
RESPNUM$	Respondent number
STATE	Program state
CASEID	Tetra Tech assigned case id
SUPPLIER	Supplier
STCFL	Standard program-discounted CFLs
SPCFL	Specialty program-discounted CFLs
KEMA_ID	KEMA assigned case id
STRAT	Stratum
CHANNEL	Channel