Connecticut Efficient Lighting Saturation and Market Assessment

FINAL

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Executive Summary

The residential lighting market in Connecticut and beyond is facing a period of rapid change. The new lighting efficiency standards mandated by the Energy Independence and Security Act of 2007 (EISA) effectively phases out the traditional incandescent light bulbs over a three year period. Consumers are now faced with a greater number and diversity of bulb choices for general service lighting—compact fluorescent lamps (CFLs), A-line incandescent halogens[1], and A-line light emitting diodes (LEDs)—than in the past. Moreover, the State of Connecticut had a goal of filling 36% of the residential sockets in the state with CFLs, that is, achieving 36% CFL socket saturation, by the end of 2011.

Given this period of rapid change, the Connecticut Energy Efficiency Board (EEB), in cooperation with Connecticut Light and Power (CL&P) and the United Illuminating Company (UI) hired NMR Group, Inc. (NMR) and its subcontractor Tetra Tech (collectively referred to as the evaluation team) to explore the current conditions of residential lighting in Connecticut as well as likely consumer reactions to EISA. The team had previously performed focus groups in the fall of 2011, which served as the first stage of the study. This report summarizes the results of the second stage of the study that relied on telephone surveys and onsite visits to residents' homes to determine saturation rates and market characteristics of efficient lighting choices. It also compares the current findings to those from the focus groups, which addressed similar topics in a more qualitative manner.

Research Objectives and Methodology

This second stage of the exploration of the residential lighting market in Connecticut had the following objectives, as outlined in the work plan:

- Establish consumers' awareness of various lighting options and of the upcoming changes in the light market stemming from EISA
- Understand consumers' current and likely reactions to EISA, such as stockpiling of bulbs and the type of bulbs they expect to buy after the incandescent phase-out
- Determine the current rates of use and storage for various lighting technologies and the reasons that underlie current lighting choices
- Identify ways in which the Companies could assist consumers in making more efficient lighting choices, including exploring issues related to incentives, education, and program design, among others

In order to meet these objectives, the evaluation team relied on a telephone survey of 551 residential customers of CL&P and UI and onsite visits to a subset of 100 survey respondents'

[1] The report refers to incandescent halogens as "halogen" bulbs throughout to avoid confusing them with other incandescent filament bulbs.

homes. The telephone survey primarily provided information on customers' current awareness and knowledge of various lighting technologies and of the EISA legislation as well as their opinions about and reactions to those technologies and the incandescent phase-out. The onsite visits served to describe the use, saturation, and storage of various lighting technologies in the home through a detailed lighting inventory; a follow-up survey delivered onsite also explored how respondents make decisions about lighting their home, their commitment to purchasing efficient lighting, and their willingness to pay for CFLs and LEDs at various price points. Table 1-1 in the main body of the report provides a more in-depth description of the research questions addressed through the surveys and onsite visits.

The evaluation team also presents relevant results from the Stage 1 lighting focus groups performed in the fall of 2011 throughout this report. However, because the focus groups were qualitative in nature, their findings provide insights that complement and inform the results from the more quantitative and statistically representative telephone survey and onsite visits.

Key Findings

Awareness of Lighting Options and Changes in Market

The first objective of the study was to establish customer awareness of lighting options and changes in the lighting market. Addressed primarily through the consumer survey, the key findings related to this objective include:

- Three-fourths of respondents were familiar with standard CFLs, but typically no more than one-half of respondents were familiar with specialty CFLs, A-line LEDs, and A-line halogen bulbs.
- Only thirty-nine percent of respondents reported that they had heard something about changes to lighting standards, and just 30% had specifically heard about the incandescent phase-out resulting from EISA.
- When asked what they had heard about the changes in lighting efficiency standards, 78% said that some light bulbs would not be available, and 17% thought they that they would be required to use CFLs or LEDs.

Current and Likely Consumer Reactions to EISA

A second objective of the study was to gauge consumers' current and likely reaction to the increased lighting efficiency standards—especially the incandescent bulb phase-out—resulting from EISA. The team addressed this objective through both the telephone survey and the onsite saturation components of the study. The exploration into reactions to EISA yields the following key conclusions:

- More than three-fourths of the respondents who were aware of change to the lighting standards understood that some light bulbs would no longer be available.

- About 30% of all respondents had noticed changes in the availability of light bulbs in the past three months, but this increased to 50% among those respondents who had actually shopped for light bulbs in the past three months. Those who had noticed changes typically cited a greater availability of CFLs and LEDs, a lower availability of incandescents, or an overall increase in the variety of bulbs on store shelves.
- When asked which type of bulb they would most likely purchase to replace a 100 Watt incandescent, 39% of respondents chose a lower wattage incandescent and 34% chose a CFL. These results are statistically different from each other. Common reasons for choosing an incandescent included preference for the light quality and familiarity with the product, while many respondents choosing CFLs noted their energy or bill savings. Focus group results suggest that more exposure to A-line (covered) CFLs through light displays or demonstrations could sway incandescent purchasers to buy covered CFLs instead of incandescent or A-line halogen bulbs.
- About one-third of telephone survey respondents reported purchasing light bulbs in the three months prior to the study. Most of these respondents bought CFLs (58% of purchasers who were also aware of CFLs) and incandescent bulbs (55% of purchasers; the team assumed that all respondents were aware of incandescent bulbs).
- Households in the onsite saturation sample stored an average of 11 incandescent bulbs versus five CFLs. Although, none of the households storing incandescents reported doing so in reaction to EISA, respondents who said that they were "very likely" to stockpile incandescent bulbs also had more 100 Watt incandescent bulbs—as well as incandescent bulbs of any wattage—in storage than those who indicated that they were less likely to stockpile.

Light Bulb Use, Saturation, Storage, and Purchase

A third objective of this market assessment was to establish the types and characteristics of lighting technologies in use and in storage in homes and to understand socket saturation and bulb purchasing habits. The key findings related to this objective include the following:

- The average number of total sockets per home was 62 (or a total of 84.3 million statewide) . Among these sockets, CFL saturation stood at 27% in spring 2012, 9% short of the goal set by the state to achieve CFL saturation of 36% by the end of 2011. However, in addition to CFLs, LEDs filled another two percent of sockets, and still another 11% of sockets were filled with pin-based fluorescent tubes. Together, the saturation of these three efficient bulb types was 40%. The remaining sockets are filled largely with incandescent and halogen bulbs, such that the remaining potential for efficient lighting is 61% (the extra one percent is due to rounding error).

- Saturation of CFLs was four percentage points higher compared to the last measurement (23%), taken in 2009[2]. LED saturation went from less than one percent in 2009 to two percent in 2012, and the saturation of fluorescent tubes went from 7% to 11% in the same time period. This means that the saturation of efficient lighting in homes was nearly 10 percentage points higher in 2012 than in 2009. Note, however, that NMR did not explicitly measure change from 2009, so the results show only the two separate amounts and cannot be used to draw conclusions about changes over time.
- Saturation of incandescent bulbs decreased from 64% in 2009 to 49% in 2012, as sockets have been converted to CFLs, LEDs, and fluorescent tubes as well as halogen (not typically A-line bulbs but more often flood-shaped ones) and other types of bulbs.
- Although the data suggest that CFL saturation has increased, the team believes that the suggested increase seems small compared to the 12.6 million program-supported CFLs sold in Connecticut between 2009 and 2011 (based on data in the annual plans). Evidence from this study (see storage below) and forthcoming in a report for another New England state suggests that households are increasingly buying CFLs to replace other CFLs, which limits increases to saturation while also preventing saturation from backsliding; in other words, households like CFLs enough to keep using them when they burn out.
- A comparison of the 2009 and 2012 studies suggests that the number of sockets per home increased from 46 to 62 in a three year period. It is the case that the number of sockets is increasing across the nation,[3] and there is no reason to believe Connecticut is not also experiencing an increase in socket numbers. Therefore, while households have been using more CFLs, the saturation rate may not have increased a great deal because they are also adding sockets that use non-CFL bulbs. However, it is also likely that some of the observed increase in sockets is due to changes in onsite methodology, as the current study was the first in the nation to implement protocols designed to reduce measurement error in onsite studies.[4]
- Other possible explanations for the disposition of program-supported and market-level sales include bulbs returned to stores, purchases by commercial customers at retail stores, leakage to other states, and measurement error.
- Research conducted over time in Massachusetts suggests that it has also seen a leveling of CFL saturation following the substantial increases achieved after the state moved to an

[2] NMR Group, Inc. 2010. *The Market for CFLs in Connecticut*. Delivered to the CEEB on March 2, 2010. NMR Group, Inc. 2010.

[3] The study found a 26% increase in the number of sockets across the nation between 2001 and 2010. Navigant Consulting. *2010 U.S. Lighting Market Characterization*. Prepared for the US Department of Energy, Energy Efficiency and Renewable Energy Division. 2012.

[4] Future replications of this method will help to determine if the socket count observed in Connecticut in 2012 was an anomaly or represents a more accurate count resulting from reduced measurement error. Filiberto, D., L. Wilson-Wright, and L. Hoefgen. "Mission Control, We have a Problem: Questioning the Reliability and Validity of On-site Data." Paper presented at the International Energy Program Evaluation Conference, Boston, MA, August 2011.

upstream approach.[5] Data comparing saturation in New York State and New York City between 2009 and 2010 show larger increases in saturation of 5% and 10%, respectively.[6] Importantly NYSERDA also changed its program design during that time period from a marketing-based program to one that included a greater number of upstream incentives and rebates, particularly targeting the New York City market.

- Almost all homes (94%) in Connecticut used at least one CFL, a change of 9 percentage points from 2009 when 85% of homes used CFLs. It is likely that many of these households using CFLs for the first time between 2009 and 2012 were "hard-to-reach" or reluctant to try CFLs, but the current study did not explicitly test this hypothesis.
- The 60 Watt incandescent bulb or its equivalent remained the most common in homes. CFLs were more likely to be 13 or 14 Watt, which are sold as 60 Watt equivalents (59% of CFLs), than any other wattage. In contrast, only 35% of incandescent bulbs were 60 Watt, which is the highest percentage of any wattage; however, incandescents come in a much wider variety of wattages than do CFLs, so the 60 Watt incandescent did not dominate in the same manner as the 13 or 14 Watt CFL.
- While the team did not directly measure change in bulb use due to EISA, over the past three years households have shown a reduced tendency to use incandescent bulbs and have instead turned more to CFLs, LEDs, fluorescent tubes, and halogen bulbs to fill existing or new sockets. Importantly, the availability and diversity of CFLs, halogens, and LEDS has increased due to EISA, making it likely that the legislation is leading, directly or indirectly, to changes in residential light bulb use patterns.
- Bedrooms and bathrooms were the most popular places to install CFLs, with CFLs accounting for 39% of bedroom lighting and 37% of bathroom lighting. LEDs were most commonly installed in the kitchen (5% of kitchen sockets), but they were typically the under-the-cabinet, pin-based lights and not the A-line screw-in type. Among the five room types with the greatest number of sockets overall (i.e., bedrooms, kitchens, bathrooms, living rooms, and the exterior of the home), 55% or more of the sockets could be filled with CFLs or LEDs.
- When asked an open-ended question about how they decide to light a room, respondents most frequently mentioned price, brightness, energy efficiency, wattage, and a preference for a particular bulb type. Close-ended questions about the preferred characteristics for a room revealed that brightness was most important in all rooms, typically followed by price; the exceptions were bedrooms and dining rooms, where price was more important than brightness.

[5] NMR Group, Inc. "Results of the Massachusetts and Pennington County, South Dakota Telephone and Onsite Compact Fluorescent Lamp Survey," in *Massachusetts ENERGY STAR Lighting Program 2010 Annual Report:* Delivered to the Massachusetts Program Administrators on June 13, 2011.

[6] NMR Group, Inc. *Impact Evaluation: NYSERDA CFL Expansion Program: Random Digit Dial and Onsite Survey Results*. Delivered to NYSERDA May 2011.

- When asked why they did not have CFLs installed in some rooms, most respondents indicated that they were waiting for an installed bulb to burn out or had not gotten around to it. However, 13% of respondents indicated that CFLs did not fit properly.
- Only 10% of all sockets in homes were dimmable, and just 6% of these dimmable sockets were filled with CFLs.
- Dining rooms have the highest remaining potential for CFLs and LEDs (87%), and only 12% of sockets in dining rooms were filled with CFLs, LEDs, or fluorescent tubes at the time of the onsite visit. More than any other rooms in the home, respondents who did not use CFLs in the dining room noted that the bulbs did not work with dimmers, that they did not like the appearance of CFLs in the dining room, or that they could not find a bulb for the application.
- Satisfaction with CFLs and LEDs was high, with 77% of CFL users and 83% of LED users rating themselves as "somewhat or very satisfied" with the products. Consumers appreciated the energy savings of CFLs and the light quality of LEDs. Persistent concerns about CFLs included light quality and brightness, being slow to brighten, and mercury content, while LED users also cited price and the appearance of the bulb itself.
- Households in the onsite study collectively stored 1,657 bulbs, of which 64% are incandescents and 29% are CFLs.
- By and large, consumers are not *changing out* inefficient bulbs for CFLs. Instead, they fill whatever sockets need replacing at that moment and then they store the remaining CFLs until another bulb—which may or may not be an incandescent—burns out. In fact, respondents reported that 63% of stored CFLs would likely replace another CFL, 30% will replace whatever bulb type burns out first, and 5% would replace incandescent bulbs. As mentioned above, the large percentage of CFLs expected to replace other CFLs is part of the likely explanation of where the program-supported CFLs have gone—many, perhaps most, have replaced other CFLs that burned out.

Assisting Consumers to make Efficient Lighting Choices

Along with understanding respondents' likely reactions to EISA and determining their current usage of efficient lighting technologies, a final objective of the current study was determining how to assist consumers in making more efficient lighting choices. Key findings related to this objective include the following:

- A willingness-to-pay analysis reveals that consumers are sensitive to price changes in standard and specialty CFLs, suggesting the continued need for incentives, the amounts of which are discussed in the conclusions and recommendations.
- Consumers will balance upfront costs with bill savings and operating costs if they believe the upfront cost is reasonable. At this time, most telephone survey respondents (77%) said they were likely to buy a six dollar bulb that lasts seven years and saves $10 a year, but less than half thought they were likely to purchase a $20 that lasts for 20 years and saves $10 a year (46%).

- A majority of telephone survey respondents reported being familiar with the terms "lumens" (56%) and "warm white and cool white" (62%) in reference to lighting. Most respondents familiar with the term lumens correctly identified it as a measure of light output or brightness (62%), but 27% admitted that they really did not know what the term meant. A similar percentage of respondents familiar with the terms "warm white and cool white" knew that they referred to color appearance. However, 27% thought those terms referred to brightness or the amount of light, and 17% admitted they did not really know what the terms meant.

Conclusions and Recommendations

The EISA Lighting Exploration tasks—Stage 1 Focus Groups and Stage 2 Efficient Lighting Saturation and Market Assessment —have yielded a number of important conclusions and recommendations regarding CEEF-funded programs that include residential lighting elements. The evaluation team presents recommendations focused on the two following themes:

1. What the CEEF-funded programs and Companies can do to help consumers make efficient lighting choices in the post-EISA period, and
2. What the CEEF funded programs and Companies can do to boost saturation of CFLs and LEDs in residential homes in Connecticut

The research presented in the main body of the report and in the earlier focus groups report makes clear that a multi-prong approach that involves education, incentives, and additional promotional efforts will be needed to help consumers make better lighting choices and to achieve 36% CFL socket saturation. NMR believes that the research supports continuation of incentives on standard and specialty CFLs as well as LEDs. Yet, the Companies must continue to promote programs that educate consumers about the lighting market and the bulb choices available to them. They must also *expose* consumers to the range of lighting available by providing consumers with low-cost or no cost opportunities to see the bulbs "in action". The recommendations presented below, then, highlight programmatic efforts that go beyond the retail setting to include programs such as Home Energy Solutions and Home Energy Solutions-Income Eligible as well as community and neighborhood outreach and educational efforts.

Conclusion 1: The willingness-to-pay (WTP) analysis and survey questions about the likelihood of purchasing bulbs at given prices and bill savings make clear that retail-based incentives on standard and specialty CFLs and LEDs should be continued in the immediate future. Moreover, consumers will consider operating costs and energy savings if the initial bulb price seems reasonable to them.

> ***Recommendation 1a:*** The recommendations below provide guidance on incentive amounts, but small sample sizes and hypothetical situations render the results somewhat unreliable. Therefore, NMR recommends that the CEEF fund market-based research

focused on determining *optimal* incentive levels for CFLs and LEDs, taking into account the *reasonable* amounts offered here but also tests for cost effectiveness.

Recommendation 1b: A reasonable incentive amount for standard CFLs would reduce the shelf price of the bulbs to approximately $3.50; the extent to which this price may already be available on the market *without* incentives would need to be determined through a pricing study. Reasonable incentive amounts for specialty bulbs would approach $5.25 to $6.00, and NMR particularly recommends the lower amount for A-line covered CFLs, which are likely the most attractive to consumers who avoid standard CFLs for aesthetic or fit in fixture reasons. The evaluators were not able to obtain an estimate of a reasonable incentive for LEDs, but the consumer survey suggests that only about one-half of consumers would purchase LEDs at $20 per bulb. Therefore, it may be reasonable to reduce the price to approximately $12 to $15 per bulb, tracking sales to see if they increase at the lower price points.

Conclusion 2: Consumers generally accept CFL-based technology in their homes, but they continue to voice reservations about the ability of CFLs to meet all of their lighting needs. Concerns remain about CFL brightness, light quality and color, slowness to brighten, mercury content, fit in fixtures, and dimmability. Consumers are less familiar with specialty CFLs and A-line, screw-in LEDs. In fact, the disconnect between self-reported use of products during the telephone survey and actual product use found onsite demonstrates that consumers remain confused about the types of lighting products *already in use* in their homes. Many of the CFL and LED products on the market could respond to some of the persistent concerns about CFLs.

Recommendation 2a: The program should continue its efforts to raise awareness of the diversity of energy efficient lighting products available to consumers through lighting displays in stores. Such displays could include bulb comparisons, end-cap promotions, and pamphlets and signs that demonstrate the range of products available and allow consumers to see the products "in action."

Recommendation 2b**:** While the A-line covered CFL is correctly classified as a "specialty" bulb from a CFL history and manufacturing perspective, it is intended to fill the same applications as a standard A-line incandescent bulb. Therefore, NMR recommends treating the A-line covered CFL as a "standard" bulb offering in promotional materials and perhaps from a future evaluation perspective, although implications for cost effectiveness and net-to-gross would have to be taken into consideration.

Conclusion 3: Although more than one-half of telephone survey respondents reported being familiar with the terms "lumens" (56%) and "warm white and cool white" (62%) in reference to lighting, a large percentage are still unfamiliar with the terms, or defined them incorrectly. Given that correct identification of new lighting terminology will be imperative to light bulb consumers as EISA continues implementation, the large number of respondents who are still unable to use the terms effectively is cause for concern.

***Recommendation 3*:** The Companies should continue to educate consumers on new lighting terminology, through in-store displays and promotional efforts. Home improvement stores and hardware stores are particularly good candidates as they appear to be the "go to" stores for efficient lighting in Connecticut.

Conclusion 4: Many consumers are just learning about the new EISA efficiency standards, and a great deal of misinformation persists about the changes that will accompany the new lighting standards. Coupled with a lack of familiarity of the diversity of efficient bulbs available, consumers may be wary to try products that look or feel "different" than the incandescent bulb. Yet, the relatively high levels of satisfaction among CFL and LED users suggests that once consumers are exposed to the technology in real world settings they tend to accept it as a viable option for at least some of their lighting needs.

Recommendation 4: The Companies should continue giving away bulbs—particularly A-line, covered CFLs—through such programs as Home Energy Solutions and Home Energy Solutions – Income Eligible as well as during in-store promotions, fairs, and special events. Because of their higher price, it may not be cost-effective to give away LEDs, but individuals who take part in an HES or HES-IE audit or visit a lighting promotional event or a booth at a fair could receive coupons for LEDs that would lower the price of the bulb beyond even the incentive price. Another strategy could involve including LEDs in raffles held at promotional events or fairs.

Conclusion 5: Although relatively few sockets in Connecticut are dimmable, dimmable sockets—particularly those with a candelabra shape and base—are often found in dining rooms. Respondents to the onsite survey also indicate that aesthetics matter more in dining rooms compared to other rooms, and they are not convinced that CFLs and LEDs can meet their lighting needs in dining rooms. Not surprisingly, dining rooms hold the greatest potential for CFLs and LEDs.

Recommendation 5: The Companies should continue working with manufacturers and retailers to improve the quality of CFLs and LEDs that would be likely choices for dining room lighting (e.g., dimmable candelabra bulbs). This could involve supporting continued research and development into these products as well as testing the quality of such bulbs.

Conclusion 6: Although nearly all households in the onsite study used at least one CFL, consumers resist *changing out* still-working but inefficient lighting for more efficient CFLs and LEDs preferring to install these more efficient bulb types after the inefficient bulb burns out.

Recommendation 6: In addition to continuing their efforts to change out inefficient lighting during HES and HES-IE audits, the Companies should also continue to explain to consumers how much money they can save by getting rid of inefficient lighting *now* rather than waiting for the products to burn out. Additional information about the positive impacts of changing bulbs out on resource availability, the environment, and greenhouse

gas reduction may also sway a portion of consumers to switch their bulbs out sooner rather than later. The Companies may also want to consider the feasibility and advisability of bulb buy-back and neighborhood blitz change-out programs.

Conclusion 7: Onsite respondents who shopped for CFLs and LEDs in the past year reported that they would have gone to another store to find these efficient lighting products if the first place they shopped did not carry them. These responses suggest that Connecticut consumers are committed to energy efficient lighting, but this commitment is most easily reinforced by making certain CFLs and LEDs are widely available at places consumers shop for light bulbs.

***Recommendation 7*:** The Companies should continue to promote CFLs and LEDs in a diversity of stores that carry lighting products. Home improvement stores and hardware stores appear to be the "go to" stores for efficient lighting in Connecticut, but drugstores, grocery stores, and other common places to shop for lighting should not be overlooked.

1 Introduction

The residential lighting market in Connecticut and beyond is facing a period of rapid change. The new lighting efficiency standards mandated by the Energy Independence and Security Act of 2007 (EISA) went into effect on January 1, 2012.[7] These standards effectively phase out traditional incandescent light bulbs over a three year period. In response, lighting manufacturers have been preparing for the increased efficiency standards by developing new products such as "incandescent" A-line halogen bulbs (as opposed to pin-based or flood-shaped halogens that have been available for many years)[8] and A-line light emitting diodes (LEDs) that adhere to the law while also expanding the production of compact fluorescent lamps (CFLs), including offering CFLs in a wider variety of styles and shapes. Consumers now must choose among a greater number and diversity of bulb choices than in the past, but the familiar incandescent bulb will soon not be among the bulbs available.

Moreover in March of 2010, the State of Connecticut Department of Public Utility Control mandated that 36% of residential light sockets in the state be filled with CFLs by the end of 2011.[9] Given the increased availability of CFLs designed for specialty applications or to have the A-line shape, consumers can now buy CFLs for nearly all types of lighting applications in their home from nearby hardware, grocery, or home improvement stores rather than having to order them via the internet or catalogs as was the case until recently. Yet, focus groups conducted in the fall of 2011 for the EEB make clear that some consumers still dislike CFLs for a variety of reasons; even those who embrace the technology for some applications still rejected CFLs for certain applications in their homes. The lukewarm reaction to—or rejection of—CFLs in some households could challenge the state's ability to reach 36% CFL socket saturation.

Given this period of rapid change in legislative mandates and lighting technology coupled with continued skepticism about CFLs, the Connecticut Energy Efficiency Board (EEB), in cooperation with Connecticut Light and Power (CL&P) and the United Illuminating Company (UI) hired NMR Group, Inc. (NMR) and its subcontractor Tetra Tech (collectively referred to as the evaluation team or the team) to explore the current conditions of residential lighting in Connecticut as well likely consumer reactions to EISA. This report summarizes the results of the market assessment and lighting saturation, and compares them to the findings of focus groups performed as the first stage of this exploration in the fall of 2011.

[7] Although Congress did not provide funds to enforce implementation of the law for most of 2012, most of the major light bulb manufactures and retailers vowed to adhere to the mandated efficiency standards despite the lack of federal enforcement.

[8] The report refers to incandescent halogens as "halogen" bulbs throughout to avoid confusing them with other incandescent filament bulbs.

[9] Docket No. 09-10-03, DPUC Review of the Connecticut Energy Efficiency Fund's 2010 Conservation and Load Management Plan for 2010, March 17 2010, page 66.

1.1 Research Objectives

The exploration of EISA on the residential lighting market in Connecticut had the following objectives, as outlined in the work plan:

- Establish consumers' awareness of various lighting options and of the upcoming changes in the light market stemming from EISA
- Understand consumers' current and likely reactions to EISA, such as stockpiling of bulbs and the type of bulbs they expect to buy after the incandescent phase-out
- Determine the current rates of use and storage for various lighting technologies and the reasons that underlie current lighting choices
- Identify ways in which the Companies could assist consumers in making more efficient lighting choices, including exploring issues related to incentives, education, and program design, among others

In order to meet these objectives, the evaluation team relied on a telephone survey of 551 residential customers of CL&P and UI and onsite visits to a subset of survey respondents' homes (100 in all). Table 1-1 summarizes the objectives, related research questions, and the approaches used to address the questions. In short, the telephone survey primarily provided information on customers' current awareness and knowledge of various lighting technologies and of the EISA legislation as well as their opinions about and reactions to those technologies and the incandescent phase-out. The onsite visits served to describe the use, saturation, and storage of various lighting technologies in the home through a detailed lighting inventory; a follow-up survey delivered onsite also explored how respondents make decisions about lighting their home, their commitment to purchasing efficient lighting, and their willingness to pay for CFLs and LEDs at various price points.

Table 1-1: Summary of Objectives, Research Questions, and Methods

Objective	Research Questions	Methodology
1. Establish consumer awareness of lighting options and changes in the lighting market	• Are customers aware of various lighting technologies meant to replace incandescent light bulbs? • Have customers heard about EISA? What have they heard? What do they understand to be the immediate and long-term implications of the changes to lighting efficiency standards?	Primarily addressed through the Consumer Survey, although questions and observations during the Onsite Saturation Study also inform this objective
2. Understand consumers current and likely reactions to EISA	• Have consumers noticed any changes in the bulbs available for purchase in recent months? If so, what have they noticed? • Are consumers currently changing their bulb use, purchase, or storage habits in anticipation of the incandescent phase-out? If so, how? • What bulbs are consumers likely to purchase after 100 Watt incandescents are no longer available on store shelves? • Are consumers currently stockpiling bulbs, or do they have plans to do so? If so, are they stockpiling for use in specific applications or for general lighting purposes?	Addressed in both the Consumer Survey and Onsite Saturation Study
3. Determine current rates of use and storage for various light bulbs	• What types of light bulbs do consumers currently use in their homes, where do consumers use them, and why do they use them in certain locations? • For those consumers who purchase CFLs, are they primarily installing them immediately or are they storing them? What types of bulbs will newly purchased CFLs replace (*e.g.*, incandescents, CFLs, or other bulb types)? • What are the key characteristics of the bulbs (*e.g.*, wattage, specialty features, *etc*.) found installed and in storage in the home? • Which types of bulbs are installed in particular types of fixtures (*e.g.*, mount, screw-base, shade style, *etc*.) and under what type of controls (*e.g.*, dimmable, three-way)?	Primarily addressed through the Onsite Saturation Study, although the Consumer Survey probed for general information on use and storage

Objective	Research Questions	Methodology
4. Identify ways to assist consumers in making efficient lighting choices	• How much are consumers willing to pay for standard CFLs, specialty CFLs, and LEDs? • Is it advisable to continue offering incentives for standard and specialty CFLs and LEDs, and, if so, what would be reasonable incentive amounts? • Would alternatives to upstream incentives, such as bulb give-aways or coupons, induce more consumers to try specialty CFLs and LEDs? • Do consumers consider shelf-price, annual operating costs, lifetime operating costs, and lifetime savings when choosing light bulbs? Why or why not? • Would they use information on lifetime operating costs and savings if it was made available to them? Why or why not? • Are consumers familiar with lighting related terminology such as lumens, color appearance, and color rendition that will become increasingly important after the incandescent phase-out?	Onsite Saturation Study provided information on willingness to pay and reasonable incentive amounts; Consumer Survey addressed key lighting terminology

1.2 Methodology

NMR relied on a study design approach in which the team first called randomly selected customers of CL&P and UI and delivered a telephone survey that explored various lighting and EISA related issues. At the end of that call, respondents indicated if they would be willing to take part in onsite visits to their homes that would be used to gather more information about their lighting use. This section provides an overview of the consumer survey and onsite saturation methodologies, while Appendix A presents more detail on sample design, sampling error, and the weighting scheme.

1.2.1 Consumer Survey

The team conducted a consumer survey from February through March 2012 of 551 randomly selected CL&P and UI residential customers, achieving 90% confidence and 10% sampling error for the state overall and for both Companies. The team used three methods to increase the representativeness of the survey. First, the team obtained lists of residential customers from the Companies and sent them letters prior to fielding the survey alerting them to the possibility that they might receive a call. The letter also described the study in a very general way. Second, the team also offered respondents the opportunity to answer the survey in Spanish, and 6 respondents did so. The team also called households ten times before removing them from the callback list.

The content of the survey included an initial set of screening questions that ensured that the respondent was eligible for the study (*e.g.*, that they were at least 18 years old and resided at least part of the year in Connecticut). The respondents then received a series of questions designed to provide information on the objectives and research questions described above. The final series of questions in the survey recruited for the onsite saturation study, as described below. Appendix D includes the full survey questionnaire.

1.2.2 Onsite Saturation Study

The team fielded the onsite lighting saturation study in March and April of 2012, visiting 100 homes throughout the CL&P and UI service territories. This sample size achieved a margin of error of plus or minus 10% with 90% confidence across both service territories, but not for each Company individually.

As mentioned above, the team identified households interested in the onsite saturation study through the telephone survey. At the end of the telephone survey, the interviewer offered each respondent a $125 incentive to participate in an onsite visit to their home. NMR randomly selected households from among all respondents voicing interest and called to set up an onsite visit. NMR successfully completed the desired 100 onsite visits, with 75 onsite visits in the CL&P service territory and 25 in the UI service territory.

NMR employed and trained two part-time technicians to conduct the onsite data collection. A typical onsite visit proceeded as follows: a technician arrived at the home at a pre-scheduled time, introduced himself, and asked for the contact person who had been identified when scheduling the visit. The technician walked through each room of the home (including the home's exterior and exterior structures) examining all lighting sockets and gathering data on fixture type, bulb type, bulb shape, socket type, wattage, and specialty characteristics for all installed lighting products. The technician and householder also examined bulbs in storage, again noting similar detailed information on each type of bulb. Participants also indicated the reason each bulb type was being stored and which type of bulb the stored bulbs were likely to replace.

The technician conducted a short survey with participants addressing willingness to pay for standard CFLs, specialty CFLs and LEDs. The survey also asked participants to identify important characteristics looked for in a light bulb and to explain in a general sense how they decide to light kitchens, bedrooms, dining rooms or dining areas, living or family rooms, and bathrooms. If a specific room did not have a CFL installed, technicians asked participants to explain the primary reason for not installing CFLs in that room. Visits typically took less than two hours.

In addition to reviewing the onsite forms submitted by the technicians, a third NMR staff member called 20% of participants to ensure that their experiences with the field technician were satisfactory. An NMR staff member also revisited approximately 5% of the homes and repeated the data collection process to make sure the technician had performed the inventory in a satisfactory manner.

1.2.3 Weighting Schemes

The consumer survey and onsite saturation samples both contained a greater proportion of households with people who had some education beyond the high school diploma and who owned homes than exist in the population of Connecticut households.[10] In response, the team weighted the consumer survey by education and home ownership status so that the reported results would better reflect the characteristics of the actual population of households in the state. For the onsite visit data, the team weighted the data solely on home ownership due to small sample sizes that would have exaggerated sampling error had weights been applied. The actual weights are provided in Appendix A, Table A-3 and Table A-4..

1.2.4 Analyses

The team analyzed the consumer survey and onsite saturation data in SPSS and Excel. The majority of analyses are descriptive in nature, noting the number or percentage of respondents who hold an opinion or the number or percentage of homes, sockets, or light bulbs with certain

[10] Underrepresentation of renters and respondents with lower levels of educational attainment is common in telephone surveys. For example, see Galesic, M., R. Tourangeau, M.P. Couper (2006) "Complementing Random-Digit-Dial Telephone Surveys with Other Approaches to Collecting Sensitive Data." *American Journal of Preventive Medicine*. Volume 35, Number 5.

characteristics. The willingness to pay (WTP) analysis, however, relied on logistic regression modeling, performed in Excel, as described below.

The team used a series of WTP questions asked during the onsite visit to provide NMR with information on whether incentives should be continued for standard and specialty CFLs as well as LEDs, and to suggest reasonable incentive amounts. To implement the approach, during the onsite saturation study, the technician asked respondents who bought or were given standard or specialty CFLs or LEDs in or after July 2011 a series of questions about the product *most recently purchased*. The inquiry was limited to this time period to increase accurate respondent recall about the bulb purchase. The technician next asked respondents how much they recalled paying for the bulb in question, and given this "anchor" price point, then asked respondents if they would have purchased the bulb at additional price points above the anchor. With this information, the team estimated how many bulbs would be purchased at the various price points, which helped to suggest reasonable incentive levels. More information on the analysis is provided in Section 2.4.1 and Appendix A.

1.2.5 Relationship of Current Approaches to Focus Group Results

Although the telephone surveys and onsite visits yielded interesting qualitative insights into the current state of residential lighting and likely reactions to EISA, they are primarily quantitative in nature. As such, they complement the qualitative information from the focus groups performed in the fall of 2011. It is important to recall that, unlike telephone survey and onsite respondents, the focus group participants were not selected randomly and, therefore, should not be seen as representative of the population of Connecticut residential households. NMR presents relevant results from the focus groups throughout this report, but characterizes those findings as qualitative insights to complement and inform the results from the telephone survey and onsite visits.

2 Key Findings

The exploration of the current state of residential lighting and anticipated reactions to EISA yielded a great deal of information that informs the understanding of these issues in general and the four study objectives specifically. This section focuses on the findings that are most pertinent to informing the study objectives by presenting a high level summary of key findings and then discussing those findings in more depth. Appendix B provides even greater detail of the results discussed here through the presentation of tables that include the full range of responses to questions and additional questions that provided important context for the survey but did not directly inform the study objectives.

2.1 Awareness of Lighting Options and Changes in Market

The first objective of the study was to establish customer awareness of lighting options and changes in the lighting market. Addressed primarily through the consumer survey, the key findings related to this objective include:

- Three-fourths of respondents were familiar with standard CFLs, but typically no more than one-half of respondents were familiar with specialty CFLs, A-line LEDs, and A-line halogen bulbs.[11]
- Only thirty-nine percent of respondents reported that they had heard something about changes to lighting standards, and just 30% had specifically heard about the incandescent phase-out resulting from EISA.
- When asked what they had heard about the changes in lighting efficiency standards, 78% said that some light bulbs would not be available, and 17% thought they that they would be required to use CFLs or LEDs.

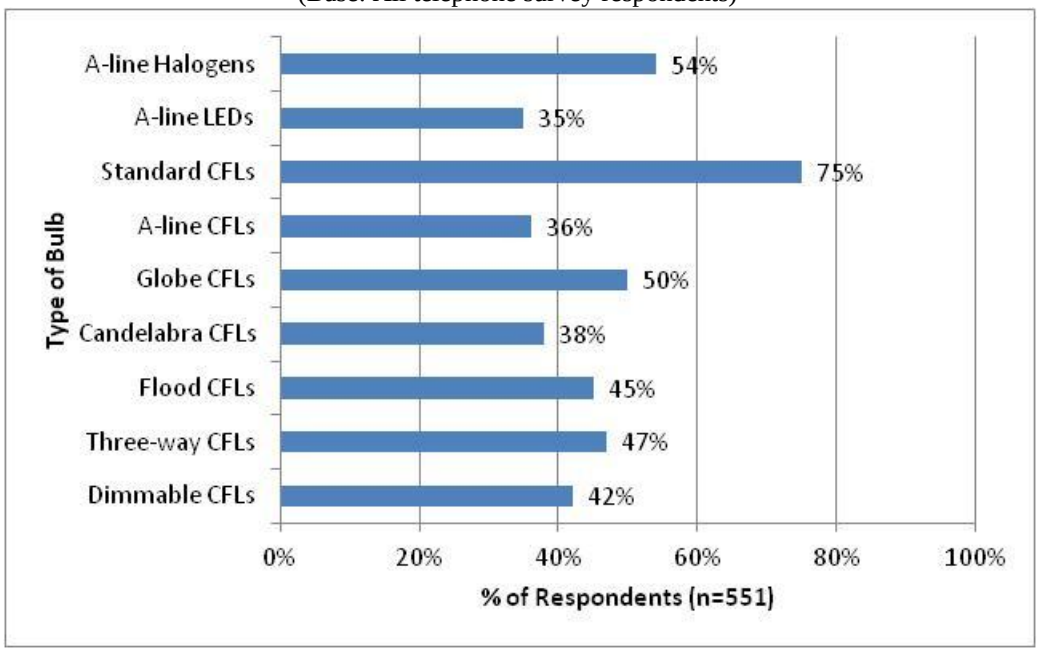
2.1.1 Awareness and Familiarity with Energy-efficient Light Bulbs

Nearly all survey respondents (91%) reported that they were aware of CFLs, either recognizing the name of the technology (69%) or a description of the shape of the bulb (71%). The survey further probed respondents to rate their level of familiarity not only with standard CFLs, but also with specialty CFLs and A-line LEDs and halogen bulbs. The results demonstrate that 75% of respondents were "somewhat" or "very familiar" with CFLs but the percentage of respondents "somewhat" or "very familiar" with specialty CFLs (50% or less), A-line LEDs (35%), and A-line halogen bulbs (54%) was far lower. See Table B-5 and Table B-6 in Appendix B for more detailed results on familiarity for all of these products.

[11] A-line halogen bulbs meet current EISA standards and are more energy efficient than incandescent bulbs. However, they are far less efficient than CFLs or LEDs and will not meet the expanded EISA standards that take effect in 2020. For ease of reading, we group them with CFLs and LEDs under the general term "energy-efficient light bulbs" but we stress that halogens are the least efficient of the bulbs that current meet EISA standards.

Figure 2-1: Familiarity with Various Types of Energy Efficient Light Bulbs

(Base: All telephone survey respondents)



These findings coincide with those of the focus groups, in which all focus group participants were familiar with CFLs but very few had previously known about A-line LEDs and halogens. The fact that familiarity was lowest for A-line LEDs (35%) and A-line CFLs (36%) presents a distinct challenge for future residential lighting program activity. Specifically these bulbs offer the most promising opportunity from an efficiency perspective to capture the subset of incandescent bulb users who reject CFLs based on the bulb shape for reasons of appearance or compatibility with certain fixtures or lampshades. The focus group findings suggested that consumers who had previously been unaware of A-line CFLs actually preferred the technology to halogens, LEDs, and standard CFLs. Together with the focus group findings, then, the research findings suggest that future program activity find ways of increasing consumer awareness of and familiarity with A-line CFLs in order to help capture those consumers who want a bulb that looks like the incandescent and can work with all their fixtures and lampshades, a point addressed in the Conclusions and Recommendations (Section 3).

2.1.2 Awareness of Changes in Efficiency Standards

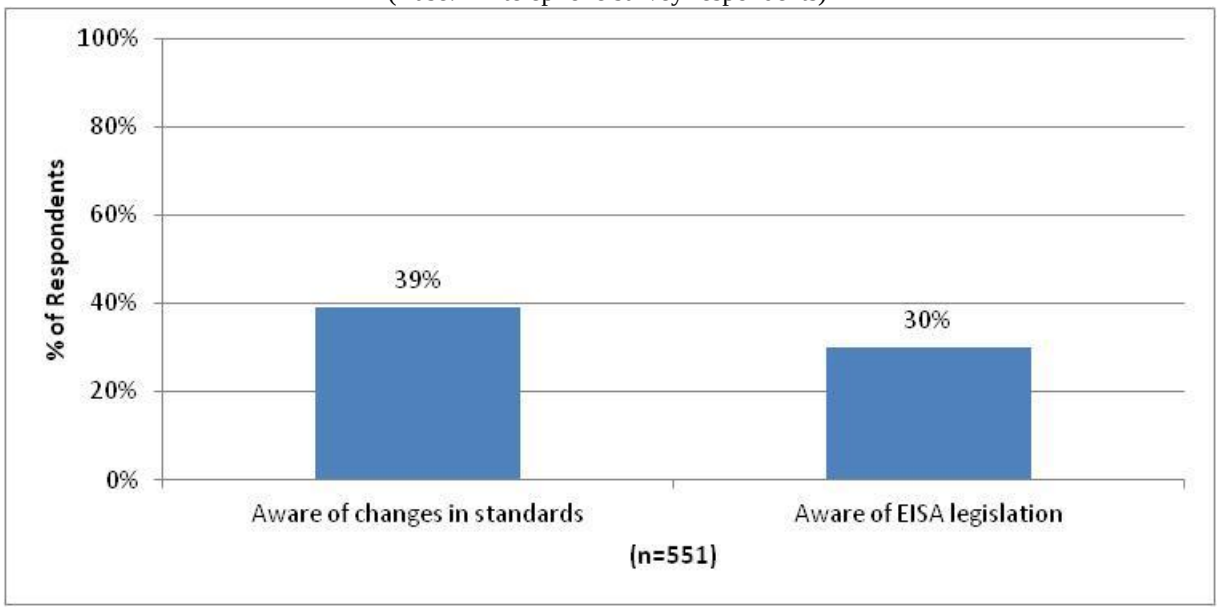
In order to gauge awareness and understanding of the higher lighting efficiency standards mandated by EISA, the team asked respondents a series of questions about the legislation. The first question was meant to ascertain if respondents had heard about any changes in standards and was followed by a question to clarify what they had heard. Importantly, these questions did not explicitly mention EISA or the incandescent phase-out allowing the team to gauge respondents' baseline knowledge of the changes. In contrast, a third question directly asked respondents whether they had heard of EISA and the incandescent phase-out, specifically

naming the legislation and the restriction of sales of 100 Watt incandescent bulbs manufactured after January 1, 2012.

Figure 2-2 summarizes the two questions about awareness, and shows that 39% of respondents had heard something about changes in lighting standards and 30% had specifically heard about EISA and incandescent phase-out. These results are statistically different from each other, suggesting that more people had heard *something* was changing than had heard the specific details of the legislation.

Figure 2-2: Awareness of Changes in Lighting Standards and of EISA

(Base: All telephone survey respondents)



The team asked respondents who had heard about any changes to lighting standards to explain what they had heard; most of these respondents had heard that some or all light bulbs would not be available (78%); however, about 17% thought they would be required to use CFLs or LEDs, while 11% said they would have to use a different type of light bulb but did not specifically state which kind. Table B-7 in Appendix B summarizes all the responses to this follow-up question. Some illustrative comments from survey respondents include the following:

> "The incandescent bulbs are not going to be as available and they are pushing the other bulbs. I had the experience of trying to find the 100 Watt bulbs and I had to go to three different stores to find them."
>
> "They are going to stop making the incandescent ones and they are going to be all energy efficient ones."
>
> "Basically they are trying to get us away from the incandescent lamps to save energy."

The focus groups conducted in the fall of 2011 pointed to similar results in that many participants had not heard of any lighting standard changes, and most of those who had heard displayed a general understanding that the incandescent bulb was being "banned" but did not understand the details of the legislation.

2.2 Current and Likely Consumer Reactions to EISA

A second objective of the study was to gauge consumers' current and likely reaction to the increased lighting efficiency standards—especially the incandescent bulb phase-out—resulting from EISA. The team addressed this objective through both the telephone survey and the onsite saturation components of the study. The exploration into reactions to EISA yields the following key conclusions:

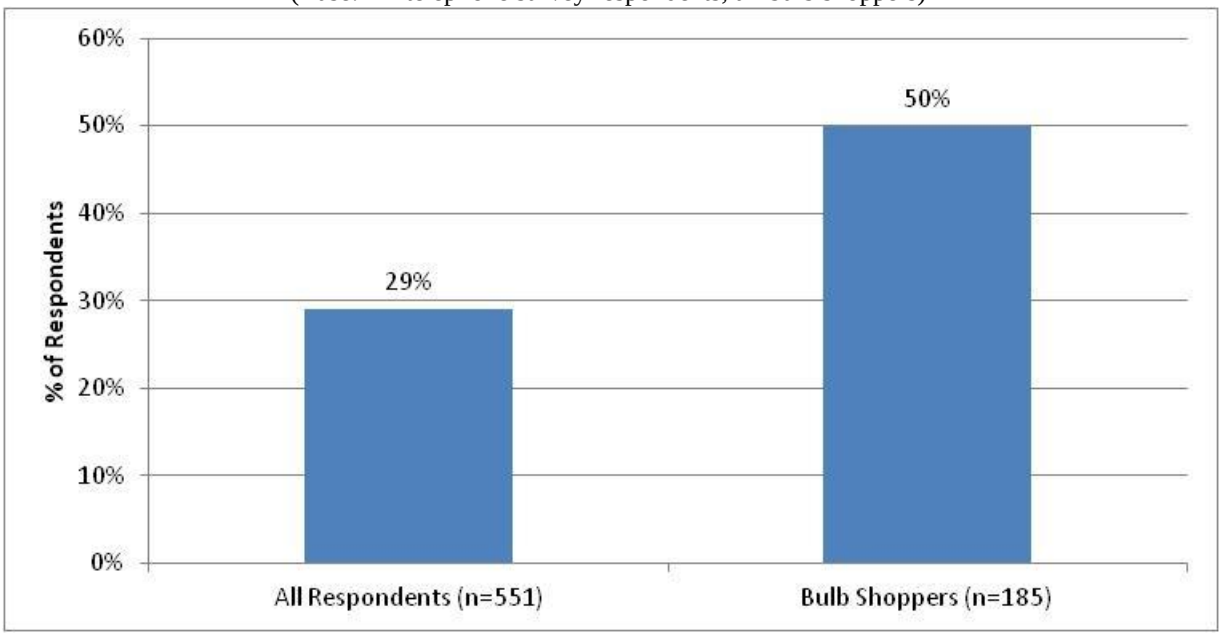
- More than three-fourths of the respondents who were aware of change to the lighting standards understood that some light bulbs would no longer be available.
- About 30% of all respondents had noticed changes in the availability of light bulbs in the past three months, but this increased to 50% among those respondents who had actually shopped for light bulbs in the past three months. Those who had noticed changes typically cited a greater availability of CFLs and LEDs, a lower availability of incandescents, or an overall increase in the variety of bulbs on store shelves.
- When asked which type of bulb they would most likely purchase to replace a 100 Watt incandescent, 39% of respondents chose a lower wattage incandescent and 34% chose a CFL. These results are statistically different from each other. Common reasons for choosing an incandescent included preference for the light quality and familiarity with the product, while many respondents choosing CFLs noted their energy or bill savings. Focus group results suggest that more exposure to A-line (covered) CFLs through light displays or demonstrations could sway incandescent purchasers to buy covered CFLs instead of incandescent or A-line halogen bulbs.
- About one-third of telephone survey respondents reported purchasing light bulbs in the three months prior to the study. Most of these respondents bought CFLs (58% of purchasers who were also aware of CFLs) and incandescent bulbs (55% of purchasers; the team assumed that all respondents were aware of incandescent bulbs).
- Households in the onsite saturation sample stored an average of 11 incandescent bulbs versus five CFLs. Although, none of the households storing incandescents reported doing so in reaction to EISA, respondents who said that they were "very likely" to stockpile incandescent bulbs also had more 100 Watt incandescent bulbs—as well as incandescent bulbs of any wattage—in storage than those who indicated that they were less likely to stockpile.

2.2.1 Awareness of Changes in Light Bulb Availability

The team sought to understand whether respondents had noticed any changes in light bulb availability in the three months prior to the survey (*i.e.*, November 2011 to January 2012), that is, just prior to and at the start of EISA implementation. Respondents indicated whether they had noticed any changes in the types of bulbs available on the market, and the team analyzed the results for all respondents and for the subset of respondents who had actually shopped for light bulbs in that three month period. The analysis indicates that only 29% of all respondents had noticed a change in bulb availability, but 50% of respondents who had actually shopped for bulbs had noticed a change in bulb availability (Figure 2-3). These results are statistically different from each other.

Figure 2-3: Noticed Change in Bulb Availability in Past Three Months

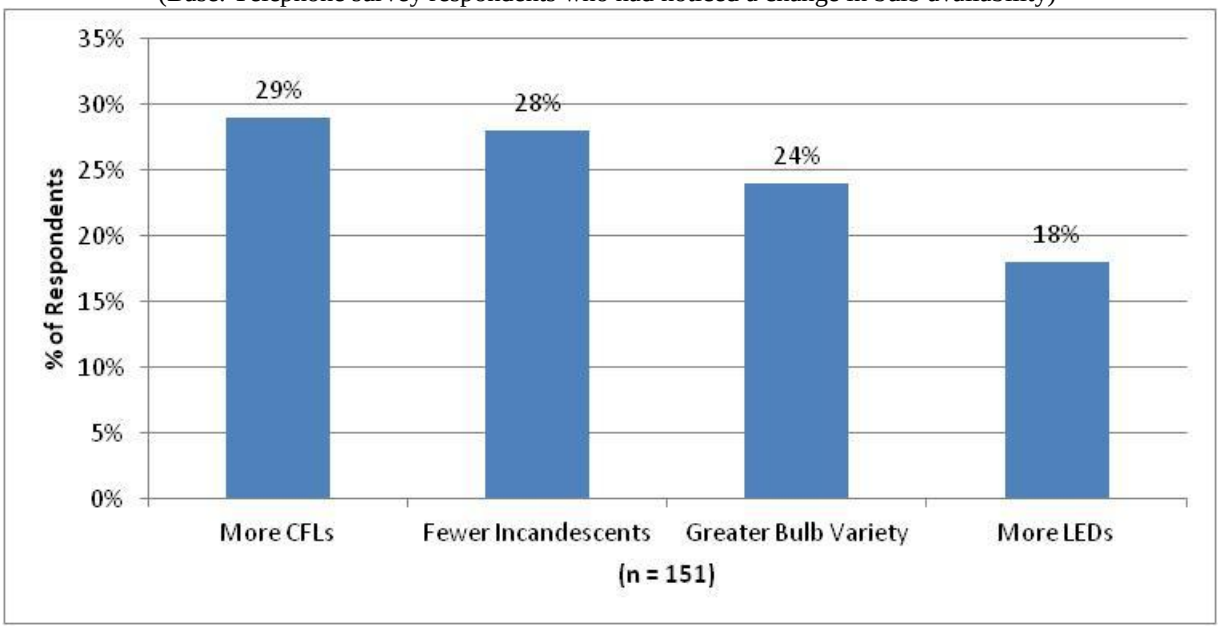
(Base: All telephone survey respondents; all bulb shoppers)



When asked to elaborate on what changes they had noticed, respondents generally noted that stores seemed to carry more CFLs or LEDs and fewer incandescents as well as display a greater variety of bulbs (Figure 2-4). Recent bulb shoppers cited the same top four reasons as all respondents aware of changes in bulb availability (see Table B-8 in Appendix B for the responses of recent bulb shoppers and a full listing of responses to this question).

Figure 2-4: Type of Changes in Bulb Availability

(Base: Telephone survey respondents who had noticed a change in bulb availability)



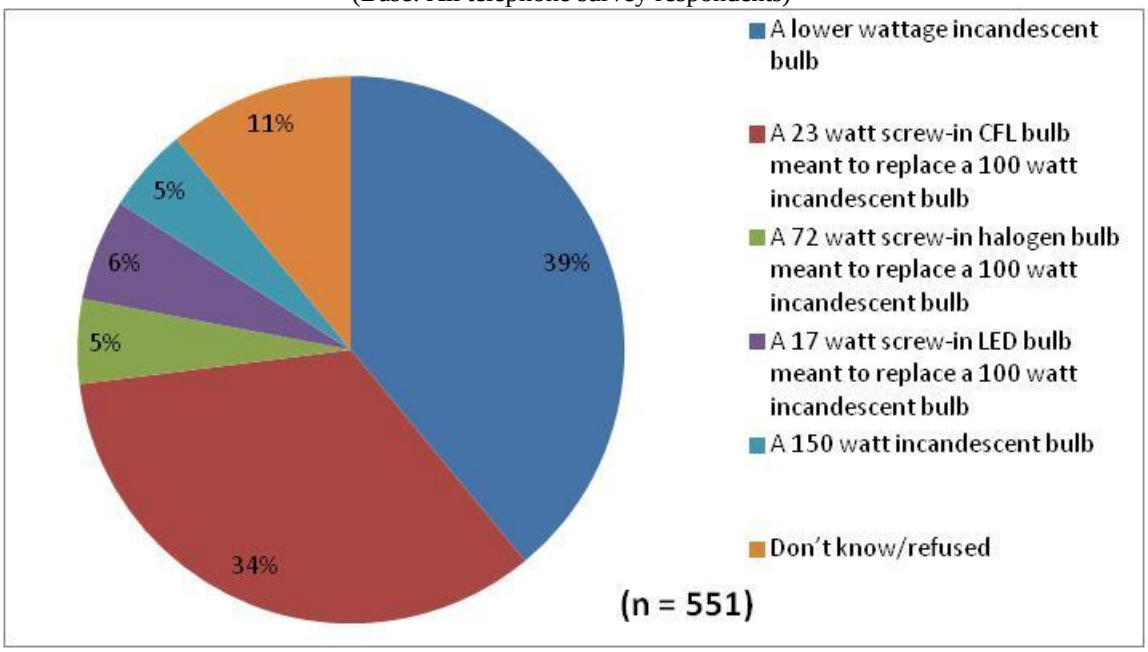
2.2.2 Consumer Changes in Lighting Habits due to EISA

In order to assess whether consumers had changed or would change their lighting-related habits due to the phase-out of 100 Watt incandescent bulbs, the team asked telephone survey respondents what types of bulbs they would be likely to buy when 100 Watt incandescents were no longer available.[12] The most popular bulb choice was a lower wattage incandescent, cited by 39% of respondents (Figure 2-5 below; see also Table B-9 in Appendix B). Second most popular—but statistically lower than incandescents—was a 23 Watt CFL, selected by 34% of respondents. Halogen bulbs (5%), LEDs (6%), and 150 Watt incandescents (5%) were less popular choices. About one out of ten respondents, however, said that they did not know what bulb type they would choose to replace a 100 Watt incandescent.

[12] It must be remembered that 100 Watt incandescents are not the most common incandescent bulb used in homes; only 29% of the telephone survey sample self-reported using 100 Watt incandescents, although the onsite survey found 100 Watt bulbs in 48% of the homes (all onsite homes used at least one incandescent, and 73% of survey respondents self-reported using at least one incandescent). See Section 2.3.1 for more on use and Appendix B, Figure B-1 for more on why telephone survey households reported they did not use 100 Watt incandescents.

Figure 2-5: Bulb Choice under EISA

(Base: All telephone survey respondents)



Respondents offered a variety of reasons for their respective bulb choices, usually citing their own familiarity with the product or perceptions of the strengths and weaknesses of different bulb technologies.[13] Respondents choosing a lower wattage incandescent, a halogen, or a 150 Watt incandescent bulb, for example, most often cited their preference for the light quality, color temperature, or brightness of those bulbs. They also mentioned being familiar with incandescent bulbs or finding the halogen to be most similar to incandescent bulbs. Some illustrative comments from respondents choosing the lower wattage incandescent include the following:

> "We do use some of the other kinds of light bulbs, but there are some negatives to them. When you need something to come on immediately at its fullest brightness, you go with an incandescent."

> "Because that is what I have always used, and I have heard negative things about CFLs."

Conversely, energy efficiency served as the most popular reason for choosing a 23 Watt CFL or a 17 Watt LED. Respondents choosing LEDs also cited the long life of the bulb. Some illustrative comments from those choosing the CFL or LED include the following:

> "From what I understand the LED has the longest shelf life and runs the coolest. The bulbs are high up and they are hard to change. The LEDs will save me money and they don't use much energy."

> "The 100 Watt bulb would burn a lot, so I would buy the bulb with the most savings and the longest life span. The LED would make the most sense."

[13] The frequencies of responses for all bulb types are shown in Table B-10 in Appendix B.

> "CFLs are cost effective, inexpensive, the filter coding has gotten so that they are reasonably like incandescent in color, and they use very little energy."
>
> "They [CFLs] seem to use a smaller amount of energy and a lot of times I can get them fairly cheap at stores. I think they last ten times longer than an incandescent. As far as I know, they're cheaper, they last longer, and they use less energy."

Finally, some comments from respondents choosing 150 Watt or halogen bulbs include the following:

> "I need a lot of brightness due to my eyesight." (Chose 150 Watt)
>
> "Because the first one, the CFLs, are too expensive for me; I cannot afford them. I would be willing to use the energy efficient bulbs if they weren't so expensive." (Chose 150 Watt)
>
> "Because it is an incandescent, it lights up right away, and I know how bright it is." (Chose 150 Watt, but similar responses given for halogens)
>
> "I am more familiar with the halogen than with other bulbs."
>
> "I think halogen light is brighter."

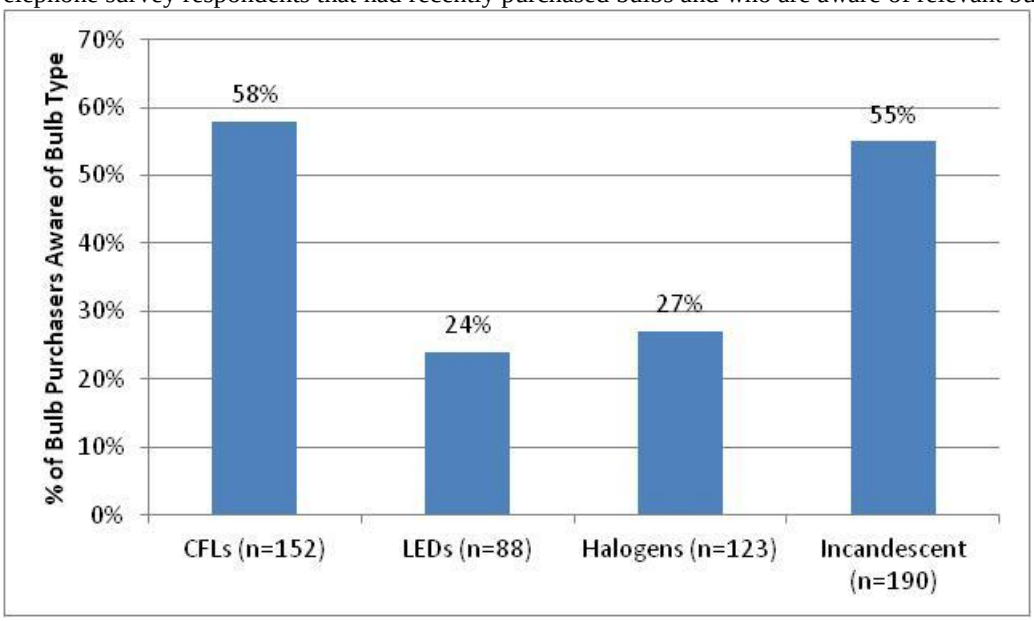
The focus group results provide an interesting counterpoint to the results from the telephone survey. After being told about the incandescent phase-out, almost all focus group participants assumed that they would *have* to buy standard CFLs in place of incandescent bulbs, and some were displeased with what they saw as taking a bulb choice away from them; they indicated they may even stockpile incandescents. Later during the focus group discussion, participants viewed a lighting display that contained standard CFLs as well as A-line (covered) CFLs, halogens, and LEDs. After the display, most participants still believed they *would* buy CFLs, but they then understood that they would not *have* to buy standard CFLs and, some participants, in fact, preferred A-line (covered) CFLs over other products in the display; a handful still intended to stockpile incandescents but more saw a CFL as a viable choice. Based on the focus group findings, it is likely that some of the telephone survey respondents could be swayed to choose A-line (covered) CFLs instead of lower-wattage incandescent bulbs if they saw these bulbs "in action" through lighting displays or demonstrations, a topic addressed in the Conclusions and Recommendations (Section 3).

Bulbs Purchased in the Past Three Months. This objective also sought to understand if respondents had actually changed their bulb use or purchase habits because of EISA. Although a cross-sectional survey such as the one the team fielded in early 2012 cannot demonstrate change over time, a review of recent self-reported purchase behavior provides some insight into whether consumers are changing their habits as a result of EISA and the diversification of the bulbs on the market that in large part stems from the new lighting standards. About one-third (34%) of telephone survey respondents reported purchasing any light bulbs in the three months prior to the survey.

Figure 2-6 summarizes the purchases of bulbs meant to screw into medium based lighting sockets (Appendix B, Table B-12 provides responses for additional base and bulb types); note that the sample size changes because the team could only ask bulb shoppers aware of a particular bulb type whether they had purchased it. The results demonstrate that bulb purchasers most frequently reported buying CFLs (58%) and incandescent bulbs (55%); these purchase rates are not statistically different from each other. Smaller percentages of bulb purchasers aware of halogens and LEDs had bought them recently, 27% and 24% respectively. Section 2.3.3 also addresses this question by comparing saturation rates in 2012 with those found in a 2009 study conducted for the EEB, which also yields evidence of changing bulb purchase behavior.[14]

Figure 2-6: Types of Bulbs Purchased in Past Three Months

(Base: Telephone survey respondents that had recently purchased bulbs and who are aware of relevant bulb type)



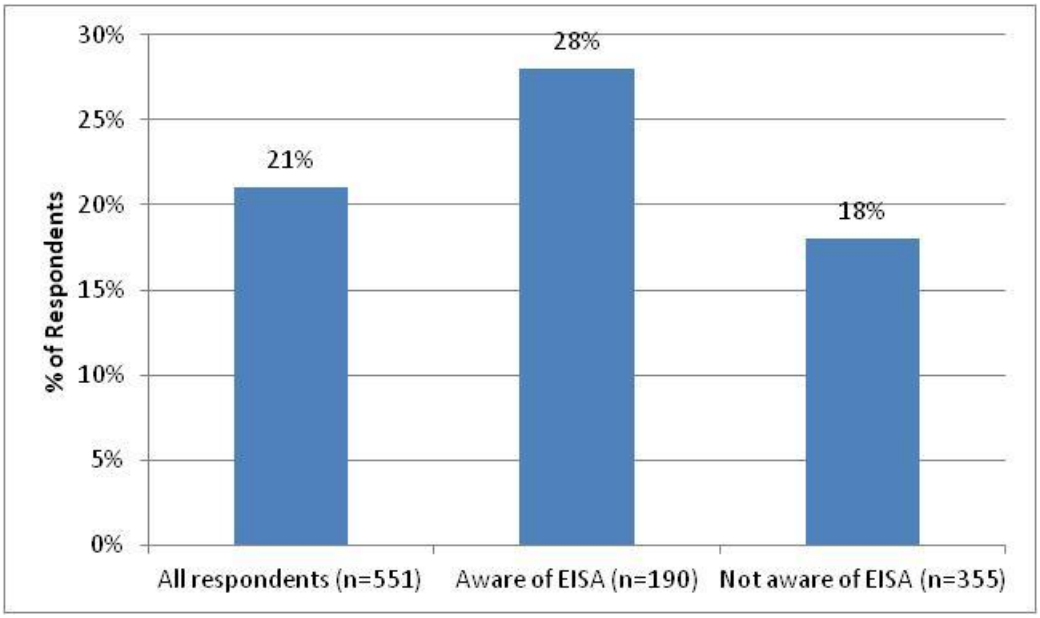
2.2.3 Stockpiling of Incandescent Bulbs due to EISA

The team addressed the issue of possible stockpiling (aka hoarding) of bulbs in two ways. First, the interviewer asked telephone survey respondents about their likelihood of buying and saving extra 100 Watt Incandescent bulbs for use after they are phased out. Second, the technician examined the characteristics of bulbs found in storage in onsite respondents' homes and explored with the householder the reasons for bulb storage.

[14] NMR Group, Inc. 2010. *The Market for CFLs in Connecticut*. Delivered to the CEEB on March 2, 2010. NMR Group, Inc. 2010. *Results of the Multistate CFL Modeling Effort: Final*. Delivered to the CEEB on February 2, 2010.

Among the telephone survey respondents, 21% indicated they would be "somewhat or very likely" to stockpile 100 Watt incandescent bulbs. However, when limiting the analysis to those aware of EISA prior to the survey, the number rose to 28%. In contrast, 18% of respondents not previously aware of EISA indicated that they would likely stockpile bulbs, significantly lower from a statistical perspective than those already aware of EISA (See Table B-11 in Appendix B for more detailed responses to this question). These results are similar to those from the focus groups in which the team found that most participants were not very likely to stockpile incandescents, although the tendency to do so was higher among those who used fewer CFLs.

Figure 2-7: Likelihood to Store 100 Watt Incandescent Bulbs



The team did not directly ask onsite participants who were storing incandescent bulbs if they were doing so in anticipation of the phase-out, but instead asked onsite householders to explain why they were storing incandescent bulbs.[15] No respondents volunteered the phase-out as a reason for storing incandescent bulbs, but, the average number of incandescent bulbs in storage per household in the state (10.8) is more than double the average number of CFLs in storage (4.8). Twenty-seven percent of households were storing more than sixteen incandescent bulbs, while only 8% were storing sixteen or more CFLs; in contrast, 39% of households were storing between one and five CFLs while only 19% were storing that few incandescent bulbs. The maximum number of incandescents stored by an onsite participant was 89 bulbs, 24 of which were 100 Watt bulbs. Overall, the 60 Watt bulb (35%) was the most common type of incandescent stored by onsite households.

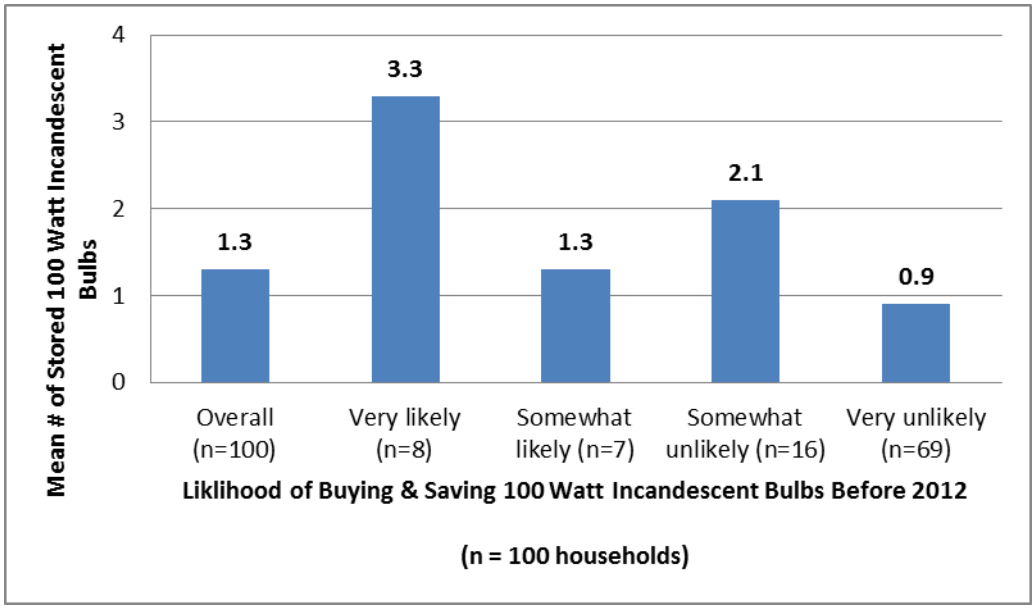
Telephone survey participants indicated how likely they would be to buy and save extra 100 Watt incandescent bulbs for use after 2012. The team compared the self-reported likelihood to stockpile 100 Watt incandescents for the onsite participants with the actual number of 100 Watt

[15] Section 2.3.7 contains more detail about storage of all bulb types, not just incandescent bulbs.

bulbs in storage. Those who had said they would be very likely to buy and save extra 100 Watt bulbs had more 100 Watt incandescent bulbs in storage (3.3) than those who were very unlikely (0.9, this result is significantly different), somewhat unlikely (2.1), or somewhat likely (1.3) to do the same (Figure 2-8). Those who claimed to be very likely to stock up on 100 Watt bulbs also stored more 40, 60, 75 and 100 Watt bulbs (11.1) than the onsite households who were less than very likely to store 100 Watt bulbs (7.2). These results suggest that at least some respondents will—and already are—storing incandescent bulbs for use at a later time. However, the team cannot be certain that this behavior diverges from what consumers did prior to EISA because NMR is not aware of any studies that have tracked storage of incandescent bulbs prior to EISA. Therefore, the team cautions against concluding with certainty that all of the incandescent storage is due to EISA, but it is probably safe to assume that some of it is.

Figure 2-8: Onsite Stored 100 Watt Incandescent Bulbs by Likelihood of Buying and Saving Extra 100 Watt Incandescent Bulbs for Use After 2012

(Base: All onsite households)



2.3 Light Bulb Use, Saturation, Storage, and Purchase

A third objective of the Stage 2 EISA exploration was to establish the types and characteristics of lighting technologies in use and in storage in homes and understand socket saturation and bulb purchasing habits. Highlights from this section include the following:

- The average number of total sockets per home was 62 (or a total of 82.3 million statewide). Among these sockets, CFL saturation stood at 27% in spring 2012, 9% short of the goal set by the DPUC to achieve CFL saturation of 36% by the end of 2011. LEDs filled another two percent of sockets, and still another 11% of sockets were filled with pin-based fluorescent tubes. Together, the saturation of these three efficient bulb types was 40%. The remaining sockets are filled largely with incandescent and halogen bulbs,

such that the remaining potential for efficient lighting is 61% (the extra one percent is due to rounding error).

- Saturation of CFLs was four percentage points higher compared to the last measurement, (23%) taken in 2009. LED saturation went from less than one percent in 2009 to two percent in 2012, and the saturation of fluorescent tubes went from 7% to 11% in the same time period. This means that the saturation of efficient lighting in homes was nearly 10% percentage points higher in 2012 than in 2009. Note, however, that NMR did not explicitly measure change from 2009, so the results show only the two separate amounts and cannot be used to draw conclusions about changes over time.
- Saturation of incandescent bulbs decreased from 64% in 2009 to 49% in 2012, as sockets have been converted to CFLs, LEDs, and fluorescent tubes as well as halogen (not typically A-line bulbs but more often flood-shaped ones) and other types of bulbs.
- Although CFL saturation has increased, the team believes that the increase seems small compared to the 12.6 million program-supported CFLs sold in Connecticut between 2009 and 2011 (based on data in the annual plans). Evidence from this study (see storage below) and forthcoming in a report for another New England state suggests that households are increasingly buying CFLs to replace other CFLs, which limits increases to saturation but also prevents saturation from backsliding; in other words, households like CFLs enough to keep using them when they burn out.
- A comparison of the 2009 and 2012 studies suggests that the number of sockets per home increased from 46 to 62 in a three year period. It is the case that the number of sockets is increasing across the nation,[16] and there is no reason to believe Connecticut is not also experiencing an increase in socket numbers. Therefore, while households have been using more CFLs, the saturation rate has not increased a great deal because they are also adding sockets that use non-CFL bulbs. However, it is also likely that some of the observed increase in sockets is due to changes in onsite methodology, as the current study was the first in the nation to implement protocols designed to reduce measurement error in onsite studies.[17]
- Other possible explanations for the disposition of program-supported and market-level sales include bulbs returned to stores, purchases by commercial customers at retail stores, leakage to other states, and measurement error.
- Research conducted over time in Massachusetts suggests that it has also seen a leveling of CFL saturation after the substantial increases achieved after the state moved to an

[16] The study found a 26% increase in the number of sockets across the nation between 2001 and 2010. Navigant Consulting. *2010 U.S. Lighting Market Characterization*. Prepared for the US Department of Energy, Energy Efficiency and Renewable Energy Division. 2012.

[17] Future replications of this method will help to determine if the socket count observed in Connecticut in 2012 was an anomaly or represents a more accurate count resulting from reduced measurement error. Filiberto, D., L. Wilson-Wright, and L. Hoefgen. "Mission Control, We have a Problem: Questioning the Reliability and Validity of On-site Data." Paper presented at the International Energy Program Evaluation Conference, Boston, MA, August 2011.

upstream approach.[18] Data comparing saturation in New York State and New York City between 2009 and 2010 show larger increases in saturation of 5% and 10%, respectively.[19] Importantly NYSERDA also changed its program design during that time period from a marketing-based program to one that included a greater number of upstream incentives and rebates, particularly targeting the New York City market.

- Almost all onsite homes (94%) in the study used at least one CFL, but most households tended to use them in only some sockets, hence the saturation rate of only 27%. It is likely that many of these households using CFLs for the first time between 2009 and 2012 were "hard-to-reach" or reluctant to try CFLs, but the current study did not explicitly test this hypothesis.
- Almost all homes (94%) in Connecticut used at least one CFL, a change of 9 percentage points from 2009 when 85% of homes used CFLs. It is likely that many of these households using CFLs for the first time between 2009 and 2012 were "hard-to-reach" or reluctant to try CFLs.
- The 60 Watt incandescent bulb or its equivalent remained the most common in homes. CFLs were more likely to be 13 or 14 Watt, which are sold as 60 Watt equivalents (59% of CFLs), than any other wattage. In contrast, only 35% of incandescent bulbs were 60 Watt, which is the highest percentage of any wattage; however, incandescents come in a much wider variety of wattages than CFLs, so the 60 Watt did not dominate in the same manner as the 13 or 14 Watt CFL.
- While the team did not directly measure change in bulb use due to EISA, over the past three years, households have shown a reduced tendency to use incandescent bulbs and have instead turned more to CFLs, LEDs, fluorescent tubes, and halogen bulbs to fill existing or new sockets. Importantly, the availability and diversity of CFLs, halogens, and LEDS has increased due to EISA, making it likely that the legislation is leading, directly or indirectly, to changes in residential light bulb use patterns.
- Bedrooms and bathrooms were the most popular places to install CFLs, with CFLs accounting for 39% of bedroom lighting and 37% of bathroom lighting. LEDs were most commonly installed in the kitchen (5% of kitchen sockets), but they were typically the under-the-cabinet, pin-based lights and not the A-line screw-in type. Among the five room types with the greatest number of sockets overall (i.e., bedrooms, kitchens, bathrooms, living rooms, and the exterior of the home), 55% or more of the sockets could be filled with CFLs or LEDs.
- When asked an open-ended question about how they decide to light a room, respondents most frequently mentioned price, brightness, energy efficiency, wattage, and a preference for a particular bulb type. Close-ended questions about the preferred characteristics for a

[18] NMR Group, Inc. "Results of the Massachusetts and Pennington County, South Dakota Telephone and Onsite Compact Fluorescent Lamp Survey," in *Massachusetts ENERGY STAR Lighting Program 2010 Annual Report:* Delivered to the Massachusetts Program Administrators on June 13, 2011.

[19] NMR Group, Inc. *Impact Evaluation: NYSERDA CFL Expansion Program: Random Digit Dial and Onsite Survey Results*. Delivered to NYSERDA May 2011.

room revealed that brightness was most important in all rooms, typically followed by price; the exceptions were bedrooms and dining rooms, where price was more important than brightness.

- When asked why they did not have CFLs installed in some rooms, most respondents indicated that they were waiting for an installed bulb to burn out or had not gotten around to it. However, 13% of respondents indicated that CFLs did not fit properly.
- Only 10% of all sockets in homes were dimmable, and just 6% of these dimmable sockets were filled with CFLs.
- Dining rooms have the highest remaining potential for CFLs and LEDs (87%); only 12% of sockets in dining rooms were filled with CFLs, LEDs, or fluorescent tubes at the time of the onsite visit. More than any other rooms in the home, respondents who did not use CFLs in the dining room noted that the bulbs did not work with dimmers, that they did not like the appearance of CFLs in the dining room, or that they could not find a bulb for the application.
- Satisfaction with CFLs and LEDs was high, with 77% of CFL users and 83% of LED users rating themselves as "somewhat or very satisfied" with the products. Consumers appreciated the energy savings of CFLs and the light quality of LEDs. Persistent concerns about CFLs included light quality and brightness, being slow to brighten, and mercury content, while LED users also cited price and the appearance of the bulb itself.
- Households in the onsite study collectively stored 1,657 bulbs, of which 64% are incandescents and 29% are CFLs.
- By and large, consumers are not *changing out* inefficient bulbs for CFLs. Instead, they fill whatever sockets need replacing at that moment and then they store the remaining CFLs until another bulb—which may or may not be an incandescent—burns out. In fact, respondents reported that 63% of stored CFLs would likely replace another CFL, 30% will replace whatever bulb type burns out first, and 5% would replace incandescent bulbs. As mentioned above, the large percentage of CFLs expected to replace other CFLs is part of the likely explanation of where the program-supported CFLs have gone—many, perhaps most, have replaced other CFLs that burned out.

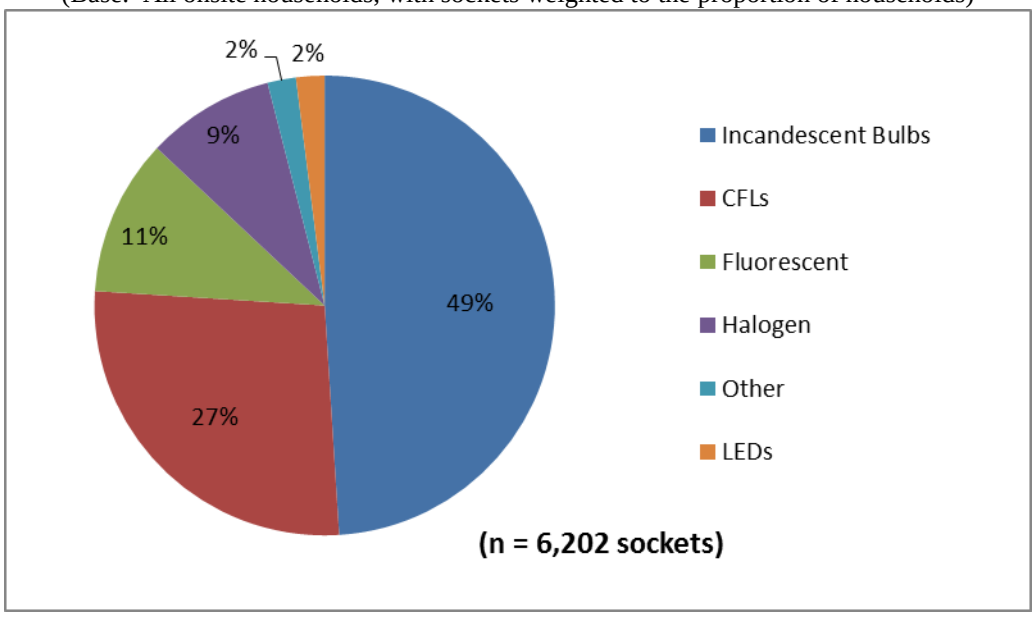
This section discusses each of these findings as well as additional information in more detail.

2.3.1 Socket Saturation and Types of Bulbs in Use

According to the onsite saturation study, CFL saturation stood at 27% (confidence interval of 22% to 31%) in spring 2012, 9% short of the 36% state goal (Figure 2-9; see also Table B-24). Another two percent of sockets were filled with LEDs, and still another 11% of sockets were filled with pin-based fluorescent tubes (including pin-based CFLs). Therefore, the saturation of these three efficient bulb types was 40%. Incandescent bulbs continued to be the most common type of bulb technology in use in Connecticut with approximately one-half (49%) of all sockets occupied by an incandescent bulb. Overall, 61% of sockets in the state have the potential to be filled with CFLs or LEDs, with potential being determined by the number of sockets currently holding incandescent, halogen, and "other" types of bulbs (see also Table 2-4).[20] When examining the potential of CFLs or LEDs by bulb shape, candelabra bulbs and bulbs that fit an A-line profile (which includes most standard CFLs) have the highest potential (97% of candelabra bulbs and 96% of A-line bulbs), followed by spot/reflector/flood shaped bulbs (86% of bulbs with these shapes).

Figure 2-9: Socket Saturation in Connecticut*

(Base: All onsite households, with sockets weighted to the proportion of households)



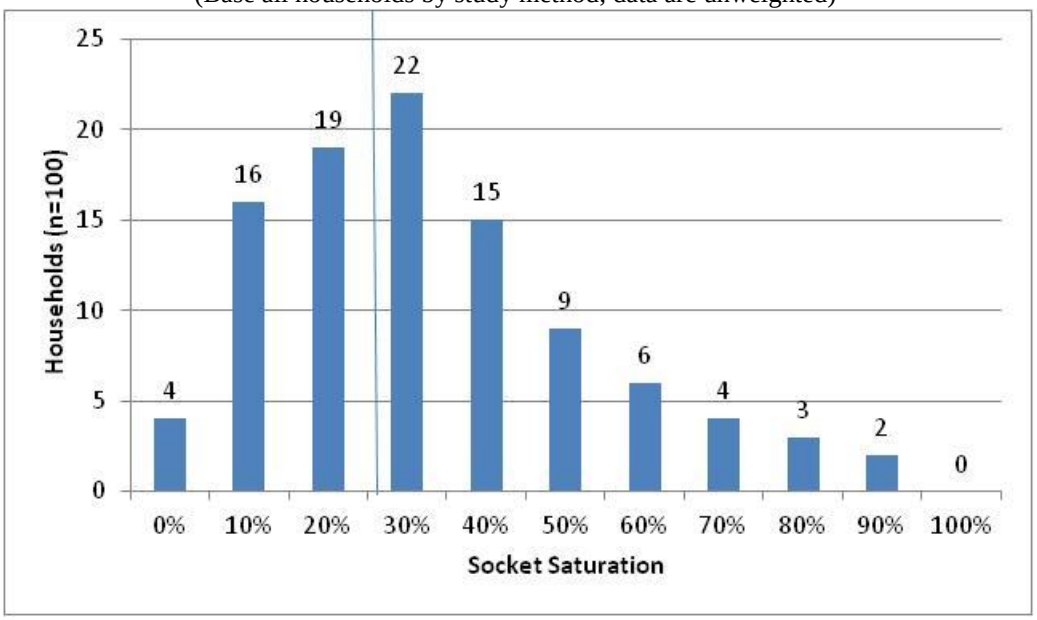
* Estimates subject to rounding error

[20] A very few of the sockets in onsite homes were empty at the time of the visit, so few that including or excluding them has little impact on saturation estimates. Empty sockets still represent potential for CFLs and LEDs.

CFL saturation is not evenly spread across households in the state. Figure 2-10 shows CFL saturation for the 100 households in the onsite sample; the solid line designates the average saturation rate of 27% while the columns are "bins" with the number listed representing the highest saturation rate in that bin. For example, 10% includes 1% to 10%, while 90% includes 81% to 90%. The figure shows that 61 of the 100 households had 30% or fewer of their sockets filled with CFLs (average saturation of 27% is within the 30% bin). Only fifteen households had more than 50% of their sockets filled with CFLs. As the following discussion will demonstrate, the analyses show that nearly all sockets in homes could be filled with currently available styles of CFLs and LEDs, but consumers have not yet converted these remaining sockets despite the energy and bill savings they could achieve by doing so.

Figure 2-10: CFL Saturation by Household

(Base all households by study method; data are unweighted)



Where Have the CFLs Gone: This study did not have an explicit objective of comparing the results of the current study to previous saturation estimates from 2009,[21] but examination of the 2009 data helped to inform objectives about the current saturation rates and (as discussed later) how bulb use habits have changed due to EISA. However, because the comparison of saturation rates from the two years showed a relatively small increase in CFL saturation despite the number of CFLs supported by the Companies between 2009 and 2011 (2012 data are not yet available via annual plans), NMR found it necessary to consider "Where have all the CFLs gone?"

More specifically, Table 2-1 compares saturation by bulb type in 2009 and early 2012; below (Section 2.3.3), the team discusses the potential impact of EISA on saturation of various bulb types, but here the saturation estimates serve to introduce the challenge of understanding what happens to CFLs—either program-supported or not—after they leave the store. Table 2-1 shows

[21] NMR. *Market for CFLs*. 2010.

that saturation of was 23% in 2009 and was 27% in early 2012, a difference of only four percentage points. During this time, the programs supported approximately 12.5 million CFLs between 2009 and 2011, and consumers also purchased CFLs that had not received program incentives. Given that a comparison of the 2009 and 2012 numbers suggest only a small increase in saturation and large number of CFLs being sold that begged the question, "Where have all the CFLs gone?"

Table 2-1: Comparison of Saturation Rates 2009 and 2012

(Base: All onsite households, weighted to the proportion of households)

Sockets Containing	**2009**	**2012**
Sample Size	*95*	*100*
Total Sockets[a]	**4,394***	**6,202**
Incandescent bulbs	64%	49%
CFLs	23%	27%
Fluorescent	7%	11%
Halogen	6%	9%
LED	<1%	2%
Other[b]	n/a	3%

[a] The increase in the total number of sockets may be exaggerated due to variations in data collection and quality control procedures in the two studies. See Appendix C for more detail.

[b] Other includes: sodium bulbs, xenon bulbs, bulbs whose type could not be identified and empty sockets.

Appendix C examines the quality control steps NMR took to ensure that data collection or analysis errors were not behind the lack of increase in CFL saturation. The discussion here focuses on the question of where the CFLs might have gone. The team identified five explanations that collectively provide a feasible explanation for where many, if not most, of the CFLs have gone.

First, as the data in Table 2-1 suggest, the number of sockets per home has increased between 2009 and early 2012. While the team believes the increase in sockets from an average of 46 to 62 is exaggerated due to variations in data collection procedures in the two studies (see Appendix C), a comprehensive study performed by Navigant Consulting shows that the number of sockets has been increasing in residences across the nation; specifically, the study found a 26% increase in the number of sockets across the nation between 2001 and 2010.[22] While CFLs are filling many of the new sockets, so are bulbs of other types, thereby limiting increases in CFL saturation.

Second, as discussed below regarding storage in Section 2.3.7, onsite respondents who were storing CFLs at the time of the visit explained that 63% of the stored CFLs would likely replace an existing CFL, and another 30% would replace whatever kind of bulb burned out first. The team believes that it is safe to assume that many of these respondents have already been

[22] Navigant Consulting. *Lighting Market Characterization*. This study uses data collected in numerous onsite studies conducted in recent years, including some data from Connecticut. 2012.

replacing at least some CFLs that have burned out with CFLs purchased in Connecticut between 2009 and 2011. Results from the 2008 Residential Measure Life study support this argument.[23] Table 2-2 shows the failure rates of CFLs as determined in that study, such that, by their sixth year, 54% of the CFLs obtained in 2005 should have failed by 2011. If one considers the failure rate over time, the age of CFLs installed in Connecticut (the Companies began promoting CFLs the late 1990s), and that saturation has increased as has the number of sockets in the home, it becomes clear that newly purchased CFLs must have been replacing existing CFLs and in fairly large numbers; otherwise, saturation, the number of sockets, or both would have had to have decreased.[24] Thus, the residential lighting program should take credit for helping to maintain saturation rates despite the large numbers of CFLs burning out according to expected failure rates.

Table 2-2: Cumulative CFL Failure Rates by Age of Bulb*

Age of Bulb, in years (calendar year from 2011)	Failure Rate*
One (2010)	4%
Two (2009)	13%
Three (2008)	21%
Four (2007)	36%
Five (2006)	46%
Six (2005)	54%

* NMR and RLW. *Residential Lighting Measure Life Study*. 2008.

Although the team is not able to quantify the number of CFLs attributable to each possible explanation, the final three answers for where CFLs have gone include the following:

- Purchases at retailers for non-residential applications: Program-supported bulbs may be installed in commercial applications, particularly small businesses or public areas of multifamily buildings.
- Returns and early failures: Customers may have returned bulbs to the store or disposed of them in some other manner.
- Leakage outside of the state: CFLs purchased in Connecticut may be installed outside of the state.

Note, however, that it is the team's opinion that installation in new sockets and the replacement of burned out CFLs likely account for the lion's share of CFLs obtained in recent years in Connecticut.

[23] NMR and RLW. *Residential Lighting Measure Life Study*. Delivered to the New England Residential Lighting Program Sponsors, June 10, 2008.

[24] NMR is in the process of finalizing a similar analysis for another New England state that comes to the same conclusion and estimates the number of likely CFL failures in 2011. The team has a detailed time series of data for this state on market-level and program-level sales together with CFLs installed and in storage in homes. When this analysis is available for public distribution, NMR will alert the EEB evaluation consultant.

It is also worth noting that Connecticut is not alone in seeing CFL saturation rates increase at slower than desired rates. Research conducted over time in Massachusetts suggests that it has also seen a leveling of CFL saturation after the substantial increases achieved when the state moved to an upstream program approach in the early 2000s (Figure 2-11).[25]

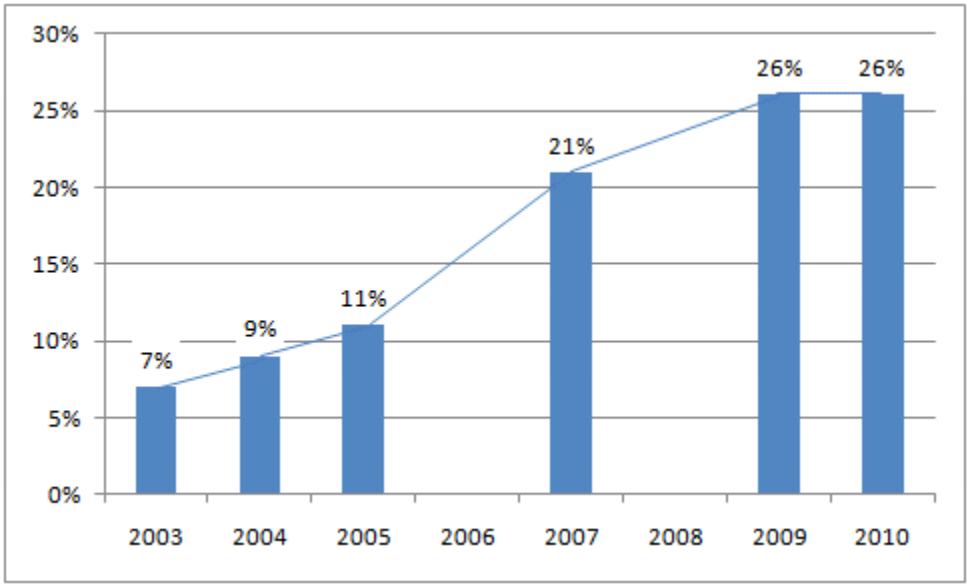
Data comparing saturation in New York State and New York City between 2009 and 2010 show larger increases in saturation, 5% (to approximately 24%) and 10% (to approximately 31%), respectively.[26] However, NYSERDA substantially revised its program during that time period to increase the incentives for CFLs and specifically targeted the New York City market for CFL promotions.[27]

The Navigant study finds national residential CFL saturation in 2010 to be about 23%.[28]

The 2010 multistate modeling effort (in which Connecticut did not participate; it participated only in 2009) suggested an average of 21% saturation among all participating areas, while program areas tended to have saturation rates between 23% and 28%.[29]

Boosting saturation rates above 30%, then, appears difficult, and it may take the concerted effort of program administrators across the nation—not just in Connecticut—to identify ways to convince consumers to adopt efficient lighting choices such as CFLs and LEDs for their general service lighting needs.

Figure 2-11: CFL Saturation in Massachusetts Over Time*



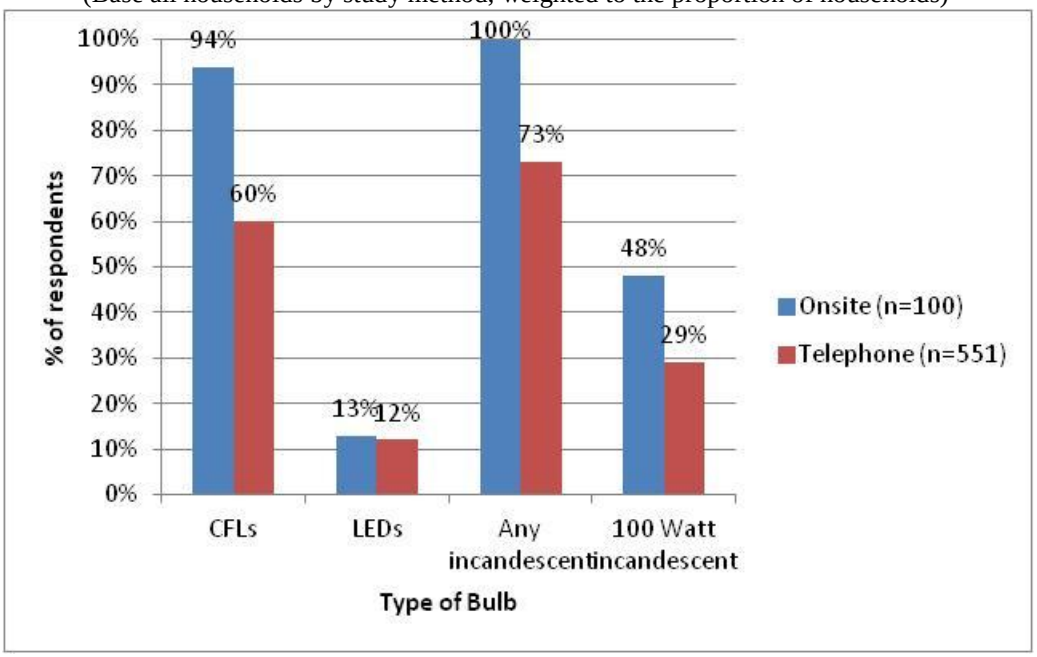
[25] NMR Group, Inc. "Results of the Massachusetts and Pennington County, South Dakota Telephone and Onsite Compact Fluorescent Lamp Survey.". 2011.
[26] NMR Group, Inc. *Impact Evaluation: NYSERDA CFL Expansion Program* 2011.
[27] Prior to 2009, NYSERDA had focused more on marketing-based programs with very few direct incentives available for CFLs or other retail products.
[28] Navigant Consulting. *Lighting Market Characterization. 2012.*
[29] See, for example, NMR Group, Inc. 2011. *Results of the Multistate CFL Modeling Effort*. Delivered to NYSERDA September. 2011.

* NMR. 2011. NMR, *ENERGY STAR Lighting Program 2010 Annual Report*.

Household Penetration. In addition to socket saturation, the team also examined the penetration of bulb types, that is, the percentage of households with at least one bulb installed of a particularly lighting technology. The onsite saturation study found that, statewide, while all households used at least one incandescent (100%), nearly all used at least one CFL (94%) This number represents a 9 percentage point increase from 85% found in the 2009 study (Figure 2-12). The increase in CFL penetration is important not only because more households are using CFLs, but also because these last few households likely have been "hard-to-reach" or reluctant to use CFLs in the past. The efforts of the Program combined with market forces have come together to make CFLs an accepted and common lighting option in nearly every household in the state.

Figure 2-12: Penetration by Lighting Technology

(Base all households by study method, weighted to the proportion of households)



Fewer than one-half of households (48%) had a 100 Watt incandescent installed, and 13% of households had at least one LED installed. The onsite results are similar to the findings from the focus groups in that nearly all focus group participants used CFLs and incandescent bulbs, but very few used LEDs. The telephone survey estimates of penetration stand in contrast to those of the onsites and focus groups. With the exception of LEDs, self-reported use of CFLs, incandescents, and 100 Watt incandescents was statistically lower among telephone survey respondents than verified onsite. While it is certainly likely that households interested in lighting—and perhaps even those predisposed to energy-efficient lighting—were more likely to take part in the onsite visits and focus groups, the findings here are consistent with those reported by NMR previously for Connecticut and other states that concluded that telephone survey

estimates of light bulb use were less reliable than onsite estimates of the same indicators.[30] The current findings suggest that consumers remain confused about the types of light bulbs they use in their own homes, offering an opportunity for continued consumer education as EISA diversifies the lighting products available on the market, as discussed in the Conclusions and Recommendations (Section 3).

The households that had no CFLs installed revealed why they did not use them. Collectively, they provided 15 responses, six of which indicated they did not need to replace bulbs yet (e.g., using up old stock, waiting for bulbs to burn out), six reported that they had never purchased them, and one was unaware of the energy savings from using CFLs. Only one respondent indicated that CFLs were too expensive; likewise, just one respondent did not think CFLs looked as good as other bulb types.

Bulb Shape. The most common bulb shape installed overall was A-line, but most of these were incandescent bulbs. Only 3% of A-line bulbs were CFLs, although it must be remembered that most standard, spiral CFLs will fit A-line sockets. One percent of A-line bulbs were LEDs, (Figure 2-13; see also Table B-28 in Appendix B). The majority of twist or spiral shaped bulbs in homes were CFLs (98%). Nearly all sockets (96%) currently filled with an A-line bulb could hold CFLs or LEDs with an A-line profile. Focus group participants showed strong preferences for A-line, covered CFLs in a lighting display during the group, though most had not been familiar with this type of CFL prior to the focus group, suggesting that greater exposure to A-line CFLs could increase their adoption. Increasing the adoption of A-line CFLs will likely be a necessary component of strategies to increase CFL socket saturation in Connecticut, as the bulbs may be more appealing to consumers who are concerned about the shape of the bulb for reasons of aesthetics or fit in fixture, a point discussed again in the Conclusions and Recommendations (Section 3).

[30] NMR Group, Inc. 2010. *The Market for CFLs in Connecticut*. Delivered to the CEEB on March 2, 2010. NMR Group, Inc. 2010. *Results of the Multistate CFL Modeling Effort: Final*. Delivered to the CEEB on February 2, 2010.

Figure 2-13: Bulb Shape by Type of Bulb

(Base all onsite households, weighted to the proportion of households)

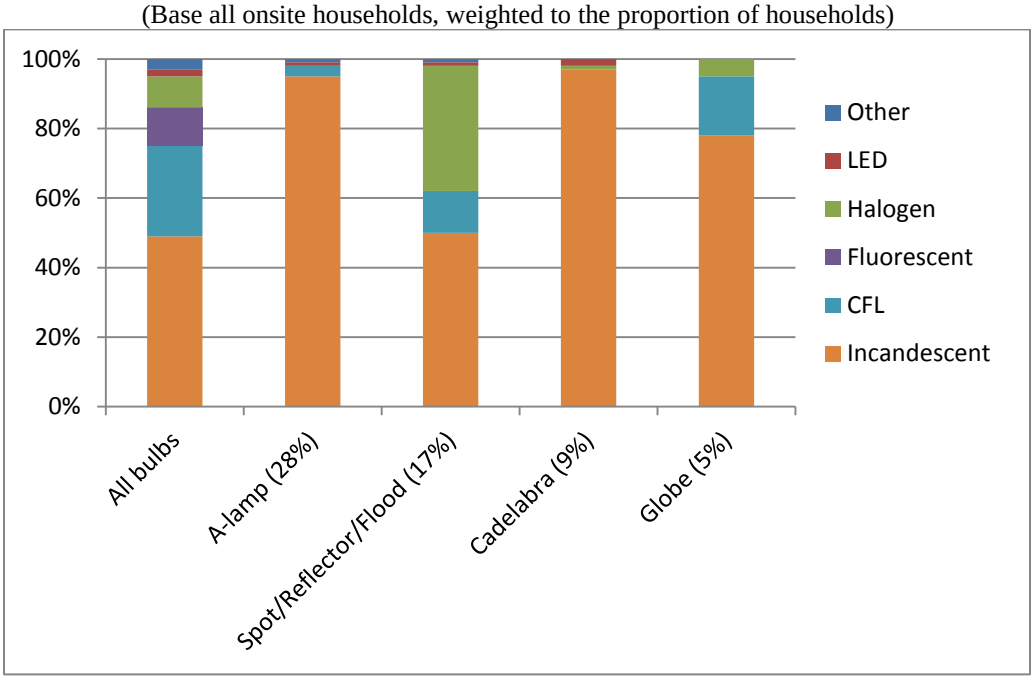


Figure 2-13 also shows that 12% of spot, reflector, and flood bulbs were CFLs, but halogen bulbs (not the newer A-line but the flood style that has long been on the market) comprised (36%) of this bulb shape. Potential for CFLs and LEDs among spot, reflector, and flood shapes was 86%. CFLs made up 17% of all globe bulbs installed, but CFLs and LEDs could fill the remaining 83% of globe sockets. Finally, nearly all candelabra bulbs in the state were still filled with incandescent technology; virtually all of the remaining candelabra sockets could be filled with CFLs and LEDs.

Although filling specialty sockets with shaped CFLs and LEDs will be an important strategy for increasing socket saturation, the vast amount of remaining potential still rests with applications currently filled with an A-line profile bulb. For some reason, however, consumers have not accepted standard spiral CFLs as the best bulb to fill these sockets despite the fact that most households use at least one CFL. A-line, covered CFLs could help to fill many of these A-line profile applications with an energy efficient bulb. Importantly, although most had never seen a covered CFL prior to the focus group, focus group participants showed a strong preference for covered CFLs after having the opportunity to compare various lighting technologies during the groups. Thus, the findings from the telephone and onsite samples confirm what the team found in the focus groups—few people know about A-line, covered CFLs, and, as a result, few people are using them. Yet, it is likely that Connecticut households would adopt covered CFLs in greater numbers if they were more aware of the technology and had the opportunity to compare the bulb's performance against those of the bulb types.

Bulb Wattages. The majority of CFLs installed in Connecticut are 13 or 14 Watt bulbs (59%), which are usually sold as the equivalent of a 60 Watt incandescent (Table B-25). Not surprisingly, the most common wattage for incandescent bulbs was 60 Watt bulbs (35%) followed by 40 Watt bulbs (19%). As incandescent bulbs have long been available in a wide variety of shapes and sizes, they also come in a wider variety of wattages.

Fixture Controls. A small portion of socket controls overall had dimmable (10%) or three-way (2%) capabilities (see also Table B-28 in Appendix B). CFLs appear to have made headway into the three-way market, with 26% of three-way bulbs being CFLs, which is statistically similar to the percentage of overall sockets filled with CFLs; remaining potential for three-way bulbs is 69%. In contrast, most of the dimmable sockets (91%) still have the potential to be filled with CFLs or LEDs, suggesting that consumers are having some difficulty finding dimmable CFLs or LEDs or those found may have not expectations for attributes such as cost or performance.

Fixture Types. Flush mount fixtures were the most common fixture type found in Connecticut households overall. While the incandescent was the most popular bulb found in flush mounts (43%), CFLs (29%), and fluorescent bulbs (24%) also accounted for a large proportion. (See also Table B-26 in Appendix B). No LEDs were found in this type of fixture.

Wall mounts (34%) and portable table lamps (36%) were also common fixture types to house CFLs. The most common types of fixtures with LEDs were night lights (29%) and under cabinet fixtures (21%). Overall, at least 47% of sockets in each fixture type have the potential to be filled with CFLs or LEDs.

The majority (84%) of all sockets, CFL bulbs (99%) and halogen bulbs (59%) installed in Connecticut households were screw based; the majority of LED bulbs (62%) were pin based (see also Table B-27 in Appendix B).

2.3.2 In-depth Questions on A-line LEDs

The availability of A-line, screw-in LEDs has expanded greatly in the past year, and the team wanted to learn more about why consumers might use this emerging technology. Therefore, the telephone survey asked the 76 respondents who reported using A-line LEDs why they did so. As shown in Table 2-3, responses varied considerably. The most common response is that LEDs save energy (24%), while the second was that the bulbs were given to them (19%), although none specified provision by a Company program. Other reasons included wanting a bulb that lasted a long time (16%), giving them a try (15%), and saving money on an electricity bill (14%). Four percent of the responses noted that the LEDs were on sale, which could signify that they were bought through the CEEF lighting program. A few responses however, suggest that respondents confused A-line, screw-in LEDs with other types of LEDs by noting that the bulb was needed to fit an existing socket or that they bought them out of habit (15%) or that the LEDs were decorative or nightlights (9%).

Table 2-3: Reasons to Use Screw-In LEDs

(Base: Telephone survey respondents who said they were currently using screw-in LED bulbs)

Reasons to Use Screw-In LEDs (Multiple Response)	
Sample size	*76*
To save electricity/energy	24%
Given to me by someone else	19
Wanted a bulb that lasts a long time	16
To give them a try	15
Fit a pre-existing need/habit	15
To save money/reduce electricity bill	14
Liked the light quality	9
They are decorative lights/nightlights	4
They were on sale	4
Bought for no reason/availability	7
Liked them better than CFLs	6
Recommended to me	2
Not as hot	1
Better functionality	1
Don't know	6

2.3.3 Changes in Bulb Use due to EISA

Although neither the onsite nor the telephone survey directly asked respondents if they had changed their bulb use or purchase behavior because of EISA, a comparison of 2009 and 2012 saturation rates revealed changes in the saturation of bulb types found in Connecticut homes, namely a decrease in incandescent bulbs and an increase in nearly all other bulb types (see Table 2-1). While the evaluators cannot conclude with certainty that EISA is behind these changes, it is likely that the increased availability of CFLs, LEDs, and halogen bulbs in a diversity of wattages, shapes, and base-types that stemmed from EISA has made it possible for households to shift from incandescent to other bulbs.

2.3.4 Location of Bulb Use

Bedrooms and bathrooms were the most popular places to install CFLs. Of all bulbs installed in bedrooms, 39% of them were CFLs (Table 2-4). The kitchen was the most common room to have sockets filled with LEDs, with 6% of such sockets utilizing them, although these tended to be under-the-cabinet lights. As noted above (see Section 2.3.1) the evaluators observed an overall potential of 61% for CFLs and LEDs across all rooms[31]. Among the five room types with the greatest number of sockets overall (i.e., bedrooms, kitchens, bedrooms, living rooms, and the exterior of the home), 55% or more of the sockets could be filled with CFLs or LEDs.

[31] As explained earlier in Section 2.3.1, potential is based on the percentage of sockets that could be filled with CFLs or LEDs (but are currently filled with halogens, incandescents or other bulb types).

Table 2-4: Socket Saturation - Room Types by Percent of Sockets

(Base: All sockets, weighted to population of households)

	All Sockets[1]	CFL	Fluorescent	Halogen	Incandescent	LED	Other[2]	Potential for CFLs and LEDs[4]
Number of households	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Total Sockets	**6,202**	**1,642**	**667**	**572**	**3,041**	**95**	**185**	3,798
All rooms	**100%**	**27%**	**11**	**9**	**49**	**2**	**3**	**61%**
Bedroom	15%	39%	5	4	51	1	0	55%
Kitchen	14	22%	9	28	32	6	3	63%
Bathroom	12	37%	6	3	53	0	0	56%
Exterior	11	21%	2	18	58	1	0	76%
Living Room	10	31%	3	10	55	1	0	65%
Basement	8	26%	47	1	26	0	0	27%
Hall/Stairs	6	34%	5	2	59	1	0	61%
Dining Room	6	9%	2	7	80	1	0	87%
Garage	4	21%	29	3	45	0	0	48%
Closet	3	13%	24	5	57	0	0	62%
Family Room	2	22%	10	6	61	1	0	67%
Foyer/Mudroom	1	15%	0	6	79	0	0	85%
Laundry/Utility	2	27%	25	1	48	0	0	49%
Office	2	25%	13	13	44	5	0	57%
Workshop/Studio	1	5%	44	17	28	5	0	45%
Other[3]	2	20%	16	3	60	0	1	64%

[1] The data in this column sum to 100%. The percentages in the next six columns (CFLs to Other) should be read left to right, so that the data for each room type sum to 100%. Note that results are subject to rounding error.

[2] "Other bulb type" includes: sodium bulbs, xenon bulbs, bulbs whose type could not be identified and empty sockets.

[3] "Other room" includes: Attic, Game Room, Greenhouse, Loft, Crawl Space, Mudroom, Storage, Shed, Solarium, Pantry, etc.

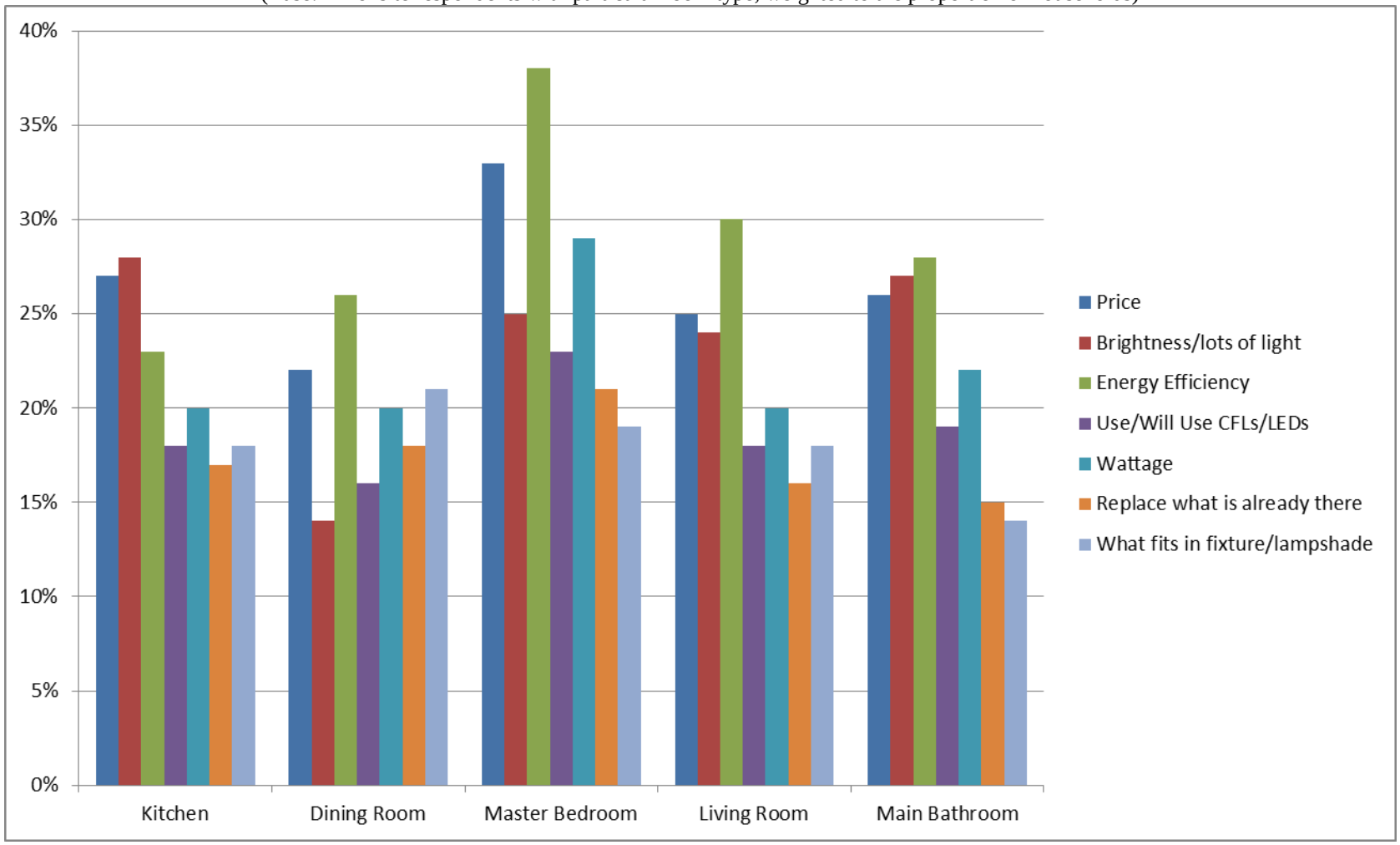
[4] This category is the sum of the halogen, incandescent and other bulb types.

2.3.5 Lighting Decisions by Room Type

When onsite participants described how they decided what bulbs to use in different parts of the home, responses were fairly similar across room types. The top five factors most commonly cited were price, energy efficiency, brightness, and wattage as well as a preference for CFLs and LEDs (Figure 2-14 and Table B-41).

Figure 2-14: Lighting Decisions by Room

(Base: All onsite respondents with particular room type, weighted to the proportion of households)

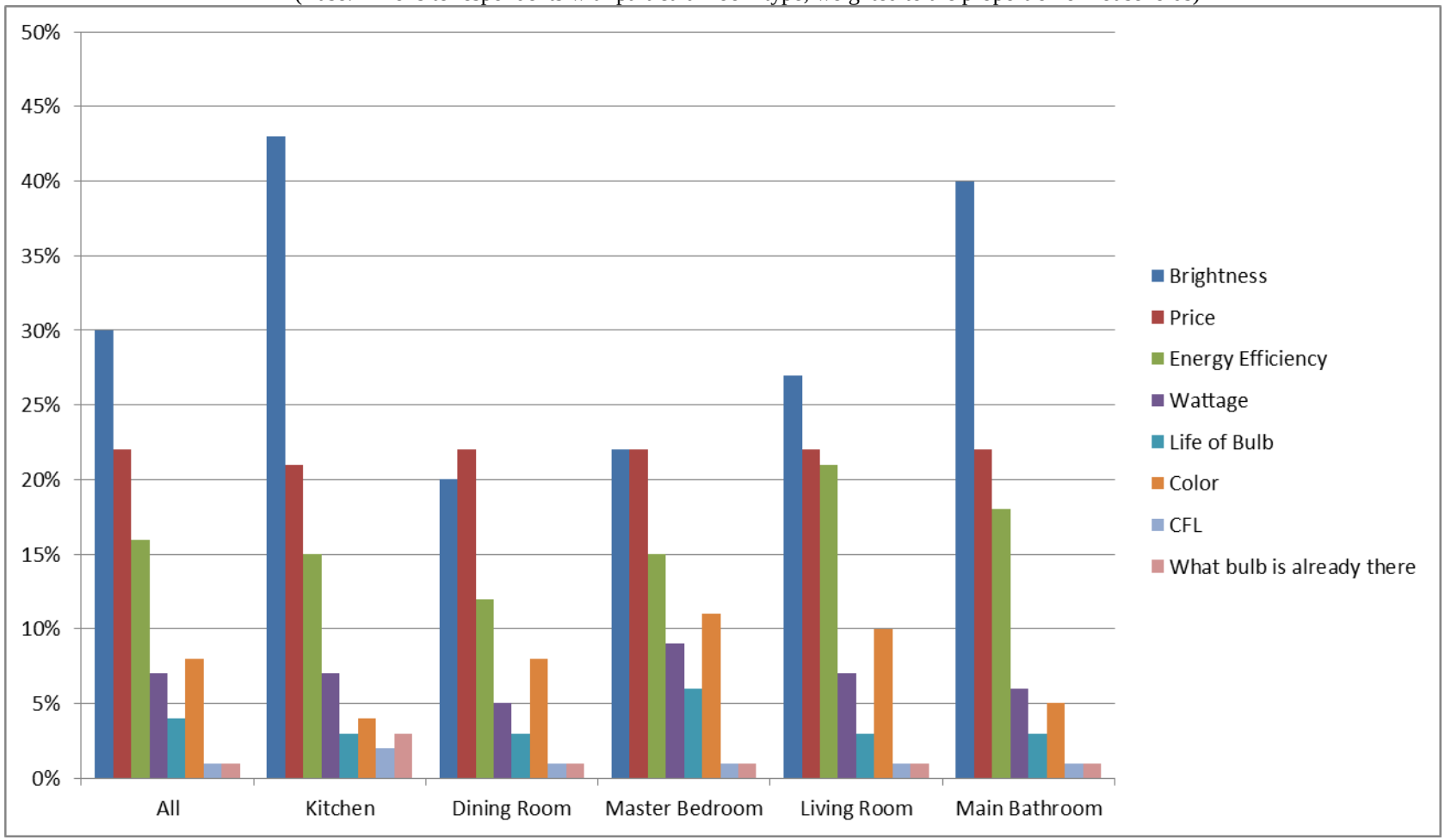


Onsite participants gave similar responses when asked to identify important bulb *characteristics* by room. Brightness was the most important characteristic across all rooms (except for the dining room where price was slightly more important), followed by price and energy efficiency (Figure 2-15). More participants highlighted brightness as the most important in the kitchen and the bathroom than the other three room types. Bulb shape, aesthetics or ambiance, and dimmability (not shown in figure but see Table B-42 in Appendix B) were more important in the dining room than in other rooms. Finally, onsite participants also often noted that they decided what bulb to use in a room by getting a replacement bulb that matched what had been there before or filling an empty socket with whatever bulb type they had in storage.

Onsite responses to questions regarding lighting decisions were similar to low CFL user focus group participants who were most concerned about the price and lack of brightness of CFLs. When examining onsite responses in terms of low, moderate, and high users, low users were more likely than moderate users to highlight bulb price as an important characteristic. Moderate to high users in the focus groups, on the other hand, were more concerned about aesthetics, safety and whether the bulb fit in the fixture or not; moderate and high user onsite participants were most concerned with the brightness of the bulb (Table B-43)

Figure 2-15: Preferred Lighting Characteristics by Room

(Base: All onsite respondents with particular room type, weighted to the proportion of households)



For onsite participants who did not have CFLs installed in a specific room, three of the four most common responses could largely be attributed to circumstance as opposed to preference: current bulbs had not burnt out yet, the participant had not gotten around to buying CFLs, and the participant had not gotten around to installing CFLs. These reasons indicate that the participant intended to buy or install CFLs in the future. CFLs not fitting properly in a fixture was also a common responses across all room types. As with previous responses, the dining room again stands somewhat in contrast to other rooms, with participants noting issues related to dimmability, aesthetics, and finding a CFL for the application more frequently than for other room types. Lack of CFL brightness was also mentioned more for kitchens than other rooms. (Table B-44)

Table 2-5: Why No CFLs Installed by Room

(Base: All onsite households, weighted to proportion of households)

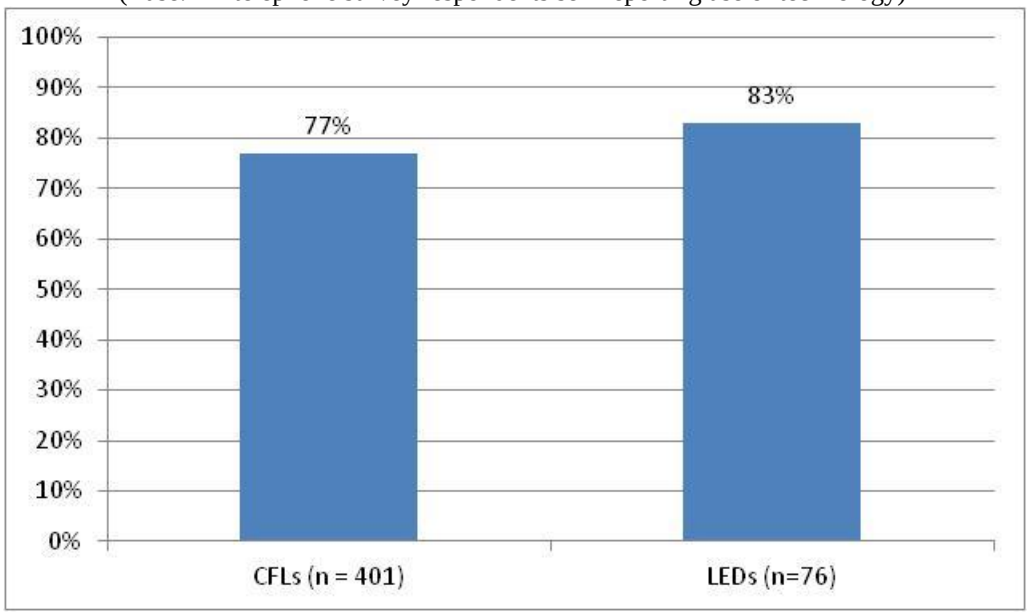
	All	Kitchen	Dining Room	Master Bedroom	Living Room	Main Bathroom
Number of households	*68*	*38*	*57*	*29*	*27*	*32*
Current bulbs haven't burnt out yet	19%	19%	11%	26%	27%	13%
Have not gotten around to buying CFLs	13	10	11	15	14	13
Do not fit properly	13	21	22	13	5	5
Have not gotten around to installing CFLs	15	15	2	15	16	28
CFLs do not work with dimmer	7	6	20	5	3	3
Do not like appearance	7	4	12	3	8	8
Not aware of CFL for application	5	2	9	5	5	5
CFLs not bright enough	5	10	3	5	3	3
Delay in light coming on	5	6	2	5	3	8
Using up old stock	2	2	0	3	3	3
No reason	1	2	2	0	0	0
Mercury	3	2	2	3	3	3
Do not like color	1	0	3	0	3	0
Prefer "Reveal" incandescents	3	0	0	0	8	8
Do not use lamp often	1	0	0	3	0	0
Cost	1	0	2	0	0	3
Design	<1	0	2	0	0	0

2.3.6 Satisfaction with CFLs and LEDs

The focus group findings made clear that many households that used CFLs—sometimes large numbers of CFLs—still voiced concerns about the products. Moreover, very few focus group participants liked the look of the LED bulb on display, despite the fact that it is one of the most readily available—and program supported—A-line LEDs on the market. Given the concerns raised by the focus groups about CFL and LED satisfaction, the team asked telephone survey respondents who used these bulb types to rate their satisfaction with them. The results indicated that 77% of CFL users and 83% of LED users are "somewhat or very satisfied" with each product.

Figure 2-16: Satisfaction with Standard CFLs and A-line LEDs

(Base: All telephone survey respondents self-reporting use of technology)



The team also delved more deeply into the question of what CFL and LED users liked and did not like about the products. *All users* of CFLs and LEDs were asked to name what they did and did not like about these products despite the respondent's stated level of satisfaction. In addition, dimmable CFL users were also asked to name anything they did not like about those bulbs. The full range of responses to these questions are presented in Table B-14 through Table B-18 in Appendix B, and Table 2-6 below summarizes the most frequently cited "likes" and "dislikes" about CFLs and LEDs.

Users of CFLs most frequently mentioned that the bulbs saved energy or had a long life; notably, 10% of CFLs users said there was nothing at all that they liked about CFLs. When asked what they did not like about standard CFLs, 39% of CFLs users could not name one thing they disliked (Table 2-6). Moreover, 59% of dimmable CFLs users also said there was nothing they disliked about the bulbs. Therefore, although respondents did have complaints about standard and dimmable CFLs—slow to brighten, contain mercury, have poor light color, flicker, etc.—satisfaction and acceptance of the products was relatively strong. Turning to LEDs, light quality (34%) served as the most frequently mentioned "like" followed by energy savings (23%). As with CFL users, most LED users had no complaints about the products, but the few concerns raised included their price, poor light color, the actual color of the bulb itself, and some difficulties with warm up time and dimmability. To summarize, satisfaction with CFLs and LEDs was high, and while consumers still had some concerns about both technologies, they generally appeared to have accepted the bulbs as a viable lighting option for their home.

Table 2-6: Top Five "Likes" and "Dislikes" for CFLs and LEDs

Like		Dislike		
CFL (n=401)	LEDs (n=76)	Standard CFLs (n=41)	Dimmable CFLs (n=69)	LEDs (n=76)
Save energy (47%)	Light quality / brightness (34%)	No dislikes (39%)	No dislikes (59%)	No dislikes (59%)
Bulb life (26%)	Save energy (23%)	Slow to brighten (24%)	Limited dimmability (11%)	Price (16%)
Bill savings (17%)	Bulb life (17%)	Mercury (15%)	Flicker (9%)	Poor light color (6%)
Like nothing (10%)	Design/shape (13%)	Not bright enough (12%)	Price (7%)	Color of bulb[a] (6%)
Brightness (9%)	Availability (12%)	Poor light color (8%)	Slow to brighten (5%)	Long warm up time or poor dimming (6%)

[a] One of the most common LEDs has a yellow filter to make the light warmer.

The team also compared the top five things respondents like and dislike about CFLs broken down by level of satisfaction; this analysis reveals that both satisfied and dissatisfied respondents tended to appreciate the same characteristics of CFLs, namely that they save energy, have a longer bulb life, and save money on electricity bills. Unfortunately, more than one-third of the 95 respondents who were not satisfied with CFLs reported that there was nothing that they liked about them. Satisfied and dissatisfied respondents also agreed on what they disliked about CFLs, with concerns about mercury, being slow to brighten, and not being bright enough being named by both groups. Table B-19 and Table B-20 in Appendix B show the full range of responses for both questions and groups.

Table 2-7: Top Five "Likes" and "Dislikes" for CFLs by CFL Satisfaction

Like		Dislike	
Satisfied (n=303)[a]	Dissatisfied (n=95)[b]	Satisfied (n=303)[a]	Dissatisfied (n=95)[b]
Save energy (51%)	Nothing liked (37%)	No dislikes (46%)	Mercury (26%)
Bulb life (30%)	Save energy (33%)	Slow to brighten (24%)	Slow to brighten (24%)
Bill savings (19%)	Bill savings (14%)	Mercury (11%)	Not bright enough (23%)
Brightness (11%)	Bulb life (13%)	Not bright enough (9%)	Poor light color (17%)
Light quality (8%)	Light quality (5%)	Design or shape (7%)	No dislikes (17%)[c]

[a] Indicated that they were "very satisfied" or "somewhat satisfied" with CFLs.

[b] Indicated that they were "neither satisfied or dissatisfied," "somewhat dissatisfied," or "very dissatisfied" with CFLs.

[c] Households that rated satisfaction sometimes gave this response.

Some illustrative quotes about what respondents like about CFLs and LEDs include the following:

> "I like that they come with different types of light. I don't like the original bright white that the original CFLs came with. Newer ones come with different shades of light."
>
> "The lighting is fine and in terms of the cost it's negligible, regular bulbs are cheap but I feel like we never have to replace CFLs."
>
> "I feel like I am getting my money's worth [with LEDs], even though the upfront cost is high."
>
> "It's a soothing temperature for me to sit next to. The CFLs can be too bright and incandescent can be too soft, but the LED is more soothing. It gives off a better type of light than the incandescent. They seem more sturdy and won't crack like an eggshell when I hold it."

In contrast, the following opinions summarize what respondents disliked about CFLs and LEDs:

> "The CFLs don't work in lamps ... with shades that grip onto the bulb."

"The fact that [CFLs] need to be recycled instead of me just throwing them out in the trash."

"It is hard to understand the equivalency of the wattage or brightness."

"[CFLs] are not that attractive. If you put them in some fixtures they are exposed and do not look too good."

"The initial cost of buying [LEDs] at the stores."

"The fact that [the LED] is yellow on top when it's turned off is weird to me. Every time I see it, I think it's on when it's not."

"In general, they take a while to warm up." (Offered for both CFLs and LEDs)

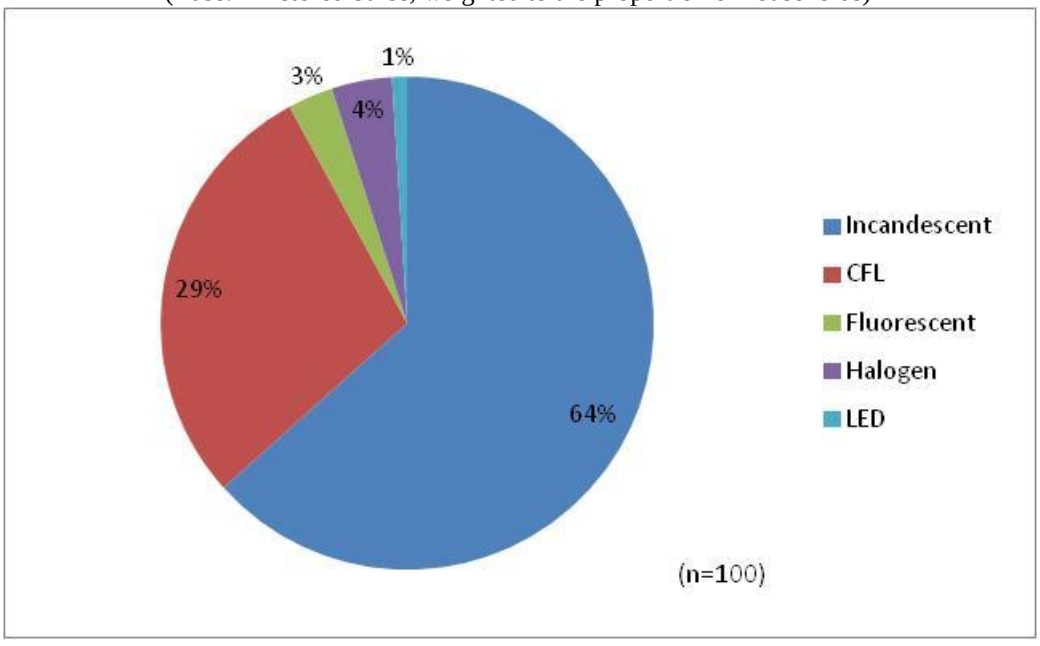
"They don't work in the dimmable fixtures." (Offered for both CFLs and LEDs)

2.3.7 Stored Bulbs

Onsite households were storing about 16 light bulbs per household at the time of the onsite; unfortunately, NMR is not aware of prior attempts to collect information on the storage of *all types* of light bulbs, so the team is unable to determine whether the estimate is typical for other locations as well. Incandescent bulbs were the most common type of stored bulbs in the onsite homes, comprising 64% of the 1,657 stored bulbs. CFLs made up just over one fourth (29%) of the stored bulbs, a percentage similar to their socket saturation (Figure 2-17). The team found very few bulbs of any other type found in storage (Table B-29).

Figure 2-17: Stored Bulbs by Bulb Type

(Base: All stored bulbs, weighted to the proportion of households)



Stored incandescents ranged in wattage from four to 200 watts. About one-quarter (23%) of the incandescent bulbs that were stored were 60 Watt bulbs; the phase-out of this wattage does not begin until 2014, but it is the most common type of incandescent in use. Only 11% of stored incandescents were 100 Watt (Table B-34). Almost all (99%) of the A-line bulbs found in storage were incandescents, and every candelabra bulb found in storage was also an incandescent. Other specialty incandescents in storage included globe (72% of the globe bulbs found), spotlight/reflector/flood (51%), and bullet/torpedo (48%) (Table B-30).

Stored CFLs ranged from nine to sixty-five watts; 29% of stored CFLs were 14 Watt bulbs. Three-quarters (75%) of the stored CFLs were the standard spiral CFL bulb; specialty CFLs in storage included spot/reflector/flood (21% were CFLs), capsule/post/barrel (98% CFLs), globe (26% CFLs), tube (19% CFLs), and A-line (1% CFLs).

Additionally, the team found two types of halogens in storage—spot/reflector/flood (28% were halogen) and bullet/torpedo (52%)—and, two types of fluorescents were stored—tube (80% were fluorescent) and circline (86%). Out of all 100 onsite homes, only one household had three 1.5 Watt globe shaped LED bulb in storage for future use (Table B-30).

The majority (92%) of all stored bulbs—and 98% of CFLs found in storage—are being saved for future use (Table B-31). The majority (63%) of stored CFLs are intended to replace CFL bulbs. Roughly one third (30%) of the stored CFLs will replace whichever type bulb needs replacing first, either CFL or incandescent. A small percentage (5%) of stored CFLs were being stored solely to replace incandescent bulbs; fortunately, very few incandescents (1%) were beings stored solely to replace CFL bulbs. One onsite participant stated that they would replace all bulbs with CFLs as much as possible (Table B-33).

These results help to provide an answer to the research question about whether consumers are storing or installing recently purchased CFLs. In reality, the answer is "a little bit of both". Socket saturation indicates that consumers install some of the CFLs that they buy immediately; but, instead of changing out still working but less efficient bulb types, they are also storing CFLs until other bulbs burn out. Moreover, the fact that nearly two-thirds of CFLs are expected to replace other CFLs is a case of good news/bad news. The good news is that many consumers appear to have embraced CFLs as an accepted bulb technology in the home and intend to continue using CFLs in the same sockets they currently use them. The bad news is consumers are not reporting that CFLs will *certainly* replace the still numerous incandescents in most homes, and this fact is part of the explanation for the slow rise in CFL saturation. Lighting-related programs funded by the CEEF, therefore, should continue their efforts to educate the consumers about *changing out* still-working but inefficient lighting with more efficient CFLs and LEDs rather than simply installing these more efficient bulb types after the inefficient bulb burns out, as discussed in the Conclusions and Recommendations (Section 3).

2.3.8 Commitment to Purchasing Energy Efficient Lighting

The team also asked onsite respondents a series of questions to determine their commitment to buying energy efficient lighting—specifically standard and specialty CFLs and LEDs. This series began by determining when participants had last purchased these efficient light bulbs. As shown in Table 2-8, 51% of onsite households had bought CFLs in the past year, but only 18% had purchased specialty CFLs and 8% LEDs. Note that about one-half of onsite households did not have any specialty CFLs installed and most did not have any LEDs installed. (Table B-37)

Table 2-8: When Last Purchased Standard CFLs, Specialty CFLs, or LEDS

(Base: All onsite households)

	Standard CFLs	Specialty CFLs	LEDs
Number of households	*100*	*100*	*100*
Purchased within the past year	51%	18%	8%
Purchased more than a year ago	29	30	2
No bulbs of type currently in home	20	52	91

The majority of purchasers of CFLs and LEDs obtained them from home improvement stores such as Home Depot or Lowes—54% for CFLs, 52% for specialty CFLs, and 75% for LEDs. Home Improvement stores were also the most likely place a participant would shop for a CFL or LED if they had not found them at the first store, but discount (e.g., Wal-Mart), hardware stores, or warehouse clubs were also sometimes mentioned (Appendix B, Table B-21 and Table B-22 presents the full range of responses to these two questions).

The team determined the actual commitment to buying energy efficient lighting, however, by asking respondents what they would have done if they had not found standard or specialty CFLs or LEDs at the first store at which they shopped for these products. About two-thirds or more of respondents for each bulb type said they would have looked for them at another store within a short time, demonstrating a commitment to buying efficient light bulbs (Table 2-9). However, most of the remaining respondents admitted that they would probably have bought an incandescent bulb instead of the more efficient choice. These responses suggest that Connecticut consumers are committed to energy efficient lighting, but this commitment is most easily reinforced by making certain that CFLs and LEDs are widely available at places consumers shop for light bulbs, a topic addressed again in the Conclusions and Recommendations (Section 3).

Table 2-9: Action if No Standard CFLs, Specialty CFLs, or LEDS at Store

(Base: Households Currently Using Standard CFLs/Specialty CFLs/LEDs installed)

	Standard CFLs	Specialty CFLs	LEDs
Number of households	*89*	*56*	*12*
Gone to another store within a short time to buy bulb	68%	68%	83% (10)
Bought an incandescent	29	27	17 (2)
Waited and purchased bulb at a different time	1	2	0
Someone else would give/buy bulbs	1	2	0
Wouldn't buy the bulb without a sale	1	0	0
Bought Nothing	0	2	0

2.4 Assisting Consumers to make Efficient Lighting Choices

Along with understanding respondents' likely reactions to EISA and determining their current usage of efficient lighting technologies, a final objective of the current study was determining how to assist consumers in making more efficient lighting choices. To do so, the team employed three approaches, as follows:

- A willingness-to-pay analysis (WTP) to determine the advisability of offering incentives—and for what amounts—for CFLs and LEDs
- A series of telephone survey questions designed to the determine factors that respondents consider when shopping for light bulbs, including upfront costs and bill savings
- A series of telephone survey questions aimed at understanding respondent's current knowledge of key lighting terms

Note that an additional research question about alternatives to incentives is addressed in the Conclusions and Recommendations (Section 3). The conclusions section also discussed reasonable amounts for incentives that could be offered.

Key findings from this assessment include the following:

- A willingness-to-pay analysis reveals that consumers are sensitive to price changes in standard and specialty CFLs, suggesting the continued need for incentives, the amounts of which are discussed in the conclusions and recommendations.
- Consumers will balance upfront costs with bill savings and operating costs if they believe the upfront cost is reasonable. At this time, most telephone survey respondents (77%) said they were likely to buy a six dollar bulb that lasts seven years and saves $10 a year, but less than half thought they were likely to purchase a $20 that lasts for 20 years and saves $10 a year (46%).
- A majority of telephone survey respondents reported being familiar with the terms "lumens" (56%) and "warm white and cool white" (62%) in reference to lighting. Most respondents familiar with the term lumens correctly identified it as a measure of light output or brightness (62%), but 27% admitted that they really did not know what the term meant. A similar percentage of respondents familiar with the terms "warm white and cool white" knew that they referred to color appearance. However, 27% thought those terms referred to brightness or the amount of light, and 17% admitted they did not really know what the terms meant.

2.4.1 Advisability of Continuing Incentives and for Which Amounts

The WTP analysis relied on a series of questions during the onsite visit in which respondents that had recently bought standard CFLs, specialty CFLs, or LEDs indicated how much they paid for those bulbs and how much more they would have been willing to pay for them. After determining the price at which the bulb was purchased, the respondent answered up to four additional questions following the form "Would you have purchased this bulb if it had cost $X?" For standard CFLs, the price points were $3, $4.50, $9, and $15. For specialty CFLs, the price points were $5, $7.50, $15, and $25, and for LEDs, the price points were $15.25, $20.25, $25.25, and $30.25. In total 63 onsite respondents answered the standard CFL series and 20 answered the specialty CFL series. NMR does not report final WTP or price elasticity estimates for LEDs because only 10 onsite respondents had recently bought LEDs. This section first provides figures that demonstrate how WTP for standard and specialty CFLs differs at given price points and then provides a final elasticity estimate that indicates how demand for the product is likely to change when price changes.

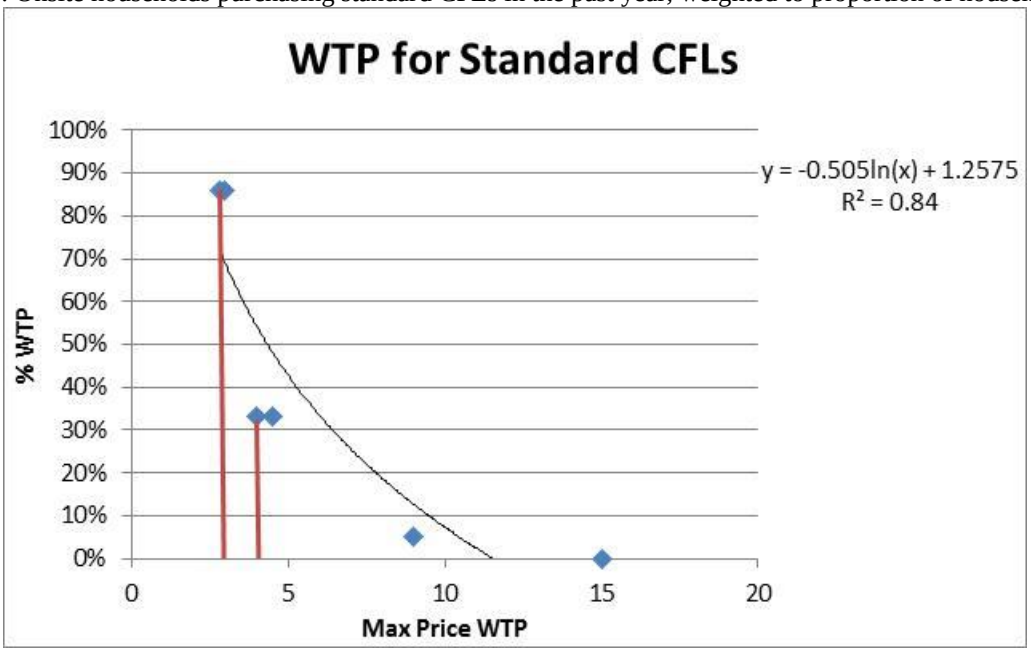
The results for standard CFLs are shown in Figure 2-18, which plots the percentage of respondents willing to pay for the bulbs at the various administered price points. The team fit a logarithmic trend-line to the data points, to model how WTP decreases as price increases. NMR used prices developed in a shelf price study done in Massachusetts in late 2010[32] as price points for this study. The results showed that 86% of the recent CFL purchasers were willing to pay the

[32] NMR, *et al.*. 2011. *Massachusetts ENERGY STAR Lighting Program: 2010 Annual Report. Appendix B CFL Willingness to Pay Analysis Results and Appendix E Residential Lighting Shelf Stocking Survey, Pricing Analysis, and Conjoint Analysis.* .

average incented standard CFL price of $2.83. At the average non-incented standard CFL price of $3.98, the percentage of recent CFL purchasers willing to pay dropped to 33%. Only 5% were willing to pay for CFLs at $9. The estimated elasticity of standard CFLs is -1.50, indicating that the price of standard CFLs is elastic (see Section B.2 in Appendix B for detailed calculations).[33] As such, the demand for the product is sensitive to price changes, suggesting the continued need for incentives (see the Conclusions and Recommendations in Section 3 for discussion of reasonable incentive amounts).

Figure 2-18: Willingness-to-pay for Standard CFLs

(Base: Onsite households purchasing standard CFLs in the past year, weighted to proportion of households)

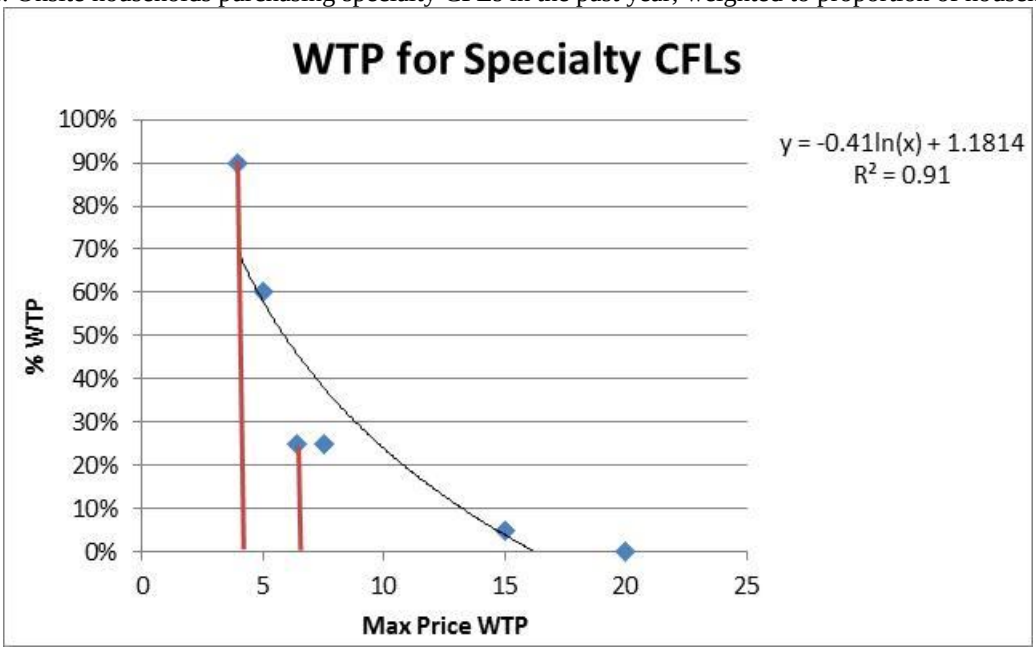


[33] See Section 0 Willingness to Pay in Appendix A for more detailed information on these calculations

The results for specialty CFLs are shown in Figure 2-19. Once again, the team fit a logarithmic trend-line to the data points, to model how WTP decreases as price increases. At the average incented specialty CFL price of $3.96, 90% of recent specialty CFLs purchasers were willing to pay for specialty CFLs. At the average non-incented specialty CFL price of $6.43, the percentage decreased to 25%. The estimated elasticity of specialty CFLs is -1.16. As with standard CFLs, this number indicates that the price of specialty CFLs is elastic, and the demand for the product is sensitive to price changes, suggesting the need for continued incentives.

Figure 2-19: Willingness-to-pay for Specialty CFLs

(Base: Onsite households purchasing specialty CFLs in the past year, weighted to proportion of households)



2.4.2 Consumer Lighting Decisions

The interviewer also asked respondents to identify the information they typically look for on bulb packaging when making a purchase. The question was posed first as an open ended question and then followed by a similar question where the interviewer read a list of possibilities and respondents would affirm whether or not that was a piece of information they typically looked for; multiple responses were allowed for both forms of the question. Overall, participants most commonly looked for information on wattage (94%) followed by price (88%), and Watt equivalency (74%). However, while more than two-thirds (67%) of respondents indicated that Watt-equivalency was important in the prompted version of the question, only seven percent named it in the unprompted version. Similarly, more than one-half indicated that the ENERGY STAR label (57%) and bulb life (52%) were important in the prompted version, but a very small percentage named those same pieces of information in the unprompted version (6% and 14% respectively).[34]

Onsite participants also listed price, wattage, and energy efficiency in the top five important factors when asked about how they make lighting decisions and important bulb characteristics in specific rooms in the home, as shown earlier in Figure 2-14 and Figure 2-15. However, onsite participants identified brightness as an important factor in lighting decisions and preferred bulb characteristics, while only 4% of telephone participants gave brightness as a response. This could be due to the fact that "brightness" was not included in the prompted version of the question for telephone participants and, as the focus groups made clear, most consumers still equate "wattage" with "brightness," although this will likely be changing as they become more educated about the term "lumens."

[34] It is worth noting that FTC labels have just recently been introduced, and some consumers likely had limited exposure to them at the time of the telephone survey.

Table 2-10: Information Looked for on Bulb Packaging

(Base: All respondents)

Information on packaging (Multiple Response)	Unprompted Response	Prompted Response	Total Prompted and Unprompted
Sample size	*551*	*551*	*551*
Wattage	45%	49%	94%
Price	27%	61%	88%
Watt Equivalency	7%	67%	74%
Bulb life	14%	52%	66%
Energy Star label	6%	57%	63%
Shape or appearance of bulb	5%	54%	59%
Color Appearance	12%	43%	55%
3-way	2%	46%	48%
Dimming	1%	33%	34%
Lumens	5%	24%	29%
UL or Underwriters laboratory	0%	29%	29%
Lighting facts/energy facts label	4%	21%	25%
Mercury content	<1%	20%	20%
CRI, or Color Rendition Index	1%	15%	16%
Brand/manufacturer	4%	2%	6%
Energy usage/efficiency (did not specify label)	11%	N/A	N/A
Nothing in particular	6%	N/A	N/A
Brightness	4 %	N/A	N/A
Familiarity/I use the same bulb every time	4%	N/A	N/A
Type of fixture it fits in	4%	N/A	N/A
Bulb type e.g. CFL or Halogen	3%	N/A	N/A
Someone else buys bulbs	2%	N/A	N/A
Purpose/location for use in the home	2%	N/A	N/A
Size	2%	N/A	N/A
Heat/safety/disposal instructions	1%	N/A	N/A
Other	3%	2%	5%
Don't know/Refused	6%	N/A	N/A

Consideration of Shelf Price, Bulb Life, and Bill Savings. As discussed above in Section 2.2.2 and Section 2.3.5, open-ended questions about why consumers would choose particular bulbs in place of 100 Watt incandescents as well as responses about how consumers decide to light rooms in the home make clear that energy efficiency and energy savings are an important consideration to consumers. Yet, this research effort, together with insights gained from the focus groups, also suggests that consumers balance their desire for energy savings with the shelf price of bulbs; rarely do consumers perform an explicit assessment of the annual or lifetime operating costs of bulbs. Instead, they rely on information that promises energy and bill savings over the course of the bulb rather than on their own calculation of this information.

Based on the insights from the focus group, NMR decided to survey telephone respondents about their likelihood of buying energy efficient bulbs when given realistic scenarios about upfront costs and annual operating costs of these bulbs. The first question offered a realistic scenario for CFLs by asking respondents the following:

> "How likely would you be to buy a bulb that costs $6, lasts seven years, and saves you $10 a year on your electricity bill, compared to a traditional incandescent light bulb?"

The second scenario described the *current* situation for LEDs, although it should be noted that LED price is expected to decrease and the lumens per Watt increase in the near future:

> "How likely would you be to buy a bulb that costs $20, lasts 20 years, and saves you $10 a year on your electricity bill over those 20 years, compared to a traditional incandescent light bulb?"

Table 2-11 summarizes the percentage of respondents willing to buy the bulbs described in these two scenarios. The results demonstrate that 77% of respondents were likely to buy the bulb in Scenario 1, while only 46% would likely buy the bulb in Scenario 2. In fact, 48% of respondents indicated they most likely *would not* buy the Scenario 2 bulb. Thus, it appears that consumers will consider operating costs if given the opportunity to do so, but only if they believe the upfront costs to be reasonable.

Table 2-11: Likelihood That Respondent Would Purchase a Bulb at Different Price Points, Lifetimes, and Savings Bill

(Base: All respondents)

	Scenario 1*	Scenario 2**
Sample size	*551*	*551*
Very likely	53%	25%
Somewhat likely	24	21
Neither likely nor unlikely	4	4
Somewhat unlikely	6	13
Very unlikely	11	35
Don't know/refused	3	2

*Scenario 1: Bulb that costs $6, lasts 7 years, and saves $10 a year on electricity bill
**Scenario 2: Bulb that costs $20, lasts 20 years, and saves $10 a year on electricity bill

2.4.3 Familiarity with Key Lighting Terms

The telephone survey assessed respondents' familiarity and understanding of the terms "lumens," "warm white," and "cool white." Overall, 56% of respondents voiced familiarity with the term "lumens" and 62% reported being familiar with the terms "warm white" and "cool white" (See Table B-23 in Appendix B). The team asked these questions because of changes in the way light bulbs will be marketed to consumers in the post-EISA period. Previously, consumers largely chose bulbs based on wattage alone—they knew the wattage of the incandescent bulb they needed and purchased that bulb or the CFL equivalent of it. However, now that most incandescent bulbs are being phased out, consumers will need to think beyond wattage when

selecting which bulbs to buy and use in their homes. Lumens (i.e., bulb brightness) and color appearance (i.e., warm or cool white light, or color temperature) are among the concepts that will become important considerations in the selection of bulbs. Consumers have often voiced concerns that CFLs do not have the same brightness or light quality as incandescent bulbs, and so making certain that they understand the concept of lumens and color appearance will be vital to helping them select the correct energy efficient bulb for their needs.

In order to understand if these consumers truly understood the concepts of lumens and color temperature, the interviewer then asked what the terms meant to them. Of the respondents familiar with the term lumens, 62% correctly identified that the term refers to light output or brightness. However, 27% of respondents admitted they really did not know what lumens meant. Other responses, mentioned with lower frequency, were candlelight/power, illumination, or the same as watts. It is worth noting that eight of the eleven focus group participants who had heard of lumens correctly identified the term as referring to bulb brightness or light output.

Table 2-12: Understanding of the Term "Lumens"

(Base: Respondents who said they had seen or heard the term "lumens")

Respondents' understanding of "lumens" (Multiple Response)	
Sample size	*347*
Light output or brightness	62%
Candlelight/power	3
The same as watts	2
Illumination	3
Unit or measure of lighting	2
Light color or quality	2
Distance light will penetrate	1
Energy emitted	1
Efficiency	1
Number of light particles	<1
Wire inside of the bulb	<1
Don't know	27

Sixty-four percent of respondents familiar with the terms "warm white" and "cool white" correctly identified the terms as referring to the bulb's color appearance, although 6% of these described color appearance in terms of whether the color of bulb resembled that of fluorescent tubes or not. Another 17% of respondents, however, said they did not know what the terms meant, even though they had heard of them. Other common responses confused color appearance with brightness, color rendition, the heat emitted from the bulb, or wavelengths of light. In the focus groups, the moderator had inquired about the term "color temperature" and not "warm or cool light", so the results are not comparable between approaches; yet, it is worth recalling that only six focus group participants had heard of the term color temperature, but all of them correctly knew it referred to how warm or cool the light appeared.

Table 2-13: Understanding of the Terms "Warm White" and "Cool White"

(Base: Respondents who said they had seen or heard the terms "warm white" and "cool white")

Respondents' understanding of "warm white" and "cool white" – as in the color white (Multiple Response)	
Sample size	*365*
Color appearance	64%
Brightness/amount of light	27
Color rendition (how eyes perceive the light)[a]	9
Heat of the bulb	4
Wavelength/frequency/spectrum of the light	2
Coated vs. clear bulb	1
The way you look in the bulbs light	1
Lumens	<1
Other	1
Don't know	17

[a] This is actually the color rendition index, a concept not tested in the survey because of its complicated nature. However, it appears that at least some Connecticut households know the rating exist, but they have confused it with the color temperature of the bulb.

3 Conclusions and Recommendations

The EISA Lighting Exploration tasks—Stage 1 Focus Groups and Stage 2 Consumer Telephone Survey and Onsite Lighting Inventory—have yielded a number of important conclusions and recommendations regarding CEEF-funded programs that include residential lighting elements. Prior sections of this report have summarized the key findings; this section knits these key findings together to offer overall conclusions and recommendations that stem from them. NMR presents recommendations focused on the two following themes:

1. What the CEEF-funded programs and Companies can do to help consumers make efficient lighting choices in the post-EISA period, and
2. What the CEEF funded programs and Companies can do to boost saturation of CFLs and LEDs in residential homes in Connecticut

The research presented in this study and in the earlier focus groups report makes clear that a multi-prong approach that involves education, incentives, and additional promotional efforts will be needed to help consumers make better lighting choices and to achieve 36% socket saturation. NMR believes that the research supports continuation of incentives on standard and specialty CFLs as well as LEDs. Yet, the Companies must continue to promote programs that educate consumers about the lighting market and the bulb choices available to them. They must also *expose* consumers to the range of lighting available by providing consumers with low-cost or no cost opportunities to see the bulbs "in action". The recommendations presented below, then, highlight programmatic efforts that go beyond the retail setting to include programs such as Home Energy Solutions and Home Energy Solutions-Income Eligible as well as community and neighborhood outreach and educational efforts.

Conclusion 1: The WTP analysis and survey questions about the likelihood of purchasing bulbs at given prices and bill savings make clear that retail-based incentives on standard and specialty CFLs and LEDs should be continued in the immediate future. Moreover, consumers will consider operating costs and energy savings if the initial bulb price seems reasonable to them.

> ***Recommendation 1a:*** The recommendations below provide guidance on incentive amounts, but small sample sizes and hypothetical situations render the results somewhat unreliable. Therefore, NMR recommends that the CEEF fund market-based research focused on determining *optimal* incentive levels for CFLs and LEDs, taking into account the *reasonable* amounts offered here but also tests for cost effectiveness.
>
> ***Recommendation 1b:*** A reasonable incentive amount for standard CFLs would reduce the shelf price of the bulbs to approximately $3.50; the extent to which this price may already be available on the market *without* incentives would need to be determined through a pricing study. Reasonable incentive amounts for specialty bulbs would approach $5.25 to $6.00, and NMR particularly recommends the lower amount for A-line covered CFLs, which are likely the most attractive to consumers who avoid standard CFLs for aesthetic or fit in fixture reasons. The team was not able to obtain an estimate of

a reasonable incentive for LEDs, but the consumer survey suggests that only about one-half of consumers would purchase LEDs at $20 per bulb. Therefore, it may be reasonable to reduce the price to approximately $12 to $15 per bulb, tracking sales to see if they increase at the lower price points.

Conclusion 2: Consumers generally accept CFL-based technology in their homes, but they continue to voice reservations about the ability of CFLs to meet all of their lighting needs. Concerns remain about CFL brightness, light quality and color, slowness to brighten, mercury content, fit in fixtures, and dimmability. Consumers are less familiar with specialty CFLs and A-line, screw-in LEDs. In fact, the disconnect between self-reported use of products during the telephone survey and actual product use found onsite demonstrates that consumers remain confused about the types of lighting products *already in use* in their homes. Many of the CFL and LED products on the market could respond to some of the persistent concerns about CFLs.

Recommendation 2a: The programs should continue its efforts to raise awareness of the diversity of energy efficient lighting products available to consumers through lighting displays in stores. Such displays could include bulb comparisons, end-cap promotions, and pamphlets and signs that demonstrate the range of products available and allow consumers to see the products "in action."

***Recommendation 2b*:** While the A-line covered CFL is correctly classified as a "specialty" bulb from a CFL history and manufacturing perspective, it is intended to fill the same applications as a standard A-line incandescent bulb. Therefore, NMR recommends treating the A-line covered CFL as a "standard" bulb offering in promotional materials and perhaps from a future evaluation perspective, although implications for cost effectiveness and net-to-gross would have to be taken into consideration.

Conclusion 3: Although more than one-half of telephone survey respondents reported being familiar with the terms "lumens" (56%) and "warm white and cool white" (62%) in reference to lighting, a large percentage are still unfamiliar with the terms, or defined them incorrectly. Given that correct identification of new lighting terminology will be imperative to light bulb consumers as EISA continues implementation, the large number of respondents who are still unable to use the terms effectively is cause for concern.

***Recommendation 3*:** The Companies should continue to educate consumers on new lighting terminology, through in-store displays and promotional efforts. Home improvement stores and hardware stores are particularly good candidates as they appear to be the "go to" stores for efficient lighting in Connecticut.

Conclusion 4: Many consumers are just learning about the new EISA efficiency standards, and a great deal of misinformation persists about the changes that will accompany the new lighting standards. Coupled with a lack of familiarity of the diversity of efficient bulbs available, consumers may be wary to try products that look or feel "different" than the incandescent bulb.

Yet, the relatively high levels of satisfaction among CFL and LED users suggests that once consumers are exposed to the technology in real world settings they tend to accept it as a viable option for at least some of their lighting needs.

> ***Recommendation 4:*** The Companies should continue giving away bulbs—particularly A-line, covered CFLs—through such programs as Home Energy Solutions and Home Energy Solutions – Income Eligible as well as during in-store promotions, fairs, and special events. Because of their higher price, it may not be cost-effective to give away LEDs, but individuals who take part in an HES or HES-IE audit or visit a lighting promotional event or a booth at a fair could receive coupons for LEDs that would lower the price of the bulb beyond even the incentive price. Another strategy could involve including LEDs in raffles held at promotional events or fairs.

Conclusion 5: Although relatively few sockets in Connecticut are dimmable, dimmable sockets—particularly those with a candelabra shape and base—are often found in dining rooms. Respondents to the onsite survey also indicate that aesthetics matter more in dining rooms compared to other rooms, and they are not convinced that CFLs and LEDs can meet their lighting needs in dining rooms. Not surprisingly, dining rooms hold the greatest potential for CFLs and LEDs.

> ***Recommendation 5:*** The Companies should continue working with manufacturers and retailers to improve the quality of CFLs and LEDs that would be likely choices for dining room lighting (e.g., dimmable candelabra bulbs). This could involve supported continued research and development into these products as well as testing the quality of such bulbs.

Conclusion 6: Although nearly all households in the onsite study used at least one CFL, consumers resist *changing out* still-working but inefficient lighting for more efficient CFLs and LEDs rather than installing these more efficient bulb types after the inefficient bulb burns out.

> ***Recommendation 6:*** In addition to continuing their effort to change out inefficient lighting during HES and HES-IE audits, the Companies should continue their efforts to explain to consumers how much money they can save by getting rid of inefficient lighting *now* rather than waiting for the products to burn out. Additional information about the positive impacts of changing bulbs out on resource availability, the environment, and greenhouse gas reduction may also sway a portion of consumers to switch their bulbs out sooner rather than later. The Companies may also want to consider the feasibility and advisability of bulb buy-back and neighborhood blitz change-out programs.

Conclusion 7: Onsite respondents who shopped for CFLs and LEDs in the past year reported that they would have gone to another store to find these efficient lighting products if the first place they shopped did not carry them. These responses suggest that Connecticut consumers are committed to energy efficient lighting, but this commitment is most easily reinforced by making certain CFLs and LEDs are widely available at places consumers shop for light bulbs.

***Recommendation 7*:** The Companies should continue to promote CFLs and LEDs in a diversity of stores that carry lighting products. Home improvement stores and hardware stores appear to be the "go to" stores for efficient lighting in Connecticut, but drugstores, grocery stores, and other common places to shop for lighting should not be overlooked.

Appendix A Methodological Details

This appendix provides more detail on methodological concerns, such as sample design and sampling error, the weighting scheme, and the methodology used to determine willingness to pay, net-to-gross, and price elasticity.

A.1 Sample Design

The consumer survey sample was designed so as to achieve 3.5% precision overall at the 90% confidence level, assuming a 50/50 break in responses. Thus, for any question asked to all 551 respondents in which one-half answered one way (e.g., "yes") and the other one-half another way (e.g., "no"), the confidence interval around their responses would be ±3.5%. The consumer survey was also able to achieve better than 10% precision at the 90% confidence level for both UI and CL&P.

Table A-1: Consumer Survey Sample Design and Sampling Error

Area	Population: Households[1]	Sample: Households	Sampling Error
CL&P	966,616	414	4.1%
UI	322,205	137	7.1%
Overall	1,288,822	551	3.5%

[1] Population of households as estimated by the 2010 *Census of Population and Housing*, adjusted downward by six percent to account for households served by municipal utilities. Estimates of CL&P households based on 75% of the population, while UI accounts for the remaining 25%.

The onsite sample achieved 8.3% precision overall at the 90% confidence level, again assuming a 50/50 break in responses. The smaller sample size for the onsite visits means that the team was not able to achieve 10% precision for UI without expanding the sample size to a level that would have been cost prohibitive for the evaluation.

Table A-2: Onsite Visits Sample Design and Sampling Error

Area	Population: Households[1]	Sample: Households	Sampling Error
CL&P	966,616	75	**9.6%**
UI	322,205	25	**16.8%**
Overall	1,288,822	100	**8.3%**

[1] Population of households as estimated by the 2010 *Census of Population and Housing*, adjusted downward by six percent to account for households served by municipal utilities. Estimates of CL&P households based on 75% of the population, while UI accounts for the remaining 25%.

A.2 Weighting Scheme

The consumer survey and onsite visit samples both contained a greater proportion of households with people who had some education beyond the high school diploma and who owned homes than exist in the population of Connecticut households.[35] In response, the team weighted the consumer survey by education and home ownership status so that the reported results would better reflect the characteristics of the actual population of households in the state. The onsite visit data were weighted only by home ownership status due to small sample sizes.

Table A-3: Consumer Survey Weighting Scheme

	Households	Sample Size	Weight
State Total	*1,359,218*	*541**	
Owner-occupied housing units			
Less than high school graduate	65,937	12	2.19
High school graduate	230,143	90	1.02
Some college or Associate's degree	241,225	104	0.92
Bachelor's degree or higher	402,679	229	0.70
Renter-occupied housing units			
Less than high school graduate	81,995	4	8.16
High school graduate	129,220	31	1.66
Some college or Associate's degree	110,115	29	1.51
Bachelor's degree or higher	97,904	42	0.93

* Ten respondents refused to answer either the home ownership or the education question, or both. They were assigned a weight of one.

As with the consumer survey, when weighted, the onsite sample size still sums to 100 respondents but the results are reallocated to represent the proportion of owners and renters in the state.

Table A-4: Onsite Visits Weighting Scheme

	Households	Sample Size	Proportionate Weight
State Total	*1,359,218*	*100*	
Owners	939,984	87	0.79
Renters	419,234	13	2.37

[35] Underrepresentation of renters and respondents with lower levels of educational attainment is common in telephone surveys. For example, see Galesic, M., R. Tourangeau, M.P. Couper (2006) "Complementing Random-Digit-Dial Telephone Surveys with Other Approaches to Collecting Sensitive Data." *American Journal of Preventive Medicine*. Volume 35, Number 5.

A.3 Willingness to Pay Analysis

NMR turned to a willingness-to-pay approach (WTP) to explore whether continuation of incentives for CFLs and LEDs was advisable, and, if so, to suggest reasonable incentive levels. The strength of the WTP approach to address these research questions is that it was relatively simple to administer. It followed logically from the other questions onsite respondents were asked during the site visit, meaning that they were already thinking in more depth about their lighting behavior than during the typical phone survey. This increased the likelihood that the respondents provided more accurate estimates of what they originally paid for bulbs and how much they would be willing to pay for them. The team entered the responses to these questions into a logarithmic regression analysis to estimate the demand curve and calculate price elasticity, as described below.

The willingness to pay approach does have a weakness: In the best-case scenario, it requires a large enough number of households recently obtaining the products to provide reliable estimates of WTP and price elasticity. For the purposes of this evaluation, the team intended to develop these estimates for products purchased by 25 or more households during the specific time period. In reality, the team achieved this sample size only for standard CFLs, with 63 respondents providing data. Only 20 respondents could provide usable data for specialty CFLs, but the team nevertheless conducted the WTP analysis and price elasticity believing the information would ultimately be useful in a qualitative sense, if not reliable in a quantitative sense. The team presents the results, but cautions that the small sample size limits the ability to generalize the results to all lighting consumers in Connecticut. It was not, however, advisable to perform the analysis for the ten respondents who had purchased LEDs; the results would simply be unreliable and potentially biased.

The following procedure, including equations, was used for calculating elasticity:

First the team calculated the percentage change in quantity demanded. The formula used to calculate the percentage change in quantity demanded is:

[QDemand(NEW) - QDemand(OLD)] / QDemand(OLD)

Next, the team calculated the percentage change in price. The formula used to calculate the percentage change in price is similar to that for change in quantity demanded:

[Price(NEW) - Price(OLD)] / Price(OLD)

To come up with a final elasticity number, the team substituted the change in demand and change in price into the following equation:

Price elasticity of demand: PEoD = (% Change in Quantity Demanded)/(% Change in Price)

The following decision scheme designates whether the price is elastic or inelastic:

- If PEoD > 1 then Demand is Price Elastic (Demand is sensitive to price changes)

- If PEoD = 1 then Demand is Unit Elastic
- If PEoD < 1 then Demand is Price Inelastic (Demand is not sensitive to price changes)

Appendix B Detailed Findings

This appendix contains detailed findings for most of the analyses presented in the main body of the report. Specifically, the types of results presented here include the following:

- More detailed response categories
- Responses to questions not directly used to inform study objectives
- Equations used for the willingness to pay analysis
- Demographic characteristics

In most cases, the team simply presents the detailed results, as the pertinent findings have been addressed in the main body of the text. However, at times NMR provides more explanation for the results, such as with the willingness to pay section.

B.1 Consumer Survey Results

Table B-5: Familiarity with Specialty CFLs

(Base: Respondents who had heard of CFLs and were very, somewhat or not too familiar with CFLs)

Familiarity	Dimmable	3-way	Flood or Recessed	Candelabra	Globe	A-line
Sample size	*551*	*551*	*551*	*551*	*551*	*551*
Very familiar	18%	20%	20%	15%	23%	14%
Somewhat familiar	24	27	25	23	27	22
Not too familiar	11	8	11	13	10	13
Not at all familiar	32	30	29	34	25	35
Not aware of CFLs	15	15	15	15	15	15
Don't know / refused	<1	<1	<1	<1	<1	1

Table B-6: Familiarity with Energy-Saving Bulb Types 2011

(Base: All respondents)

Familiarity	CFLs	LEDs	Halogen Bulbs
Sample size	*551*	*551*	*551*
Very familiar	34%	14%	23%
Somewhat familiar	41	21	31
Not too familiar	11	20	19
Not at all familiar	14	44	27
Don't know / refused	1	<1	<1

Table B-7: Information Heard About Changes in Lighting Standards

(Base: Respondents who were aware of changes in lighting standards)

What respondents have heard about changes in lighting standards (Multiple Response)	
Sample size	*249*
Some or all bulbs would not be available	78%
Requirement to start using CFLs or LEDs	17
There were new efficiency standards/regulations	13
Have to change light bulbs or buy new type, but not specified	11
There would be a cutoff date	9
The government rescinded or postponed the mandate	9
Indicated frustration at being forced to do something	9
There would be a wattage cutoff	6
Other	2
Don't know/remember	5

Table B-8: Changes Respondents Noticed in Types of Bulbs Available

(Base: Respondents aware of changes to lighting market; respondents aware of changes to lighting market who recently purchased bulb)

Changes noticed (Multiple Response)	Those Aware of Changes	Those Aware of Changes and Purchased Bulbs Recently
Sample size	*151*	*94*
More CFLs on the market	29%	37%
Fewer incandescent bulbs on the market	28	35
Greater bulb variety (type unspecified)	24	17
More LEDs on the market	18	20
Greater availability of efficient bulbs (bulb type unspecified)	7	8
Cannot find my favorite or needed bulb type (unspecified)	7	1
The changes are confusing or a pain	6	5
The wattages are different	6	6
More Halogens on the market	4	7
Bulbs are more expensive	4	4
Bulbs are less expensive	4	4
Different kinds of light	3	4
Bulb size is different	2	2
Better quality	2	2
Price mentioned (no mention of change or direction of price)	2	1
Worse or inconsistent quality	1	1
Some CFLs being discontinued	1	1
Government is trying to control us	1	0
Did not notice a change	-	-

As a follow-up, the 67% of respondents who indicated not having them installed gave their reasons for not utilizing that technology. Figure B-1 displays the reasons mentioned by 3% of respondents or more, the most popular of which was that they use too much energy, or the respondent is trying to save energy. Also popular was the rationale that 100 Watt incandescent bulbs are too bright or too hot, or that respondent prefers efficient lighting choices.

Figure B-1: Reasons 100 Watt Incandescent Bulbs Not Installed in Home

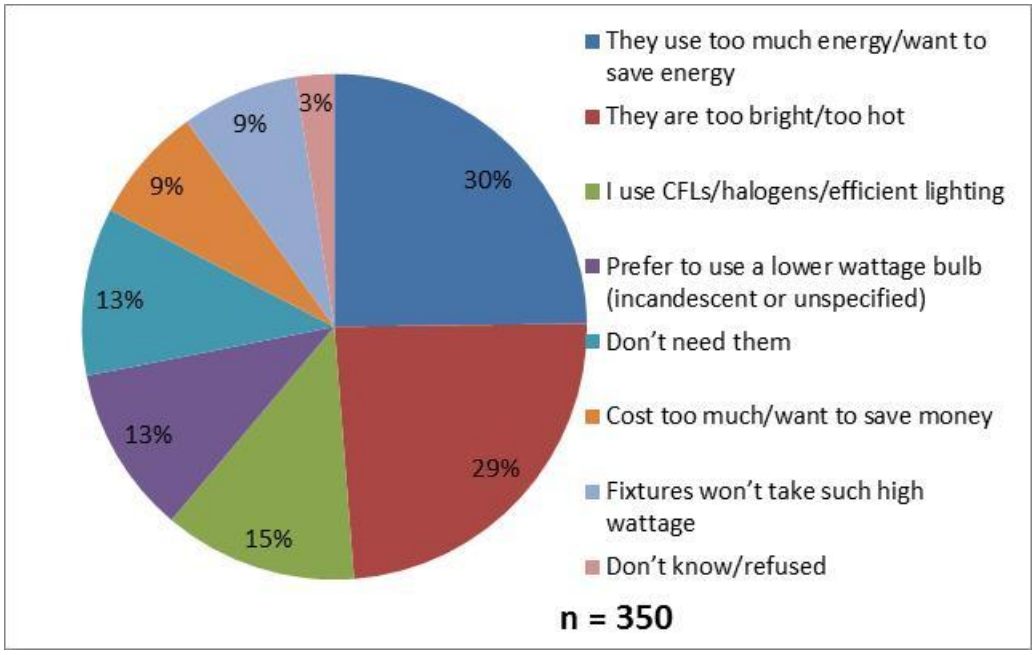


Table B-9: Bulb Choice under EISA

(Base: All Respondents)

Bulb type	
Sample size	*551*
A lower wattage incandescent bulb	39%
A 23 Watt screw-in CFL bulb meant to replace a 100 Watt incandescent bulb	34
A 72 Watt screw-in halogen bulb meant to replace a 100 Watt incandescent bulb	5
A 17 Watt screw-in LED bulb meant to replace a 100 Watt incandescent bulb	6
A 150 Watt incandescent bulb	5
Don't know/refused	11

Table B-10: Reasons for Bulb Choice under EISA

(Base: Respondents who said they would most likely choose relevant bulb)

Reasons (Multiple Response)	Lower wattage incandescent	23 Watt CFL	72 Watt Halogen	17 Watt LED	150 Watt Incandescent
Sample size	*179*	*213*	*29*	*39*	*29*
Prefer this light/color temperature/brightness	34%	13%	43%	24%	76%
Uses less energy/efficient/lower wattage	19%	41%	10%	41%	0%
Familiar with/already use this bulb/just like bulb type	15%	17%	13%	21%	10%
Fit fixtures/recommended for fixture	8%	1%	0%	3%	0%
Low price/on sale	5%	10%	3%	0%	3%
Lower energy bills/lower lifetime cost/cost effective	4%	16%	0%	12%	0%
Warm up quicker/dimmers	1%	0%	3%	3%	4%
Exchanging incandescents to other bulbs as needed	1%	5%	0%	3%	0%
Someone recommended it/gave it to me	1%	3%	3%	3%	0%
Good quality bulb/trustworthy	1%	1%	0%	3%	0%
Concerned about dimmability	1%	0%	0%	6%	3%
Don't like the government telling me what bulb to use	1%	0%	0%	0%	0%
Prefer or like shape of bulb	<1%	0%	0%	3%	0%
Wattage equivalency	0%	11%	17%	0%	0%
Don't like CFLs because of mercury/dangerous/other health	0%	0%	0%	3%	3%
Convenience/availability/easy to use	0%	3%	7%	6%	3%
Most similar to incandescent I used/use	0%	1%	13%	3%	3%
Lasts longer	0%	7%	0%	24%	0%
Not as hot	0%	4%	0%	3%	0%
Because of EISA/following the market	0%	1%	0%	0%	0%
Environmentally friendlier	0%	2%	0%	0%	0%
Other	4%	3%	0%	6%	3%
Don't know/refused	12%	6%	23%	3%	3%

Table B-11: Likelihood of Buying and Saving Extra 100 Watt Incandescent Bulbs for Use After 2012

(Base: All Respondents)

Level of likelihood	Overall	Aware of EISA	Not Aware of EISA
Sample size	*551*	*190*	*355*
Mean	3.4	3.1	3.5
Very likely	10%	19%	6%
Somewhat likely	11	9	12
Somewhat unlikely	11	11	11
Very unlikely	66	61	68
Don't know/refused	1	0	2

Table B-12: Bulb Types Purchased in the Past Three Months

(Base: Respondents with familiarity of relevant bulb type)

	Sample Size	Yes	No	Don't know/refused
CFLs that screw into regular light sockets	152	58%	42%	1%
LEDs that screw into regular light sockets	88	24	76	0
Halogens that screw into regular light sockets	123	27	73	0
Incandescent or regular light bulbs	190	55	43	2
Pin-based fluorescent tubes that can only be used in fluorescent light fixtures	190	22	77	1
Pin-based CFLs that can only be used in special light fixtures	190	5	95	1
Pin-based LEDs that can only be used in special light fixtures	190	3	95	2
Nightlight/candelabra/other specialty bulb	8	Responses volunteered by respondents		
Other CFL	6			
Flood lights	3			
Holiday/string lighting	3			
Tube fluorescents	3			
Pin-based Halogen	2			
Outdoor (various)	2			
Incandescents	2			
Strip or under cabinet LED	1			
Bulb for recessed lighting	1			
Warming bulbs	1			

Table B-13: Satisfaction with Standard CFLs and LEDs

(Base: Respondents who said they had ever used a CFL or LED)

Level of satisfaction	CFLs	LEDs
Sample size	*401*	*76*
Very satisfied	47%	59%
Somewhat satisfied	30	24
Neither satisfied nor dissatisfied	7	6
Somewhat dissatisfied	10	6
Very dissatisfied	5	3
Don't know/refused	1	1

Table B-14: Reasons Respondents Like CFL Bulbs

(Base: Respondents who said they had ever used a CFL on the interior or exterior of home)

Reasons (Multiple Response)	
Sample size	*401*
Save energy	47%
Longer bulb life	26
Save money on bills	17
Brighter/brightness	9
Do not like anything about them/negative impression	10
Light quality e.g. soft, clear	7
Don't get hot	5
Help environment	5
Cheaper	4
Like the incentive program	2
Familiar/work just as well	2
Convenience/availability/easy to install	2
Design/shape	2
Color/color choices	2
Durability	1
It is necessary to have them	1
Like everything about them	1
They are versatile/many uses	1
Other	<1
Don't know/nothing in particular/no preference	10

Table B-15: Dimmable CFL Features Respondents Do Not Like

(Base: Respondents who said they had ever used a CFL on the interior or exterior of home and were somewhat or very familiar with dimmable CFLs)

Reasons (Multiple Response)	
Sample size	*69*
Nothing I don't like about them	59%
Do not dim to low light levels/Do not dim as low as incandescents	11
Flicker	9
Price/too expensive	7
Slow to turn on/brighten	5
Shorter bulb life than promised	5
Design/shape	3
They are hard to find	2
Require installation of special dimmers/sockets	2
Don't fit in my fixtures	2
Light level is not the same for all bulbs	2
Poor light color	1
Not bright enough	1
Mercury/disposal issues	1
Don't know/refused	3

Table B-16: Other CFL Features Respondents Do Not Like

(Base: Respondents who said they had ever used a CFL on the interior or exterior of home)

Reasons (Multiple Response)	
Sample size	*401*
Nothing I don't like about them	39%
Slow to turn on/brighten	24
Mercury/disposal issues	15
Not bright enough	12
Poor light color	8
Design/shape	7
Poor light output	6
Price	6
Shorter bulb life than promised	5
Not compatible with fixtures	3
Poor manufacturing	2
Not dimmable	2
Not durable/break easily	1
Too bright	1
Flicker	1
Buzz	1
Nothing I like about them	1
The government makes me use them	1
Not made in USA	1
Other	1
Don't know/refused	3

Table B-17: What Respondents Like About Screw-in LEDs

(Base: Respondents who said they were currently using screw-in LED bulbs)

Reasons to Use Screw-In LEDs (Multiple Response)	
Sample size	*76*
Like the light quality/brightness	34%
Save energy	23
Longer bulb life	17
Design/shape/size	13
Convenience/availability	12
Save money on bills	9
Don't like anything about them	6
Not as hot	6
Better than CFLs	6
Like everything about them	4
Easy to use	4
Quick to turn on	3
Dimmable	2
Help environment	1
Came with the lamp	1
Don't know	5

Table B-18: What Respondents DO NOT Like About Screw-in LEDs

(Base: Respondents who said they were currently using screw-in LED bulbs)

Reasons to Dislike Screw-in LEDs (Multiple Response)	
Sample size	*76*
Nothing I don't like about them	59%
Price	16
Poor light color	6
Color of the light	6
Long warm up time/poor dimming	6
Not bright enough	4
Too bright	3
Poor light output	2
Ugly	1
Shorter bulb life than promised	1
Disposing of them	1
Not as efficient as promised	1
Don't know/refused	2

Table B-19: Reasons Respondents Like CFL Bulbs by CFL Satisfaction

(Base: Respondents who said they had ever used a CFL on the interior or exterior of home)

Reasons (Multiple Response)	Satisfied with CFLs[a]	Dissatisfied with CFLs[b]	Total
Sample size	*303*	*95*	*401*
Save energy	51%	33%	47%
Longer bulb life	30%	13%	26%
Save money on bills	19%	14%	17%
Do not like anything about them/negative impression	2%	37%	10%
Brighter/brightness	11%	4%	9%
Don't get hot	6%	3%	5%
Help environment	5%	4%	5%
Light quality i.e. soft, clear	8%	5%	7%
Cheaper	4%	2%	4%
Like the incentive program	3%	1%	2%
Design/shape	2%	1%	2%
Color/color choices	3%	0%	2%
Convenience/availability/easy to install	3%	0%	2%
Familiar/work just as well	3%	1%	2%
Durability	2%	0%	1%
They are versatile/many uses	2%	0%	1%
Necessary to have them	1%	1%	1%
Like everything about them	1%	0%	1%
Other	<1%	0%	<1%
Don't know/nothing in particular/no preference/refused	9%	10%	10%

[a] Indicated that they were "very satisfied" or "somewhat satisfied" with CFLs.

[b] Indicated that they were "neither satisfied or dissatisfied," "somewhat dissatisfied," or "very dissatisfied" with CFLs.

Table B-20: Reasons Respondents Do Not Like CFLs by CFL Satisfaction

(Base: Respondents who said they had ever used a CFL on the interior or exterior of home)

Reasons (Multiple Response)	Satisfied with CFLs[a]	Dissatisfied with CFLs[b]	Total
Sample size	*303*	*95*	*401*
Nothing I don't like about them	46%	17%	39%
Slow to turn on/brighten	24%	24%	24%
Mercury/disposal issues	11%	26%	15%
Not bright enough	9%	23%	12%
Poor light color	5%	17%	8%
Design/shape	7%	9%	7%
Poor light output	3%	15%	6%
Price/expense	5%	12%	6%
Shorter bulb life than promised	2%	15%	5%
Not suitable/don't fit certain fixtures	2%	4%	3%
Poor manufacturing	1%	5%	2%
Not dimmable	2%	3%	2%
Flicker	1%	2%	1%
Too bright	1%	0%	1%
Buzz	1%	1%	1%
Don't like government forcing consumers to buy them	0%	3%	1%
Poor durability/break easily	1%	3%	1%
Not American-made	1%	1%	1%
Nothing I like about them	0%	3%	1%
Other	1%	1%	1%
Don't know/Refused	2%	4%	3%

[a] Indicated that they were "very satisfied" or "somewhat satisfied" with CFLs.

[b] Indicated that they were "neither satisfied or dissatisfied," "somewhat dissatisfied," or "very dissatisfied" with CFLs.

Table B-21: Where Current Users Purchased Standard CFLs, Specialty CFLs, or LEDS

(Base: Households with Standard CFLs/Specialty CFLs/LEDs installed)

	Standard CFLs	Specialty CFLs	LEDs[a]
Number of households	*89*	*56*	*12*
Home Depot	44%	40%	33% (4)
Ocean State Job Lot	10	9	0
Wal-Mart	12	5	8 (1)
Lowes	10	12	42 (5)
Grocery Store	10	3	0
Costco/BJs/Sam's Club	7	10	0
Home Furniture/Lighting Store	3	7	0
Energy fair/fundraiser	3	0	0
Hardware Store	1	12	8 (1)
Online	0	0	8 (1)
Dollar Store	1	0	0
Other	1	2	0

[a] Number of products presented in parentheses due to small sample size of LED purchasers.

Table B-22: Second Store Option to Buy CFL or LED

(Base: Participants who would have gone to another store within a short time to buy bulb if first store had not had CFLs or LEDs)

	Standard CFLs	Specialty CFLs	LEDs
Number of households	*62*	*38*	*9*
Lowes	33%	36%	33% (3)
Home Depot	17	17	33 (3)
Wal-Mart	17	24	0
Hardware Store	13	10	0
Dollar Store	4	0	0
Home Furniture/Lighting Store	7	2	0
Grocery Store	3	2	0
Target	3	0	0
Costco/BJs/Sam's Club	1	2	22 (2)
Drug Store	1	2	0
Online	0	0	11 (1)
Other	1	5	0

Table B-23: Whether Respondents Had Seen or Heard the Term "Lumens" and "Warm White" and "Cool White"

(Base: All Respondents)

	Have Heard of Lumens	Have Heard "Warm White" and "Cool White"
Sample size	*551*	*551*
Yes	56%	62%
No	43	36
Don't know/Refused	2	1

B.2 Price Elasticity Calculations

The price elasticity of demand (PEoD) is calculated using the following formula:

Equation 1: PEoD = (% Change in Quantity Demanded)/(% Change in Price)

The first component of this procedure is to calculate the percentage change in quantity demanded**.** The formula used to calculate the percentage change in quantity demanded is:

Equation 2: [QDemand(NEW) - QDemand(OLD)] / QDemand(OLD)

Based on responses from the onsite WTP series, the team calculated the change in quantity demanded as follows:

Standard CFLs: (21 – 54)/54 = -.6111

Specialty CFLs: (5-18)/18 = -.7222

The second component of this procedure involves calculating the percentage change in price, using the following formula:

Equation 3: [Price(NEW) - Price(OLD)] / Price(OLD)

Based on responses from the onsite WTP series, the team calculated the percentage change in price as follows:

Standard CFLs: $3.98 - $2.83/$2.83 = .4064

Specialty CFLs: $6.43 - $3.96/$3.96 = .6237

Inputting these values into the Equation 1 yields the following:

Standard CFLs PEoD= -.6111/.4064 = -1.5037

Specialty CFLs PEoD = -.7222/.6237 = -1.1579

For determining whether a commodity is price elastic or inelastic, one compares the absolute value obtained from the previous equations to the following algorithm:

- If PEoD > 1 then Demand is Price Elastic (Demand is sensitive to price changes)
- If PEoD = 1 then Demand is Unit Elastic

- If PEoD < 1 then Demand is Price Inelastic (Demand is not sensitive to price changes)

Based on the analysis, the prices for both standard and specialty CFLs are elastic, suggesting they are sensitive to changes in price.

B.3 Onsite Study Results

B.3.1 Installed Bulbs

Table B-24: Socket Saturation

(Base: All sockets, weighted to the proportion of households)

Bulb Type	Onsite Socket Count	Socket Saturation
Number of households	*100*	*100*
Total Sockets	**6,202**	**6,202**
Incandescent bulbs	3,041	49%
CFLs	1,642	27%
Fluorescent	667	11%
Halogen	572	9%
LEDs	95	2%
Other[1]	182	3%
Potential for CFLs and LEDs[2]	**3,795**	**61%**

[1] "Other" includes: sodium bulbs, xenon bulbs, bulbs whose type could not be identified and empty sockets.
[2] Potential is equal to the sum of the halogen, incandescent and other bulb types.

Table B-25: Wattage of Installed Incandescent Bulbs

(Base: All sockets, weighted to the proportion of households)

Wattage	All Bulbs	Incandescents
Total Sockets	*6,202*	*3,041*
0 to 39 Watts	44%	16%
40 Watts	14	19
41 to 60 Watts	24	39
61 to 75 Watts	9	14
76 to 100 Watts	4	6
101 + Watts	2	4
3-way	2	2

Table B-26: Socket Saturation by Fixture Type - Percent of Sockets

(Base: All sockets, weighted to the population of households)

Socket Type	All Sockets[1]	CFL	Fluorescent	Halogen	Incandescent	LED	Other[2]	Potential for CFLs or LEDs[3]
Number of households	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Total Sockets	**6,202**	**1,642**	**667**	**572**	**3,041**	**95**	**185**	3,619
Flush mount	27%	29%	24%	2%	43%	0%	2%	47%
Recessed	14%	21%	9%	14%	53%	1%	1%	68%
Wall mount	12%	34%	7%	3%	54%	0%	2%	59%
Table	11%	36%	4%	2%	53%	1%	3%	58%
Pendant	9%	17%	8%	2%	69%	1%	3%	75%
Ceiling Fan	6%	36%	0%	2%	55%	0%	6%	64%
Porch	4%	29%	3%	4%	60%	1%	2%	67%
Floods	3%	16%	0%	38%	41%	1%	4%	82%
Floor	4%	43%	8%	2%	41%	1%	5%	48%
Track	3%	14%	0%	60%	23%	1%	3%	85%
Under cabinet	3%	0%	15%	49%	3%	21%	12%	64%
Night light	1%	0%	0%	2%	69%	29%	0%	71%
Range hood	1%	17%	3%	33%	43%	1%	3%	79%
Walkway	1%	0%	0%	43%	45%	9%	4%	91%
In cabinet	<1%	5%	3%	14%	68%	11%	0%	81%
Motion Sensor	<1%	0%	0%	31%	64%	0%	6%	100%
Post Mount	<1%	28%	0%	0%	72%	0%	0%	72%
Other	<1%	15%	21%	12%	41%	0%	0%	53%

[1] The data in this column sum to 100%. The percentages in the next six columns (CFLs to Other) should be read left to right, so that the data for each fixture type sum to 100%.

[2] "Other bulb type" includes: sodium bulbs, xenon bulbs, bulbs whose type could not be identified and empty sockets.

[3] This category is the sum of the halogen, incandescent and other bulb types.

Table B-27: Socket Saturation by Socket Type - Percent of Sockets

(Base: All sockets, weighted to the proportion of households)

Socket Type	All Sockets	CFL	Halogen	LED
Number of households	*100*	*100*	*100*	*100*
Total Sockets	**6,202**	**1,642**	**572**	**95**
Screw base (small/medium)	83%	99%	59%	37%
Pin base	16%	<1%	37%	62%
Other / Unknown	1%	<1%	3%	2%

Table B-28: Socket Saturation by Bulb Feature - Percent of Sockets

(Base: All sockets, weighted to the proportion of households)

Sockets Containing	All Sockets[1]	CFL	Fluorescent	Halogen	Incandescent	LED	Other[2]	Potential for CFLs or LEDs[3]
Number of households	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Total Sockets	**6,202**	**1,642**	**667**	**572**	**3,041**	**95**	**185**	**3,619**
A-line	28%	3%	0%	0%	95%	1%	1%	96%
Twist/Spiral	21%	98%	0%	0%	1%	0%	0%	2%
Spot/Reflector/Flood	17%	12%	0%	36%	50%	1%	0%	86%
Tube	11%	2%	91%	4%	2%	1%	7%	7%
Candelabra	9%	0%	0%	1%	97%	2%	0%	97%
Globe	5%	17%	0%	5%	78%	0%	0%	83%
Bullet/Torpedo	4%	1%	0%	57%	11%	20%	10%	79%
Capsule/Post/Barrel	3%	85%	0%	2%	14%	0%	0%	15%
Circline	1%	0%	97%	0%	3%	0%	0%	3%
Bug light	<1%	47%	0%	0%	53%	0%	0%	53%
Other	1%	0%	20%	32%	33%	2%	13%	78%
*Dimmable***	10%	6%	1%	25%	66%	1%	-	91%
*Three-way***	2%	26%	5%	3%	66%	0%	-	69%

*A-line bulbs are the typical shape for standard incandescent bulbs. A-line 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.

[1] The data in this column sum to 100%. The percentages in the next six columns (CFLs to Other) should be read left to right, so that the data for each bulb feature sum to 100%.

[2] "Other bulb type" includes: sodium bulbs, xenon bulbs, bulbs whose type could not be identified and empty sockets.

[3] This category is the sum of the halogen, incandescent and other bulb types.

B.3.2 Stored Bulbs

Table B-29: Stored Bulbs

(Base: All stored bulbs, weighted to the proportion of households)

Number of households	*100*
Total Stored Bulbs	**1,657**
Incandescent	64%
CFL	29%
Fluorescent	3%
Halogen	4%
LED	<1%

Table B-30: Stored Bulbs by Bulb Shape

(Base: Households with stored bulbs, weighted to the proportion of households)

	All[1]	**Incandescent**	**CFL**	**Fluorescent**	**Halogen**
Number of households with stored bulbs	*87*	*87*	*87*	*87*	*87*
Total Stored Bulbs	**1,657**	**1,055**	**484**	**56**	**59**
A-line	36%	99%	1%	-	-
Twist/Spiral	22%	2%	98%	-	-
Candelabra	16%	100%	-	-	-
Spot/Reflector/Flood	11%	51%	21%	-	28%
Globe	7%	72%	26%	-	-
Tube	4%	1%	19%	80%	-
Capsule/Post/Barrel	2%	2%	98%	-	-
Bullet/Torpedo	1%	48%	-	-	52%
Bug light	<1%	100%	-	-	-
Circline	<1%	-	14%	86%	-
Other	<1%	88%	-	-	13%

[1] The data in this column sum to 100%. The percentages in the next columns (Incandescent to Halogen) should be read left to right, so that the data for each bulb shape sum to 100%.

Table B-31: Reason for Storing Bulbs by Bulb Type

(Base: All stored bulbs, weighted to the proportion of households)

	All Bulbs	Incandescent	CFL	Fluorescent	Halogen	LED
Number of households with stored bulbs	*87*	*87*	*87*	*87*	*87*	*87*
Total Stored Bulbs	**1,657**	**1,055**	**484**	**56**	**59**	**2**
Storing for future use	92%	90%	98%	93%	76%	100%
Do not fit or work with fixture	3%	5%	1%	3%	0%	0%
Will throw away/recycle	1%	1%	1%	0%	0%	0%
Don't plan to use them	1%	1%	0%	0%	0%	0%
Don’t throw things away	3%	3%	0%	4%	20%	0%
Other	<1%	<1%	0%	0%	4%	0%

Table B-32: Current Storage of CFLs and Incandescents by Households

(Base: All stored CFLs, weighted to the proportion of households)

	CFLs	Incandescents
Number of households	*100*	*100*
Zero	37%	33%
One to five	39	19
Six to fifteen	16	21
Sixteen or more	8	27
Number of households in state	*1,359,218*	*1,359,218*
Total Stored Bulbs	**484**	**1,055**
Mean number of bulbs in storage	4.8	10.6
Median number of bulbs in storage	1.0	4.0

Table B-33: Type of Bulb Stored Bulb Will Replace

(Base: All stored bulbs, weighted to the proportion of households)

Type of bulb	All Bulbs	CFL	Fluorescent	Halogen	Incandescent	LED
Number of households with stored bulbs	*87*	*87*	*87*	*87*	*87*	*87*
Total Stored Bulbs	**1,657**	**484**	**56**	**59**	**1,055**	**2**
Incandescent	37%	5%	7%	20%	54%	0%
Both/whichever needs replacing first	34%	30%	8%	23%	38%	0%
CFL	19%	63%	0%	0%	1%	0%
Replace the same type of bulb as the stored bulb	5%	NA	82%	57%	NA	100%
Can't use but still storing	<1%	0%	0%	0%	<1%	0%
Other	2%	1%	0%	0%	3%	0%
DK	1%	0%	0%	0%	1%	0%
NA	2%	1%	3%	0%	2%	0%

Table B-34: Stored 40-100 Watt A-Line Incandescent Bulbs

(Base: All stored CFLs, weighted to the proportion of households)

	Count	Percentage of all stored incandescent bulbs
Number of households	*100*	*100*
All stored incandescent bulbs	1,055	NA
All stored 40-100 Watt A-line incandescent bulbs	502	48%
40 Watt A-line incandescent bulbs	77	7%
60 Watt A-line incandescent bulbs	239	23%
75 Watt A-line incandescent bulbs	59	6%
100 Watt A-line incandescent bulbs	117	11%

Table B-35: Stored 100W Incandescent Bulbs vs. Reported likelihood

(Base: All stored CFLs, weighted to the proportion of households)

Likelihood of buying and saving 100 Watt incandescent bulbs before 2012	Mean # of Stored 100 Watt bulbs	Mean # of 40 to 100 Watt bulbs
Number of households	*100*	*100*
Very likely	3.3	11.1
Somewhat likely	1.3	9.3
Somewhat unlikely	2.1	8.5
Very unlikely	0.9	6.7
Overall	1.3	7.6

Table B-36: Reason No CFL Bulbs Installed in Home

(Base: Households with no CFLs installed; multiple response, not weighted)

Reason	Count
Number of households	*10*
Using up old stock	1
Bulbs were already installed	3
No need yet	2
Too expensive	1
CFLs don't look as good	1
Have never purchased them	6
Unaware of energy savings	1

B.3.3 Onsite Customer Survey Results

Table B-37: When Last Purchased Standard CFLs, Specialty CFLs, or LEDS

(Base: All onsite households)

	Standard CFLs	Specialty CFLs	LEDs
Number of households	*100*	*100*	*100*
Purchased within the past year	51%	18%	8%
Purchased more than a year ago	29	30	2
No bulbs of type currently in home	20	52	91

Table B-38: Where Current Users Purchased Standard CFLs, Specialty CFLs, or LEDS

(Base: Households with Standard CFLs/Specialty CFLs/LEDs installed)

	Standard CFLs	Specialty CFLs	LEDs
Number of households	*89*	*56*	*12*
Home Depot	44%	40%	33% (4)
Ocean State Job Lot	10	9	0
Wal-Mart	12	5	8 (1)
Lowes	10	12	42 (5)
Grocery Store	10	3	0
Costco/BJs/Sam's Club	7	10	0
Home Furniture/Lighting Store	3	7	0
Energy fair/fundraiser	3	0	0
Hardware Store	1	12	8 (1)
Online	0	0	8 (1)
Dollar Store	1	0	0
Other	1	2	0

Table B-39: Action if No Standard CFLs, Specialty CFLs, or LEDS at Store

(Base: Households Currently Using Standard CFLs/Specialty CFLs/LEDs installed)

	Standard CFLs	Specialty CFLs	LEDs
Number of households	*89*	*56*	*12*
Gone to another store within a short time to buy bulb	68%	68%	83% (10)
Bought an incandescent	29	27	17 (2)
Waited and purchased bulb at a different time	1	2	0
Someone else would give/buy bulbs	1	2	0
Wouldn't buy the bulb without a sale	1	0	0
Bought Nothing	0	2	0

Table B-40: Second Store Option to Buy CFL or LED

(Base: Participants who would have gone to another store within a short time to buy bulb if first store had not had CFLs or LEDs)

Store	Standard CFLs	Specialty CFLs	LEDs
Number of households	*62*	*38*	*9*
Lowes	33%	36%	33% (3)
Home Depot	17	17	33 (3)
Wal-Mart	17	24	0
Hardware Store	13	10	0
Dollar Store	4	0	0
Home Furniture/Lighting Store	7	2	0
Grocery Store	3	2	0
Target	3	0	0
Costco/BJs/Sam's Club	1	2	22 (2)
Drug Store	1	2	0
Online	0	0	11 (1)
Other	1	5	0

Table B-41: Lighting Decisions by Room

(Base: All onsite households; multiple response)

	Kitchen	Dining Room	Master Bedroom	Living Room	Main Bathroom
Number of households	*100*	*98*	*100*	*99*	*100*
Price	27%	22%	33%	25%	26%
Brightness/lots of light	28	14	25	24	27
Energy Efficiency	23	26	38	30	28
Use/Will Use CFLs/LEDs	18	16	23	18	19
Wattage	20	20	29	20	22
Replace what is already there	17	18	21	16	15
What fits in fixture/lampshade	18	21	19	18	14
Soft/warm lighting	8	7	10	5	3
Based on usage	6	4	10	5	5
Appearance/Attractiveness	6	10	7	6	6
What is on hand	3	3	6	4	4
Dimmability/Three-way	3	9	5	2	2
Prefer Incandescents	2	2	2	6	6
Life of Bulb	3	3	2	2	2
Manufacturer	2	3	2	2	2
Instant light/No delay	2	1	3	2	1
Save on energy bill	1	1	2	1	2
Color	1	3	1	2	2
Have not replaced bulbs yet	1	1	1	1	1
Other	2	2	2	0	1

Table B-42: Important Bulb Characteristics by Room

(Base: All onsite households)

	All	Kitchen	Dining Room	Master Bedroom	Living Room	Main Bathroom
Number of households	*100*	*100*	*98*	*100*	*99*	*100*
Brightness	30%	43%	20%	22%	27%	40%
Price	22	21	22	22	22	22
Energy Efficiency	16	15	12	15	21	18
Wattage	7	7	5	9	7	6
Life of Bulb	4	3	3	6	3	3
Color	8	4	8	11	10	5
Bulb Shape	4	2	9	3	2	4
Aesthetics/Ambiance	3	0	8	2	4	0
Dimmability	2	0	9	2	1	0
Three-way	1	0	0	3	2	0
CFL	1	2	1	1	1	1
What bulb is already there	1	3	1	1	1	1
Immediate Lighting	<1	0	0	1	0	0
Other	1	0	3	2	0	0

Table B-43: Important Bulb Characteristics by Number of CFLs Installed

(Base: All onsite households; multiple response)

	None	1 to 5	6 to 15	16 or more
Number of households	*4*	*12*	*31*	*53*
Brightness	3	32	63	51
Life of Bulb	0	0	14	3
Price	24	16	17	50
Energy Efficiency	0	12	14	54
Color	2	5	13	18
Wattage	1	2	6	24

Table B-44: Why No CFLs Installed by Room

(Base: All onsite households)

	All	Kitchen	Dining Room	Master Bedroom	Living Room	Main Bathroom
Number of households	*68*	*38*	*57*	*29*	*27*	*32*
Current bulbs haven't burnt out yet	19%	19%	11%	26%	27%	13%
Have not gotten around to buying CFLs	13	10	11	15	14	13
Do not fit properly	13	21	22	13	5	5
Have not gotten around to installing CFLs	15	15	2	15	16	28
CFLs do not work with dimmer	7	6	20	5	3	3
Do not like appearance	7	4	12	3	8	8
Not aware of CFL for application	5	2	9	5	5	5
CFLs not bright enough	5	10	3	5	3	3
Delay in light coming on	5	6	2	5	3	8
Using up old stock	2	2	0	3	3	3
No reason	1	2	2	0	0	0
Mercury	3	2	2	3	3	3
Do not like color	1	0	3	0	3	0
Prefer "Reveal" incandescents	3	0	0	0	8	8
Do not use lamp often	1	0	0	3	0	0
Cost	1	0	2	0	0	3
Design	<1	0	2	0	0	0

B.3.4 Customer Demographics

The team does not show tables for education and homeownership because the weighting scheme is based on these two variables.

Table B-45: Type of Home

(Base: All Respondents)

Type of home	Connecticut Census	Telephone Survey	Onsite Survey
Sample size	*1,358,809*	*551*	*100*
Single-family detached house	61%	60%	60%
Single-family attached house (townhouse, row house, or duplex)	5	12	16
Apartment building with 2-4 units	17	10	11
Apartment building with 5 or more units	17	17	14
Mobile home or house trailer	1	1	0
Other	-	0	0
Don't know/Refused	-	0	0

* Total occupied 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.

Table B-46: Decade in Which Home was Built

(Base: Those living in houses)

Decade	Connecticut Census	Telephone Survey	Onsite Survey
Sample size	*1,358,809*	*435*	*100*
1930s or earlier	22%	26%	18%
1940s	23	8	7
1950s		22	23
1960s	28	10	8
1970s		14	14
1980s	13	10	10
1990s	7	6	6
2000 or later	7	5	5
Don't know/Refused (sample size)	-	22	8

* Total occupied housing units

Table B-47: Size of Home

(Base: All Respondents)

Square Feet	Telephone Survey	Onsite Survey
Sample size	*551*	*100*
Less than 1,400	39%	25%
1,400 – 1,999	31	28
2,000 –2,499	14	12
2,500 – 3,499	12	7
3,500 – 3,999	2	3
4,000 – 4,999	2	0
5,000 or more	<1	0
Don't know/Refused (sample size)	140	25

Table B-48: Rooms in Home

(Base: All Respondents)

Total Rooms	Connecticut Census	Telephone Survey	Onsite Survey
Sample size	*1,358,809*	*551*	*100*
1	2%	1%	0%
2	11	5	4
3		9	2
4	33	13	27
5		19	12
6	32	18	22
7		12	17
8	23	9	8
9		5	3
10 or more		9	3
Don't know/Refused (sample size)	-	8	2

*Total occupied housing units

** The ACS reports only 9 or more rooms.

Table B-49: Number of Persons Living the Home

(Base: All Respondents)

Number of household members	Connecticut Census	Telephone Survey	Onsite Survey
Sample size	*1,358,809*	*551*	*100*
1	28%	24%	25%
2	32	42	44
3	16	15	12
4	15	10	15
5	6	6	3
6 or more	3	2	1
Don't know/refused (sample size)	-	8	1

* Total occupied housing units

** The ACS reports only 4-or-more person household

Table B-50: Household Income

(Base: All Respondents)

Household Income	Connecticut Census	Telephone Survey	Onsite Survey
Sample size	*1,358,809*	*551*	*100*
Less than $15,000	10%	11%	7%
$15,000 to less than $20,000	5	10	6
$20,000 to less than $30,000	9	10	10
$30,000 to less than $40,000	8	9	12
$40,000 to less than $50,000	8	8	7
$50,000 to less than $75,000	17	18	22
$75,000 to less than $100,000	13	14	9
$100,000 to less than $150,000	16	11	10
$150,000 or more	14	10	7
Don't know (sample size)	-	14	2
Refused (sample size)	-	101	9

*All households

Table B-51: Gender

(Base: All Respondents)

Gender	Connecticut Census	Telephone Survey	Onsite Survey
Sample size	*3,574,097*	*551*	*100*
Female	51%	52%	58%
Male	49	48	42

* 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.

Appendix C Onsite Data Collection Quality Control

Reviews of an earlier draft of this report raised concerns about the increase in socket counts between 2009 and 2012. As one reviewer noted, NMR staff members had conducted prior research that demonstrated that onsite lighting saturation studies is prone to measurement error.[36] That same study, however, outlined quality control procedures that could reduce measurement error, and NMR adopted these procedures in the current Connecticut onsite saturation study. It is to note that the identification of these sources of measurement error occurred in 2010, *after the last lighting onsite saturation study performed in Connecticut.* Therefore, the team believes that the 2009 data probably suffered from the measurement error problems identified in the IEPEC paper, while the 2012 data collection reduced these errors through adoption of the procedures set forth in the paper. Specific procedures put into place in the 2012 study included the following:

- Held training seminars with technicians, including administering tests and performing "walk-along" home visits in order to make certain the technicians understood the protocols and could identify bulb types
- Called onsite participants to make certain the technician came to their home, behaved in a professional manner, and performed visit in accordance with the protocols
- Made maps of the path taken through the home and took pictures of questionable lighting situations in the home, both of which help in data verification
- Revisited five homes to verify the accuracy of the technicians' data collection
- Required technicians to submit data collection forms multiple times a week and reviewed the forms upon receipt to identify possible errors; having the review close to the date of the actual visit made it easier for technicians to remember the specific details of the home, which would help them rectify mistakes or explain the context of the data in the particular home
- Performed multiple checks of the accuracy of transcription of data from collection forms to Excel spreadsheets
- Compared data collection between technicians to search for systematic biases in their methods; these checked revealed no biases (i.e., the data were similar across technicians)

Because this is the first study to implement these protocols to reduce measurement error, replication of the approach will be necessary to determine if the high socket count in Connecticut in 2012 was an anomaly or whether the improved methods will cause the energy efficiency field to revise its assumptions about the number of sockets in homes.

NMR team members also examined the size of homes in the onsite sample to ascertain if the homes were larger than the average Connecticut home, which might explain the seemingly high socket count. Table C-52 shows the unweighted percentage of homes in Connecticut and the onsite sample by total number of rooms in the home. The percentages are actually quite similar,

[36] Filiberto, et al.. Mission Control, We have a Problem." 2011.

demonstrating that the team did not accidentally sample larger-than-average homes in Connecticut. The team presents the other information in the table to exemplify the importance of home size to socket counts and saturation. These other data make clear that, not only do larger homes have more sockets (as expected) but also that they tend to have smaller saturation rates. The team is not certain why this is the case, but possible explanations include that they have more specialty sockets that they prefer to fill with non-CFL and LED technology and that they have more sockets to change-out. As discussed in text, households still resist changing out bulbs before they burnout, and this process likely takes longer in homes with more sockets.

Table C-52: Rooms in Home by Total Bulbs and EE Saturation (Unweighted)

(Base: All Respondents)

Total Rooms	Connecticut Census	Onsite Sample	Total Bulbs Installed	EE Socket Saturation Overall
Sample size	*1,358,809**	*100*	*100*	*7,232*
1	2%	0%	-	-
2	2	3	40	33%
3	9	2	52	48%
4	15	16	37	33%
5	18	13	61	29%
6	18	22	65	29%
7	13	21	88	27%
8	10	11	91	29%
9	12	4	120	27%
10 or more		6	102	16%
Don't know/Refused	-	2	130	19%

*Total occupied housing units

Given the quality control procedures and the assurance that the sample was not drawn from larger-than-average homes, NMR concludes that the socket count in the homes visited in the 2012 study was higher than would be expected based on prior research. The team believes that improvements to data collection procedures likely explains the increase, although replication of the methods will be needed in future studies to verify if this is the case.

Appendix D Research Protocols

Telephone Survey Questionnaire

Hello, my name is _____ and I am calling from Tetra Tech on behalf of the Connecticut Energy Efficiency Fund with the cooperation of Connecticut Light and Power and The United Illuminating Company. May I please speak with [INSERT NAME ON THE ACCOUNT].

We are conducting a survey about household lighting. I'm not selling anything. I just want to ask you some questions about lighting in your home. You may have received a letter explaining the purpose of this call. For quality assurance and training purposes, this call will be recorded. [IF ACCOUNT HOLDER ISN'T AVAILABLE, READ] Is there an adult over the age of 18 available who is responsible for purchasing the light bulbs for your household? [IF NOT AVAILABLE, TRY TO RESCHEDULE AND THEN TERMINATE]

[IF NECESSARY, READ: THE CONNECTICUT ENERGY EFFICIENCY FUND IS SPONSORING THIS PROGRAM AND STUDY. THE CEEF CONTACT PERSON IS TIM COLE. IF YOU HAVE QUESTIONS, YOU CAN REACH HIM AT (860) 874-5813. IF YOU PREFER EMAIL, CT_EEB@ATT.NET.

AWARENESS OF ENERGY-SAVING LIGHT BULBS

S1. Before this call today, had you ever heard of Compact fluorescent light bulbs or CFLs?

1. Yes **[GO TO S2a]**
2. No **[GOT TO S2b]**
96. DON'T KNOW **[GOT TO S2b]**
97. REFUSED **[GOT TO S2b]**

S2a Just to confirm that we are talking about the same thing, compact fluorescent light bulbs – also known as CFLs – usually do not look like regular incandescent bulbs. The most common type of compact fluorescent bulb is made with a glass tube bent into a spiral, resembling soft-serve ice cream, and it fits in a regular light bulb socket. Was this light bulb what you were thinking of?

1. Yes **[GO TO S3]**
2. No **[GO TO S4]**
96. DON'T KNOW **[GO TO S4]**
97. REFUSED **[GO TO S4]**

S2b Compact fluorescent light bulbs – also known as CFLs – usually do not look like regular incandescent bulbs. The most common type of compact fluorescent bulb is made with a glass tube bent into a spiral, resembling soft-serve ice cream, and it fits in a regular light bulb socket. Thinking about it again, before today, had you heard of CFLs?

1. Yes **[GO TO S3]**
2. No **[GO TO S4]**
96. DON'T KNOW **[GO TO S4]**
97. REFUSED **[GO TO S4]**

S3. How familiar are you with CFLs? Would you say that you are…?

1. Very familiar
2. Somewhat familiar
3. Not too familiar
4. Not at all familiar
96. DON'T KNOW
97. REFUSED

S4. Another type of light bulb that is used in homes is called an L-E-D **[SAY THE LETTERS L-E-D]**, also known as a light emitting diode bulb. These bulbs have regular screw bases that fit into most sockets, but they are heavier than most other bulbs and have a white or yellow plastic cover over the light portion of the bulb. They are not battery-operated LEDs, holiday lights, or decorative strands and do not need special attachments to work in regular sockets. How familiar are you with L-E-D light bulbs that screw into regular light sockets? Would you say that you are…?

1. Very familiar
2. Somewhat familiar
3. Not too familiar
4. Not at all familiar
96. DON'T KNOW
97. REFUSED

S5. Another type of light bulb is a halogen bulb. These bulbs have regular screw bases that fit into most sockets; they do not need special attachments to work in regular sockets. The halogen looks similar to incandescent bulbs but they have a glass tube filled with halogen gas in the middle of the bulb. How familiar are you with halogen bulbs that screw into regular light sockets? Would you say that you are…?

1. Very familiar
2. Somewhat familiar
3. Not too familiar
4. Not at all familiar
96. DON'T KNOW
97. REFUSED

S6. **[ASK IF S3 = 1, 2, 3 OTHERWISE SKIP TO EISA1.]** While most CFLs are spiral shaped, CFLs also come in other shapes and some have special features. I'm going to read you a list of different types of CFLs. For each type, please tell me if you are very familiar, somewhat familiar, not too familiar, or not at all familiar with that type of CFL. **[RANDOMIZE ORDER OF A THROUGH F]**

[READ IF NECESSARY WITH EACH ITEM] Are you very familiar, somewhat familiar, not too familiar, or not at all familiar with this type of CFLs?

a. Dimmable CFLs. This refers to a CFL that can be used with a dimmer switch to adjust the level of brightness
b. 3-way CFLs. This refers to a CFL that has the ability to shine at 3 different levels of brightness in a 3-way lamp
c. Flood or recessed lighting CFLs—shaped like a regular incandescent floodlight
d. Candelabra CFLs. This refers to a CFL with a small base for use in a decorative fixture such as a chandelier. The spiral part of the bulb is usually covered so that it resembles the "flame" shape of most other chandelier bulbs.
e. Globe CFLs. This refers to a CFL that has a round shape and might be used in a fixture such as a vanity light
f. A-shaped CFLs. This refers to a covered CFL that is made to look and feel like a traditional incandescent or regular light bulb.

1. Very familiar
2. Somewhat familiar
3. Not too familiar
4. Not at all familiar
96. DON'T KNOW
97. REFUSED

EISA Awareness & Future Expectations

EISA1. Have you heard or read any information concerning upcoming changes in lighting standards from the federal government that have to do with incandescent light bulbs?

1. Yes **[GO TO EISA2]**
2. No **[GO TO EISA3]**
96. DON'T KNOW **[GO TO EISA3]**
97. REFUSED **[GO TO EISA3]**

EISA2. What you have heard? [RECORD VERBATIM; CONTINUE TO EISA3

EISA3. **[IF EISA1=1 READ** "We are interested in talking with you today about one change in lighting standards."] A new federal law, the Energy Independence and Security Act of 2007, restricts the sale of 100 Watt incandescents, or regular 100 Watt bulbs, manufactured after January 1, 2012. Had you heard about this new federal law before this call? **[IF NEEDED FOR EISA1=1 READ** "I understand you just described this change, but we still need you to confirm that you have heard about it."]

1. Yes
2. No
96. DON'T KNOW
97. REFUSED

EISA4. Do you currently use any 100 Watt incandescent light bulbs in your home?

1. Yes
2. No
96. DON'T KNOW
97. REFUSED

EISA5. **[IF EISA4 = 2]** Some people use 100 Watt incandescent bulbs and others do not. What are the reasons you don't use 100 Watt bulbs in your home? [**DO NOT READ RESPONSES; MULTPLE RESPONSE]**

1. (They are too bright)
2. (They use too much energy)
3. (My socket says only to use a certain Watt bulb/fixtures won't take such high wattage)
4. (Other [Specify: _____])
96. DON'T KNOW
97. REFUSED

EISA6. **[IF EISA4 NE 1]** Do you currently use ANY incandescent light bulbs, of any wattage, in your home?

1. Yes
2. No
96. DON'T KNOW
97. REFUSED

EISA7. **[READ ONLY IF EISA4 NE 2]** We are interested to know the type of bulb you would be likely to use instead of a 100-Watt incandescent bulb once this is no longer available for purchase. I'm going to name different types of bulbs that may be options and after I read the list, I'd like you to tell me which one you would be most likely to use instead of the 100-Watt incandescent bulb. **[READ ONLY IF EISA4=2]** We understand that you do not currently use any 100 Watt incandescent bulbs, but please tell me which of the following bulb types you would be most likely to use.

The options are **[READ ENTIRE LIST BASED ON INSTRUCTIONS BELOW]. THEN IMMEDIATELY ASK**: Which one of these bulbs would you be **most** likely to use [READ ONLY IF EISA4 NE 2] instead of the 100-Watt incandescent?
[PROGRAMMER: RANDOMIZE LIST. INCLUDE 2 IN LIST ABOVE AND IN THE ACCEPTABLE RESPONSES ONLY IF S5=1 OR 2; SIMILARLY, INCLUDE 3 ONLY IF (S3=1 OR 2) AND INCLUDE 4 ONLY IF S4=1 OR 2]

BULB TYPES
1. A lower wattage incandescent bulb
2. A 72 Watt screw-in halogen bulb meant to replace a 100 Watt incandescent bulb
3. A 23 Watt screw-in compact fluorescent bulb meant to replace a 100 Watt incandescent bulb
4. A 17 Watt screw-in LED [SAY THE LETTERS L-E-D] or light-emitting diode bulb meant to replace a 100 Watt incandescent bulb
5. A 150 Watt incandescent bulb
96. DON'T KNOW **[ONLY ALLOW FOR ENTIRE QUESTION]**
97. REFUSED **[ONLY ALLOW FOR ENTIRE QUESTION]**

EISA8. You said you would be most likely to instead use **[IF EISA7=1 SHOW:** a lower wattage incandescent bulb]/**[EISA7=2 SHOW:** a 72 Watt screw-in halogen bulb]**[IF EISA7=3 SHOW:** a 23 Watt screw-in compact fluorescent bulb]/**[IF EISA7=4 SHOW:** a 17 Watt screw-in LED bulb]/**[IF EISA7=5 SHOW:** a 150 Watt incandescent bulb)**].** Why that bulb?

1. **[RECORD VERBATIM]**

96. DON'T KNOW

97. REFUSED

EISA9. How likely are you to buy extra 100 Watt incandescent light bulbs and save them to use after they are no longer available at stores? Would you say you are . . . **[READ LIST]. [RECORD ONE ANSWER]**:

1. Very likely
2. Somewhat likely
3. Somewhat unlikely, or
4. Very unlikely to buy and save 100 Watt incandescent light bulbs for use after they are no longer available in stores?

96. DON'T KNOW
97. REFUSED

CFL USE AND SATISFACTION

[ASK CFL USE AND SATISFATION IF S3 = 1, 2, 3 OTHERWISE SKIP TO AT1 Alternative Lighting Technologies Section.]

USE1. Have you EVER used a compact fluorescent light bulb, or CFL, on the interior or exterior of your home?

1. Yes
2. No

96. DON'T KNOW
97. REFUSED

[IF USE1= 2, 96, 97, GO TO INTRO PRECEDING AT1 Alternative Lighting Technologies Section]

USE2. Do you CURRENTLY have CFLs installed on the interior or exterior of your home?

1. Yes
2. No

96. DON'T KNOW
97. REFUSED

USE3. How satisfied are you with the compact fluorescent light bulbs currently in your home or, if you have no CFLs installed right now, the ones you have used in the past? Would you say you are….?

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied

96. DON'T KNOW
97. REFUSED

USE4. In your experience, what do you like about compact fluorescent light bulbs? **[DO NOT READ; ALLOW MULTIPLE RESPONSE; IF RESPONDENT SAYS 'LIGHT QUALITY', PROBE FOR EXACTLY WHAT 'QUALITY' THEY MEAN]**

1. (Save energy)
2. (Save money on bills)
3. (Help environment)
4. (Longer bulb life)
5. (Other [SPECIFY])
6. (Do not like anything about them)

96. (DON'T KNOW)
97. (REFUSED)

USE5. **[IF S6a=1 or 2 (Very or Somewhat Familiar with dimmable CFLs); OTHERWISE SKIP USE7]** Do you currently use any dimmable CFLs in your home?

1. Yes **[GO TO USE6]**
2. No **[GO TO USE7]**

96. DON'T KNOW **[GO TO USE7]**
97. REFUSED **[GO TO USE7]**

USE6. Is there anything that you do NOT like about dimmable CFLs? [**DO NOT READ; ALLOW MULTIPLE RESPONSE; IF RESPONDENT SAYS 'LIGHT QUALITY', PROBE FOR EXACTLY WHAT 'QUALITY' THEY MEAN]**

1. (Do not dim to low light levels/Do not dim as low as incandescents)
2. (When dimmed with other CFLs, light LEVEL/BRIGHTNESS is not the same for all bulbs)
3. (When dimmed with other CFLs, light COLOR is not the same for all bulbs)
4. (Poor light color)
5. (Poor light output)
6. (Not bright enough)
7. (Too bright)
8. (Slow to turn on/brighten)
9. (Flicker)
10. (Buzz)
11. (Poor manufacturing (unspecified))
12. (Shorter bulb life than promised)
13. (Mercury/disposal issues)
14. (Other [SPECIFY])
15. (Nothing I don't like about them)
96. (DON'T KNOW)
97. (REFUSED)

USE7. Is there anything that you do NOT like about **[IF ASKED USE6, SAY: 'Other types of'] compact fluorescent light bulbs?] [DO NOT READ; ALLOW MULTIPLE RESPONSE; IF RESPONDENT SAYS 'LIGHT QUALITY' PROBE FOR EXACTLY WHAT 'QUALITY' THEY MEAN]**

1. (Poor light color)
2. (Poor light output)
3. (Not bright enough)
4. (Too bright)
5. (Slow to turn on/brighten)
6. (Flicker)
7. (Buzz)
8. (Poor manufacturing (unspecified))
9. (Shorter bulb life than promised)
10. (Mercury/disposal issues)
11. (Other **[SPECIFY]**)
12. (Nothing I don't like about them)
96. (DON'T KNOW)
97. (REFUSED)

ALTERNATIVE LIGHTING TECHNOLOGIES

[**ASK AT1 IF S4= 1, 2, OR 3]**

[**SKIP TO RECENT LIGHTING PURCHASES Section IF S4= 4, 96, 97**]

I'd like to ask you a few questions about your use of other types of light bulbs.

AT1. Are you currently using L-E-D screw in bulbs in your home—the kind that screw into regular light fixtures? **[IF NEEDED, READ "**I'm not interested in holiday lights, flashlights or any other kind of L-E-Ds. I only want to know about the ones that screw into regular light fixtures."**]**

1. Yes **[GO TO AT2]**
2. No **[GO TO BUY1]**
96. DON'T KNOW **[GO TO BUY1]**
97. REFUSED **[GO TO BUY1]**

AT2. Why did you decide to use the screw-in L-E-D? **[DO NOT READ; ALLOW MULTIPLE RESPONSE]**

1. (To give them a try)
2. (To save money/reduce my electricity or energy bill)
3. (To save electricity/energy)
4. (To help the environment/reduce greenhouse gases)
5. (Wanted a bulb that lasts a long time)
6. (It was given to me by a utility program)
7. (It was given to me by someone else **[PROBE TO MAKE SURE NOT A UTILITY PROGRAM; IF SO, RECORD AS '6']**
8. (Friend, family member, coworker recommended)
9. (It looked cool)
10. (Other **[SPECIFY]**)
96. DON'T KNOW
97. REFUSED

AT3. [IF AT1=1] In what types of fixtures do you have screw-in L-E-D bulbs installed in your home? Again these are only the LEDs that screw into regular light sockets. **[DO NOT READ. ALLOW MULTIPLE RESPONSES]**

1. (Ceiling/overhead lighting)
2. (In an appliance)
3. (In a particular room) [SPECIFY]
4. (General lighting/Wherever I can)
5. (Floor/Table/Portable lamps)
6. (Ceiling fans with lighting)
7. (Holiday lighting/Candle)
8. (Outdoor [various])
9. (Other) [SPECIFY]

96 (Don't know)
97 (Refused)

AT4. How satisfied are you with the screw-in L-E-Ds that you currently use in your home? Would you say you are….?

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied

96. DON'T KNOW
97. REFUSED

AT5. In your experience, what do you like about screw-in L-E-Ds? **[DO NOT READ; ALLOW MULTIPLE RESPONSE; IF RESPONDENT SAYS 'LIGHT QUALITY', PROBE FOR EXACTLY WHAT 'QUALITY' THEY MEAN]**

1. (Save energy)
2. (Save money on bills)
3. (Help environment)
4. (Longer bulb life)
5. (Can dim them)
6. (Other **[SPECIFY]**)
7. (Do not like anything about them)

96. (DON'T KNOW)
97. (REFUSED)

AT6. Is there anything that you do NOT like about screw-in L-E-Ds? **[DO NOT READ; ALLOW MULTIPLE RESPONSE; IF RESPONDENT SAYS 'LIGHT QUALITY', PROBE FOR EXACTLY WHAT 'QUALITY' THEY MEAN]**

1. (Price)
2. (Poor light color)
3. (Poor light output)
4. (Not bright enough)
5. (Too bright)
6. (Color of the light)
7. (Flicker)
8. (Buzz)
9. (Poor manufacturing (unspecified))
10. (Shorter bulb life than promised)
11. (Other **[SPECIFY]**)
12. (Nothing I don't like about them)

96. (DON'T KNOW)
97. (REFUSED)

RECENT LIGHTING PURCHASES

BUY1. Have you noticed any changes in the types of bulbs available for purchase in stores in the past three months, that is, since November 2011]?

1. Yes **[GO TO BUY2]**
2. No **[GO TO BUY3]**

96. DON'T KNOW **[GO TO BUY3]**
97. REFUSED **[GO TO BUY3]**

BUY2. What have you noticed? **[RECORD VERBATIM; PROBE FOR DETAILS]**

BUY3. Have you purchased any of the following types of light bulbs in the past three months? **[RANDOMIZE AND READ a-g THEN h; RECORD RESPONSE FOR EACH]**.

a. [**SKIP IF S3 GT 3**] Compact fluorescent light bulbs or CFLs that screw into regular light sockets
b. [**SKIP IF S4 GT 3**] L-E-Ds that screw into regular light sockets
c. [**SKIP IF S5 GT 2**] Halogen bulbs that screw into regular light sockets
d. Incandescent or regular light bulbs
e. Pin-based fluorescent tubes that can only be used in fluorescent light fixtures
f. Pin-based CFLs that can only be used in special light fixtures
g. Pin-based L-E-Ds that can only be used in special light fixtures
h. OTHER **[SPECIFY]**_____

1. Yes
2. No
96. DON'T KNOW
97. REFUSED

BUY4. What information do you look for when buying a bulb to help you decide which bulb to purchase? **[DO NOT READ. RECORD VERBATIM ANY RESPONSES THAT DO NOT FIT PRECODES. ACCEPT MULTIPLE RESPONSES.]**

01 (PRICE)
02 (LIGHTING FACTS/ENERGY FACTS LABEL)
03 (WATTAGE)
04 (WATT EQUIVALENCY)
05 (ENERGY STAR LABEL)
06 (UL, OR UNDERWRITERS LABORATORIES LABEL)
07 (LUMENS)
08 (CRI, OR COLOR RENDITION INDEX)
09 (BULB LIFE)
10 (DIMMING)
11 (3-WAY)
12 (SHAPE)
13 (MERCURY CONTENT)
14 (COLOR APPEARANCE, WARM/COOL, DAYLIGHT, ETC.)
95 (OTHER) **[SPECIFY]**
96 DON'T KNOW
97 REFUSED

BUY5. I'm going to read a list of types of information you might look for when buying a bulb. Please tell me whether or not you have looked for it. **[READ LIST]. [DO NOT SHOW ITEMS 01-14 RECORDED IN BUY4 [RANDOMIZE A-N, THEN READ M. RECORD AS YES/NO FOR EACH. ACCEPT MULTIPLE RESPONSE.]**

A. Price?
B. Lighting Facts Label?
C. Wattage?
D. Watt equivalency?
E. The ENERGY STAR label?
F. The UL, or Underwriters Laboratories Label?
G. Lumens?
H. CRI, or color rendition index?
I. Bulb life?
J. Dimming?
K. 3-Way ability?
L. Certain bulb shape?
M. Mercury content?
N. Color appearance?
O. Anything else I didn't already mention?**[SPECIFY]**

1. Yes
2. No
96. DON'T KNOW
97. REFUSED

BUY6. How important are the following in your decision on which light bulb to buy? For each, please use the following scale **[READ SCALE; REPEAT AS NEEDED]**.

1. Not at all important
2. Not very important
3. Neither important nor unimportant
4. Somewhat important
5. Very important
96. DON'T KNOW
97. REFUSED

[RANDOMIZE AND READ EACH]

A. How much the bulb costs to buy
B. How much the bulb costs to run [**IF NEEDED**, "That is, how much it will cost on your electricity bill"]
C. How long the bulb lasts before it burns out
D. How much energy the bulb uses

BUY7. How likely would you be to buy a bulb that costs $6, lasts seven years, and saves you $10 a year on your electricity bill, compared to a traditional incandescent light bulb?

1. Very unlikely
2. Somewhat unlikely
3. Neither likely nor unlikely
4. Somewhat likely
5. Very likely
96. DON'T KNOW
97. REFUSED

BUY8. How likely would you be to buy a bulb that costs $20, lasts 20 years, and saves you $10 a year on your electricity bill over those 20 years, compared to a traditional incandescent light bulb?

1. Very unlikely
2. Somewhat unlikely
3. Neither likely nor unlikely
4. Somewhat likely
5. Very likely
96. DON'T KNOW
97. REFUSED

Lumens & Key Lighting Knowledge

P1. Before this call, have you seen or heard of the terms "warm white" and "cool white"- as in the color white – used in relation to lighting?

1. Yes **[GO TO P2]**
2. No **[GO TO P3]**
96 DON'T KNOW **[GO TO P3]**
97 REFUSED **[GO TOP3]**

P2. What does the terms "warm white" and "cool white" – as in the color white - mean to you? [**DO NOT READ. RECORD VERBATIM. ALLOW MULTIPLE RESPONSE. IF RESPONDENT SAYS 'LIGHT QUALITY', PROBE FOR EXACTLY WHAT 'QUALITY' THEY MEAN]**

1. [RECORD VERBATIM]
96 REFUSED
97 DON'T KNOW

P3. Have you seen or heard of the word "lumens" used in relation to lighting?

1. Yes **[GO TO P4]**
2. No **[GO TO DEM1]**

96 DON'T KNOW **[GO TO DEM1]**
97 REFUSED **[GO TO DEM1]**

P4. What does the word "lumen" mean to you? [**RECORD VERBATIM. ALLOW MULTIPLE RESPONSE. IF RESPONDENT SAYS 'LIGHT QUALITY', PROBE FOR EXACTLY WHAT 'QUALITY' THEY MEAN]**

1. (LIGHT OUTPUT OR BRIGHTNESS)
2. (LIGHT COLOR)
3. (THE SAME AS WATTS)
4. (OTHER)[RECORD VERBATIM]

96 DON'T KNOW
97 REFUSED

CUSTOMER DEMOGRAPHICS

Now I have a few questions for statistical purposes only.

DEM1. What type of home do you live in? Is it a . . .?

1. Single-family detached house
2. Single-family attached house (townhouse, row house, or duplex)
3. Apartment building with 2-4 units
4. Apartment building with 5 or more units
5. Mobile home or house trailer
6. Other (Specify): _____

96. DON'T KNOW
97. REFUSED

[ASK DEM2 IF DEM1 = 1, 2. OTHERWISE, SKIP TO DEM3.]

DEM2. When was your home built? Please stop me when I get to the appropriate category.

1. 1930s or earlier
2. 1940s
3. 1950s
4. 1960s
5. 1970s
6. 1980s
7. 1990s
8. 2000 or later

96. DON'T KNOW
97. REFUSED

DEM3. Do you or members of your household own this home or do you rent?

1. Own/Buying
2. Rent/Lease
3. Occupied without Payment or Rent
4. OTHER (SPECIFY): _____

96. DON'T KNOW
97. REFUSED

DEM4. About how large is your home? [READ LIST IF NECESSARY]

1. Less than 1,400 square feet
2. 1,400 – less than 2000 square feet
3. 2,000 – less than 2500 square feet
4. 2,500 – less than 3500 square feet
5. 3,500 – less than 4000 square feet
6. 4,000 – less than 5000 square feet
7. 5,000 square feet or more

96. DON'T KNOW
97. REFUSED

DEM5. How many rooms are in your home, not counting bathrooms? [**HELP RESPONDENTS COUNT ROOMS IF NEEDED, KEEPING TRACK ON A PIECE OF PAPER OF THE NUMBER OF ROOMS AS THEY NAME THEM]**

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. 10 or more
96. DON'T KNOW
97. REFUSED

DEM6. What is the highest level of education that you have completed so far?

[READ CATEGORIES, IF NECESSARY.]

1. Less than Ninth Grade
2. Ninth to Twelfth Grade, No Diploma
3. High School Graduate (includes GED)
4. Some College, No Degree
5. Associates Degree
6. Bachelors Degree
7. Graduate or Professional Degree
96. DON'T KNOW
97. REFUSED

DEM7. Counting yourself, how many people normally live in this household on a full time basis? Please include everyone who lives in your home whether or not they are related to you and exclude anyone who is just visiting or children who may be away at college or in the military.

RECORD NUMBER OF PEOPLE ____

96. DON'T KNOW
97. REFUSED

DEM8. Which category best describes your total household income in 2010 before taxes? Please stop me when I get to the appropriate category.

1. Less than $15,000
2. $15,000 to less than $20,000
3. $20,000 to less than $30,000
4. $30,000 to less than $40,000
5. $40,000 to less than $50,000
6. $50,000 to less than $75,000
7. $75,000 to less than $100,000
8. $100,000 to less than $150,000
9. $150,000 or more

96. DON'T KNOW
97. REFUSED

DEM9. [INTERVIEWER: DO NOT READ.]

Sex:

1. Female
2. Male

RECRUIT FOR ONSITE SURVEY

R1. On behalf of the Connecticut Energy Efficiency Fund with the cooperation of Connecticut Light and Power and The United Illuminating Company, we are offering eligible households in your area $125 to allow a trained technician to visit their homes to gather more detailed information about the lighting and consumer electronics products used. The visit should take about an hour. By saying yes, you are simply agreeing to be considered for the follow-up study. We need to have a wide range of households across the state take part in the follow-up study, and you household may or may not be selected. Please do not call or write us to express your interest in this follow-up study. If we do select you for the study, we will contact you to set up an appointment. During the visit, there will be no attempt to sell you anything. The information gathered will be used to evaluate and improve the energy efficiency programs offered by your electric utility.

Would you be interested in being a part of this type of visit?

1. Yes **[CONTINUE TO R2]**
2. No **[THANK AND TERMINATE]**
3. (Don't know/Refused)

[IF R1=3] That's OK, you do not have to decide now. Would it be OK if I take your name and have someone call you when we are scheduling these visits?

1. Yes **[CONTINUE TO R2]**
2. No **[THANK AND TERMINATE]**

R2. **[IF YES]** What is your name? **[RECORD]**_____

R3. **[IF YES**] What is your address, city, state, and zip?
[RECORD]_____

R4. **[IF YES]** And what is the best number to call you about a visit?

[RECORD]_____

Thank you very much. As I said, we will be scheduling these visits in the next few weeks and will call you then.

Light Bulb REFERENCE

Bulb Shape	Code	Image	Bulb Shape	Code	Image
1. Twister/Spiral	**T**		7. Circline	**C**	
2. Globe (e.g., for bathroom vanity fixtures)	**G**		8. Tube Style	**TUB**	
3. A-lamp (shaped like standard incandescent)	**A**		9. Candelabra (pointed top with a candelabra screw base)	**CAN**	
4. Bullet/ Torpedo (pointed top, standard screw base)	**B**		10. Post, Capsule, Barrel (round top, standard screw base)	**CAP**	
5. Bug light (yellow color; do not confuse with LEDs with yellow filters)	**BUG**		11. Other (Describe to right of table)	**O**	
6. Spotlight/ reflector/flood	**S**		12. LED Globe	**LG**	
Bulb Style	**Code**	**Image**	**Bulb Style**	**Code**	**Image**
13. LED A-Bulb: note that appearance could differ, with a yellow filter or with the electronics hidden	**LA**		14. LED Bullet/Torpedo	**LB**	

15. LED Spotlight/ reflector/flood	**LS**		16. LED Circline	**LC**	
17. LED Tubes	**LTUB**		18. LED Candelabra	**LCAN**	
19. LED Capsule	**LCAP**		20. LED Rope	**LR**	

Connecticut Retrofit and Retail Products Study

Onsite Data Collection Form

Customer Name: _____Customer ID #_____

Customer Address: _____Inspector: _____

Date _____ Time _____

Introduction

"Hello, my name is _____, and I am working with NMR Group, Inc. NMR is working under contract with Connecticut Energy Efficiency Fund with the cooperation of Connecticut Light and Power and The United Illuminating Company. I'm here to meet with _____. As mentioned on the phone, I'm here to walk through your home and record the types of lighting fixtures and bulbs installed in each socket. [Customer should be expecting inspector]. During my visit I'll also be asking a few questions about your home's general characteristics and about lighting. In appreciation for your time, on behalf of Connecticut Energy Efficiency Fund with the cooperation of Connecticut Light and Power and The United Illuminating Company, we are offering you a payment of $125. Do you have any questions regarding my visit?"

Lighting Count

- **Record information on all interior and exterior lighting sockets on the attached sheets. Refer to bulb shape code list. Then ask:**

  "Now, I would like to see all light bulbs and fixtures that are not currently installed. This would include those you have bought and not yet installed as well as those that were installed and then removed."

- **Record information on all bulbs in storage on the attached sheet.**

Customer Survey

- **Then ask:** "I would like to ask you some questions."
- **Ask the resident the questions listed on the last page of the form**

Home Schematic

[Sketch a simple dimensionless diagram of home layout. Label rooms.]

Room	Fixture Type by Location				# of Fixtures	# of Sockets	Bulb Type	Bulb Shape	Socket Type	Watts	Dimmable ?	3-Way?	# Bulbs	Notes
	Ceiling R=Recessed P=Pendant F=Flush mount T=Track CF=Ceiling Fan O=Other [Specify]	**Wall** W=Wall mount N=Night light O=Other [Specify]	**Portable** T=Table F=Floor O=Other [Specify]	**Other/Outdoor** U=Under cabinet [See Outdoor types under 'Rooms']	#	#	I=Incandescent CFL=CFL F=Fluorescent LED=LED O=Other [Specify] E=Empty Socket	T=Twist/Spiral G=Globe A=A-lamp B=Bullet/Torpedo Bug=Bug light S=Spot/Reflector/Flood C=Circline Tub=Tube Cap=Capsule/Post/Barrel Can=Candelabra O=Other [Specify]	S=Screw P=Pin G=GU O=Other [Specify]	#	Y=Yes N=No	Y=Yes N=No	#	

Customer ID: _____ **Page __ of__ Pages**

Data Collection Form for ALL bulbs in Storage [Including CFL, Incandescent, Halogen, LED, etc]

Bulb Type	Bulb Shape	Base Type	Watts	Dim?	3-way?	# Bulbs	# stored bulbs removed from sockets/fixtures	Where bulbs removed from	Why are you storing these bulbs?	What types of bulbs will these bulbs likely replace?
I=Incandescent CFL=CFL F=Fluorescent LED=LED O=Other [Specify]	T=Twist/Spiral G=Globe A=A-lamp B=Bullet/Torpedo Bug=Bug light S=Spot/Reflector/Flood C=Circline Tub=Tube O=Other [Specify]	S=Screw P=Pin G=GU Can=Candelabra O=Other [Specify]	#	Y=Yes N=No	Y=Yes N=No	#	#	Room	1= Storing for future use 2= Do not fit or work with fixture 3= Other [Specify]	1= CFL 2= Incandescent 3= Both/whichever needs replacing first 4= Other [Specify]

Customer Survey

IF NO CFLS INSTALLED OR IN STORAGE

[Show interviewee an actual CFL bulb]

[ASK] Are you familiar with this type of energy efficient light bulb that you could use in place of a traditional screw-in incandescent bulb?

Yes ___ ***[IF YES; Ask]*** Is there a reason you haven't installed any CFL Bulbs in your home?

No ___

IF AT LEAST ONE <u>SPIRAL</u> CFL INSTALLED OR IN STORAGE

[SHOW RESPONDENT A SPIRAL CFL. ASK] When was the last time you purchased a **<u>spiral</u>** CFL?

In the past 12 months ___ ***[ASK WILLINGNESS TO PAY SPIRAL QUESTIONS]***

More than 12 months ago ___ ***[SKIP TO CH1]***

<u>WILLINGNESS TO PAY - SPIRAL CFLs.</u> **IF RESPONDENT PURCHASED ANY <u>SPIRAL CFLS</u> IN THE PAST YEAR, ASK THEM TO SHOW YOU THE MOST RECENTLY PURCHASED <u>SPIRAL CFL</u>, EVEN IF IN STORAGE**

[ASK] Thinking about the most recent spiral CFL you purchased, about how much do you remember paying for this spiral CFL? If the bulb was a part of a multipack, tell me how much you paid for the entire pack and the number of CFLs in it.

[IF PURCHASED WITH A COUPON, ASK FOR THE FINAL PRICE, AFTER APPLYING THE COUPON]

Single Bulb Price: ___

Multi Pack Price: ___ Pack Size: ___ Price/Bulb = ___

[READ:] This would be about [INSERT RESULT] per bulb, right? ***[IF OKAY, CONTINUE, IF NOT TRY TO GET BETTER ESTIMATE, THEN CONTINUE]***

[IF THEY DON'T KNOW THE PRICE, ASK:] Was it more or less than $3 per bulb?

More ___ Less ___ DK ___ ***[IF STILL DON'T KNOW, GO TO PRICE1A]***

PRICE1 **IF PRICE = $0 to $2.75**

PRICE1 **IF PRICE = $2.76 to $4.25**

A

Would you have purchased this CFL if it had cost $3?

Yes ___ **GO TO PRICE1B**

No ___ **GO TO CH1**

B

Would you have purchased this CFL if it had cost $4.50?

Yes ___ **GO TO PRICE1C**

IF YES AND ASKED PRICE1A, GO TO PRICE2E

No ___ **GO TO CH1**

PRICE1C **IF PRICE = $4.26 to $8.75**

Would you have purchased this CFL if it had cost $9?

Yes ___ **GO TO PRICE1D**

IF YES AND ASKED PRICE1B, GO TO PRICE2E

No ___ **GO TO CH1**

PRICE1D **IF PRICE = $8.76 to $14.75**

Would you have purchased this CFL if it had cost $15?

Yes ___ **GO TO PRICE1E**

No ___ **GO TO CH1**

PRICE1E **IF PRICE = $14.75 or more**

What is the price at which this CFL would have become too expensive to consider buying?

Price ___

DK ___

At no price is it too expensive ___

CH1. [ASK ONLY IF BULB WAS <u>NOT</u> GIVEN TO RESPONDENT (FREE or PRICE = $0)]

Thinking about the same spiral CFL, where did you purchase this spiral CFL? ___

If this store had not carried CFLs would you have:

Bought an incandescent (regular light bulb) ___

Gone to another store within a short time to buy a CFL ___ What store? ___

Or done something else? ___ Record other: ___

IF AT LEAST ONE SPECIALTY CFL INSTALLED OR IN STORAGE

[SHOW RESPONDENT A SPECIALTY CFL. ASK] When was the last time you purchased a **specialty** CFL?

In the past 12 months		***[ASK WILLINGNESS TO PAY SPECIALTY QUESTIONS]***
More than 12 months ago		***[SKIP TO CH2]***

WILLINGNESS TO PAY - SPECIALTY CFLs. **IF RESPONDENT PURCHASED ANY SPECIALTY CFLS IN THE PAST YEAR, ASK THEM TO SHOW YOU THE MOST RECENTLY PURCHASED SPECIALTY CFL, EVEN IF IN STORAGE**

TYPE OF SPECIALTY BULB:

[ASK] Thinking about the most recent specialty CFL you purchased, about how much do you remember paying for this specialty CFL? If the bulb was a part of a multipack, tell me how much you paid for the entire pack and the number of CFLs in it.

[IF PURCHASED WITH A COUPON, ASK FOR THE FINAL PRICE, AFTER APPLYING THE COUPON]

Single Bulb Price: _____

Multi Pack Price: _____ Pack Size: _____ Price/Bulb = _____

[READ:] This would be about [INSERT RESULT] per bulb, right? ***[IF OKAY, CONTINUE, IF NOT TRY TO GET BETTER ESTIMATE, THEN CONTINUE]***

[IF THEY DON'T KNOW THE PRICE, ASK:] Was it more or less than $5 per bulb?

More ____ Less ____ DK _____ ***[IF STILL DON'T KNOW, GO TO PRICE1A]***

PRICE2A **IF PRICE = $0 to $4.75**

Would you have purchased this CFL if it had cost $5?

Yes ____ **GO TO PRICE1B**

PRICE2B **IF PRICE = $4.76 to $7.25**

Would you have purchased this CFL if it had cost $7.50?

Yes _____ **GO TO PRICE1C**

IF YES AND ASKED PRICE1A, GO TO PRICE2E

No ☐ **GO TO CH1**

PRICE2C **IF PRICE = $7.26 to $14.75**

Would you have purchased this CFL if it had cost $15?

Yes ☐ **GO TO PRICE1D**

IF YES AND ASKED PRICE1B, GO TO PRICE2E

No ☐ **GO TO CH1**

No ☐ **GO TO CH1**

PRICE2D **IF PRICE = $14.76 to $24.75**

Would you have purchased this CFL if it had cost $25?

Yes ☐ **GO TO PRICE1E**

No ☐ **GO TO CH1**

PRICE2E **IF PRICE = $24.75 or more**

What is the price at which this CFL would have become too expensive to consider buying?

Price ☐ At no price is it too expensive ☐

DK ☐

CH2. [ASK ONLY IF BULB WAS <u>NOT</u> GIVEN TO RESPONDENT (FREE or PRICE = $0)]

Thinking about the same spiral CFL, where did you purchase this spiral CFL? ☐

If this store had not carried CFLs would you have:

Bought an incandescent (regular light bulb) ☐

Gone to another store within a short time to buy a CFL ☐ What store? ☐

Or done something else? ☐ Record other: ☐

Lighting Decisions

- Ask for all rooms below.
- Ask for two fixture types with the highest number of bulbs in each room.
- If interviewee does not use the Master Bedroom or if there is no Master Bedroom, ask the interviewee about the bedroom he/she uses.
- If interviewee does not use the Main Bathroom or if there is no Main Bathroom, ask the interviewee about the bathroom he/she uses.

LD1. Now I'd like to ask you about how you decide what bulbs to use in different parts of your home. **[proceed to nearest room on the list]** How did you decide what kind of bulbs to install in [fixture type]? **[proceed to next nearest room on the list and repeat]**

Room	**Most Common**	**Fixture Type**	**How do you decide what types of bulbs to install in your_____**
Kitchen	First		
	Second		
Dining Room/Area	First		
	Second		
Master Bedroom	First		
	Second		
Living or Family Room	First		
	Second		
Main Bathroo	First		

m	Secon d		

LD2. What are the most important characteristics you look for in a light bulb for your [room]? **[Probe for additional responses:** Are there any other characteristics that are important to you?**]**

Room	Kitchen	Dining Room/ Dining Area	Master Bedroom	Living/ Family Room	Main Bathroom
Price					
Wattage					
Life of Bulb					
Energy Efficiency					
Brightness					
Bulb Size					
Color					
Bulb Shape					
Manufacturer					
Durability					
Dimmability					
Three-way					
Other (Specify)					

LD3. **[IF NO CFLS IN HOME AT ALL SKIP] [IF NO CFLS INSTALLED IN SPECIFIED ROOM, ASK]** What is the one more important reason you do not have any CFLs installed in [*room*]? **[DO NOT READ. SELECT ONE RESPONSE]**

Reason	Kitchen	Dining Room/ Dining Area	Master Bedroom	Living/ Family Room	Main Bathroom
Do not fit properly					
Do not like light color					
Interference with radio, TV, other electronics					
Delay in light coming on					
CFLs not bright enough					
CFLs do not work with dimmer					
Do not like appearance					
Have not gotten around to buying CFL(s)					
Have not gotten around to installing CFL(s)					
Not aware of CFL for application					
Waiting to be given CFL(s)					
Do not use lamp often					
Other (Specify): _____					
Refused					

Homeowner Verification of Receipt of Incentive Payment

My signature below is provided only to verify that I did receive a $125 incentive check from the visiting inspector, as previously agreed upon, on the date indicated.

Name: _____

Address: _____

Signature: _____ Date: _____