

**RESIDENTIAL LIGHTING MARKET CHARACTERIZATION STUDY**

Final

Prepared for

**New York State**

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## ABSTRACT

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The purpose of this market characterization study was to provide NYSERDA with a better understanding of the current residential lighting market in New York State and to identify opportunities for optimizing NYSERDA's future investments in the residential lighting market given the unprecedented changes in this market. The research team performed secondary research, conducted in-depth interviews with a wide variety of groups, and surveyed New York retailers, consumers, and homeowners who had installed lighting fixtures. A dynamic model of future lighting market adoption was developed for use in planning for future lighting programs. This model assesses the likely savings from residential lighting given different scenarios. The research findings point to the importance of increasing consumer awareness and knowledge of the information on the Lighting Facts label to meeting the state's goals for lighting, and identify a variety of promising approaches to increase the efficiency of residential lighting in the state. The report concludes with specific recommendations for NYSERDA to consider in residential lighting program planning.

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## EXECUTIVE SUMMARY

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The U.S. lighting market is changing rapidly. Popular incandescent bulbs<sup>1</sup> are gradually being phased out under the Energy Independence and Security Act of 2007 (EISA)<sup>2</sup>. New energy-efficient lighting technologies are emerging to take the place of incandescent bulbs at the same time that relatively inexpensive—but not so efficient—EISA-compliant halogen bulbs with qualities similar to incandescent bulbs are becoming increasingly available. The new lighting options will require consumers to change how they choose light bulbs. Even with the new Federal Trade Commission (FTC) Lighting Facts label to help them navigate the new world of residential lighting, it is unclear if consumers are adequately equipped to use this information to select lighting with which they will be satisfied. This study was undertaken to provide NYSERDA with a better understanding of the current residential lighting market in New York State and to identify opportunities for optimizing NYSERDA’s future investments in the residential lighting market given the unprecedented changes in the market.

### STUDY OBJECTIVES

The study research objectives were to (1) develop an understanding of current and likely future conditions of the residential lighting market; (2) assess perceptions of the lighting market and prospects for different lighting technologies and program approaches by various market segments, market actors, and trade allies, including other lighting programs and federal government agencies; (3) identify opportunities for changing efficient lighting adoption behavior among various market segments; (4) identify opportunities to reach, educate, and influence market actors to use energy-efficient lighting and effective lighting design in their residential lighting products and services; and (5) research residential lighting programs in other jurisdictions to inform future program planning.

In support of the research objectives, the research team performed secondary research and conducted in-depth interviews with a wide variety of groups, including administrators of ratepayer-funded residential lighting programs from across North America, federal and state government, stakeholders with an interest in the residential lighting or building industry, lighting manufacturers, lighting installers, lighting specifiers, and organizations that provide training in residential lighting design and installation. The research team also conducted quantitative telephone surveys with representative samples of NY retailers, consumers, and homeowners who had installed one or more lighting fixtures in the previous year. Findings

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<sup>1</sup> To reduce confusion for readers not familiar with the terminology used by the lighting and energy efficiency industries, this report refers to “bulbs” rather than “lamps.” In this report, the term “bulbs” also refers to tube and other shapes of lamps using various forms of lighting technology.

<sup>2</sup> Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1573. Accessed April 2, 2012 from: <http://www.gpo.gov/fdsys/pkg/PLAW-110publ140/pdf/PLAW-110publ140.pdf>.

from the various research activities informed the development of a dynamic model of future lighting market adoption. The research was conducted by NMR Group, Inc. (NMR) and The Cadmus Group under the direction of NMR, which is part of the Market Characterization and Assessment team led by Navigant Consulting. APPRISE, Inc. managed the data collection efforts.

## **SYNOPSIS OF FINDINGS**

### **EISA and the Transformation of the Residential Lighting Market**

A “market adoption model” tool was developed as part of this study to assess the likely savings from residential lighting given different scenarios for use in planning for future lighting programs. The model shows that lighting savings could vary considerably depending on consumers’ choices. Programs that shift consumers’ lighting choices away from less efficient replacements toward more efficient ones will be able to find additional savings potential—and the savings could be much higher than casual observers might expect in a post-EISA world.

Going forward, New York consumers will need to begin to look for, understand, and use the information on the Federal Trade Commission (FTC) Lighting Facts label if they are to choose high-efficiency bulbs with which they will be satisfied and if the state is to achieve its lighting energy savings goals. Yet the results from surveys conducted as part of this study make it clear that New York State consumers are not well prepared to put the information on the Lighting Facts label to full use in choosing bulbs. Specifically, the surveys found:

- It is questionable whether consumers will know how to interpret bulb brightness from the lumens data provided on the Lighting Facts label. Only 3% to 5% of respondents who were asked to quantify lumens provided an answer within 200 lumens of the correct value of 800 lumens in a 60-watt incandescent bulb.
- Understanding of color rendering is low. The color rendering index (CRI) appears on the DOE Lighting Facts label for LED fixtures and on the packaging of many CFLs. Less than one-fifth (17%) of the consumers had seen or heard the term “color rendering” and only 7% of the total sample of consumers demonstrated a good understanding of color rendering.
- Understanding of the terms “warm white” and “cool white” and of color temperature, which appear on the Lighting Facts label, is also low. Only 14% of consumers surveyed demonstrated understanding the meaning of warm white and cool white, and just 10% demonstrated understanding of color temperature.

- A substantial fraction of consumers may be unaware that CFLs are considerably more efficient than EISA-compliant halogens.<sup>3</sup>

Lighting manufacturers interviewed for this study all expect other organizations, such as distribution companies, contractors, agents, lighting training institutions the U.S. Environmental Protection Agency (EPA), and the media, to take responsibility for marketing energy-efficient lighting to consumers. Yet interviews with EPA and the U.S. Department of Energy (DOE) yielded no evidence of a concerted federal education effort on this front, and as of the time of publication of this report federal funding for the enforcement of EISA had been delayed, raising the question of whether or when there would be a federal budget for consumer education activities around the FTC Lighting Facts label and how to make satisfactory bulb choices under EISA.

### **ENERGY STAR Label in Fixture and Specialty CFL Decision-Making**

The results of the surveys of retailers and of homeowners who had installed fixtures in the prior year suggest that the ENERGY STAR label is not an important factor in the decision to stock a specialty CFL or fixture, or to purchase a fixture. Only one in five retailers cited qualifying for the ENERGY STAR label as an important factor in deciding which specialty CFLs to stock. It appears that homeowners are not accustomed to looking for the ENERGY STAR label when purchasing fixtures—just one out of ten of these respondents reported looking for the ENERGY STAR label.

### **Mid-stream Program Ideas**

Some mid-stream approaches to encouraging the selection of higher efficiency products identified through the study include taking a “market lift” approach to rewarding retailers for increasing sales of high-efficiency lighting products and providing training in high-efficiency lighting products for retail sales staff and point-of-sales material for high-efficiency lighting.

The “market lift” approach leverages the sales volume of large retailers while addressing the net-to-gross problems associated with providing rebates and incentives to mass merchants. Under this approach, the program administrator develops a high-efficiency lighting market share for the retailer, and then pays the retailer for achieving sales of high-efficiency lighting products above the baseline, or “market lift.” A major drawback to this approach is that a significant amount of data is required from a retailer in order to establish the baseline for measuring market lift. NYSERDA’s partner retailers already provide NYSERDA with much, if not all, of the data that would be needed to implement a market lift approach.

A drawback of retailer training is that it must be repeated frequently due to the relatively high rate of turnover of retail sales staff.

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<sup>3</sup> U.S. Department of Energy. 2010. “ENERGY STAR<sup>®</sup> CFL Market Profile.” September. Accessed March 7, 2012 from [http://www.drintl.com/Data/Sites/1/downloads/publications/2010\\_cfl\\_market\\_profile.pdf](http://www.drintl.com/Data/Sites/1/downloads/publications/2010_cfl_market_profile.pdf).

**Demonstrations of High-Efficiency Lighting**

There was considerable interest among interviewees in the residential building industry and among homeowners who had installed fixtures in the previous year in seeing demonstrations of high-efficiency lighting.

**Training to Accelerate High-Efficiency Lighting Adoption in New Construction**

The research suggests that use of architects or lighting designers in residential new construction or renovation is not common. Nearly a quarter of NYS retailers that sell fixtures were found to already offer residential lighting design services, and the demand for these services appears to be weak. Interest among NYSERDA partner retailers in obtaining referrals to lighting designers was found to be low.

Lighting specification for residential new construction is more often done by builders than by lighting designers or architects. Small, privately held non-production builders and custom builders would be more likely than other builders to be willing to accept the risks associated with using new lighting technology or any new technology. Privately held non-production builders and custom builders could perform a valuable role in helping to lead the residential new construction market toward routinely specifying and installing high-efficiency lighting.

Electricians could also help in leading the way toward routinely specific high-efficiency lighting in new construction projects. Those homeowners who installed fixtures and who identified anyone as having provided them with information about fixtures named electricians as one of the top two sources of this information.

There appears to be no specific lighting background that the building industry looks for when hiring new staff.

Suppliers and trade shows lead as sources of lighting training for both installers and specifiers. Targeting building associations and developers with educational seminars could expand the reach of any training that NYSERDA might develop or support.

When asked what would enable their institutions to offer additional or expanded lighting-specific training to the building trades, organizations that supply lighting training most frequently mentioned guidance on developing the curriculum, particularly around the EISA regulations and different lighting products; recommendations of outside consultants with which to work; and funding to help defray the cost of updating existing curriculum to include lighting, help recruit new instructors, or pay for guest speakers.

**Specialty CFLs**

Twenty-two different bulb types are exempted from the EISA lighting standards. Going forward, each consumer choice for a specialty CFL instead of an exempted incandescent thus represents even greater savings than the choice for a general purpose CFL instead of an EISA-compliant halogen, the least efficient EISA qualifying general purpose option.

The research highlighted the importance of two retail sales channels, home improvement stores and mass merchandisers such as Wal-Mart or K-mart, in supplying specialty CFLs to NYS consumers.

### **LED Fixtures and Bulbs**

Despite the relatively high price and limited availability of LED fixtures, surveys and interviews conducted for this study showed homeowners are more willing to consider installing pin-base LED fixtures than pin-base CFL fixtures, half the electricians and a quarter of the builders interviewed put LED fixtures in homes “very often” or “somewhat often” and specifiers are enthusiastic about LED fixtures.

While it appears that LEDs are not ready to replace general purpose lamps, and may not be ready for some years, manufacturers and others are optimistic about both LED fixtures and bulbs. Nearly half the manufacturers interviewed reported that LED fixture products are currently being developed to address the issue of consumers trying to fit LEDs into incompatible sockets, and felt that the technology will experience significant gains as these products become available in the marketplace.

In the near-term, LED fixtures look more promising than general purpose LED bulbs. Given this, the technology may have the most impact on new construction for some time to come. New construction seems unlikely to be a major driver to distribute the technology, however, given the status of the new construction market in NY and elsewhere.

### **CONCLUSIONS AND RECOMMENDATIONS**

The study findings point to the importance of marketing and education about lighting options to shifting consumer lighting choices toward higher-efficiency products. In light of this, NYSERDA may wish to:

1. Work to increase NY consumer awareness and understanding of the information on the FTC Lighting Facts label and how consumers can use it to make high-efficiency lighting choices that will satisfy lighting needs for particular common applications.
2. Review and assess the EPA online “lighting place” to determine the appropriateness of the site content and delivery to increasing NYS consumer awareness and understanding of the information on the FTC Lighting Facts label.
3. Reach out to the EPA, DOE, and FTC about any plans they might have for more active promotion to help consumers interpret information on the FTC and DOE Lighting Facts labels and explain how they can use the information to make satisfactory high-efficiency lighting choices. If there are such plans, assess (1) the degree to which the plans are in line with New York State’s needs for consumer education around the information on the Lighting Facts labels, (2) prospects for NYSRDA to link with or leverage the plans to help meet the need for increased awareness and understanding among NYS consumers of the information on the Lighting Facts labels.

4. Since EISA clearly will not by itself transform the market to favor the highest-efficiency bulbs, until the future price and availability of CFLs becomes more clear and consumer bulb preferences are better established, it is important that NYSERDA continue tracking the lighting market and continue supporting CFLs.

Bulbs that qualify for the ENERGY STAR label have many of the qualities that are familiar to consumers from general purpose incandescent bulbs. For consumers who find the Lighting Facts labels daunting, the ENERGY STAR label represents a simple fallback for assessing high-efficiency bulbs. By choosing ENERGY STAR-labeled bulbs, consumers by definition will be steered away from less efficient EISA-compliant halogen bulbs. There is ample room to increase the reliance of consumers and retailers on the ENERGY STAR label, at least for specialty CFLs and fixtures. Given this, the study recommends that:

5. NYSERDA continue to encourage consumers to look for the ENERGY STAR label on bulbs and fixtures while educating consumers about the FTC Lighting Facts label.
6. In conjunction with its periodic assessments of ENERGY STAR label awareness in NYS via the CEE ENERGY STAR Household Survey, NYSERDA may wish to consider tracking the extent to which New York consumers look for the ENERGY STAR label on CFLs and other lighting products to help in assessing efforts to encourage consumers to look for the ENERGY STAR label on bulbs and fixtures.

NYSERDA has put considerable effort over the years into developing the very relationships with retailers that are critical to taking a “market lift” approach to incentivizing retailers. While not every lighting sales channel is equally well represented among NYSERDA partner retailers, NYSERDA is in an enviable position with regard to access to retailer sales data in comparison to many energy efficiency program administrators. Given this, it makes a great deal of sense for NYSERDA to consider the possibility of encouraging growth in the share of sales of truly high-efficiency bulbs through this mid-stream incentive approach. Specifically,

7. NYSERDA may wish to explore the possibility of providing training in high-efficiency lighting products for retail sales staff. Because of the high turnover rate among retail sales staff, this training would need to be ongoing to continue being effective.
8. NYSERDA may wish to consider and assess whether a “market lift” or other incentive-based approach to encourage retailers to sell the highest efficiency bulb types is appropriate for the New York residential lighting market.

The data from the survey of homeowners who had installed fixtures suggest that consumer and client interest in seeing lighting demonstrations is relatively high. Thus NYSERDA may wish to:

9. Explore the possibility of partnering with retailers, lighting manufacturers, and/or other organizations to develop demonstrations of high-efficiency residential lighting applications for use in informing consumers and homebuyers that high-efficiency lighting can be aesthetically appealing.

10. Explore the possibility of working with lighting manufacturers, distributors, educational institutions or other organizations to develop demonstrations of high-efficiency lighting technology for residential applications geared to audiences of electricians, builders, architects and lighting designers.

The study findings suggest that training in high-efficiency lighting and lighting design for electricians and builders is a promising approach to encouraging market actors to move toward routinely specifying and installing high-efficiency lighting as part of residential new construction in New York State. Privately held non-production builders and custom builders in particular could perform a valuable role in helping to lead the residential new construction market toward routinely specifying and installing high-efficiency lighting. Electricians who serve the mass retail housing market could also help in leading the way toward routinely specific high-efficiency lighting in new construction projects. Targeting electricians could have the additional benefit of spillover into the residential retrofit market. With no specific lighting background that the building industry looks for when hiring new staff, there is ample opportunity for NYSERDA's efforts to help in setting future expectations about what is an appropriate installer background in lighting. Given this, NYSERDA may wish to:

11. Explore the possibility of working with NYS lighting distributors, trade associations for the home building industry and for electricians, to offer training in high-efficiency lighting to electricians, production builders, and small, privately held, non-production builders. (A list of possible training partners has been provided to NYSERDA.) Also consider the possibility of offering training in conjunction with industry trade shows as appropriate.
12. Explore the viability and appropriateness of partnering with the kinds of organizations to which the home building industry and electricians turn for training. This could include, but may not be limited to, providing these organizations with guidance on developing lighting curriculum, recommendations of outside consultants with which to work, and funding to help defray the cost of updating existing curriculum to include lighting, help recruit new instructors, or pay for guest speakers.

Working to increase the share of the specialty bulb market that is represented by high-efficiency specialty bulbs represents a future program opportunity for NYSERDA. This could be done in conjunction with demonstrations of high-efficiency lighting and other consumer education.

NYSERDA provides substantial financial support to partner retailers for ENERGY STAR marketing. Among the items that NYSERDA expects in return is substantial sales data from partners. The requirement for sales data appears to be an important impediment to partnering with national home centers and mass merchandisers. It may be possible to find a "middle path" of partnership with national home improvement and mass merchandisers that allows NYSERDA to expand the reach of specialty CFL displays and consumer education at the point of sale in these channels without a full commitment to partnership by either the retailers or NYSERDA.

NYSERDA may wish to:

13. Work to increase consumer awareness and knowledge of specialty CFLs in conjunction with other consumer education.
14. Consider the possibility of working with retailer partners in the home improvement store and mass merchandiser sales channels to encourage and perhaps support the development and installation of displays demonstrating specialty CFLs in use.
15. Explore whether there might be a viable way to engage national home center and mass merchandise retailers in promoting specialty CFLs without a full commitment to partnership either by the retailers or NYSERDA.
16. Assess what would be required to document evidence of the success of specialty CFL displays in boosting sales of specialty CFLs among NYSERDA partners, and whether this could be a way to provide such documentation to national home center and mass merchandise retailers without violating NYSERDA retailer partner confidentiality.

The research suggests several roles that NYSERDA could play to increase the likelihood of LED fixtures being installed in lieu of medium screw-base fixtures. These include:

17. Consider exploring the following opportunities to support market acceptance and availability of LED fixtures and bulbs:
  - Work with other organizations to developing national requirements for LED performance and reliability. This could include, but may not be limited to, DOE, EPA and CEE.
  - Work with other organizations to develop ways to explain to consumers differences in performance between LED and incandescent lamps that may not show up on the Lighting Facts labels.
  - Support research to improve LED lighting technology.
  - Use findings from research to identify what consumers value in lighting, and work to determine how best to communicate this value with regard to LED lighting or other emerging high-efficiency lighting technologies. Conduct additional research as necessary to this end.
  - Provide training in LED lighting as appropriate for retail sales staff.
  - Provide retailers with point of sales material for LED lighting. Since homeowners learn about LED fixtures primarily from store displays and installers, a focus on encouraging or supporting retailers to develop LED fixture displays also seems appropriate.
  - Provide mid-stream or down-stream incentives for LED lighting.
18. Any efforts to support or encourage the use of lighting displays by retailers should take into consideration and prioritize the multiple goals that could be served through this approach.

## Section 1

### INTRODUCTION

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The U.S. lighting market is changing rapidly. On January 1, 2012, The Energy Independence and Security Act of 2007 (EISA)<sup>4</sup> began gradually phasing out popular incandescent bulbs.<sup>5</sup> This development promises to help level the playing field for high-efficiency bulbs such as compact fluorescent lamps CFLs. Emerging new high-efficiency lighting technologies, such as light emitting diode (LED) bulbs, are also beginning to be seen in the consumer market—as are EISA-compliant halogen bulbs, which are more efficient than the standard incandescent bulbs being phased out but considerably less efficient than CFLs or LED bulbs. The new Federal Trade Commission (FTC) Lighting Facts label will provide consistent, detailed information to help consumers to make more informed bulb purchasing decisions and could be a valuable tool to help shift consumers to purchasing higher efficiency bulbs. Together, these developments are expected to have effects on the residential lighting market that could be substantial—but there appears to be no consensus in the energy efficiency industry as to what these effects will be, or their magnitude.

The goals of this market characterization study were to provide NYSERDA with a better understanding of the current residential lighting market in New York State and to identify opportunities for optimizing NYSERDA’s future investments in the residential lighting market as the residential lighting market changes. This information is necessary for NYSERDA to make the most of the opportunities presented by the market changes that are unfolding as a result of national lighting legislation and of technology advances, with the goal of effectively and efficiently maximizing the use of high-efficiency lighting in New York homes to the benefit of the state’s taxpayers and environment.

### RESEARCH OBJECTIVES

To meet the goals identified above, the research team set out to achieve the following specific research objectives:

- To develop an understanding of current and likely future conditions of the residential lighting market;

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<sup>4</sup> Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1573. Accessed April 2, 2012 from: <http://www.gpo.gov/fdsys/pkg/PLAW-110publ140/pdf/PLAW-110publ140.pdf>.

<sup>5</sup> To reduce confusion for readers not familiar with the terminology used by the lighting and energy efficiency industries, this report refers to “bulbs” rather than “lamps.” In this report, the term “bulbs” also refers to tube and other shapes of lamps using various forms of lighting technology.

- To assess perceptions of the lighting market and prospects for different lighting technologies and program approaches by various market segments, market actors, and trade allies, including other lighting programs and federal government agencies;
- To identify opportunities for changing efficient lighting adoption behavior among various market segments;
- To identify opportunities to reach, educate, and influence market actors to use energy-efficient lighting and effective lighting design in their residential lighting products and services; and
- To research residential lighting programs in other jurisdictions to inform future program planning.

To this end, the research team performed four different research tasks. First, the research team conducted secondary research, identifying and analyzing existing information that can contribute to a greater understanding of the current and future residential market, and used this to inform the development of guides for in-depth interviews and of survey instruments designed to elicit insights to help meet the research objectives. Second, the research team conducted in-depth interviews with representatives of eight different groups: (1) a variety of administrators of ratepayer-funded residential lighting programs from across North America; (2) federal and state government; (3) groups of stakeholders with an interest in the residential lighting or building industry; (5) lighting manufacturers; (6) installers of lighting, including home builders and electricians; (7) specifiers of lighting, including architects and lighting designers; and (8) organizations providing training in residential lighting design and installation. Third, quantitative telephone surveys were conducted with representative samples of NY retailers, consumers, and homeowners who had installed one or more lighting fixtures in the previous year. Fourth, findings from the secondary research, interviews, and consumer surveys were used to inform the development of a dynamic model of the NYS lighting market in the future, the “market adoption model.”

## **ORGANIZATION OF THIS REPORT**

Given that one of the objectives of this research was to develop an understanding of current and likely future conditions of the residential lighting market, this research report is organized chronologically. After a summary of the research approach in Section 2, Section 3 of the report describes the current residential lighting market from the perspective of the following:

- those responsible for specifying and installing residential lighting in new construction and renovation projects: that is, builders, electricians, architects and lighting designers;
- NYS consumers and homeowners who have recently installed lighting fixtures;
- NYS retailers that sell bulbs and fixtures.

This is followed in Section 4 by a description of the current residential lighting program approaches of five energy efficiency program administrators from around the U.S. and Canada. These program administrators

were chosen for interviews either because they operated in jurisdictions in which legislation similar to EISA had already been implemented, or because there was evidence to suggest that their approach to residential lighting was fairly innovative (i.e., they did not focus primarily on rebating bare-spiral CFLs).

Section 5 turns to the future of the residential lighting market. In this section, the report explores how manufacturers and program administrators are preparing for residential lighting after EISA, and the experiences and lessons learned from jurisdictions both within and outside of the United States that have already begun phasing in lighting legislation similar to EISA. It addresses consumer awareness of EISA and the expectations of consumers, manufacturers, and stakeholders as to which bulbs consumers are likely to use to replace the bulbs being phased out under EISA; discusses market expectations for new lighting technology held by manufacturers, stakeholders, the building industry and lighting specifiers, and program administrators; and describes the lighting market adoption model developed for NYS based on these expectations. It also describes a variety of ideas and opportunities identified by interviewees for increasing the energy efficiency of residential lighting in NYS, explores the interest of the building trades and lighting specifiers in lighting training, and examines how the building industry and lighting specifiers obtain training in high-efficiency lighting and the support that educational institutions are currently providing to train future installers and specifiers in high-efficiency lighting and what these institutions say they need to enhance or expand their efforts.

The report concludes with a discussion of implications of a selection of key findings in Section 6. Because this was a market characterization study, which is descriptive in nature in order to provide program planners with ample information on which to base future program designs, there is a great deal of detail included in this report, not all of which warrants conclusions or discussion. Readers who wish to skip the details will find in Section 6 a bulleted list of the findings and recommendations associated with each topic addressed in the report. These are presented in the same order in which they appear in the report. The bullets match those that appear in Section 3 through Section 5 under the heading “Summary” in association with each major topic addressed by the report.

## **BACKGROUND**

### **1.1.1 Summary of EISA Lighting Efficiency Standards**

In order to extract value from this report, it is critical to understand the lighting standards set by the Energy Independence and Security Act (EISA), which was signed into law on 2007. The EISA lighting efficiency standards went into effect on January 1, 2012, and are expect to change the U.S. lighting market significantly between now and 2020 as well as long afterwards.

### 1.1.1.1 Status of Funding for EISA Lighting Standards Enforcement

On December 15, 2011, a budget deal was struck among Congressional negotiators that prohibited the Obama administration from spending any money to enforce EISA lighting standards until October 1, 2012.<sup>6,7</sup> This bill was signed into law on December 23, 2012.<sup>8</sup> It appears that the lack of funding for enforcement is likely to have little effect on the implementation of the standards, however, as manufacturers had been preparing for the phase-out of 100-watt incandescents for months prior to this announcement. According to Noah Horowitz of the Natural Resources Defense Council, the delay is merely a “speed bump” since it does not change the standards themselves.<sup>9</sup>

### 1.1.1.2 Overview of EISA Lighting Standards

As Table 1 shows, in its first stage EISA sets maximum wattage levels by lumen output for medium, screw-base bulbs with lumen ranges from 310 to 2,600 lumens and voltage ranges from 110 to 130 volts. The standards do not officially ban any particular type of light bulb, but mandate that bulbs manufactured after the implementation date meet these new standards. This has the effect of phasing out many of the Edison-type incandescent bulbs, which do not meet the new standards. Since the EISA standards exclude 22 categories of incandescent bulbs (such as three-way bulbs, outdoor bug lights, reflectors, and appliance lights), as well as bulbs with light outputs of less than 310 lumens or greater than 2,600 lumens, many types of incandescent bulbs will nonetheless not be addressed by the EISA standards.

The standards go into effect via a staged approach that began on January 1, 2012 (Stage 1), when general service bulbs were required to use from 20 percent to 30 percent less energy than current incandescent bulbs. Within Stage 1, the new efficiency standards are implemented in such a manner as to apply to 100-watt incandescent bulbs in 2012, 75-watt incandescent bulbs in 2013, and 40- and 60- watt incandescent

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<sup>6</sup> “Congress overturns incandescent light bulb ban,” by Stephen Dinan, Washington Times, December 16, 2012. Accessed December 16, 2011 from <http://www.washingtontimes.com/news/2011/dec/16/congress-overturns-incandescent-light-bulb-ban/>.

<sup>7</sup> “Despite Delay, the 100-Watt Bulb Is on Its Way Out” by Diane Cardwell. The New York Times. December 16, 2012. Accessed March 2, 2012 from [http://www.nytimes.com/2011/12/17/business/energy-environment/100-watt-bulb-on-its-way-out-despite-bill.html?\\_r=2&pagewanted=all](http://www.nytimes.com/2011/12/17/business/energy-environment/100-watt-bulb-on-its-way-out-despite-bill.html?_r=2&pagewanted=all).

<sup>8</sup> “Obama Challenges Provisions in Budget Bill” by Charlie Savage. The New York Times. December 23, 2011. Accessed March 2, 2012 from <http://www.nytimes.com/2011/12/24/us/politics/obama-issues-signing-statement-on-budget-bill.html?scp=6&sq=federal+spending+bill+&st=nyt>.

<sup>9</sup> “Despite Delay, the 100-Watt Bulb Is on Its Way Out” by Diane Cardwell. The New York Times. December 16, 2012. Accessed March 2, 2012 from [http://www.nytimes.com/2011/12/17/business/energy-environment/100-watt-bulb-on-its-way-out-despite-bill.html?\\_r=2&pagewanted=all](http://www.nytimes.com/2011/12/17/business/energy-environment/100-watt-bulb-on-its-way-out-despite-bill.html?_r=2&pagewanted=all).

bulbs in 2014. In Stage 2 (Table 2), which begins on January 1, 2020, all general service bulbs are required to meet a 45 lumen-per-watt standard (close to the efficacy of many standard CFLs in 2010<sup>10</sup>)—or a more stringent level, if appropriate.

EISA prohibits the manufacture and import of non-qualifying incandescent bulbs after the implementation date, but not the sale of these bulbs. Therefore, standard 100-watt incandescent bulbs will remain available to consumers on retailers' shelves until all stock acquired before January 1, 2012, is sold.

**Table 1: Stage 1 EISA Phase-out Schedule**

Stage	Effective Date	EISA-Rated Lumen Ranges	Maximum Rate Wattage	Major Incandescent Bulb Wattage Categories Affected
1	1/1/2012	1,490-2,600	72W	100W
	1/1/2013	1,050-1,489	53W	75W
	1/1/2014	750-1,049	43W	60W
	1/1/2014	310-749	29W	40W

Sources: Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1573, p.1577 (2007) and U.S. Department of Energy. 2010. "ENERGY STAR<sup>®</sup> CFL Market Profile," p. 27. September.

**Table 2: Stage 2 EISA Phase-out Schedule**

Stage	Effective Date	Rated Lumen Ranges	Minimum Efficacy	Major Incandescent Bulb Wattage Categories Affected
2	1/1/2020	All	At least 45 lumens/W	All

Sources: Source: Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1573, p.1580 (2007) and U.S. Department of Energy. 2010. "ENERGY STAR<sup>®</sup> CFL Market Profile," p. 27. September.

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<sup>10</sup> U.S. Department of Energy. 2010. "ENERGY STAR<sup>®</sup> CFL Market Profile." September. Accessed March 7, 2012 from

[http://www.drintl.com/Data/Sites/1/downloads/publications/2010\\_cfl\\_market\\_profile.pdf](http://www.drintl.com/Data/Sites/1/downloads/publications/2010_cfl_market_profile.pdf).

### 1.1.1.3 Consumer Choices After EISA

Consumers still have a variety of options for replacement bulbs after January 1, 2012, when the first of the standards was phased in.

- EISA-compliant halogen bulbs, a more efficient type of incandescent bulb, are already available to consumers. In addition to using approximately 25 to 30 percent less energy than standard incandescent bulbs, halogen bulbs share many of the features of incandescent bulbs: size, shape, quality of light, and dimmability. The price of a 60-watt equivalent halogen bulb typically ranges from \$1.50 to \$3.<sup>11</sup> (These bulbs meet the Stage 1 EISA standard, but not the Stage 2 EISA standard.)
- CFLs, which use about 75 percent less energy than traditional incandescent bulbs, are another general service replacement option. Unlike halogen bulbs, standard spiral-shaped CFLs do not share certain features (specifically, shape, light color, and range of dimmability) with standard incandescent bulbs. However, new specialty CFLs are similar to traditional incandescent bulbs in shape, light output, color, and ability to dim. In addition, CFLs contain a small amount of mercury, which causes health and safety concerns among some consumers and adds some inconvenience regarding disposal of these bulbs. A 13-watt spiral CFL (a 60-watt equivalent) typically costs from \$2 to \$3.<sup>12,13,14</sup>
- A few non-directional LED replacement bulbs are already on the market. LEDs use approximately 80 percent less energy than standard incandescent bulbs. While LEDs are the most efficient option, they are still a developing technology with a limited number of products on the market meant to replace standard incandescent bulbs.<sup>15</sup> These bulbs begin at \$10<sup>16</sup> and go up from there—some cost approximately \$40. They are typically available only in 40- and

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<sup>11</sup> These price ranges appear to be for bare spiral CFLs. Specialty CFLs, such as those with dimming capabilities, may cost more.

<sup>12</sup> “What Retailers Need to Know About New Light Bulb Legislation.” Webinar hosted by Alliance to Save Energy and American Lighting Association. November, 21, 2011.

<sup>13</sup> Opinion Dynamics Corporation. “EISA: The End of CFL Programs? Evaluation Perspective.” Presentation in an Association of Energy Services Professionals webinar, February, 2011.

<sup>14</sup> These price ranges appear to be for bare spiral CFLs. Specialty CFLs, such as those with dimming capabilities, may cost more.

<sup>15</sup> Opinion Dynamics Corporation. “EISA: The End of CFL Programs? Evaluation Perspective.” Presentation in an Association of Energy Services Professionals webinar, February, 2011.

<sup>16</sup> “What Retailers Need to Know About New Light Bulb Legislation.” Webinar hosted by Alliance to Save Energy and American Lighting Association. November, 21, 2011.

60-watt equivalents.<sup>17</sup> As described in Section 5.1.5.5, both light output and price are expected to change rapidly in the near future.

- Until 75W, 60W and 40W incandescent bulbs stop being manufactured and sell out, consumers will also have the option of replacing higher wattage incandescent bulbs with lower wattage ones, known as “bin jumping”.

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<sup>17</sup> Opinion Dynamics Corporation. “EISA: The End of CFL Programs? Evaluation Perspective.” Presentation in an Association of Energy Services Professionals webinar, February, 2011.



## Section 2

### RESEARCH APPROACH

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This section briefly summarizes the methodology for the three telephone surveys and the market adoption model that were part of this research, and describes each of the eight groups selected for in-depth interviews. Complete methodological details for the telephone surveys can be found in Appendix B. The telephone survey results are described and discussed by topic in Section 3 and Section 5 of the report. For the convenience of readers, Appendix C includes each telephone survey instrument showing results for each question in order of appearance in the instrument, and shows some demographic and firmographic characteristics not discussed in the report. Appendix A includes additional detail on demographic and firmographic characteristics and other background information about interviewee groups.

#### SURVEYS

##### 2.1.1 Consumer Telephone Surveys

NMR conducted two separate telephone surveys of New York State residents:

- 510 interviews with consumers. A total of 279 upstate consumers and 231 downstate consumers completed the survey. The margin of error for the upstate group is +4.9% at the 90% confidence level; for the downstate group, +5.4%.
- 140 interviews with homeowners who had installed at least one fixture in the past twelve months. A total of 63 upstate homeowners and 77 downstate homeowners completed the survey. The margin of error for the upstate group is +10.4% at the 90% confidence level; for the downstate group, +9.4%.

Both surveys were managed by Apprise and conducted by Braun Inc. via computer-assisted telephone interviewing (CATI). These random-digit dial (RDD) surveys were fielded from September, 2011 to November, 2011 and lasted for an average of 15 minutes. Survey samples were selected proportionately by county so that each county was represented in the same proportion as its population within the region (Upstate or Downstate). Long Island (Nassau and Suffolk counties) were excluded from the survey sample frames. The purpose of both surveys was to ask lighting consumers in the NYSERDA territory about their familiarity and experience with energy-efficient bulbs and fixtures, their lighting-related decision making, and their understanding of key lighting knowledge that will be relevant under EISA. Survey results were weighted to adjust for patterns of non-response that might have biased the results. Further weights were also developed to adjust for demographic differences between the sample and the region including: home ownership, head of household age, education, number of adults in household, and number of people in household.

For more detail regarding the consumer and homeowner fixture survey data collection and analysis methodology, see Appendix B.

### **2.1.2 Retailer Lighting Survey**

The Retailer Lighting Survey was conducted by Apprise in order to assess the market for residential lighting products and to determine the extent to which retailers attempt to sell efficient lighting, their perception of the lighting market as well as their interactions with customers regarding energy efficiency. The survey was conducted by phone (CATI) and targeted retailers from six categories that were determined based on the channels from which NYSERDA consumers purchased 95% of Compact Fluorescent Lamps (CFLs) in 2010,<sup>18</sup> and by a study in the late 1990s to be the channels from which 76 percent of permanent fixtures were purchased in the Northeast region.<sup>19</sup> The six channel categories were: department stores, hardware stores, grocery stores, lumber material stores, lighting specialty stores, and warehouse stores. The person who answered the survey was the individual in the store responsible for making decisions about lighting stock and lighting displays. There were 83 completed surveys from a population of 11,748 stores among the targeted channels. The margin of error is +9.0% at the 90% confidence level. Weights were created to adjust the number of completed cases to align bulb stocking (as reported by survey respondents) back to consumer purchase behavior (as reported by consumers to the 2011 NYSERDA CFL Impact Study). The same weighting approach was also created for fixtures.

For more detail regarding the retailer survey data collection and analysis methodology, see Appendix B.

## **IN-DEPTH INTERVIEWS**

### **2.1.3 Stakeholder Interviews**

In July and August 2011, the research team interviewed staff of four organizations considered by NYSERDA to be “stakeholders” in the adoption of energy-efficient lighting for residential applications. The stakeholders are:

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<sup>18</sup> NYSERDA. 2011. “Impact Evaluation NYSERDA CFL Expansion Program: Random Digit Dial and Onsite Survey Results FINAL Report.” June. Accessed June 11, 2012 from [http://www.nyserda.ny.gov/en/Page-Sections/Program-Evaluation/NYE\\$-Evaluation-Contractor-Reports/2011-Reports/~media/Files/EDPPP/Program%20Evaluation/2011ContractorReports/2011%20CFL%20Expansion%20Program%20Final.ashx](http://www.nyserda.ny.gov/en/Page-Sections/Program-Evaluation/NYE$-Evaluation-Contractor-Reports/2011-Reports/~media/Files/EDPPP/Program%20Evaluation/2011ContractorReports/2011%20CFL%20Expansion%20Program%20Final.ashx).

<sup>19</sup> Hoefgen, L. and Dan Nore. 1999. “Northeast Residential Lighting Market: Measuring and Targeting Market Transformation.” AESP Annual Conference.

- A state trade association of home building efficiency professionals, including building performance contractors, home energy raters, building diagnosticians, energy auditors, engineers, architects, and consultants;
- A national labor union representing workers in a related industry;
- A research center owned by a trade association for the home building industry; and
- A university-based research and education organization devoted to lighting.

Stakeholders were asked about their involvement in encouraging the installation of high-efficiency lighting fixtures and bulbs in homes; their perspective on new lighting technologies; what would help builders, electricians, architects and lighting designers routinely specify or install high-efficiency lighting as part of residential projects; and expectations regarding the effects of EISA on the residential lighting market. In conducting the interviews, the research team followed the interview guide in Appendix D.

#### **2.1.4 Government Interviews**

In August and September of 2011, the research team interviewed staff of three government organizations involved in the adoption of energy-efficient residential lighting, including two federal agencies and one state agency. The U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA) were chosen based on their role in federal energy efficiency efforts in the residential sector. In addition, the research team chose to interview a key agency in the state of California involved in the early implementation of EISA. In conducting the interviews, the research team followed the interview guide in Appendix D.

#### **2.1.5 Program Administrator Interviews**

The research team interviewed staff of five administrators of residential lighting programs from across the U.S. and Canada. The program administrators were chosen for one or more of the following reasons: because evidence from various sources<sup>20,21</sup> suggested that their residential lighting programs were innovative; they administered residential lighting programs in a state or province that had already implemented legislation similar to EISA; or because of a recommendation from a program administrator interviewee.

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<sup>20</sup> Consortium for Energy Efficiency (CEE). 2011. "Summary of Residential Lighting Programs in the United States and Canada." Accessed September 20, 2011 from <http://www.cee1.org/files/CEEResidentialLightingProgramSummaryApril2010.pdf>.

<sup>21</sup> U.S. Department of Energy. 2010. "ENERGY STAR® CFL Market Profile." September. Accessed March 7, 2012 from [http://www.drintl.com/Data/Sites/1/downloads/publications/2010\\_cfl\\_market\\_profile.pdf](http://www.drintl.com/Data/Sites/1/downloads/publications/2010_cfl_market_profile.pdf).

All program administrators were asked about the energy-efficient residential lighting programs they were running and developing; the comprehensiveness of their programs; and what ways they find most effective to reach market actors regarding opportunities for energy-efficient lighting and lighting design. The California and Canadian program administrators were also asked about consumer and retailer reactions to early adoption of lighting efficiency standards. The interviews were conducted in July and August 2011, following the interview guide in Appendix D.

### **2.1.6 Manufacturers**

The research team spoke with staff of 11 lighting manufacturers about their plans under the new EISA requirements. All 11 manufacturers operate within the United States, and ranged in size from small organizations with only domestic operations to large international concerns. Seven of the companies interviewed manufacture fixtures and bulbs while four manufacture bulbs only. Manufacturers fit one or more of the following categories:

- Working with factories abroad to develop and import new products.
- Having consumer brands as a part of their larger residential and commercial lines (incandescent, halogens, CFLs, cold cathode fluorescents, metal halides, and high-pressure sodium lamps, in addition to fixtures).
- Manufacturing only energy-efficient products.

The research team conducted these interviews from August through November 2011, following the interview guide included in Appendix D.

### **2.1.7 Installers**

To gain perspectives and insights from the building, electrical, and contracting community, the research team conducted in-depth interviews with eight electricians and five home builders who install lighting systems for residential new construction and renovation projects. An additional three home builders provided insights through written survey responses.

The research team specifically selected installers for the interviews whose businesses are primarily driven by residential new construction and renovation projects. Out of the eight electricians interviewed, five are based in New York State and the remaining three are from California, Montana, and New Jersey. Six of the eight electricians own their respective companies.

Of the eight builders who provided responses (five via interviews and three via a written response), five are based in New York State and the remaining three are based in Pennsylvania, Massachusetts, and Texas. Six of the eight builders own their respective companies.

While most of the interviewed installers work for small companies with one to 10 employees, one builder, based in Pennsylvania, works for a development and management company that services seven states: Alabama, Connecticut, Maryland, New Jersey, New York, Ohio, and Pennsylvania.

The team conducted these interviews from September through December 2011, following the interview guide, or the questionnaire that was adapted from the interview guide, included in Appendix D.

### 2.1.8 Specifiers

To gather opinions and views from lighting system “specifiers” (i.e. architects and lighting designers), the research team conducted in-depth interviews with a total of 17 specifiers: eight architects and nine lighting designers. Each person interviewed was the owner of their respective company.

When selecting architects to interview, the research team looked for those with at least part of their practice in residential new construction. Three of the eight architects work primarily in the Tri-State area comprising New York, New Jersey, and Connecticut. The team obtained candidate lighting designer interviewees from lists of recommended contacts supplied by other lighting design professionals.

Six of the eight architects the research team interviewed said their projects are primarily or exclusively residential. One of the six described his projects as “*very high-end, custom single family apartments.*” Another said his projects are a mix of high-end residential and commercial. A third architect characterized his projects as “*all standard buildings.*”

While all nine designers said they work on residential projects, only two said their projects are “*mostly*” or “*almost all*” residential. The other seven said their work involves a mix of building types, with some providing more specificity than others. Specifically,

- Five mentioned residential and commercial projects;
- One described his firm’s projects as “*high-end residential, public spaces, and commercial;*”
- One said their projects are “*mostly commercial, health care, and institutions, but also includes residential;*”
- One described his firm’s work as, “*all types of projects including residential;*” and
- One described his firm’s work as “*a lot of museum work, also residential and institutional.*”

The lighting designers and architects with locally-focused practices generally work exclusively on high-end residential projects.

The research team designed the interviews to gather expert opinions from professionals with strong backgrounds in residential architecture and/or residential lighting design. The specifiers’ responses provide insights into how leading practitioners view high-efficiency residential lighting options.

The research team conducted the interviews in August and September 2011, following the interview guide included in Appendix A.

### 2.1.9 Educational Providers

The research team conducted in-depth interviews with representatives of 16 organizations that provide training and education to builders or electrical installers in affiliation with the building, energy-efficiency,

and lighting industries. The educational providers interviewed were identified by installers and specifiers during the course of their interviews. All educational providers interviewed by the research team have a green building or energy-efficiency focus to some degree. With the exception of three educational providers, all of the educational providers interviewed by the research team operate either in New York State, the Northeast, or nationally. The educational providers work mostly with home energy auditors or contractors, builders, architects, and engineers.

- Six are home energy-efficiency education providers that focus on providing energy rating or audit training based on a variety of certification and accreditation programs such as Building Performance Institute (BPI) and Leadership in Energy and Environmental Design (LEED);
- Five interviewees are building or energy-industry associations that provide education as a component of their services to their members;
- Three respondents are green building alliances that promote sustainable building through local government support, training, collaborative, and marketing efforts;
- One respondent is a research organization that focuses specifically on lighting; and
- One respondent is an energy-efficiency nonprofit organization.

The research team conducted the interviews in December 2011, following the interview guide included in Appendix D.

## **MARKET ADOPTION MODEL**

The market adoption model is a spreadsheet-based tool that computes energy savings based on the wattages and types of bulbs that consumers said they are likely to install in place of the incandescent bulbs being phased out by EISA, taking into account the wattage of the bulbs they currently have installed. In developing estimates of current consumer lighting purchases for the market adoption model, data were used from previous lighting research in the NYSERDA area and beyond, including lighting saturation and shelf-stocking studies. The model's projections of future lighting purchases are based on responses to the consumer survey questions about the bulbs respondents are likely to use to replace each incandescent wattage type as it is phased out. The consumer survey responses were adjusted to account for information from the manufacturer interviews about the bulb types that are likely to be available in the lighting market over the course of EISA implementation, and possible consumer reactions to new technology.

For more information about the market adoption model tool, see Section 5.1.6. The first worksheet in the tool, "Instrument Instructions and Key," provides instructions on how to use the spreadsheet and walks the user through the information contained in the other four worksheets of the tool.

## Section 3

### THE CURRENT RESIDENTIAL LIGHTING MARKET

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This section describes the current residential lighting market with a particular focus on New York State. It begins with a description of how lighting is addressed in the home building industry, including the roles of various key players and their self-reported levels of awareness and knowledge of high-efficiency lighting. Following this, it summarizes perspectives and observations on different aspects of lighting and the current residential lighting market for each of the groups surveyed and interviewed for this study, as appropriate.

As with Section 5, key observations, findings, and recommendations related to each topic are listed immediately under the heading for that topic. Key observations, findings, and recommendations for all topics are aggregated and summarized in Section 6.

#### LIGHTING RELATED ROLES IN THE BUILDING INDUSTRY

##### 3.1.1 Summary

- ***According to stakeholders, the residential building industry can be broken into three broad groups:*** (1) Production builders who take advantage of economies of scale by specifying the same design for each home they build; (2) Custom builders who offer design choices to individual homebuyers, often giving the customer a budget for lighting, and (3) Small, privately held, non-production builders who build semi-custom homes and may often be innovators.
- ***Observations from both stakeholders and installers suggest that the use of architects or lighting designers in residential new construction or renovation is not common.*** According to several of the builders and electricians interviewed, typically only high-end or custom projects include lighting designers or architects, and they are likely to focus only on the aesthetic component, not on energy efficiency.
- ***Architects agreed that lighting designers are not commonly involved in residential new construction and renovation projects.*** Even when a lighting designer is involved in a project, they may not make all the decisions about lighting. Thus, the use of lighting designers in residential new construction and renovation projects is probably even less common than the use of architects.
- ***According to specifiers (architects and lighting designers), the percent of the total project design time that is spent on lighting varies, but is typically a relatively small part of the project.***

- ***When an architect or lighting designer is involved in a project, customers and homebuyers are almost always part of the lighting design decision.*** According to specifiers, customers and homebuyers tend to take a more active role in lighting design decisions when working with lighting designers.

### **3.1.2 Roles in Residential Lighting Specification and Installation**

#### **3.1.2.1 Stakeholder Perspective**

Stakeholders interviewed explained the differing roles of various market actors in the home building and remodeling process and their differing characteristics. According to these interviewees, lighting specification for residential new construction is most often done by builders. As one stakeholder explained, there are three different types of residential builders with different business models:

1. Production builders take advantage of economies of scale by specifying the same design for each home they build.
2. Custom builders offer design choices to individual homebuyers, often giving the customer a budget for lighting. Custom builders earn a fee on top of lighting costs regardless of the choice of lighting, and thus may have less of a stake in the lighting decision than other types of builders.
3. Small, privately held, non-production builders build semi-custom homes and “are often the innovators.”

Two stakeholders indicated that electricians are not typically involved in lighting specification. According to these interviewees, the primary role of electricians is to install the fixtures that have already been selected. However, one stakeholder pointed out that electricians can influence a builder’s choice of lighting technology in certain circumstances in which there is a knowledge gap between the builder and the electrician. On one hand, electricians may charge a premium to install technology with which they are unfamiliar, which could discourage builders from specifying high-efficiency lighting. On the other hand, an electrician who is more knowledgeable about leading edge lighting technology than a builder could potentially influence the builder’s decision towards higher efficiency lighting.

#### **3.1.2.2 Specifier Perspective: Role of Specifiers in Lighting Decision Making**

When queried about their role in specifying lighting for residential new construction and renovation projects, all of the architects and lighting designers interviewed said they are almost always responsible for these lighting specifications. Two architects said they occasionally use lighting designers, but noted this practice is not common. The lighting designers elaborated that they either specify lighting themselves or make recommendations that are generally followed by the clients, architects, and other professionals with whom they work. One lighting designer also noted that his firm occasionally consults with an interior designer to make lighting decisions. Representative descriptions of the specifiers’ roles included:

- “What happens most of the time is I locate the fixture locations in the building and may provide a generic specification; usually the owner picks out the fixtures.” (Architect)
- “Even working with a consultant, [the lighting decision] is a collaborative effort. The final decisions are ours.” (Architect)
- “Some clients are more involved than others but they do not know how to get there. They are counting on our expertise: we have done a lot of things differently since LEDs [Light Emitting Diodes] have come into our world. Most people don't really know what they like without seeing it. Some people have ventured into Compact Fluorescent Lamps (CFLs), most people hate them. We try to avoid CFLs as much as we have been able to. LED has been really coming along. Part of education is really showing [clients] what LEDs can do.” (Lighting Designer)
- “There are times when the [architect’s] interior designer will have specific selections for decorative light fixtures, some projects we get into that happens. In others we make all the decisions.” (Lighting Designer)

### 3.1.3 Specifier Perspective on Lighting Decision Making

When asked, “*How is the decision made about what type of lighting to install in residential new construction/renovation projects at your firm?*,” almost all of the specifier interviewees (15 out of 17) mentioned “professional assessment” as a main factor. Slightly less than a third (5 of 17) mentioned “homebuyer interest.” Other mentions included lowest cost (n=2), contractor decisions (n=1), and consultant input (n=1).

While professional assessment was a prime factor mentioned by both architects and lighting designers, throughout the interview it was clear that specifiers consistently deal with many interests and/or concerns actively expressed by homebuyers, and that they handle the questions homebuyers/owners raise with regard to lighting. This was especially true for lighting designers. Architects are also responsive, but the interviewees indicated that lighting-related issues between architects and clients are less common.

### 3.1.4 Use of Lighting Designers or Architects

Both types of installers (electricians and builders) reported they do not often work on construction or renovation projects that involve lighting designers or architects.

Four of the eight electricians reported working on construction or renovation projects that include lighting designers or architects. One of these four stated that every project they work on involves one of these types of specifiers. The other three electricians said that only the rare high-end or custom projects include lighting designers or architects. One electrician estimated working with lighting designers or architects on one out of every three projects.

Similarly, five out of eight builders said it is “*not very often*” that they work on new construction or renovation projects that involve lighting designers or architects. However, one builder reported that his

company has an in-house designer who assists customers with picking out their lighting fixtures and bulbs. Another builder has never worked with a lighting designer or architect. Similar to the electricians, some builders stated that only high-end or custom projects include lighting designers or architects. In these cases, they explained, the designers or architects focus only on the aesthetic component, not on energy efficiency.

### 3.1.5 Time Spent on Lighting Design

Specifiers were asked, “What percentage of time in developing blueprints, on average, is allocated to lighting design?” Seven out of 17 specifiers (including five of the eight architects) estimated that 10% of the time spent on developing blueprints was allocated to lighting design. Other estimates ranged from 1% to 20%. Four of the nine lighting designers did not give a percentage, saying they aren’t familiar enough with the time architects spend overall on blueprints to estimate the percentage allocation to lighting design.

Some examples of specifier comments for this question include:

- “... less than 10% of the total project, but lighting design is almost more than anything where the sorcery and black magic happens, where the project comes to life or it doesn’t. [The design] really affects the quality and usability of the space.” (Architect)
- “100% for our part as we are lighting designers, but overall, including the architect’s plans, a very small percent of time. We do an AutoCAD layer, which they insert into their file. In the architectural firm there is often a decorator the client is also working with. From the architect’s standpoint it’s 2% of their time.” (Lighting Designer)

## AWARENESS & KNOWLEDGE OF HIGH-EFFICIENCY LIGHTING

### 3.1.6 Building Industry

#### 3.1.6.1 Summary

- **Specifiers (architects and lighting designers) tended to agree that while both lighting designers and architects are aware of high-efficiency lighting availability and uses, lighting designers’ awareness is ahead of that of architects.** Compared to architects, lighting designers were perceived as being more aware of the availability and uses of high-efficiency lighting for residential applications, as well as more likely to understand how to identify appropriate high-efficiency lighting for residential projects.
- **Lighting designers strongly favor LEDs over CFLs,** but lighting designers also serve a specialized high-end market that does not tend to reflect the overall residential market. Architects are more likely to equally promote CFLs and LEDs, or even to prefer CFLs due to their lower cost, but some architects also view LED lighting as more viable than CFL lighting. In keeping with this perspective, specifiers mention LEDs to their clients more frequently than any other type of efficient lighting design option. When discussing high-efficiency

lighting options with customers, LEDs are mentioned most frequently, by 88% of specifiers. Fifty-nine percent mention CFLs, 47% mention linear or other fluorescent lighting, and a variety of other options are also mentioned.

- ***As a group, electricians did not consider themselves particularly knowledgeable about new lighting technologies.*** On a scale of 1 “very little knowledge” to 5 (“a great deal of knowledge”), electricians gave themselves an average rating of 3.2. With an average rating of 4, builders saw themselves as somewhat more knowledgeable about new lighting technologies.
- ***All of the electricians and builders interviewed reported that they always recommended the more energy-efficient lighting products to their residential clients. However, budget was also taken into account.*** Three of the eight electricians noted that their high-efficiency lighting recommendations depend heavily on their customers’ budgets.

### 3.1.6.2 Specifier Awareness and Understanding of High-Efficiency Lighting Options

The research team asked all specifiers (lighting designers and architects) how aware as a group they thought each of the two groups of specifiers were of the availability and uses of high-efficiency lighting. Specifiers in general viewed architects as being aware of the availability and uses of high-efficiency lighting, but much less so than lighting designers. As Table 3 shows, 35% of all specifiers said that architects are very aware of high-efficiency lighting, compared to 94% who said the same about lighting designers.

**Table 3. Specifier Self-Reported Awareness of Efficient Lighting Options (n=17)**

In general, how aware do you think (architects, lighting designers) are of the availability and uses of CFLs, LEDs, and other high-efficiency lighting for residential applications?	Architects	Lighting Designers
Very aware	35%	94%
Somewhat aware	47	6
Not too aware	18	0

The research team also asked specifiers about their understanding of how to identify appropriate high-efficiency lighting for residential projects. Only 12% of specifiers overall said that architects have a high understanding of how to identify appropriate high-efficiency lighting for residences. Both architects and lighting designers agreed that while architects have a good basic awareness, they do not always know how to effectively select the right lighting for the right circumstances. As one lighting designer said, “*They [architects] don’t have the understanding on how to use them in the right situation...you need an advanced*

degree in lighting [to know] how to use it.” In contrast, 77% of specifiers overall said that lighting designers have a high understanding of the availability and uses of high-efficiency lighting (Table 4).

**Table 4 Specifier Self-Reported Understanding of Appropriate High-Efficiency Lighting Uses (n=17)**

To what extent in general do you think (architects/designers) understand how to identify appropriate high-efficiency lighting for residential projects?	Architects	Lighting Designers
High understanding	12%	77%
Moderately high understanding	35%	23%
Neutral/average understanding	6%	0%
Moderately low understanding	41%	0%
No understanding	6%	0%

It should be noted that almost all the lighting designers made negative comments about CFLs during their interviews. Designers in particular referred to the low quality of CFL light and the poor dimming capabilities of those few options that can dim. Some lighting designer comments include:

- “LEDs are going to be a big part of [the] lighting future; they have amazing capabilities but are being marketed incorrectly. It’s complicated technologies which I understand, but it’s more of a problem in translation: they are being pushed on a public who do not understand the details.”
- “...Some people have ventured into CFLs, but most people hate them. We try to avoid CFLs as much as we have been able to. LEDs have really been coming along. Part of our job to is to educate people and really show them what the technology can do.”

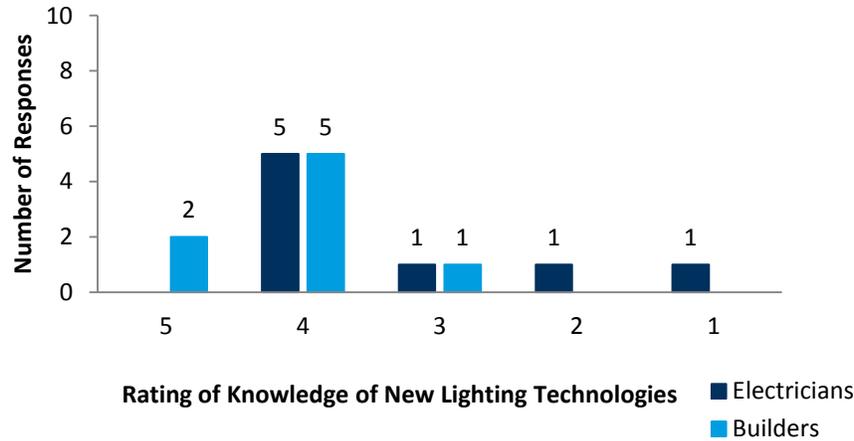
By comparison, architects tended to be neutral to positive when discussing CFLs. However, one architect did say that, “...We put LEDs in every can light. This is our third year of doing that. Once you look at the numbers, [and you realize] you are never buying a light bulb again: our clients are OK with the expense, given that. Most people hate CFLs, even for me I basically think they are OK but kind of annoying. LEDs are so much better than CFLs. The quality of light is much better.”

In keeping with this perspective, specifiers were found to mention LEDs to their clients more frequently than any other type of efficient lighting design option. When discussing high-efficiency lighting options with customers, LEDs are mentioned most frequently, by 88% of specifiers. Fifty-nine percent mention CFLs, 47% mention linear or other fluorescent lighting, and a variety of other options are also mentioned.

### 3.1.6.3 Installer Knowledge of New Lighting Technologies

The research team asked installers (electricians and builders) to rate their own level of knowledge of new lighting technologies, such as LEDs or halogens, on a scale of 1 (“very little knowledge”) to 5 (“a great deal of knowledge”). The average rating among electricians was 3.2, and the average rating among builders was 4.0. Figure 1 shows the distribution of ratings.

**Figure 1 Installer Self-Reported Knowledge of New Lighting Technologies**



When asked how often they recommend to their residential clients the more energy-efficient lighting products appropriate to the project, all of the electricians reported that they always did so. However, three electricians said that the specific high-efficiency lighting recommendations they recommend depend heavily on their customers’ budgets. If the project and budget are small, they avoid suggesting more expensive technologies such as LEDs. One electrician performs a demonstration for his clients, comparing incandescent bulbs to CFLs. He shows that it is possible to connect more CFLs than incandescent bulbs to an existing circuit without running a new circuit.

As with the electricians, all of the builders said they always recommend the more energy-efficient lighting products to their customers. One builder has a short “energy education” session with each client to discuss different types of bulbs and fixtures and their efficiencies.

### 3.1.7 Consumers

#### 3.1.7.1 Summary

- The new FTC Lighting Facts label represents a major departure not only from the way that consumers are accustomed to measuring bulb brightness, but how they are used to thinking about lighting generally.* Consumers wishing to recreate the quality of current characteristics of their homes’ lighting with most EISA-qualified bulbs will need to give thought to concepts such as lumens and color rendition as well as the function their bulb in terms of directionality

and dimming if they are to be satisfied with their purchase of high-efficiency CFLs or LEDs. In short, the decision to buy a light bulb will become more complicated. EISA-compliant halogen bulbs represent an easier choice for consumers seeking to replace general purpose lamps, as the light quality from these bulbs is similar to those of standard incandescent bulbs. However, if NYS consumers turn to EISA-compliant halogens rather than CFL or LEDs lamps to replace incandescent lamps phased out under EISA, the state will realize less than optimum savings from the legislation.

- ***If residential energy savings from lighting is to be maximized under EISA, it is important to ensure that consumers understand what to expect from their lighting choices and can make sense of the information presented on the new lighting label.***
- ***When asked as an “unaided” style question, two-thirds of NYS consumers were aware of CFLs—and close to as many claimed to be aware of LED and EISA-compliant halogen bulbs. Recent research suggests that the LED and halogen awareness numbers should be interpreted with caution.*** Two-thirds (66%) of NYS consumers had heard of CFLs,<sup>22</sup> nearly six out of ten (59%) had heard of LEDs, and slightly more than one-half (55%) reported that they had heard of “high-efficiency” (i.e., EISA-compliant) halogen bulbs. Recent focus group research conducted with Connecticut consumers suggests that consumers are not as familiar with LED and EISA-compliant halogen bulbs as with CFLs, and thus are not as able correctly identify them from descriptions. For this reason, the self-reported awareness of LED and halogen bulbs reported from consumers and homeowners who had installed fixtures should be interpreted with caution. Homeowners who had recently installed fixtures in their home were somewhat more familiar with energy-efficient bulbs, with more than three-quarters of these respondents reporting having heard of each bulb type. Upstate respondents reported having heard of all three bulb types at significantly greater rates than did Downstate respondents to both surveys. (In this measurement, respondents who said that they had heard of each bulb type were then read a description of the bulb type and asked to confirm if this was the kind of bulb they had heard about. This measurement is tantamount to “unaided” awareness.)
- ***Many NYS consumers do not understand that CFLs are much more energy efficient than EISA-compliant halogen bulbs.*** Only 30% of consumers identified CFLs as using less energy than “high-efficiency” (EISA-compliant) halogens. (It is possible that referring to EISA-

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<sup>22</sup> The bulb awareness questions for this study were asked differently from the awareness questions for the NYSERDA 2011 study “Impact Evaluation: NYSERDA CFL Expansion Program: Random Digit Dial and Onsite Survey Results, Final report”( NYSERDA Project 9875, May 2011). Because the respondents’ initial response was not recorded for any of the product types for either the consumer survey or survey of homeowners who had installed fixtures, it is not possible to make direct comparisons between the bulb awareness responses for the two studies.

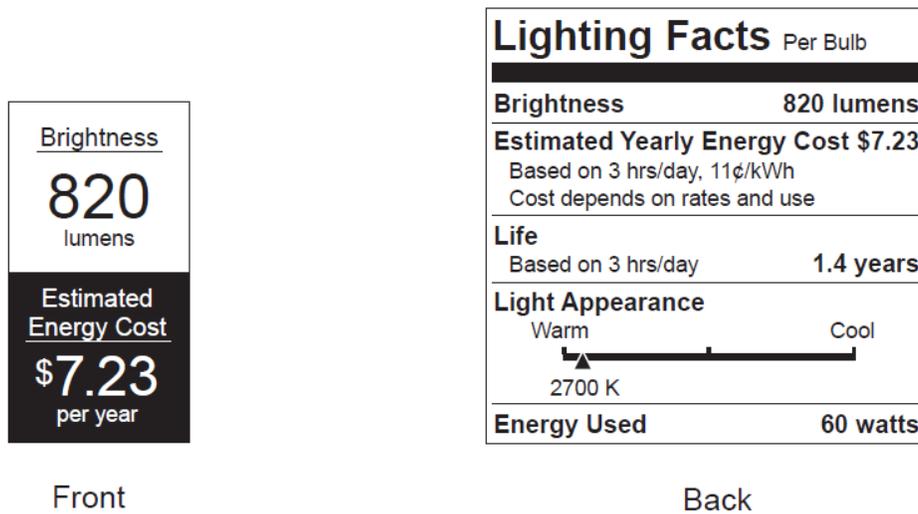
compliant halogen bulbs as “high-efficiency” halogen in the survey may have encouraged respondents to over-rate the energy efficiency of these bulbs.) Upstate respondents demonstrated a significantly lower level of knowledge on this subject than Downstate respondents. Given that EISA-compliant halogens are considerably less efficient than existing CFLs, consumers who are unaware of the energy consumption differences between the bulbs may have little incentive to choose the more efficient option. Increasing consumer awareness and understanding of the relative energy use of the different bulbs represents a possible opportunity for NYSERDA to encourage market transformation in a more energy-efficient direction.

- ***The results from respondents’ estimates of the number of lumens produced by a 60-watt incandescent bulb strongly suggest that both consumers and homeowners who had recently installed fixtures confuse lumens with watts. That CFLs have long been sold based on incandescent wattage equivalency no doubt has helped to foster this confusion.*** Less than one-half (43%) of consumers and nearly six out of ten homeowners who had installed fixtures had heard of or seen the term “lumens.” Both consumers and homeowners who had installed fixtures demonstrated relatively low levels of understanding of the term. While 35% of all consumers and 48% of all homeowners who had installed fixtures knew that the terms refer to brightness or light output, when asked the number of lumens produced by a 60-watt incandescent bulb, only a handful each of consumers and homeowners who had installed fixtures offered answers within striking distance of the correct answer (800 lumens).
- ***Color rendition is an important characteristic of bulbs that can set the stage for satisfaction—or disappointment—with a particular bulb. The rate of understanding of the term “color rendition” among respondents was quite low—less than one in ten.*** Fewer than one out of five consumers (17%) and just over one in five homeowners (22%) had heard of or seen the term “color rendition,” with only 7 % of the population of NYS consumers and 9% of homeowners demonstrating a correct understanding of the term.
- ***The rates of understanding of color temperature by NYS consumers, and of the terms “warm white” and “cool white”—terms that appear on the FTC Lighting Facts label—were also quite low, at 10% and 14%, respectively. Ten percent of the population of NY consumers demonstrated a reasonable understanding of color temperature. Nearly two-thirds (62%) of consumers and more than two thirds (69%) of homeowners said they had seen or heard the terms “warm white” and “cool white.” Fourteen percent of NYS consumers appear to understand the meaning of “warm white” and “cool white.”***
- ***Taken together, the results from the questions about awareness and understanding of the terms on the new lighting label provide evidence that NYS consumers are not well prepared to put the information on the label to full use in choosing bulbs.***

#### 3.1.7.1.1 Overview of the FTC Lighting Facts Label

On January 1, 2012 the Federal Trade Commission (FTC) began requiring manufacturers to carry a new label on the front and back of each package of light bulbs to be sold in the United States. The label provides consumers with information about the bulb’s brightness, estimated yearly energy cost, life, light appearance, and wattage.<sup>23</sup> As Figure 2 below shows, on this label brightness information is expressed in terms of lumens, light appearance in terms of color temperature in degrees Kelvin (absolute temperature scale, denoted K) and a visual scale indicating how warm or cool the light is, and energy used in terms of watts.

**Figure 2: FTC Lighting Facts Label for Bulbs**



Source: Federal Trade Commission. 2011. Accessed March 5, 2012 from <http://www.ftc.gov/os/2010/06/100618lightbulbs.pdf>.

The U.S. Department of Energy has developed a similar label for LED fixtures. Unlike the FTC label, use of the DOE Lighting Facts label is voluntary. Like the FTC label, the DOE label discloses brightness (as “light output”), watts, and light appearance. It adds efficacy, CRI, and a graphical representation of light color, along with information about the test procedure used. It does not include information about expected energy cost to operate the fixture or expected life of the bulbs to be used in the fixture.<sup>24</sup>

<sup>23</sup> Federal Trade Commission. 2011. “C Extends Deadline for New "Lighting Facts" Labels to January 1, 2012.” First published April 7, 2011. Accessed March 5, 2012 from <http://www.ftc.gov/opa/2011/04/bulblabeling.shtm>.

<sup>24</sup> U.S. Department of Energy. 2012. “LED Lighting Facts: Anatomy of the Label.” Accessed June 11, 2012 from <http://www.lightingfacts.com/content/label>.

Over the last 100 years, consumers have become accustomed to think of bulb brightness in terms of wattage. The new labels represents a major departure not only from the way that consumers are accustomed to measure bulb brightness, but how they are used to thinking about lighting generally. Consumers wishing to recreate the quality of current characteristics of their homes' lighting with most EISA-qualified bulbs will need to give thought to concepts such as lumens, temperature, and color rendition if they are to be satisfied with their purchase of high-efficiency CFLs or LED bulbs. In short, the decision to buy a light bulb will become more complicated. EISA-compliant halogen incandescent bulbs represent an easier choice for consumers seeking to replace general purpose lamps, as the light quality from these bulbs are similar to those of standard incandescent bulbs.<sup>25</sup> However, if NYS consumers turn to EISA-compliant halogens rather than CFL or LEDs lamps to replace incandescent lamps phased out under EISA, the state will realize less than optimum savings from the legislation.

If residential energy savings from lighting is to be maximized under EISA, it is important to ensure that consumers understand what to expect from their lighting choices and can make sense of the information presented on the new lighting label. To help NYSEDA understand consumer knowledge of the information with which they will be presented in purchasing light bulbs going forward, consumers (i.e., respondents to the Homeowner survey) and homeowners who had installed a fixture in the past year ("homeowners") were asked a series of questions to gauge their familiarity with different types of bulbs and their knowledge of the relative energy use of each type, as well as their current understanding of key lighting terms, including lumens, color rendering, and color temperature.

#### **3.1.7.1.2 Consumer Awareness of Energy-Efficient Light Bulbs**

In order to assess consumers' familiarity with energy saving light bulbs, respondents to both the Consumer and Homeowner Fixture surveys ("consumers" and "homeowners") were asked whether they had ever heard of CFLs, LEDs, and "high-efficiency" halogen bulbs.<sup>26</sup> EISA-compliant halogen bulbs are quite new to consumers. The term "high-efficiency halogen"<sup>27</sup> was used for these bulbs in the survey in order to differentiate them from the types of halogen bulbs historically associated with torchieres, and because these bulbs are often positioned as "green" (with names such as "EcoVantage<sup>®</sup>" [Philips], "SuperSaver<sup>®</sup>" [Osram Sylvania], or "EcoHalogen" [Bulbrite<sup>®</sup>]).

For each bulb type, respondents who said that they had heard of it were read a description of the bulb type and then asked "Is this the kind of light bulb you have heard about?" (Table 5). In this measurement, respondents who said that they had heard of each bulb type were then read a description of the bulb type and asked to confirm if this was the kind of bulb they had heard about. This measurement is tantamount to "unaided" awareness. Overall, the majority of homeowners had heard of each bulb type, with two-thirds

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<sup>25</sup> <http://www.consumerenergycenter.org/lighting/bulbs.html#halogen>

<sup>26</sup> "High-efficiency halogen bulbs" refers to EISA-compliant halogen bulbs.

<sup>27</sup> EISA-compliant halogen bulbs are not high efficiency compared to standard halogen lamps.

having heard of CFLs, nearly six out of ten (59%) having heard of LEDs, and slightly more than one-half (55%) reporting that they had heard of “high-efficiency” (EISA-compliant) halogen bulbs. Recent focus group research conducted with Connecticut consumers suggests that consumers are not as familiar with LED and EISA-compliant halogen incandescent bulbs as with CFLs, and thus are not as able correctly identify them from descriptions.<sup>28</sup> For this reason, the self-reported awareness of LED and halogen bulbs reported from consumers and homeowners who had installed fixtures should be interpreted with caution.

As might be expected, the homeowners who had recently installed fixtures in their home, and thus recently had been shopping for lighting, were somewhat more familiar with energy-efficient bulbs, with more than three-quarters of these respondents reporting having heard of each bulb type. Comparing the two regions, Upstate respondents reported having heard of all three bulb types at significantly greater rates than did Downstate respondents within both populations.

**Table 5: Consumer Awareness of Bulb Types**

	Consumers			Homeowners		
	Overall (n=510)	Upstate (n=279)	Downstate (n=231)	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
<b>CFLs</b>						
Yes	66%	71% <sup>a</sup>	61%	76%	82% <sup>a</sup>	69%
No	32	24 <sup>a</sup>	38	23	18	29
DK/refused	3	5 <sup>a</sup>	1	1	0	2
<b>LEDs</b>						
Yes	59%	73% <sup>a</sup>	47%	78%	80%	76%
No	38	24 <sup>a</sup>	50	21	20	22
DK/refused	3	3	3	1	0	2
<b>“High-Efficiency” (EISA-Compliant) Halogen Bulbs</b>						
Yes	55%	68% <sup>a</sup>	43%	76%	77%	75%
No	38	24 <sup>a</sup>	50	24	22	23
DK/refused	7	8	7	<1	1	0

<sup>28</sup> NMR Group, Inc. 2011. “Connecticut Lighting Focus Groups: Exploration of Market and Reactions to Various Efficient Lighting Choices.” Accessed April 2, 2012 from

<http://www.ctenergyinfo.com/111121%20EISA%20Lighting%20Focus%20Groups%20Report.pdf>.

### 3.1.7.1.3 Relative Energy Use of CFLs and EISA-Compliant Halogen Bulbs

Consumers (i.e., respondents from the Consumers survey) were asked to identify which type of bulb—a CFL or a “high-efficiency” halogen bulb—uses less energy to produce light (Table 6). Only 30% of respondents correctly identified CFLs as using less energy than EISA-compliant halogens. However, it is possible that referring to EISA-compliant halogen bulbs as “high-efficiency” halogen in the survey may have encouraged respondents to over-rate the energy efficiency of these bulbs.

It is expected that EISA-compliant halogen bulbs will be available for sale as an alternative after EISA goes into effect. Given that these bulbs are considerably less efficient than existing CFLs<sup>29</sup>, consumers who are unaware of the energy consumption differences between the bulbs may have little incentive to choose the more efficient option. Increasing consumer awareness and understanding of the relative energy use of the different bulbs represents a possible opportunity for NYSERDA to encourage market transformation in a more energy-efficient direction.

It is interesting to note that, although Upstate respondents were more likely than their Downstate counterparts to have heard of the three types of energy-savings bulbs, they were more likely to incorrectly say that EISA-compliant halogen bulbs use less energy than CFLs (25% versus 14%) or that they use the same amount of energy (24% versus 11%).

**Table 6: Judgments about Relative Energy Use of CFLs and Halogen Bulbs**

Which bulb uses less energy	Overall (n=510)	Upstate (n=279)	Downstate (n=231)
CFLs	30%	27%	33%
“High efficiency” halogen bulbs	19	25a	14
About the same	17	24a	11
Don’t know/refused	34	25a	42

a Statistically different at the 90% confidence level between Upstate and Downstate.

### 3.1.7.1.4 Key Lighting Knowledge among Consumers and Homeowners

Respondents to the Consumers survey (“consumers”) and respondents to the Homeowner Fixture survey (“homeowners”) were asked a series of questions about whether they had heard of various key lighting terms that appear on the new FTC lighting label, and if so, what the term meant to them. The descriptions respondents gave were recorded verbatim and back coded after all surveys had been administered.

<sup>29</sup> [http://www.energysavers.gov/your\\_home/lighting\\_daylighting/index.cfm/mytopic=12060](http://www.energysavers.gov/your_home/lighting_daylighting/index.cfm/mytopic=12060)

The first term respondents were asked about was “lumens.” Lumens are an empirical measure of the quantity of light emitted from a source; this is different from watts, which are a unit of electrical power.<sup>30</sup> Less than one-half (43%) of the consumers affirmed that they had seen or heard of this term, with the Upstate group being significantly more likely to claim to have seen or heard of lumens than the Downstate group (51% versus 36%). It is important to note that while 43% had heard of lumens, only 12% offered it in an open-ended question as information they had looked for when purchasing bulbs.

As might be expected due to the more involved nature of fixture shopping than bulb shopping, the homeowners were more familiar with the term “lumens” than were the consumers. Nearly six out of ten homeowners (59%) had heard of the term before the call. Again, a greater percentage of Upstate respondents than Downstate respondents had heard the term (65% versus 52%); however, this difference is not statistically significant.

Respondents who reported having seen or heard the term lumens were asked to describe what the word meant to them. Multiple answers were allowed. As shown in the following table, about eight out of ten respondents in both populations (81% consumers; 82% homeowners) correctly identified lumens as light output or brightness (Table 7). Although the homeowners were more likely than the consumers to have heard of lumens and, among those who had heard the term, were equally likely to give a correct understanding of the term, they were also more likely to confuse lumens with watts (14% of the homeowners versus only 4% of the consumers). While both terms are associated with brightness, it is important that customers know that different types of bulbs have different watts/lumens ratios.

Among the consumers, there were no regional differences in the likelihood of correctly identifying the meaning of lumens. However, among the homeowner respondents who had heard the term, Downstate respondents were more likely than Upstate respondents to indicate a correct understanding of the term (91% versus 77%) (Table 7). Upstate respondents were more likely than Downstate respondents to incorrectly say that lumens were the same as watts (20% versus 5%, 14% overall).

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<sup>30</sup> US Energy Information Administration website, <http://www.eia.gov/tools/glossary/>. Retrieved: December 12, 2011.

**Table 7: Understanding of the Term “Lumens”**

(Base: Respondents who have heard the term “lumens”)

Description of lumens <sup>1</sup>	Consumers			Homeowners		
	Overall (n=270)	Upstate (n=155)	Downstate (n=115)	Overall (n=78)	Upstate (n=40)	Downstate (n=38)
Light output/brightness	81%	80%	82%	82%	77% <sup>a</sup>	91%
The same as watts	4%	3%	5%	14%	20% <sup>a</sup>	5%
Light (general)	2%	3%	1%	3%	5%	1%
Light color	1%	1%	1%	0%	0%	0%
Other	3%	3%	3%	<1%	0%	1%
DK/refused	12%	11%	11%	12%	9%	18%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

Respondents’ understanding of lumens was further assessed by asking those who had heard the term to estimate the number of lumens produced by a 60-watt incandescent bulb. A 60-watt incandescent bulb is rated at approximately 800 lumens. Overall, respondents showed a poor understanding of the relationship between watts and lumens in the context of incandescent lighting.

Among the consumers (Table 8), estimates ranged from one to 2,300, but the most common value given was 60, indicating that despite the fact that 81% of those who had heard of the term understood that lumens refer to brightness, many respondents believed watts and lumens were the same thing. Nearly six out of ten said they did not know the number of lumens produced by a 60-watt bulb. Only three respondents gave the correct response.

Similarly, among the homeowners who had recently installed fixtures (Table 8) over one-half of respondents who were asked this question provided an estimate of between 1 and 199 lumens; eleven of these respondents estimated that a 60-watt bulb produced sixty lumens. These results indicate that despite their greater awareness of high-efficiency bulbs and familiarity with the term “lumens,” homeowners who recently installed light fixtures also confuse lumens with watts at high rates. Nearly four out of ten (38%) said that they did not know the number of lumens produced by a 60-watt bulb. Only two respondents provided the correct answer of 800 lumens.

**Table 8: Respondents' Estimates of Number of Lumens Produced by 60-watt Incandescent Bulb**

(Base: Respondents who have heard the term "lumens")

Ranges of estimates	Consumers			Homeowners		
	Overall (n=270)	Upstate (n=155)	Downstate (n=115)	Overall (n=78)	Upstate (n=40)	Downstate (n=38)
Range	1-2300	1-2300	1-1100	1-900	1-800	1-900
Mode	60	60	60	60	60	60
1-199	35%	31%	38%	54%	55%	52%
200-399	0	0	0	2	3	0
400-599	0	0	0	1	0	3
600-799	2	3a	0	3	5	0
800-999	1	1	1	2	1	3
1000 and up	4	6a	2	0	0	0
DK/refused	59	59	59	38	36	42

a Statistically different at the 90% confidence level between Upstate and Downstate.

Color Rendering Index (CRI) appears on the voluntary DOE Lighting Facts label for LED fixtures, and sometimes appears on bulb packages though it is not part of the FTC Lighting Facts label. Color rendering is a quantitative measure of the ability of a light source to reproduce the colors of various objects faithfully in comparison with a reference light source. The Color Rendering Index (CRI) is expressed on a scale of one to 100, where a value of 100 indicates no color shift compared to the reference source; a specifically-defined spectrum similar to daylight (valued at 100) is the reference source.<sup>31</sup> Respondents to both the consumer and homeowner surveys were asked if they had seen or heard the term "color rendering" used in relation to lighting. Less than one-fifth (17%) of the consumers and just over one-fifth of the homeowners (22%) had seen or heard the term color rendering. Among the consumers, the Upstate group was significantly more likely to say they had seen or heard this term was than the Downstate group (20% versus 14%), whereas among the homeowners the two regions were equally likely to have heard the term.

Respondents who indicated they had seen or heard the term color rendering were asked to describe what the term meant to them; multiple responses were allowed. Responses were recorded verbatim and back coded. Among the 17% of consumers who had heard the term, 41% demonstrated a correct understanding of color rendition—a rate of 7% for the entire sample (Table 9).<sup>32</sup> Some common misconceptions among

<sup>31</sup> Architectural Lighting website, glossary of typical lighting terms, <http://www.archlighting.com/industry-news.asp?articleID=462127&sectionID=1319>. Retrieved: December 12, 2011.

<sup>32</sup> Calculated as 17% (awareness of the term among consumers)\* 41% (correct understanding of the term).

respondents in both surveys were that color rendering is the color of the light itself, the brightness of the light, or the color of the bulb.

Color rendering is an important characteristic of bulbs that can set the stage for satisfaction—or disappointment—with a particular bulb. That such a small percentage of NYS consumers understands the term suggests that the need for education about this term so that consumers can put it to use when it appears on bulb packaging or when shopping for LED fixtures.

**Table 9: Understanding of the Term “Color Rendering”**

(Base: Respondents who have heard of the term “color rendering”)

Description	Consumers			Homeowners		
	Overall (n=81)	Upstate (n=45)	Downstate (n=36)	Overall (n=33)	Upstate (n=15)	Downstate (n=18)
Color/tone of light	27%	24%	30%	46%	69% <sup>a</sup>	14%
Effect of light on color of surroundings	25%	28%	21%	29%	17% <sup>a</sup>	45%
Naturalness of light/likeness to daylight	18%	19%	17%	17%	29% <sup>a</sup>	5%
Refers to light spectrum	13%	9%	18%	8%	11%	6%
Light/color temperature	13%	10%	17%	5%	6%	2%
Softness of light	8%	10%	6%	4%	0%	9%
Brightness of light	7%	11%	3%	7%	0% <sup>a</sup>	17%
Quality/purity of light	7%	9%	4%	0%	0%	0%
Color of bulb	5%	6%	4%	3%	0%	6%
Other/unclear	9%	10%	8%	6%	0%	13%
DK/refused	2%	4%	0%	7%	6%	9%

Note: Columns sum to more than 100% because some respondents provided more than one response.

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

Consumers and homeowners were also asked if they had seen or heard the term “color temperature” used in relation to lighting. Correlated Color Temperature (CCT) refers to the color appearance of a light source stated in terms of the thermal unit Kelvin (K). It appears on both the FTC and DOE Lighting Facts labels. This measurement can also be described as the “warmth” or “coolness” of a light source, with temperatures over 4,000K referred to as “cool colors” that show a bluish white light, and temperatures below 3,200K

referred to as “warm colors” that show yellowish through reddish white light.<sup>33</sup> Less than one-fifth of both samples had seen or heard the term color temperature (17% of the consumers and 19% of the homeowners). Among the homeowners, the Downstate group was more likely than Upstate respondents to report having heard the term (27% versus 14%).

Respondents who claimed to have seen or heard the term color temperature were asked to define what the term meant to them. Among the consumers (Table 10), less than half (44%) stated correctly that color temperature refers to warm (reddish) or cool (bluish) light. The Downstate group was significantly more likely to define color temperature in terms of red/blue light than was the Upstate group (53% versus 31%). A small percentage overall correctly identified color temperature as referring to harsh or soft light (5%) and Kelvin temperatures (3%). Some definitions given, including “daylight/white light,” “brightness,” and “similar to color rendering,” suggested that some respondents were confusing color temperature with lumens or color rendering.

Among the thirty homeowners who were familiar with the term color temperature, about one out of three (35%) indicated that it had to do with the color of the light, with Upstate respondents significantly more likely than their Downstate counterparts to have given this response (63% versus 15%). Downstate respondents, in turn, were more likely to be more specific about light color, saying that color temperature refers to warm (yellowish) versus cool (bluish) light, with three out of ten Downstate and no Upstate respondents mentioning “warm versus cool” in their responses. Two out of ten respondents who were familiar with the term incorrectly said that color temperature meant the brightness of light, while somewhat fewer (15%) mentioned the subjective quality of warm versus cool lighting by referring to the “softness” versus “harshness” of light. More than one out of ten respondents who had heard the term (13%) said they did not know what it meant.

As with color rendering, for consumers we created a new variable representing level of understanding of color temperature and assigned a value to each respondent based on their open-ended responses to the understanding question<sup>34</sup>. Of the 17% of consumers who had heard of the term color temperature, 57% demonstrated a reasonable understanding of color temperature. Thus 10% of the total sample of NY consumers have some understanding of color temperature.<sup>35</sup>

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<sup>33</sup> Architectural Lighting website, glossary of typical lighting terms, <http://www.archlighting.com/industry-news.asp?articleID=462127&sectionID=1319>. Retrieved: December 12, 2011.

<sup>34</sup> Respondents who included any of the following in their responses were considered to have a correct understanding of color temperature: “warm/reddish or cool/bluish light,” “harsh or soft light,” “color/shade of light,” and “refers to Kelvin temperatures.”

<sup>35</sup> Calculated as 17% (awareness of the term among consumers)\* 57% (correct understanding of the term).

**Table 10: Understanding of the Term “Color Temperature”**

(Base: Respondents who have heard of the term “color temperature”)

Description of color temperature <sup>1</sup>	Consumers			Homeowners		
	Overall (n=77)	Upstate (n=35)	Downstate (n=42)	Overall (n=30)	Upstate (n=9)	Downstate (n=21)
Warm (reddish) or cool (bluish) light	44%	31% <sup>a</sup>	53%	19%	0% <sup>a</sup>	31%
Color of light	20%	8% <sup>a</sup>	29%	35%	63% <sup>a</sup>	15%
Brightness	10%	16%	6%	20%	31%	13%
Temperature of bulb	9%	19% <sup>a</sup>	2%	8%	0% <sup>a</sup>	13%
Temperature of light	7%	9%	5%	10%	4%	15%
Daylight/white light	7%	9%	5%	5%	0%	9%
Harsh or soft light	5%	8%	3%	15%	16%	15%
Related to TV image	5%	7%	3%	--	--	--
Ambience of light	4%	9%	1%	--	--	--
Refers to Kelvin temperatures	3%	0%	4%	--	--	--
Same as color rendering	2%	1%	3%	--	--	--
Energy of light	--	--	--	1%	0%	2%
Other	6%	2%	9%	5%	4%	6%
DK/refused	8%	15%	4%	13%	18%	9%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

Finally, consumers and homeowners were asked if they had seen or heard of the terms “warm white” and “cool white.” These terms are connected to color temperature. “Cool white” tends to have a bluish hue and is described as giving the light a cold feeling; “warm white” tends to have a yellowish or reddish hue and is similar to light given off by an incandescent light bulb.<sup>36</sup> European and North American consumers tend to

<sup>36</sup> Architectural Lighting website, glossary of typical lighting terms, <http://www.archlighting.com/industry-news.asp?articleID=462127&sectionID=1319>. Retrieved: December 12, 2011.

prefer bulbs that produce warmer light (Kanellos 2011).<sup>37</sup> If higher efficiency CFL and LED bulbs are to dominate the residential lamp marketplace after EISA, consumers will need to learn to look for bulbs with the desired hue.

Compared to other terms that appear on the new lighting label, the situation is more positive for the terms warm white and cool white. Nearly two-thirds (62%) of the consumers and more than two thirds (69%) of the homeowners said they had seen or heard the terms warm white and cool white. The data suggest that the Upstate population is more familiar with these terms than the Downstate population: Within both the consumer population and the homeowner population the Upstate group was significantly more likely than the Downstate group to have seen or heard these terms (consumers: 74% versus 52%; homeowners: 76% versus 62%).

Respondents who reported having heard of the terms warm white and cool white were asked to explain what the terms meant to them. Responses were recorded verbatim and back coded. As shown in the following two tables, over one-fifth (22%) of the consumers and just under one-fifth (18%) of the homeowners who had heard the term correctly identified warm white as having more yellow, red, orange, or pink, and cool white as having more blue. Extrapolating from the rate of understanding of these terms in the consumer sample, the results suggest that 14% of NYS consumers understand the meaning of warm white and cool white.<sup>38</sup> Many of the other responses describe subjective attributes of the light, such as that warm white is brighter or more intense, that warm white is softer, and that cool white is “harsher” or harder on the eyes.

Although Upstate respondents in both samples were more likely to have heard of these terms, the Downstate group was more likely to define the terms correctly. This regional difference was statistically significant within the consumer group (32% versus 14%) but not statistically significant within the homeowner group (26% versus 13%).

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<sup>37</sup> Kanellos, M. 2011. “Why China May Not Take Over LED Lighting Just Yet.” GreentechEnterprise. March 7. <http://www.greentechmedia.com/articles/read/why-china-may-not-take-over-led-lighting-just-yet/>.

<sup>38</sup> Calculated as 62% (awareness of the term among the consumers in the Homeowner survey)\*22% (understanding of the term among consumers in the Homeowner survey).

**Table 11: Understanding of the Terms “Warm White” and “Cool White”**

(Base: Respondents who have heard of the term “warm white” and “cool white”)

Description of warm white/cool white <sup>1</sup>	Consumers			Homeowners		
	Overall (n=77)	Upstate (n=35)	Downstate (n=42)	Overall (n=88)	Upstate (n=48)	Downstate (n=40)
Cool is brighter/more intense	23%	24%	23%	--	--	--
Warm more yellow/red/orange/pink, Cool more blue	22%	14%a	32%	18%	13%	26%
Warm is softer/mellow	13%	16%	9%	14%	19%a	7%
Warm emits more heat	9%	8%	11%	9%	7%	11%
Warm is brighter/more intense	5%	7%	3%	15%	16%	13%
Cool is harsher/more stark/ hard on eyes	5%	7%	2%	7%	9%	4%
Coating of bulb	3%	1%	4%	4%	7%a	0%
Cool is clearer	3%	2%	5%	--	--	--
Cool is more like daylight	3%	1%	5%	--	--	--
Cool has more glare	2%	< 1%	3%	--	--	--
Warm is associated with incandescent	2%	2%	3%	--	--	--
Cool is associated with fluorescent light	1%	1%	2%	2%	2%	0%
Warm is more like daylight	1%	0%	1%	2%	2%	2%
Refers to brightness (not further specified)	--	--	--	9%	7%	13%
Cool is brighter/more intense	--	--	--	8%	6%	12%

Cool white looks artificial	--	--	--	1%	2%	0%
Warm uses more energy	--	--	--	1%	0%	2%
Other/unclear	30%	34%	25%	12%	15%	6%
Don't know/refused	7%	8%	6%	18%	13%	22%

a Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

Taken together, the results from the questions about awareness and understanding of the terms on the new lighting label provide evidence that NYS consumers are not well prepared to put the information on the label to full use in choosing bulbs. Increasing consumer awareness of the new label and improving their understanding of the information it conveys represents a new opportunity for NYSERDA to help transform the state’s consumer lighting market and improve the likelihood of maximizing residential lighting savings.

**CONSUMER PERSPECTIVE ON BULBS**

**3.1.8 Summary**

- *Consumers reported choosing CFLs for their familiarity, energy efficiency, cost and convenience, but qualities of the light, such as brightness, were not among the top reasons for choosing this bulb type.* By comparison, respondents who chose EISA-compliant halogen and LED bulbs to replace 100-watt CFLs most frequently cited qualities of the light in addition to energy efficiency and familiarity as among the reasons for their choice. Of those who chose incandescent replacements of either lower or higher wattage, qualities of the light were either the most offered reasons or were among them. Overall, these findings suggest that consumers who choose to install CFLs typically are not making the choice for reasons of lighting quality, and lighting quality is important to bulb choice for many consumers.
- *Consumers cited energy efficiency as a reason for selecting a certain replacement bulb even when the replacement was not an energy-efficient option.* This may indicate that consumers may not have the information base necessary to make an informed decision about what is an energy-efficient bulb.
- *Increasing education and exposure to efficient lighting choices—specifically how to gauge what is and is not efficient lighting—will allow consumers to identify and accept efficient lighting options.*
- *The majority of respondents who reported buying CFLs had begun doing so in the past five years (64%).* About one-fifth (21%) purchased their first CFL more than five years earlier.

Nearly one-third (31%) of those who had heard of CFLs had purchased a CFL in the prior three months. Of the total sample, only 8% had never purchased a CFL.

- ***Overall, flood or recessed bulbs were the most common type of specialty CFL purchased in the three months prior to the survey.*** One-fourth of respondents who had purchased a CFL in this period saying they had purchased this bulb type. The Upstate group was significantly more likely to have purchased globe shaped bulbs than was the Downstate group (30% versus 12%).
- ***The majority of respondents who bought specialty CFLs purchased them at home improvement stores. The data suggest that for Upstate respondents, mass merchandise department stores such as Wal-mart or K-mart are important sales channels for specialty CFLs.*** Two-thirds had bought most or all specialty CFL bulbs at a home improvement store, such as Home Depot or Lowes. The Downstate group was considerably more likely than the Upstate group to have purchased a bulb at a home improvement store (79% versus 56%), whereas the Upstate group was considerably more likely than the Downstate group to have purchased a bulb at a department store, such as a Wal-Mart or K-mart (38% versus 13%).

### **3.1.9 Consumer Perspectives on Different Bulb Types**

#### **3.1.9.1 Lower Wattage Incandescent Bulbs**

In Section 5.1.4.6.2 of this report, we show results for a series of questions fielded to consumers about the types of bulbs they would select to replace 100-watt incandescent bulbs once these are no longer available. To help in understanding respondents' perspectives on particular bulb types, respondents to the consumer survey were then asked to explain the reasons behind what they expect to be their first choice of bulb once the 100-watt incandescent bulb is no longer available. We address these questions in this section as they are most relevant to our understanding of consumers' current views of different bulb options.

This series of questions was open-ended and back coded. Multiple responses were accepted. Table 12 through Table 16 show the reasons respondents gave for their primary choice of replacement bulb after EISA. (Note that in this section, respondents were asked about "a screw-in halogen bulb that is just as bright as a 100 watt incandescent bulb" rather than about a "high-efficiency" halogen bulb.) A review of the most frequently offered reasons for each bulb replacement choice on Table 12 through Table 16 shows that respondents choose CFLs for their familiarity, energy efficiency, cost and convenience, but qualities of the light, such as brightness, were not among the top reasons for choosing this bulb type. By comparison, respondents who chose halogen and LED bulbs to replace 100-watt incandescents most frequently cited qualities of the light in addition to energy efficiency and familiarity as among the reasons for their choice. Of those who chose incandescent replacements of either lower or higher wattage, qualities of the light were either the most offered reasons or were among them. Overall, these findings suggest that consumers who choose to install CFLs typically are not making the choice for reasons of lighting quality, and lighting quality is important to bulb choice for many consumers. Table 12 shows the reasons cited for choosing a

*lower wattage incandescent bulb* to replace 100-watt bulbs after EISA. The most common reason was that respondents believed it used less energy and was more energy efficient than the other options, with just over four out of ten respondents who chose this type of bulb (42%) providing this reason. It should be noted that while lower wattage incandescent bulbs do use less energy than 100-watt incandescent bulbs, they are not more efficient—efficiency is determined by the ratio of watts to lumens, and this ratio is the same for different wattages of incandescent bulbs. One-fifth of respondents who had chosen this bulb (19%) believed that a lower wattage incandescent bulb had a softer light that wasn't as bright as the other bulbs. Conversely, almost one-fifth (17%) claimed to have chosen this bulb because it provided brighter light or better lighting than the other bulbs.

**Table 12: Reasons for Lower Wattage Incandescent Bulbs Choice under EISA**

(Base: Consumers who said they would most likely use lower wattage incandescent bulbs)

Reason (Multiple Response) <sup>1</sup>	Overall (n=77)	Upstate (n=44)	Downstate (n=33)
Uses less energy/energy efficient	42%	38%	46%
Soft Lighting/not as bright	19%	22%	17%
Brighter/better lighting	17%	14%	20%
Familiar with bulb/use already	15%	20%	10%
Cheaper to buy	12%	7%	17%
Lasts a long time	11%	7%	14%
Saves money on energy bill	9%	12%	6%
Better for eyes/reading	5%	3%	6%
Safer (no mercury, cooler, etc.)	4%	7%	2%
Prefer bulb (size, look, light, color, overall, etc.)	4%	4%	4%
Fits in screw-in fixture	3%	3%	2%
Readily available/convenient	2%	1%	3%
Better for environment	2%	1%	4%
Most similar to 100-watt bulb	1%	1%	0%
Modern/New technology	1%	0%	2%
Other	2%	1%	4%
Don't know/refused	4%	4%	4%

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

**3.1.9.2 CFLs**

As Table 13 shows, the most common explanation given by those who had selected CFLs as their top choice under EISA was familiarity with CFLs. The Upstate group was significantly more likely to cite this reason than were their Downstate counterparts (44% versus 24%). Among the Downstate group, the most common reason for choosing a CFL was its energy efficiency (31%); overall, this was the second most common reason given (28%). The Downstate group was also significantly more likely than the Upstate group to assert that they would choose this bulb because it was readily available or convenient (17% versus 9%).

**Table 13: Reasons for CFL Bulb Choice under EISA**

(Base: Consumers who said they would most likely use CFL bulbs)

Reason (Multiple Response) <sup>1</sup>	Overall (n=200)	Upstate (n=107)	Downstate (n=93)
Familiar with bulb/use already	33%	44% <sup>a</sup>	24%
Uses less energy/energy efficient	28%	25%	31%
Cheaper to buy	17%	16%	18%
Readily available/convenient	13%	9% <sup>a</sup>	17%
Lasts a long time	13%	13%	14%
Saves money on energy bill	8%	7%	10%
Brighter/better lighting	7%	4%	9%
Most similar to 100-watt bulb	6%	4%	8%
Recommended (by ad, contractor, etc.)	6%	1% <sup>a</sup>	10%
Fits in screw-in fixture	3%	5%	2%
Soft lighting/not as bright	3%	2%	3%
Better for environment	3%	4%	2%
Safer (no mercury, cooler, etc.)	3%	3%	3%
Better for eyes/reading	1%	1%	1%
Prefer bulb (size, look, light, color, overall, etc.)	1%	<1%	2%
Modern/New technology	<1%	1%	0%
Other	2%	2%	2%
Don't know/refused	2%	1%	4%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

### **3.1.9.3 EISA-Compliant Halogen Incandescent Bulbs**

Among respondents who had reported they would choose a screw-in halogen bulb to replace a 100-watt incandescent once EISA is in effect, energy efficiency was the most commonly cited reason, with about one out of four providing this response (Table 14). (It is possible that referring to EISA-compliant halogen bulbs as “high-efficiency” halogen earlier in the survey may have skewed the responses to this question towards energy efficiency.)

The second most common reason was that respondents were familiar with or had already used this bulb (18%). The explanations given for choosing a screw-in halogen bulb under EISA were similar across the two regions, though the Upstate group was more likely to cite the fact that the bulb fits in a specific fixture than was the Downstate group.

**Table 14: Reasons for Screw-In Halogen Bulb Choice Under EISA**

(Base: Consumers who said they would most likely use screw-in halogen bulbs)

Reason (Multiple Response) <sup>1</sup>	Overall (n=85)	Upstate (n=46)	Downstate (n=39)
Uses less energy/energy efficient	26%	29%	24%
Familiar with bulb/use already	18%	19%	17%
Brighter/better lighting	16%	14%	18%
Fits in screw-in fixture	16%	22% <sup>a</sup>	9%
Cheaper to buy	12%	11%	13%
Most similar to 100-watt bulb	11%	9%	12%
Saves money on energy bill	10%	7%	12%
Lasts a long time	9%	11%	7%
Recommended (by ad, contractor, etc.)	6%	0% <sup>a</sup>	11%
Safer (no mercury, cooler, etc.)	6%	0% <sup>a</sup>	12%
Better for eyes/reading	4%	6%	1%
Prefer bulb (size, look, light, color, overall, etc.)	3%	5%	1%
Readily available/convenient	2%	2%	1%
Soft Lighting/not as bright	1%	2%	0%
Other	3%	5%	1%
Don't know/refused	4%	3%	4%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

**3.1.9.4 LEDs**

The reasons given for choosing LED bulbs under EISA were similar to those given for other bulbs, with the energy efficiency of LED bulbs mentioned most often (35%) and familiarity second (23%). Comparing the two regions, the Downstate group was significantly more likely than were the Upstate respondents to cite familiarity as a reason for choosing an LED bulb (37% versus 12%), while the Upstate group was significantly more likely to mention saving money on their energy bill as a rationale (10% versus 0%) (Table 15).

**Table 15: Reasons for LED Bulb Choice under EISA**

(Base: Consumers who said they would most likely use LED bulbs)

Reason (Multiple Response) <sup>1</sup>	Overall (n=45)	Upstate (n=29)	Downstate (n=16)
Uses less energy/energy efficient	35%	40%	28%
Familiar with bulb/use already	23%	12% <sup>a</sup>	37%
Brighter/better lighting	21%	23%	18%
Most similar to 100-watt bulb	19%	21%	15%
Lasts a long time	11%	9%	14%
Safer (no mercury, cooler, etc.)	9%	9%	10%
Cheaper to buy	7%	10%	3%
Modern/new technology	7%	1%	15%
Saves money on energy bill	6%	10% <sup>a</sup>	0%
Soft lighting/not as bright	4%	3%	5%
Readily available/convenient	3%	5%	0%
Fits in screw-in fixture	3%	5%	0%
Recommended (by ad, contractor, etc.)	3%	3%	4%
Don't know/refused	6%	0%	14%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

### 3.1.9.5 150-Watt Incandescent Bulbs

Among the 14 respondents who reported that they would choose a 150-watt incandescent bulb to replace a 100-watt incandescent bulb when the latter is no longer available, more than two-thirds (9 out of 14) mentioned brightness or better lighting as a rationale for this choice. Curiously, two respondents indicated that they believed a 150-watt bulb used *less* energy or was more energy efficient than the other bulb options read to them (Table 16).

**Table 16: Reasons for 150-Watt Incandescent Bulb Choice under EISA (Unweighted Counts)**

(Base: Consumers who said they would most likely use 150-Watt incandescent bulbs)

Reason (Multiple Response) <sup>1</sup>	Overall (n=14)	Upstate (n=9)	Downstate (n=5)
Brighter/better lighting	9	6	3
Lasts a long time	3	3	0
Uses less energy/energy efficient	2	1	1
Better for environment	2	1	1
Familiar with bulb/use already	3	3	0
Most similar to 100-watt bulb	1	0	1
Cheaper to buy	1	1	0
Other	2	1	1
Don't know/refused	2	1	1

<sup>1</sup> Columns sum to more than total sample size because some respondents provided more than one response.

### 3.1.10 Consumer Experience with CFL Bulbs

#### 3.1.10.1 Rate of CFLs in the Home

Consumers (i.e., respondents to the Consumers survey) were asked a series of questions about their experiences with CFLs. More than two thirds of consumers (68%) had heard of CFLs. Over three-quarters (78%) of respondents who had heard of CFLs also reported having CFLs installed in fixtures in their home (Table 17).

**Table 17: CFLs Installed in Home**

(Base: Respondents who had heard of CFLs)

CFLs installed in fixtures in home	Overall (n=348)	Upstate (n=198)	Downstate (n=150)
Yes	78%	76%	80%
No	20	22	19
Don't know/refused	2	2	1

Respondents who reported having CFLs installed in light fixtures in their home were read a list of percentage ranges and asked to identify the range that contained the percentage of CFL bulbs installed in lamps or light fixtures in their home (Table 18). On one hand, nearly half (47%) reported that CFLs made up 75% or more of the bulbs installed in lamps or fixtures in their homes. On the other hand, one-third (33%) reported that CFLs made up less than 25% of the bulbs in lamps or fixtures in their homes.

Self-reported rates of measure and equipment installation, including bulbs, are known to be subject to recall error and other biases. Survey results indicate that the majority of people with CFLs in their homes believe that more than half their sockets are filled with CFLs; however, other site visit work suggests that this is not the case and that there may be a disconnect between a survey respondents' recollections and actual lighting usage in the home.<sup>39</sup> Between this and the fact that one third of respondents with any CFLs installed reported that CFLs reside in fewer than 25% of sockets, it would be a mistake to discontinue the effort to increase CFL saturation in NY homes at this time.

**Table 18: Percent of Bulbs in Home that are CFLs**

(Base: Respondents who had any CFLs installed in home)

Percentage	Overall (n=279)	Upstate (n=159)	Downstate (n=120)
< 10%	17%	17%	16%
10% to < 25%	16	13	18
25% to < 50%	10	13	8
50% to < 75%	11	9	13
75% to < 100%	23	29a	16
100%	24	18a	30

a Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>39</sup> NMR and RLW (2009) *Residential Lighting Markdown Impact Evaluation: Final*. January 20, 2009.

**3.1.10.2 CFL Purchasing**

Consumers who asserted they had heard of CFLs before the call were asked a series of questions addressing CFL purchasing activities. The aim of this series was to better understand the types of CFLs people are buying, where they are buying them, and what information they are taking into consideration when buying these bulbs.

As displayed in Table 19, nearly one-third (31%) of those who had heard of CFL bulbs reported having purchased one in the three months prior to the survey. Respondents who had ever purchased a CFL were asked to identify when they had started purchasing CFL bulbs. Almost two-thirds (64%) had started purchasing CFLs within the past five years (not including 2011), while about one-fifth (21%) had purchased their first CFL more than five years ago. A smaller percentage (12%) reported having purchased their first CFL in 2011 (Table 20).

**Table 19: CFL Purchases in Past Three Months**

(Base: Respondents who had heard of CFLs)

Purchased a CFL in past 3 months	Overall (n=348)	Upstate (n=198)	Downstate (n=150)
Yes	31%	32%	29%
No	68	67	70
Don't know/refused	1	2	1

**Table 20: When Started Purchasing CFLs**

(Base: Respondents who had purchased CFLs)

When started purchasing CFL	Overall (n=305)	Upstate (n=172)	Downstate (n=133)
In 2011	12%	9%	14%
Not this year but within past five years	64	66	61
More than five years ago	21	22	20
Received as gift/already in the house	1	1	2
Don't know/refused	2	1	2

**3.1.10.3 Specialty CFL Purchasing**

Consumers who had purchased any CFLs in the past three months were read a list of specialty CFL bulb types and asked to indicate whether or not they had purchased each specific type of CFL bulb in the three months prior to the survey. Multiple responses were accepted.

Overall, flood or recessed bulbs were the most common type of specialty CFL purchased in the prior three months, with one-fourth of respondents who had bought any CFLs in the past three months saying they had purchased this bulb type. The Upstate group was just as likely to have bought globe bulbs as they were to have bought flood or recessed bulbs; however, this group was significantly more likely to have purchased globe shaped bulbs than was the Downstate group (30% versus 12%).

**Table 21: Specialty CFL Purchases in Past Three Months**

(Base: Respondents who had purchased any CFLs in past three months)

Type of Specialty CFL (Multiple Response) <sup>1,2</sup>	Overall (n=117)	Upstate (n=66)	Downstate (n=51)
Flood or recessed	25%	30%	18%
Globe	22%	30% <sup>a</sup>	12%
Candelabra	21%	23%	18%
3-way	19%	23%	17%
A-shaped	16%	15%	16%
Dimmable	13%	12%	14%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

<sup>2</sup> Respondents who did not buy any specialty bulbs are not included in this analysis.

Respondents who had purchased specialty CFLs were also read a list of store types and asked to indicate whether or not they had bought CFLs at each type of store; multiple responses were accepted. Two-thirds had bought most or all specialty CFL bulbs at a home improvement store, such as Home Depot or Lowes. The Downstate group was considerably more likely than the Upstate group to have purchased a bulb at a home improvement store (79% versus 56%), whereas the Upstate group was considerably more likely than the Downstate group to have purchased a bulb at a department store, such as a Wal-Mart or K-mart (38% versus 13%) (Table 22).

**Table 22: Where Purchased Specialty CFLs**

(Base: Respondents who had purchased any specialty CFLs)

Type of store (Multiple response) <sup>1,2</sup>	Overall (n=74)	Upstate (n=43)	Downstate (n=30)
Home improvement store (e.g., Lowe’s, Home Depot)	66%	56% <sup>a</sup>	79%
Department store (e.g., Wal-mart, K-mart)	28%	38% <sup>a</sup>	13%
Hardware store	23%	21%	26%
Warehouse Store (e.g., Costco, BJ’s)	6%	6%	5%
Grocery store	5%	6%	4%
Drug store	2%	0%	4%
Other	4%	3%	5%
Don’t know/refused	2%	0%	4%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

<sup>2</sup> Don’t know/refused was measured individually for each store type. This is the average across all store types.

**3.1.10.4 Never Purchased a CFL**

Among the consumers who claimed not to have any CFLs installed in their home and had not purchased a CFL in the past three months, nearly three-quarters (70%) claimed never to have purchased a CFL (Table 23), meaning that about 9% of all consumers had never purchased a CFL.

**Table 23: Past CFL Purchases**

(Base: Respondents who did not have any CFLs installed in their home and had not purchased a CFL in the past three months)

Have ever purchased a CFL	Overall (n=62)	Upstate (n=34)	Downstate (n=28)
Yes	27%	21%	33%
No	70	79	61
Don't know/refused	3	0	6

### 3.1.11 Consumer Experience with LED Bulbs

#### 3.1.11.1 Rate of LEDs in the Home

Respondents who claimed to have heard of LEDs before the call were asked whether or not an LED was installed in a fixture in their home. As Table 24 shows, one-fifth (21%) of the respondents who had heard of LEDs reported actually having LEDs installed in fixtures in their home.

**Table 24: LEDs Installed in Home (Base: Respondents who had heard of LEDs)**

Have any LEDs installed in fixtures in home	Overall (n=308)	Upstate (n=195)	Downstate (n=113)
Yes	21%	20%	23%
No	75	76	74
Don't know/refused	4	4	3

## HOMEOWNER AND BUILDING INDUSTRY PERSPECTIVE ON FIXTURES

### 3.1.12 Summary

- *A relatively high rate of homeowners—about one-third—reported having installed a fixture in the year prior to the survey. The average number of fixtures installed was 3.4 per household.* Among potential respondents contacted for the Homeowner Fixture survey, which included renters as well as owners, the rate at which households reported having installed fixtures in the previous 12 months was 15%. Among those who owned their homes, it was 34%. The average number of fixtures installed of any kind was 3.4 per household.
- *The fixture types most frequently installed were ceiling flush mounts, recessed fixtures, and wall fixtures over the bathroom vanity.* The fixture types that homeowners (i.e., respondents to the Homeowner Fixture survey) most commonly reported having installed were ceiling flush mounts, recessed fixtures, and wall fixtures over the bathroom vanity, with each of these types being installed by roughly one-quarter of respondents in the previous twelve months.

Across the fixture types, incandescent bulbs and CFLs with a screw-in base tended to be the most popular choices for bulbs to be used with the fixtures.

- ***Home improvement stores are overwhelmingly the most popular place from which homeowners purchase fixtures, followed by hardware stores. Homeowners purchased fixtures from lighting stores or showrooms, catalogues or the internet, and department stores comparatively rarely, and from specifiers or installers very rarely indeed.*** Nearly three-quarters of homeowners (73%) who had installed a fixture in the past year reported that they had bought the fixture(s) from a home improvement store such as Home Depot or Lowe's. Downstate respondents were more likely than Upstate to report having purchased a fixture at a hardware store (19% versus 5%). Only 6% of respondents reported having purchased fixture(s) at a lighting store or showroom, followed by catalogue or internet (5%) and department store (4%). Just 1% reported purchasing a fixture from a lighting designer, architect or electrician.
- ***From the perspective of homeowners, the look of the fixture is its most important characteristic. Qualification for the ENERGY STAR label and energy efficiency are not important characteristics for most homeowners when shopping for fixtures.*** The most frequently mentioned feature homeowners looked for when choosing fixtures was the design or look of the fixture. The price of the fixture and the brightness of the light were the next most frequently reported features looked for. Just one out of ten respondents looked for the ENERGY STAR label and about one out of twenty mentioned that they had considered energy efficiency in their fixture purchases.
- ***The majority of fixture installations are stand-alone projects.*** More than half of respondents (53%) had installed the light fixture(s) as a stand-alone project, whereas slightly more than one-third (36%) had installed them as part of a larger project in the home. About one out of ten had installed fixtures in the past year both as a stand-alone project and as part of a larger project in the home.
- ***The use of a lighting designer or architect in conjunction with fixture installations was rare.*** Overall, only one in 10 homeowners (10%) had employed a lighting designer or architect to help them with their lighting project, with a significantly greater proportion of Downstate respondents than Upstate respondents employing such specialists (19% versus 3%).
- ***The lighting decision-maker varies by type of project, but for the building industry interviewees, the customer is always part of the decision-making.*** Electricians noted that for projects with larger budgets or that require custom lighting, architects, engineers, interior decorators, or lighting designers most often make the decisions—though the homeowner is the ultimate decision-maker. Builders were split regarding who made the lighting decision, but half said that it was up to the customer. Where the customer was named as decision-

maker, installers said that this was most likely to be the female head of household. According to specifiers, customers and homebuyers are almost always part of the lighting design decision with both lighting designers and architects. Customers and homebuyers tend to take a more active role in lighting design decisions when working with lighting designers.

- ***Homeowners appear to commonly make fixture decisions with little or no advice from experts or sales staff.*** While the installers interviewed claimed to talk with homeowners about lighting, the large majority of homeowners who had installed a fixture in the prior 12 months appear to have made their decision with no expert input on energy-efficient lighting. Close to nine out of ten (87%) said that no one had talked to them about high-efficiency fixtures, with Upstate respondents significantly more likely than their Downstate counterparts to give this response (92% versus 81%).
- ***LED lighting appears to have captured the interest of specifiers, especially lighting designers.*** Eighty-eight percent of specifiers—all but 2 of those interviewed—said that they typically mention them to customers. Lighting designers tended to be more enthusiastic about LEDs than were architects.
- ***The specifiers were less enthusiastic about CFLs or other fluorescent lighting than about LEDs.*** CFLs were mentioned by 10 of 17 respondents (59%) and linear or other types of fluorescents by eight of 17 (47%). Three lighting designers said they do not use or recommend CFLs to their clients for various reasons, including color and dimming.
- ***Store displays appear to be an important information source for consumers to learn about pin-base CFL and LED fixtures.*** Homeowners who had heard of pin-base CFL or LED fixtures learned about these fixtures primarily from store displays (30% CFL, 35% LED) and installers (18% CFL, 15% LED). However, homeowners only very rarely reported installing fixtures that use pin-base bulbs in the year before the survey, with just one respondent reporting installing a pin-base LED fixture and one reporting installed a pin-base CFL fixture—a rate of 1%.
- ***Homeowners—especially Downstate ones—appear to be more willing to consider pin-base LED fixtures than pin-base CFL fixtures.*** The most commonly offered reasons for not considering pin-base fixtures of either type are that the fixtures are not common or the respondent was not familiar enough with them. Of homeowners who had installed a fixture and were familiar with pin-base CFL fixtures, only one-fifth had considered using a pin-base CFL fixture. The most commonly offered reasons for not considering these fixtures were that they were not common or the respondent was not familiar enough with them or that they did not fit the bulb type the respondent wanted to use. Of homeowners who had installed a fixture other than a pin-base LED fixture and who indicated that they were at least somewhat familiar with pin-base LED fixtures (but had not installed any in the past twelve months), more than a quarter (29%) had had considered using these fixtures. The most commonly offered reason for

not considering these fixtures were that they were not common or the respondent was not familiar enough with them. Downstate homeowners who installed fixtures considered pin-base LED fixtures at higher rates than those Upstate (51% versus 14%).

- ***Most consumers who installed pin-base fixtures are satisfied with the quality of the light from these fixtures.*** A majority of consumers with pin-base CFL fixtures (74%) and LED fixtures (77%) were either somewhat or very satisfied with the quality of light. About one in ten (12%) were either somewhat dissatisfied or not at all satisfied with their pin-base CFL fixtures; for LEDs, the rate was 6%.
- ***Installers report installing pin-base CFL fixtures most frequently in kitchens, bathrooms, garages, and on exterior walls.*** The builders interviewed were much more likely than the electricians to report installing pin-base CFL fixtures in customers' homes. They typically install these fixtures in kitchens, bathrooms, garages, and on exterior walls.
- ***Dimming and lack of ready availability of pin-base CFL bulbs give electricians pause when considering pin-base CFL fixtures for their customers.*** The most common reasons offered by electricians for not installing CFL fixtures were of a lack of dimmability, fear of limiting their customers, and the lack of availability of pin-base CFL bulbs.
- ***Though price and lack of availability are barriers, fully half of the electricians interviewed install LED fixtures in homes "very" or "somewhat" often.*** Half the electricians and a quarter of the builders interviewed said that they install LED fixtures in homes "very often" or "somewhat often." The installers generally install them in kitchens (especially under cabinets), bathrooms, or as overhead lighting. Installers cited high price as the main barrier to installing LED fixtures in homes, though for some lack of availability was also a barrier.

### 3.1.13 Rate of Fixture Installation among Homeowners

Among prospective respondents screened for the homeowner fixture survey, which included renters as well as owners, the rate at which households reported having installed fixtures in the previous 12 months was 15%. Among those who owned their homes, it was 34%. Among respondents who reported the kind of fixtures they had installed, the average number of fixtures installed of any kind was 3.4 per household.

Respondents to the Consumers survey ("consumers") who reported that they had installed CFL and/or LED bulbs were posed a series of questions about light fixtures. The aim of this series was to better understand respondents' use of and overall satisfaction with pin-base fixtures.

A description of screw-base and pin-base bulbs was read to these respondents and they were asked if any *pin-base* LED or CFL bulbs were installed in light fixtures in their home at the time of the survey. Almost one-fifth (18%) of this group believed that they did have pin-base bulbs installed in light fixtures (Table 25). As described in Section 3.1.7.1.2, given lack of consumer familiarity with LED bulbs, the reported rate of pin-base fixtures should be taken with a grain of salt.

**Table 25: CFL or LED Pin-Base Bulbs Currently Installed in Home**

(Base: Respondents who had installed CFL and/or LED bulbs)

Have CFL or LED pin-base bulbs currently installed	Overall (n=305)	Upstate (n=173)	Downstate (n=132)
Yes	18%	20%	16%
No	80	78	82
Don't know/refused	2	1	3

Those respondents who reported having both CFL and LED bulbs installed in light fixtures in their home and claimed to have pin-base bulb installed were asked to identify the specific type of pin-base bulb they had installed; multiple responses were allowed. Of these nineteen respondents, seven reported having a fixture with a pin-base CFL bulb and thirteen reported having a fixture with a pin-base LED bulb (Table 26).

**Table 26: Type of Pin-Base Bulbs Currently Installed in Home (Unweighted)**

(Base: Respondents with both CFL and LED bulbs in their home and had pin-base fixtures in the past 12 months)

Type of pin-base bulbs currently installed (Multiple Response) <sup>1</sup>	Overall (n=19)	Upstate (n=9)	Downstate (n=10)
A fixture with pin-base CFL bulbs	7 (37%)	4 (44%)	3 (30%)
A fixture with pin-base LED bulbs	13 (68%)	6 (67%)	7 (70%)
Don't know/refused	1 (5%)	1 (10%)	0

<sup>1</sup> Columns sum to more than 100% because some respondents provided more than one response.

### 3.1.14 Types & Locations of Fixtures Installed in the Previous Twelve Months

Respondents to the Homeowner Fixture survey (“homeowners”), all of whom had installed fixtures in the previous year, were asked how many of each type, as well as which type of bulb was in each fixture type.

The fixture types most commonly installed were ceiling flush mounts, recessed fixtures, and wall fixtures over the bathroom vanity, with each of these types being installed by roughly one-quarter of respondents in the previous twelve months. Across the fixture types, incandescent bulbs and CFLs with a screw-in base tended to be the most popular choices for bulbs to be used with the fixtures. Notably, pin-base bulbs were very rarely used, with one respondent reporting using pin-base LED bulbs and one reporting using pin-base CFL bulbs (about 1% of homeowners who had installed fixtures in the previous year). The findings for each fixture type are detailed in the following nine tables.

Table 27 shows that nearly one-quarter of respondents (22%) had installed wall fixtures over the bathroom vanity in the past twelve months, an average of 1.6 fixtures per respondent who had installed this fixture type. These respondents were most likely to have CFL bulbs with a screw-in base in these fixtures (29%), followed by incandescent bulbs (23%), halogen bulbs (19%), LED bulbs with a screw-in base (16%) and fluorescent tubes (10%).

**Table 27: Types of Fixtures Installed: Wall Fixture Over Bathroom Vanity**

Wall fixture over bathroom vanity	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
Installed any in past year	22%	18%	28%
Installed any in past year (count)	(n=31)	(n=11)	(n=20)
Mean number installed	1.6	1.2a	1.9
Range: Number installed	1-6	1-3	1-6
<b>Types of bulbs in fixtures (unweighted counts and percentages)</b>			
Incandescent	7 (23%)	2 (18%)	5 (25%)
Fluorescent tube	3 (10%)	1 (9%)	2 (10%)
CFL screw-in	9 (29%)	5 (46%)	4 (20%)
LED screw-in	5 (16%)	3 (27%)	2 (10%)
Halogen	6 (19%)	0 (0%)a	6 (30%)

a Statistically different at the 90% confidence level between Upstate and Downstate.

As shown in Table 28, almost one-quarter of respondents installed fixtures for recessed lighting. The number of fixtures installed ranged from one to fifteen, with a mean of 3.6. The most common type of bulb used in these fixtures was CFL screw-in bulbs (40%), followed by incandescent bulbs (23%), halogen bulbs (17%), LED screw-in bulbs (9%), and fluorescent tubes (9%).

**Table 28: Types of Fixtures Installed: Recessed Fixture**

Recessed Fixture	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
Installed any in past year	25%	25%	26%
Installed any in past year (count)	<b>(n=36)</b>	<b>(n=15)</b>	<b>(n=21)</b>
Mean number installed	3.6	3.4	4.0
Range: Number installed	1-15	1-9	1-15
<b>Types of bulbs in fixtures (unweighted counts and percentages)<sup>1</sup></b>			
Incandescent	8 (23%)	4 (27%)	4 (19%)
Fluorescent tube	3 (9%)	0 (0%) <sup>a</sup>	3 (14%)
CFL screw-in	14 (40%)	7 (47%)	7 (33%)
LED screw-in	3 (9%)	1 (7%)	2 (10%)
Halogen	6 (17%)	3 (20%)	3 (14%)
Flood light	1 (3%)	1 (7%)	0 (0%)
Don't know/refused	2 (6%)	1 (7%)	1 (5%)

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents installed more than one type of bulb in fixtures.

Approximately three out of ten respondents reported that they had installed at least one ceiling flush mount fixture in the past year (Table 29). The number of fixtures installed ranged from one to eight and averaged 2.2 fixtures per respondent who had installed this type of fixture. Again, CFL screw-in bulbs and incandescent bulbs were the most commonly used bulb types for these fixtures, with 43% and 31% of respondents reporting using these types of bulbs, respectively. Upstate respondents who had installed ceiling flush mount fixtures were significantly more likely than were their Downstate counterparts to use incandescent bulbs with these fixtures (45% versus 13%).

**Table 29: Types of Fixtures Installed: Ceiling Flush Mount**

Ceiling Flush Mount	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
Installed any in past year	29%	34%	23%
Installed any in past year (count)	(n=35)	(n=20)	(n=15)
Mean number installed	2.2	2.2	2.2
Range: Number installed	1-8	1-8	1-7
<b>Types of bulbs in fixtures (unweighted counts and percentages)<sup>1</sup></b>			
Incandescent	11 (31%)	9 (45%) <sup>a</sup>	2 (13%)
Fluorescent tube	4 (11%)	2 (10%)	2 (13%)
CFL screw-in	15 (43%)	7 (35%)	8 (53%)
CFL pin-base	1 (3%)	0 (0%)	1 (7%)
LED screw-in	2 (6%)	2 (10%)	0 (0%)
Halogen	2 (6%)	0 (0%)	2 (13%)
Coil tubes	1 (3%)	1 (10%)	0 (0%)

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents installed more than one type of bulb in fixtures.

As shown in Table 30, fifteen percent of respondents reported having installed a chandelier or pendant light in the past twelve months, installing an average of 1.6 fixtures per respondent who had installed this fixture type. Half of these respondents had used incandescent bulbs in these fixtures, while thirty percent had used CFL screw-in bulbs. A few respondents reported having used fluorescent tubes or halogen bulbs. Upstate respondents were again significantly more likely than were Downstate respondents to use incandescent bulbs in these fixtures.

**Table 30: Types of Fixtures Installed: Chandelier or Pendant**

<b>Chandelier or Pendant</b>	<b>Overall (n=140)</b>	<b>Upstate (n=63)</b>	<b>Downstate (n=77)</b>
Installed any in past year	15%	14%	16%
Installed any in past year (count)	<b>(n=20)</b>	<b>(n=10)</b>	<b>(n=10)</b>
Mean number installed	1.6	1.6	1.6
Range: Number installed	1-6	1-6	1-3
<b>Types of bulbs in fixture (unweighted counts and percentages)</b>			
Incandescent	10 (50%)	3 (30%) <sup>a</sup>	7 (70%)
Fluorescent tube	2 (10%)	2 (20%)	0 (0%)
CFL screw-in	6 (30%)	4 (40%)	2 (20%)
Halogen	1 (5%)	1 (10%)	0 (0%)
Don't know/refused	1 (5%)	0 (0%)	1 (10%)

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

Fewer than one out of ten respondents (8%) had installed at least one ceiling fan with lighting in the past year (Table 31). The number of fans installed ranged from one to ten, and averaged 2.6 fans per respondent who had installed this type of fixture. Incandescent bulbs, CFL screw-in bulbs, and halogen bulbs were all equally likely to have been used in ceiling fan lighting fixtures, with each of these types having been used by one-quarter of these respondents.

**Table 31: Types of Fixtures Installed: Ceiling Fan with Lighting**

<b>Ceiling Fan with Lighting</b>	<b>Overall (n=140)</b>	<b>Upstate (n=63)</b>	<b>Downstate (n=77)</b>
Installed any in past year	8%	5%	11%
Installed any in past year (count)	<b>(n=12)</b>	<b>(n=3)</b>	<b>(n=9)</b>
Mean number installed	2.6	1.0a	3.4
Range: Number installed	1-10	1-1	1-10
<b>Types of bulbs in fixture (unweighted counts and percentages)</b>			
Incandescent	3 (25%)	0 (0%)a	3 (33%)
Fluorescent tube	1 (8%)	0 (0%)	1 (11%)
CFL screw-in	3 (25%)	1 (33%)	2 (22%)
Halogen	3 (25%)	2 (67%)	1 (11%)
Don't know/refused	2 (17%)	0 (0%)	2 (22%)

a Statistically different at the 90% confidence level between Upstate and Downstate.

Table 32 shows that fewer than one in twenty respondents had installed track lighting in the past twelve months. Of the three respondents who had installed this type of fixture, one had used incandescent bulbs, one had used LED screw-in bulbs, and the third had used halogen bulbs.

**Table 32: Types of Fixtures Installed: Track Lighting**

<b>Track Lighting</b>	<b>Overall (n=140)</b>	<b>Upstate (n=63)</b>	<b>Downstate (n=77)</b>
Installed any in past year	4%	2%	6%
Installed any in past year (count)	<b>(n=3)</b>	<b>(n=1)</b>	<b>(n=2)</b>
Mean number installed	1.0	1.0	1.0
Range: Number installed	1-1	1-1	1-1
<b>Types of bulbs in fixture (unweighted counts and percentages)</b>			
Incandescent	1 (33%)	0 (0%)	1 (50%)
LED screw-in	1 (33%)	1 (100%)	0 (0%)
Halogen	1 (33%)	0 (0%)	1 (50%)

One out of ten respondents reported having installed a wall fixture in the past year. The number of fixtures installed ranged from one to four, and averaged two wall fixtures per respondent who had installed this fixture type. Among these thirteen respondents, five had used incandescent bulbs, five had used CFL screw-in bulbs, and two had used halogen bulbs. Fluorescent tubes and LED screw-in bulbs had been used by one respondent each.

**Table 33: Types of Fixtures Installed: Wall Fixture**

Wall fixture	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
Installed any in past year	10%	13%	7%
Installed any in past year (count)	<b>(n=13)</b>	<b>(n=8)</b>	<b>(n=5)</b>
Mean number installed	2.0	2.3a	1.4
Range: Number installed	1-4	1-4	1-2
<b>Types of bulbs in fixture (unweighted counts and percentages)</b>			
Incandescent	5 (39%)	2 (25%)	3 (60%)
Fluorescent tube	1 (8%)	1 (13%)	0 (0%)
CFL screw-in	5 (39%)	3 (38%)	2 (40%)
LED screw-in	1 (8%)	1 (13%)	0 (0%)
Halogen	2 (16%)	2 (25%)	0 (0%)

a Statistically different at the 90% confidence level between Upstate and Downstate.

One out of twenty respondents reported having installed under-cabinet lighting in the past year (Table 34), installing an average of 3.8 fixtures. Of the six respondents who had installed under-cabinet lighting, two had used LED screw-in bulbs, two had used LED pin-base bulbs, and the remaining two did not know what type of bulb they had used.

**Table 34: Types of Fixtures Installed: Under-cabinet Lighting**

<b>Under-cabinet Lighting</b>	<b>Overall (n=140)</b>	<b>Upstate (n=63)</b>	<b>Downstate (n=77)</b>
Installed any in past year	5%	3%	8%
Installed any in past year (count)	<b>(n=6)</b>	<b>(n=2)</b>	<b>(n=4)</b>
Mean number installed	3.8	4.8	3.4
Range: Number installed	2-6	2-6	2-6
<b>Types of bulbs in fixture (unweighted counts and percentages)</b>			
LED screw-in	2 (33%)	0 (0%)	2 (50%)
LED pin-base	2 (33%)	0 (0%)	2 (50%)
Don't know/refused	2 (33%)	2 (100%)	0 (0%)

As shown in Table 35, about one out of ten respondents reported having installed outdoor lighting fixtures in the past twelve months. The number installed ranged from one to twelve, with an average of 2.7 fixtures. Incandescent and CFL screw-in bulbs were the most likely bulb types to have been used for outdoor lighting fixtures, with four respondents reporting having used each, while LED screw-in bulbs and solar bulbs had been used by one respondent each.

**Table 35: Types of Fixtures Installed: Outdoor Lighting**

<b>Outdoor Lighting</b>	<b>Overall (n=140)</b>	<b>Upstate (n=63)</b>	<b>Downstate (n=77)</b>
Installed any in past year	11%	8%	15%
Installed any in past year (count)	<b>(n=15)</b>	<b>(n=4)</b>	<b>(n=11)</b>
Mean number installed	2.7	2.3	2.9
Range: Number installed	1-12	1-4	1-12
<b>Types of bulbs in fixture (unweighted counts and percentages)</b>			
Incandescent	4 (27%)	0 (0%) <sup>a</sup>	4 (36%)
CFL screw-in	4 (27%)	2 (50%)	2 (18%)
LED screw-in	1 (7%)	1 (25%)	0 (0%)
Solar	1 (7%)	0 (0%)	1 (9%)
Don't know/refused	5 (33%)	1 (25%)	4 (36%)

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

### 3.1.15 Source of Fixtures Installed

Home improvement stores appear to be the most popular source of source of fixtures. As Table 36 shows, nearly three-quarters of homeowners who specified the type(s) of fixtures they installed in the past year reported that they had bought the fixture(s) from a home improvement store such as Home Depot or Lowe's. Downstate respondents are more likely than Upstate to report having purchased a fixture at a hardware store. Overall, more than one in ten respondents (13%) had bought the fixture(s) from a hardware store, with Downstate respondents significantly more likely than Upstate respondents to have done so (19% versus 5%). Other store types reported by respondents include lighting stores or showrooms (6%), catalogues or the internet (5%), and Department stores (4%) (Table 36).

**Table 36: Where Fixtures were Purchased**

(Base: Homeowners who had purchased at least one fixture in the past year)

Store type <sup>1</sup> (Multiple Response)	Overall (n=126)	Upstate (n=56)	Downstate (n=70)
Home improvement store	73%	73%	73%
Hardware store	13%	19% <sup>a</sup>	5%
Lighting store or showroom	6%	4%	8%
Catalogue or internet	5%	2%	8%
Department store	4%	5%	4%
Lighting designer/architect/electrician	1%	0%	3%
Antique store	<1%	0%	1%
Don't know/refused	<1%	0%	1%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents purchased fixtures at more than one type of store.

### 3.1.16 Sought-after Characteristics of Fixtures

The Homeowner Fixture survey included a question asking which features respondents looked for when shopping for the lighting fixtures they had installed, out of a list of possible features. After saying whether they looked for the features on the list, they were given the opportunity to come up with additional features they look for. As shown in Table 37, the most frequently mentioned feature was the design or look of the fixture, with approximately six out of ten respondents overall reporting that they had looked for this feature. Upstate respondents were significantly more likely than Downstate respondents to give this response (67% versus 52%).

The price of the fixture and the brightness of the light were the next most frequently reported features looked for; nearly one-quarter of respondents (23%) mentioned price and nearly two out of ten (18%) mentioned brightness. Just one out of ten respondents looking for the ENERGY STAR label and about one out of twenty mentioning that they had considered energy efficiency in their fixture purchases. Other features mentioned by respondents include dimming ability (4%) and being attached to a ceiling fan (3%).

**Table 37: Types of Features Looked for when Buying Fixtures**

(Base: Homebuyers who had purchased at least one fixture in the past year)

Features <sup>1</sup> (Multiple Response)	Overall (n=126)	Upstate (n=56)	Downstate (n=70)
Design/aesthetics	61%	67% <sup>a</sup>	52%
Price	23%	18%	30%
Brightness	18%	21%	14%
ENERGY STAR label	10%	11%	9%
Dimming ability	4%	4%	4%
Energy efficiency	4%	2%	6%
Fan	3%	5%	1%
Motion detector	2%	0% <sup>a</sup>	4%
Match with original fixture being replaced	2%	1%	3%
Longevity	2%	2%	1%
Size	<1%	0%	1%
Other	2%	2%	2%
Don't know/refused	9%	6%	13%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents looked for more than one feature.

The Homeowner Fixture survey included a question gauging the importance of various features of lighting in respondents' lighting choices in general (both fixtures and bulbs). The interviewer read a list of features and interviewees rated the importance of each when choosing lighting for their home, using a scale from one ("not at all important") to five ("very important"). Table 38 shows the average ratings for each feature.

The mean ratings ranged from 3.1 (for "time taken to turn on or brighten") to 4.3 ("amount of light from fixture"). The look of the fixture and the lifetime of the bulb were on average judged to be the next most important attributes of lighting, with each receiving a mean rating of 4.0. The amount of energy used by the bulb or fixture received a slightly lower mean rating (3.9).

Comparing the two regions, the mean ratings for Downstate respondents were significantly higher than those for Upstate respondents on a number of lighting features—lifetime of bulb, energy use by light or fixture, cost of the fixture, impact on the environment, and lack of glare.

**Table 38: Importance of Lighting Features**

(Base: Homeowners who had purchased at least one fixture in the past year)

Feature (Mean rating, 1-5 scale)	Overall (n=126)	Upstate (n=56)	Downstate (n=70)
Amount of light from fixture	4.3	4.2	4.5
Look of fixture design	4.0	3.9	4.2
Lifetime of bulb	4.0	3.8a	4.2
Energy use by light or fixture	3.9	3.7a	4.1
Cost of fixture	3.8	3.6a	4.0
Impact on environment	3.7	3.5a	4.0
Cost of replacement bulb	3.6	3.5	3.9
Lack of glare	3.4	3.1a	3.6
Light color	3.3	3.0a	3.7
Time taken to turn on or brighten	3.1	3.0	3.2

a Statistically different at the 90% confidence level between Upstate and Downstate.

### 3.1.17 Type of Installation

The majority of fixture installations are stand-alone projects. Table 39 shows that more than half of respondents (53%) had installed the light fixture(s) as a stand-alone project, whereas slightly more than one-third (36%) had installed them as part of a larger project in the home. About one out of ten had installed fixtures in the past year both as a stand-alone project and as part of a larger project in the home.

**Table 39: Fixture Installation – Type of Project**

(Base: Homeowners who had purchased at least one fixture in the past year)

Type of project	Overall (n=126)	Upstate (n=56)	Downstate (n=70)
Stand-alone project	53%	54%	52%
Part of a larger project	36	34	38
Both	11	12	10

**3.1.18 Use of Lighting Designer or Architect**

The use of a lighting designer or architect in conjunction with fixture installations was rare. Overall, only one in 10 respondents (10%) had employed a lighting designer or architect to help them with their lighting project (Table 40), with a significantly greater proportion of Downstate respondents than Upstate respondents employing such specialists (19% versus 3%).

**Table 40: Whether Respondent Employed Lighting Designer or Architect for Lighting Project**

(Base: Homeowners who had purchased at least one fixture in the past year)

Employed a lighting designer or architect for lighting project/lighting portion of project?	Overall (n=126)	Upstate (n=56)	Downstate (n=70)
Yes	10%	3% <sup>a</sup>	19%
No	90	97 <sup>a</sup>	81

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

**3.1.19 Fixture Decision-making**

**3.1.19.1 Building Industry Perspective on How Decisions are Made**

Installers (builders and electricians) and specifiers (architects and lighting designers) were asked about how lighting decisions are made in their residential projects. Most of the electricians (six out of eight) said the lighting decision maker for a new home or planned renovation varies from project to project. They elaborated that for projects with larger budgets or that require custom lighting, architects, engineers, interior decorators, or lighting designers most often make the decisions. However, for projects with small budgets or more straightforward planning, the electricians make lighting decisions, and they are primarily concerned with meeting minimum code requirements. Two electricians reported always being the decision maker for construction or renovation projects; these two electricians service low-income or rural areas with very few custom or high-end projects. Three electricians said that regardless of who makes the planned

lighting decisions, ultimately it's up to the homeowner: *"Regardless of the types of bulbs we leave in the fixtures, the homeowner will change them [according to their preferences]."* Two electricians said that the lighting decisions are most often made by *"the guy's wife [the female head of the household]."*

Four of the eight builders said their customers most often decide the types of lighting to install in their new home or planned renovation. Similar to the comments by two electricians, one builder mentioned that the decision is almost always made by the female head of the household. Two builders reported that the decision maker varies based on the project scope and the lighting being considered: *"in terms of the type of bulb, the look, and the feel, the customer will be hands on...where we interject is advising on the types of fixtures."* In other words, customers tend to be less knowledgeable about fixtures and often ask builders about fixture-related planning and decisions. The remaining two builders stated they are most often the ultimate decision-makers.

When lighting designers or architects are involved in a lighting design decision, customers and homebuyers are almost always part of the decision. As shown in Table 41, 82% of specifiers said that customers/homebuyers are part of the lighting design decision more than 75% of the time. All but two interviewees also commented that interest in lighting designs varies considerably from client to client. As one architect said, *"We won't put in stuff they hate and they choose 25% of the time."* Another architect indicated that interest in this topic among his clients is low: *"Most people think of caulking for energy efficiency and that is it. The big thing for savings is turn off the lights when you leave the room. I've had exceptions though."*

Lighting designers made more extensive comments, and seven of nine said the customer is always involved. One designer said her clients make suggestions from the concept renderings as opposed to the exact specifications. Another said their customers are always a part of the decision: *"...they have brought in a lighting designer for a reason, to provide the necessary professional input. But the focus is their point of view and the architect's concept."*

Also shown in Table 41, 75% of interviewees said they tell their customers about high-efficiency lighting options more than 75% of the time. Three of eight architects and three of nine lighting designers mention these options 100% of the time.

Both specifier groups indicated that client interest in the topic is varied. One architect commented, *"It doesn't come up that much in discussion, it's really more about design and quality of light and decorative and aesthetic issues. That is certainly changing for wealthier clients where light bill cost is not a concern but relamping is... when they are told that LEDs will cut their bill and they will never need to re-lamp, they get excited about it."* California-based interviewees also said they are virtually required to mention these options by the energy code.

**Table 41: How Often Customers Help Decide/Are Told About High-Efficiency Lighting**

LD11 & LD12: How often are customers/homebuyers ...	Part of lighting design decisions	Told about high-efficiency lighting options
More than 75% of the time	82%	75%
61% to 75% of the time	12%	0%
41% to 60%	0%	25%
Less than 25%	6%	0%
Total	100	100

**3.1.19.2 Building Industry Perspective on Information Offered**

Specifiers were asked about the high-efficiency lighting options they mention to customers. LED lighting seems to have captured the interest of specifiers: 88% of specifiers--all but 2 of those interviewed—said that they typically mention them to customers. The specifiers interviewed are less enthusiastic about CFLs or other fluorescent lighting: CFLs were mentioned by 10 of 17, or 59% of respondents, and linear or other types of fluorescents (eight of 17, or 47%). Three lighting designers said they do not use or recommend CFLs to their clients. Six of the eight architects and all nine of the lighting designers said they mention LEDs to their customers. Lighting designers tended to be more enthusiastic about LEDs than were architects.

The fourth most frequently cited option was low-wattage (presumably EISA-compliant) halogens, which are perceived by those who mentioned them as being more versatile than CFLs. Day lighting was cited by two architects. Also, two architects and one designer said they discuss the importance of controls with their customers in addition to lighting.

**Table 42: Lighting Options Specifiers Mention to Customers**

LD13 When customers are told about high-efficiency lighting and lighting design options, what kinds of options are typically mentioned?	Number of times mentioned	Percent of specifiers mentioning <sup>1</sup>
LED	15	88%
CFL	10	59%
Linear and other fluorescent	8	47%
Halogen/MR16	4	24%
Controls	2	12%
Incandescent (including low watt)	2	12%
Daylighting	2	12%
Ballasts	1	6%
4 Not at all familiar	44	40

<sup>1</sup> Columns sum to more than 100% due to multiple response per specifier.

The following are some representative quotes:

- *“Basically what’s most frequently used in our industry: things that are less costly, mostly CFLs. LEDs would be mentioned as well.”* (Architect)
- *“I mention performance options, dimming controls, power output compared to energy savings, and then it comes down to cost.”* (Architect)
- *“If we pushed CFLs our clients would say are you nuts? ...I don’t think CFLs are the savior of the environment the PR says they are... We’re looking more at IR (halogen) sources: warmer light, not as warm as A-lamps...Also bowled over by the progress being made with LEDs.”* (Lighting Designer)
- *“Our clients would not use CFLs or fluorescent. We talk to them about LED. The only place they would use linear fluorescents would be the garage or storage. We are not proponents. Also most people want dimmers, which CFLs do not do well [for].”* (Lighting Designer)

### 3.1.19.3 Homeowner Perspective on Information Received

While the installers interviewed claimed to talk with homeowners about lighting, the large majority of homeowners who had installed a fixture in the prior 12 months (87%) appear to have made their decision with no expert input on energy-efficient lighting. Homeowners who had installed a fixture were asked if anyone involved in their lighting project shared any information about “green” or high-efficiency light

fixtures. Those who indicated that someone had done so reported the source(s) of information. As Table 43 shows overall, close to nine out of ten (87%) said that no one had talked to them about high-efficiency fixtures, with Upstate respondents significantly more likely than their Downstate counterparts to give this response (92% versus 81%). The minority of respondents who recalled anyone having shared such information mentioned salespeople, electricians, architects, lighting designers, and builders as sources of information about energy-efficient fixtures.

**Table 43: Person who Informed Respondent about High-Efficiency Fixtures**

(Base: Homeowners who had purchased at least one fixture in the past year)

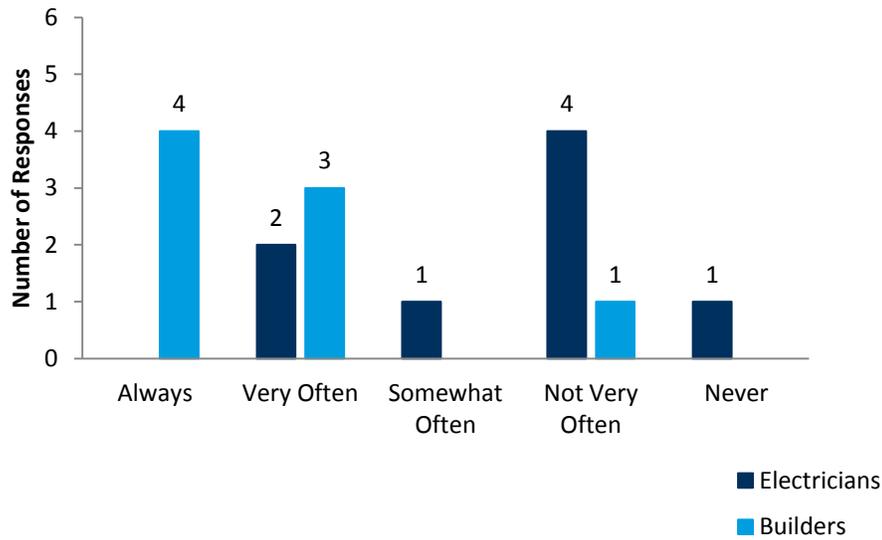
Person who shared information (Multiple Response)	Overall (n=126)	Upstate (n=56)	Downstate (n=70)
No one	87%	92% <sup>a</sup>	81%
Salesperson in store	5%	3%	9%
Electrician	5%	4%	6%
Architect	1%	0%	1%
Lighting Designer	1%	2%	1%
Builder	1%	0%	1%
Other	1%	1%	1%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

### 3.1.20 CFL Fixtures

#### 3.1.20.1 Building Industry Perspective

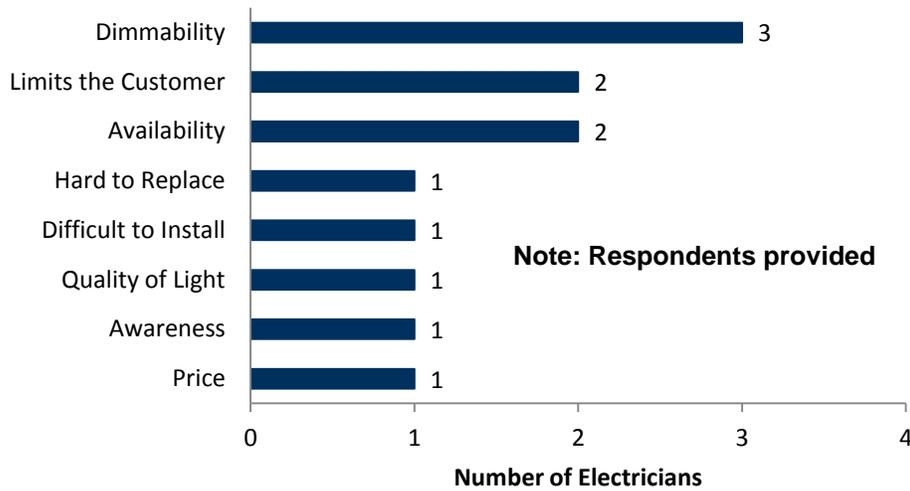
The builders interviewed were much more likely than the electricians to report installing pin-base CFL fixtures in customers’ homes. Most electricians reported they rarely or never install CFL fixtures in residential new construction or renovation projects. More specifically, only two of them do this, “*very often*,” one electrician said, “*somewhat often*,” four said “*not very often*,” and one electrician never installs CFL fixtures. Four builders said they “*always*” install CFL fixtures, three “*very often*” do this, and one builder installs CFL fixtures “*not very often*.” The distribution of electrician and builder responses is shown in Figure 3.

**Figure 3: How Often Electricians and Builders Install CFL Fixtures**

Of those respondents who said they install CFL fixtures at least somewhat often, most explained that they usually install these fixtures in kitchens, bathrooms, garages, and on exterior walls. One builder from New York reported he has installed CFL fixtures for every single project he worked on for the past seven years. The builder from Texas said that approximately 30% of his clients specifically ask for CFL fixtures.

The electricians, who rarely or never install CFL fixtures most commonly said this is because of a lack of dimmability, fear of limiting their customers, and the lack of availability of pin-base CFL bulbs. Other reasons they gave included the high price of CFL bulbs, low general awareness, the poor quality of CFL light, difficulties with installing the fixtures, and difficulties with replacing pin-base CFL bulbs. The builder who never installs CFL fixtures cited cost as the main reason. Figure 4 shows the distribution of the electricians' responses.

**Figure 4. Reasons Why Electricians do not Install CFL Fixtures**



**3.1.20.2 Homeowner Perspective**

Homeowners who had installed one or more fixtures were asked about pin-base CFL fixtures.

Less than one-half of respondents (45%) said they were either “very” or “somewhat” familiar with these fixtures, whereas more than half (56%) indicated that they were either “not too” or “not at all” familiar with them (Table 44).

**Table 44: Familiarity with Pin-base CFLs**

Familiarity (Scale of 1 to 4)	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
1 Very familiar	22%	17%	28%
2 Somewhat familiar	23	28a	15
3 Not too familiar	12	8	17
4 Not at all familiar	44	47	40

a Statistically different at the 90% confidence level between Upstate and Downstate.

Homeowners learned about pin-base CFL fixtures primarily from store displays and installers. Respondents who were at least somewhat familiar with pin-base CFL fixtures were asked where they had heard of them (Table 45). The most frequently mentioned source of awareness was store displays, with three out of ten respondents who were familiar with pin-base CFL fixtures citing this source. Nearly two out of ten (18%)

reported having heard about these fixtures through a contractor or builder. About half that many cited word of mouth (11%), the Internet (10%), and a salesperson at a store (10%) as a source of information.

**Table 45: Where Heard about Pin-base CFL Fixtures**

(Base: Homeowners who are somewhat or very familiar with pin-base CFL fixtures)

Source <sup>1</sup> (Multiple Response)	Overall (n=56)	Upstate (n=26)	Downstate (n=30)
Store displays	30%	31%	29%
Contractor or builder	18%	23%	11%
Word of mouth (friend, relative, co-worker)	11%	9%	14%
Internet	10%	13%	6%
Salesperson	10%	10%	10%
Advertisement in newspaper or magazine	6%	9%	2%
TV or radio commercial	6%	5%	9%
Article in newspaper or magazine	5%	6%	3%
Electrician	4%	4%	2%
Direct mail or circular advertisement	3%	5%	0%
TV or radio news feature story	3%	4%	0%
NYSERDA representative	<1%	1%	0%
Already installed in house when moved in	1%	0%	1%
Other	3%	2%	3%
Don't know/refused	5%	5%	5%

<sup>1</sup> Columns sum to more than 100% because some respondents cited more than one source of awareness.

Interviewees who had indicated in previous questions that they were familiar with pin-base CFL fixtures, but had not installed any in the past twelve months, were asked whether they had considered using them. Table 46 shows that only two out of ten had considered using pin-base CFL fixtures.

**Table 46: Whether Respondents Considered using Pin-base CFL Fixtures**

(Base: Respondents who are familiar with pin-base CFLs but did not install them in the past year)

Considered using pin-base CFL fixtures	Overall (n=43)	Upstate (n=22)	Downstate (n=21)
Yes	20%	20%	22%
No	80	80	78

Respondents who had not considered installing pin-base CFL fixtures (i.e., the majority of respondents who were familiar with them) explained why not. Over one-quarter of these respondents (27%) said that the fixtures were not common or that they were not familiar enough to the respondent. About one out of ten (12%) had a particular bulb type they had wanted to use and had chosen fixtures that fit that type of bulb. Other reasons for not considering pin-base CFLs included that it simply had not occurred to the respondent to consider them (6%), that they had followed their contractor’s recommendation for a different fixture type (5%), and that they had thought the fixtures would be difficult to obtain or replace (5%).

**Table 47: Reasons for Not Considering Installing Pin-base CFL Fixtures**

(Base: Homeowners who considered using pin-base CFL fixtures but did not do so)

Reasons <sup>1</sup>	Overall (n=33)	Upstate (n=17)	Downstate (n=16)
Not common or not familiar enough	27%	35%	12%
Doesn't fit bulb respondent wanted to use	12%	7%	22%
Wanted same type as previous fixture	6%	7%	5%
Didn't occur to respondent	6%	6%	6%
Used what contractor recommended	5%	7%	5%
Difficult to obtain or replace	5%	0%	14%
Difficult to fit bulbs in to pin base	4%	6%	0%
Too big	2%	0%	5%
Costs too much	2%	3%	0%
Lacks dimming ability	2%	0%	5%
Wanted to use solar	2%	0%	5%
Other/unclear	16%	13%	22%
Don't know/refused	14%	17%	6%

<sup>1</sup> Columns sum to more than 100% because some respondents gave more than one response.

The minority of respondents who said they *had* considered installing pin-base CFL fixtures, but had decided not to do so, were asked to explain why they had chosen not to use this type of fixture. As shown in Table 48, the most commonly cited reason, mentioned by two of these ten respondents, was that they had cost too much. Other reasons, cited by one respondent each, included not having been able to find the kind of pin-base CFL fixture they had needed, that these fixtures had not fit the particular bulb type they had wanted to use, that the respondent had not been familiar enough with this fixture type, and that they hadn't liked the color of the light from these fixtures.

**Table 48: Reasons for Decision Not to Install Pin-base CFL Fixtures**

(Base: Homeowners who considered using pin-base CFL fixtures but did not do so)

Reasons (Multiple Response) (Unweighted counts and percentages)	Overall (n=10)	Upstate (n=5)	Downstate (n=5)
Cost too much	2 (20%)	2 (40%)	0 (0%)
Couldn't find right kind of fixture	1 (10%)	0 (0%)	1 (20%)
Didn't fit bulb respondent wanted to use	1 (10%)	1 (20%)	0 (0%)
Not familiar enough with them	1 (10%)	0 (0%)	1 (20%)
Convenience	1 (10%)	1 (20%)	0 (0%)
Didn't like color of bulbs that fit into them	1 (10%)	0 (0%)	1 (20%)
Lacked dimming ability	1 (10%)	0 (0%)	1 (20%)
Don't know/refused	2 (20%)	1 (20%)	1 (20%)

**3.1.20.3 Consumer Satisfaction with CFL Fixtures**

Consumers who reported having pin-base CFL bulbs installed in their home (i.e., 7% of consumers) were asked to rate their satisfaction with the quality of light produced by the fixture with this type of bulb. Table 49 shows that on average, respondents were somewhat satisfied with the quality of light these bulbs produced. Almost three-quarters (74%) of respondents were either somewhat or very satisfied with the quality of light, while just over one in ten (12%) were either somewhat dissatisfied or not at all satisfied.

**Table 49: Satisfaction with Quality of Light from Pin-Base CFL Bulbs Currently Installed in Home**

(Base: Consumers who had pin-base CFL bulbs installed)

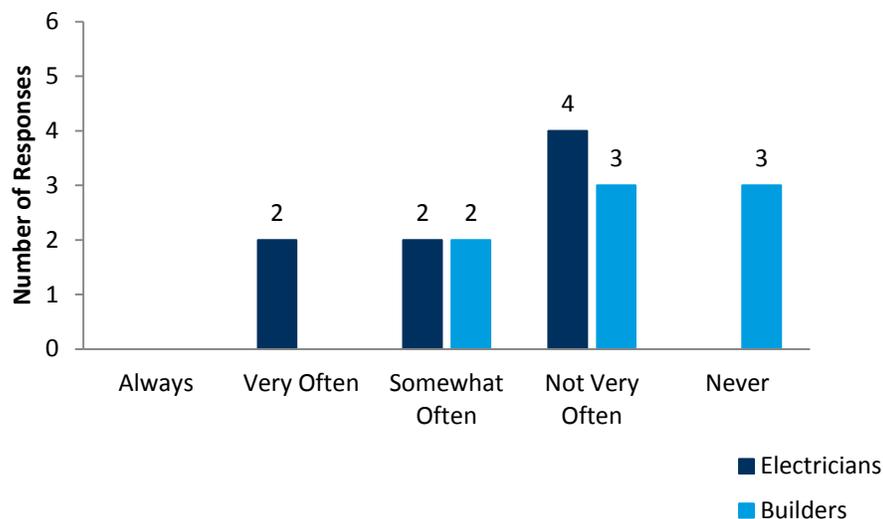
Level of Satisfaction	Overall (n=36)	Upstate (n=20)	Downstate (n=16)
Mean (Scale of 1 to 5)	4.0	3.9	4.2
Range	1-5	1-5	2-5
5 – Very Satisfied	49%	47%	50%
4 – Somewhat satisfied	24	21	29
3 – Neither satisfied nor dissatisfied	15	16	14
2 – Somewhat dissatisfied	6	5	7
1 – Not at all satisfied	6	11	0

**3.1.21 LED Fixtures**

**3.1.21.1 Building Industry Perspective**

When asked how often they install LED fixtures in residential projects, electricians reported installing them slightly more frequently than builders. The distribution of responses is shown in Figure 5.

**Figure 5. How Often Electricians and Builders Install LED Fixtures**



The electricians and builder who installed LED fixtures at least somewhat often said they generally installed them in kitchens (especially under cabinets), bathrooms, or as overhead lighting. One electrician reported that he installs LED fixtures in one out of every three high-end projects. All of the installers who

rarely or never install LED fixtures cited the high price of LEDs as the main barrier. Three builders from New York reported that LED fixtures are not readily available in their geographic regions.

All of the installers who rarely or never install CFL or LED fixtures said they would be willing to try these types of lighting in a small number of projects. All of the respondents who already install CFL or LED fixtures somewhat often or very often said they would be willing to use these types of fixtures in all of their projects if the previously mentioned CFLs issues are resolved, if the price of LEDs continues to decrease, and if the availability of LED fixtures increases.

Although the interview guide did not include a halogen-specific question, four installers (two electricians and two builders) volunteered that they never used halogens. One builder simply said, “I’m not so hot on halogens.”

**3.1.21.2 Homeowner Perspective**

Homeowners who had installed fixtures in the past year appear to be somewhat less familiar with pin-base LED fixtures than with pin-base CFL fixtures. Thirty-three percent of homeowners were very or somewhat aware of pin-base LEDs, versus 45% for pin-base CFLs.

**Table 50: Familiarity with Pin-base LED Fixtures Among Homeowners**

Level of familiarity	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
Very familiar	8%	4% <sup>a</sup>	14%
Somewhat familiar	25	28	21
Not too familiar	15	13	19
Not at all familiar	50	53	47
Don't know/refused	2	3	0

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

These homeowners heard about pin-base LED fixtures from similar sources as for pin-base CFL fixtures. The respondents who were at least somewhat familiar with pin-base LED fixtures had heard about them from a variety of sources (Table 51). By far the most common source of awareness was store displays, with over one in three of these respondents (35%) citing this source. Contractors or builders (15%), the Internet (15%) and word of mouth (13%) were also important sources. Upstate respondents were significantly more likely to have heard of pin-base LED fixtures by word of mouth than were Downstate respondents (29% versus 4%).

**Table 51: Where Homeowners Heard about Pin-base LED Fixtures**

(Base: Homeowners who are somewhat or very familiar with pin-base LED fixtures)

Source <sup>1</sup> (Multiple Response)	Overall (n=46)	Upstate (n=18)	Downstate (n=28)
Store displays	35%	36%	35%
Contractor or builder	15%	14%	15%
Internet	15%	14%	15%
Word of mouth (friend, neighbor, relative, co-worker)	13%	29% <sup>a</sup>	4%
Salesperson	8%	7%	8%
Electrician	5%	0%	8%
Advertisement in newspaper or magazine	5%	0%	8%
Through job (as electrician, contractor, etc.)	4%	0%	8%
Article in newspaper or magazine	3%	7%	0%
Was installed in house when moved in	3%	0%	4%
Don't know/refused	5%	7%	3%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents cited more than one source of awareness.

Homeowners appear to be somewhat more willing to consider pin-base LED fixtures than pin-base CFL fixtures. Of homeowners who had installed a fixture other than a pin-base LED fixture indicated that they were at least somewhat familiar with pin-base LED fixtures, but had not installed any in the past twelve months, more than a quarter (29%) had had considered using these fixtures, as compared to 20% for CFLs. Downstate homeowners who installed fixtures considered pin-base LED fixtures at higher rates than Upstate (51% versus 14%).

**Table 52: Whether Homeowners Considered using Pin-base LED Fixtures**

(Base: Homeowners who are familiar with pin-base LED fixtures but did not install them in the past year)

Considered using pin-base LED fixtures?	Overall (n=38)	Upstate (n=17)	Downstate (n=21)
Yes	29%	14% <sup>a</sup>	51%
No	71	86 <sup>a</sup>	49

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

Respondents who indicated that they had *not* considered using this type of fixture (i.e., the majority of those who were familiar with them) were asked to explain their reasoning. More than one in three (36% overall) explained that the fixtures were not common enough or that the respondent was not familiar enough with this fixture type, with Upstate respondents citing this reason significantly more frequently than Downstate respondents (45% versus 11%). Other reasons given were that there had been no place to install the fixture or that it had not fit in the space where the fixture was to be installed (12%) and that they had wanted to use bulbs that were not pin-base LEDs (9%).

**Table 53: Reasons for Not Considering Installing Pin-base LED Fixtures**

(Base: Homeowners who considered using pin-base LED fixtures but did not do so)

Reasons <sup>1</sup> (Multiple Response)	Overall (n=25)	Upstate (n=14)	Downstate (n=13)
They are not common or familiar enough	36%	45% <sup>a</sup>	11%
No place to put it or did not fit in space for fixture	12%	7%	27%
Did not see any in store	11%	15%	0%
Does not fit with bulb respondent wanted to use	9%	0% <sup>a</sup>	33%
Cost too much	6%	5%	8%
Wanted same fixture as was installed previously	6%	8%	0%
Wanted battery-operated light	5%	7%	0%
Did not occur to respondent	4%	5%	0%
Concerned they would not work properly	4%	0%	14%
Light is too bright	2%	2%	0%
They do not last long enough	2%	3%	0%
Other/unclear	2%	0%	8%
Don't know/refused	5%	7%	0%

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

<sup>1</sup> Columns sum to more than 100% because some respondents cited more than one reason.

Homeowners who said they had considered installing pin-base LED fixtures, but had decided not to do so, were asked to explain why they had chosen not to use this type of fixture. Out of the five respondents who had considered using pin-base LED fixtures, three explained their reasoning. One of these respondents indicated that the fixture had not needed to be changed and had purchased replacement bulbs instead, and another said that the fixtures, “wouldn’t work in this particular area.” The third respondent reported not liking the “cool light” emitted by LED fixtures.

**3.1.21.3 Consumer Satisfaction with LED Fixtures**

The majority of consumers with pin-base LED fixtures were somewhat or very satisfied with the quality of the light produced by these fixtures. Consumers who reported having fixtures with pin-base LED bulbs were asked to rate their satisfaction with the quality of light produced from these fixtures. As shown in Table 54, over three-quarters (77%) of respondents with a pin-base LED bulb installed were either somewhat or very satisfied with the quality of light of pin-base LED bulbs, while none reported being not at all satisfied.

**Table 54: Satisfaction with Quality of Light from Pin-Base LED Bulbs Currently Installed in Home**

(Base: Consumers who have pin-base LED bulbs installed)

Level of Satisfaction	Overall (n=25)	Upstate (n=12)	Downstate (n=13)
Mean (Scale of 1 to 5)	4.3	4.3	4.3
Range	2-5	3-5	2-5
5 - Very Satisfied	59%	50%	67%
4 - Somewhat satisfied	18	25	11
3 - Neither satisfied nor dissatisfied	18	25	11
2 - Somewhat dissatisfied	6	0	11
1 - Not at all satisfied	0	0	0

**RETAILER PERSPECTIVE AND EXPERIENCE**

**3.1.22 Summary**

- The majority of fixtures on retail sales floors are hard-wire fixtures—and the majority of these use medium screw-base bulbs.*** The retailers selling fixtures reported that almost two-thirds of fixtures on their sales floors (63%) were hard-wired fixture models while slightly over one-third (35%) were models with plugs. Retailers estimated that on average 64% of the fixture models they stocked used medium screw-base bulbs.
- For the vast majority of retailers, ENERGY STAR qualification is not a major factor in choosing which fixtures to stock. It is a minor factor for over a quarter of retailers.*** Retailers most frequently cited the following as major factors in determining what type of fixtures are stocked: customer demand (44%) and availability of replacement bulbs (36%). By comparison, that a fixture qualified for the ENERGY STAR label was a secondary consideration: it was cited as a major factor in this determination by just 14% of retailers, and as a minor factor by 29% of retailers.

- ***According to retailers, lowering the price of pin-base CFL fixtures, providing information about these fixtures to sales staff, improving the quality of the light from these fixtures, and finding other ways to increase customer demand could help increase market share of pin-base CFL fixtures.*** Retailers identified the following factors as being “very helpful” in selling pin-base CFL fixtures: lower fixture price for customer (73%), information for the sales staff about the fixture (56%), and better quality of light for the fixture (54%). Another factor that the retailers volunteered as helpful in selling pin-base CFL fixtures was customer awareness (15%). The research team also asked fixture retailers who did not stock CFL pin-base fixtures why they did not carry these fixtures. The retailers’ most common response was lack of customer demand (32%).
- ***Retailers identified similar factors to increase demand for LED fixture as for CFL fixtures, with the exception of improving light quality.*** When retailers who sold LED fixtures were asked what factors would be helpful in selling LED fixtures, some factors commonly listed as very helpful were: lower price for customer (90%), information for sales staff about this type of fixture (70%), and point of sales material about this type of fixture (69%). The factor least likely to be cited as very helpful in selling LED fixtures was incentives for sales staff (36%). Lack of customer demand (26%) and that the fixtures were too expensive (21%) were the two most common reasons given for not stocking this type of LED fixture.
- ***Only one in five retailers consider qualifying for the ENERGY STAR label to be an important factor in choosing which specialty CFLs to stock.*** Customer demand (36%) and that the bulbs fit fixtures sold in the store (33%) were the two most commonly cited major factors that retailers considered when deciding which specialty CFLs to stock. By comparison, just 20% of retailers identified carrying the ENERGY STAR label as a major factor in deciding which specialty CFLs to stock.
- ***Lowering the prices of high-efficiency bulbs and educating customers about high-efficiency bulbs lead as factors that retailers identified as likely to be very helpful in increasing demand for high-efficiency bulbs.*** When read a list of factors that could influence the retailers to stock a wider selection of energy-efficient bulbs, bulb retailers most frequently identified the following factors as having “a great deal of influence”: customer demand (47%), lower prices (42%) and better quality products (36%). More consumer education about energy-efficient bulbs was most frequently cited by bulb retailers as a factor that would be “very helpful” in selling more energy-efficient bulbs (63%), followed by information for staff about energy-efficient bulbs (51%) and point of sales material about bulbs (49%). Over three-quarters of the retailers (80%) said that lower prices on energy-efficient bulbs would have “a great deal” of influence in increasing customer interest in buying energy-efficient bulbs from the store.

- ***When shopping for bulbs, consumers are most likely to ask retailers about wattage, followed by brightness. This provides further evidence that consumers do not distinguish between the two.*** When retailers were asked for detail about the bulb characteristics about which customers most frequently inquired, 40% of bulb retailers reported that customers always or frequently asked about wattage, 33% about light level or brightness, and 22% about light color.

**3.1.23 Background**

The Retailer Survey targeted store channels that were identified by the consumers in the 2011 NYSEDA CFL Impact Study to be the channels through which New York consumers purchased light bulbs and lighting fixtures. Two sets of weights were created, one to represent the distribution of store types by 2010 sales of CFLs in New York State, and another to represent the distribution of store types by 2011 fixture sales in the state. The weighting scheme created two groups that are not mutually exclusive, with the exception that stores that did not stock bulbs are not in the “weighted by CFL sales channels” and the stores that did not stock fixtures are not in the “weighted by fixture sales channels” group. Throughout this study, the “overall” category is not weighted.

The majority of the retailers surveyed sold both light bulbs and light fixtures (64%) while a quarter of the respondent stores did not sell any fixtures and 11% did not sell any bulbs (Table 55). Regarding this sample of retailers, the retailers who sold only bulbs or both bulbs and fixtures had a larger store presence in NY than did retailers who sold only fixtures or both bulbs and fixtures (17 vs. 10 respectively) (Table 56).

**Table 55: At this location, does your store sell light bulbs, light fixtures, or both?**

	<b>Overall (n=83)</b>
Light Bulbs Only	21
Light Fixtures Only	9
Both Light Bulbs and Light Fixtures	53

**Table 56: Number of Locations in New York**

	<b>Overall (n=83)</b>	<b>Weighted By CFL Sales Channels (n=74)</b>	<b>Weighted by Fixture Sales Channels (n=62)</b>
Average number	14.1	17.1	9.6
Don't know (unweighted count)	38	34	27

**3.1.24 Fixtures**

**3.1.24.1 Fixture Stocking and Display**

The number of fixture models displayed by stores that sell fixtures range from one to ten (37%) to over 500 (5%). Another third (31%) displayed between 11 and 100 models while the remaining 27% of stores displayed 101 to 500 fixtures on their sales floor (Table 57). Almost two-thirds of fixtures on the sales floors (63%) were hard-wired fixture models while slightly over one-third (35%) were models with plugs (Table 58). Retailers estimated that on average 64% of the fixture models they stocked used medium screw-base bulbs (Figure 6).

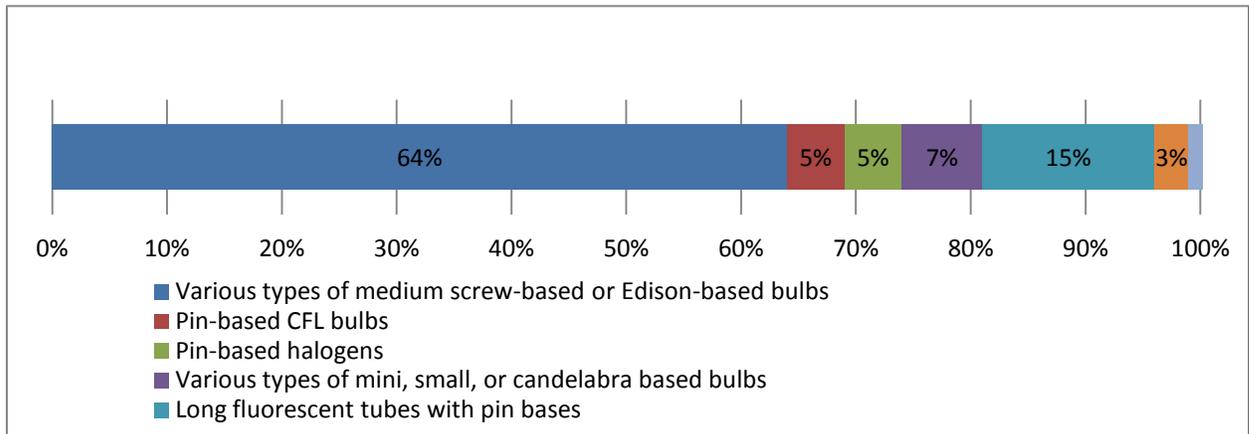
**Table 57: Number of Fixture Models Displayed on Sales Floor**

<b>General Fixture Question #F1: About how many different fixture models do you currently display on your sales floor? Would you say that you display...</b>	<b>Weighted by Fixture Sales Channels (n=62)</b>
1 to 10 models	37%
11 to 25 models	10%
26 to 50 models	10%
51 to 100 models	11%
101 to 200 models	7%
201 to 500 models	16%
Over 500 models	5%
Don't know	4%

**Table 58: Percentage of Lighting Fixtures on Sales Floor that are Portable Table or Floor Models with a Plug, and Percentage Hard-wired**

	Weighted by Fixture Sales Channels (n=62)
Portable floor, table models, or work lamps	35%
Hard-wired models	63%
Don't know (unweighted count)	2

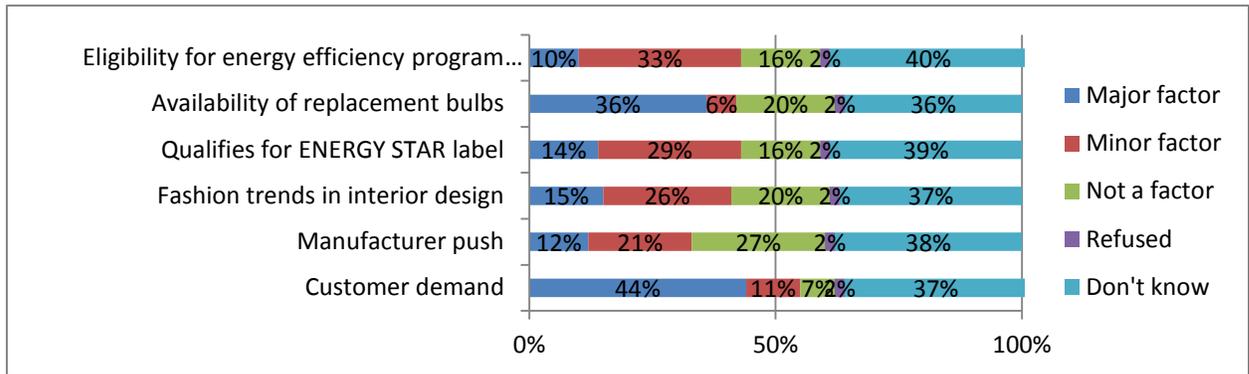
**Figure 6: Percent of Fixtures Using Various Types of Bulbs (n=62)**



<sup>2</sup>These data were weighted by fixtures sales channels.

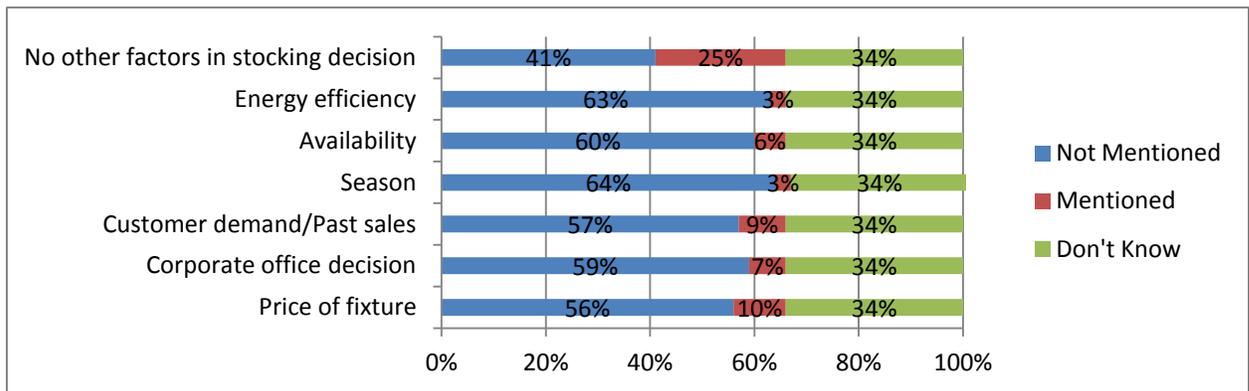
Fixture retailers were asked about major and minor factors in determining what type of fixtures are stocked. These retailers most frequently cited the following as major factors in determining what type of fixtures are stocked: customer demand (44%) and availability of replacement bulbs (36%). By comparison, that a fixture qualified for the ENERGY STAR label was a secondary consideration: it was cited as a major factor in this determination by just 14% of retailers, and as a minor factor by 29% of retailers. Other minor factors that were more frequently cited were eligibility for energy efficiency programs (33%) and fashion trends in interior design (26%). Manufacturer push was the least frequently cited as either a major (12%) or minor (21%) factor (Figure 7). Other factors that retailers offered in an open-ended question as impacting decisions on what fixtures are stocked are the price of the fixture, previous sales, and corporate decisions (Figure 8).

**Figure 7: Factors Determining What Type of Fixtures Are Stocked (n=62)**



<sup>2</sup>These data were weighted by the fixture sales channels.

**Figure 8: Other Factors Determining What Type of Fixtures Are Stocked (n=62)**



<sup>2</sup>These data were weighted by the fixture sales channel.

Retailers attribute 82% of their sales to models on display on the sales floor as opposed to models ordered from a catalog, website or special order (19%) (Table 59). Only 28% of retailers reported having special fixture displays weekly or monthly, 22% reported having special fixture displays a couple of times a year or less, and 29% reported never having special fixture displays (Figure 9). When retailers who sold fixtures were asked which factors influence their decision about which types of fixtures should be on special lighting display, fixture appearance (37%), new product offering (36%), and sale pricing (34%) were the most commonly cited major factors (

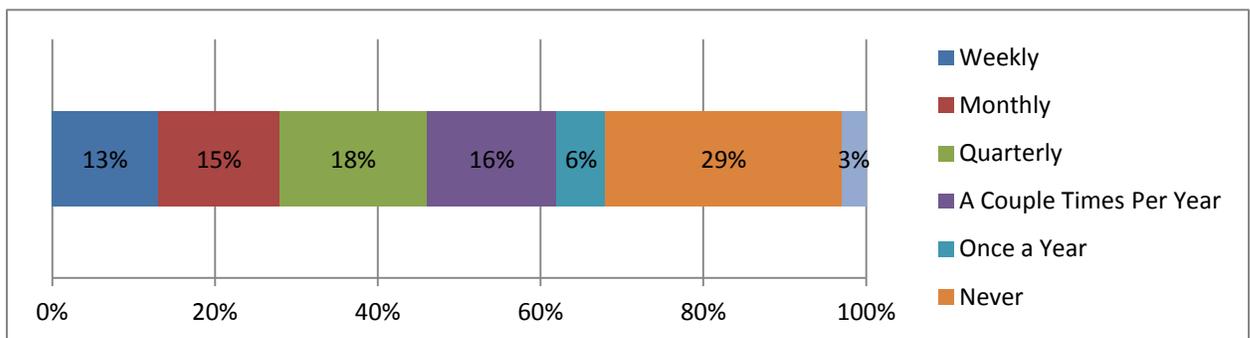
Table 60). The most commonly cited minor factor in the decision about which types of fixtures to put in special lighting displays was manufacturer suggestion (36%). Several factors were spontaneously offered by retailers (n=48) as having influenced their decision about which fixtures to put on special display, they are: to sell slow moving inventory (mentioned by 2 of 48), corporate decision (mentioned by 3 of 48), customer interest (mentioned by 6 of 48), and season (mentioned by 3 of 48).

Fixture retailers were also asked about factors that influence decisions about the types of fixtures chosen for special promotions or pricing. Fixture appearance (27%) and new product offering (21%) were the most commonly cited major factors influencing this decision. Manufacturer suggestion (30%) was the most commonly cited minor factor (Table 61).

**Table 59: Percentage of Fixture Sales from Models on Display in Store versus from Store’s Catalog, Website, or Special Order from a Manufacturer**

General Fixture Question #F16: What percentage of your fixture sales are from the models that you have on display in your store versus from your store’s catalogue, website, or special order from a manufacturer?	Weighted by Fixture Sales Channels (n=62)
Fixture sales from models on display_____%	81%
Fixture sales from store’s catalogue, website, or special order from a manufacturer_____%	19%

**Figure 9: Frequency of Special Displays of Fixtures (n=62)**



<sup>2</sup>These data were weighted by the fixture sales channel.

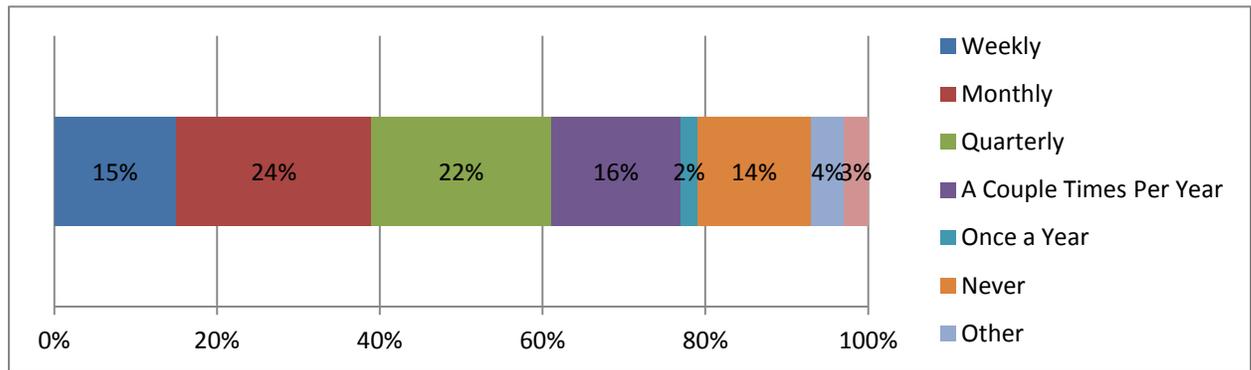
**Table 60: Factors that Influence Decision about What Types of Fixtures to Put on Special Display**

Note: This question was only asked to stores that have special displays of fixtures.

	<b>Weighted by Fixture Sales Channels (n=48)</b>
<b>Product features</b>	
Major Factor	29%
Minor Factor	16%
Not a Factor	17%
Refused	3%
Don't know	35%
<b>Appearance</b>	
Major Factor	37%
Minor Factor	14%
Not a Factor	11%
Refused	3%
Don't know	35%
<b>Manufacturer suggestion</b>	
Major Factor	12%
Minor Factor	36%
Not a Factor	14%
Refused	3%
Don't know	35%
<b>New product offering</b>	
Major Factor	36%
Minor Factor	18%
Not a Factor	8%

Refused	3%
Don't know	35%
<b>Sale pricing</b>	
Major Factor	34%
Minor Factor	16%
Not a Factor	12%
Refused	3%
Don't know	35%

Figure 10: Frequency of Special Promotions or Pricing on Fixtures (n=62)



<sup>2</sup>These data were weighted by the fixtures sales channels.

Table 61: Factors that Influence Decision About Types of Fixtures Chosen for Special Promotions or Pricing

Note: This question was only asked to stores that have special promotions or pricing on fixtures

	Weighted by Fixture Sales Channels (n=52)
<b>Special features</b>	
Major Factor	17%
Minor Factor	25%
Not a Factor	9%
Refused	2%

Don't know	48%
<b>Appearance</b>	
Major Factor	27%
Minor Factor	11%
Not a Factor	14%
Refused	2%
Don't know	46%
<b>Manufacturer suggestion</b>	
Major Factor	11%
Minor Factor	30%
Not a Factor	13%
Refused	2%
Don't know	44%
<b>New product offering</b>	
Major Factor	21%
Minor Factor	14%
Not a Factor	17%
Refused	2%
Don't know	46%

**3.1.24.2 CFL Fixtures**

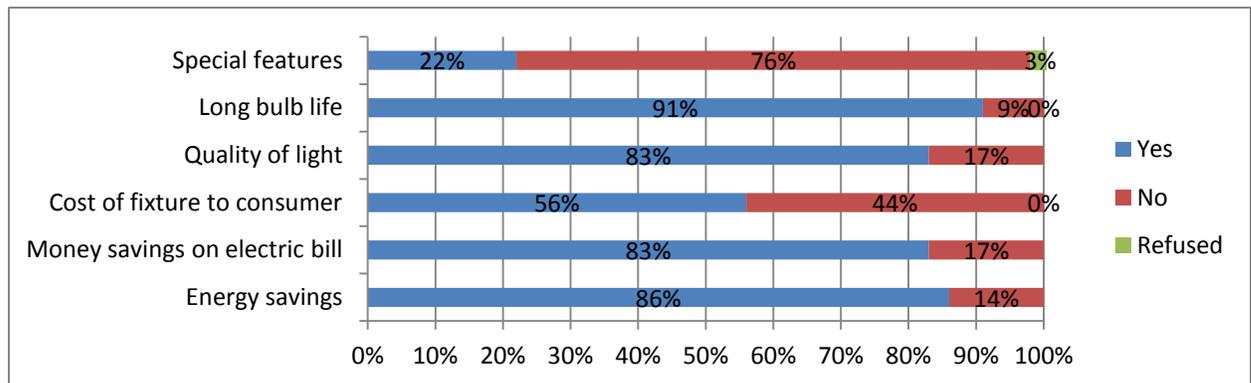
The research team asked the retailers who sold CFL pin-base fixtures a series of questions about these fixtures. When selling pin-base CFL fixtures (Figure 11), 91% of retailers in this group emphasized long bulb life, 86% emphasized energy savings, and 83% emphasized the quality of light and money savings on electric bills. Special features of the CFL pin-base fixtures were not emphasized by 76% of the retailers. Retailers identified the following factors as being “very helpful” in selling pin-base CFL fixtures: lower fixture price for customer (73%), information for the sales staff about the fixture (56%), and better quality of light for the fixtures (54%) (Table 62). Another factor that the retailers volunteered as helpful in selling pin-base CFL fixtures was customer awareness (15%) (Figure 12).

The research team also asked fixture retailers who did not stock CFL pin-base fixtures why they did not carry these fixtures. The retailers’ most common response was lack of customer demand (32%) (Table 63).

That retailers cited customer awareness as a factor that helps sell CFL pin-base fixtures, and customer lack of awareness of these fixtures as a reason to *not* stock CFL fixtures, suggests that if customers were made more aware of CFL pin-base fixtures, retailers would be more likely to stock and sell more of the fixtures.

**Figure 11: Type of Features Emphasized When Selling Pin-Based CFL Fixtures (n=36)**

Note: This question was only asked to stores that stock CFL pin-base fixtures.



<sup>2</sup> These data were weighted by fixture sales channels.

**Table 62: How Helpful Factors are in Selling More Pin-base CFL Fixtures**

Note: This question was only asked to stores that stock CFL pin-base fixtures.

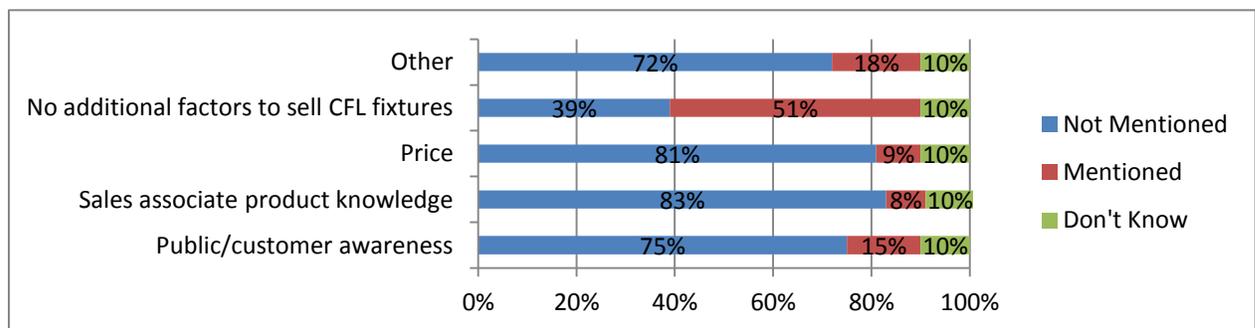
	Weighted by Fixture Sales Channels (n=36)
<b>Information for sales staff about this type of fixture</b>	
Very helpful	56%
Somewhat helpful	29%
Not too helpful	8%
Not at all helpful	7%
<b>Point of sales material about this type of fixture</b>	
Very helpful	43%
Somewhat helpful	48%

Not too helpful	5%
Not at all helpful	4%
<b>Wider range of models available from suppliers or manufacturers</b>	
Very helpful	42%
Somewhat helpful	30%
Not too helpful	15%
Not at all helpful	13%
<b>Lower price for customers</b>	
Very helpful	73%
Somewhat helpful	17%
Not too helpful	3%
Not at all helpful	7%
<b>Better dimming capabilities</b>	
Very helpful	49%
Somewhat helpful	36%
Not too helpful	4%
Not at all helpful	11%
<b>Better quality fixtures</b>	
Very helpful	31%
Somewhat helpful	40%
Not too helpful	13%
Not at all helpful	13%
Don't know	3%
<b>Better quality light from these fixtures</b>	
Very helpful	54%
Somewhat helpful	29%

Not too helpful	6%
Not at all helpful	8%
Don't know	3%
<b>Greater availability of replacement bulbs</b>	
Very helpful	39%
Somewhat helpful	46%
Not too helpful	1%
Not at all helpful	10%
Don't know	4%
<b>Incentives for sales staff</b>	
Very helpful	23%
Somewhat helpful	22%
Not too helpful	18%
Not at all helpful	37%

**Figure 12: Factors that Would Help in Selling More Pin-Based CFL Fixtures (n=36)**

Note: This was only asked to stores that stock CFL pin-base fixtures.



<sup>2</sup>These data were weighted by fixture sales channels.

**Table 63: Reasons Why Stores Do Not Stock Pin-Based CFL Fixtures**

Note: This question was only asked to stores that do NOT stock CFL pin-base fixtures.

General Fixture Question #F10: (If does NOT stock CFL pin-base fixtures) Why don't you stock pin-base CFL fixtures?	Weighted by Fixture Sales Channels (n=26)
Lack of customer demand	32%
Not many are available from suppliers/manufacturers	0%
Fixtures too expensive	3%
Fixtures have technical problems/do not work well	0%
Other	14%

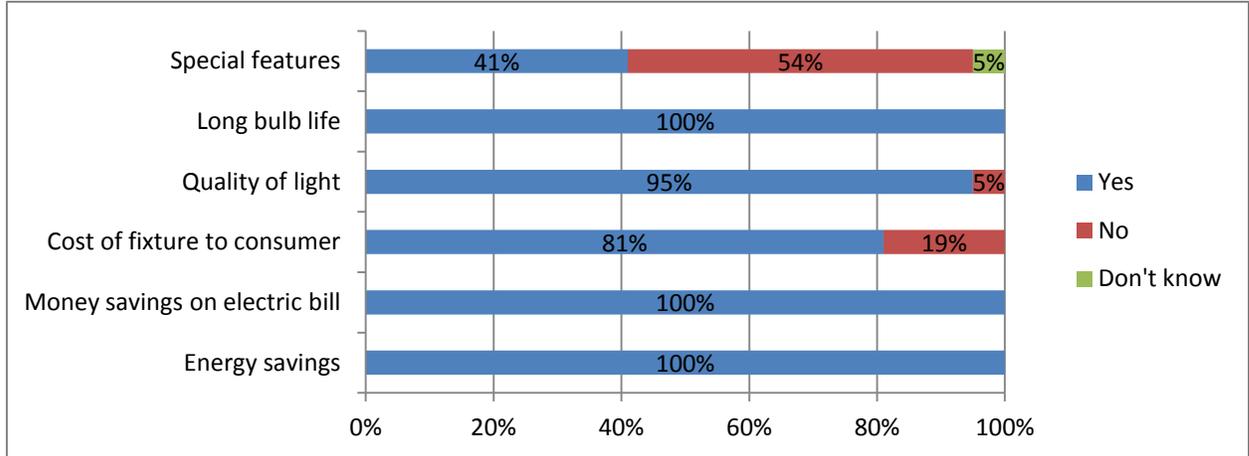
**3.1.24.3 LED Fixtures**

The research team asked retailers who sold LED fixtures for LED bulbs that were not medium screw-base a series of yes or no questions about what they emphasized when selling the LED fixtures. All (100%) of these respondents emphasized long bulb life, money savings on electric bill, and energy savings, and the vast majority (95%) emphasized the quality of the light (Figure 13). When retailers who sold LED fixtures were asked what factors would be helpful in selling LED fixtures (Table 64), the factors most commonly listed as very helpful were: lower price for customer (90%), information for sales staff about this type of fixture (70%), and point of sales material about this type of fixture (69%). Retailers also offered consumer awareness of the LED fixture (mentioned by 2 of 22 respondents). The factor least likely to be cited as very helping to selling LED fixtures was incentives for sales staff (36%) (Table 64).

The research team asked those retailers who did stock fixtures but did not stock LED fixtures why they did not stock these fixtures. Lack of customer demand (26%) and fixtures were too expensive (21%) were the two most common reasons given (Table 65).

**Figure 13: Features Emphasized When Selling Fixtures with Integrated LED Bulbs or for LED Bulbs with Any Other Type of Base Except Medium-Screw Base. (n=22)**

Note: This question was only asked to stores that stock fixtures with integrated LED bulbs or LED bulbs with any other type of base except medium screw-base.



<sup>2</sup>These data were weighted by fixture sales channels.

**Table 64: How Helpful Factors would be in selling More Fixtures for Integrated LED Bulbs or for LED Bulbs with Any Other Type of Base Except Medium-Screw Base**

Note: This question was only asked to stores that stock fixtures with integrated LED bulbs or LED bulbs with any other type of base except medium screw-base.

	Weighted by Fixture Sales Channels (n=22)
<b>Information for sales staff about this type of fixture</b>	
Very helpful	70%
Somewhat helpful	30%
Not too helpful	0%
Not at all helpful	0%
<b>Point of sales material about this type of fixture</b>	
Very helpful	69%
Somewhat helpful	21%
Not too helpful	5%

Not at all helpful	5%
<b>Wider range of models available from suppliers or manufacturers</b>	
Very helpful	58%
Somewhat helpful	42%
Not too helpful	0%
Not at all helpful	0%
<b>Lower price for customers</b>	
Very helpful	90%
Somewhat helpful	10%
Not too helpful	0%
Not at all helpful	0%
<b>Better dimming capabilities</b>	
Very helpful	57%
Somewhat helpful	31%
Not too helpful	6%
Not at all helpful	6%
<b>Better quality fixtures</b>	
Very helpful	54%
Somewhat helpful	31%
Not too helpful	5%
Not at all helpful	5%
Don't Know	5%
<b>Better quality light from these fixtures</b>	
Very helpful	60%
Somewhat helpful	35%
Not too helpful	0%

Not at all helpful	0%
Don't Know	5%
<b>Greater availability of replacement bulbs</b>	
Very helpful	56%
Somewhat helpful	31%
Not too helpful	0%
Not at all helpful	8%
Don't Know	5%
<b>Incentives for sales staff</b>	
Very helpful	23%
Somewhat helpful	29%
Not too helpful	12%
Not at all helpful	36%

**Table 65: Reasons Why Stores Do Not Stock Fixtures for Integrated LED Bulbs or for LED Bulbs with Any Other Type of Base except Medium-Screw Base**

Note: This question was only asked to stores that do not stock LED pin-base fixtures.

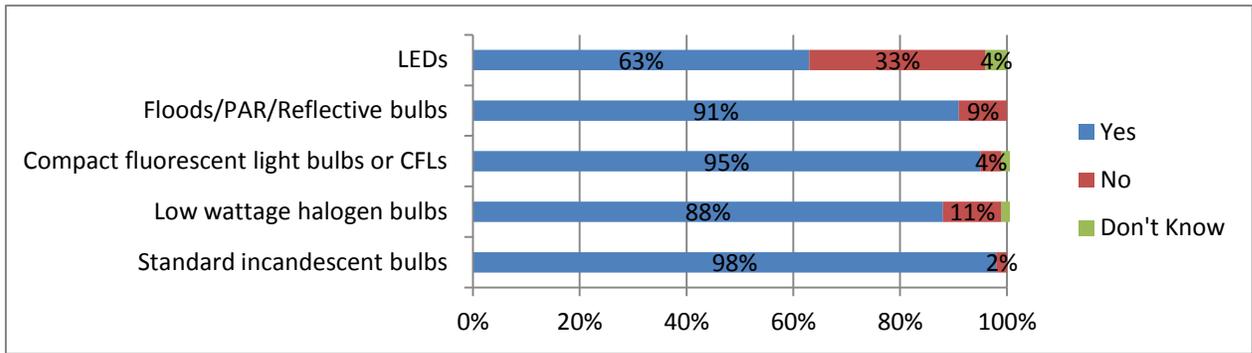
<b>General Fixture Question #F15: (If does NOT stock LED pin-base fixtures) Why don't you stock fixtures for integrated LED bulbs or for LED bulbs with any other type of base accept medium screw-base?</b>	<b>Weighted by Fixture Sales Channels (n=62) (n=39)</b>
Lack of customer demand	26%
Not many are available from suppliers/manufacturers	4%
Fixtures too expensive	21%
Fixtures have technical problems/do not work well	0%
Other	13%

### **3.1.25 Bulbs**

#### **3.1.25.1 Specialty Bulbs Product Mix**

The research team asked retailers who sold bulbs about their specialty bulb stocking patterns. The data were weighted to reflect the distribution store types by NYS 2010 CFL bulb sales channels. While the vast majority of retailers (98%) who sold bulbs stocked standard incandescent bulbs, 95% also stocked CFLs, 91% stocked Flood/PAR/Reflective bulbs, 88% stocked “low wattage” halogen bulbs, and 63% stocked LEDs (Figure 14). The research team also asked retailers who stocked CFL bulbs about what type of CFLs they carried in their store. The CFL types these retailers most commonly reported were standard spiral CFLs (93%) and 3-way CFLs (77%). Retailers were somewhat less likely to report stocking covered CFLs (56%) and candelabra CFLs (48%) (Table 66). Customer demand (36%) and that the bulbs fit fixtures sold in the store (33%) were the two most commonly cited major factors retailers considered when deciding which specialty CFLs to stock. By comparison, just 20% of retailers identified carrying the ENERGY STAR label as a major factor in deciding which specialty CFLs to stock (Figure 15). About a fifth (17%) of these retailers reported having special displays of their specialty CFL stock every week, while a quarter (24%) of them had special displays monthly. Nearly a quarter of the retailers (21%) had special displays a couple times a year or once a year while 16% never had special displays for specialty CFLs (Figure 16). The retailers who reporting having special displays of specialty CFLs were given a list of factors and asked which of these factors affect the types of specialty CFLs chosen for special display. These retailers most commonly offered sale pricing (46%) as a factor, followed by manufacturer suggestions (34%) and product features (32%) (Figure 17). Corporate decision (mentioned by 4 of 53 retailers) and customer demand (mentioned by 4 of 53 retailers) were also factors mentioned by retailers. The majority of retailers (86%) who sold specialty CFLs reported having had sales or promotions for these types of bulbs (Figure 18). Of these, 3% always had these sales or promotions going on, 38% had these promotions weekly or monthly, 21% had the promotions/sales quarterly, and 24% of the retailers had the specialty CFL bulb sales or promotions a couple of times a year. The retailers who offered specialty CFL bulb sales and promotions listed new product offering (46%) and product features (45%) as factors that affected which specialty CFL would be put on promotion or sale (Figure 19). The retailers also spontaneously offered specialty CFL bulb price and customer demand as factors that affect specialty CFL promotion and sales.

**Figure 14: Types of Edison, Medium Screw-base Bulbs Typically Stocked (n=74)**



<sup>1</sup> These data were weighted by the CFL sales channels.

**Table 66: Types of CFLs Typically Stocked**

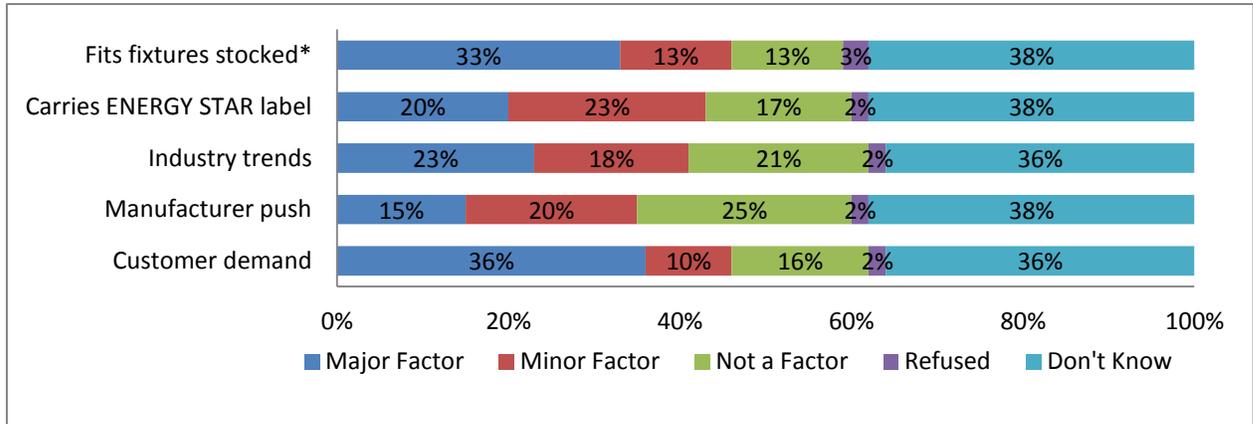
Note: This question was only asked to stores that stock CFLS.

Specialty Bulbs Question #B2: (If stocks CFLs) Now I would like to find out what types of compact fluorescent light bulbs, or CFLs, you typically stock. Do you stock [INSERT ITEM]?	Weighted By CFL Sales Channels (n=70)
Standard spiral CFLs	93%
3-way CFLs	77%
Floods, PAR, or reflective CFLs	71%
Dimming CFLs	63%
Covered CFLs	56%
Candelabra CFLs	48%

<sup>1</sup> This column was weighted by the sells only bulb along with bulbs and fixture weights.

**Figure 15: Factors that Determine What Types of Specialty CFLs are Stocked (n=64)**

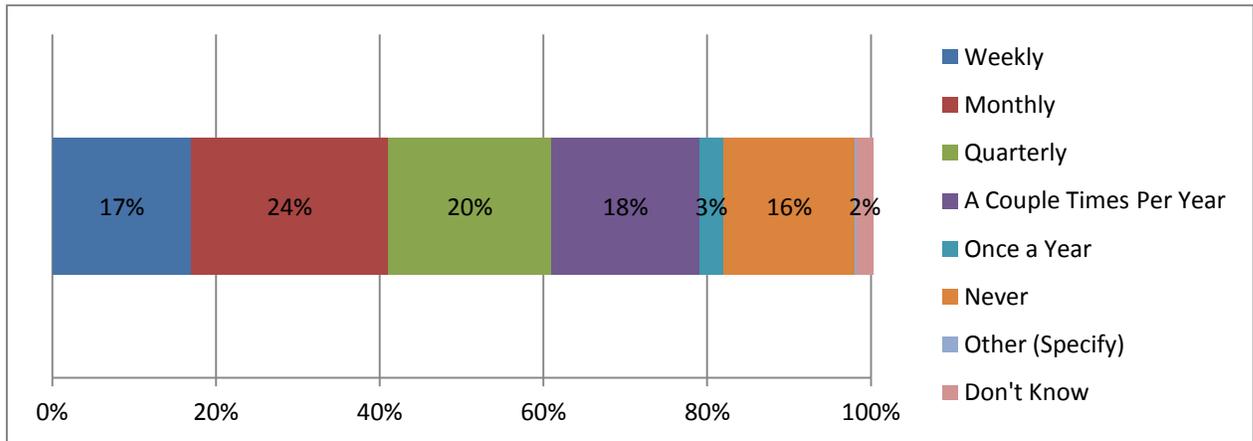
Note: This question was only asked to stores that stock specialty CFLs. "Fits fixtures stocked" was only asked to stores that sell fixtures (n=49).



<sup>1</sup> These data were weighted by the sells only bulb along with bulbs and fixture weights.

**Figure 16: Frequency of Special Displays of Specialty CFL Bulbs (n=64)**

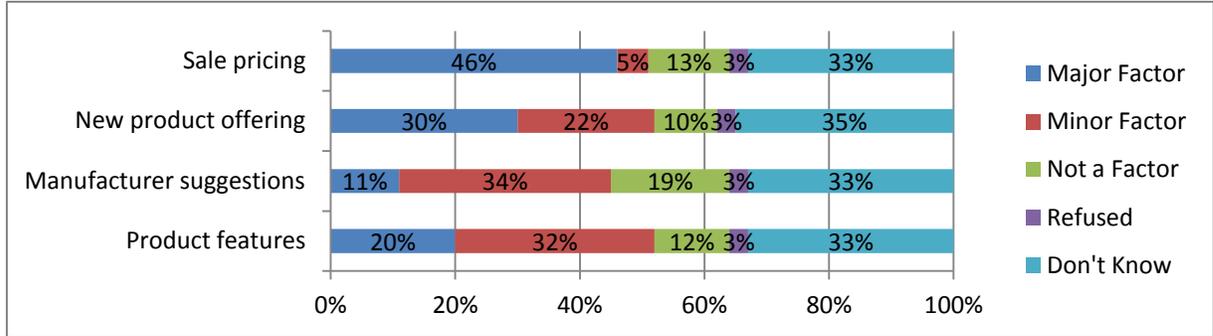
Note: This question was only asked to stores that sell specialty CFL bulbs.



<sup>1</sup> These data were weighted by the sells only bulb along with bulbs and fixture weights.

**Figure 17: Factors that Affect How Types of Specialty CFLs are Chosen to Put on Special Display (n=53)**

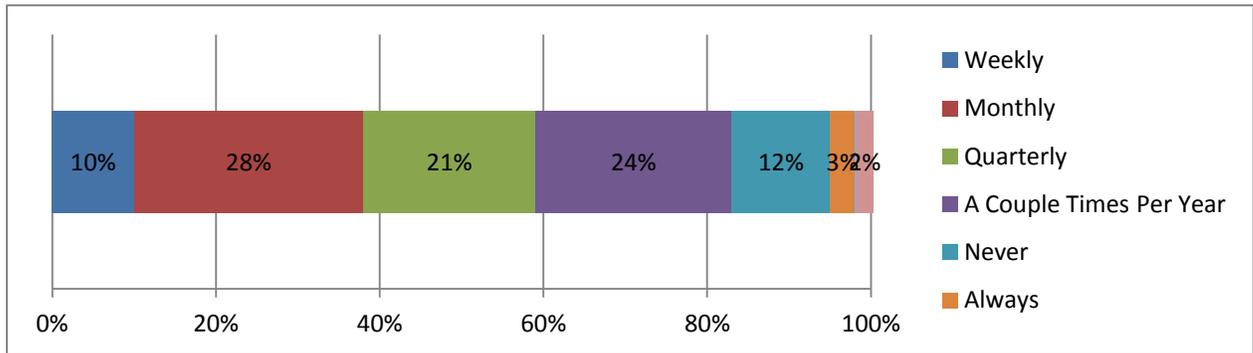
Note: This question was only asked to stores that sell specialty CFL bulbs *and* have special displays of specialty CFL bulbs.



<sup>1</sup> These data were weighted by the sells only bulb along with bulbs and fixture weights.

**Figure 18: How Often There are Special Promotions or Pricing on Specialty CFL Bulbs (n=64)**

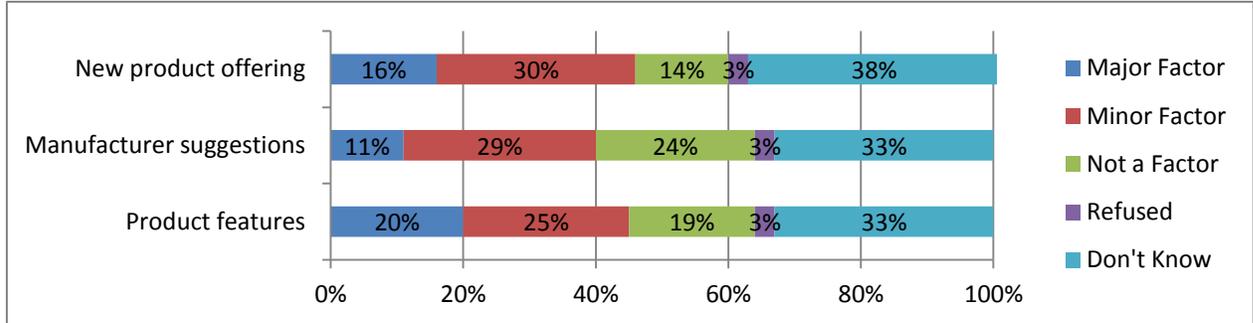
Note: This question was only asked to stores that sell specialty CFL bulbs.



<sup>1</sup> These data were weighted by the sells only bulb along with bulbs and fixture weights.

**Figure 19: Factors that Influence Types of Specialty CFL Bulbs for Special Promotions or Pricing (n=53)**

Note: This question was only asked to stores that sell specialty CFL bulbs *and* have special promotions or pricing on specialty CFL bulbs.



<sup>1</sup> These data were weighted by the sells only bulb along with bulbs and fixture weights.

The research team posed a series of questions to retailers who sold bulbs but not CFLs asking why they did not sell these bulbs. Only two responses were offered: lack of customer demand (2 out of 3 retailers) and that the bulbs were too expensive (1 out of 3 retailers) (Table 67). The retailers who sold CFLs but not specialty CFLs were asked why they did not stock specialty CFL bulbs. They listed lack of customer demand (47%) and lack of shelf space (28%) as major factors for not stocking specialty CFLs (Table 68). Therefore, offering various support to help increase customer demand for CFLs, such as incentives, education, point-of-sale materials, or advertising, etc., could help in opening up these stores to stocking specialty CFLs.

**Table 67: Reasons Why Compact Fluorescent Light Bulbs Are Not Stocked**

Note: This question was only asked to stores that do not stock CFLs.

	Weighted By CFL Sales Channels (n=3)
Lack of customer demand	61%
Price / Too Expensive	39%

**Table 68: Factors that Influence Decision not to Stock Any Specialty CFLs**

Note: This question was only asked to stores that only stock standard CFLs, NO specialty CFLs.

	Weighted By CFL Sales Channels (n=6)

<b>Lack of customer demand</b>	
Major Factor	47%
Minor Factor	0%
Not a Factor	0%
Don't know	53%
<b>Specialty CFLs are too expensive for our customers</b>	
Major Factor	10%
Minor Factor	18%
Not a Factor	18%
Don't know	53%
<b>Lack of shelf space</b>	
Major Factor	28%
Minor Factor	18%
Not a Factor	0%
Don't know	54%

### 3.1.25.2 Increasing Customer Interest In and Sales of Energy-Efficient Bulbs

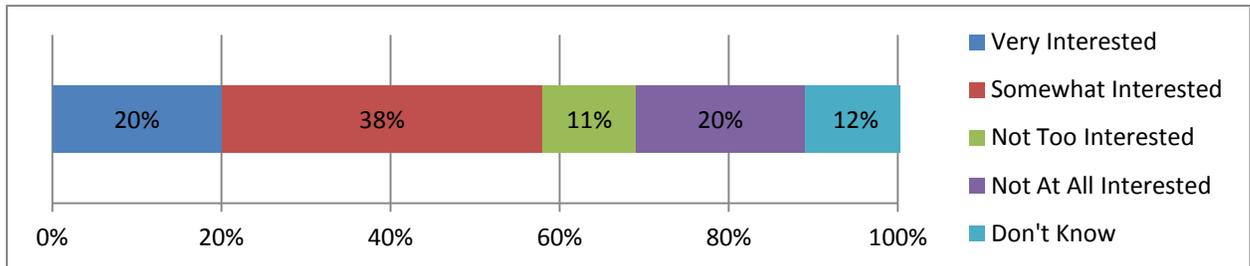
The research team asked bulb retailers a series of questions designed to better understand the retailers' experience selling energy-efficient bulbs and what support might help them sell energy-efficient bulbs at greater rates in the future.

Over half of the bulb retailers (58%) mentioned being interested in stocking a wider selection of energy-efficient bulbs while 31% showed little or no interest (Figure 20). When read a list of factors that could influence the retailers to stock a wider selection of energy-efficient bulbs, retailers most frequently identified the following factors as having "a great deal of influence": customer demand (47%), lower prices (42%) and better quality products (36%) (Figure 21).

The bulb retailers were also read a list of factors that might help them sell more energy-efficient bulbs, and asked how influential each was likely to be in increasing customer interest in buying energy-efficient bulbs from their store. More consumer education about energy-efficient bulbs was most frequently cited as a factor that would be "very helpful" (63%), followed by information for staff about energy-efficient bulbs (51%) and point of sales material about bulbs (49%) (Table 69). Over three-quarters of the retailers (80%) said that lower prices on energy-efficient bulbs would have "a great deal" of influence in increasing

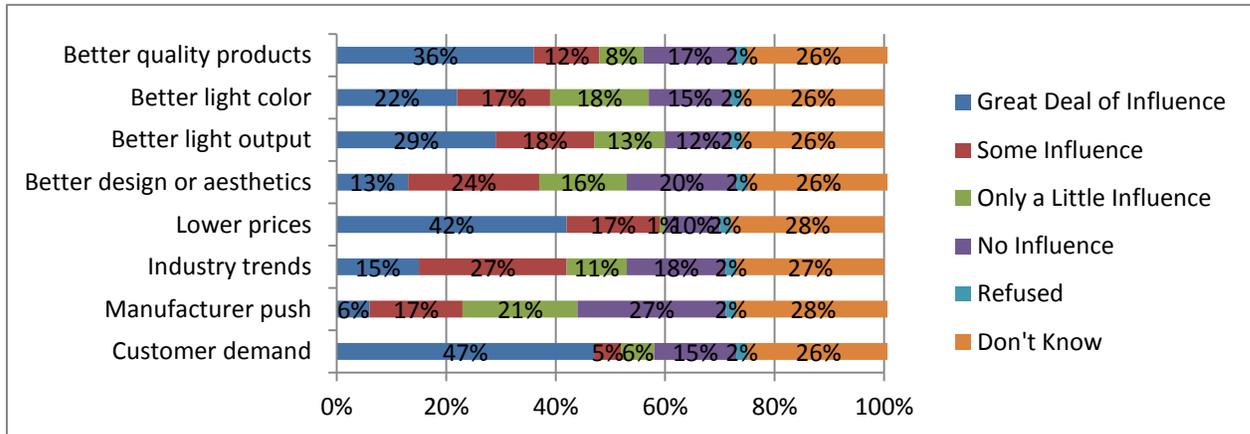
customer interest in buying energy-efficient bulbs from the store. Bulb retailers were also asked about the influence of a series of possible change to the product on customer interest in buying energy-efficient bulbs. Of the changes offered, the one most commonly identified by bulb retailers as having “a great deal” of influence was better light output (47%). While not a product change, 42% of retailers said that more informed sales associates on the sales floor would also have a very great deal of influence on customer interest in buying high-efficiency bulbs (Table 70).

**Figure 20: Interest in Stocking a Wider Selection of Energy-Efficient Light Bulbs (n=74)**



<sup>1</sup> These data were weighted by CFL sales channels.

**Figure 21: Factors that Influence Stocking a Wider Selection of Energy-Efficient Light Bulbs (n=74)**



<sup>1</sup> These data were weighted by CFL sales channels.

**Table 69: How Helpful Factors Would Be for Selling More Energy-Efficient Light Bulbs**

	<b>Weighted By CFL Sales Channels(n=74)</b>
<b>Information for staff about energy-efficient bulbs</b>	
Very helpful	51%
Somewhat helpful	32%
Not too helpful	8%
Not at all helpful	8%
Don't know	1%
<b>Point of sales material about bulbs</b>	
Very helpful	49%
Somewhat helpful	39%
Not too helpful	2%
Not at all helpful	8%
Don't know	1%
<b>In-store demonstrations</b>	
Very helpful	29%
Somewhat helpful	37%
Not too helpful	8%
Not at all helpful	27%
Don't know	
<b>More consumer education about energy-efficient bulbs</b>	
Very helpful	63%
Somewhat helpful	26%
Not too helpful	3%
Not at all helpful	7%
Don't know	1%

**Table 70: How Influential Factors Would Be in Increasing Customer Interest in Buying Energy-Efficient Bulbs from the Particular Store**

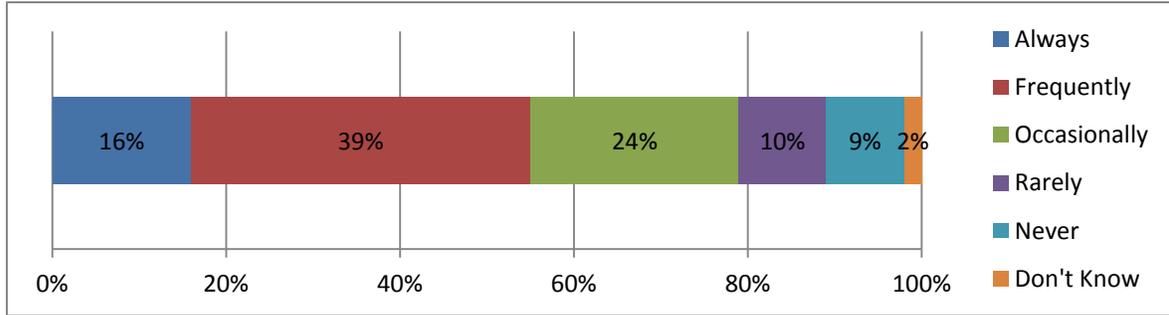
	Weighted By CFL Sales Channels(n=74)
<b>Lower prices</b>	
A great deal	80%
Some	13%
Only a little	0%
None	4%
Don't know	3%
<b>Better design or aesthetics</b>	
A great deal	24%
Some	45%
Only a little	16%
None	12%
Don't know	3%
<b>Better light output</b>	
A great deal	47%
Some	42%
Only a little	2%
None	5%
Don't know	4%
<b>Better light color</b>	
A great deal	30%
Some	44%
Only a little	10%
None	13%

Don't know	3%
<b>Better quality products</b>	
A great deal	36%
Some	40%
Only a little	11%
None	10%
Don't know	3%
<b>More informed sales associates on the sales floor</b>	
A great deal	42%
Some	31%
Only a little	13%
None	9%
Don't know	5%

### 3.1.25.3 Customer Inquiries About Bulbs

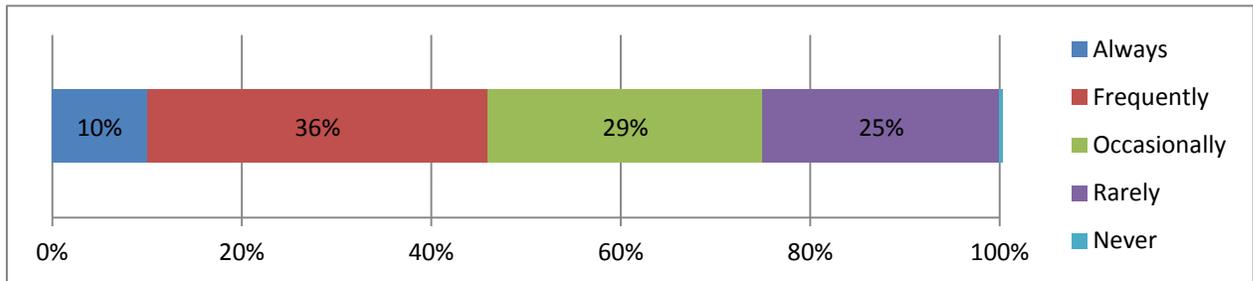
More than half of these retailers (55%) reported that the energy efficiency of bulbs always or frequently comes up when discussing bulbs with customers while about one-fifth (19%) said that energy efficiency of bulbs rarely or never comes up (Figure 22). Almost half of retailers who sold bulbs stated that customers always or frequently ask advice on which bulbs to buy (Figure 23). When retailers were asked for detail about the bulb characteristics about which customers inquired, 40% of retailers reported that customers always or frequently asked about wattage, 33% about light level or brightness, and 22% about light color (Figure 24). When asked about the frequency with which customers present them with concerns about particular bulb capabilities or drawbacks, retailers reported that customers always or frequently brought up the following items at the following rates: 3-way capability (56%), bulb size (26%), dimming capability (22%), and mercury (15%) (Figure 25).

**Figure 22: How Often Energy Efficiency Comes up When Talking to Customers about Light Bulbs (n=74)**



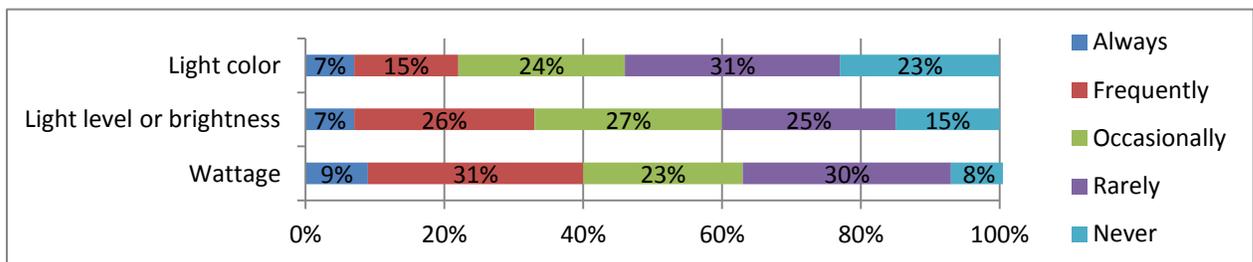
<sup>1</sup> These data were weighted by CFL sales channels.

**Figure 23: How Often Customers Ask for Advice about Which Light Bulbs to Buy (n=74)**



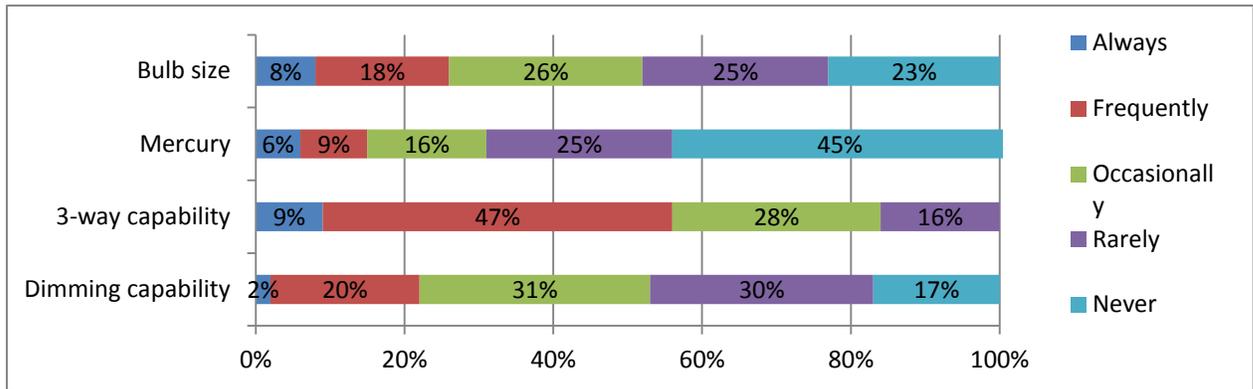
<sup>1</sup> These data were weighted by CFL sales channels.

**Figure 24: How Often Customers Ask about Light Color, Light Level or Brightness and Wattage (n=74)**



<sup>1</sup> These data were weighted by CFL sales channels.

**Figure 25: How Often Customers are Concerned about the Following Topics (n=74)**



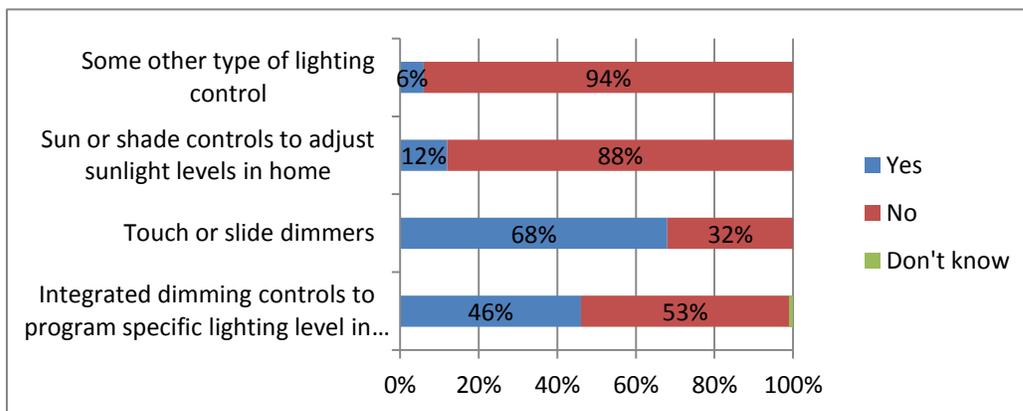
<sup>1</sup> These data were weighted by CFL sales channels.

**3.1.26 Lighting Controls**

The research team also asked retailers who sold fixtures questions about lighting controls. Of the retailers who stocked lighting controls, 68% stocked touch or slide dimmers, 46% stocked integrated dimming controls, and 12% stocked sun or shade controls (Figure 26). Retailers who stocked lighting controls were asked how often energy efficiency comes up when they talk with customers about lighting. Half of these retailers (50%) said that it always or frequently comes up, and half (50%) said that it comes up only occasionally, rarely, or never. (Figure 27).

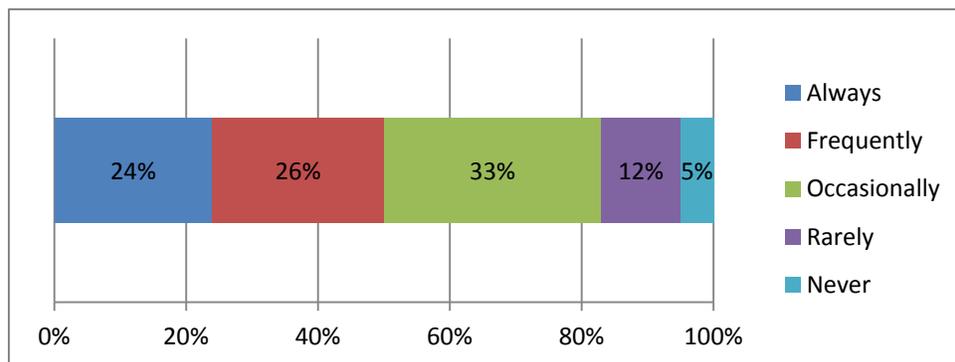
**Figure 26: Types of Residential Lighting Controls Stocked (n=62)**

Note: This question was only asked to stores that stock lighting controls.



<sup>1</sup> These data are weighted by CFL sales channels.

**Figure 27: How Often Energy Efficiency Comes Up When Talking to Customers About Lighting (n=62)**



<sup>1</sup> These data are weighted by CFL sales channels.

**3.1.27 Firmographics**

The respondents to the Retailer Survey represent six channels of lighting and fixture outlets: hardware store (20%), grocery store (20%), home center (19%), discount department store (17%), warehouse store 16%), and lighting specialty store (6%) (Table 71). Around a third of the retailers (31%) represent stores with fewer than 10 employees, 21% of stores had 10 to 49 employees, 10% had 50 to 99, and the remainder (34%) of the stores had 100 or more employees (Table 72). Half (49%) of the retailers surveyed were not aware of the dollar volume attributable to lighting in their store (Table 73). The average revenue of 28 of the stores included in this survey was \$22.4 million—the other 55 participants could not provide a figure (Table 74). Around 70% of those surveyed represent stores that are part of a larger company while 26% were from independent business (Table 75).

**Table 71: Type of Business**

	Overall (n=83)	Weighted By CFL Sales Channels(n=74)	Weighted by Fixture Sales Channels (n=62)
Hardware Store	20%	21%	29%
Grocery Store	20%	10%	8%
Home Center	19%	21%	23%
Discount Department Store	17%	31%	7%
Warehouse Store	16%	15%	19%
Lighting Specialty Store	6%	1%	15%

**Table 72: Number of Employees at Particular Store Location**

	<b>Overall (n=83)</b>	<b>Weighted By CFL Sales Channels(n=74)</b>	<b>Weighted by Fixture Sales Channels (n=62)</b>
Fewer than 5	15%	10%	18%
5 to 9	2%	1%	5%
10 to 19	14%	9%	25%
20 to 49	7%	9%	10%
50 to 99	10%	16%	7%
100 to 249	29%	36%	28%
250 or More	15%	13%	4%

**Table 73: Approximate Yearly Dollar Volume of Lighting Sales in Store**

	<b>Overall (n=83)</b>	<b>Weighted By CFL Sales Channels(n=74)</b>	<b>Weighted by Fixture Sales Channels (n=62)</b>
Less than \$1,000	9%	5%	8%
\$1,000 to \$5,000	3%	3%	4%
\$5,000 to \$10,000	4%	6%	5%
\$10,000 to \$50,000	12%	10%	3%
\$50,000 to \$100,000	3%	2%	5%
\$100,000 to \$250,000	4%	4%	4%
\$250,000 to \$500,000	1%	0%	1%
\$500,000 to 1 million	5%	6%	7%
More than \$1 million	6%	7%	8%
Refused	4%	4%	7%
Don't Know	49%	53%	47%

**Table 74: Approximate Total Yearly Sales Revenue for Store**

	<b>Overall (n=83)</b>	<b>Weighted By CFL Sales Channels(n=74)</b>	<b>Weighted by Fixture Sales Channels (n=62)</b>
Average	\$22,431,989	\$26,357,169	\$20,547,758
Refused	9	8	6
Don't Know	46	41	34

**Table 75: Is Store Independent or Part of Larger Company?**

	<b>Overall (n=83)</b>	<b>Weighted By CFL Sales Channels(n=74)</b>	<b>Weighted by Fixture Sales Channels (n=62)</b>
Independent	22	20	18
Part of a Larger Company	59	52	42
Other	2	2	2





## Section 4

# RESIDENTIAL LIGHTING PROGRAM APPROACHES OUTSIDE NYS

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### SUMMARY

- ***The primary residential lighting activity undertaken by the program administrators interviewed is upstream or midstream promotion of efficient lamps.*** Currently, few resources are put towards incenting fixtures due to their lower cost effectiveness. In general, these program administrators are shifting away from coupon and mail-in rebate incentives, although these are still used for some fixtures and Light Emitting Diode (LED) lamps.
- ***Training and other support for the trades provided by the program administrators interviewed tend not to focus specifically on lighting.*** Residential energy audits and electric savings calculators made available to consumers usually encompass comprehensive home energy savings and are not specific to lighting. Similarly, contractor training and education activities are not usually focused on lighting products.
- ***When program administrators offer lighting training, it is typically for retail sales staff.*** The program administrators' programs typically include training components, although some are more comprehensive than others. The primary audience for training is retail staff. Retail level training must be repeated frequently due to relatively high staff turnover.
- ***For a variety of reasons, lighting design is not a particular focus of these program administrators' residential lighting programs.*** Some of the challenges involved in addressing lighting design in the residential market include the relatively high expense and long payback for retrofit customers, that homeowners are generally not knowledgeable nor inclined to be trained on lighting design themselves, and that lighting designers are typically not interested in doing one-off jobs.
- ***None of the program administrators interviewed typically target builders, contractors, and electricians to encourage them to routinely specify or install high-efficiency lighting as part of residential projects.*** Two out of the five program administrators reach out to architects and lighting designers, and four out of five reach out to lighting showrooms about opportunities for energy-efficient residential lighting.
- ***NYSERDA may wish to consider adopting some of the more innovating lighting program approaches described here,*** such as a contest to encourage manufacturers to develop a "super CFL" that meets certain specification requirements, and exchanges of inefficient torchiere and plug-in fixtures for efficient ones.

## BACKGROUND

In July and August 2011, the research team interviewed staff of five administrators of residential lighting programs from across the U.S. and Canada. The program administrators were chosen for one or more of the following reasons: because evidence from various sources<sup>40,41</sup> suggested that their residential lighting programs were innovative; they administered residential lighting programs in a state or province that had already implemented legislation similar to EISA; or because of a recommendation from a program administrator interviewee.

The general descriptions that appear here were informed in part by program descriptions in the CEE 2011 residential lighting summary.<sup>42</sup> Additional detail about specific aspects of the programs appear elsewhere in this report by topic.

The residential lighting programs implemented by the program administrators employ various combinations of upstream and downstream activities to promote energy-efficient lamps and fixtures. All of the programs promote ENERGY STAR qualified Compact Fluorescent Lamps (CFLs) and LED lamps and fixtures. With the exception of a provincial program in Canada, which does not promote standard CFLs, the other administrators' programs incent both standard and specialty CFLs. The types of LEDs currently being promoted include LED downlights and ENERGY STAR integral LED lamps, including A-lamps and reflectors. The program administrators generally plan to expand promotion of LED products in the future. The majority of the program administrators' budgets are dedicated to lamps (as opposed to fixtures), in part because incenting fixtures is less cost effective than incenting lamps. Each program has a large upstream and/or midstream component in which lamp discounts are applied at retail. In general, the program administrators are shifting away from coupon and mail-in rebate incentives, although these are still used for some fixtures and LED lamps.

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<sup>40</sup> Consortium for Energy Efficiency (CEE). 2011. "Summary of Residential Lighting Programs in the United States and Canada." Accessed September 20, 2011 from <http://www.cee1.org/files/CEEResidentialLightingProgramSummaryApril2010.pdf>.

<sup>41</sup> U.S. Department of Energy. 2010. "ENERGY STAR<sup>®</sup> CFL Market Profile." September. Accessed March 7, 2012 from [http://www.drintl.com/Data/Sites/1/downloads/publications/2010\\_cfl\\_market\\_profile.pdf](http://www.drintl.com/Data/Sites/1/downloads/publications/2010_cfl_market_profile.pdf).

<sup>42</sup> Consortium for Energy Efficiency (CEE). 2011. "Summary of Residential Lighting Programs in the United States and Canada." Accessed September 20, 2011 from <http://www.cee1.org/files/CEEResidentialLightingProgramSummaryApril2010.pdf>.

Each program administrator implements programs containing complete home assessment audits which include lighting as a component, but they do not generally offer home energy audits or surveys focused exclusively on lighting. The exception is a community-level program administered by one of the program administrators. In this program, volunteers are trained to do simple walkthroughs and direct installs of CFLs in homes. Additionally, the program administrators generally offer tools such as online calculators for customers to estimate home energy savings. Aside from the online CFL savings calculators made available by two of the program administrators interviewed, the tools they offer to estimate energy savings are not specific to lighting measures alone. One interviewee explained that their organization's savings estimate tool was integrated with other residential programs, and did not disaggregate lighting savings from other savings because the program administrator "did not want consumers to see silos."

## **INTERVIEWEES' RETAIL LIGHTING PROGRAMS**

### **4.1.1 California Utility**

The research team interviewed staff of a California utility that runs energy efficiency programs in its service territory. This program administrator's portfolio of residential programs includes three programs that address residential lighting: the Residential Lighting Incentive Program, Lighting Market Transformation, and Advanced Consumer Lighting. The Residential Lighting Incentive Program consists of upstream promotions of standard, bare spiral CFLs with wattages of 30 watts or less. The Lighting Market Transformation program is a statewide, non-resource, research and education program requested by the CPUC to allow for greater visibility into program administrators' internal efforts to bring new products to market. Of particular interest for this study is Advanced Consumer Lighting, since it does not focus on bare spiral CFLs. Advanced Consumer Lighting is an umbrella program comprising five subcomponents: 1) an advanced LED ambient trial study, 2) a lighting showroom trial study, 3) a web catalogue phone sale trial study, 4) a super lamp subcomponent, and 5) an exchange program.

- The advanced LED ambient trial study was still in the design phase at the time the in-depth interview was conducted in July, 2011. The study will test various prices, incentives, promotional activities, delivery channels, and installation of LEDs. It is primarily an upstream test, but will contain some midstream and downstream applications, including LED installation in a sample of houses.
- Lighting showrooms often display products for new construction purposes. However, in California program administrators are not permitted to put incentives on residential new construction lighting products. Therefore, this program administrator designed the lighting showroom trial study to determine whether lighting showrooms would display high-efficiency products at certain prices. The purpose of the lighting showroom trial study is to determine whether walk-in customers doing residential retrofit projects want to purchase high-end, aesthetically pleasing, energy-efficient fixtures. The interviewee representing this program

administrator indicated that while the lighting showroom study did not perform as well as they had hoped, it had performed better than some had expected it would.

- The web catalogue phone sale trial study targets geographically hard-to-reach consumers by creating a convenient way to purchase CFLs and fixtures. Web and phone sales offer the advantage of providing real-time customer level data, and the program administrator envisions this sales channel as a good fit for early adopters of LEDs.
- The super lamp subcomponent is a contest designed to encourage manufacturers to develop a “super CFL” that meets certain specification requirements, including being covered, dimmable, of the same dimensions as an incandescent lamp, and some additional requirements pertaining to performance, CRI, and R9 coverage. The premise of the super CFL concept is that consumers do not fill their sockets with CFLs because CFLs do not share the same features as incandescent lamps such as smooth shape and dimmability, and that addressing this issue would increase CFL saturation. During the super lamp program’s first year, the program administrator received a few inquiries about the contest but no product samples. The prize for developing a super CFL is an increased incentive on the winning manufacturer’s product. However, prior to awarding the prize, the program administrator intends to conduct comprehensive market tests in order to test the premise of the super CFL—that the features on display (and not the price) will result in increased sales volume.
- The long running exchange program allows consumers to exchange inefficient torchiere and plug-in fixtures for efficient ones. While fixtures are included within various subcomponents of Advanced Consumer Lighting, the program administrator is not emphasizing promotion of fixtures due to their relatively low cost effectiveness.

The California utility works exclusively with manufacturers through its upstream promotions. Manufacturers are allowed to propose per-unit incentives that are less than the program administrator’s published amounts in their reservation requests for allocation of program dollars. Manufacturers are responsible for obtaining retailer commitment to participate. The manufacturers calculate the per-unit incentives based on the quantities and models of efficient lighting products outlined in retailers’ commitments. Allowing manufacturers to propose per-unit incentives in the reservation requests makes the process more competitive and allows the program administrator to enhance electric savings by awarding program dollars to the manufacturers with the lowest per-unit incentives.

#### **4.1.2 Non-Profit Statewide Program Administrator**

In July of 2011, the research team interviewed staff of a non-profit program administrator that runs energy efficiency programs in a Northeastern state. This program administrator’s Retail Efficient Products Lighting Promotion Program promotes ENERGY STAR lamps (including standard and specialty CFLs and integral LEDs) and ENERGY STAR fixtures (including fluorescent fixtures and LED downlights) through upstream promotions, instant coupons, multimedia marketing campaigns (including radio, print, and

television ads) and special events.<sup>43</sup> Replacement lamp incentives account for around 98 percent of the budget, while the remaining two percent is allocated to fixtures. In recent years, the program administrator has transitioned most of its instant rebate coupons to midstream promotions with retailers, allowing the program administrator to experiment with price points and to enhance quality through the ability to select products for promotion. The program administrator has found that face-to-face relationship building leads to higher implementation success, and holds annual, in-person meetings with retailer and manufacturer partners to discuss program goals and plans. The program administrator attributes much of the program's success to its small size and ability to act quickly in the market.

This program administrator's residential lighting marketing activities have evolved over time since the transition from instant rebate coupons to midstream promotions in 2005. Starting in 2005, the program administrator advertised in community papers and mobilized community enthusiasm through community-level CFL initiatives. An example of a particularly successful effort is an initiative to change out incandescent bulbs for CFLs in a single town. This initiative was viewed as a resource acquisition and market transformation success story, because not only were over 43,000 CFLs purchased by the town's residents, but the program administrator was able to add retail partners and expand its product availability. In 2008, the program administrator ran its first CFL marketing campaign, which included TV ads designed to raise awareness of CFLs and how to recycle them. In 2009 the program began to target the hard-to-reach population by partnering with a statewide food bank to distribute CFLs to local food pantries. Also in 2009, the program's retail partner base was expanded to include independent grocery and convenience stores in addition to its traditional base of hardware stores. However, the partnership with convenience stores proved unsuccessful because this segment was generally unwilling to give the products good location and was unable to satisfy the program administrator's reporting needs. In 2010 the program increased its radio advertising and discontinued its TV ads. New radio ads are developed roughly twice per year to keep things fresh. For 2012 and beyond, the program administrator is considering the "market lift" model as a possible future approach to its residential lighting program.

#### **4.1.3 Connecticut Utility**

In August of 2011, the research team interviewed staff of a Connecticut utility that runs energy efficiency programs in its service territory. Through the Residential Retail Products Program, this program administrator promotes ENERGY STAR lamps (including standard and specialty CFLs and LEDs) and ENERGY STAR fixtures (including fluorescent fixtures and LED recessed downlights) through upstream promotions, instant rebates, special events, online and printed catalogs, and fundraising opportunities, as well as through point of purchase and educational materials (Consortium for Energy Efficiency, 2011).

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<sup>43</sup> Consortium for Energy Efficiency (CEE). 2011. "Summary of Residential Lighting Programs in the United States and Canada." Accessed September 20, 2011 from

<http://www.cee1.org/files/CEEResidentialLightingProgramSummaryApril2010.pdf>.

Replacement lamp incentives account for around 98 percent of the budget, while the remaining two percent is allocated to fixtures. The program's primary activity is the upstream promotion of CFL lamps. Two-thirds of CFL lamps incented through the program are standard CFLs, while around one-third are specialty CFLs. The quantity of LED products sold through the program has been increasing, and the program administrator plans to promote more LED products (including ENERGY STAR integral LED A-lamps and reflectors and LED downlight luminaries) in the upcoming year.

The program administrator's program incorporates fundraising and lighting events to educate consumers. The fundraising component allows nonprofit organizations to raise money by selling CFL bulbs. Nonprofit partners are often children's organizations, and the program administrator has found that these organizations derive value not only from the fundraising aspect but also in the sense of doing good for the environment. The program administrator's lighting event vendor travels throughout the state, primarily to offices and large facilities to target the "lunch crowd." The program has begun to expand its lighting event venues by including home shows. About ten percent of the program administrator's products are sold through these lighting events.

#### **4.1.4 Non-Profit Contract Program Administrator**

In August of 2011, the research team interviewed staff of a nonprofit organization that implements programs on a contract basis in a variety of states. This program administrator promotes a variety of lighting products for its clients, including CFLs, LEDs, pin-base CFL and LED fixtures, desk lamps, and, in less mature markets, LED holiday lights. The majority of residential lighting programs the program administrator runs for its clients are retail markdown programs. The program administrator also promotes products through mail-in rebates, point of purchase materials, give-aways, and cooperative advertising with retailers. This program administrator employs an RFP process for its markdown programs. Because various retail channels (i.e. big box, hardware, grocery, etc.) each have different net-to-gross ratios, the program administrator estimates the percentage of each retailer channel to award product markdowns based on the geographic area. Then, the program administrator will select retail partners based on scoring criteria, including product selection, percentages of specialty and non-specialty products, product placement, signage, events, and retailer efforts to educate staff and consumers. After selecting the highest scoring retail partners within each channel, the program administrator combines all programs into one master agreement and negotiates the "spend," allowing it to get better pricing for its sponsors. The program administrator's retailer RFP specifies the required proportion of a retailer's product mix that must be comprised of specialty CFLs, and offers a higher incentive on specialty CFLs than on standard CFLs. Fixtures represent around one percent of total lighting savings. The program administrator has recently made a focused effort to transition its partner relationships from being heavily manufacturer-based to retailer-based, having found that that retailer-based relationships more effectively facilitate lighting program goals.

#### **4.1.5 Provincial Program Administrator**

In July of 2011, the research team interviewed staff of a provincial program administrator in Canada. This program administrator's ENERGY STAR Lighting Program promotes ENERGY STAR lamps (LEDs and specialty CFLs) and ENERGY STAR fixtures through upstream promotions, point of purchase materials, retail events, radio and print ads, bill inserts, radio remote events, and web and social media channels.<sup>44</sup> The majority of instant discounts are paid to retailers, although the program administrator does occasionally go further upstream to manufacturers in order to influence shelf space allocation. The program has two business development managers on staff who work with manufacturers and retailers to better understand the lighting product mix and how to maximize efficient lighting within the mix. Outreach teams from the program conduct in-store retailer training and attend retail promotional events. This program administrator was the first to promote an ENERGY STAR LED lamp in Canada. In May of 2011, the program administrator launched the promotion of the GE 9w LED (a 40-watt replacement lamp) at Canadian Tire, a large general retailer in Canada. Additionally, the program administrator began promoting CREE recessed downlights at Home Depot in June 2011. Further LED promotions are planned for fall when additional LED products are expected to be ENERGY STAR qualified. The program administrator is currently involved in developing a standard for measuring the performance of all general service lamps regardless of technology, in order to help consumers better understand the different options available to them.

### **PROGRAM OUTREACH TO THE BUILDING INDUSTRY AND SHOWROOMS**

#### **4.1.6 Outreach to Builders, Contractors, and Electricians**

The program administrators interviewed for the study do not typically target builders, contractors, and electricians to encourage them to routinely specify or install high-efficiency lighting as part of residential projects. Some of the program administrators interviewed engage in education, outreach and training activities with this audience on all efficient products (not just lighting) through their new construction programs. One of the program administrators conducts contractor outreach and training of efficient lighting and program incentives in order to leverage sales through contractors, although the emphasis is greater on commercial lighting than on residential lighting projects. Another program administrator generally avoids targeting builders, contractors, and electricians in its residential lighting programs in order to avoid the issue of "double dipping" savings between residential and business programs.

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<sup>44</sup> Consortium for Energy Efficiency (CEE). 2011. "Summary of Residential Lighting Programs in the United States and Canada." Accessed September 20, 2011 from

<http://www.cee1.org/files/CEEResidentialLightingProgramSummaryApril2010.pdf>.

**4.1.7 Outreach to Architects, Lighting Designers, and Lighting Showrooms**

All of the program administrators interviewed have tried to reach out to lighting showrooms about opportunities for energy-efficient residential lighting and lighting design, and four out of the five program administrators interviewed currently do this. Three of the program administrators work with showrooms that sell to residential customers and promote CFL technologies. One of these targets standalone lighting showrooms (as opposed to those that are part of distributors) in order to avoid the issue of “double dipping” savings between residential and business programs. A fourth program administrator engages with lighting showrooms through their Advanced Consumer Lighting showroom trial study and through training of lighting showroom staff.

The program administrator that no longer reaches out to these audiences recently experimented with outreach to contractors through a showroom pilot program. However, the pilot program was discontinued due to the relatively low cost-effectiveness of working with independent lighting showrooms.

In addition to lighting showrooms, two of the program administrators reach out to architects, lighting designers and other key market actors. One of these two program administrators organizes an annual Better Buildings by Design Conference in which lighting experts give presentations on residential and commercial lighting design to builders, engineers, architects, and other trade professionals. The other program administrator typically conducts training several times per year for architects and designers through its residential new construction program. The training is not tailored specifically to lighting, but covers new construction in general.

## Section 5

# THE FUTURE OF THE RESIDENTIAL LIGHTING MARKET

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## RESIDENTIAL LIGHTING AFTER EISA

### 5.1.1 Preparation and Planning for EISA by Manufacturers and Program Administrators

#### 5.1.1.1 Summary

- *Manufacturer perspectives on the degree to which customers might currently be hoarding bulbs, or might hoard them in future, were mixed.* Three manufacturers were planning to increase production to prepare for some degree of hoarding, while two were not planning to do so.
- *After EISA, program administrators are looking to lighting strategies such as allocating additional program dollars to fixtures, specialty Compact Fluorescent Lamps (CFLs), and Light Emitting Diodes (LEDs), and potentially transitioning to a “market lift” model.* The uncertainty regarding the new baseline for residential lighting savings resulting from the implementation of EISA represents an added challenge in residential lighting program planning. In the short-term, the program administrators interviewed generally anticipate additional savings to come from standard and specialty CFLs. The strategies mentioned by program administrators for continuing to achieve residential lighting program savings include allocating additional program dollars to fixtures, specialty CFLs, and LEDs, and potentially transitioning to a “market lift” model. The “market lift” model is designed to leverage the sales volume of large retailers while addressing the net-to-gross problems associated with these mass merchants. However, setting a baseline for market lift can be a complex task.

#### 5.1.1.2 Production Changes by Manufacturers

The evaluation team asked manufacturers and program administrators how they were preparing for EISA. Two of the five manufacturers of incandescent bulbs that were interviewed for the study had not changed their inventory planning and said that they will produce the same quantity of 100-watt incandescent bulbs until their manufacture is no longer permitted. One said: “We are not building our inventory or adjusting, we are just producing 100-watt incandescents until we cannot produce them anymore. If people start stockpiling in the beginning [post-January], the national inventory will not last long.”

The other three respondents who manufacture incandescent bulbs said that demand was currently strong for incandescents, and that they plan to take advantage of customers who hoard bulbs by increasing incandescent production slightly prior to January 1, 2012. At the same time, one of these three

manufacturers said they will be developing new technologies (such as halogens that save 28% to 30% energy and have the same shape and dimming capability as incandescent bulbs).

One respondent from a company that manufactures only LEDs stated its mission is to make other types of bulbs obsolete, as CFLs contain mercury and incandescents are inefficient. None of the manufacturers plan to vastly increase their inventories or production of incandescents to account for potential hoarding of 100-watt incandescent bulbs.

#### **5.1.1.3 Planning by Program Administrators**

The program administrators interviewed were giving thought to how their residential lighting programs might need to change with the implementation of EISA. In particular, they were grappling with how to measure future savings due to the uncertainty of the new baseline for residential lighting savings. In the short-term, the interviewees generally anticipate additional savings from standard CFLs and specialty CFLs after EISA. They also expect LEDs to account for an increasing proportion of program savings, although how quickly and at what price points remain to be seen. One of the program administrators noted that during 2012 they plan to allocate more program dollars to specialty CFLs and to change customer messaging so that it is more targeted. This program administrator also foresaw fixtures playing a stronger role in the programs it implements for its customers in order to mitigate anticipated program savings losses from EISA.

Another program administrator was considering transitioning to a “market lift” model in 2012, and had recently begun piloting a three-month market lift program. This program administrator was working with a major retailer in a state where lighting incentives have largely been discontinued at mass merchants due to net-to-gross attribution issues.

#### **5.1.1.4 “Market Lift” Approach**

The “market lift” approach is designed to leverage the sales volume of large retailers while addressing the net-to-gross problems associated with providing rebates and incentives to mass merchants. Via this approach, rather than paying incentives on all high-efficiency lighting products sold by a particular retailer, the program administrator develops a high-efficiency lighting market share baseline for the retailer, and then pays the retailer for achieving sales of high-efficiency lighting products above the baseline. This difference is referred to as the “market lift.” For example, if a retailer’s market share of high-efficiency lighting products was ten percent before the program and fifteen percent after the program, the program administrator would pay the retailer incentives on the five-percent “market lift.” The “market lift” pilot described by the program administrator includes ENERGY STAR CFLs and medium-base LED screw-in bulbs. The pilot is designed to pay incentives on a per-bulb basis since that is what retailers are accustomed to.

Among the drawbacks of this approach are that a significant amount of data is required from a retailer in order to establish its baseline for measuring “market lift,” including data not only on efficient lighting products but on a retailer’s entire lighting category, and the determination of a baseline can be a complex task. Another drawback is that the market lift model may be too difficult to be implemented with independent “mom and pop” stores. Unlike many upstream programs implemented by this program administrator in the past, in which the working relationship was with the manufacturer, the relationship between the program administrator and the retailer is very important to the success of this approach. No data were available to assess the pilot program’s effectiveness at the time of the in-depth interview because it had been running for only three weeks.

## 5.1.2 Experiences with Early Implementation of EISA

### 5.1.2.1 Summary

- ***As of when interviews were conducted, it was still too early to assess the quantitative impacts of early implementation of EISA in these jurisdictions.*** Efficiency standards phasing out certain wattages of incandescent lamps went into effect in California and British Columbia at the beginning of 2011. However, at the time of the interviews (Summer 2011) the California and Canadian interviewees did not yet have any quantitative assessments of how the market has reacted to the new standards in these regions. It may not be possible to accurately assess consumer reaction to EISA until retailers’ stocks of traditional incandescent lamps have been depleted.
- ***California interviewees believe that it is important that consumers be educated about their options under EISA.*** It appears that there was no particular effort made in California to notify or educate consumers about the change in advance of the date on which the legislation went into effect. The state agency interviewees believed that consumers generally did not have a clear understanding of their lighting options under EISA. In their opinion, consumers on the whole were insufficiently educated regarding lumens, wattage, light output, and selecting the appropriate bulb for the application.
- ***The experience of manufacturers with early implementation of EISA in California suggests that it could take up to half a year before retailers run out of stock of 100-watt bulbs.***
- ***For a variety of reasons, consumers in other states may not react to EISA in its first year in the same way as California consumers.*** Manufacturers observed that California consumers were purchasing lower wattage incandescent bulbs and CFLs to replace 95-watt bulbs after

January 2011.<sup>45</sup> However, EISA-compliant halogens were not available in California until mid-2011. Manufacturers also noted that compared to the nation, California consumers are used to environmental initiatives. Given these factors, we would expect that California's experiences with early implementation of EISA may be somewhat different from the rest of the country.

- ***In the U.K. and Australia, where phase-outs of incandescent lighting are already underway, there is evidence of a migration from traditional incandescent bulbs to halogen bulbs.*** During the time period in which Australia's and the UK's lighting standards went into effect, compliant halogen bulb sales have increased in Australia (from 24% in 2008 to approximately 45% of total bulbs sold in 2009) and in the U.K. (from 18% in 2009 to 30% in 2010). The data from Austria, which experienced consumer hoarding of incandescent bulbs after a very adverse publicity campaign, are inconclusive about this migration.
- ***The data from the U.K., Austria and Australia offer a variety of different trajectories for CFL market penetration. Data from the U.K. and Australia suggest that CFLs should at least hold their own in the US as the phase-out progresses. However, the case of Austria suggests that adverse publicity about the legislation could serve to delay the full impact of EISA.*** CFL sales in the U.K. have steadily increased from less than 10% before phase-out legislation was passed to 50% of total domestic bulb sales in 2010. In contrast, CFL sales in Australia leveled off after reaching 34% of total bulb sales in 2007, up from 10% before phase-out legislation was passed. In Austria, CFL sales dropped as a percentage of all bulb sales prior to implementation of legislation, as an adverse publicity campaign resulted in consumers stocking up on incandescent bulbs.
- ***It is possible that CFL market share in the United States may eventually exceed that in either the U.K. or Australia after EISA takes effect.*** The market share of CFLs has consistently been higher in the United States (16% to 22%) than in either Australia (about 10%) or the U.K. (6%) before the phase-out introduction. Thus, it is possible that after EISA, CFL market share in the United States may eventually exceed that in either the U.K. or Australia.
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<sup>45</sup> Prior to the early implementation of EISA in California, the state of California had already enacted legislation requiring lamps sold in the state to be five percent more efficient than standard incandescent lamps. Therefore, in California 100-watt lamps had already been phased out and replaced with 95-watt lamps on retailers' shelves.

### **5.1.2.2 Background**

Legislation very similar to EISA went into effect in California and British Columbia, Canada, on January 1, 2011. Australia and the U.K. implemented similar legislation in 2009 and 2010, respectively. To understand these jurisdictions' experiences, the research team asked manufacturers, a California government agency, and the California program administrator questions about early experiences with EISA in California, and interviewed the British Columbia program administrator about early in British Columbia. The team also found and reviewed relevant literature for insights from experiences in Europe and Australia.

### **5.1.2.3 California**

According to the California government agency interviewed, EISA went into effect in California one year earlier than the federal legislation. Titles 20 and 24 are the California legislation regulating energy efficiency—Title 20 regulates what energy-using products can be sold in California and Title 24 regulates what can be installed in new construction. Title 20 sets the minimum efficiency standards for light bulbs sold in California. A California version of EISA (phasing out 95-watt incandescent lamps, which are sold in California instead of 100-watt bulbs due to earlier legislation) was implemented in California on January 1, 2011 via Title 20, one year prior to the federal legislation.

#### **5.1.2.3.1 Manufacturer Experience**

The research team asked manufacturers what they noticed about consumer purchasing habits after implementation of EISA in California, and what expectations they had for consumer purchases of bulbs in California going forward.

Some manufacturers had prepared retailers for the early implementation of EISA in California and said the transition away from the 95-watt incandescent bulbs was fairly smooth. While the legislation stipulates that manufacturers cannot make 100-watt incandescent bulbs after January 1, 2011, retailers are still permitted to sell the bulbs until their stock is gone. Most of the larger manufacturers that sell products in California stated that retailers continued to sell the 95-watt incandescent bulbs until their stock was depleted. One manufacturer visited many locations of a large home improvement chain in May and noted that they still had some 95-watt incandescent bulbs in stock, five months after the legislation was implemented in California.

When asked what types of bulbs customers in California were choosing instead of 95-watt incandescent bulbs, most manufacturers mentioned that customers are purchasing lower wattage incandescents and that retailers also noticed a small increase in CFL sales. One manufacturer said it is difficult to assign early trends from EISA implementation in California to the nation, as EISA-compliant halogens were not widely available in California until this past summer. Another manufacturer mentioned that the transition in California was seamless, but they expect less ease in other states such as New York.

Two large manufacturers mentioned that consumers in California are used to environmental initiatives and thus were not fazed when 95-watt incandescent bulbs became unavailable, adding that consumers in other states are less accustomed to environmental initiatives. Although these non-California consumers are used to products being discontinued, they may have more confusion when faced with selecting new types of lighting products, and they may be less aware of the EISA legislation. In general, manufacturers expect consumers to buy the bulb most similar to incandescents, as this will cause the least possible change for them. Thus far, the results from California bear out this predicted trend.

#### **5.1.2.3.2 State Agency Experience**

The interviewees representing the California state agency described a concerted misinformation campaign that began in the months leading up to EISA's implementation in California on January 1, 2011. One interviewee explained that the campaign was inaccurate in its messaging by attacking government for taking away the 100-watt light bulb, when in fact 100-watt lamps had already been phased out in California by state regulation requiring lamps to be five percent more efficient. This government agency published lighting facts on its website and addressed media questions through its media office, but did not otherwise provide consumers with education related to the California legislation in the months leading up to its implementation. According to one interviewee, discussions had taken place between the government agency and industry members about conducting consumer outreach and education, but industry members were unwilling due to uncertainty caused by the EISA counter bill that went to Congress in July of 2011. The interviewees believed that consumers generally did not have a clear understanding of their lighting options under California's version of EISA. In their opinion, consumers on the whole were insufficiently educated regarding lumens, wattage, light output, and selecting the appropriate bulb for the application.

The interviewees reported that as of August, 2011, it appeared that most consumers in California were unaware of the changes due to California's EISA legislation, despite the fact that the legislation had been in effect since January 2011. The agency had received few inquiries from consumers about bulb regulation, and the interviewees had observed no consumer reaction (other than reaction to the misinformation campaign). The interviewees primarily attributed the lack of consumer awareness to the fact that 95-watt lamps were still on retailers' shelves; EISA-compliant 72-watt incandescent lamps had not yet appeared on retailers' shelves in California as of August. The interviewees reported that stockpiling of 95-watt lamps had taken place among California retailers in the months leading up to EISA. At the time of the interview, it was one interviewee's estimation that EISA-compliant 72-watt incandescent lamps would likely first appear on retailers' shelves in October or November of 2011. In addition, the interviewees attributed the lack of consumer awareness in part to the fact that in recent years, retailers have committed increasingly more shelf space to CFLs.

#### **5.1.2.3.2.1 Initiatives to Achieve Lighting Savings in California Since EISA**

According to the California state agency interviewees, continuing to achieve savings from residential lighting after EISA in California is a collaborative effort by several organizations, including the state agency interviewed, the utilities in California, and the California Public Utilities Commission. The utilities play a large role by administering lighting buy-down programs with retailers and conducting consumer outreach and education. When asked how utilities expected to continue to achieve savings from residential lighting, one interviewee noted that the utilities planned to incorporate MR16 lamps into their programs.

The California agency is involved in a number of activities to achieve lighting savings in California. According to interviewees, the driving force for these activities is AB 1109—state-level legislation that mandates a reduction in residential lighting electricity consumption of 50% of 2007 levels by 2018.<sup>46</sup> As of the time of this interview, efforts included the following:

1. Developing the 2007 baseline for lighting energy consumption. The agency is working with the California Lighting Technology Center at University of California, Davis to estimate the quantity of electricity consumed for lighting in 2007. Once this baseline is established, they can determine the corresponding target for 2018.
2. Regular meetings with the lighting industry. The agency meets quarterly with the National Electric Manufacturers Association, the three largest lamp manufacturers, and some controls manufacturers to discuss how to reach the goals laid out in AB 1109.
3. Enforcement of Titles 20 and 24. The agency works with retailers to ensure that the lighting products they sell comply with Title 20 standards. In addition, the agency runs a hotline to answer questions about Titles 24 and 20. The agency also has a Title 24 enforcement and outreach unit that develops educational materials and offers training for building departments and builders. The training materials cover all aspects of Title 24, including (but not limited to) lighting.

Additionally, as of the time of this interview the interviewees indicated that future efforts to meet the lighting goals laid out in AB 1109 would likely include the following:

4. Developing LED Standards. The agency is looking to develop LED lamp standards for California. The interviewees were aware that national ENERGY STAR LED standards were already under development. However, as one interviewee explained, if the agency liked the ENERGY STAR standards, it might create a California standard that ENERGY STAR would meet by default. However, if the agency did not like the ENERGY STAR standards, it would come up with its own standards, possibly as part of the next Title 20 appliances rule making proceeding.
5. New lighting products. The agency plans to focus on new lighting fixtures and products that are not already regulated through EISA or Titles 20 or 24. One interviewee mentioned that the agency

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<sup>46</sup> [http://www.cawrecycles.org/issues/current\\_legislation/ab1109\\_07](http://www.cawrecycles.org/issues/current_legislation/ab1109_07)

was examining the opportunities associated with LED lamps and with linear fluorescent lighting in kitchens and garages.

6. Education and outreach. The agency does not currently have funding for consumer education and outreach. However, the interviewees indicated that they intended to engage in education and outreach in the future.

#### **5.1.2.3.2 Role of Lighting Design**

California's Title 24 lays out the energy efficiency standards for residential and nonresidential buildings. Title 24 regulates what can be installed in new construction, additions, and alterations to buildings. The interviewees pointed out three features of Title 24 (outlined below) that they believe help reduce lighting load in California. The first of these features addresses the topic of lighting design:

- Title 24 takes lighting density into account. As one interviewee explained, for a given residential or nonresidential area, the project must reach a certain efficacy for a percentage of the floor space.
- Title 24 is enforced by building departments. In comparison, new construction energy efficiency standards in many other states are not enforced.
- Title 24 regulates lumens rather than lamps. In this way, luminaires are incorporated into Title 24, leading to long-term energy savings.

#### **5.1.2.3.3 Program Administrator Experience**

The interviewee representing the California utility program administrator felt that it is too early to tell how consumers have reacted to the new standards because 95-watt incandescent lamps were still on store shelves at the time of the interview. This interviewee noted that while EISA contains provisions to control stockpiling of standard incandescent lamps, in the interviewee's opinion these codes have not been consistently enforced in California. The interviewee noted that a number of issues could impact the effectiveness of the standards, both in California and nationwide. These issues include limited consumer awareness and education regarding new lighting technologies, inaccurate information about bulb choices after EISA conveyed in the media, and similar product packaging of lamps with different efficiencies. For example, newer, compliant incandescent lamps are packaged similarly to standard ones in California, and consumers often base their bulb purchasing decisions on the wattage equivalency listed on the package and the lowest price option.

This interviewee also noted that EISA Tier 1 standards have affected the utility's lighting program by reducing the electric savings that could be claimed. As lower wattage bulbs are affected by EISA, the utility will likely decrease the size of its Residential Lighting Incentive Program, which provides incentives only for standard CFLs, and will focus more heavily on Advanced Consumer Lighting, which includes many specialty bulbs that are exempt from EISA. In addition, the PA plans to push specialty CFLs into both small and large retailers. Due to California's strict societal cost-effectiveness test requirements, the utility

cannot increase promotion of LEDs and efficient fixtures until the prices of these products decrease significantly.

#### **5.1.2.4 British Columbia**

##### **5.1.2.4.1 Program Administrator Experience**

At the time of the interview, the interviewees representing the Canadian utility program administrator believed that retailers were generally complying with the regulation, pointing out that the provincial ministry has four inspectors on staff to investigate reports of noncompliance. They noted that when the new standards went into effect in British Columbia, there was initially some confusion among retailers about which products met the lumens/watt requirement set by the standards. In addition, in spite of numerous stakeholder meetings and public information sessions held prior to the effective date, overall consumer reaction to the legislation was negative. As with California, media coverage of the legislation during the first months of its implementation focused on the mercury risks associated with CFLs and diminished consumer choice.

Until its biannual residential end use study is fielded in 2012, the Canadian utility is estimating that three-quarters of British Columbians are using CFLs in place of 100-watt and 75-watt incandescent bulbs, and the remaining quarter are purchasing halogens as replacement lamps. The utility plans to explore opportunities associated with solid state lighting and fixture technologies, in addition to new marketing channels such as social media, in order to continue generating lighting savings as lower wattage bulbs are phased out.

#### **5.1.2.5 The U.K., Austria and Australia**

Incandescent phase-outs similar to EISA became effective in 2009 in Australia and in the European Union (E.U.) in 2010. The phase-out legislation in the E.U. and Australia is similar to EISA in that the regulations: (1) are technology neutral, (2) require a minimum level of efficacy, (3) have exclusions for certain lighting applications, and (4) are implemented incrementally over time.

##### **5.1.2.5.1 Impact of Impending Legislation on U.K., Austria and Australian Lighting Markets**

The Mapping and Benchmarking Annex of the International Energy Agency (IEA) recently conducted a study to assess the impact of impending incandescent phase-out regulations on lighting markets.<sup>47</sup> Toward this effort, the researchers collected bulb sales data for a number of IEA member countries for the years

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<sup>47</sup> International Energy Agency Mapping and Benchmarking Annex of the Efficient End-use Electrical Equipment Implementing Agreement. "Draft Benchmarking Impact of 'Phase-Out' Regulations on Lighting Markets." July 2011. Accessed August 31, 2011 from [http://mappingandbenchmarking.iea-4e.org/shared\\_files/193/download](http://mappingandbenchmarking.iea-4e.org/shared_files/193/download).

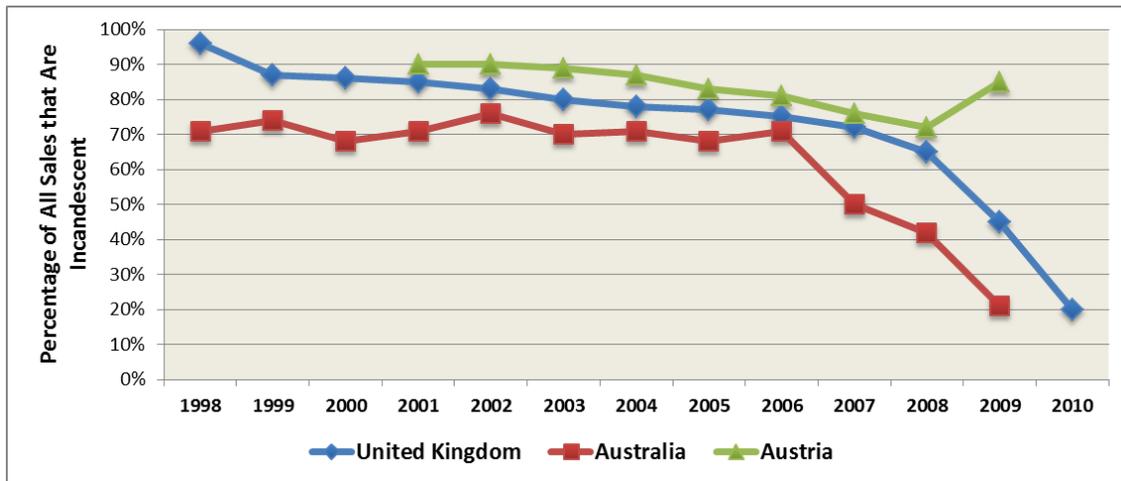
from 1996 to 2010. These member countries are Australia, Austria, Canada, Denmark, France, the Republic of Korea, the United Kingdom (U.K.), and the United States. Incandescent phase-out regulations are already underway in all of these countries except Canada and the United States.

The study placed particular emphasis on bulb sales in Australia and the U.K., because phase-out regulations were more advanced in these countries and data were available through the first year of implementation.<sup>48</sup> For this reason, our focus here is on illustrating the effects of EISA-like phase-outs through the first year of legislation on the lighting market in the U.K. and Australia. Data for Austria are available only through the year prior to the implementation of legislation, but are included for illustrative purposes.

As shown in Figure 28, results of the study indicate that market penetration (i.e., the percentage of all bulb sales that are of a particular type) of incandescent bulbs in the U.K. and Australia—and in Austria through 2008—have been on a general downward trend over the past decade. This downward trend appeared to intensify in Australia during the period 2006-2008, leading up to the 2009 effective date of the first stage of the phase-out legislation. Market penetration of incandescent bulbs in the U.K. appears to follow a similar pattern, with percentages declining during the period 2007-2009 in advance of the 2010 effective date of the E.U. phase-out legislation. By comparison, there was a sharp increase in the market penetration of incandescent bulbs in Austria in the year prior to implementation of legislation in this country. The study attributes the rise in incandescent sales in Austria in 2009 to very adverse publicity about the legislation that year, which appears to have resulted in large scale purchases by consumers of incandescent lamps in anticipation of their disappearance from the market in 2010.

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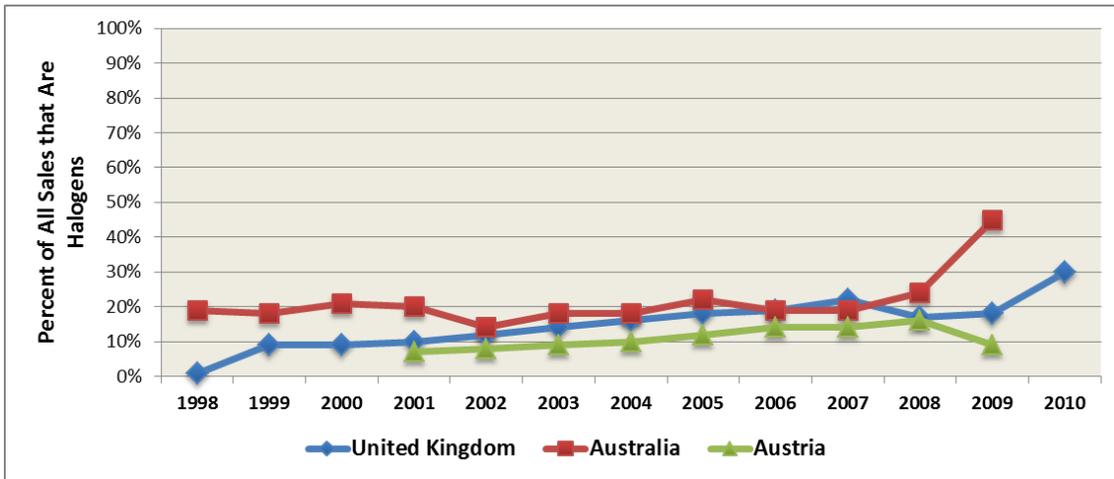
<sup>48</sup> Incandescent phase-out legislation became effective in Australia in 2009. The U.K. is subject to E.U. phase-out legislation, which became effective in 2010. However, according to the IEA study, voluntary agreements with major retailers to remove inefficient lighting products prior to the 2010 E.U.-wide effective date had the effect of advancing the regulation in the U.K.

**Figure 28 Percentage of All Domestic Bulb Sales That Are Incandescent**

Source: “Draft Benchmarking Impact of ‘Phase-Out’ Regulations on Lighting Markets.” International Energy Agency Mapping and Benchmarking Annex of the Efficient End-use Electrical Equipment Implementing Agreement. July 2011. 35.

After the implementation of legislation, market penetration of halogen bulbs rose in the U.K. and Australia. Figure 29 displays halogen bulbs as a percentage of total bulb sales. As shown in the figure, market penetration of halogen bulbs increased noticeably in Australia between 2008 and 2009. The share of sales of halogen bulbs also rose in the U.K. during the year before the phase-out standards went into effect, although less dramatically than in Australia. Thus, a key finding of the benchmarking study is that in countries where regulation is most advanced, there is evidence that elements of the market are migrating from traditional incandescent to halogen bulbs. By comparison, market penetration of halogen bulbs dropped slightly in Austria in the year prior to implementation. The study attributes the percentage drop as an artifact of the increase in incandescent sales during the same period, rather than lack of consumer interest in purchasing halogen bulbs.

**Figure 29 Percentage of Bulb Sales That Are Halogen Bulbs (All Halogen Types)**

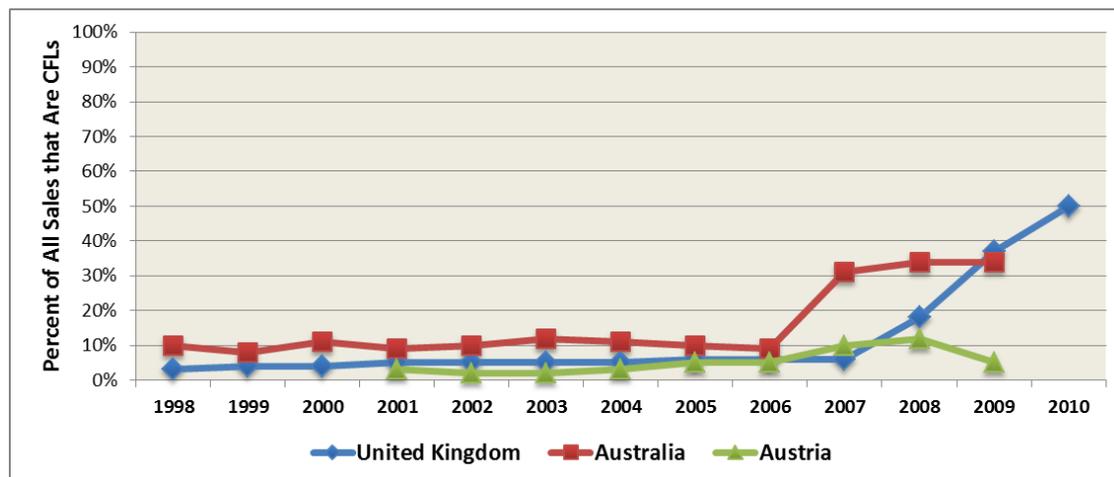


Source: “Draft Benchmarking Impact of ‘Phase-Out’ Regulations on Lighting Markets.” International Energy Agency Mapping and Benchmarking Annex of the Efficient End-use Electrical Equipment Implementing Agreement. July 2011. 36.

The story of market penetration of CFLs after implementation is more mixed. Figure 30 displays the percentage of all domestic CFL sales (both pin-base and integrated ballast) for the same period. In Australia, market penetration of CFLs appeared to increase up until 2007, and then flattened through the first year of implementation. In contrast, CFL market penetration continued to rise in the U.K. after implementation. The study authors noted that the spike in consumer purchases of incandescent bulbs in Austria prior to the implementation of legislation would likely delay consumer purchases of compliant bulbs such as CFLs and thus delay the full impact of the legislation. They attributed the differences in market penetration prior to implementation in Austria versus the U.K. and Australia to “significant delays between the date of announcement and the date at which regulations come into force” in Austria. The negative perception of the legislation that was formed, and with the low cost of incandescent bulbs, consumers could afford to stock up in anticipation of the change. It is possible that something similar could happen in the US, especially prior to 2014, when the ubiquitous 60-watt bulb is affected. As described in Section 5.1.1.2, the manufacturers interviewed offered mixed assessments as to the likelihood of hoarding prior to the 2012 implementation of EISA.

**Figure 30 Percentage of All Domestic Sales That Are CFLs**

(Pin-Base and Integrated Ballast)



Source: “Draft Benchmarking Impact of ‘Phase-Out’ Regulations on Lighting Markets.” International Energy Agency Mapping and Benchmarking Annex of the Efficient End-use Electrical Equipment Implementing Agreement. July 2011. 36.

Regarding LEDs, market penetration data were available only for Austria, Denmark, and the Republic of Korea. In addition, these data were available only up to 2009. Due to these data limitations, no meaningful conclusions can be derived regarding the penetration of LEDs into the replacement bulb market.

### 5.1.3 Consumer Awareness of EISA

#### 5.1.3.1 Summary

- *Awareness of EISA among consumers in NY and elsewhere is relatively low. Only one-third of NY consumers were aware of EISA at the time of the consumer survey. This measurement is identical to the estimate of national awareness of EISA provided by one of the manufacturers interviewed.* Just one-third (33%) of NY consumers had heard of EISA legislation. Upstate respondents were significantly more likely to say they were aware of the legislation than were Downstate respondents (42% versus 25%). One of the manufacturers provided the same estimate for the nation, saying: “Anecdotally, I’d say one-third of customers know about EISA, and two-thirds have no idea.” Other studies in the literature have also found that awareness of EISA among consumers is low, particularly for those with certain demographic characteristics.
- *According to the manufacturers, a reason for the general public being largely unaware of EISA is lack of marketing running up to its implementation.*
- *According to manufacturers, reducing energy use—in their opinion, the real reason behind EISA—has not been clearly conveyed to consumers.* Manufacturers believed that consumers who are aware of the legislation assume it is a government ban on incandescent bulbs and that

the legislation is taking something away from consumers. The manufacturers thought that reducing energy usage, the real reason behind the legislation, is not being conveyed clearly to consumers.

- **Most manufacturers agreed that there needs to be a focus on creating educational materials around light quality.**
- **Taken together, these findings suggest a need to increase both understanding and awareness of the legislation and its purpose among the general audience of consumers as well as certain demographic subgroups.** They also provide further support for earlier observations about the need for consumer education in order to ensure consumer satisfaction with lighting options in the future.

### 5.1.3.2 EISA Awareness Among NY Consumers

In order to understand consumers’ awareness and knowledge of the upcoming EISA legislation, we interviewed five lighting manufacturers and asked consumers survey questions about their own awareness of EISA. We also conducted a literature search on other surveys assessing consumers’ level of awareness. The results of the interviews, relevant findings from the NY consumer survey, and findings from other surveys in the literature are discussed here.

The Energy Independence and Security Act (EISA) was briefly described to respondents in the Consumer survey. Just one-third (33%) of respondents had heard of the impending legislation before the call (see Table 76). Upstate respondents were significantly more likely to say they were aware of the legislation than were Downstate respondents (42% versus 25%).

**Table 76: Awareness of EISA Law**

Have heard about EISA law?	Overall (n=510)	Upstate (n=279)	Downstate (n=231)
Yes	33%	42% <sup>a</sup>	25%
No	67	58 <sup>a</sup>	75
Don't know/refused	< 1	< 1	< 1

<sup>a</sup> Statistically different at the 90% confidence level between Upstate and Downstate.

### 5.1.3.3 Manufacturer Perspective on Consumer Awareness

Every manufacturer who was interviewed believed that the general public is largely unaware of the upcoming legislation. They stated that consumer understanding of the reasons and implications of the legislation are not accurate because there has not been enough marketing running up to its implementation. All respondents indicated that the consumers who are aware of the legislation assume it is a government

ban on incandescent bulbs and that the legislation is taking something away from consumers. Further, they thought that reducing energy usage, the real reason behind the legislation, is being conveyed clearly to consumers. Most manufacturers expressed concern that this lack of information could lead to confusion in January 2012 or once 100-watt incandescent stocks run out.

One manufacturer said: *“Anecdotally, I’d say one-third of customers know about EISA, and two-thirds have no idea. When I talk to consumers, people that know about it tell me they are buying more than normal, and storing extra quantities in their pantries. We have one last big hurrah where the demand for incandescents will accelerate and consumers will rush from store to store until they find them. The short-term (especially the first three months of 2012) should be an interesting phenomenon for the lighting industry.”*

Another manufacturer stated: *“We just spent two months conducting a consumer study. People are confused; they have never had to make decisions on lighting like this. People want to buy the right thing but don’t know how when they are looking at 40-feet of lighting products on a shelf. They then purchase something and get home and hate the light.”* Most manufacturers agreed that there needs to be a focus on creating educational materials around light quality.

One manufacturer purchases incandescents from other manufacturers, as they do not manufacture their own, to maintain their inventory while manufacturing LED light engines. (An LED light engine is a comprehensive unit that contains the LED module as well as the control gear and, in some cases, a connector cable.<sup>49</sup>) This manufacturer said that as soon as there is enough consumer interest, they will shift over to making LED products, especially for residential uses.

#### 5.1.3.4 Literature

The research team’s search for consumer awareness information in the literature yielded several studies, all of which provided evidence that awareness of the EISA-mandated phase-out of incandescent bulbs was relatively low among consumers. A recent Opinion Dynamics survey found that approximately two-thirds of consumers are still unaware of the legislation.<sup>50</sup> In addition, Osram Sylvania’s Third Annual Socket Survey<sup>51</sup> determined that:

- Fewer than two out of 10 respondents were aware of the 2012 100-watt bulb phase-out, and

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<sup>49</sup> “What is an LED Light Engine?” Accessed April 3, 2012 from <http://www.zhagastandard.org/specifications/lightengine.html>.

<sup>50</sup> Dimetrosky, Scott. 2011. “Does EISA Represent the End of Residential Lighting Programs?” Dynamics Newsletter, Summer.

<sup>51</sup> KRC Research. 2010. “3rd Annual SYLVANIA SOCKET SURVEY”. Conducted for Osram Sylvania, December.

- Approximately one-third of respondents were aware of the 2014 incandescent phase-out.
- Those least likely to be aware of the EISA legislation were younger consumers, non-Caucasians, and those without a college degree.

#### 5.1.4 Expectations about Rates of Different Lighting Products Replacing Phased-Out Bulbs

##### 5.1.4.1 Summary

- *As EISA phases in, stakeholders interviewed for the study generally expected builders to use CFLs to replace incandescent bulbs, but are in less agreement about consumers, who might opt for EISA-compliant halogen bulbs at greater rates than for CFLs.* Reasons cited for builders to choose CFLs are that CFLs are already on store shelves, that adopting a new technology is risky for builders, and that CFL technology is mature compared to LEDs. Being on the leading edge with technology that is not ready for prime time poses a considerable risk to builders. In addition, they are unlikely to adopt a new technology unless it reduces their costs.
- *More than half of manufacturers believe that as 100-watt and 75-watt bulbs are phased out, most consumers will turn to lower wattage incandescents to replace them.* About half of manufacturers interviewed (6 of 11) expected most consumers to replace 100- and 75-watt bulbs with the closest available wattage incandescent as these two bulb types are being phased out. Two believed that most consumers would replace them with CFLs, and one believed they would replace them with EISA-compliant halogens.
- *Most manufacturers interviewed believe that LEDs will gain significant market share by 2015, but will still be behind EISA-compliant halogens and CFLs.*
- *Most manufacturers interviewed thought that until the price of LEDs is low enough, CFLs and EISA-compliant halogens will be the primary consumer replacement for 60-watt incandescent bulbs.*
- *Most manufacturers interviewed thought that consumers would replace most 40-watt incandescent bulbs with LEDs, given that these lamps are not common, assuming that the price is low enough by 2014.*
- *Manufacturers expect that the market will continue to change rapidly and that whatever technologies become mainstream will depend mostly on price, marketing, and ultimately consumer preference.* To that end, manufacturers would like for utilities to offer direct installation and give-away programs specifically for LEDs.
- *Manufacturers expectations about the role of EISA-compliant halogen bulbs offers further support about the need to encourage consumers people through education, incentives, etc., to choose higher-efficiency bulbs than EISA-compliant halogen.* In the near-term, most manufacturers predict that EISA-compliant halogens, CFLs, and lower wattage incandescents will be most popular with consumers. In the longer-term, they expect LEDs, EISA-compliant

halogens, and CFLs to maintain a strong market presence. That manufacturers see halogen in the mix over the long-term offers further support about the need to encourage consumers people through education, incentives, etc., to choose higher-efficiency bulbs than EISA-compliant halogen.

- ***The NYS consumer survey data suggest that if a CFL is not a respondent's first choice as a replacement for a 100-Watt bulb, it is close to the last bulb type chosen.*** This in turn suggests that NYS consumers already have strong opinions for or against using CFLs.
- ***When asked about their primary choice to replace a 100-watt bulb, NYS consumers most commonly identified a CFL—followed by a lower wattage incandescent bulb.*** When NYS consumers were asked their first choice to replace 100-watt bulbs when they are no longer available, 40% identified a CFL, 18% a lower wattage incandescent bulb, 16% a screw-in halogen, 9% an LED, and 2% a 150-watt bulb.
- ***For the second and third choice of replacement for a 100-Watt bulb, LED and EISA-compliant halogen bulbs were the leading choices, at similar rates.*** When asked for their second or third choice bulb to replace 100-watt bulbs, NYS consumers most commonly offered an LED bulb that is just as bright as a 100-watt incandescent for both the second and third choice bulb (23% and 14%), followed closely in both cases by a screw-in halogen bulb that was just as bright as a 100-watt incandescent bulb (17% and 13%).
- ***When asked, over a quarter of NYS consumers reported that they thought they might stock up on 100-watt bulbs while they were still available.*** Just over one-quarter of the NYS consumer survey sample (28%) reported they were either somewhat or very likely to stock up on 100-watt bulbs while they are still available.

#### **5.1.4.2 Background**

The findings reported here on expectations about the types of bulbs that will likely replace phased-out incandescent come from a variety of sources: interviews with manufacturers about expected market changes and how they will respond to the changes, interviews with stakeholders about bulb types they expect builders and consumers to use after EISA takes effect, recent studies in the literature, and the NY Consumer survey.

#### **5.1.4.3 General Expectations**

#### **5.1.4.4 Manufacturers**

The research team asked manufacturers what they expect the market distribution of light bulbs will be after EISA is implemented nationally on January 1, 2012.

Table 77 outlines the average manufacturer-predicted residential market share of lighting types in the short- and long-term.

**Table 77: Average Predicted Residential Market Share by Year and Lighting Type**

Bulb Type	Short-term (pre 2014)	Long-term (post 2014)
CFLs	41%	35%
Halogens	35%	29%
LEDs	11%	22%
OLEDs	4%	5%
Induction Lighting	4%	4%
Specialty Incandescents (that are exempt from EISA)	4%	4%
Other	Down-wattage=majority of market share	Down-wattage=less prevalent

Note: Due to rounding these numbers do not add up to 100%

As Table 77 shows, there are several new and competing lighting technologies currently on the market, such as EISA-compliant halogens and more efficient CFLs. Manufacturers continually come out with new technologies as well as improved features and characteristics of existing technologies, which makes it difficult to predict which will offer the best options.

Manufacturers expect that the market will continue to change rapidly and that whatever technologies become mainstream will depend mostly on price, marketing, and ultimately consumer preference. To that end, manufacturers would like for utilities to offer direct installation and give-away programs specifically for LEDs. One large manufacturer is currently working to engage many utilities across the country to develop LED-rebate programs starting in 2012. They have already convinced five utilities to offer \$10 point-of-sale rebates for A-19 LEDs, which reduces the cost to \$14.97 per bulb.

In the near-term, most manufacturers predict that EISA-compliant halogens, CFLs, and lower wattage incandescents will be most popular with consumers. In the longer-term, they expect LEDs, halogens, and CFLs to maintain a strong market presence. It appears that manufacturer expectations for the near term have evolved somewhat since a 2010 Applied Proactive Technologies study based on interview with three major bulb manufacturers, GE, Philips, and Osram Sylvania. In this study, the authors found that manufacturers expected customers to trade down in wattage of standard incandescent bulbs from 2012 through 2014, for reasons of price, the misconception that brightness is always related to wattage, and that the lower wattage incandescents are the closest alternative to what is familiar. The relatively few consumers unwilling to switch to a lower lumen output bulb were expected to choose from either EISA-

compliant halogens or CFLs.<sup>52</sup> The longer term expectation of the manufacturers interviewed for NYSERDA are more consistent with the earlier study.

The manufacturers interviewed for NYSERDA noted that LEDs will gain market share as prices come down and quality improves. Without energy-efficiency program subsidies, this is not likely to happen until somewhat later in the decade. This observation is also echoed in the earlier APT study.

All of the manufacturers admitted to making educated guesses about which products will sell well and be desirable to consumers. They assume that CFLs will continue to gain market share, but expressed concern that the price of rare earth metals, which was skyrocketing at the time of the interviews, could impact sales of this technology. (These prices have since dropped sharply, and evidence suggests that the market for rare earth metals may have been manipulated.<sup>53,54</sup>) Manufacturers also assume that EISA-compliant halogens will be popular, especially since they look similar to incandescents; however, their eventual market share will depend on price. To become competitive, LEDs will eventually need to be \$10 to \$20 per bulb, instead of the current \$30 to \$50.

#### 5.1.4.5 Stakeholders

Stakeholders interviewed for the study expect that as EISA phases in, builders will use CFLs in place of the incandescent light bulbs being phased out. However, they were not in agreement as to what consumers are likely to use. One stakeholder pointed out that CFLs are already on shelves, and another stated, “Contractors are creatures of habit; they understand that CFLs are the better alternative to incandescents right now. LEDs are too experimental: they’re not mainstream yet.” Unlike LEDs, CFL technology is easy for builders to incorporate into residential new construction because the costs have come down, builders are not required to change their processes to install the technology, and the payback on CFLs is relatively short, easy to calculate, and easy to communicate to customers. Regarding LEDs, another stakeholder commented, “I think as you get down to the lower wattages you may see people choosing LEDs, but I think cost is going to be a major barrier.”

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<sup>52</sup> Craig-Snell, Seth, Mike DelNegro, Gary Elliott, Peter Feroli, David Leishman, Brian Loughran, Stan Mertz, and Frank Molander. “The U.S. Replacement Lamp Market, 2010-2015, and the Impact of Federal Regulation on Energy Efficiency Lighting Programs.” August, 2010. Accessed September 1, 2011 from [http://www.appliedproactive.com/uploads/pdf/USLampMarket\\_and\\_EELightingPrograms\\_APT\\_Final.pdf](http://www.appliedproactive.com/uploads/pdf/USLampMarket_and_EELightingPrograms_APT_Final.pdf).

<sup>53</sup> Keith Bradsher. November 16, 2011. “Price of Rare Earth Metals Declining Sharply.” The New York Times. Accessed April 1, 2012 from [http://www.nytimes.com/2011/11/17/business/global/prices-of-rare-earth-metals-declining-sharply.html?\\_r=2](http://www.nytimes.com/2011/11/17/business/global/prices-of-rare-earth-metals-declining-sharply.html?_r=2).

<sup>54</sup> Mark Landler. March 13, 2012. “Obama Files Complaint Over China.” The New York Times. Accessed April 1, 2012 from [http://www.nytimes.com/2012/03/14/business/obama-takes-up-trade-case-against-china.html?\\_r=1&ref=rareearths](http://www.nytimes.com/2012/03/14/business/obama-takes-up-trade-case-against-china.html?_r=1&ref=rareearths).

However, the same stakeholder that described contractors as “creatures of habit” adopting CFLs added that “diamonds don’t look good under CFLs,” and that consumers might be more inclined to purchase halogen bulbs under EISA. Another stakeholder believed that whether CFL or halogen bulbs are chosen will depend on the application. This stakeholder expressed the opinion that under EISA, the consumer market for EISA-compliant halogen bulbs will increase more than for CFLs.

According to a 2011 survey of 18 key stakeholder groups,<sup>55</sup> ten of 18 respondents rated the following scenario as the most likely outcome for the general service replacement bulb market during the EISA transition period of 2012-2014: There will be demand for minimally EISA-compliant bulbs (such as halogens) at a price roughly equivalent to CFLs, and these will be preferred by consumers. They will become the baseline technology, and residential programs will continue to promote CFLs in the 2012-2014 period. Seven of the eight remaining respondents expected no significant demand for minimally EISA compliant bulbs such as halogens, that CFLs will be treated as the baseline technology, and that programs will focus on LEDs and specialty CFLs in the 2012-2014 period.

#### **5.1.4.6 Consumer Expectations for Replacing Specific Wattage Bulbs**

##### **5.1.4.6.1 Manufacturer Perspective**

###### **5.1.4.6.1.1 Replacements for 100-watt and 75-watt Incandescents**

Six manufacturers believed that for the next year or so, as the 100-watt and 75-watt incandescent bulbs are phased out, residential consumers will likely purchase the closest available incandescent wattage. Two manufacturers believed that residential consumers will most likely purchase CFL bulbs, one manufacturer thinks EISA-compliant halogens will fill the void, and the remaining manufacturer was not sure. As discussed previously, manufacturers generally think that market share, quality, technology development, and cost will be the key determinants of which bulbs become popular with consumers, especially since product development is moving extremely rapidly. One CFL manufacturer, who was among the six respondents who thought that consumers will most likely purchase the closest available incandescent wattage, does not think there is a good CFL product available that compares to the 100-watt or 75-watt incandescent, but is planning to produce one within the next 18 months. Another manufacturer, who predicted that EISA-compliant halogens will fill the void of incandescents, said that consumers will be completely confused initially because they do not know what EISA is. Most manufacturers believed that LEDs will gain significant market share by 2015, but that LED market share will be less than EISA-

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<sup>55</sup> Sumi, David, Eric Rambo, and Bryan Ward. 2011. “What Will the Lighting Market Look Like Under EISA?” Presentation at the National Symposium on Market Transformation, Washington D.C.. Accessed September 1, 2011 from <http://www.aceee.org/files/pdf/conferences/mt/2011/T2%20-%20David%20Sumi.pdf>.

compliant halogens and CFLs. The exception to this is the LED manufacturer who predicted that LEDs will be a “*game changer*” once consumers realize the benefits extend beyond just lighting (i.e., that LEDs can be electronically controlled and are less fragile).

#### **5.1.4.6.1.2 Replacements for 60-watt Incandescents**

For the 60-watt incandescent replacement products, all manufacturers thought that as better lamps are introduced into the market and large manufacturers work out deals with the big-box stores, the price of LEDs will decrease and gain market share. Until then, these manufacturers believed, CFLs and EISA-compliant halogens will be the primary replacement for 60-watts incandescent bulbs.

#### **5.1.4.6.1.3 Replacements for 40-watt Incandescents**

Manufacturers were also asked about their expectations for what would replace 45-watt incandescent bulbs. They generally thought that 40-watt incandescent bulbs are not as pervasive as other wattages, and that by January 1, 2014, LEDs might be developed that are cost-competitive enough to serve as a replacement.

One manufacturer stated that consumers will primarily gravitate towards CFLs, to a lesser extent to EISA-compliant halogens, and to an even lesser extent LEDs (until they are cost-competitive). This manufacturer said that CFLs are widely available and will continue to expand in retail presence, but that EISA-compliant halogens will gain ground with people who do not want CFLs, at least until the price of LEDs comes down: *“Consumers have not had to make these decisions previously. Halogens look like what consumers are used to buying and not much will stop them from buying these unless they are priced too high or unless consumers are educated that CFLs will last longer. Otherwise people are going to see halogens and not care about hours or lumens; they look the same as incandescent bulbs and are now more energy efficient. The mass public does not grasp what the savings will be between CFLs and halogens.”*

#### **5.1.4.6.2 Consumer Perspective**

##### **5.1.4.6.2.1 Replacements for 100-watt Incandescents**

Respondents to the Consumer survey were asked to identify the type of bulb they would be most likely to use instead of a 100-watt incandescent bulb once it is no longer available for purchase (Table 78). After being read a list of five different types of bulbs, they were asked to choose which one they would be the *most* likely to use, which would be their second choice and finally, which would be their third choice under EISA.

Overall, the top primary choice was a CFL that was just as bright as a 100-watt incandescent bulb. This is an encouraging sign, as is the fact that a very small percentage chose the 150-watt incandescent bulb as their primary, second, or third choice (2%, 4%, and 7%, respectively).

The second most common primary choice was a lower wattage incandescent bulb that would be less bright than a 100-watt bulb (18%). Osram Sylvania’s Third Annual Socket Survey found that a similar percentage

of U.S. consumers (23%) would switch to a lower wattage incandescent once 100-watt incandescent bulbs are no longer available,<sup>56</sup> supporting the relative popularity of this choice. In the NYS consumer survey conducted for this study, lower wattage incandescent bulbs were followed closely by a screw-in halogen bulb that was just as bright as a 100-watt incandescent bulb (16%).

Regarding respondents’ second and third choice replacement bulbs, an LED bulb that is just as bright as a 100-watt incandescent was the most common for both the second and third choice bulb (23% and 14%), followed in both cases by a screw-in halogen bulb (17% and 13%). A smaller percentage chose a CFL that was just as bright as a 100-watt incandescent bulb as a second or third option (11% and 8%). This suggests that if a CFL was not a respondent’s first choice as a replacement, it was close to the last bulb chosen. Even a lower wattage incandescent, which uses more energy, was seen by many respondents as being preferable to a CFL.

**Table 78: Bulb Choice under EISA**

Type of bulb likely to use instead of 100-watt incandescent bulb	Overall (n=510)	Upstate (n=279)	Downstate (n=231)
<b>Most Likely Replacement</b>			
CFL that is just as bright as a 100-watt incandescent bulb	40%	38%	41%
Lower wattage incandescent bulb that would be less bright than a 100-watt bulb	18	18	17
Screw-in halogen bulb that is just as bright as a 100-watt incandescent bulb	16	16	17
LED bulb that is just as bright as a 100-watt	9	12a	7
150-watt incandescent bulb	2	3	2
Don't know/refused	15	14	17
<b>2<sup>nd</sup> Most Likely Replacement</b>			
LED bulb that is just as bright as a 100-watt	23%	22%	24%
Screw-in halogen bulb that is just as bright as a 100-watt incandescent bulb	17	23a	12

<sup>56</sup> KRC Research. 2010. “3rd Annual SYLVANIA Socket Survey”. Conducted for Osram Sylvania, December.

Lower wattage incandescent bulb that would be less bright than a 100-watt bulb	13	12	13
CFL that is just as bright as a 100-watt incandescent bulb	11	14a	8
150-watt incandescent bulb	4	3	4
Don't know/refused	33	25a	39
<b>3<sup>rd</sup> Most Likely Replacement</b>			
LED bulb that is just as bright as a 100-watt	14%	15%	13%
Screw-in halogen bulb that is just as bright as a 100-watt incandescent bulb	13	15	12
Lower wattage incandescent bulb that would be less bright than a 100-watt bulb	12	12	11
CFL that is just as bright as a 100-watt incandescent bulb	8	9	7
150-watt incandescent bulb	7	10a	5
Don't know/refused	46	39a	52

a Statistically different at the 90% confidence level between Upstate and Downstate.

Respondents who had stated that they would use a lower wattage incandescent bulb as either their first, second or third choice to replace a 100-watt bulb were asked to specify what wattage they were most likely to choose. Table 79 shows that the majority of respondents (86% overall) would choose either a 60-watt or 75-watt bulb. Given this, we can expect some energy savings among this group but not as great as if a CFL were chosen instead of a lower wattage incandescent. This is taken into account in the market adoption model tool that was prepared as part of this study.

**Table 79: Wattage of Incandescent Bulb Chosen under EISA**

(Base: Respondents who said they would use lower wattage incandescent bulbs as one of their three most likely choices)

Bulb Wattage	Overall (n=206)	Upstate (n=113)	Downstate (n=93)
60-Watt Bulb	44%	49%	40%
75-Watt Bulb	42	40	43
40-Watt Bulb	7	9	5
Other	3	0a	6
Don't know/refused	4	2	6

a Statistically different at the 90% confidence level between Upstate and Downstate.

**5.1.4.6.2.2 Hoarding**

Respondents to the Consumer survey were asked to rate the likelihood that they would buy and save extra 100-watt incandescent bulbs before 2012 for use after the new standards go into effect. On a scale of one (“very likely”) to four (“very unlikely”), more than two-thirds of the sample (69%) declared that they were either somewhat or very unlikely to stockpile bulbs before EISA goes into effect; on the other hand, just over one-quarter of the sample (28%) reported they were either somewhat or very likely to do so (Table 80). This is somewhat high in comparison to the Osram Sylvania study, in which 13% of U.S. consumers said they would stock up on 100-watt bulbs while they were still available in order to continue using them.<sup>57</sup>

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<sup>57</sup> KRC Research. 2010. “3rd Annual SYLVANIA SOCKET SURVEY”. Conducted for Osram Sylvania, December.

**Table 80: Likelihood of Buying and Saving Extra 100-Watt Incandescent Light Bulbs for Use After 2012**

Level of Likelihood	Overall (n=510)	Upstate (n=279)	Downstate (n=231)
Very likely	16%	18%	14%
Somewhat likely	12	10	13
Somewhat unlikely	13	13	13
Very unlikely	56	57	55
Don't know/refused	4	2a	5

a Statistically different at the 90% confidence level between Upstate and Downstate.

### 5.1.5 Market Expectations for Various Lighting Technologies

#### 5.1.5.1 Summary

- Recent volatility in the prices of rare earth metals, and the possibility that many jurisdictions could drop program support for CFLs, raise the possibility that CFL prices could increase, and CFLs could become harder to find, as EISA is phasing in.*** All of the manufacturers interviewed noted the extremely steep cost increases in the price of rare earth metals in the year prior to the interviews. The manufacturers generally expected to increase the prices of their bulbs within the first four months of 2012 in order to continue to produce the same quantity and quality of CFL products. Some manufacturers plan to decrease CFL production in anticipation of weaker orders after the price increase. (Given that the price of rare earth metals has dropped precipitously since these interviews, this anticipated cost increase may not come about.) In addition, most manufacturers expressed concern that utility funding support has enabled them to offer lower prices on CFLs to consumers, but that this may not be possible after EISA.
- Despite mixed reviews for CFLs, their use in residential settings has continued to increase. Manufacturers attribute this in part to program efforts, and expect to continue to manufacture CFLs.*** The manufacturers recognized that CFLs have received mixed reviews, and understand that many that people simply do not like them. Despite the mixed reviews, since 2004, at the urging of many climate-change and energy-saving advocates, the number of CFLs in residential settings has increased by approximately 25%. In general, manufacturers believed that CFL technology is still pertinent and expected to continue manufacturing CFLs.
- Manufacturers recognize that CFLs need to continue improving.*** Manufacturers gave a wide variety of responses when asked about the future of the CFL market. Some manufacturers

pointed to challenges still to overcome, such as making a smaller tube and ballast and improving color rendering and temperatures to continue attracting consumers. Three of 11 manufacturers expect future CFLs to have instant-on and improved dimming capabilities, and three expect the CFL market to increase for outdoor applications and offer floodlights, spotlights, globes, A-shaped bulbs, recessed cans, retrofit lamps, and decorative lamps.

- ***Manufacturers were fairly positive about the near-term future of the pin-base CFL fixture market.*** Five of seven manufacturers familiar with the pin-base CFL fixtures market expect this market to increase slightly after 2012; the other two expect no change. Three of five manufacturers expect continued upward sales of pin-base CFL fixtures after 2014, while two of five expect such sales to drop after 2014.
- ***Manufacturers tended to take a relatively bullish view on the residential LED lighting market. However, they recognize that LEDs are still not cost-competitive.*** Five of the six manufacturers who responded to questions about LED lighting expressed confidence that the LED market share will grow significantly in the near future. Four manufacturers reported that LED fixture products are currently being developed to address the current issues of consumers trying to fit LEDs into incompatible sockets, and felt that the technology will experience significant gains as these products become available in the marketplace. While manufacturers have high hopes for LED technology, according to most manufacturers interviewed (9 of 11), LEDs are not yet cost-competitive.
- ***According to the manufacturers, exterior lighting and retrofitting incandescent fixtures represent good future opportunities for LED lighting, and consumer education around LED technology and its potential savings could help boost market acceptance of the technology.***
- ***Approaches to improving market acceptance for LED lamps include developing national requirements for LED performance and reliability, disclosing to consumers differences in performance between LED and incandescent lamps, and researching what consumers value in lighting.*** Findings from this research could be used to determine how best to communicate this value with regard to new lighting technology.
- ***Stakeholders are less positive about the residential LED lighting market than manufacturers. They noted that LED lighting is market-ready for some applications, but not to replace general use lamps, and they expect LED lighting to have more of an impact on the new construction market than the residential retrofit market.*** Stakeholders noted many barriers still to be overcome before we can expect widespread consumer acceptance and use of LED bulbs and fixtures. Three of the four stakeholders said that LED lighting is market-ready for at least some applications. The fourth stakeholder expressed that LED lighting is not ready for successful use in homes. The applications cited as being ready (with no disagreement among the three stakeholders who identified them) are recessed downlights,

kitchens cabinet lighting, accent lighting, pendant lighting, backlighting, and countertop lighting. As for using LEDs to replace incandescent lamps in general applications, the sense among three of the four stakeholders was that LEDs are not yet ready for successful use as general replacement lamps because of quality, performance and design issues, and because of high initial cost. Stakeholders expect LED lighting to have more of an impact on the new construction market than the residential retrofit market. The fact that LED technology is, according to one lighting designer, “complicated,” and that the general public does not understand the details, lends strong support to the stakeholder view that LED lighting is not ready to replace general use lamps.

- ***Lighting designers strongly favor LEDs over CFLs***, but lighting designers also serve a specialized high-end market that does not tend to reflect the overall residential market. Architects are more likely to equally promote CFLs and LEDs, or even to prefer CFLs due to their lower cost, but some architects also view LED lighting as more viable than CFL lighting.
- ***Quality is the most commonly cited barrier that needs to be overcome in order for LED lighting to be widely adopted for use in homes, followed by the need to change out fixtures, directional light output, lamp weight, first cost versus lifecycle cost, and the nature of residential new construction.*** Quality issues include color consistency over time, dimmability issues, and advertised lamp life. Proper use of LED lighting in homes requires thoughtful design consideration, but lighting designers are not typically involved in the residential new construction or renovation process. Moreover, it is likely that builders do not perceive any benefits from involving a lighting designer in the process, given the added cost.
- ***It is not clear when LED lighting is likely to become cost-effective for residential use—but it could be within the next two to three years.*** There was disagreement among the stakeholders as to when this would happen. One thinks LED lighting is just now beginning to be cost-effective for residential use, while two others suggested a timeframe of two to three years for this to be achieved. A fourth declined to speculate. The majority of manufacturers interviewed (nine of 11) thought that LEDs would become cost-competitive when they reached \$10 per bulb.
- ***Lighting manufacturers do not expect LEDs to be as subject to the problems experienced in the lighting industry when CFLs were first introduced to the market.*** Lighting manufacturers offered a number of reasons that LEDs might be less subject to the problems experienced in the lighting industry when CFLs were first introduced to the market. These included a smaller number of manufacturers, leading to less variability in quality; that LED manufacturers have made a concerted effort to provide clear branding and other information on LED bulb packaging and are working hard to educate distributors and retailers about how to best market LED products to consumers; that unlike CFL manufacturers LED fixture and

bulb designers use the same technologies; and that there are more different types of LEDs available at this early stage in the product's life than there were for CFLs in a similar stage.

- ***New lighting technologies under development, such as OLEDs, will not be ready for market soon enough to provide a viable alternative as EISA phases in.*** Most manufacturers agreed that the lighting products most likely to succeed after EISA will be down-wattted incandescent bulbs (while feasible), EISA-compliant halogens, CFLs, and, once they become cost-effective, LEDs. The additional technologies in development, such as OLEDs, are currently a long way from being market-ready.

### **5.1.5.2 Influence of Market Factors on Bulb Production**

The research team asked manufacturers how market factors influence their production and pricing.

One manufacturer talked about being pleasantly surprised at the rate of increased demand for one of its canned LED-light technologies, due to partnering with a major big-box store to reduce the retail price by 64%. Even with this market interest, however, the manufacturer believes that the “*economics of LEDs are out of reach for most consumers, unless they are extremely green, wealthy, or want the first of everything.*”

One manufacturer said that, because it is at the mercy of its supplier for material costs, it no longer offers set pricing agreements to retailers and must pass along the increased costs.

Two manufacturers noted that other manufacturers are able to decrease the price of their bulbs by using lower-quality, lower-performing products. One other manufacturer has been able to decrease its own prices through volume and efficiencies of production. Most manufacturers expressed concern that utility funding support has enabled them to offer lower prices on CFLs to consumers, but this may not be possible after EISA.

The research team asked manufacturers how they respond to increases in material costs for CFLs. All of the manufacturers stated that the cost of rare earth metals has increased significantly over the last several months. Manufacturers who purchase phosphors from China have been hit with percent increases of 500 to 2,000 times over the previous 12 months. The rare earth material price increase is the first real price spike in the CFL market to date. Manufacturers will generally have to increase the prices of their bulbs in the coming months in order to continue to produce the same quantity and quality of CFL products. However, most manufacturers said they will delay increasing prices for consumers for as long as possible, usually four to six months from the time the material cost increases. One large manufacturer is hoping that they will not have to increase retail prices at all, but can instead continue to absorb the price increase internally. (As noted in Section 5.1.4.4, these prices have since dropped sharply. Thus, the anticipated cost increase may not come about.)

Several manufacturers are passing the price increase along to customers without decreasing CFL production, based on the assumption that increased CFL prices will not significantly affect consumer demand. However, others expect higher prices to adversely affect demand; these manufacturers reported

that they are decreasing production of bulbs with increasing material costs by 25%. Some manufacturers notify their wholesale customers before a price increase which, they explained, causes an influx of orders prior to the increase.

### **5.1.5.3 Market Expectations for CFLs**

The manufacturers we interviewed believed that CFL technology is still pertinent and they expected to continue manufacturing CFLs. They believed that utilities' CFL programs will experience about a one-year lag before there is a significant decrease in savings from EISA's implementation.

The research team asked manufacturers to identify the types of specialty CFL bulbs they expect the lighting market to produce in the future. Eight manufacturers were able to describe improvements to existing CFLs or name specialty CFL bulbs they believe will become available in the market. One admitted the challenge with CFL technology is making a smaller tube and ballast. Two opined that CFL design must improve color rendering and temperatures in order to continue attracting consumers. Three said that they expect future CFLs to look and function more like incandescents by coming on instantly (no lag time) and having better dimming capability and performance. Three expected the CFL market to increase for outdoor applications, and offer floodlights, spotlights, globes, A-shaped bulbs, recessed cans, and retrofit lamps, and will eventually offer decorative lamps.

### **5.1.5.4 Market Expectations for Pin-Base CFL Fixtures**

Seven of the eleven manufacturers were familiar with the pin-base CFL fixture market. These manufacturers expressed less certainty about CFL fixtures than they did about CFL bulbs, and were less in agreement about the future of this market. Five of the seven manufacturers expected the market for pin-base CFL fixtures to increase slightly after 2012. They reasoned that they have recently noticed increasing customer demand for these fixtures and that club stores and utilities are asking for them. Also, one manufacturer stated that, after 2012, pin-base CFL fixtures will be mandatory for new construction in California due to Title 24 legislation in that state, and thus are likely to become more widespread nationally. The remaining two manufacturers believed that the market for pin-base CFL fixtures will stay the same after 2012.

With respect to longer-term forecasts, three of the five manufacturers who believed there will be an increase in pin-base CFL fixture sales after 2012 also believed the sales trend will continue upward after 2014. The two other manufacturers speculated that sales in this market will decrease after 2014.

### **5.1.5.5 Market Expectations for LEDs**

#### **5.1.5.5.1 General Expectations for the Future of the LED Lighting Market**

Manufacturers and stakeholders supplied the majority of information about residential LED lighting. Six of the 11 manufacturers answered questions about the effect of LED lighting on the residential lighting market

and whether new fixtures will need to be developed to accommodate LED bulbs. Five of the six expressed confidence that the LED market share will grow significantly in the near future. One manufacturer even speculated that, “by 2015, LEDs will be 25% of the market.” Four manufacturers reported that LED fixture products are currently being developed to address the current issues of consumers trying to fit LEDs into incompatible sockets, and that the technology will experience significant gains as these products become available in the marketplace. One manufacturer believed that the current LED fixture market is already fully developed and that the only thing holding the LED market back is the technology’s high cost.

One manufacturer believes there will be a market for retrofitting incandescent fixtures to fit LEDs. Another manufacturer emphasized the potential opportunity for the LED market to succeed in exterior lighting. A third manufacturer pointed out that there is growth in both directions: while fixtures are being built to fit LEDs, LEDs are also being built to match existing fixtures. Since LED fixtures are anticipated to be expensive, this manufacturer expects LED bulbs to gain market share more quickly than their fixture counterparts.

One of the manufacturer interviewees reported that his company currently offers an outdoor LED lantern fixture for just \$40 and is creating upwards of 50 new fixtures for LEDs. The manufacturer hopes to accelerate its offerings, but has found that consumers increasingly expect specialized lighting to fit their needs and thus fit in existing fixtures. This manufacturer hopes that with better education around LED technology and its potential savings, customers will be more apt to purchase LED products.

By comparison, the four stakeholders interviewed took a less rosy perspective on the residential market for LED lights. They cited many barriers to widespread consumer acceptance and use of this technology (described in Section 5.1.5.5.3), offering these as reasons that LED lighting will not have a considerable impact on the market for residential light fixtures any time soon. For example, one stakeholder noted that consumers cannot simply screw an LED into any incandescent socket—it usually requires a fixture change-out or some kind of retrofit kit for the fixture. Another stakeholder pointed to the primary consideration for selecting light fixtures being style, not technology, as a reason for slower uptake. A third stakeholder felt that LED lighting would have the greatest impact on the residential new construction market--especially if incentives are offered for these fixtures--because homeowners are unlikely to remove existing, functioning fixtures in their homes in order to install LEDs.

#### **5.1.5.5.2 Readiness of LED Lighting for Use in Homes**

The four stakeholders had somewhat mixed opinions regarding the degree to which LED lighting is ready for successful use in homes, and which types of LED products and lighting applications are the most ready, but three of the four were of the opinion that at least some LED lighting applications are ready.

On the opposite ends of the spectrum, one stakeholder believed that LEDs are not ready for successful use in homes due to quality issues, while another believed that direct screw-in replacement LED lamps are currently ready for successful use in homes, commenting that “the costs are down, the problems that they

had seem to be solved,” and, “LEDs have just turned the corner and are ready.” The two other stakeholders believe that LEDs are not yet ready for successful use as general replacement lamps because of performance issues, high cost, and design issues, but are ready for certain lighting applications. As one stakeholder explained, “I think that right now the jury is still out on the performance of a lot of replacement lamps. Some work well, some do not, and it’s very difficult for a consumer to determine what the performance will be over the long term.” Another stakeholder pointed out that the upfront cost of LED technology for general lighting is currently too high for successful use in homes. Moreover, he called attention to the fact that new technologies such as LEDs require thoughtful design considerations, but that most residential homes do not involve a lighting designer.

Table 81 shows the lighting applications for which stakeholders mentioned that LEDs are ready.

**Table 81: Most Ready for Successful Use in Homes**

LED Products/Applications	Number of Times Mentioned
Direct screw-in replacements	1
Recessed downlights	1
Kitchens cabinet lighting	1
Accent lighting	1
Pendant lighting	1
Backlighting	1
Countertop lighting	1

Overall, lighting designers expressed very positive views of LEDs. Some example lighting designer comments include:

*“LEDs are going to be a big part of [the] lighting future, they have amazing capabilities but are being marketed incorrectly. It’s complicated technologies, which I understand, but it’s more of a problem in translation: they are being pushed on a public who do not understand the details.”*

*“...Some people have ventured into CFLs, but most people hate them. We try to avoid CFLs as much as we have been able to. LEDs have really been coming along. Part of our job to is to educate people and really show them what the technology can do.”*

### **5.1.5.5.3 Barriers to Residential LED Lighting**

#### **5.1.5.5.3.1 Price**

As expected, the high price of LEDs was very commonly cited throughout the research as a substantial barrier to widespread adoption of LEDs. To better understand the magnitude of the price barrier, the research team asked manufacturers at what price point LEDs would be cost-competitive with CFLs. While all of the manufacturers agreed “*it is anyone’s guess,*” nine manufacturers stated that it will happen when LEDs are \$10 or less. Two manufacturers thought LEDs would need to be less than \$8, and one manufacturer was not sure but stressed utility-sponsored rebates as an important factor in making LEDs cost-competitive. One manufacturer replied that LEDs would certainly not be cost-competitive while they are above \$15 in the short-term (next two years) and that LEDs will need to be closer to \$5 in the long-term (two years or more). Another manufacturer said that the price for LEDs is coming down and will continue to fall; he predicts a 25% decrease per year. This manufacturer expects a \$10 LED to be available next year and explained that this low price is in part because LEDs do not break easily and do not require as much packaging as other types of bulbs.

One manufacturer drew a parallel to the early CFL market of the 1980s and early 1990s. CFLs at that time were big and heavy, blinked on and off, were lower wattage than incandescents but did not provide much light, and cost \$25 each. Consequently, not many people bought them. However, the technology improved and eventually CFLs cost \$10 and started to sell more quickly. Sales really picked up once CFLs cost less than \$5.

In a similar vein, the four stakeholders were asked when they expect LED lighting to become cost-effective for residential use. Their answers were mixed. One stakeholder believed that direct screw-in replacement LEDs are just now becoming cost-effective for residential use. Two of the stakeholders reported that LED lighting may be cost-effective in two to three years, once costs have come down and product reliability and light output have improved. The fourth stakeholder did not know when LED lighting will become cost-effective, and added that the next important step is for manufacturers to back up their product claims with field data.

#### **5.1.5.5.3.2 Other Barriers**

The survey of retailers is helpful in understanding barriers to widespread consumer acceptance and use of LED lighting. When 65 % of retailers surveyed who said that their location did not stock LED bulbs were asked why. Table 82 show that retailers who sold only bulbs or bulbs and fixtures and did not stock any LEDs reported reasons why they did not stock LEDs, the most common reasons cited were that the bulbs were too expensive (29%) and that there was a lack of customer demand (19%).

**Table 82: Why Retailers Do Not Stock LEDs**

<b>Energy Efficiency Bulbs Question #EB1: (If does not stock any LEDs) Why don't you stock any energy-efficient LED bulbs? [Multiple response]</b>	<b>Weighted by CFL Sales Channels (n=26)</b>
Lack of customer demand	19%
Price/ Too expensive	29%
Not enough shelf space	5%
Bulbs have technical problems/ Do not work well	5%
Other	9%

The stakeholders were asked to enumerate the barriers (other than cost) that need to be overcome in order for LED lighting to be used widely in homes. Table 83 displays the barriers mentioned by stakeholders and the number of times each barrier was mentioned. The most commonly cited barrier is quality issues, including color consistency over time, dimmability issues with many LED products (e.g. inconsistent dimming and not working with all dimmers), and advertised lamp life. For example, one stakeholder mentioned that the lumen output of some LED products decreases after a number of hours of use, and another pointed out that not all LEDs dim as smoothly as incandescent lamps. One stakeholder stated that the less expensive LED products shift their color over time, and brought up a lesson learned pertaining to CFL adoption and color consistency: “[LEDs are] not going to appear the same, so when homeowners put them in luminaires next to each other they’re going to look different, and that’s typically something that we found, with CFLs for example, that homeowners object to—they don’t like the color differences.” Another stakeholder explained, *“If you’re going to have a direct replacement, that direct replacement has to offer equivalent quality. The color rendering, the color temperature; all these lighting quality aspects need to be equivalent or the retrofits won’t stick.”*

**Table 83: Barriers to Widespread Use of LED Lighting**

Barriers	Number of Times Mentioned
Lamp quality	4
Changing out fixtures (retrofit)	1
Directional light output	1
Lamp weight	1
First cost versus lifecycle cost	1
Nature of residential new construction	1

After lamp quality, the rest of the barriers displayed in Table 83 were each mentioned only once during the in-depth interviews. Three of these barriers pertain to physical characteristics of LED technology: (1) downlight reflector lamps are heavy, and can potentially pull the socket out of an existing reflector lamp; (2) heat sinking materials around the bottom of an LED lamp result in ample light output upwards but not downwards, making them unsuitable for table lamps; (3) a fixture change out may be required, particularly in cases where a homeowner wants to replace a pin-base CFL fixture with an LED fixture. Getting consumers to understand the relationship between first cost and operational cost was also identified as a barrier to the widespread use of LED lighting in homes.

The last barrier in Table 83, the nature of residential new construction, represents a complex process involving numerous market actors. The stakeholder who identified this barrier explained that the proper use of LED accent lighting requires the involvement of a lighting designer, which is not a normal part of the residential development process. This stakeholder stressed the importance of proper lighting design in the use of LEDs in homes, warning that the lack of effective lighting design could lead to bad customer experiences, which could in turn kill the technology. Additionally, he stated that it is the builder's role to interpret what the new home market wants and whether the anticipated return from any changes to the process outweigh the costs, and pointed out that the market will not currently bear the added cost of involving a lighting designer in the residential new construction process. He added that new technology is adopted quickly by builders only when it reduces their costs, and that being on the bleeding edge with technology that is not ready for prime time poses a considerable risk to builders. According to this interviewee, *"With new technologies, it pays to be second in this industry, not first."* In this interviewee's opinion, the move from incandescent to CFL lighting is much less problematic than to LED lighting, as CFL technology is more mature, first cost is relatively low and payback short, and a lighting designer is not needed.

### **5.1.5.5.3.3 Overcoming Barriers to LED Lighting**

Stakeholders were asked for suggestions about ways to overcome the barriers to the widespread use of LED lighting in homes. Two stakeholders offered suggestions addressing lamp quality: (1) develop nationwide requirements for LED manufacturers (such as the ENERGY STAR platform) in order to improve product performance and reliability; (2) if LED quality is not the same as incandescents, ensure that information is disclosed to customers. One stakeholder suggested educating consumers about the lifecycle costs of lighting products so they understand that spending more money upfront means they can save money in the future. Another stakeholder highlighted the importance of understanding the consumer market, and suggested assessing what consumers value and how to communicate this value to them in order to engage the market.

One marketing challenge mentioned by several interviewees is that it generally takes 15 to 20 years of data to report on bulb reliability, and LED bulbs have just entered this state of maturity. Another manufacturer added that Federal Trade Commission (FTC) and U.S. Department of Energy (DOE) regulations, which stipulate a number of months of testing prior to new products being distributed, also presents a challenge to lighting manufacturers.

Lighting manufacturers offered a number of reasons that LEDs might be less subject to the problems experienced in the lighting industry when CFLs were first introduced to the market. One difference between CFLs and LEDs noted by several manufacturers is that so many manufacturers produced CFLs of varying quality that consumers have not associated quality with the technology. LEDs, in contrast, are produced by fewer manufacturers, and LED manufacturers have made a concerted effort to provide clear branding and other information on LED bulb packaging (such as information about safety, color temperature, elements, and energy savings). LED manufacturers are also working hard to educate distributors and retailers about how to best market LED products to consumers.

Another difference between CFLs and LEDs is that the CFL fixture designers used different technologies than those who designed bulbs. Unlike CFLs, LEDs can do more than just produce light. LEDs may have occupancy sensing, motion detection, and temperature sensing capabilities all within a single unit. Another difference is that CFLs were all of one type (spirals) when they were first introduced. In contrast, although LEDs are still a relatively new technology, there are already several LED types available of varying costs and quality.

One manufacturer mentioned that the DOE released a report describing the introduction of CFLs and noting their variable quality, expense, and difficulty for consumers. To ensure a more favorable response to LEDs, one manufacturer reported it is overdesigning for reliability and quality. It also released a special series of tests for LEDs and has offered these tests to other manufacturers in an effort to remove poor quality products from the market. This manufacturer feels strongly enough about removing inferior products that it would like the federal government to broaden energy-efficiency requirements. Another manufacturer

suggested that the ENERGY STAR<sup>®</sup> program take a role in developing more stringent bulb requirements, and possibly partner with lighting manufacturers.

One manufacturer mentioned that it is field testing its new LEDs rigorously to ensure that the products operate the way they are supposed to. Another manufacturer also reported field testing their LED products and, if necessary, will wait to put the products on the market until they are extremely confident that the products are operating at a very high standard, because they believe that some manufacturers will put products out early that might not be operating at a high standard, as occurred in the early CFL market,. Most of the manufacturers said they will look to label requirements and education to improve the transition to LEDs for consumers.

### **5.1.5.6 Market Expectations for Other Lighting Technologies**

#### **5.1.5.6.1 EISA-compliant Halogen Bulbs**

Manufacturers explained that although halogen bulbs are marketed as energy-efficient incandescents, they have the added technology of a halogen element in a quartz envelope. Halogens are considered hybrid bulbs because they reuse wasted heat energy and recycle it into light energy. Compared to standard incandescent bulbs, EISA-compliant halogens save 28% more energy and last longer. At the time of the interviews, EISA-compliant halogens cost a little more than incandescent light bulbs.

#### **5.1.5.6.2 Induction Lighting**

All of the manufacturers we interviewed expressed that they consider induction lighting to be a niche market. None of them thought that the induction share of the residential lighting market will increase, and some opined that it may eventually decrease as other technologies become available. Most manufacturers believed that induction lighting is only a viable technology for commercial purposes.

#### **5.1.5.6.3 Other Emerging Technologies**

Manufacturers were asked about existing or emerging technologies they expect to see in the residential lighting market in addition to those discussed above. Most were not aware of additional existing options; only three offered predictions for emerging technologies.

One manufacturer talked about flat-light technology and CFL replacements for mini downlights, which have recently gained popularity abroad. Another talked about plasma options, which would be expensive, and explained they can be controlled on home computers using smart home energy management. The third manufacturer spoke of OLEDs but did not believe that these were a viable short-term solution given the need for further technological development.

## NYS LIGHTING MARKET SCENARIOS

### 5.1.6 Summary

- *As EISA phases in, programs will be able to find additional saving potential by shifting consumers' lighting choices away from less efficient replacements toward CFLs and LEDs.*

As sales shift away from incandescents toward other lighting products, programs will no longer be able to claim the full seven years of savings from all CFL purchases at the current Delta Watts, but depending on consumers' choices, Delta Watts could vary considerably, and may be much higher than casual observers might expect in a post-EISA world. Programs will be able to find additional saving potential by shifting consumers' lighting choices away from less efficient replacements (i.e., EISA-compliant halogens, lower or higher wattage incandescents) toward CFLs and LEDs.

### 5.1.7 Description of the Market Adoption Model Tool

The market adoption model is a spreadsheet-based tool that computes energy savings based on the wattages and types of bulbs that consumers said they are likely to install in place of the incandescent bulbs being phased out by EISA, taking into account the wattage of the bulbs they currently have installed. In developing estimate of current consumer lighting purchases for the market adoption model, data were used from previous lighting research in the NYSERDA area and beyond, including lighting saturation and shelf-stocking studies. The market adoption model's projections of future lighting purchases are based on responses to the consumer survey questions about the bulbs they are likely to use to replace each wattage type as it is phased out. The consumer survey responses were adjusted to account for information from the manufacturer interviews about the bulb types that are likely to be available in the lighting market over the course of EISA implementation, and possible consumer reactions to new technology.

The market adoption model includes detailed instructions on how to use the instrument. The tool consists of five worksheets, as described below:

1. The first worksheet, "Instrument Instructions and Key," provides instructions on how to use the spreadsheet and walks the user through the information contained in the other four worksheets.
2. The second worksheet, "Starting Baseline," reflects NMR's prediction of consumer behavior without further program interventions. These predictions are based on the current General Population survey and previous research, as described above.
3. The third worksheet, "Adjustable Baseline," is set up in a way that allows for input of new and revised data as they become available, and can include data on actual installations (which could be gathered through future saturation studies) as well as future intentions. Thus, the spreadsheet can yield up-to-date estimates of savings as current baseline conditions are clarified.

4. The fourth worksheet, “Adjustable Program Impact,” allows NYSERDA to manipulate certain values to create alternative program scenarios and determine the most efficient approach to securing energy savings in the NYSERDA program area.
5. The final worksheet, “Savings Tables and Graph,” summarizes the estimated energy savings. This is computed as the annual gross energy savings predicted in the Adjustable Program Impact worksheet minus the annual gross energy savings predicted in the Adjustable Baseline worksheet. NMR created a program scenario that assumes increases in the number of CFLs and LEDs in consumers’ homes over the projection period while curtailing bin jumping (e.g., replacing a 60-watt incandescent with a 23-watt CFL instead of a 13-watt CFL) and the use of less efficient EISA-compliant halogen bulbs. Changes in either the Adjustable Baseline worksheet of the Adjustable Program Impact worksheet will change the tables and graphs in the “Savings Tables and Graph” worksheet.

**5.1.8 Preliminary Results from the Market Adoption Model**

Table 84 shows the savings that the market adoption model predicts can be attributed to the hypothetical program described above when compared to the baseline. The energy savings are largely due to the successful promotion of LED lighting throughout the period and successful promotion of CFLs early in the period, but later phasing out in favor of LEDs.

**Table 84: Program Induced Savings (MWh)**

Projection Year	CFL	LED	Total
2012	13,749	16,905	30,654
2013	42,050	28,251	70,300
2014	53,346	22,669	76,014
2015	1,920	100,787	102,708
2016	0	172,216	172,216
2017	0	228,320	228,320
2018	0	280,113	280,113
2019	0	311,509	311,509
2020	--	325,880	325,880

The market adoption model has also been used to estimate average “Delta Watts” given different assumptions about consumer behavior in the face of EISA; the estimates are synthesized in a table in the “Savings Tables and Graph” worksheet of the instrument (Table 85). (Delta Watts is an input into the savings calculations based on the difference between the sales-weighted wattage of the inefficient and efficient lighting options in each EISA category.) As sales shift away from incandescents toward other

lighting products, programs will no longer be able to claim the full seven years of savings from all CFL purchases at the current Delta Watts, but depending on consumers' choices, Delta Watts could vary considerably, and may be much higher than casual observers might expect in a post-EISA world. Programs will be able to find additional saving potential by shifting consumers' lighting choices away from less efficient replacements (i.e., EISA-compliant halogens, lower or higher wattage incandescents) toward CFLs and LEDs. The market adoption model provides estimates of these parameters and expected annual savings depending on the proportions of consumers making different choices. Table 85 shows that the hypothetical program has lower annual Delta Watts for both CFLs and LEDs than do the baseline scenarios (currently identical) because the hypothetical program is effective at increasing the number of LEDs and CFLs. Despite the hypothetical program leading to lower Delta Watts, it is successful in generating energy savings.

**Table 85: Delta Watts**

Projection Year	Starting Baseline		Adjustable Baseline		Adjustable Program Impact	
	CFL	LED	CFL	LED	CFL	LED
2012	37	43	37	43	35	41
2013	37	43	37	43	33	39
2014	35	42	35	42	30	38
2015	34	41	34	41	25	34
2016	32	39	32	39	23	31
2017	31	39	31	39	21	29
2018	30	39	30	39	20	27
2019	28	38	28	38	18	25
2020	--	36	--	36	--	23

## FACILITATING NYS RESIDENTIAL LIGHTING ENERGY EFFICIENCY

### 5.1.9 General Opportunities to Increase Residential Lighting Energy-Efficiency

#### 5.1.9.1 Summary

- *Stakeholders see educating builders in lighting design and increasing consumer demand for efficient lighting as the top needs which, if met, would most help market actors move toward routinely specifying or installing high-efficiency lighting as part of residential projects.* The current economic climate may represent an opportunity for builders educated in high-efficiency lighting to market this lighting to new homebuyers, but only if consumers

recognize the value of high-efficiency lighting. Providing incentives for builders to install high-efficiency lighting and improving lighting quality were also noted as important needs of market actors.

- ***According to stakeholders, since lighting specification for residential new construction is often done by builders rather than lighting designers, architects, or electricians, builders are a particularly promising group on which to focus lighting training efforts.*** Of these, small non-production builders and custom builders may be the most promising builders on which to focus efforts to encourage adoption of cutting-edge lighting technology. These builders are more likely than large production builders to consider adopting new lighting and other technologies.
- ***According to manufacturers, the mix of products available in future residential lighting markets will depend heavily on consumers' preferences and knowledge of the choices.*** Therefore, marketing and education about lighting options is almost as important as the technologies themselves. While manufacturers described some efforts by their individual organizations to address education, they all mentioned that they expect other organizations—e.g., distribution companies, contractors, agents, lighting training institutions and organizations, the U.S. Environmental Protection Agency (EPA) and the media—to take responsibility for marketing energy-efficient lighting to consumers.
- ***Several manufacturers suggested increasing direct install and give-away programs to generate savings and demonstrate to consumers how far CFL technology has advanced.*** This might induce those consumers who did not like CFLs in the past and are reluctant to buy them again to give CFLs another chance.
- ***Education and outreach, particularly in the form of demonstration projects for homebuyers, were most frequently mentioned by installers (builders and electricians) and specifiers (architects and lighting designers) as the support NYSERDA should provide to help increase efficiency in new construction and renovation.*** Other suggestions included educating electrical contractors who serve the mass retail housing market, so they are aware of the range of affordable energy-efficient lighting options (including controls), as well as targeting building associations and developers with educational seminars; supporting LED research; pressuring New York State for a clearer energy code; and offering more rebates and incentives for the adoption of energy-efficient lighting.
- ***Lighting controls are as important to effective energy-efficient design as efficient light sources, according to many lighting designers.*** Those who mentioned controls said they have to be considered together with the light source to obtain the most effective results.

All interviewees were asked in various ways to identify ways to increase the energy efficiency of residential lighting in NYS after EISA, and what role, if any, they thought NYSERDA might be able to play in facilitating this increase.

### 5.1.9.2 Suggestions from Installers

The installers had a variety of ideas about opportunities to increase the energy efficiency in residential new construction or renovation. One electrician stressed the recessed fixture and outdoor lighting markets and reasoned that lights that are harder to change (due to a high ceiling or suspended lights) could benefit “*enormously*” from lighting technologies (such as LEDs) with longer lifetimes. He also mentioned the potential of LEDs in “*accentuating colors in kitchen marbles, displays, and artwork.*” Another electrician emphasized the importance of improving the quality of CFL light, dimmability, chandelier functionality, aesthetics (of the exposed CFL), and warm-up time.

When asked about support NYSERDA could provide to help increase energy efficiency in residential new construction and renovation, two electricians underscored the importance of educating the end-user. One electrician suggested that utility companies start billing customers by wattage so that consumers can see how each watt they use is converted directly into dollars. Others suggested that NYSERDA support efforts to give consumers concrete examples and interactive displays. For example, a New York builder envisioned a display that would demonstrate the conversion of lighting into dollars and cents instead of wattage: “*where the lights can be turned on and people can see how many watts are burned and how much it costs.*”

Five installers (two electricians and three builders) suggested that NYSERDA not only offer rebates to consumers to bring down the price of new lighting technologies, but also offer contractor rebates to incentivize them to promote newer lighting technologies to their customers. As one builder said, “*it takes a lot of effort on our part to figure out what rebates are going on and ultimately, it costs us money to save the customer money...but there’s no rebates for contractors*” to help them manage the extra costs.

One electrician suggested that NYSERDA work with utility companies to provide rebates to lighting product suppliers, not just retailers. He explained, “*The problem is, our suppliers can’t compete with the rebates given to retailers, such as Wal-Mart.*” In his opinion, the retailers offer a cheaper, rebated bulb, and by buying bulbs there he gives up the quality he would receive by buying from his normal supplier.

Another electrician expressed concern that the prices of alternative lighting technologies will rise once incandescents are no longer available. He said that the low price of incandescent bulbs has been the main driver behind retailers lowering their prices for alternative lighting products to date. He suggested that utilities should continue to offer rebates for new lighting technologies even after incandescent bulbs are completely phased out.

One New York builder suggested that NYSERDA promote a requirement for hard-wired lighting in residential construction that is similar to the current commercial construction requirement. This requirement would force people to use either CFL or LED fixtures that are not compatible with regular incandescent bulbs.

### 5.1.9.3 Suggestions from Specifiers

When asked, “*What opportunities exist to increase energy efficiency in residential new construction and renovation?*,” respondents gave a wide variety of interesting comments. LEDs were cited as the future of efficient lighting design by several respondents. One specifier mentioned the importance of providing proven, tested information on payback from efficiency investments. Another thought that having better (East Coast) regulation of residential construction was the answer. Two interviewees mentioned the importance of the building envelope to overall energy efficiency. Also, throughout the interviews, a few specifiers stressed the importance of lighting controls in addition to high-efficiency lighting as essential to increasing efficiency. Some quotes from the interviewees include:

- *“[The] much bigger picture is energy-efficient fixtures controls. NYSERDA has to communicate better: CFLs are basically an interim technology until they get affordable LEDs. People don't like CFLs. They have real and perceived problems that LEDs just don't have.”* (Architect)
- *“Even the clients we have who want to be green, they want to know what the payback on that choice is. We have been recording how things perform so we can better define for our clients exactly what the payback is.”* (Architect)
- *“The thing we most know [is that] the greatest energy savings is through envelope and HVAC. More efficient, not just thicker insulation, involves solar orientation, shading systems, glazing, etc. In New York State, that is really important stuff. Lighting is way down the list.”* (Lighting Designer)
- *“[We] need to educate homeowners and builders about what is out there: there's a lot of product but people don't know what it is. It's not just fixtures. It's fixtures and dimming controls combined.”* (Lighting Designer)

Specifiers also commented specifically about the support NYSERDA should provide to help increase energy efficiency in new construction and renovation. Comments tended to focus on the need for either more education or more outreach to specific groups, with eight respondents mentioning one idea or the other. Other ideas included targeting building associations, contractors, and developers, and offering seminars and education on lighting efficiency options. One of the most detailed comments from a lighting designer, quoted below, was a suggestion to target the electrical contractors supplying the mass market for retail housing, and educate them about all aspects of lighting including the importance of controls.

Three specifiers out of 17 mentioned more marketing or advertising. Demonstration projects, both for industry representatives and consumers, were mentioned by two respondents. One specifier said that NYSERDA should support research and manufacturing of LEDs. Another recommended pressuring New York State for a better energy code, saying that it is poorly written and hard for builders to follow. Rebates and incentives were also mentioned by three respondents, including the quote below about tracking usage and providing rebates for reducing usage.

More quotes from the interviews include:

- *“NYSERDA rocks. New York is so far ahead of Connecticut in some ways. It would be great if people could track their energy usage in some formal way and get credit/incented/rebates for reducing [their] usage over time.”* (Architect)
- *“I’m [from] California of course, it’s amazing to see [that] the rest of country doesn’t have codes that cover this, but you know my market is rather small (high-end residential). For the bulk of residential, electrical contractors are making [the] most of the lighting decision. They could get more familiar with quality, affordable products, especially in terms of using the appropriate controls for energy-efficiency purposes, [and] make sure they understand what drivers are, and heat issues. If they could become more aware or get more training in these areas this would make the biggest impact.”* (Lighting Designer)
- *“They should run public awareness campaigns, include photographs, NYSEDA should spend money advertising, they could show before and after photos for remodeling projects, photos of new construction with energy-efficient lighting, in kitchen and bath for example. Don’t just show a package of light bulbs, that’s meaningless. It’s meaningful to show how good the light can be. Magazine photos and advertising showcase that they are less expensive to run, and the quality is just as good.”* (Lighting Designer)
- *“[I am] concern[ed] with so many agencies that say ‘we can save you money, let’s go in and put these CFLs in,’ but they don’t know enough to do it right. Needs more education, LEDs need more. It’s not just about energy, it’s [about] energy and beauty. We would much rather put on seminars and classes because we know what we’re doing, we understand lighting.”* (Lighting Designer)

When asked what else they would like to share about lighting and lighting design, eight of 17 specifiers offered additional comments. These comments tended to showcase their interest in energy-efficient lighting and in NYSEDA’s efforts to promote and encourage it. As suggested by the quotes below, these respondents tend to look forward to a future that includes better educated homebuilders and buyers, and a wider and cheaper variety of LED options.

- *“LEDs are so far superior you should focus on those. I get a ton of feedback from clients who just do not like CFLs.”* (Architect)
- *“Here in California we have ‘idea houses’ that demonstrate how all these lighting systems and energy-efficient applications work in practice. They are very popular. If NYSEDA offered ‘idea houses,’ that could also have an impact and increase awareness of efficiency and its benefits.”* (Lighting Designer)
- *“NYSEDA should keep at it, they are on the right track. They need to speak to the general public, not just the experts...every project I’ve done where I’ve fitted LED instead of incandescent has been very well received. There are lots of retrofits for down-lights, some are really good and some are really bad but the good ones are great. Clients are always*

*appreciative of the quality lighting effects that can be achieved with LEDs.” (Lighting Designer)*

#### **5.1.9.4 Suggestions from Stakeholders**

Stakeholders were asked what different market actors need to routinely specify or install high-efficiency lighting as part of residential projects. Table 86 shows what stakeholders identified as needed and the number of times each need was mentioned. The two most frequently mentioned target audience needs were a) builder education, and b) increased consumer demand for high-efficiency lighting. Stakeholders generally believe that builders need to be educated about the appropriate use of high-efficiency lighting technologies in homes. As one interviewee stated, builders are accustomed to approaching residential lighting specification in one way only, and they repeat this approach for each home they build. He explained that builders are used to slapping 32 downlights in a kitchen, putting one receptacle in the middle of a dining room, putting one receptacle in the middle of a bedroom, etc., and they do not know how to design lighting for residences that takes advantage of all of the benefits of efficient lighting.

In addition to education on lighting design, builders and other key market actors need to be sure that there is consumer demand for high-efficiency lighting. According to one stakeholder, “If the consumer demands it, it’ll get done. If the consumer doesn’t do that, it’s still a ways away.” Two stakeholders suggested educating the public about efficient lighting in order to increase consumer demand for efficient lighting. Moreover, one of those two stakeholders noted that there is a trend in the building industry toward building smaller homes because consumers are less able to afford larger ones and are more focused on value—including the value inherent to a home with lower operation and maintenance costs. In his view, these conditions present an opportunity for builders to differentiate themselves by marketing homes with efficient lighting. He stressed that effective consumer messaging will be necessary to communicate the value proposition of high-efficiency lighting to customers. A third stakeholder suggested holding demonstration projects with builders in order to show them that efficient lighting can be perceived as a benefit by consumers.

After increasing consumer demand and providing lighting education for builders, the next most frequently mentioned need is incentives for builders. According to one stakeholder, “If the proposed lighting fixture costs more and doesn’t make it easier for them to sell [the home or project], they’re very unlikely to do it.” He explained that builders need to build cheaply and sell the property, and that they respond to incentives like those offered in the ENERGY STAR Homes program. Lastly, one stakeholder addressed the needs of lighting designers, stating that this target audience needs to be sure that the quality of the light from an efficient technology is equivalent to that of the less efficient alternatives in order to routinely specify high-efficiency lighting.

**Table 86: Target Audience Needs**

Needs	Number of Times Mentioned
Builder education on efficient lighting design	3
Consumer demand for efficient lighting	3
Incentives to builders	2
Improved lighting quality	1

### 5.1.9.5 Suggestions from Manufacturers

Several manufacturers suggested that utilities consider increasing direct install and give-away programs to generate savings and demonstrate to consumers how far CFL technology has advanced. They thought these types of programs might induce those consumers who did not like CFLs in the past and are reluctant to buy them again to give CFLs another chance.

Most manufacturers expressed concern that consumers are very uneducated about the economics of energy efficiency, and provided input about how to overcome the higher upfront cost of efficient lighting when marketing these products to consumers, with examples of efforts they are making to this end.

Ten manufacturers are embarking on marketing strategies, such as programs, websites, e-mail campaigns, in-store signs, and promotional displays that will assist consumers with their lighting purchase decisions. One manufacturer, who works with kitchen and bath showrooms, demonstrates multiple efficient lighting options for consumers when they purchase cabinets or kitchen countertops. This allows the consumer to see how the lighting will look in their home and to try new, more efficient products.

Another manufacturer is redesigning its bulb packaging to be color-coded by lumen category; the packaging will also include details about the cost to operate the bulb for a full year. The larger manufacturers plan to work with utilities and retailers to develop programs that bring down the cost of new lighting technologies, such as LEDs, to encourage consumers to try new products. All of the manufacturers also mentioned that they expect distribution companies, contractors, agents, lighting training institutions and organizations, the Environmental Protection Agency (EPA), and the media to take responsibility for marketing energy-efficient lighting to consumers.

One manufacturer opined that the new Federal Trade Commission (FTC) labeling will drive sales: the FTC labels show the cost of operating a CFL as \$1 per year, and the cost of operating an incandescent as \$7 per year. However, this manufacturer believes the lifetime savings would show an even bigger advantage for CFLs. Another manufacturer mentioned that the choice will be more confusing after EISA, because consumers used to have only an A or B option and now must select from a large range of efficiency options.

All of the manufacturers the research team spoke with mentioned the importance of consumer education as the transition from 100-watt incandescent bulbs takes place nationwide, even more so once the 75-watt incandescent bulb is phased out and down-watting is no longer an option.

The majority of manufacturers reported that they participate in industry efforts to improve the quality of lighting products, most commonly with the following organizations:

- Federal Trade Commission
  - According to the FTC, the new Federal Lighting Facts Label “will appear on each package of bulbs and provide consumers with information about the bulb’s brightness, estimated yearly energy cost, life, light appearance, and wattage.”
  - Manufacturers think this labeling may appear before EISA implementation on January 1, 2012, to help consumers with lighting purchase decisions.
- Lumen Coalition
  - The Lumen Coalition has a tag-line of “*Lighting Understanding for a More Efficient Nation.*” It works to increase public awareness about the transition to energy-efficient lighting sources, new lighting products, and the best lighting choices for individual circumstances. The Coalition wants to curb public misunderstandings of the lighting transition and its purpose.
  - The Coalition will address consumer dissatisfaction regarding various lighting technologies.
- ENERGY STAR
  - Through ENERGY STAR, the EPA and DOE are protecting the environment and helping consumers save money through the use of energy-efficient products and practices. ENERGY STAR products include a seal of approval to generate consumer trust and market rigor. The EPA and DOE also test new lighting products to ensure that labeling accurately represents functionality.
  - Some manufacturers want ENERGY STAR to provide stricter requirements.
- Utility programs and product sponsors
  - Manufacturers interpret utility programs as providing another seal of approval for their lighting technologies. Utility programs help manufacturers reduce their cost for new technologies, thereby helping them get energy-efficient bulbs into consumers’ homes. Utility programs also help retailers sell new products.

## 5.1.10 Prospects for Increasing Energy Efficiency through Residential Lighting Design and Lighting Demonstrations

### 5.1.10.1 Summary

- ***Almost a quarter of fixture retailers claim to already offer some sort of lighting design services, but the rate at which customers avail themselves of these services appears to be low.*** Almost a quarter (24%) of fixture retailers offer lighting design services to their customer. Over one-fifth (23%) of fixture retailers reported that their customers always or frequently ask for advice about lighting design. However, only about 6% of all the fixture retailers surveyed often find that the lighting design services they offer assists customers with selecting among high-efficiency products.
- ***More than half of bulb and fixture retailers report having materials in their stores to educate customers about high-efficiency lighting.*** More than half (56%) of both fixture and bulb retailers said that there are signs, literature, or other materials in their stores to educate consumers about high-efficiency lighting design. The most common types of educational material on energy-efficient lighting products available in the stores of retailers who carried these were pamphlets (40% of retailers carrying educational materials) and posters (37%), and displays (19%).
- ***The retailer survey data suggest that customer demand for lighting design advice is fairly low.*** Among fixture retailers, less than one-quarter (23%) reported that their customers always or frequently ask for advice about lighting design, while 50% said that they rarely or never asked for such advice.
- ***About a third of NYSERDA partner retailers expressed interest in free materials from NYSERDA to educate consumers about high-efficiency lighting design, but far fewer were interested in a list of professional lighting designers to use with customers.*** Thirty-three percent of NYSERDA partner fixture retailers would use materials designed to educate consumers about high-efficiency lighting design if it were provided to the retailers free of charge. However, just 12% of fixture retailers and only 1% of bulb retailers were very interested in having a list of professional lighting designers made available to them so that they could make customer referrals to lighting designers.
- ***The data from the survey of homeowners who had installed fixtures suggest that consumer and client interest in seeing lighting demonstrations is relatively high.*** Even after having recently installed light fixtures, about one-third of homeowners who had installed fixture(s) in the previous year said that they would be “somewhat” or “very” interested in seeing demonstrations of either pin-base CFL or integrated LED fixtures. About three-quarters (76%) of specifiers (architects and lighting designers) said their clients would be very or somewhat interested in seeing demonstration projects using CFL or LED fixtures.

- ***Specifiers believe that demonstration projects are the best way to educate consumers about lighting design options, and they are also interested in seeing these projects themselves.*** As one respondent said, “Seeing is believing.” Specifiers are also interested in attending demonstration projects themselves, except for several lighting designers that perceive themselves as being too knowledgeable to benefit from it.
- ***Specifiers observed that once end-user customers realize they may never have to change a bulb again, the cost of LEDs becomes less important.***
- ***Interest in seeing high-efficiency lighting demonstrations using technologies such as LEDs is high among electricians and builders as well—as long as they are free.*** Electricians expressed particular interest in demonstrations of LEDs, halogens, Lutron lighting control systems, and recessed fixtures, LED wall packs for the exterior, and an interactive comparison of lighting technologies that includes their energy savings, cost, lifetime, and maintenance. To improve the chances that electricians actually see such demonstrations, they should be local and free.

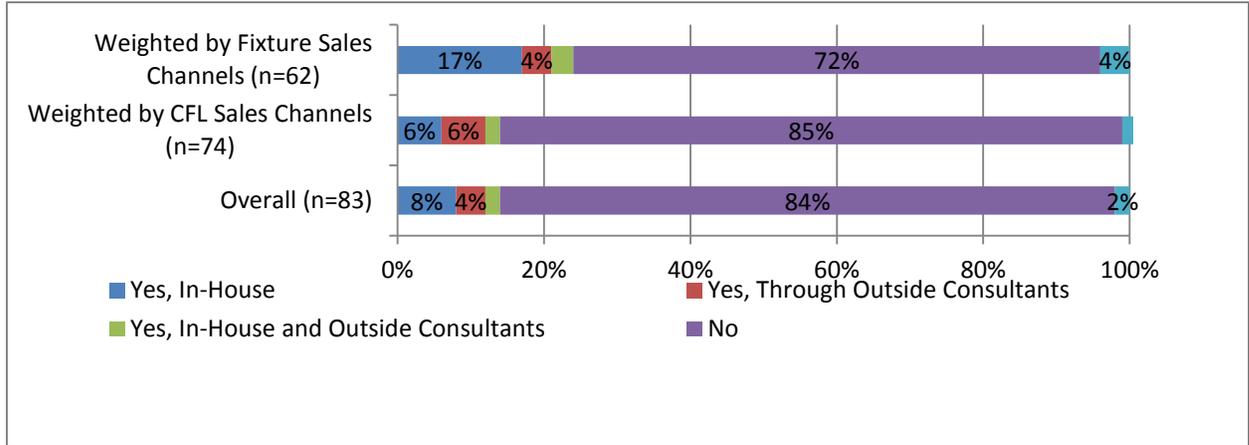
#### **5.1.10.2 Customer Interest in Lighting Design**

NYSERDA staff expressed a particular interest in the possibility of increasing energy efficiency through a focus on lighting design. To better understand prospects for energy savings from residential lighting design, the research team asked retailers, builders, lighting installers and specifiers for their perspective on customer interest—including that of consumers, home buyers, and others—in lighting design. As appropriate, some of these groups were also asked about their own interest in lighting design and in the possibility of lighting design support from NYSERDA.

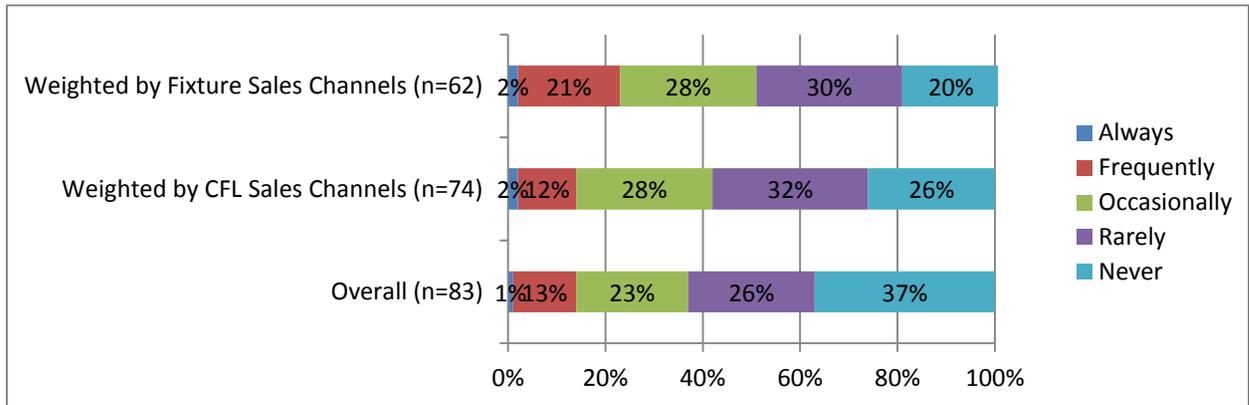
##### **5.1.10.2.1 Retailer Perspective**

The research team asked retailers a series of questions about customer interest in lighting design and the lighting design services and materials available through their stores. As would be expected given the nature of the product mix in different types of stores selling fixtures, bulbs, or both, the research team found that 24% of fixture retailers offered lighting design services to their customers versus only 13% of bulb retailers (Figure 31). Twenty-three percent of fixture retailers reported that their customers always or frequently ask for advice about lighting design, while 50% said that they rarely or never asked for such advice. Among bulb retailers, 14% said that customers always or frequently asked for such advice, versus 63% that said they rarely or never asked (Figure 32).

**Figure 31: Does the Store Offer Lighting Design Services to Customers, Either Through In-House Staff or Outside Professionals?**

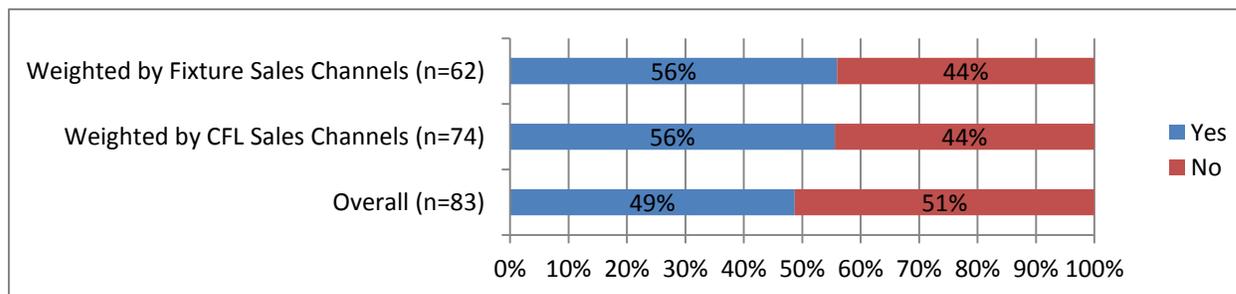


**Figure 32: Frequency of Customers Asking Advice about Lighting Design**



More than half (56%) of both fixture and bulb retailers said that there were signs, literature, or other materials in their stores to educate consumers about high-efficiency lighting design (Figure 33). The most common types of educational material on energy-efficient lighting products available in retailers stores were pamphlets (40% of all retailers who had materials), posters (37% of all retailers who had materials), and displays (19% of all retailers who had materials) (Table 87).

**Figure 33: Are There Signs, Literature, or Other Materials in Store to Educate Consumers About High-Efficiency Lighting Design?**



**Table 87: Types of In-Store Energy-efficient Lighting Product Educational Materials for Customers**

Note: This question was only asked to stores that have customer education materials in-store.

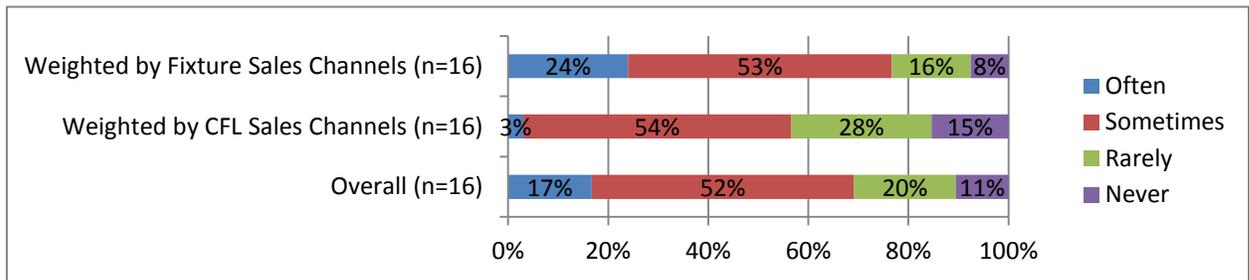
	Overall (n=44)	Weighted By CFL Sales Channels (n=42)	Weighted by Fixture Sales Channels (n=34)
<b>Signs/posters</b>			
Mentioned	37%	41%	38%
Not Mentioned	63%	60%	62%
<b>Printed pamphlets/brochures/flyers</b>			
Mentioned	40%	43%	45%
Not Mentioned	60%	57%	55%
<b>Classes</b>			
Mentioned	3%	4%	3%
Not Mentioned	97%	96%	97%
<b>Displays</b>			
Mentioned	19%	17%	20%
Not Mentioned	81%	83%	80%
<b>Materials from manufacturers</b>			
Mentioned	7%	7%	8%

Not Mentioned	93%	93%	92%
<b>Other</b>			
Mentioned	16%	12%	13%
Not Mentioned	83%	88%	87%

Of the retailers who offered lighting design services, 24% of fixture retailers reported their lighting design services often assisted customers with selecting among high-efficiency products versus only 3% of bulb retailers (Figure 34). Thus, only about 6% of all the fixture retailers surveyed often find that the lighting design services assist customers with selecting among high-efficiency products.<sup>58</sup>

**Figure 34: How often do lighting design services assist customers in selecting among high-efficiency lighting products? (n=16)**

Note: This question was only asked to stores that offer lighting design services.

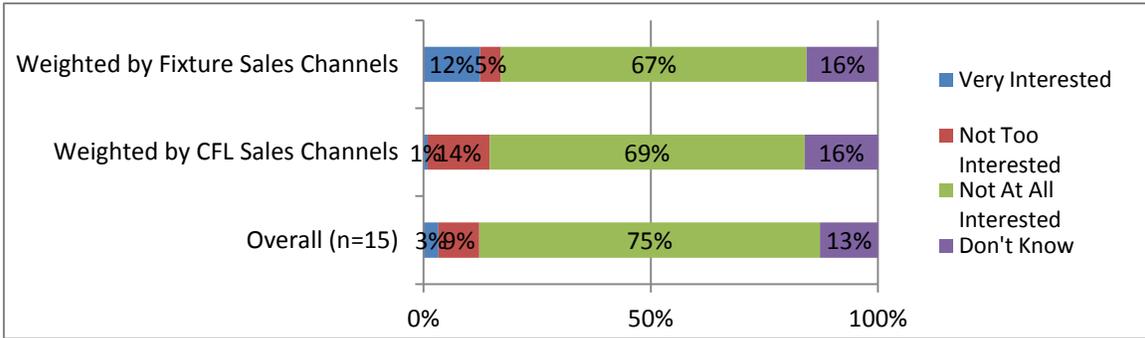


**5.1.10.3 NYSERDA Partner Interest in Consumer Education Material**

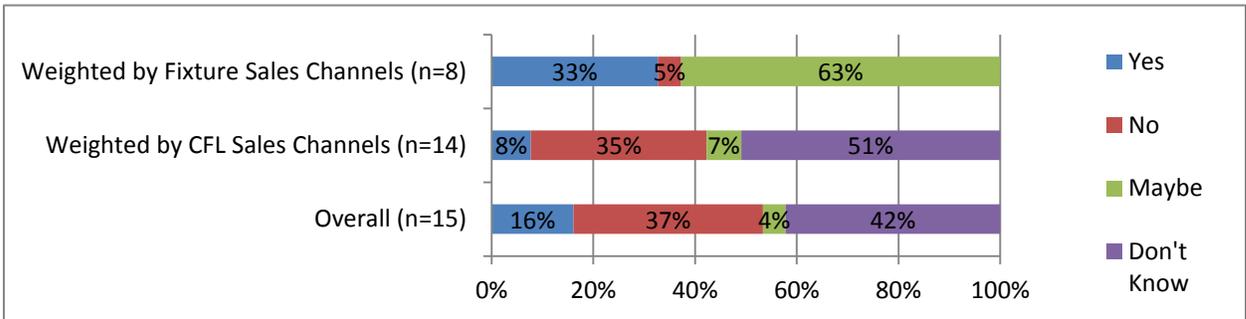
As part of the Retailer Survey, NYSERDA partner retailers were asked if they had any interest in having a list of professional lighting designers made available to them so that they could make customer referrals to lighting designers. Just 12% of fixture retailers and only 1% of bulb retailers were very interested (Figure 35). NYSERDA partner fixture retailers were considerably more interested in materials to educate consumers about high-efficiency lighting design. Thirty-three percent reported that they would use materials designed to educate consumers about high-efficiency lighting design if it were provided to the retailers free of charge (Figure 36).

<sup>58</sup> Calculated by multiply the rate of fixture retailers offering lighting design services (24%) by the rate at which these retailers reported that their lighting design services often assisted customers with selecting among high efficiency products (24%).

**Figure 35: NYSERDA Partner Interest in List of Professional Lighting Designers for Referral to Customers**



**Figure 36: NYSERDA Partner Likelihood of Using Free Lighting Educational Materials in Their Store**



#### 5.1.10.4 Builder and Home Buyer Interest in Lighting Design

Specifiers were asked about the degree to which they saw home builders as interested in energy-efficient lighting design. As shown in Table 6, specifiers said that homebuilders were not too (53%) or not at all (24%) interested in energy-efficient lighting design. Both architects and lighting designers tended to rank homebuilder interest as low. Reasons for this low interest varied somewhat, ranging from a lack of awareness about options to a ‘lose-lose’ scenario for contractors where their clients generally do not want efficiency options and those options also increase contractor costs. Low interest was also attributed to homebuilders because they are perceived as working more often in the broader-based mass market than in the more specialized high-end markets our specifier respondents focus on.

Interviewees working in California were more likely to report higher levels of homebuilder interest, partly due to higher code standards and partly due to a general increased interest in energy efficiency in the state. Some of the comments made included:

- *“Some do want to promote energy efficiency but it is not common.”* (Architect)
- *“They don't have a clue. They're lower down the food chain. If they have experience with it, they may have some interest, but if they are doing custom work, it's just not the way they are programmed.”* (Architect)
- *“They are getting more and more interested. It's a buzzword; it's what's going on in California. Everyone is trying to jump on the bandwagon.”* (Lighting Designer)
- *“It's a hard question, a lot of builders don't want to spend the money on it. Right now (energy-efficient design) is expensive. Most are building for the average Joe: very bottom line driven, often by the customer.”* (Lighting Designer)

**Table 88. Builder/Homebuyer Interest in Energy-Efficient Lighting Design**

LD14 & LD15: How interested would you say builders/homebuyers are in energy-efficient lighting design?	Residential Builders	Customers/Homebuyers
Very interested	6%	41%
Somewhat interested	12%	41%
Neutral	6%	6%
Not too interested	53%	6%
Not at all interested	24%	6%
Total	100%	100%

Meanwhile, specifiers perceived customer and homebuyer interest as much higher than that of home builders: 41% said this group is very interested in lighting design, with another 41% saying they are somewhat interested. More than one respondent mentioned the value to clients of not having to re-lamp, particularly for high-end residential projects where LEDs are being discussed. Once they realize they may never have to change a bulb again, cost becomes less important to the customer. Selected comments include:

- *“It varies wildly: we do eco-design. Some are enthusiastic, others I have to and can convince. Others will say ‘no I hate those things [CFLs]’.”* (Architect)
- *“For the high end they are not too interested. Aesthetics and convenience are their two main areas of interest. For the lower end (where cost becomes a factor), yes they are definitely interested.”* (Architect)
- *“Everyone has always been interested in the San Francisco area. The average perspective is ‘if we can make it energy efficient let’s do it’.”* (Lighting Designer)
- *“They love not changing bulbs, and electric bills drop. More and more clients are asking for smarter choices. People are reading more and asking for it even if it [efficient technology] isn’t ready.”* (Lighting Designer)

#### **5.1.10.5 Building Industry Perspective on the Importance of Lighting Design**

Builders and electricians were asked about the importance of lighting to new construction and renovation projects, rather than about lighting design specifically. The majority of electricians (six of eight) agreed that lighting in new construction and renovation projects is very important. Many reported that the importance of lighting varies according to the project budget, with high-end or custom construction and renovation projects placing a heavy emphasis on the efficiency of lighting. Low-cost projects tend to be *“more concerned with aesthetics and price,”* or, especially in the case of multifamily construction, *“just meeting the minimum code.”*

However, three builders said they have seen an increased interest in lighting efficiency in recent years, particularly for custom homes or renovation projects. They elaborated that homeowners are increasingly demanding specific types of lighting such as LEDs, or requesting lighting advice. Two electricians described an increase in motion-sensor lighting, particularly in the common spaces of multifamily buildings.

All the builders also agreed that lighting in new construction and renovation projects is very important. One builder from New York discussed the importance of permanent lighting to increase the energy efficiency of the structure. He said that, despite being a focal and regulated element in commercial construction, he has observed a lack of focus on lighting in the residential sector, particularly for single family homes. Another builder expounded upon the importance of lighting not only for functionality, but also for atmosphere and aesthetic qualities. He said that CFLs fall short due to issues with dimmability and light quality. One

builder, who works primarily on multifamily residential construction, said his company has generally moved away from incandescent bulbs and instead bases lighting decisions on energy efficiency. Similar to some electricians, he reported an increase in lighting controlled by motion sensors.

#### 5.1.10.6 Current Program Support for Residential Lighting Design

Just one of the program administrators interviewed addressed lighting design in their residential lighting programs at the time of the interviews. The California utility's lighting market transformation program addresses lighting design by conducting outreach to builders, architects, and lighting designers through partners such as Customer Technology Application Center (CTAC), Agricultural Technology Application Center (AgTAC), and the Lighting Lab. Lighting design program activities include summits of lighting specialty manufacturers, tests and trials, tech briefs, and engineering around lighting design. In addition, at the time of the in-depth interviews, the Connecticut utility had begun investigating the possibility of incorporating lighting design into its residential new construction program.

One interviewee highlighted the challenges involved in addressing lighting design in programs. These challenges include the relatively high expense and long payback for retrofit customers, that homeowners are generally not knowledgeable nor inclined to be trained on lighting design themselves, and that lighting designers are typically not interested in doing one-off jobs.

#### 5.1.10.7 Interest in Lighting Demonstrations

##### 5.1.10.7.1 Consumer/Client Interest

Homeowners who had installed one or more fixtures in the previous year were asked how interested they would be in seeing a store-base demonstration of pin-base CFL fixtures and integrated LED fixtures used in the home.

Bearing in mind that this group of respondents had recently changed fixture(s) and thus could have exhausted their current need for new fixtures, about one-third (31%) said that they would be "somewhat" or "very" interested in seeing pin-base CFL fixtures (Table 89) and in integrated LED fixtures (33%) (Table 90).

**Table 89: Interest in Seeing Demonstration of Pin-base CFL Fixture Use in the Home**  
(Base: All respondents)

Level of Interest	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
Very interested	4%	2%	7%
Somewhat interested	27	32	21

Not too interested	19	21	17
Not at all interested	50	46	55

**Table 90: Interest in Seeing Demonstration of Pin-base LED Fixture Use in the Home**

Level of Interest	Overall (n=140)	Upstate (n=63)	Downstate (n=77)
Very interested	6%	5%	8%
Somewhat interested	27	32	21
Not too interested	17	14	21
Not at all interested	49	48	50
Don't know/refused	1	1	1

a Statistically different at the 90% confidence level between Upstate and Downstate.

Specifiers were asked about their clients' interest in seeing CFL or LED lighting demonstrations. About three-quarters (76%) said their clients would be very or somewhat interested in seeing demonstration projects using CFL or LED fixtures (Table 91). Several, particularly lighting designers, expressed great enthusiasm for physical demonstrations as the best way to educate clients and help people understand what is possible.

Selected comments include:

- *“They always want to see an example. In the past I have asked old clients ‘can we come to your house [to see the installed lighting]?’ With lighting seeing is believing.”* (Architect)
- *“Customers can't picture it just by talking, they need to see what lighting looks like, they have no idea what it looks like. When you talk about lighting with a residential client they are clueless.”* (Architect)
- *“It can be hard to get an audience (on this topic) with rich clients: your job is to pick out the things they will love. If you're doing design build and clients are interested in design, there might be more client interest there.”* (Lighting Designer)
- *“Any one of my clients would love to see products installed. Seeing it in place makes all the difference. Everyone likes to see how the lighting will actually work.”* (Lighting Designer)

**Table 91. Specifier and Client Interest in Demonstration Projects**

<b>LD16 &amp; LD17: Would you/your clients be interested in seeing demonstration projects using CFL or LED fixtures?</b>	<b>Specifiers</b>	<b>Clients</b>
Very interested	47%	47%
Somewhat interested	12%	29%
Not too interested	35%	18%
Not at all interested	6%	6%
Total	100%	100%

#### 5.1.10.7.2 Installer Interest

When asked about their own interest in seeing high-efficiency lighting demonstrations using technologies such as LEDs, all of the electricians said they would be interested. Specifically, they expressed interest in seeing model homes that use LEDs, halogens, Lutron lighting control systems, and recessed fixtures, as well as LED wall packs for the exterior. Additionally, three electricians expressed interest in seeing an interactive comparison of lighting technologies that includes their energy savings, cost, lifetime, and maintenance. While all of the electricians were enthusiastic about the idea of model homes or trade show displays, four electricians stressed that they would only see these demonstrations if they were local and free.

Almost all of the builders (seven out of eight) would be interested in seeing demonstrations of high-efficiency lighting, particularly LEDs.

#### 5.1.10.7.3 Specifier Interest

When asked about their own interest in seeing demonstration projects using CFL or LED fixtures, over half of specifiers (59%) said they would be very or somewhat interested. Some who expressed interest indicated that they already know a lot about the subject, but there is always more to learn. Others simply said that demonstrations are by far the best way to see what a specific type of lighting source is like.

Specifiers gave some examples of exemplary LED projects, including the outdoor lighting at the Plaza Hotel and the indoor lighting at the JP Morgan library, both in New York City. Most who are not interested in a demonstration said they are too experienced for it to be valuable. Lighting designers tended to be the most supportive of demonstration projects. As one lighting designer commented, *“Demo sites are absolutely the very best way to convince people of the benefits of energy-efficient lighting. People just don't get it until they see it. I also personally love looking at demo sites. I do mock-ups all the time on projects.”*

### 5.1.11 Lighting Training for the Building Trades

#### 5.1.11.1 Summary

- ***The installers and specifiers interviewed did not look for any specific lighting background when hiring new staff.***
- ***Trade shows, especially LightFair, are the most common way specifiers get design training and hear about new lighting products.*** Professional continuing education programs, often available at trade shows attended by specifiers, were also mentioned by specifiers.
- ***Most installers and specifiers are not required to pursue continuing education credits.*** Some sources of continuing education credits include suppliers, Green Build, the National Association of Home Builders, the American Institute of Architecture and the National Council on Qualifications for the Lighting Profession.
- ***There appears to be no standard lighting curriculum for the installers or architects.*** In addition, there was no agreement among installers and specifiers as to which organization should be responsible for developing a standard lighting curriculum.
- ***Continuing education programs, especially through professional associations, were seen as the best example of a standard lighting design curriculum for lighting designers.*** When asked about training and education options, several schools with graduate programs were mentioned, but these were considered to be too technical for a standard curriculum. Lighting designers were much more familiar with lighting design education options than were architects.
- ***Electricians were not in agreement about the need for a standard curriculum for lighting, while the majority (six of eight) builders did not see a need for a standard lighting curriculum.***
- ***When stakeholders have offered training in energy-efficient lighting, is it typically part of training on broader topics, not stand-alone training.*** Of the stakeholders who offer training in energy-efficient lighting to any of the key target audiences (electricians, builders, architects and lighting designers, or retailers), this is an element integrated into training on broader topics, and is not a stand-alone offering that goes into depth on lighting technology or design. (The exception is training in advanced lighting controls for commercial and industrial buildings.)
- ***All seven institutions that offer lighting training included lighting energy efficiency and lighting technologies in the curriculum; just over half (4 of 7) included lighting design.***
- ***The educational institutions do not necessarily have specific requirements for their lighting teaching staff.*** Four of the seven said that in choosing teaching staff, they generally look for expertise and aptitude based on professional experiences, successes, and recommendations.

- **All the educational institutions that offer lighting-specific education stated these trainings earn participants continuing education credits or certifications through one certification programs.**
- **All seven educators who offer lighting-specific education reported seeing an increase in demand for residential lighting training in recent years, and others organizations interviewed are interested into expanding into lighting training.** Four of the nine educators who currently offer minimal or no lighting training said they would be interested in expanding their current lighting curricula in the future.
- **The topic most in demand is training on LEDs.** Educators noted that the lighting topic most in demand is training on LEDs. This was followed by training on CFLs, then distantly by fixtures, applications to increase energy efficiency, and daylighting along with other topics.
- **The most-frequently mentioned form of assistance that would enable educational institutions to offer additional or expanded lighting-specific training was guidance on developing the curriculum, specifically for more information about the EISA regulations or about different lighting products, and for recommendations of outside consultants.** Educators also asked for more funding to help defray the cost of updating existing curriculum to include lighting, help recruit new instructors, or pay for guest speakers.
- **The educational institutions could be better prepared to address EISA in their lighting education.** Eleven of the 16 educators (69%) were familiar with the new lighting requirements in EISA. However, only four educators currently address EISA in their lighting training, and three of these said they merely mention the upcoming regulations.
- **The retail lighting programs of the program administrators interviewed typically include training components for retail sales staff.** Because upstream and midstream retail promotions account for significant portions of the administrators' residential lighting programs, the primary audience for training is retail staff.
- **Three of the four stakeholders interviewed are interested in partnering with NYSERDA, or expanding their existing partnership with the agency, to provide lighting training.** Two of the four stakeholders interviewed already provide lighting training in some specific topics to some of the key target audiences, such as builders and electricians, and are interested in working with NYSERDA to address needs specific to residential lighting training and consumer education. A third stakeholder expressed interest in establishing a training partnership with NYSERDA.
- **Stakeholders identified five different groups of organizations and two individual organizations for NYSERDA to consider as prospective partners in providing lighting training or education for key target audiences and for consumers.**

#### **5.1.11.2 Desired Background for Building Industry Staff**

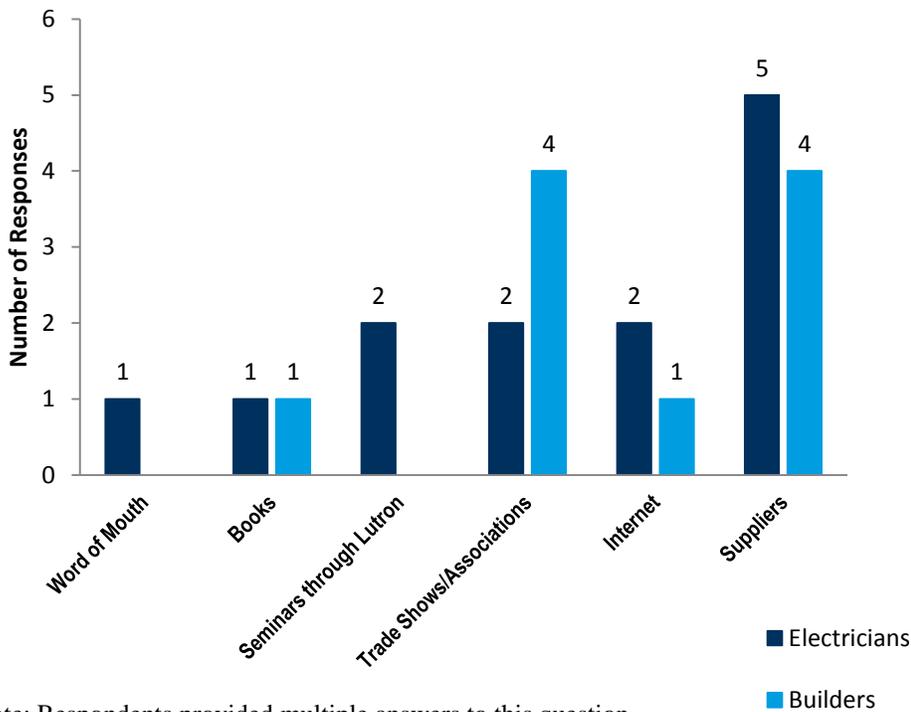
It appears that there is no specific lighting background that the building industry looks for when hiring new staff. Installers were asked about the backgrounds they look for when hiring new staff. Only two electricians said they look for candidates who have received formal training or that have an electrical license (residential, journey man, or master), a state license, an apprentice license, or an engineering degree. Three electricians reported they do not look for formal training, but require that new staff have at least a couple of years of prior experience. The three remaining electricians stated they have no formal candidate requirements.

None of the builders look for formal training when hiring new staff. One builder, however, reported that he looks for college-educated new hires with a background or experience in construction management.

#### **5.1.11.3 Sources of Training in Lighting Identified by Installers & Specifiers**

Suppliers and trade shows lead as sources of lighting training identified by installers and specifiers. Installers and specifiers were asked where they obtain training on new lighting products or applications. Electricians most frequently mentioned suppliers who are authorized dealers for specific companies, and thus have an incentive to market the functionality and application of their products. Electricians said their other sources of lighting information include the internet, trade shows or associations, and seminars given by Lutron Electronics, Inc.

Builders said that suppliers and trade shows or associations are most frequently their sources of lighting information. Figure 37 shows the distribution of these responses.



Note: Respondents provided multiple answers to this question.

### Figure 37. Sources of Training on New Lighting Product/Applications (Installers)

Both architects and lighting designers most often mentioned trade shows. A few architects and almost all lighting designers also mentioned LightFair, a major annual lighting industry event that was held in Philadelphia for 2011. LightFair is co-sponsored by the Illuminating Engineering Society (IES) and the International Association of Lighting Designers (IALD). Specifiers also mentioned professional continuing education seminars and programs. Several said that good educational programs are available at various trade shows as part of the schedule of events.

#### 5.1.11.4 Continuing Education Credit requirements

Most installers and specifiers are not required to pursue continuing education credits. Some sources of continuing education credits include suppliers, Green Build, the National Association of Home Builders, the American Institute of Architecture and the National Council on Qualifications for the Lighting Profession.

Installers and specifiers were asked about continuing education credit requirements. Only three electricians—all from outside New York State—reported being required to obtain continuing education credits. One of these electricians said he received all of his continuing education credits from attending seminars organized by suppliers. Another electrician received his continuing education credits from Technical Education Services. The third electrician stated he received his credits from multiple organizations but could not recall those organizations' names.

Only two builders said they are required to earn continuing education credits: one from upstate New York and the other from Texas. The New York builder received his credits from Green Build and other associations he was unable to name. The Texas builder said he is required to obtain continuing education credits because of his membership in the National Association of Home Builders (NAHB), and that he obtained his credits through NAHB trainings.

Neither architects nor lighting designers are required to obtain continuing education credits in lighting, but such credits are available on a voluntary basis through American Institute of Architecture (AIA) continuing education and various other available coursework. Only lighting designers with the Lighting Certified (LC) certification from the National Council on Qualifications for the Lighting Profession are required to take continuing education, and these classes do not have to be about high-efficiency lighting specifically.

#### **5.1.11.5 Lack of Standard Lighting Curriculum**

There appears to be no standard lighting curriculum for the installers or architects. Lighting designers pointed to the Illuminating Engineering Society and several other possible sources of a standard curriculum, but noted that some of these were too advanced to be considered “standard.”

All of the electricians reported that there is currently no standard curriculum for lighting training. Similar to the electricians, all of the builders reported that there is currently no standard curriculum for lighting training.

Four of the architects interviewed were not aware of a standard curriculum in lighting. One of those who are aware could not think of specific instances. The other three architects mentioned schools: the master’s program at Parsons School of Design, Rensselaer (the architect respondent attended here), and Lawrence Technological University in Michigan. One architect said that lighting industry professionals would be the most qualified to determine an appropriate standard curriculum.

Lighting designers were much more familiar with education options for energy-efficient lighting. All nine mentioned specific institutions, and as for a standard curriculum, two focused on seminars offered by the Illuminating Engineering Society as being very good and comprehensive. Five mentioned Rensselaer’s program, but most said it is too advanced and technical to be considered a standard. They also mentioned Parsons (n=4), Weissmar in Germany (n=1), Penn State (n=3), the University of Colorado (n=2), Colorado State University (n=1), and some unnamed “*programs out in the Midwest*” (n=1), and “*colleges around the country*” (n=1).

#### **5.1.11.6 Perceived Need for a Standard Lighting Curriculum**

Electricians were not in agreement about the need for a standard curriculum for lighting, while the majority (six of eight) builders did not see a need for a standard lighting curriculum.

Only half of the electricians believe a standard curriculum should be developed. Three electricians agreed that “*with all the [regulatory] changes going on, it [a standard curriculum] would be a good idea.*” One of

these three electricians expressed an interest in having the curriculum include training about energy codes or regulations. Another electrician suggested that online training sessions would be helpful, as well as inexpensive and convenient. Additionally, one electrician suggested having the curriculum include lighting design training that would help answer basic questions such as, “*How many watts do I need of an LED or halogen to light up a room per square foot?*”

Of the four electricians who do not believe a standard curriculum should be developed, one reasoned that, “*there are already so many requirements; [additional training] would just be a burden.*” Another electrician opined that the current training required for licensing is sufficient.

Only two builders said they would support the development of a standard curriculum, while six builders do not think a standard curriculum is necessary. Of the six builders who do not believe there should be a standard curriculum, two reasoned that there were already too many other “*requirements, building and energy codes, and regulations regarding rebate eligibility.*”

#### **5.1.11.7 Who Should Develop a Standard Lighting Curriculum**

There was no agreement among installers and specifiers as to which organization should be responsible for developing a standard lighting curriculum.

When asked who should be responsible for developing a standard lighting curriculum, if there is to be one, the electricians offered a variety of suggestions, including: incorporating the curriculum into apprenticeship or continuing education credits programs; and having trainings offered by manufacturers, electrician employers, engineers, architects, suppliers, and trade associations.

The two builders who support having a standard lighting curriculum thought that the NAHB, other associations and nonprofits, lighting manufacturers, suppliers, electrical engineers, and architects could be responsible for developing the curriculum.

Two lighting designers mentioned the Illuminating Engineering Society as the possible source of a standard lighting curriculum.

#### **5.1.11.8 Training Provided by Stakeholders**

Three of the four stakeholders interviewed mentioned that they are currently involved in efforts to encourage the installation of high-efficiency lighting fixtures and bulbs in homes. These efforts primarily consist of training and consulting services offered to builders, in which lighting training is typically integrated into other training. In addition, one stakeholder engages in education activities targeted to homeowners.

Through its contract work with a federal program, the trade association research center provides engineering services to builders to help them design more efficient buildings and learn about energy-efficient construction in the process. This includes modeling the energy use of the new home or home

remodeling design and working with the builder to improve the energy efficiency of lighting plans and other aspects of the design that affect energy consumption. The work takes into account the need to meet multiple objectives, including but not limited to energy efficiency, such as marketability to consumers. The trade association research center also offers a wide range of training classes to builders at international builder shows and on-line. While this training is not focused primarily on lighting technologies or design, these topics are addressed in some of its design classes.

The union has a lighting grant from a state agency to train journey men, inside wiremen, and apprentices in advanced lighting controls for commercial and industrial settings. These same technologies—such as remote dimming via I Pads and PCs, and the use of occupancy sensors—could be applied in residences. The union sees an opportunity for this training to evolve into training for the residential sector.

The academic research center engages in on-line training and education activities for both homeowners and builders. The on-line education is designed to assist homeowners and builders in making the best choices about energy-efficient lighting.

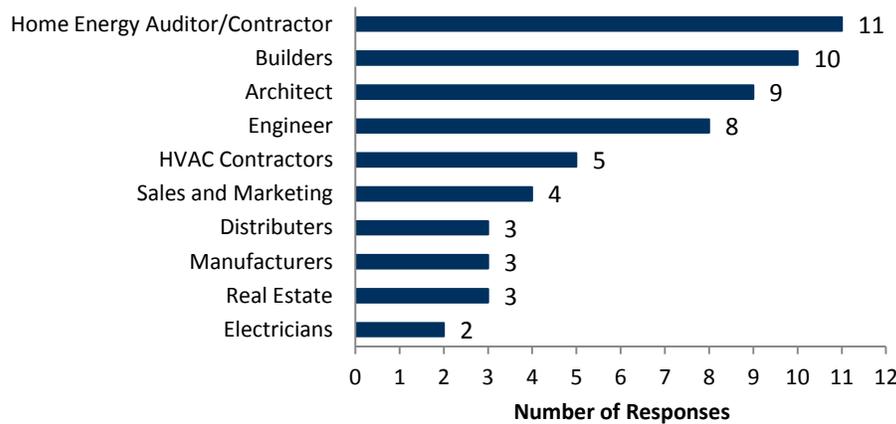
#### **5.1.11.9 Insights from Educational Institutions**

##### **5.1.11.9.1 Background**

To better understand what lighting training is currently available to builders or electrical installers from educational institutions, the research team conducted in-depth interviews with representatives of 16 organizations that provide training and education to builders or electrical installers in affiliation with the building, energy-efficiency, and lighting industries. The educational providers interviewed were identified by installers and specifiers during the course of their interviews as being organizations to which they turned for training, or from which they would expect to be able to obtain training. All educational providers interviewed by the research team have a green building or energy-efficiency focus to some degree, either as the focus of the entire organization, or in the case of some of the larger associations, as a focus of a particular branch of the organization. With the exception of three educational providers, all of the educational providers interviewed by the research team operate either in New York State, the Northeast, or nationally. For firmographic details about the educational providers, see Appendix A.

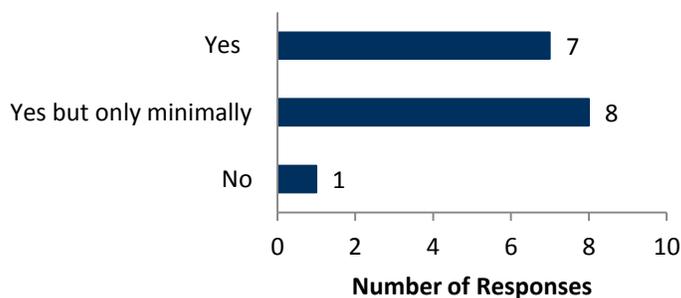
##### **5.1.11.9.2 Trainee Types**

When asked about the types of trainees the educators typically worked with, the 16 interviewees gave a variety of responses. The most frequently mentioned trainees were home energy auditors or contractors, builders, architects, and engineers. Other types of trainees mentioned were HVAC contractors, sales and marketing professionals, distributors, manufacturers, real estate professionals, and electricians. Figure 38 illustrates the frequencies of these responses.

**Figure 38: Types of Trainees (n = 16)**

### 5.1.11.9.3 Extent of Lighting Training Offered

Of the educational institutions interviewed, not quite half offered training specifically about energy-efficient lighting. With regard to their lighting-related educational offerings, each of the 16 educational institutions fell into one of three groups: (1) those that offer training specifically about energy-efficient lighting; (2) those that offer *minimal* lighting training; and (3) those that *do not* offer lighting training. Figure 39 shows the distribution of educational institutions currently providing lighting training. A discussion of each of the groups is provided below.

**Figure 39: Do You Currently Provide Lighting Education or Training (n = 16)**

**Educators Offering Lighting Training:** Seven respondents currently provide training or education on lighting: three energy-efficiency training providers, two associations, one green building alliance, and one lighting research organization.

**Educators Offering Minimal Lighting Training:** Eight respondents said lighting is a minor component of their curriculum and is addressed generally, only as it pertains to energy efficiency or the energy rating of a home (e.g., the Home Energy Rating System, HERS). These respondents included five energy-efficiency training providers, two associations, and one green building alliance.

- One association said, *“We focus more on how different lighting technologies, including fixtures ... save you energy, reduce energy loads, [and affect] the hours of use, and electricity rates.”*
- One educator said his classes include recommendations for encouraging homeowners to increase energy savings by implementing energy-efficient lighting.
- Another trainer spoke of teaching lighting techniques; specifically how to light a space appropriately from an energy-efficiency perspective.
- The green building alliance said, *“We are generalists in green building.... Our trainings approach lighting on the consumer side and how we can influence the consumers to change their behaviors.... It becomes training on how to have conversations with consumers ... not so much from a building perspective.”*

**Educators Not Offering Lighting Training:** Only one educator contacted does not offer training or education in residential lighting. This contractors association offers training on health and safety, building durability, energy-efficiency, and comfort issues through applied building science. It currently does not offer any lighting-specific classes, seminars, or workshops.

#### 5.1.11.9.4 How Educational Institutions Develop Lighting Curricula

Three of the seven educational institutions that offer lighting-specific education said they developed their own curricula, while three others said they partner with other organizations to develop their classes. One educator reported she sometimes hires an industry professional to help develop curricula and sometimes develops the curricula on her own. The three educators who develop their curricula in conjunction with others listed several partner organizations (e.g., the Energy Affordability Association, CalCERTS, and Building America).

When asked where they conduct their trainings, all seven stated their classes take place in classrooms.

- Five educators reported augmenting the classroom sessions with a hands-on component, either in the field at residential buildings, or through field trip-type outings to buildings where they can showcase specific lighting applications.
- Three educators use an online component, such as webinars or optional online classes, to augment their in-person sessions.
- Another respondent does not offer regular classes, but instead offers trainings and presentations at annual conferences over multiple days.

Four educators said they do not have specific requirements for their teaching staff but that they generally look for expertise and aptitude based on professional experiences, successes, and recommendations. All four stated their internal staff uses a vetting process to screen and qualify new teachers.

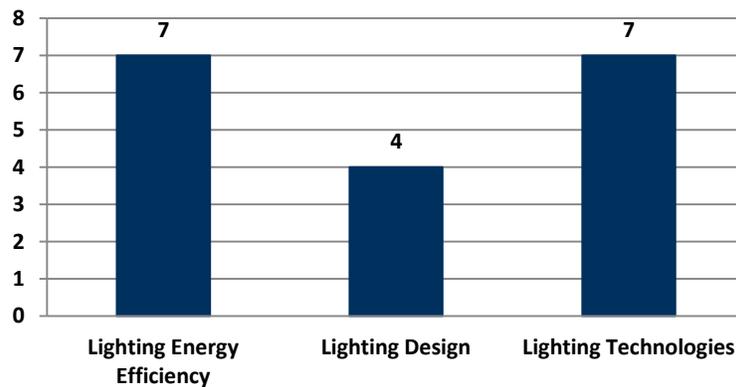
All seven educational institutions that offer lighting-specific education stated these trainings earn participants continuing education credits or certifications through one or more of these certification

programs: Illuminating Engineering Society (IES), National Council on Qualification for Lighting Professionals (NCQLP), LEED, Green Building Certification Institute (GBCI), Residential Energy Services Network (RESNET), Building Performance Institute (BPI), U.S. Green Building Council (USGBC), American Institute of Architects (AIA), and National Association of Home Builders.

#### 5.1.11.9.5 Lighting Curricula Content

All seven institutions that offer lighting training included lighting energy efficiency and lighting technologies in the curriculum; just over half (4 of 7) included lighting design. The research team asked educators from the seven institutions that currently offer lighting training whether their curricula include information about energy efficiency, lighting design, and lighting technologies. Figure 40 shows the number of respondents who offer lighting education covering these topics.

**Figure 40: Distribution of Lighting Curriculum Topics (multiple responses allowed, n = 7)**



The respondents were then asked to provide more detail about the energy efficiency, lighting design, and lighting technology components of their training courses.

**Lighting Energy Efficiency:** While all seven said their current lighting curricula include a focus on lighting energy efficiency, one respondent's curriculum is exclusively geared toward lighting energy-efficiency for commercial applications. The specific aspects of lighting energy efficiency addressed in their training include:

- Building load reduction
- Daylighting
- Lighting controls and occupancy sensors
- Determining the best wattage per square foot, and
- Information on relevant energy codes and LEED requirements.

**Lighting Design:** Only four educational institutions reported having lighting design in their curricula. (One respondent said he prefers to call lighting design "lighting application.") When asked to describe how

lighting design was addressed, the four respondents mentioned training on designing strategic electrical plans, fixture and lighting choices, natural lighting, new technologies, color, and lumen considerations.

**Lighting Technologies:** When asked about the technologies for which they provide information, all seven respondents mentioned bulb types: CFLs, pin-base CFLs, LEDs, and halogens. Two educators also mentioned specific training on fixtures and controls. In terms of emerging technologies that may play a larger role in future residential lighting markets, three educators mentioned the curricula emphasize LED technology and applications. Another educator reported his curriculum covers automated controls.

#### 5.1.11.9.6 The Future for Lighting Education

To gain some insight into the future of lighting education, the research team asked the educational institutions about the existing demand for lighting training, the specific lighting topics in which trainees are most interested, and potential assistance that could help educators overcome challenges in improving existing curricula or in establishing new lighting education programs.

#### 5.1.11.9.7 Existing Demand for Lighting Training

**Trainee Demand for Lighting Training<sup>59</sup>:** The seven educators who offer lighting-specific education reported seeing an increase in demand for residential lighting training in recent years. Three of the educators were able to estimate the number of students who attend their courses each year: on average, each of these organizations provides lighting-specific training to 2,000 students annually. One educator estimated the demand for residential lighting training is increasing by 12% to 15% annually.

**Educator Demand for Lighting Training<sup>60</sup>:** Four of the nine educators who currently offer minimal or no lighting training said they would be interested in expanding their current lighting curricula in the future. However, one energy-efficiency educator said he would be interested only “... *as far as it falls into the whole-home aspect of energy efficiency.*”

Of the five remaining educators who said they would not be interested, three were energy-efficiency educators focused on training auditors and raters, one was a green building alliance, and one was an energy-efficiency nonprofit. As the green building alliance respondent said, “*We are generalists in green building...and lighting trainings haven’t been a specific topic in the [green building] space.*” Another educator said, “*We cover such a broad range of topics from a high level, specific training on lighting wouldn’t fit into the curriculum.*”

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<sup>59</sup> The responses in this category are exclusively from those educators that currently offer lighting specific training.

<sup>60</sup> The responses in this category are exclusively from those educators who currently offer minimal or no lighting training.

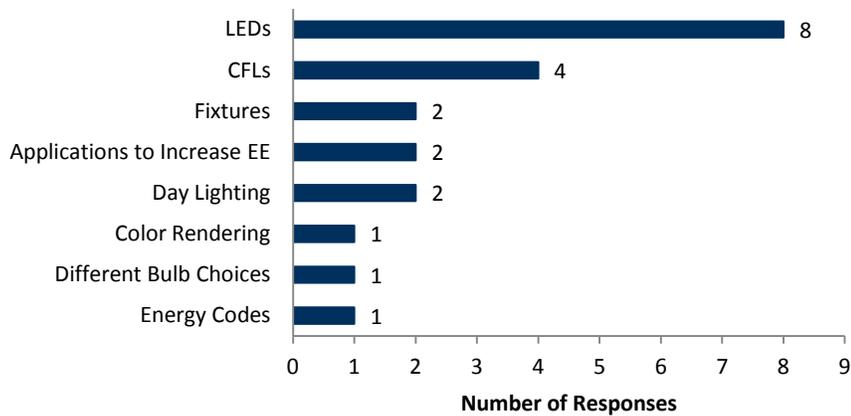
### 5.1.11.9.8 Lighting Topics in Demand

The research team asked all the educational institutions, except the association that doesn't offer any lighting training, about the types of lighting training that are most often requested. The most frequently mentioned response was training on LEDs.

- One educator said his students are extremely interested in learning more about LEDs: *"LEDs are huge, really hot right now."*
- Another educator said his students *"... want to know the difference between the CFLs and regular incandescent in terms of price and lifetime savings."*

Other responses included: training on CFLs, fixtures, applications to increase energy efficiency, daylighting, color rendering, different bulb choices, and energy codes related to lighting. Figure 41 shows the distribution of responses.

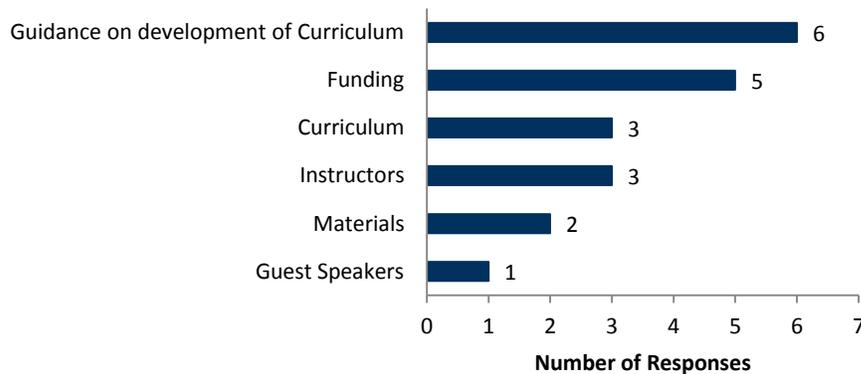
**Figure 41: Distribution of Lighting Topics Trainees are Most Interested In (multiple responses allowed, n = 15)**



### 5.1.11.9.9 Assistance Needed for Lighting Training

When educators were asked about assistance that would enable them to offer additional or expanded lighting-specific training (e.g., lighting design, installation), educator responses varied widely. The most frequently mentioned request was for guidance on developing the curriculum, specifically for more information about the EISA regulations or about different lighting products, and for recommendations of outside consultants. Educators also asked for more funding to: (1) help defray the cost of updating existing curriculum to include lighting; (2) help recruit new instructors; or (3) pay for guest speakers. Other requests were for assistance in selecting instructors, materials, and guest speakers. Figure 42 shows the distribution of responses.

**Figure 42: Distribution of What Educators Need to Offer Lighting-Specific Training  
(multiple responses allowed, n = 15)**



**5.1.11.9.10 Addressing EISA in Lighting Education**

The educational institutions could be better prepared to address EISA in their lighting education. Eleven of the 16 educators (69%) were familiar with the new lighting requirements in EISA. However, only four educators currently address EISA in their lighting training, and three of these said they merely mention the upcoming regulations. One educator said he covers a brief history of lighting legislation, including EISA, and leads discussions on “... how [EISA] has already affected the market, what new technologies have been bolstered by the legislations, the intent of what the regulation is trying to do, the need for the reduction of energy, and future implications [on the lighting market as a result] of the regulations.”

The seven educators who are familiar with EISA but do not address it in their current curriculum have plans to cover EISA in the future. One educator said he thought this kind of training would be very important as, “... public knowledge about EISA has probably increased from 30% to 60% since last year but people don’t necessarily understand why [these regulations are in place].”

When asked why they currently do not offer training on EISA, two educators said, “It hasn’t been on our radar.”

Three educators were able to recall the EISA-related questions their trainees have been asking them:

- One said her students are alarmed or confused by news headlines, and have logistical questions about the timing of the regulations. Other students have questions regarding the regulations’ implications for the building industry.
- Another said his students “... just want to know when specific wattages are going away and what technology they should replace [the incandescent] with.”
- The third said, “Builders and contractors always have questions about the future, mostly around how it will impact their day-to-day business.”

Five educators believed other organizations might offer trainings that address EISA. These educators mentioned the following organizations as potential sources of EISA-related information: National Electrical Manufacturers Association (NEMA), Department of Energy (DOE) Website, American Institute of Architects (AIA), Green Building Council (GBC), and Building Performance Institute (BPI).

#### **5.1.11.10 Training as Part of Energy Efficiency Programs**

The retail lighting programs of the program administrators interviewed typically include training components, although some are more comprehensive than others. Because upstream and midstream retail promotions account for significant portions of the administrators' residential lighting programs, the primary audience for training is retail staff. The non-profit contract program administrator builds training requirements into its master agreements for buy down programs with retailers to ensure that retail managers are trained in lighting. This program administrator's retailer educational activities include e-learnings and web feeds on retailers' web portals, and educational materials supplied by the program administrator's staff at retailers' staff meetings. The non-profit statewide program administrator has BPI- and BEP-certified retail account managers on staff that can answer retailers' questions and conduct informal training as needed. Outside of working with lighting showrooms, the California utility does very little retailer training due to the high level of retail staff turnover and the challenge of implementing training for such a large program. Instead, this program administrator provides educational materials to retailers on the internet and encourages manufacturers to train retailers on its program, although manufacturers do not always follow through with the training.

The Connecticut and Canadian program administrators incorporate relatively comprehensive retailer training into their lighting programs. The Connecticut utility's retailer training is implemented by its vendor, Applied Proactive Technologies (APT), during retail site visits to store-level management, sales personnel, department heads, and cashiers. Training topics include ENERGY STAR requirements and specifications, program requirements and parameters (such as purchase limits and proper use of point of purchase and collateral materials), product features and benefits (including savings and proper product application), and CFL recycling and remediation. Training is conducted more frequently at large DIY and discount stores than at smaller retailers because new employees are hired more often at large stores. The objective of the store-level retailer training is to equip sales staff to assist customers in making educated and energy-efficient purchases. The Canadian program administrator's Power Smart outreach teams work to increase the baseline knowledge of store staff by holding in-store training events and offering online training modules for retail partners. This program administrator tracks the number of staff that have gone through the training and recognizes the need to repeat training frequently due to sales staff turnover. The program stimulates friendly competition within retail chains by holding contests that award a prize to the store that completes the most on-line trainings.

#### 5.1.11.11 Prospective Training and Education Partners

The research team asked the stakeholders to suggest organizations for NYSERDA to consider partnering with to reach out to key market actors with information or training that will help encourage the installation of high-efficiency lighting in homes. The labor union and university-based research organization, which already work in partnership with NYSERDA on other activities, expressed interest in expanding their partnership to training in residential lighting for several of the target audiences and to establishing demonstration projects. The state trade association is also interested in exploring the possibility of partnering with NYSERDA.

In the opinion of one stakeholder, NYSERDA would be best served by focusing on training for builders, designers, and electricians through organizations that serve or represent them, and on education for consumers through retailers.

The stakeholders suggested several other potential partners for consideration. This listing has been provided to NYSERDA for consideration.

#### 5.1.12 Opportunities to Increase Lighting Energy Efficiency through Leveraging Federal Efforts

##### 5.1.12.1 Summary

- *Existing federal residential energy efficiency programs typically focus on whole-house efficiency and not specifically on lighting.* Lighting is a component in both new construction and retrofit programs, but advanced high-efficiency lighting technologies and lighting design are not typically incorporated.
- *Builder training on efficient lighting through federal residential energy efficiency programs is general in nature,* focusing on quality installation issues and minimum energy efficiency specifications. A federal-level initiative currently underway to develop job certifications for energy efficiency retrofit workers will address efficient light bulbs but will not address light fixtures.
- *At the time of the interview, the federal government agencies interviewed had no plans for new programs aimed at increasing energy-efficient lighting in residences.*
- *Interviewees at one of the federal agencies sense that there is an opportunity to train builders on lighting design for high efficiency,* but further research is required to evaluate this opportunity. This agency is interested in assessing the needs of partners such as NYSERDA in terms of training for builders on high-efficiency lighting design.
- *If NYSERDA decides to develop consumer education around lighting, it may be possible to leverage EPA's on-line "lighting place" for source material.* The EPA's online "lighting place" will provide consumer information related to the FTC Lighting Facts label.
- *There is an opportunity to provide input to EPA in the development of future training support.* EPA staff are in the process of exploring new program ideas for workforce training

related to energy efficiency. They would like to better understand NYSERDA's ideas and needs in this area, including but not limited to training in high-efficiency lighting design for residential applications.

- *NYSERDA is already highly engaged in the channels through which state and regional organizations leverage the work of federal agencies to increase the adoption of efficient lighting and contribute to development of federal energy efficiency programs.*

#### **5.1.12.2 Background**

To better understand opportunities for NYSERDA to leverage federal energy efficiency efforts, the research team interviewed several representatives of the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA). The federal government interviewees described seven major initiatives currently underway to increase residential energy efficiency. Most of these initiatives focus on whole-house efficiency and include lighting as one of many components. Four of the initiatives target builders and other market actors, while the other three target consumers. Three of the initiatives target the residential retrofit market and three target the residential new construction market. The seventh initiative is an online educational resource for consumers.

#### **5.1.12.3 Programs Targeting Builders and Other Market Actors**

##### **5.1.12.3.1 Workforce Development**

The DOE is responsible for workforce development for energy efficiency retrofits. The DOE developed and maintains a national set of guidelines outlining work quality specifications for contractors performing energy efficiency retrofits through the federal low-income weatherization and Home Performance with ENERGY STAR (HPwES) programs. The national workforce guidelines have served as the basis for energy efficiency retrofit job certifications developed by industry and other government organizations. The guidelines incorporate many of the numerous building standards in one place, and can be used by program administrators to define the expected quality outcomes of the work done under their programs. While they focus more heavily on residential end uses such as heating and cooling, the guidelines do address residential lighting. The lighting portion of the guidelines focuses on increasing energy efficiency while satisfying the needs of occupants, specifying that lighting measures should be (1) approved by Underwriters Laboratories (UL), (2) appropriate and effective for the job, (3) higher efficiency while fulfilling the intended application, and (4) ENERGY STAR qualified if appropriate. Additionally, the guidelines specify that customers should be informed about proper disposal of CFLs and how to obtain replacement bulbs.

In addition to the workforce guidelines, the DOE is in the process of developing additional job certifications for the weatherization and HPwES programs. The new certifications will supplement the existing certifications discussed above. These new certifications are being developed because the focus in

the retrofit industry has historically been very skill- or task-specific, but programs such as weatherization and HPwES call for more holistic skills including the ability to perform an entire energy audit and to install a broad array of measures. This initiative was in an early stage as of August, 2011, when the DOE was conducting a job task analysis on which to base the new certifications. According to the interviewee, the outcome of the job task analysis will be “a detailed table of what the worker does, and what they need to know to do it.” The federal agency’s intent is for the industry to deliver the certifications and to develop and deliver training informed by the task analysis. The interviewee stated that the certifications incorporate the knowledge base needed for lighting as part of the larger set of job skills required for each position. Moreover, the certifications address light bulbs but do not address fixtures or lighting design. The interviewee explained that fixtures and lighting design are outside of the scope for these certifications, stating “replacing a fixture is in the domain of an electrician, and lighting redesign is architectural.” Instead, the focus is on topics such as electrical safety, new lighting technologies, when to replace versus repair, determining the best bulb for the application, selecting a bulb with lumens equivalent to the bulb being replaced, and communicating the benefits to the homeowner.

The workforce guidelines and certification requirements are made public. While it does not engage directly in training, the DOE intends for them to serve as resources for trainers of the residential retrofit workforce.

#### **5.1.12.3.2 Builder Challenge**

The Builder Challenge is a DOE supported initiative designed to promote the construction of high performance homes in terms of energy consumption. It is a labeling program that allows a builder to label a qualifying home as a Builder Challenge home. In order to obtain the Builder Challenge label, a home’s whole house energy efficiency must meet a certain level on the Home Energy Rating System (HERS) index. According to one interviewee, the program addresses lighting by promoting cutting-edge, high-efficiency lighting technology to builders. Lighting calculations are included among the calculations performed to derive the home’s whole-house energy score along the HERS index. It is up to the builder to determine which lighting fixtures and bulbs to install in a Builder Challenge home.

#### **5.1.12.3.3 ENERGY STAR Homes Version 3**

All ENERGY STAR new homes with permit dates after January 1, 2012 must be qualified under ENERGY STAR for Homes Version 3 (V3). A home may earn the ENERGY STAR label by one of two paths: the prescriptive path or the performance path. The prescriptive path requires that individual components of the home meet minimum levels of efficiency. The performance path requires that the entire home as a system meets a minimum level of efficiency, but not necessarily each of the individual components. In terms of lighting, there is one fundamental change between ENERGY STAR for Homes V3 and its predecessor, ENERGY STAR for Homes V2.5—the prescriptive path for lighting has been made more stringent under V3. In order to meet the V3 prescriptive path for lighting, a home must have a minimum of either a) 80% ENERGY STAR qualified fixtures, or b) 60% ENERGY STAR qualified hard-wired fixtures and 100%

ENERGY STAR qualified ceiling fans. The interviewees representing the EPA do not believe that it is more difficult for builders to meet lighting goals under V3 than it was under V2.5. Additionally, they had not received any early feedback on the lighting portion of ENERGY STAR for Homes V3. While the interviewees reported that the EPA receives ample feedback on many the ENERGY STAR homes specifications, feedback on the lighting specifications is rare. As of September, 2011, there had been no pushback from builders regarding the new lighting prescriptive path requirements.

High level online orientation materials have been developed by the EPA in order to communicate the changes associated with ENERGY STAR for Homes V3 to builders. These materials cover topics such as the roles and responsibilities of builders participating in ENERGY STAR homes, logo use guidelines, quality assurance, general specification information, and program logistics. The materials introduce the new prescriptive path lighting requirements, but do not offer any training on high-efficiency lighting technologies or lighting design guidance. According to the interviewees, builder training and guidance on ENERGY STAR technical requirements is often delivered by Home Energy Raters (HERs). HERs complete two days of classroom or online training through the Residential Energy Services Network's (RESNET) infrastructure on all of the ENERGY STAR specifications. Lighting is addressed in the training, but is limited to instructing the HERs to communicate the lighting technical requirement to builders. One of the interviewees commented that although HERs often train builders on ENERGY STAR lighting specifications, HERs may not be an appropriate mechanism for delivering lighting design training to builders due to the technical, engineering-focused nature of their work.

#### **5.1.12.3.4 Design to Earn the ENERGY STAR**

Design to Earn the ENERGY STAR is a residential program targeted to architects and home plan designers. If architects and home plan designers include certain ENERGY STAR specifications in the home plans, they can get the home plans approved as Design to Earn the ENERGY STAR. Once a home is built according to Design to Earn ENERGY STAR plans, it must still be tested by a Home Energy Rater in order to actually earn the ENERGY STAR homes label. An interviewee representing the EPA indicated that Design to Earn ENERGY STAR may be an area in which high-efficiency lighting could be examined more closely by architects and home designers.

#### **5.1.12.4 Programs Targeting Consumers**

##### **5.1.12.4.1 Home Energy Score**

Another federally supported residential energy efficiency initiative is the Home Energy Score. The Home Energy Score, sponsored by the DOE, is calculated by a home energy assessor who collects information during a brief walkthrough of a home. After the walkthrough, the home energy assessor provides the homeowner with the Home Energy Score (ranging from zero to ten) and a list of recommended energy improvements. The Home Energy Score incorporates lighting consumption into the total energy

consumption of the home. The lighting portion of the score is based on the number of fixtures, number of bulbs, type and wattage of bulbs, and placement of fixtures by room. The DOE interviewee who described the Home Energy Score indicated that the recommendations resulting from the Home Energy Score do not incorporate advanced lighting recommendations such as high-efficiency fixtures, specialty CFLs, LED fixtures and bulbs, lighting design for energy efficiency.

#### **5.1.12.4.2 Home Energy Yardstick**

The Home Energy Yardstick is an EPA-sponsored online energy assessment tool targeted to consumers. Users input their annual electric and gas usage into the online tool, which uses the information to generate a score ranging from zero to ten based on energy usage. The user is then offered up to nine recommendations to improve the energy efficiency of the home, one of which is to replace the lights with ENERGY STAR qualified lighting. The tool also offers assistance in finding ENERGY STAR qualified products. While no solid plans were in place as of September 2011, EPA interviewees indicated that developmental changes had been considered that would make homeowner advice more specific. However, it was too early for the interviewees to provide any details on the potential changes such as if and how they would impact the lighting recommendations.

#### **5.1.12.4.3 Online Consumer Lighting Landing**

The EPA recently launched a new online “lighting place”<sup>61</sup> that gives consumers an overview of what they need to know about high-efficiency lighting. According to the interviewees, the site covers topics such as the main things to think about when buying energy-efficient lighting; an overview of brightness; and what to consider for various lighting applications (i.e. the right color for the task, dimmability, etc.). In addition, the site provides information on the FTC Lighting Facts label, offering guidance to consumers on how to use the new label to compare the true costs of different bulbs. According to the interviewees, the site conveys to consumers that ENERGY STAR bulbs offer substantially more savings than EISA-compliant halogen bulbs.

#### **5.1.12.5 1.1.3 Lighting Design in Federal Programs**

Neither of the two federal agencies interviewed are currently involved in any efforts to promote lighting design for high efficiency in residences. However, as of September 2011, the EPA had plans underway to reach out to the National Associations of Lighting Designers and Electrical Distributors with training. According to one EPA interviewee, the training will take the form of a PowerPoint Presentation to be used internally by the associations’ member organizations. The interviewee developing the training stated that it would focus on a) providing an overview of ENERGY STAR lighting products (especially fixtures), and b) communicating the value of ENERGY STAR lighting products and the benefits they offer.

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<sup>61</sup> This can be found at [http://www.energystar.gov/index.cfm?c=lighting.pr\\_lighting\\_landing](http://www.energystar.gov/index.cfm?c=lighting.pr_lighting_landing).

In addition to reaching out to the National Associations of Lighting Designers and Electrical Distributors, the EPA had given thought to the idea of offering guidance to builders on lighting design for high-efficiency lighting in residences. While they had yet to assess the potential energy efficiency gains to be achieved by enhancing lighting design in homes, the interviewees from the EPA sensed that there was an opportunity to improve the effectiveness of residential lighting design. As one interviewee explained, in terms of residential new construction, the opportunities to increase lighting efficiency through ENERGY STAR specifications are limited since the ENERGY STAR homes program already requires at least 80% efficient fixtures. This interviewee called attention to the fact that the EPA needs to allocate its limited resources to efforts that will yield the highest energy efficiency gains. Therefore, it would make sense to invest in lighting design guidance only if it was determined that significant energy efficiency gains could be achieved by offering such guidance. The interviewees indicated that the EPA intends to assess the level of effort builders currently put into lighting design in homes and gauge their interest in lighting design guidance. The interviewees explained that they need to conduct research to determine a) whether lighting design training will be valued by builders, and b) what the appropriate role is for the EPA in delivering this training. One of the interviewees shared a vision of what the agency's role might look like should the research indicate that lighting design training will be valued and that a role exists for the agency in delivering it. This interviewee envisioned the EPA potentially incorporating lighting design considerations into its messaging while supporting builder training via partnerships with other organizations.

#### **5.1.12.6 1.1.4 Plans for New Federal Programs for the Residential Sector**

Interviewees from both of the federal agencies interviewed stated that the agencies had no plans for new residential programs aimed at getting builders and other market actors to routinely specify or install high-efficiency lighting as part of residential projects. Interviewees also stated that there were no plans for new residential programs aimed at getting retailers to recommend and/or stock high-efficiency lighting fixtures and bulbs. One interviewee commented that while no plans were underway for new federal programs, state and municipal entities could utilize federal grants for encouraging the installation of high-efficiency lighting in residences.

#### **5.1.12.7 1.1.5 Opportunities to Leverage Resources**

The research team asked interviewees to suggest ways in which program administrators could leverage the work of federal agencies to increase the adoption of efficient lighting in the residential sector. One interviewee could not offer any suggestions, commenting that NYSERDA is already very engaged in the organization's residential sector efforts by its presence on the board of the Building Performance Institute (BPI) and its involvement in HPwES and the Builder Challenge program. An interviewee who was involved in researching the opportunity of training builders on lighting design did not offer any direct suggestions, but did express the desire to ascertain what partners such as NYSERDA need in terms of training related to high-efficiency residential lighting.

**5.1.12.8 1.1.6 Opportunities to Provide Input to Design of Federal Initiatives**

The research team asked interviewees how state and regional program administrators could contribute to the development of new and existing federal residential energy efficiency programs as early as possible in the process –ideally, before the formal comment periods begin. An interviewee from one of the federal agencies could not think of any ways in which NYSERDA could contribute more, commenting that NYSERDA is a key ally in the development of HPwES program and is actively involved in the Better Buildings Grant and ENERGY STAR homes programs. An interviewee from the other federal agency said that a technical committee approach to developing the ENERGY STAR homes specifications is being considered. The interviewee indicated that a technical committee could potentially include builders, contractors, program administrators, and technical specialists, allowing for industry and program administrators to contribute early in the process of program development. Before this agency can adopt a technical committee approach, it must first establish a framework for participating industry experts. The interviewee indicated that if the technical committee approach is ultimately adopted, the framework might be developed by the end of 2012.

EPA staff noted that they are in the process of exploring new program ideas for workforce training related to energy efficiency. They would like to better understand NYSERDA’s ideas and needs in this area, including but not limited to training in high-efficiency lighting design for residential applications.

**5.1.12.9 1.1.7 Technology Neutrality of Federal Programs**

Both of the federal agencies interviewed reported that technology neutrality is a general underlying principle of their high-efficiency lighting work. For one of the federal agencies interviewed, the shift to technology neutrality for lighting technologies is recent, having occurred during the last several years. An interviewee from this agency explained that its online messaging regarding ENERGY STAR lighting has been consolidated such that the focus is on the benefits of ENERGY STAR qualified lighting and not any specific lighting technologies, adding that references to specific technologies have been minimized so as to appear only when necessary. Additionally, the interviewee stated that while the ENERGY STAR lighting specification development process had been technology specific in the past, the fixture and bulb specifications are currently technology neutral. According to the interviewee, the agency has set appropriate levels for multiple technologies to compete. The interviewee also stated that in comparison to ENERGY STAR specifications for other products, the lighting specifications are unique in order to ensure that consumers end up with “good products” that do not lead to “bad experiences.”

The other federal agency is more heavily involved in lighting technology research. The interviewee representing this agency explained that while the lighting programs discussed above are indeed technology neutral, the agency’s research arm will prioritize investment in research for technologies it expects to have a higher likelihood of success. However, according to the interviewee, the agency’s approach to setting code specifications for housing and residential products is generally technology neutral.

## Section 6

# CONCLUSIONS AND RECOMMENDATIONS

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## CONCLUSIONS AND RECOMMENDATIONS

The overall goal of this market characterization research was to develop a better understanding of the residential lighting market in New York State, and to identify opportunities for optimizing NYSERDA's future investments in the lighting market as the market changes. This section discusses some important implications from the research findings described in Sections Section 3 through Section 5. Because this was a market characterization study, which is descriptive in nature in order to provide program planners with ample information on which to base future program designs, there is a great deal of detail included in this report, not all of which warrants discussion in these conclusions or related recommendations. For detailed findings by topic, please see the bulleted summaries of findings that precede discussions of specific topics throughout this report.

### 6.1.1 EISA and the Transformation of the Residential Lighting Market

As has been noted in one other studies<sup>62, 63</sup> and is supported by the findings presented in this report, it is clear that by itself, EISA will not result in the NYS residential lighting market being transformed into the most energy efficient that it could be. This has important implications as NYSERDA considers its residential lighting options going forward.

A fundamental outcome of EISA is that as common incandescent bulb<sup>64</sup> types are replaced with different technologies such as Compact Fluorescent Lamps (CFLs), EISA-compliant halogen incandescent bulbs, and Light Emitting Diode (LED) bulbs, choosing among light bulbs is becoming much more complicated for consumers. Since the beginning of electrification for the home, consumers have been able to assess whether a particular bulb would produce an appropriate amount of light for a particular application using a simple measure—wattage—as a proxy for brightness. When all bulbs were in essence equally inefficient and used the same basic technology to produce light,

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<sup>62</sup> U.S. Department of Energy. 2010. "ENERGY STAR® CFL Market Profile." September. Accessed March 7, 2012 from [http://www.drintl.com/Data/Sites/1/downloads/publications/2010\\_cfl\\_market\\_profile.pdf](http://www.drintl.com/Data/Sites/1/downloads/publications/2010_cfl_market_profile.pdf).

<sup>63</sup> U.S. Environmental Protection Agency. 2011. "Next Generation Lighting Programs: Opportunities to Advance Efficient Lighting for a Cleaner Environment." October. Accessed June 11, 2012 from [http://www.energystar.gov/ia/partners/manuf\\_res/downloads/lighting/EPA\\_Report\\_on\\_NGL\\_Programs\\_for\\_508.pdf](http://www.energystar.gov/ia/partners/manuf_res/downloads/lighting/EPA_Report_on_NGL_Programs_for_508.pdf)

<sup>64</sup> To reduce confusion for readers not familiar with the terminology used by the lighting and energy efficiency industries, this report refers to "bulbs" rather than "lamps." In this report, the term "bulbs" also refers to tube and other shapes of lamps using various forms of lighting technology.

wattage worked well as a proxy for brightness, and there was little need for the consumer to be concerned with other characteristics such as color rendition. Under EISA, wattage breaks down as a proxy for brightness, and light appearance varies from bulb type to bulb type. Consumers wishing to recreate the quality of current characteristics of their homes' lighting with most EISA-qualified bulbs will need to give thought to concepts such as lumens and color rendition if they are to be satisfied with their purchase of high-efficiency bulbs.

The new Federal Trade Commission (FTC) Lighting Facts label, which went into effect on January 1, 2012 and is now required to appear on the front and back of bulbs sold in the United States, is a critical tool for helping consumers navigate lighting decisions. The label provides consumers with information about the brightness, estimated yearly energy cost, life, light appearance, and wattage of bulbs. There is greater variability in light appearance and color rendition of CFL and LED bulbs compared to incandescent bulbs and EISA-compliant halogen bulbs.<sup>65,66</sup> Given this, the new label will be particularly important as a tool for consumers choosing among CFL and LED bulbs.

In an effort to assess the likely future direction of the residential lighting market in NYS after EISA, the research team asked a variety of groups knowledgeable about the residential lighting market about their expectations for the lighting market after EISA. These groups included lighting manufacturers and stakeholders with an interest in the residential lighting or building industries. The research team also spoke with efficiency program administrators in California and British Columbia, Canada, and searched the literature to learn about lighting market changes after the implementation of similar legislation in California and other parts of the industrialized world. The research team asked NYS consumers what would be their first, second and third choices of bulbs to replace 100-watt incandescent bulbs once these are no longer available for purchase. The information gathered from these interview and survey questions were used to inform the development of a dynamic model of future market adoption of lighting in NYS, the "market adoption model."

Most manufacturers interviewed thought that, until the price of LEDs is low enough, CFLs and EISA-compliant halogens would be the primary consumer replacement for 60-watt incandescent bulbs. For 100-watt and 75-watt incandescent bulbs, this group thought that lower wattage incandescent bulbs would also be important replacements, at least until those lower wattage bulbs become subject to EISA regulations. Most manufacturers interviewed believed that LEDs would gain significant market share by 2015, but these sales would still lag behind EISA-compliant halogens and CFLs. Stakeholders interviewed for the study expected that because of the nature of the new construction market, builders would likely use CFLs to replace incandescent bulbs. Several stakeholders were of the opinion that consumers might opt for EISA-compliant halogen bulbs at greater rates than for CFLs. Among New York State consumers surveyed, the largest percentage indicated that their first choice to replace 100-watt bulbs

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<sup>65</sup> Calwell, Chris. "Lighting Portfolio Planning for Efficiency Programs: Advanced Session." Presentation at the ENERGY STAR Partners Meeting, Denver, CO, October 2010.

<sup>66</sup> "Demystifying Lighting Jargon – Color Rendering Index." From My LED Lighting Guide website. Accessed April 3, 2012 from <http://www.myledlightingguide.com/Article.aspx?ArticleID=13>.

when these became unavailable would be a CFL (40%), followed by a lower wattage incandescent bulb (18%) or an EISA-compliant halogen bulb (16%), an LED (9%), and finally a 150-watt bulb (2%). The consumer survey data also revealed some strong anti-CFL biases among a subset of NYS consumers: the data suggest that if a CFL is not a respondent's first choice as a replacement bulb, it would be close to the last bulb type the respondent would choose as a replacement for a 100-watt incandescent bulb. In Australia and the U.K., where phase-outs of incandescent lighting were underway as of 2009 and 2010, respectively, there is evidence that consumers had begun migrating from traditional incandescent bulbs primarily to EISA-compliant halogen bulbs and to CFLs.

As Section 5.1.8 describes, the market adoption model computes savings (“Delta Watts”) based on the wattages and types of bulbs NYS consumers said they are likely to install in place of the incandescent bulbs being phased out by EISA, taking into account the wattage of the bulbs they currently have installed. In calculating Delta Watts, it takes into account the likely effects of a successful hypothetical future program in which LEDs are promoted throughout the analysis period and CFLs are promoted only in the early part of the period. Under the hypothetical future program, as sales shift away from incandescents toward other lighting products, programs no longer claim the full seven years of savings from all CFL purchases at the current Delta Watts. However, depending on consumers’ choices, Delta Watts could vary considerably, and could be much higher than casual observers might expect in a post-EISA world. As will be clear to NYSERDA staff who experiment with the market adoption model tool, programs that shift consumers’ lighting choices away from less efficient replacements, such as EISA-compliant halogens and lower- or higher wattage incandescent bulbs, toward CFLs and LEDs will be able to find additional savings potential.

As common general purpose incandescent bulbs are phased out, NYS consumers will need to begin to look for, understand, and use the information on the FTC Lighting Facts label if they are to choose high-efficiency bulbs with which they will be satisfied. If NYS consumers continue to purchase bulbs based on incandescent wattage equivalency rather than on the information on the FTC Lighting Facts label, they will run the risk of being disappointed with their CFL and LED purchases because they are using the wrong indicator of brightness and cannot assess other important bulb characteristics. Lower wattage incandescent bulbs and EISA-compliant halogen bulbs represent an easier choice than CFLs and LEDs for consumers seeking to replace general purpose lamps, as the light quality from these bulbs is similar to those of standard incandescent bulbs.

To help assess the likelihood that the FTC Lighting Facts label could be effective in shifting consumers’ lighting choices toward more efficient replacement bulbs, the consumer surveys fielded as part of this study included questions designed to gauge NYS consumer awareness and understanding of the items to be included on the FTC Lighting Facts label. It is clear from the results that New York State consumers are not well prepared to put the information on this label to full use in choosing bulbs. Specifically, the surveys found:

- While the majority of both consumers and homeowners who had recently installed fixture(s) had heard of the various types of high-efficiency bulbs available, the data suggest that a substantial fraction of consumers may be unaware that CFLs are considerably more efficient than EISA-compliant halogens. Less than one-third of consumers correctly identified CFLs as using less energy than EISA-compliant

halogens. (It is possible that the way in which the survey referred to EISA-compliant halogen bulbs may have encouraged respondents to over-rate the efficiency of these bulbs.) Consumers who are unaware of the energy consumption differences between EISA-compliant halogen bulbs and CFLs or LEDs have little reason to choose the more efficient option, especially since EISA-compliant halogens are already on sale at prices comparable to CFLs.<sup>67</sup>

- Thirty-five percent of all consumers and 48% of all homeowners demonstrated a correct understanding of the concept of lumens. When it comes to quantifying lumens, however, only 3% to 5% of respondents provided an answer within 200 lumens of the correct value of 800 lumens in a 60-watt incandescent bulb. The number of lumens now appears prominently on the front of bulb packages as part of the FTC Lighting Facts label. There is no scale associated with the lumens information on the label. Without context, it is questionable whether consumers will know how to interpret the lumens data provided on the label.
- While the color rendering index, or CRI, is not shown on the FTC Lighting Facts label, color rendering is an important characteristic of bulbs that can set the stage for satisfaction—or disappointment—with a particular bulb. CRI appears on the DOE Lighting Facts label for LED fixtures and on the packaging of many CFLs. More sophisticated lighting consumers can use this information to help in purchasing bulbs appropriate for particular areas of the home or for particular uses. The data showed that awareness and especially understanding of color rendering were both low. Less than one-fifth (17%) of the consumers and just over one-fifth of the homeowners who had recently installed fixture(s) (22%) had seen or heard the term color rendering. Among consumers, only 7% of the total sample of consumers demonstrated a good understanding of color rendering.
- The terms warm and cool and the Correlated Color Temperature in degrees Kelvin appear in the “Light Appearance” portion of the FTC Lighting Facts label. Nearly two-thirds (62%) of the consumers and more than two thirds (69%) of the homeowners who had recently installed fixture(s) said they had seen or heard the terms “warm white” and “cool white.” However, only 14% of consumers demonstrated understanding the meaning of warm white and cool white, and just 10% demonstrated understanding of color temperature.

It was the opinion of the manufacturers interviewed that the mix of products available in the residential lighting market in the future will depend heavily on consumer’s preferences and their knowledge of the choices available to them. Manufacturers and other interviewees suggested a variety of approaches NYSERDA could take to help shift consumers’ lighting choices toward higher efficiency products. These suggestions are described in these conclusions and appear in the discussion and summary bullets associated with each topic in this report.

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<sup>67</sup> U.S. Department of Energy. 2010. “ENERGY STAR<sup>®</sup> CFL Market Profile.” September. Accessed March 7, 2012 from [http://www.drintl.com/Data/Sites/1/downloads/publications/2010\\_cfl\\_market\\_profile.pdf](http://www.drintl.com/Data/Sites/1/downloads/publications/2010_cfl_market_profile.pdf).

Lighting manufacturers, retailers, and some stakeholders identified providing consumer education about lighting as critical to shifting consumers' lighting choices toward higher efficiency products. Lighting manufacturers interviewed were generally of the opinion that marketing and education about lighting options is almost as important as the lighting technologies themselves. Most manufacturers interviewed were also of the opinion that a focus is needed on creating educational materials around light quality. The retailers surveyed for this study most frequently identified consumer education about energy-efficient bulbs as a factor that would be "very helpful" in selling more energy-efficient bulbs (63%). Two of the stakeholders interviewed suggested educating the public about efficient lighting in order to increase consumer demand for efficient lighting. The evidence that New York State consumers are not well prepared to put the information on the FTC Lighting Facts label to full use in choosing bulbs lends further weight to the suggestion the consumer education will be important to shifting the market toward higher efficiency lighting products.

The interviews did not identify any concerted consumer lighting education plans by any national interests. While lighting manufacturers described some efforts by their individual organizations to address consumer lighting education, they all mentioned that they expect other organizations—e.g., distribution companies, contractors, agents, lighting training institutions and organizations, the U.S. Environmental Protection Agency (EPA) and the media—to take responsibility for marketing energy-efficient lighting to consumers. While EPA and the U.S. Department of Energy (DOE) were not asked directly about consumer education around the FTC or DOE Lighting Facts labels, they were both asked about their organizations' involvement in encouraging the installation of high-efficiency lighting fixtures and bulbs in homes. The only federal effort identifying consumer lighting education that was identified by these interviewees was EPA's online "lighting place." This recently launched website gives consumers an overview of what they need to know about high-efficiency lighting. According to the interviewees, included among the offerings on the site is information on the FTC Lighting Facts label and guidance to consumers on how to use the new label to compare the true costs of different bulbs. Interviewees did not mention any active outreach, or plans for such outreach, to encourage consumers to visit the site.

Since the FTC, which is the organization responsible for the Lighting Facts label for bulbs, was not interviewed as part of this study, the research cannot speak to any FTC plans for consumer lighting education in conjunction with the label.

EISA has not been accepted with open arms by all. An attempt was made to repeal EISA in July 2011<sup>68</sup> and California interviewees described a concerted anti-phase out campaign in that state before similar legislation took effect there. EISA was also a pawn in the federal budget negotiations between the Obama administration and Congress in December 2011, with funding for the enforcement of EISA delayed, but not dropped altogether from the budget, as a consequence. These developments raise the question of whether there will be a federal budget for consumer education activities around the FTC Lighting Facts label and making bulb choices under EISA in the near

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<sup>68</sup> "US House votes down incandescent bulb-ban bill" by Maury Wright. LEDs Magazine. July 13, 2011. Accessed June 12, 2012 from <http://ledsmagazine.com/news/8/7/12>.

future. If federal funding is made available for consumer education soon, one approach that seems likely is for dissemination of consumer education about bulb choices to be modeled along the lines of ENERGY STAR, with the federal government developing campaigns and relying on manufacturers, retailers and energy efficiency program administrators to provide substantial supplemental promotion.

#### **6.1.1.1 Recommendations**

In light of these findings, NYSERDA may wish to:

1. Work to increase NY consumer awareness and understanding of the information on the FTC Lighting Facts label and how consumers can use it to make high-efficiency lighting choices that will satisfy lighting needs for particular common applications. (E.g., Identifying appropriate lumen levels for different purposes; identifying locations in the home in which color temperature matters more, such as the bathroom, and ones in which it matters less, such as the garage.)
2. Review and assess the EPA online “lighting place” to determine the appropriateness of the site content and delivery to increasing NYS consumer awareness and understanding of the information on the FTC Lighting Facts label.
3. Reach out to the EPA, DOE, and FTC about any plans they might have for more active promotion to help consumers interpret information on the FTC and DOE Lighting Facts labels and explain how they can use the information to make satisfactory high-efficiency lighting choices. If there are such plans, assess (1) the degree to which the plans are in line with New York State’s needs for consumer education around the information on the Lighting Facts labels, (2) prospects for NYSRDA to link with or leverage the plans to help meet the need for increased awareness and understanding among NYS consumers of the information on the Lighting Facts labels.
4. Since EISA clearly will not by itself transform the market to favor the highest-efficiency bulbs, until the future price and availability of CFLs becomes more clear and consumer bulb preferences are better established, it is important that NYSERDA continue tracking the lighting market and continue supporting CFLs.

#### **6.1.2 Growth in Importance of the ENERGY STAR Label**

Bulbs that qualify for the ENERGY STAR label have many of the lighting quality characteristics that are familiar to consumers from general purpose incandescent bulbs. Consumers who find the Lighting Facts labels daunting will thus have a simple fallback for assessing high-efficiency bulbs, and by definition will be steered away from less efficient EISA-compliant halogen bulbs.

There is ample room to increase the reliance of consumers and retailers on the ENERGY STAR label, at least for specialty CFLs and fixtures. The results of the surveys of retailers and of homeowners who had installed fixtures in the prior year suggest that the ENERGY STAR label is not an important factor in the decision to stock a specialty CFL or fixture, or to purchase a fixture. Only one in five retailers cited qualifying for the ENERGY STAR label as an important factor in deciding which specialty CFLs to stock. For most fixture retailers, qualifying for the ENERGY STAR label is only a minor consideration in determining which fixtures to stock: it was cited as a major

factor by just 14% of retailers—far behind customer demand and availability of replacement bulbs for the fixture—and as a minor factor by 29% of retailers. It appears that homeowners are not accustomed to looking for the ENERGY STAR label when purchasing fixtures—just one out of ten of these respondents reported looking for the ENERGY STAR label. While the degree to which consumers associate CFLs with the ENERGY STAR label was not measured in this study, at the national level in 2011 just seven percent of consumers who were aware of the ENERGY STAR label offering lighting as a product that they think of when they think of the ENERGY STAR label. When consumers were asked to select from a list of products on which they had seen the ENERGY STAR label, 35% selected compact fluorescent light bulb—ten out of a total of 28 products listed.<sup>69</sup>

#### **6.1.2.1 Recommendation**

5. While educating consumers about the FTC Lighting Facts label, continue to encourage consumers to look for the ENERGY STAR label on bulbs and fixtures.
6. In conjunction with its periodic assessments of ENERGY STAR label awareness in NYS via the CEE ENERGY STAR Household Survey, NYSERDA may wish to consider tracking the extent to which New York consumers look for the ENERGY STAR label on CFLs and other lighting products to help in assessing efforts to encourage consumers to look for the ENERGY STAR label on bulbs and fixtures.

#### **6.1.3 Mid-stream Program Ideas**

Some mid-stream approaches to encourage the selection of higher efficiency products identified through the study include offering incentives to builders to install high-efficiency fixtures; providing incentives to retailers to help reduce the cost of high-efficiency bulbs, including taking a “market lift” approach to rewarding retailers for increasing sales of high-efficiency lighting products; and providing training in high-efficiency lighting products for retail sales staff and point-of-sales material for high-efficiency lighting.

##### **6.1.3.1 Incentives for Builders**

Builders interviewed for the study suggested offering rebates and incentives to the building trades—or increasing these if they are already offered—as a way to increase the adoption of energy-efficient lighting. As NYSERDA already offers fixed incentives to builders for achieving NYS energy code in new buildings, additional incentives may not be practical.

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<sup>69</sup> EPA Office of Air and Radiation, Climate Protection Partnerships Division. 2012. National Awareness of ENERGY STAR® for 2011: Analysis of 2011 CEE Household Survey. Washington, D.C.: U.S. Environmental Protection Agency. Accessed June 19, 2012 from [http://www.cee1.org/eval/National\\_Awareness\\_of\\_ENERGY\\_STAR\\_2011.pdf](http://www.cee1.org/eval/National_Awareness_of_ENERGY_STAR_2011.pdf).

### 6.1.3.2 Incentives and Training for Retailers

The factors that bulb retailers most frequently identified as being likely to have “a great deal of influence” in their decision to stock a wider selection of energy-efficient bulbs were customer demand (47%) and lower prices (42%). Over three-quarters of retailers (80%) said that lower prices on energy-efficient bulbs would also have “a great deal” of influence in increasing customer interest in buying energy-efficient bulbs from the store. When read a list of factors that might help them sell more energy-efficient bulbs, bulb retailers most frequently indicated that in addition to more consumer education, information for staff about energy-efficient bulbs (51%) and point of sales material about energy-efficient bulbs (49%) would be “very helpful” in selling more energy-efficient bulbs. (NYSERDA has offered generous marketing and point-of-sale promotion assistance to its partner retailers for a number of years. Many of the retailers surveyed were not NYSEDA partners and thus may have been unaware of this opportunity.) Forty-two percent of retailers said that more informed sales associates on the sales floor would also have a very great deal of influence on customer interest in buying high-efficiency bulbs.

When retailers who sold LED fixtures were asked what factors would be helpful in selling LED fixtures, some factors commonly listed as very helpful were: lower price for customer (90%), information for sales staff about this type of fixture (70%), and point of sales material about this type of fixture (69%). The factor least likely to be cited as very helpful in selling LED fixtures was incentives for sales staff (36%). Lack of customer demand (26%) and that the fixtures were too expensive (21%) were the two most common reasons given for not stocking this type of LED fixture.

The residential lighting programs of the program administrators interviewed typically included some retail sales staff lighting training. Program administrator staff noted that retailer training must be repeated frequently due to the relatively high rate of turnover of retail sales staff.

As described earlier, an innovative new approach to encouraging retailers to increase the share of high-efficiency bulbs sold is through incentivizing “market lift.” This approach leverages the sales volume of large retailers while addressing the net-to-gross problems associated with providing rebates and incentives to mass merchants. Via this approach, rather than paying incentives on all high-efficiency lighting products sold by a particular retailer, the program administrator develops a high-efficiency lighting market share for the retailer, and then pays the retailer for achieving sales of high-efficiency lighting products above the baseline. This difference is referred to as the “market lift.” For example, if a retailer’s market share of high-efficiency lighting products was ten percent before the program and fifteen percent after the program, the program administrator would pay the retailer incentives on the five-percent “market lift.” A drawback to this approach is that a significant amount of data is required from a retailer in order to establish its baseline for measuring “market lift,” including data not only on efficient lighting products but on a retailer’s entire lighting category. The relationship between the program administrator and the retailer is very important to the success of this approach.

NYSERDA has put considerable effort over the years into developing these very relationships with retailers. NYSEDA’s partner retailers already provide NYSEDA with much, if not all, of the data that would be needed to implement a market lift approach. While not every lighting sales channel is equally well represented among

NYSERDA partner retailers, NYSERDA is in an enviable position with regard to access to retailer sales data in comparison to many energy efficiency program administrators. Given this, it makes a great deal of sense for NYSERDA to consider the possibility of encouraging growth in the share of sales of truly high-efficiency bulbs through this mid-stream incentive approach.

### **6.1.3.3 Recommendations**

7. NYSERDA may wish to explore the possibility of providing training in high-efficiency lighting products for retail sales staff. Because of the high turnover rate among retail sales staff, this training would need to be ongoing to continue being effective.
8. NYSERDA may wish to consider and assess whether a “market lift” or other incentive-based approach to encourage retailers to sell the highest efficiency bulb types is appropriate for the New York residential lighting market.

### **6.1.4 Demonstrations of High-Efficiency Lighting**

The data from the survey of homeowners who had installed fixtures suggest that consumer and client interest in seeing lighting demonstrations is relatively high. Even after having recently installed light fixtures, about one-third of homeowners who had installed fixture(s) in the previous year said that they would be “somewhat” or “very” interested in seeing demonstrations of either pin-base CFL or integrated LED fixtures. About three-quarters of specifiers (76%) said their clients would be somewhat or very interested in seeing demonstration projects using CFL or LED fixtures.

Specifiers believe that demonstration projects are the best way to educate consumers about lighting design options. As one interviewee said, “seeing is believing.” Education and outreach, particularly in the form of demonstration projects for homebuyers, were most frequently mentioned by the building industry and specifiers as the support NYSERDA should provide to help increase efficiency in new construction and renovation. Interest in seeing demonstration projects is also high among the specifiers, electricians and home builders interviewed. Electricians expressed particular interest in demonstrations of LEDs, halogens, Lutron lighting control systems, and recessed fixtures, LED wall packs for the exterior, and an interactive comparison of lighting technologies that includes their energy savings, cost, lifetime, and maintenance. To improve the chances that electricians actually see such demonstrations, they should be local and free.

#### **6.1.4.1 Recommendations**

9. Explore the possibility of partnering with retailers, lighting manufacturers, and/or other organizations to develop demonstrations of high-efficiency residential lighting applications for use in informing consumers and homebuyers that high-efficiency lighting can be aesthetically appealing.
10. Explore the possibility of working with lighting manufacturers, distributors, educational institutions or other organizations to develop demonstrations of high-efficiency lighting technology for residential applications geared to audiences of electricians, builders, architects and lighting designers.

### **6.1.5 Training to Accelerate Adoption of High-Efficiency Lighting in New Construction**

The study findings suggest that training in high-efficiency lighting and lighting design for electricians and builders is a promising approach to encouraging market actors to move toward routinely specifying and installing high-efficiency lighting as part of residential new construction in New York State.

Observations from both stakeholder and installer interviews indicate that the use of architects or lighting designers in residential new construction or renovation is not common, and there appears to be little interest in increasing this use. According to several of the stakeholders, builders and electricians interviewed, typically only high-end or custom projects include lighting designers or architects, and they are likely to focus only on the aesthetic component, not on energy efficiency. Questions asked of homeowners who had installed fixtures and retailers support the observation that the use of lighting designers or architects in projects involving lighting is very low: overall, only one in 10 homeowners surveyed (10%) had employed a lighting designer or architect to help them with their lighting project. Nearly a quarter of NYS retailers that sell fixtures were found to already offer residential lighting design services, and the demand for these services appears to be weak. While over one-fifth (23%) of retailers that sell fixtures reported that their customers always or frequently ask for advice about lighting design, only about 6% of all the fixture retailers surveyed often find that the lighting design services they offer assist customers with selecting among high-efficiency products. Interest among NYSERDA partner retailers in obtaining referrals to lighting designers was found to be low—just 12% of partner fixture retailers and only 1% of partner bulb retailers were very interested in having a list of professional lighting designers made available to them so that they could make customer referrals to lighting designers.

The stakeholders interviewed noted that lighting specification for residential new construction is more often done by builders than by lighting designers or architects. The descriptions of the home building industry offered by stakeholders suggest that small, privately held non-production builders and custom builders would be more likely than other builders to be willing to accept the risks associated with using new lighting technology or any new technology. Since production builders are more likely to wait until a technology becomes main stream before adopting it, the privately held non-production builders and custom builders could perform a valuable role in helping to lead the residential new construction market toward routinely specifying and installing high-efficiency lighting.

Observations from interviews suggest that electricians could also help in leading the way toward routinely specific high-efficiency lighting in new construction projects. Installers and specifiers suggested targeting electrical contractors who serve the mass retail housing market with lighting education to ensure that they are aware of the range of affordable energy-efficient lighting options, including controls. That both electricians and builders do not consider themselves particularly knowledgeable about new lighting technologies provides further support for targeting these groups for lighting education. Targeting electricians could have the additional benefit of spillover into the residential retrofit market, since homeowners who installed fixtures and identified anyone as having provided them with information about fixtures named electricians as one of the top two sources of information.

There appears to be no specific lighting background that the building industry looks for when hiring new staff, so there is ample opportunity for NYSERDA's efforts to help in setting future expectations about what is an appropriate installer background in lighting.

As for channels through which to supply training, suppliers and trade shows lead as sources of lighting training for both installers and specifiers. Electricians most frequently mentioned receiving lighting training from suppliers who are authorized dealers for specific companies, and thus have an incentive to market the functionality and application of their products. Electricians said their other sources of lighting information include the internet, trade shows or associations, and seminars given by manufacturers. Builders noted that suppliers and trade shows or associations are the sources of lighting information they use most frequently. Installers and specifiers suggested targeting building associations and developers with educational seminars, which could expand the reach of any training that NYSERDA might develop or support.

The same types of organizations identified by installers and specifiers as being sources of training for the industry were asked what forms of assistance would enable their institutions to offer additional or expanded lighting-specific training to the building trades. The most frequently mentioned assistance was (1) guidance on developing the curriculum, particularly around the EISA regulations and different lighting products, and (2) recommendations of outside consultants with which to work. Educators also asked for (3) funding to help defray the cost of updating existing curriculum to include lighting, help recruit new instructors, or pay for guest speakers.

The research pointed to the importance of lighting controls, not just light sources, to effective energy-efficient design. Given this, lighting controls should be covered as part of any lighting training for the building trades that may be offered with NYSERDA's help in future.

#### **6.1.5.1 Recommendations**

11. Explore the possibility of working with NYS lighting distributors, trade associations for the home building industry and for electricians, to offer training in high-efficiency lighting to electricians, production builders, and small, privately held, non-production builders. (A list of possible training partners has been provided to NYSERDA.) Also consider the possibility of offering training in conjunction with industry trade shows as appropriate.

**6.1.6 Explore the viability and appropriateness of partnering with the kinds of organizations to which the home building industry and electricians turn for training. This could include, but may not be limited to, providing these organizations with guidance on developing lighting curriculum, recommendations of outside consultants with which to work, and funding to help defray the cost of updating existing curriculum to include lighting, help recruit new instructors, or pay for guest speakers. Specialty CFLs**

As described in Section 1.1.1.2, 22 different bulb types are exempted from the EISA lighting standards. Exemptions include three-way bulbs, reflectors, larger globe bulbs, decorative bulbs, and candelabra-style bulbs.<sup>70</sup> Going forward, each consumer choice for a specialty CFL instead of an exempted incandescent thus represents even greater savings than the choice for a general purpose CFL instead of an EISA-compliant halogen, the least efficient EISA qualifying general purpose option.

Working to increase the share of the specialty bulb market that is represented by high-efficiency specialty bulbs is a possible future program opportunity for NYSERDA. This research highlighted the importance of two retail sales channels, home improvement stores and mass merchandisers such as Wal-Mart or K-mart, in supplying specialty CFLs to NYS consumers.

One possible approach increasing the efficiency of specialty bulbs in NY homes is to increase consumer awareness and knowledge of specialty CFLs in conjunction with other consumer education discussed elsewhere in these Conclusions. As part of this, NYSERDA could work with retailer partners in these channels to encourage and perhaps support the development and installation of displays demonstrating specialty CFLs in use.

Currently, NYSERDA provides substantial financial support to partner retailers for ENERGY STAR marketing. Among the items that NYSERDA expects in return is substantial sales data from partners. As the requirement for sales data appears to be an important impediment to partnering with national home centers and mass merchandisers, NYSERDA may wish to explore whether there might be a “middle path” of partnership with national home improvement and mass merchandisers in order to expand the reach of specialty CFL displays and consumer education at the point of sale. For example, if after working with retailer partners to develop such displays and establish them in partner stores NYSERDA can document evidence of their success in increasing sales of specialty CFLs, NYSERDA could use this information to help persuade national retailers to develop or host specialty CFL displays and point of sales materials without requiring them to provide sales information in return.

**6.1.6.1 Recommendations:**

12. Work to increase consumer awareness and knowledge of specialty CFLs in conjunction with other consumer education.
13. Consider the possibility of working with retailer partners in these channels to encourage and perhaps support the development and installation of displays demonstrating specialty CFLs in use.

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<sup>70</sup> U.S. Department of Energy. 2010. “ENERGY STAR® CFL Market Profile.” September. Accessed March 7, 2012 from [http://www.drintl.com/Data/Sites/1/downloads/publications/2010\\_cfl\\_market\\_profile.pdf](http://www.drintl.com/Data/Sites/1/downloads/publications/2010_cfl_market_profile.pdf).

14. Explore whether there might be a viable way to engage national home center and mass merchandise retailers in promoting specialty CFLs without a full commitment to partnership either by the retailers or NYSERDA.
15. Assess what would be required to document evidence of the success of specialty CFL displays in boosting sales of specialty CFLs among NYSERDA partners, and whether this could be a way to provide such documentation to national home center and mass merchandise retailers without violating NYSERDA retailer partner confidentiality.

### **6.1.7 LED Fixtures and Bulbs**

Despite the relatively high price and limited availability of LED fixtures, surveys and interviews conducted for this study revealed that:

- homeowners—especially Downstate homeowners—are more willing to consider installing pin-base LED fixtures than pin-base CFL fixtures,
- half the electricians and a quarter of the builders interviewed put LED fixtures in homes “very often” or “somewhat often,” and
- specifiers, particularly lighting designers, are enthusiastic about LED fixtures.

While it appears that LEDs are not ready to replace general purpose lamps, and may not be ready for some years, manufacturers and others are optimistic about both LED fixtures and bulbs. Four of the 11 manufacturers interviewed reported that LED fixture products are currently being developed to address the issue of consumers trying to fit LEDs into incompatible sockets, and felt that the technology will experience significant gains as these products become available in the marketplace.

Given that in the near-term, LED fixtures look more promising than general purpose LED bulbs, the technology may have the most impact on new construction for some time to come. New construction seems unlikely to be a major driver to distribute the technology, however, given the status of the new construction market in NY and elsewhere.

The research suggests several roles that NYSERDA could play to increase the likelihood of LED fixtures being installed in lieu of medium screw-base fixtures. These are described in the recommendations below.

#### **6.1.7.1 Recommendations**

16. Consider exploring the following opportunities to support market acceptance and availability of LED fixtures and bulbs:
  - Work with other organizations to develop national requirements for LED performance and reliability. This could include, but may not be limited to, DOE, EPA and CEE.
  - Work with other organizations to develop ways to explain to consumers differences in performance between LED and incandescent lamps that may not show up on the Lighting Facts labels.
  - Support research to improve LED lighting technology.

- Use findings from research to identify what consumers value in lighting, and work to determine how best to communicate this value with regard to LED lighting or other emerging high-efficiency lighting technologies. Conduct additional research as necessary to this end.
  - Provide training in LED lighting as appropriate for retail sales staff.
  - Provide retailers with point of sales material for LED lighting. Since homeowners learn about LED fixtures primarily from store displays and installers, a focus on encouraging or supporting retailers to develop LED fixture displays also seems appropriate.
  - Provide mid-stream or down-stream incentives for LED lighting.
17. Supporting or encouraging the use of lighting displays and demonstrations by retailers is also discussed elsewhere in these Conclusions. Any efforts to support or encourage the use of lighting displays by retailers should take into consideration and prioritize the multiple goals that could be served through this approach.