# RLPNC 1715 Shelf Stocking Study

FINAL

July 6, 2018

SUBMITTED TO:
Massachusetts Electric Program Administrators and Energy Efficiency Advisory Council Consultants

SUBMITTED BY:
NMR Group, Inc.

NMR Group, Inc.

# Table of Contents

**EXECUTIVE SUMMARY** ..... **V**
OBJECTIVES ..... V
METHODOLOGY ..... V
OVERALL ASSESSMENT ..... VI
KEY FINDINGS ..... VI
Stocking and Display ..... VI
Product Pricing ..... VIII
EISA Coverage and Exemptions ..... X
GUIDANCE FOR FUTURE STUDIES ..... XI
**INTRODUCTION** ..... **1**
1.1 OVERVIEW ..... 1
1.2 OBJECTIVES ..... 1
1.3 METHODOLOGY ..... 2
1.4 SAMPLE DESCRIPTION AND WEIGHTING ..... 3
**STOCKING AND DISPLAY** ..... **5**
2.1 PROGRAM-INCENTIVIZED LAMPS ..... 5
2.2 LINEAR LAMPS ..... 5
2.3 NON-LINEAR LAMPS ..... 6
**PRODUCT PRICING** ..... **12**
3.1 PRICE BY LAMP SHAPE ..... 14
3.2 PRICE BY ENERGY STAR STATUS ..... 15
3.3 PRICE BY DISPLAY LOCATION ..... 17
**EISA COVERAGE AND EXEMPTIONS** ..... **19**
4.1 EISA BACKGROUND ..... 19
4.1.1 Current Status ..... 19
4.1.2 Uncertainty ..... 20
4.1.3 Categorizing Lamps ..... 20
4.2 EISA SHELF-STOCKING ANALYSIS ..... 21
**APPENDIX A DATA TABLES** ..... **1**
**APPENDIX B EISA FLOW CHARTS** ..... **1**

# Figures

**FIGURE 1: STATEWIDE SHELF SHARE BY NON-LINEAR LAMP TYPE** ..... **VI**

FIGURE 2: SHELF SHARE BY LAMP SHAPE ..... VII
FIGURE 3: SHELF SHARE BY EFFICIENCY AND CHANNEL ..... VII
FIGURE 4: PERCENT OF LAMPS IN PRICE RANGE BY LAMP TYPE ..... VIII
FIGURE 5: EISA EXEMPTION STATUS BY LAMP TYPE ..... XI
FIGURE 6: PROGRAM AND ENERGY STAR NON-LINEAR LAMP SHELF SHARE IN 2017 ..... 5
FIGURE 7: STATEWIDE SHELF SHARE BY NON-LINEAR LAMP TYPE 2010–2017 ..... 6
FIGURE 8: STATEWIDE SHELF SHARE OF NON-LINEAR LAMPS BY SHELF LOCATION ..... 7
FIGURE 9: SHELF SHARE BY EFFICIENCY AND CHANNEL ..... 8
FIGURE 10: SHELF SHARE BY NON-LINEAR LAMP TYPE AND CHANNEL ..... 9
FIGURE 11: SHELF SHARE BY CHANNEL AND LAMP SHAPE ..... 10
FIGURE 12: INEFFICIENT LAMP SHELF SHARE BY LUMENS ..... 11
FIGURE 13: COMPARING SHELF SHARE TO SALES BY CHANNEL† ..... 11
FIGURE 14: PERCENT OF LAMPS IN PRICE RANGE BY LAMP TYPE ..... 13
FIGURE 15: EISA EXEMPTION STATUS BY LAMP TYPE ..... 22
FIGURE 16: EISA EXEMPTION STATUS BY CHANNEL FOR INEFFICIENT LAMPS ..... 22
FIGURE 17: EISA EXEMPT LAMPS: REASONS FOR EXEMPTION ..... 24
FIGURE 18: EISA PHASE I COVERAGE AND COMPLIANCE FLOW CHART ..... B-1
FIGURE 19: EISA PHASE II COVERAGE AND COMPLIANCE FLOW CHART ..... B-2

# Tables

TABLE 1: AVERAGE AND MEDIAN UNIT PRICE BY ENERGY STAR LEDS ..... IX
TABLE 2: AVERAGE UNIT PRICE OF PROGRAM-INCENTIVIZED ENERGY STAR LEDS..... IX
TABLE 3: AVERAGE UNIT PRICE BY DISPLAY LOCATION AND LAMP TYPE ..... X
TABLE 4: SAMPLED STORES .....3
TABLE 5: SAMPLED NON-LINEAR BULBS .....3
TABLE 6: CHANNEL WEIGHTING .....4
TABLE 7: LINEAR LAMP SHELF SHARE BY CHANNEL .....6
TABLE 8: AVERAGE AND MEDIAN UNIT PRICE BY LAMP TYPE .....12
TABLE 9: AVERAGE AND MEDIAN PRICE BY LAMP TYPE, A-LINE LAMPS .....14
TABLE 10: AVERAGE AND MEDIAN PRICE BY LAMP TYPE, REFLECTOR SHAPES .....14
TABLE 11: AVERAGE UNIT PRICE BY LAMP TYPE AND LAMP SHAPE.....15
TABLE 12: AVERAGE AND MEDIAN UNIT PRICE BY ENERGY STAR LEDS.....16
TABLE 13: AVERAGE UNIT PRICE & AVAILABILITY OF ENERGY STAR LAMPS BY CHANNEL .....17
TABLE 14: AVERAGE OBSERVED UNIT PRICE BY DISPLAY LOCATION & LAMP TYPE† .....18
TABLE 15: AVERAGE UNIT PRICE BY DISPLAY LOCATION AND LAMP TYPE .....18
TABLE 16: EISA EXEMPTIONS .....21
TABLE 17: EISA PHASE I AND PHASE II EXEMPT LAMPS BY CHANNEL & LAMP TYPE.....23
TABLE A-1: STATEWIDE SHELF SHARE BY NON-LINEAR LAMP TYPE.....A-1
TABLE A-6: PROGRAM AND ENERGY STAR NON-LINEAR LAMP SHELF SHARE IN 2017.....A-1
TABLE A-7: STATEWIDE SHELF SHARE BY NON-LINEAR LAMP TYPE 2010–2017 .....A-1
TABLE A-8: STATEWIDE SHELF SHARE OF NON-LINEAR LAMPS BY SHELF LOCATION.....A-2
TABLE A-9: SHELF SHARE BY NON-LINEAR LAMP TYPE AND CHANNEL .....A-3
TABLE A-10: INEFFICIENT LAMP SHELF SHARE BY LUMENS .....A-4
TABLE A-11: SHELF SHARE BY CHANNEL AND LAMP SHAPE .....A-4
TABLE A-12: COMPARING SHELF SHARE TO SALES BY CHANNEL.....A-5
TABLE A-13: PERCENT OF LAMPS IN PRICE RANGE BY LAMP TYPE .....A-6
TABLE A-14: EISA EXEMPTION STATUS BY LAMP TYPE.....A-6
TABLE A-15: EISA EXEMPTION STATUS BY CHANNEL.....A-6
TABLE A-16: EISA EXEMPT LAMPS: REASONS FOR EXEMPTION.....A-7

# Executive Summary

On behalf of the Massachusetts ENERGY STAR® Lighting program administrators (PAs), Lockheed Martin conducted a shelf-stocking and price survey to evaluate the impact of the Mass Save® residential lighting program on consumer retail lighting in Massachusetts. Lockheed Martin conducted all the shelf-stocking visits and prepared an analysis of the results.[1] At the request of the PAs, NMR Group, Inc. (NMR) provided support for the study by reviewing data collection protocols, reviewing data, and preparing a separate analysis of selected data.

It is important to note that this study differs from the previous shelf stocking study conducted in 2016 (RLPNC 16-6 Shelf Stocking) in that this study focused exclusively on participating store locations in Massachusetts and does not include any data collection or analysis of data from a comparison area (non-program locations in portions of Upstate New York).

## OBJECTIVES

The objectives of this study were to assess the following indicators at participating Massachusetts retailers:

- The amount of shelf area dedicated to LEDs, CFLs, halogens, and incandescent lamps in Massachusetts
- The amount of shelf area dedicated to linear LEDs and linear fluorescent lamps
- The pricing, number of lamps per package, and shelf locations of LED, CFL, halogen, and incandescent lamps in Massachusetts
- The differences in pricing and availability of LED ENERGY STAR vs. Non-ENERGY STAR products in Massachusetts
- The current stock of lamps to determine coverage by the Energy and Independence Security Act of 2007 Phase I and Phase II

NMR also compared the results of the current survey with those of similar Massachusetts surveys that were conducted either separately by the evaluation team or in conjunction with Lockheed Martin in 2010, 2012, 2013, and 2016. When examining results for shelf space, it is important to remember that we are observing products *available* for sale – it does not reflect actual market-level lighting sales.

## METHODOLOGY

Lockheed Martin completed site visits at participating stores between October and November of 2017, and delivered data to NMR in January 2018. NMR calculated shelf share for each lamp technology and channel in the same manner as defined in the previous report (RLPNC16-6). To understand the market for linear LEDs (TLEDs), linear lamps were added to the in-store data collection protocols in 2017; these lamps were not included in past efforts.

[1] Lockheed Martin Energy, *2017 ENERGY STAR Lighting Practices Report*, March 2018.

Shelf area and pricing for linear lamps are presented separately from screw-base lamps. EISA Phase I and Phase II coverage, exemptions, and compliance were determined according to the flow chart diagrams seen in Appendix B. We weighted the data by store channel. Thus, tables and figures in this report that show results broken down by channel are unweighted, while tables and figures that show results where channels are combined are weighted, unless otherwise noted. Additional methodological details can be found in Section 1.3.

## Overall Assessment

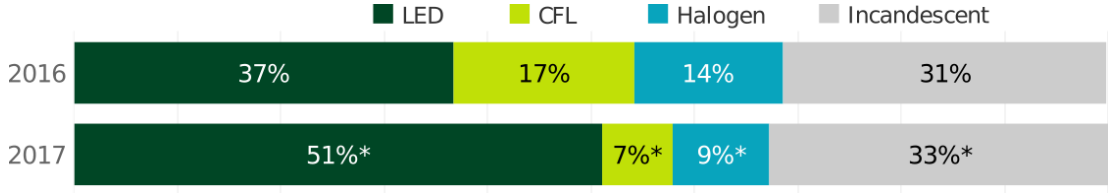
When compared to 2016 data, the current data show an increase in the shelf share of LEDs and a decrease in the average unit price of LEDs – especially for ENERGY STAR.

## Key Findings

### Stocking and Display

Based on a comparison of 2016 and 2017 shelf area, it appears that CFL and halogen lamps are being squeezed out by LEDs and incandescents; however, the remaining incandescent lamps are predominantly low-wattage and frequently exempt from EISA. Interestingly, while LED share increased substantially between 2016 and 2017 (14%), when combined with decreases in CFL shelf share, the shelf share of energy-efficient lamps only increased by four percentage points. Note that shelf share does not reflect sales, but it does represent the ratio and variety of options presented to consumers. In addition, since the Massachusetts samples (in both 2016 and 2017) include only participating retail locations, the shelf shares presented reflect the impact of the upstream program.

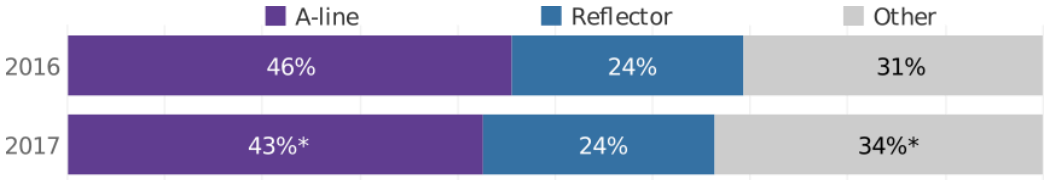
**Figure 1: Statewide Shelf Share by Non-Linear Lamp Type**




* Significantly different from 2016 at the 90% confidence level.

As one might expect, the relative mix of lamp shapes offered on store shelves is fairly consistent from year to year. Although there appears to be a small but significant shift from A-line to Other (non-reflector) lamp shapes, Figure 11 (in the body of the report) indicates that this is largely an artifact of channel weighting and the large number of lamps sampled.

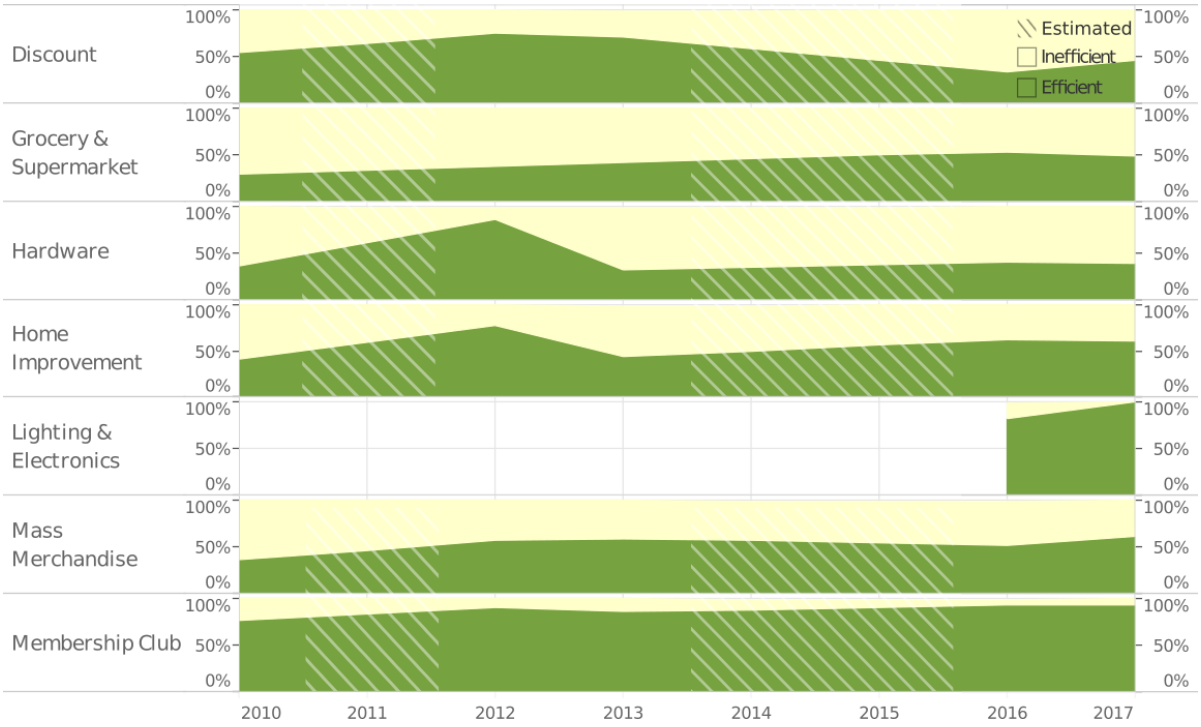
**Figure 2: Shelf Share by Lamp Shape**




* Significantly different from 2016 at the 90% confidence level.

Examining results by retail channel reveals interesting stocking patterns. As Figure 3 shows, efficient lamp shelf share stagnated or only increased slightly across all channels in 2017; however, this trend is due to significant increases in LED shelf share in most channels offset by declining CFL shelf share. See Figure 10 for a more detailed version of this graph with shelf share by lamp type. Again, it is important to note that all stores visited participated in the program. The graph reflects the influence of the program and that in the absence of the program, inefficient shelf share might be higher – especially in some channels that showed more modest gains in LED shelf share. No studies were conducted in 2011, 2014, or 2015; these years are shown with estimated data in Figure 3, as indicated by the striped overlay. Additional details can be found in the Stocking and Display section.

**Figure 3: Shelf Share by Efficiency and Channel**

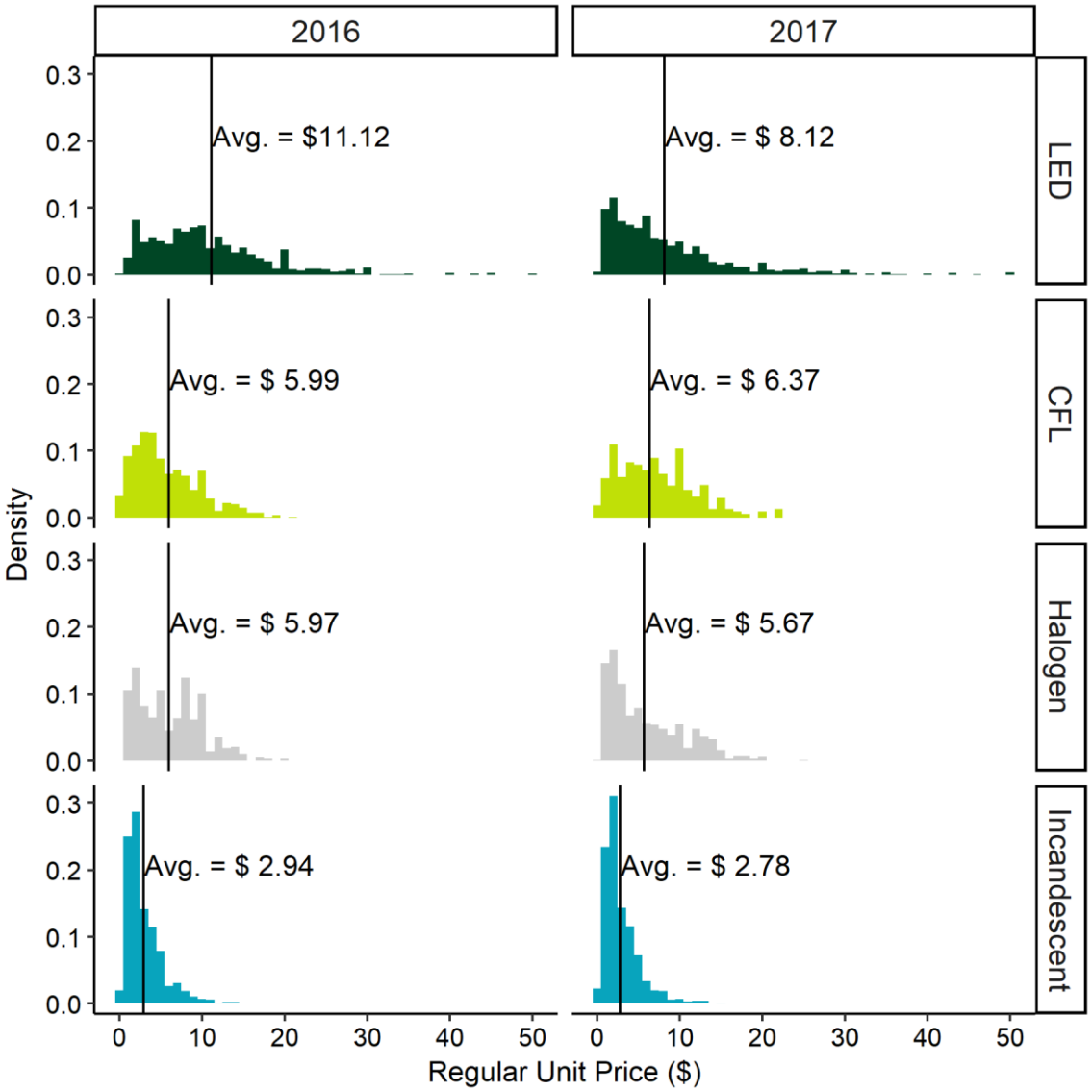


## Product Pricing

The average unit price of LED lamps in Massachusetts, including program incentives, decreased by $3.56 between 2016 and 2017; this is the most dramatic shift in price observed for all lamp technologies. The average unit price of incandescent and halogen lamps also decreased in this period, but only by $0.16 and $0.30, respectively.

In addition to significant changes in average unit price among all lamp technologies, the distribution of unit prices also varied between 2016 and 2017. A larger proportion of LED lamps fell into the $0–$2 range, the $2–$4 range, and the $4–$6 range in 2017 than in 2016, and fewer LED lamps fell into most price categories $8 and higher. As in 2016, LED lamps show the widest range of prices, which may demonstrate this technology's wide array of choices and features available to consumers. Figure 4 shows the distribution of prices by lamp type.

**Figure 4: Percent of Lamps in Price Range by Lamp Type**



The average unit price of LED lamps decreased regardless of bulb shape. The average unit price of A-line lamps, as well as reflectors and most specialty lamp shapes, fell between 2016 and 2017. Other lamp technologies saw changes in average price over this period, but of a smaller magnitude than those observed for LEDs.

The average unit price of ENERGY STAR LEDs fell by $3.68 between 2016 and 2017, while the average unit price of non-ENERGY STAR LEDs fell by $3.17 during the same period (Table 1). On average, ENERGY STAR LEDs were $1.31 cheaper than their non-ENERGY STAR counterparts in 2017. As expected, program-incentivized ENERGY STAR LED lamps in the shelf stocking data were less expensive on average than non-program ENERGY STAR LED lamps in both 2016 and 2017.

**Table 1: Average and Median Unit Price by ENERGY STAR LEDs**

| | Average | | Median | |
|---|---|---|---|---|
| | 2016 | 2017† | 2016 | 2017† |
| *n* | 4,196 | 4,126 | 4,196 | 4,126 |
| ENERGY STAR | $10.73 | $7.05* | $9.49 | $5.49 |
| Program | $6.98‡ | $5.83‡ | $8.51‡ | $5.22‡ |
| Non-Program | $10.39‡ | $7.50‡ | $9.30‡ | $6.98‡ |
| Non-ENERGY STAR | $11.53 | $8.36* | $9.99 | $7.33 |

* Significantly different from 2016 at the 90% confidence level.

† Wireless-enabled lamps were excluded from 2017 calculations. Wireless-enabled lamps represent 3% of LEDs in 2017, and impact the average weighted price of LEDs in 2017 in this table by $0.50 –$2.08. Due to inconsistencies in the 2016 wireless-enabled variable, comparable averages excluding these lamps could not be calculated.

‡ Due to the distribution of lamps among channels, program and non-program average prices were computed using the same methodology as shelf share calculations to diminish the impact of outliers. As a consequence of this and the wide range of channel weights, 2016 average program and on-program ENERGY STAR prices do not bracket the overall ENERGY STAR price.

Program-incentivized LEDs comprise 68% of ENERGY STAR shelf share, and ENERGY STAR lamps account for 65% of LED shelf share statewide (Section 2.1 and Table A-6). Consequently, the program ENERGY STAR prices in Table 1 have a strong influence on the overall price of ENERGY STAR bulbs on the shelves in Massachusetts. Comparing the average pre-rebated prices of program-incentivized bulbs in Table 2 with non-program ENERGY STAR prices in Table 1, the values appear to be similar, differing by less than 5%.[2]

**Table 2: Average Unit Price of Program-Incentivized ENERGY STAR LEDs**

| | Average | | Median | |
|---|---|---|---|---|
| | 2016 | 2017 | 2016 | 2017 |
| Without rebate | $9.52 | $9.15 | $8.00 | $7.68 |
| With rebate | $4.98 | $4.98 | $3.81 | $3.33 |

[2] Post-rebate and prices in Table 2 may not match those for program ENERGY STAR lamps in Table 1 since the former represents all incentivized non-linear lamps sold in the Commonwealth, whereas the latter accounts for the prices of models observed in the shelf-stocking survey. Furthermore, incentives may vary by channel or location.

LED lamps were displayed in a greater variety of locations throughout the store than other lamp technologies, including in glass display cases, at the register, and on special racks. The average unit price of LED lamps found at the register or in a wing stack is very low – under two dollars – representing some of the lowest average prices among any lamp type or display location. Seventy percent of LED lamps displayed on wing stacks and 73% of LED lamps displayed on endcaps were ENERGY STAR in 2017. Additional details can be found in the Product Pricing section.

**Table 3: Average Unit Price by Display Location and Lamp Type**

| | Year | LED | ESTAR |
|---|---|---|---|
| Upper Shelf | 2016 | $11.17 | 32% |
| | 2017 | $7.88*§ | 51% |
| Middle Shelf | 2016 | $11.52 | 43% |
| | 2017 | $7.83*§ | 59% |
| Lower Shelf | 2016 | $13.59 | 46% |
| | 2017 | $8.05*§ | 49% |
| Endcap | 2016 | $6.68 | 62% |
| | 2017 | $4.48§ | 73% |
| Wing Stack† | 2016 | $4.20 | 74% |
| | 2017 | $1.73*§ | 70% |
| Clearance | 2016 | $11.65 | 41% |
| | 2017 | $16.24§ | 47% |
| Other‡ | 2016 | $6.25 | 53% |
| | 2017 | $12.27*§ | 47% |

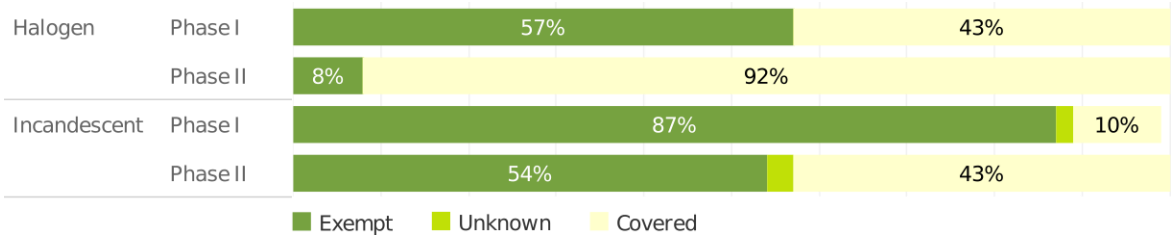
## EISA Coverage and Exemptions

To help understand the potential impact that EISA Phase I standards have had on the marketplace already, and to understand the impact the Phase II standards may have in the future, we categorized incandescent and halogen lamps as exempt or covered by EISA standards in Phase I or Phase II. This analysis was limited to the 2017 shelf-stocking data as the 2016 data did not include sufficient detail to fully categorize lamps.

Since EISA Phase II stands to close loopholes present in Phase I, it is not surprising that a larger proportion of lamps on shelves are covered under these standards.[3] Almost nine out of ten incandescent lamps are exempt according to Phase I, whereas a little over one-half are exempt under Phase II (Figure 5).

[3] Federal Register. U.S. Energy Conservation Program: Energy Conservation Standards for General Service Lamps. 82 FR 7276; 82 FR 7322.

**Figure 5: EISA Exemption Status by Lamp Type**




Looking at results by retail channel, it appears that Phase II will have a large impact on Hardware stores' inventories. Almost nine out of ten lamps sold in Hardware stores were exempt according to Phase I standards, whereas less than one-half of lamps sold in Hardware stores were exempt according to Phase II. Over one-half of all EISA-exempt incandescent lamps, according to both Phase I and Phase II standards, were found in Hardware stores, along with 65% of Phase I-exempt and 78% of Phase II-exempt halogen bulbs. Additional details on this analysis can be found in the EISA Coverage and Exemptions section.

## GUIDANCE FOR FUTURE STUDIES

In this sub-section, NMR offers guidance for future program and study planning based on the findings discussed in this report.

**Guidance 1:** The PAs should consider monitoring prices by channel in a comparison area (such as New York) to verify program impact on prices in Massachusetts. The program currently engages in web scraping to monitor changes in LED prices in Home Improvement stores over time, but could be extended to include other channels, such as Electronic, Hardware, and Mass Merchandise stores.

> *Rationale: Web scraping is a cost-effective option for monitoring price trends over time, including outside of program areas. Data collected through this method could enhance the shelf-stocking research. For example, web-scraping data can identify emerging trends that may be valuable to document in the field. Web-scraping results can also identify broader market trends by tracking a larger variety of retailers, including online outlets. Note that this research method may not be viable for some channels, and would be useful to supplement, not supplant, the shelf-stocking study.*

**Guidance 2:** Improve control of sub-channel sampling of store mix.

> *Rationale*: *The shelf-stocking study could be improved by including a consistent mix of retailers across studies. For example, there were no groceries (independent stores) in 2017, only chain supermarkets and convenience stores. As a result, we combined Grocery & Supermarket into one channel. Some differences arising between 2016 and 2017 findings in this channel may be affected by this disparity in sampling.*

**Guidance 3:** Changes in LED prices observed as part of the shelf-stocking visits indicate that the PAs should continue to monitor price trends in Massachusetts, as well as in areas where lighting programs are not offered.

*Rationale: The recent shelf-stocking study revealed a substantial drop in average price for LEDs between 2016 and 2017. The study also found that the decline in the average unit price for ENERGY STAR LEDS was much higher than non-ENERGY STAR LEDs ($2.70 versus $1.58), which also corresponds with new ENERGY STAR specifications that were phased in during late 2016. Furthermore, program-incentivized ENERGY STAR LED lamps in the shelf stocking data were less expensive on average than non-program ENERGY STAR LED lamps in both 2016 and 2017. These findings highlight the importance of the program's role in reducing the average price of ENERGY STAR LEDs beyond baseline average unit price reductions among all LEDs due to other market forces. Monitoring prices in a comparison area by channel will help to verify the effect of program incentives on LED prices in Massachusetts.*

# 1 Introduction

On behalf of the Massachusetts ENERGY STAR® Lighting program administrators (PAs), Lockheed Martin conducted a shelf-stocking and price survey to evaluate the impact of the Mass Save® residential lighting program on consumer retail lighting in Massachusetts. Lockheed Martin conducted all the shelf-stocking visits and prepared an analysis of the results. At the request of the PAs, NMR Group, Inc. (NMR) provided support for the study by reviewing data collection protocols, reviewing data, and preparing a separate analysis of selected data.

## 1.1 Overview

Lockheed Martin completed site visits between October and November of 2017, and delivered data to NMR in January 2018. The team inventoried 93,895 LED, CFL, incandescent, and halogen packages, for a total of 225,547 bulbs, representing 10,480 models of linear and non-linear lamps.

## 1.2 Objectives

The objectives of this study were to assess the following indicators:

- The amount of shelf area dedicated to LEDs, CFLs, halogens, and incandescent lamps in Massachusetts
- The amount of shelf area dedicated to linear LEDs and linear fluorescent lamps
- The pricing, number of lamps per package, and shelf locations of LED, CFL, halogen, and incandescent lamps in Massachusetts
- The differences in pricing and availability of LED ENERGY STAR vs. Non-ENERGY STAR products in Massachusetts
- The current stock of lamps to determine coverage by the Energy and Independence Security Act of 2007 Phase I and Phase II

NMR also compared the results of the current survey with those of similar Massachusetts surveys that were conducted either separately by the evaluation team or in conjunction with Lockheed Martin in 2010, 2012, 2013, and 2016. It is important to note that this study differs from the previous shelf stocking study conducted in 2016 (RLPNC 16-6 Shelf Stocking) in that this study focuses exclusively on Massachusetts and does not include any data collection or analysis of data from a comparison area (portions of Upstate New York).

## 1.3 METHODOLOGY

NMR calculated shelf share for each lamp technology and channel in the same manner as defined in the previous report (RLPNC16-6); discussed in Section 1.4.We counted each distinct location (shelf, end-cap, etc.) where a customer might encounter a particular product (make and model) as a unique lamp. For example, the four models in the list below would be counted as six items.

- FluoroBright PAR38, Lower Shelf
- GreinTek Q2718, End-Cap
- GreinTek Q2718, Middle Shelf
- Wolframite A19-60W, Register
- Wolframite A19-60W, Upper Shelf
- Zerp Corp E89B12D3, Clearance

We determined the average fraction of lamp stock for each technology across all stores in a channel. By contrast, a product volume-based metric ($ft^3$) was used prior to 2016; however, this was shown to have a high correlation with the current system in the previous report (RLPNC16-6 Shelf Stocking). Finally, we calculated proxy data for years without studies during the product-volume era by linear interpolation from existing reports.

In addition to program sales data for 2016 and 2017, we compiled sales data furnished by InfoScout, as part of the RLPNC 17-12 Decision Making Study for comparison to shelf share. Sales data were not used in weighting, and shelf share is not meant to reflect sales but instead provide a snapshot of available stock. InfoScout is a private market research company that has a nationwide panel of mobile device users who upload their receipts from retail and restaurant shopping trips in exchange for various rewards. They have three apps that are similar in purpose, but differ in design and reward structure to target different populations and create a demographically representative panel. InfoScout uses character recognition software to extract the text from submitted receipts and provides tailored analysis of this data, as well as the opportunity to survey targeted panelists via their mobile devices.

We established EISA Phase I and Phase II coverage, exemptions, and compliance according to the flow chart diagrams seen in Appendix B. When determining EISA coverage, we considered wattage and lumen values; life hours; specialty features, including base type, three-way, rough service, and modified spectrum status; and lamp shape, including the diameter of globe lamps and the length of T-shaped lamps. Specialty features, apart from three-way and rough service, were not individually named in our data, but rather a note was made indicating whether any specialty features in general were present for a given observation (in other words, specialty features was coded as a binary variable). Lumen or wattage values were sometimes unavailable. In the case of missing lumen values for inefficient lamps, we used wattage as a proxy[4] and categorized any lamps with a wattage between 0–40 watts (Phase I and Phase II) or above 100 watts (Phase I) as exempt.

[4] After determining that for all sampled bulbs with known lumens and wattage, the lumen range matched the corresponding nominal wattage specified by EISA.

## 1.4 Sample Description and Weighting

Three of the 100 sampled stores in 2017 only sold light fixtures (LED desk lamps), and we therefore excluded them from further analysis. Table 4 shows the number of stores in the study sample by retail channel. Lighting and Electronics stores were not sampled separately before 2016. The 2017 store sample did not contain small grocery stores, only supermarkets; for this reason, we combined Grocery & Supermarket into one channel. Some differences arising between 2016 and 2017 findings in this channel may be affected by this disparity in sampling. However, the classification of *Grocery* and *Supermarket* stores is an internal classification and may not be significant if the program does not treat these stores differently. In addition, we only labeled seven out of 21 stores as *Grocery* in 2016.

**Table 4: Sampled Stores**

| Channel | 2010 | 2012 | 2013 | 2016 | 2017 |
|---|---|---|---|---|---|
| Discount Store | 8 | 19 | 9 | 14 | 16 |
| Grocery & Supermarket | 11 | 9 | 12 | 21 | 21 |
| Hardware Store | 12 | 12 | 30 | 31 | 31 |
| Home Improvement | 3 | 16 | 15 | 10 | 4 |
| Lighting & Electronics | 0 | 0 | 0 | 8 | 7 |
| Mass Merchandise | 11 | 9 | 13 | 14 | 11 |
| Membership Club | 2 | 5 | 4 | 2 | 7 |
| **TOTAL** | **54** | **70** | **99** | **100** | **97** |

Table 5 shows all non-linear lamp occurrences in the sample stores, and serves as a proxy of the number of stocked models.[5] Many were present in both years, but our analysis also revealed the introduction of new models and overall reduction in stocked models between 2016 and 2017.

**Table 5: Sampled Non-Linear Bulbs**

| Channel | 2010 | 2012 | 2013 | 2016 | 2017 |
|---|---|---|---|---|---|
| Discount Store | N/A | 17,775 | 6,521 | 273 | 273 |
| Grocery & Supermarket | N/A | 5,054 | 5,699 | 1,573 | 1,595 |
| Hardware Store | N/A | 11,281 | 21,184 | 4,837 | 4,301 |
| Home Improvement | N/A | 55,710 | 59,653 | 2,818 | 1,466 |
| Lighting & Electronics | N/A | 0 | 0 | 140 | 95 |
| Mass Merchandise | N/A | 8,998 | 14,422 | 1,824 | 2,005 |
| Membership Club | N/A | 2,450 | | 27 | 92 |
| **TOTAL** | **N/A** | **101,268** | **107,749** | **11,493** | **9,827** |

[5] The average number of occurrences for a bulb model in a store varies across channels, from 1 to 2.97 in 2017, with a median of 1.82; occurrences varied from 1 to 1.63 in 2016, with a median of 1.25.

For simplicity, this report assumes the same relative distribution of stores per channel as the previous study for weighting of statewide results, which are given in Table 6. However, we performed most of the analysis on an unweighted, per-channel basis. All tables and figures that show results where all channels are combined are weighted unless otherwise noted. Note that in the previous report, the 2016 data were adjusted to account for differences in data collection methodology between New York and Massachusetts. To facilitate comparisons between 2016 and 2017, we recalculated the results for 2016 without this New York methodological correction factor.

**Table 6: Channel Weighting**

| Channel | N | Weights | |
|---|---|---|---|
| | | 2016 | 2017 |
| Discount Store | 1,655 | 118.21 | 103.44 |
| Grocery & Supermarket | 2,515 | 119.76 | 119.76 |
| Hardware Store | 1,064 | 34.32 | 34.32 |
| Home Improvement | 241 | 24.10 | 60.25 |
| Lighting & Electronics | 334 | 41.75 | 47.71 |
| Mass Merchandise | 494 | 35.29 | 44.91 |
| Membership Club | 107 | 53.50 | 15.29 |

# 2 Stocking and Display

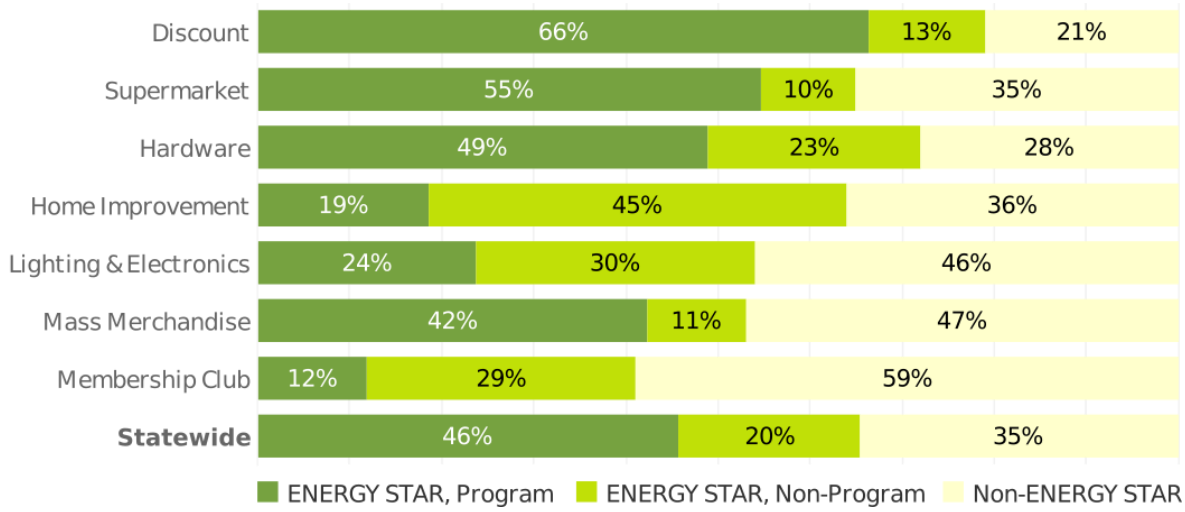
This section explores the prevalence of available lighting technologies in different channels and locations within stores.

Data tables for each figure are included in Appendix A. Click or control-click on a figure to jump to the corresponding detailed table; do the same on a table title in the appendix to return to the original figure.

## 2.1 Program-Incentivized Lamps

Figure 6 shows the ENERGY STAR and program-penetration levels of non-linear LEDs on store shelves, determined by combining shelf stocking data with program rebate records. The program's emphasis on promoting lamps in select channels can be seen in the dominance of program bulbs in Discount, Hardware, and Grocery stores. Take particular note of the contrast between Hardware and Home Improvement stores.

**Figure 6: Program and ENERGY STAR Non-Linear Lamp Shelf Share in 2017**




## 2.2 Linear Lamps

Traditionally, fluorescent lamps have been the only technology available for linear tube applications; therefore, this segment was excluded from previous studies. With the recent advent of TLED replacement bulbs, this study conducted the first assessment of linear lamp shelf stocking. Table 7 reveals that, much as one would expect, these lamps are present in only a few channels (according to the shelf-stocking data), and that fluorescent tubes are still the most common technology stocked.

**Table 7: Linear Lamp Shelf Share by Channel**

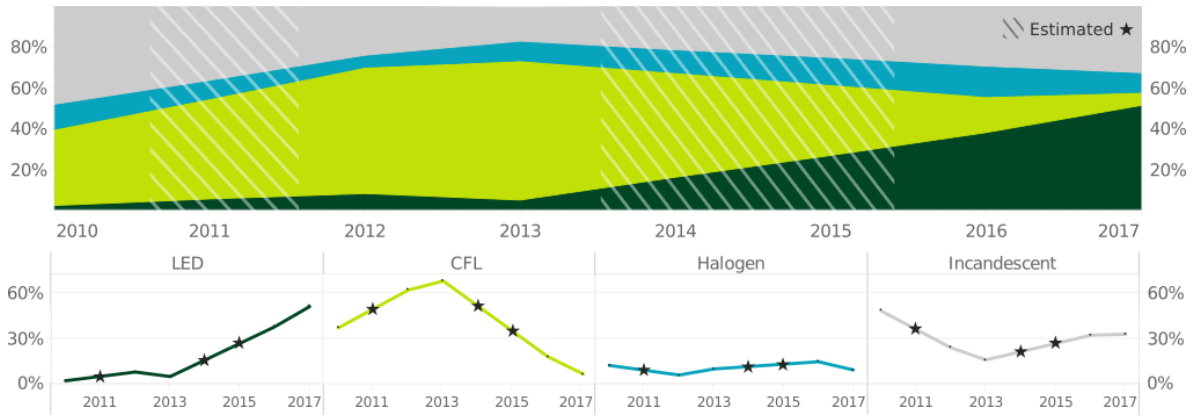
| Channel | *n* | LED | Fluorescent |
|---|---|---|---|
| Discount | 1 | 0% | 100% |
| Hardware | 378 | 11% | 89% |
| Home Improvement | 193 | 17% | 83% |
| Mass Merchandise | 81 | 4% | 96% |

## 2.3 NON-LINEAR LAMPS

Overall, growth of LEDs has been at the expense of CFLs rather than inefficient lighting options, as seen in Figure 7. Shelf share of efficient lamps tapered between 2013 and 2016, but has increased in the last year, principally displacing halogens, but not yet reaching the 2013 peak. The PAs discontinued program support for CFLs beginning on January 1, 2017. Additionally, updates to ENERGY STAR mean that few CFLs meet ENERGY STAR standards. These policy changes likely contributed to the continued decline observed in the share of CFLs stocked among retailers in Massachusetts.

Note that no studies were conducted in 2011, 2014, or 2015; these years are shown with estimated data in Figure 7 and Figure 10, as indicated by the striped overlay/starred data points.

**Figure 7: Statewide Shelf Share by Non-Linear Lamp Type 2010–2017**

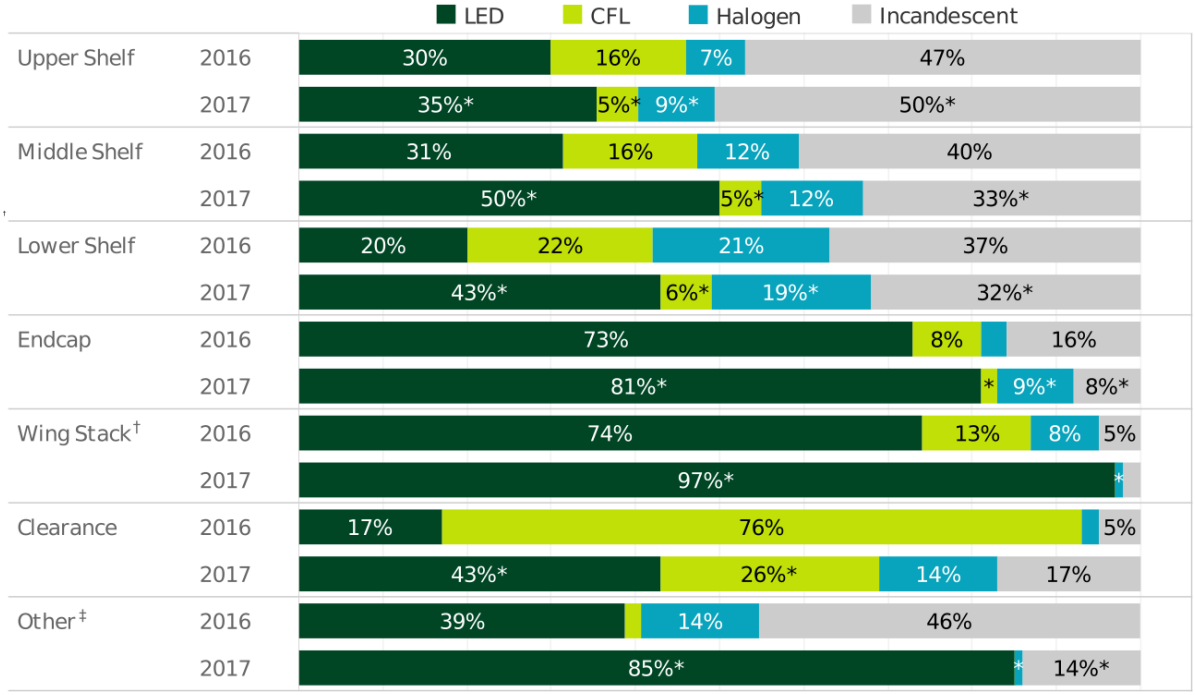



We expect the display location of a product to influence its popularity; products displayed in more locations or more prominent locations should sell more than products in fewer or less visible locations. A product on a middle shelf is in the line of sight for more customers and does not require them to reach or bend.[6] Retailers use endcap, shipper (a free-standing floor display, usually on the shipping pallet), wing stack (another type of free-standing display), and register displays to highlight products to customers who may not visit the main product display shelf, or to give customers a second chance to pick up an item after leaving the main display.

[6] As part of the RLPNC 16-6 Shelf Stocking Study, NMR measured shelf heights in New York and found that a lower shelf was 3 ft. high or lower, a middle shelf was 3-5 ft., and an upper shelf was 5 ft. or higher.

Figure 8 shows a marked increase in the presence of LEDs on store shelves between 2016 and 2017, as well as in lower volume locations, such as clearance displays and wing stacks/shippers. In fact, there were statistically significant changes across all locations for LEDs, and all locations except Other (in which they were a negligible fraction both years) for CFLs.

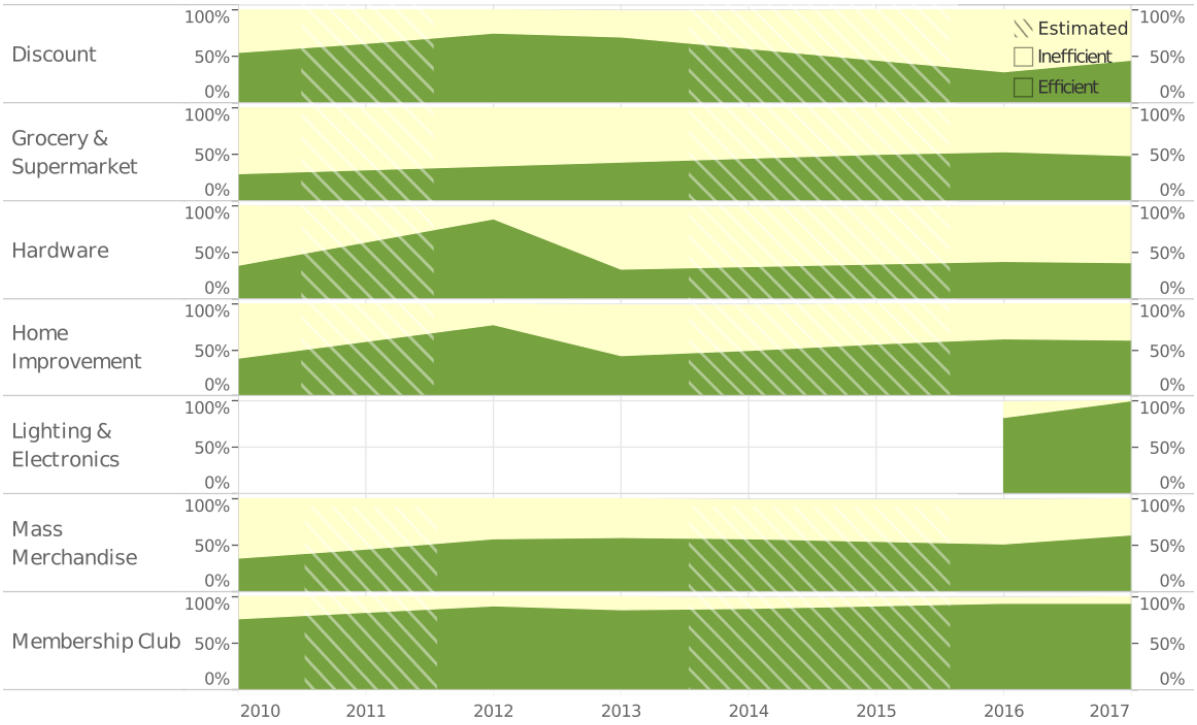
**Figure 8: Statewide Shelf Share of Non-Linear Lamps by Shelf Location**




* Statistically significant from 2016 at the 90% confidence level.
† Includes *Shipper* location.
‡ Includes *Register*, *Glass Display Case*, and *Rack* locations.

As shown in Figure 9, shelf share occupied by efficient lamp technologies appears to have stagnated in many channels in 2017. This is largely due to increases in LED shelf share being offset by decreases in CFL shelf share. Again, it is important to note that all stores included in the sample were program partners.

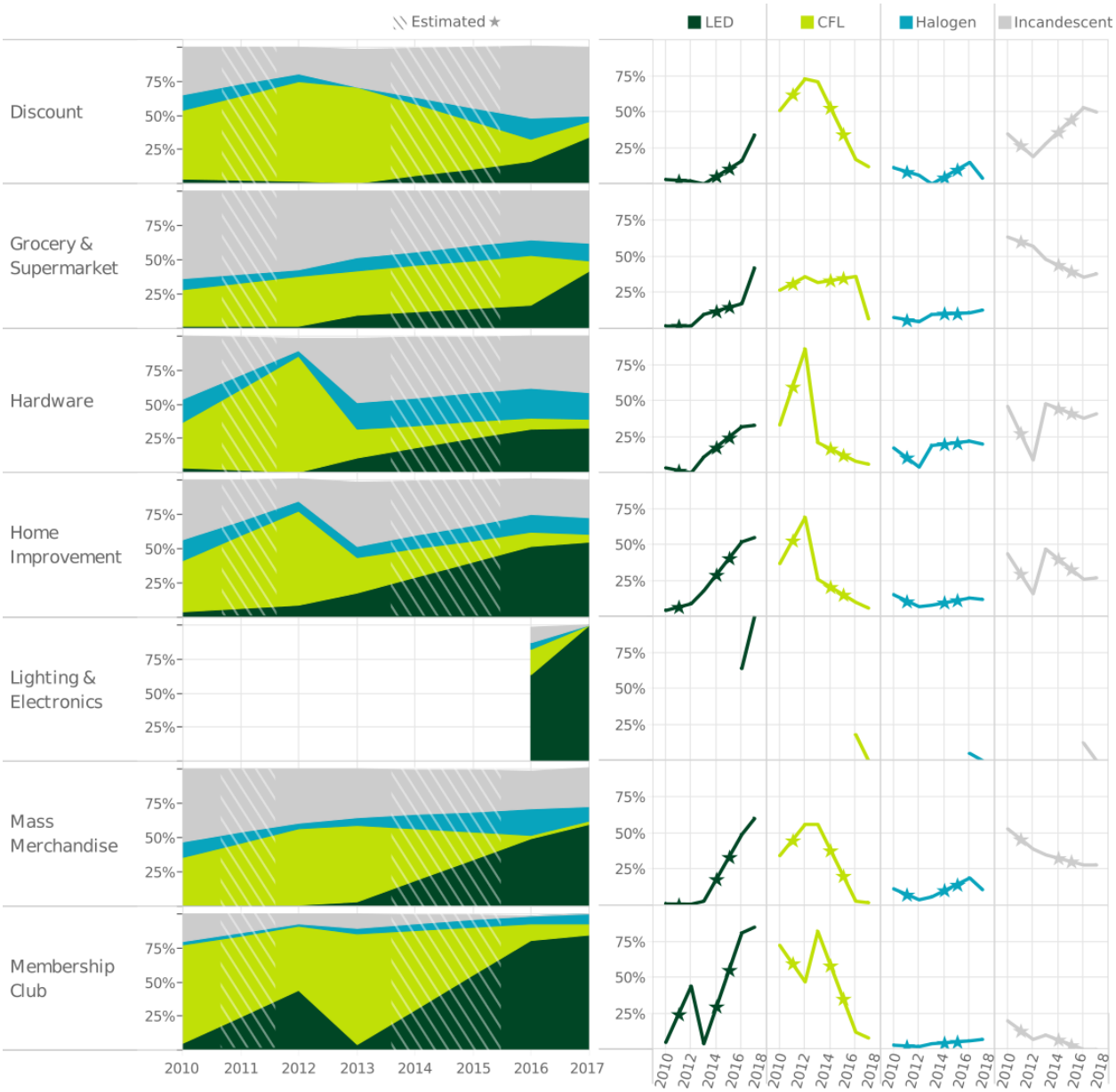
## Figure 9: Shelf Share by Efficiency and Channel




As shown in Figure 10, LED shelf share increased in most channels, while the share of CFLs decreased. However, while the trend in LED shelf share has increased overall, the proportion of shelf space occupied by LEDs was not equal among all retail channels. In addition, even as the availability of LEDs ticked upwards, incandescent bulbs continued as the dominant lamp type available in Discount and Hardware stores. The continued gains in LED shelf share reflect program influence, but the continued persistence of inefficient lamps in Hardware and Discount stores suggest room for continued improvement.

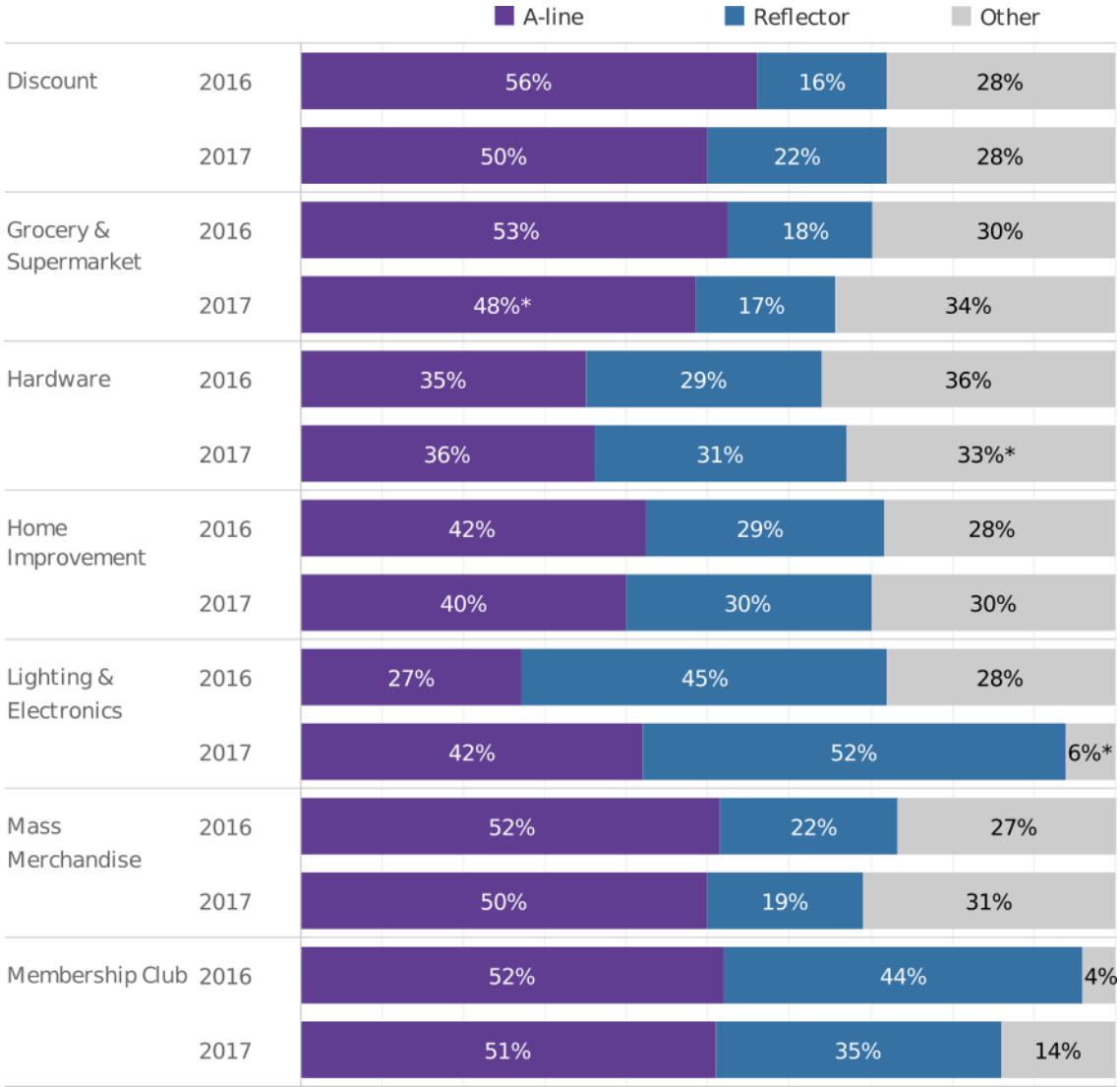
Of particular note, the shelf share of LEDs increased significantly across all channels in 2017, except for Membership Clubs, where LEDs already held 81% of the market in 2016. In addition, between 2016 and 2017, there was a large and statistically significant decrease of halogen shelf share in Discount (15% to 4%) stores, and a statically significant increase of incandescents in Hardware stores (38% to 41%). The data also show small but statistically significant decreases in halogen shelf share at Hardware (22% to 20%) and Mass Merchandise stores (19% to 11%).

## Figure 10: Shelf Share by Non-Linear Lamp Type and Channel




The shelf share of lamp shapes within channels is largely unchanged since 2016 and is relatively consistent across channels, with a few exceptions (as shown in Figure 11). Lighting & Electronics stores feature a high proportion of Reflectors, while Membership Clubs stock a small number of specialized lamp shapes. Significant differences in the shelf share of A-line lamps were also observed in Grocery & Supermarkets, and in Other (non-reflector) lamps at both Hardware and Lighting stores.

**Figure 11: Shelf Share by Channel and Lamp Shape**

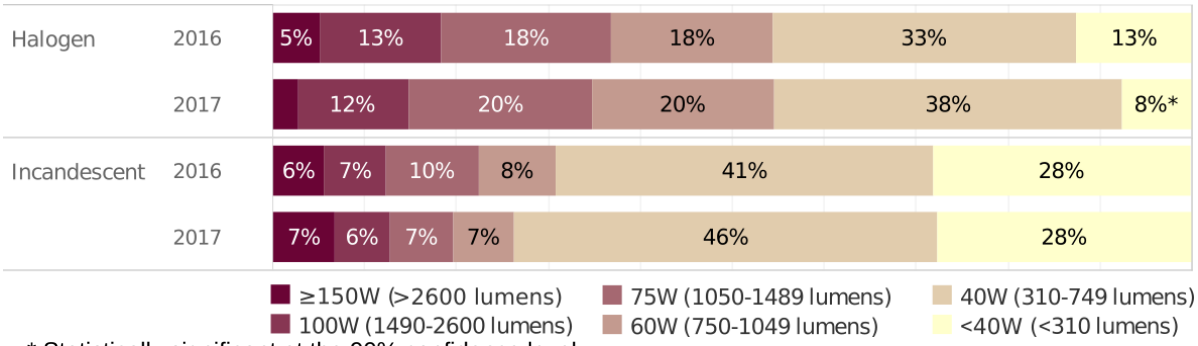



* Significantly different from 2016 at the 90% confidence level.

The proportion of incandescent lighting shelf share in most channels did not change abruptly; however, the characteristics of incandescent lamps available did shift between 2016 and 2017. As shown in Figure 12, the majority of inefficient lamps available are lower-output lamps (less than 750 lumens [<40W]); higher-output lamps (greater than 1049 lumens [≥75W]) appear to be disappearing from the market.[7]

[7] In fact, only seven instances (totaling 18 packages) of high wattage – greater than 2500 lumens (≥150W) – EISA-exempt halogen bulbs were noted in the 2017 shelf-stocking survey, all at Hardware and Home Improvement stores.

## Figure 12: Inefficient Lamp Shelf Share by Lumens

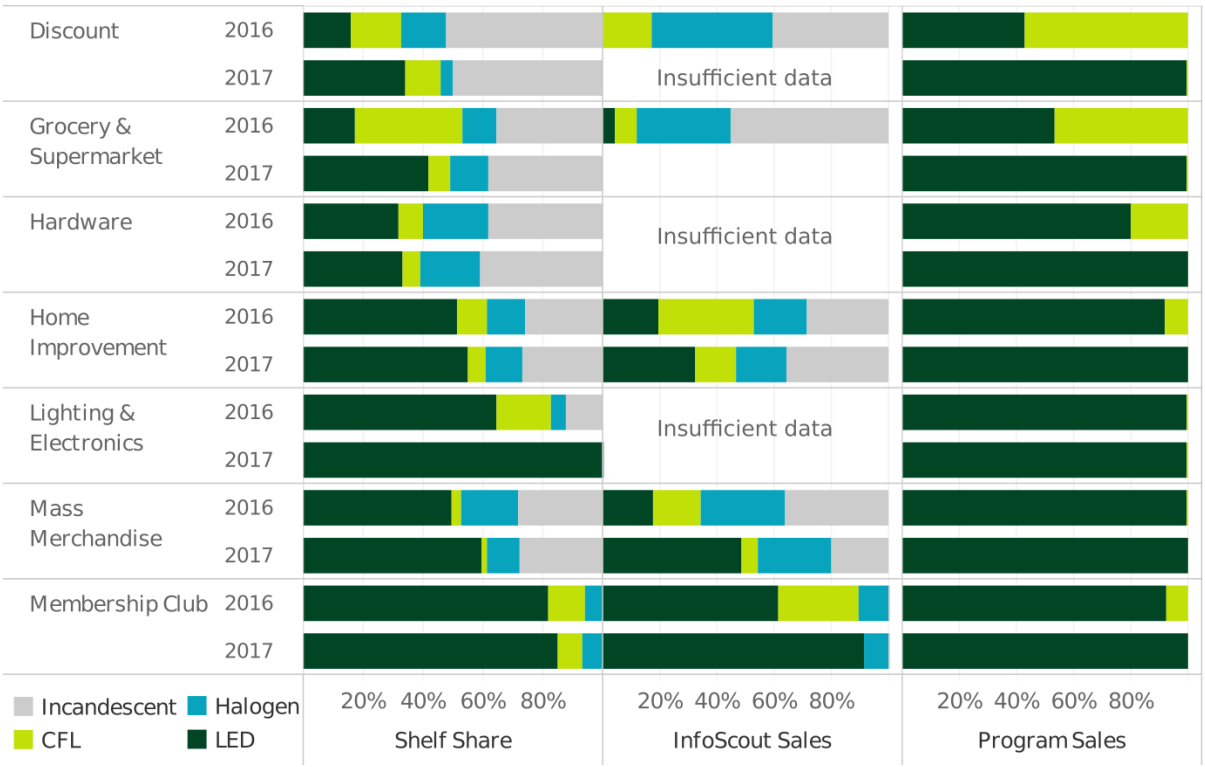



* Statistically significant at the 90% confidence level.

While the shelf share of different lamp technologies varied across channels, the overall proportion of shelf space dedicated to lighting also varied across channels. Shelf space for lamps has increased in Membership Clubs and Mass Merchandise stores since 2016, but decreased in Home Improvement stores and Lighting and Electronics stores.

Figure 13 includes recent shelf share data from Figure 10 and InfoScout sales data. Although there were insufficient data points for some lower-volume channels, several hundred receipts were available for each year in each of the three largest channels: Home Improvement, Mass Merchandise, and Membership Clubs.

## Figure 13: Comparing Shelf Share to Sales by Channel†




† The 2016 data are reweighted from the previous report.

# 3 Product Pricing

Data tables for each figure are included in Appendix A. Click or control-click on a figure to jump to the corresponding table; do the same on a table title in the appendix to jump back to the figure.

Consistent with the methodology from the 2016 analysis, we present price as the average unit price per package or, in other words, the regular package price divided by the number of lamps in the package. Shoppers are likely to compare the per-lamp price of one product to another when shopping, similar to how shoppers compare unit prices of comparable products at a supermarket. The prices presented include program incentives.

Data from this analysis suggest that program support continues to have an impact on the average unit price of LED lamps.

The average unit prices of all lamp technologies, except CFLs, were different in 2017 than in 2016, as seen in Table 8. The average unit price of LED lamps decreased by $3.56 in this period – the most dramatic shift in price observed among all lamp technologies. The average unit price of incandescent and halogen lamps also decreased in this period, but only by $0.16 and $0.30, respectively. CFL lamps alone saw an increase in average unit price, which is similar to the level of incentives (see Section 2.1). We observed the same trends and similar values among median unit prices as average unit prices, suggesting the data are not tremendously skewed, and validating the average unit price values. Median unit LED prices were lower than their accompanying average prices – this is likely due to the small proportion of very expensive smart LED lamps, some of which are also sold with accompanying technology that facilitate the wireless-enabled system. A minority of expensive specialty bulbs among incandescent and halogen lamps also slightly increased the average unit price over the median.

**Table 8: Average and Median Unit Price by Lamp Type**

| | Average | | Median | |
|---|---|---|---|---|
| | 2016 | 2017 | 2016 | 2017 |
| *n* | 11,302 | 9,403 | 11,302 | 9,403 |
| LED | $11.19 | $7.63*† | $9.99 | $6.23† |
| CFL | $5.99 | $6.37 | $4.66 | $5.49 |
| Halogen | $5.97 | $5.67* | $5.00 | $4.50 |
| Incandescent | $2.94 | $2.78* | $2.23 | $2.04 |

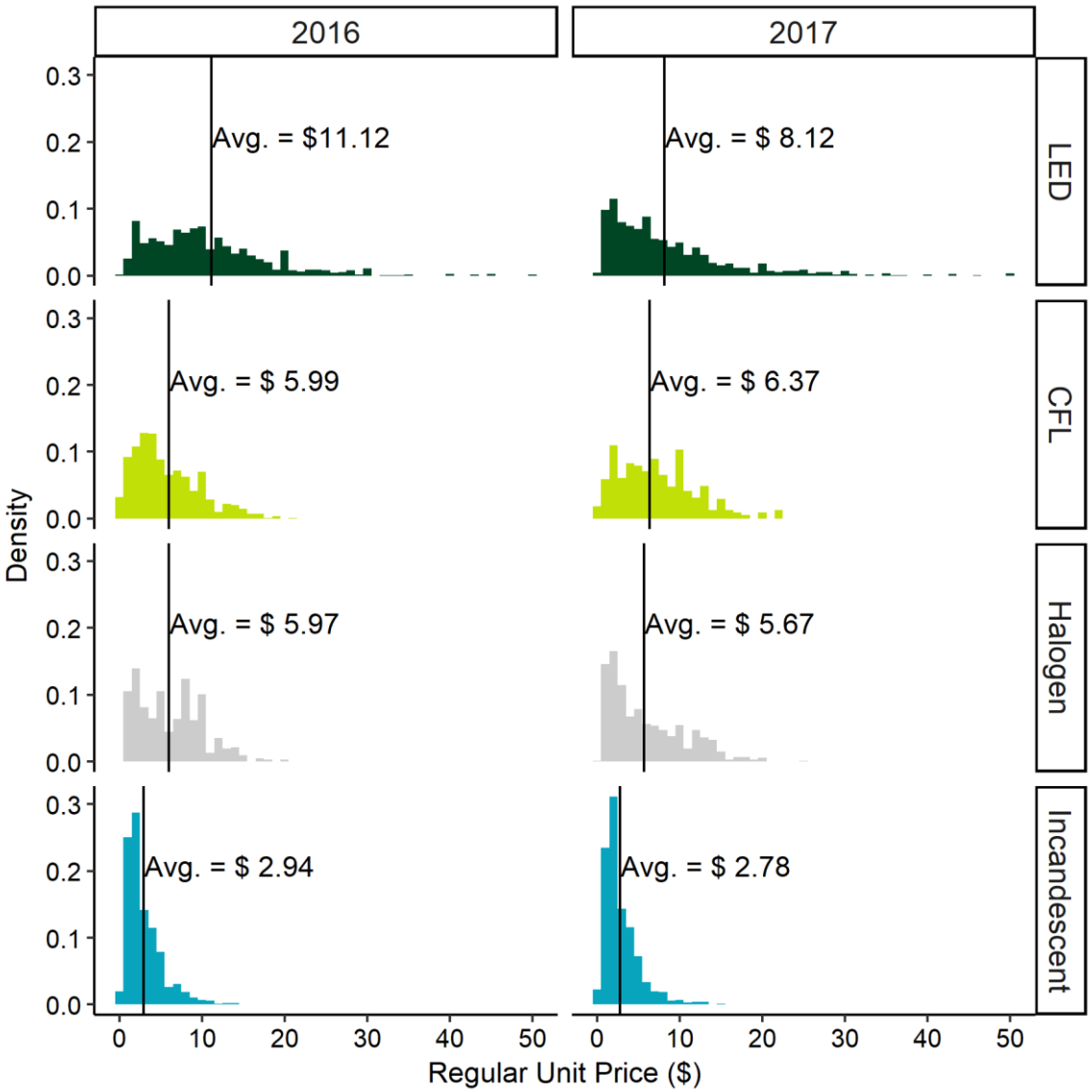
* Significantly different from 2016 price at the 90% confidence level.

† Wireless-enabled lamps were excluded from 2017 calculations. Wireless-enabled lamps represent 3% of LEDs in 2017, and impact the average weighted price of LEDs in 2017 by $0.70. Due to inconsistencies in the 2016 wireless-enabled variable, comparable averages excluding these lamps could not be calculated.

The average unit price of wireless-enabled lamps in 2017 was $34.20. As expected, the average unit price of wireless-enabled lamps is much higher than the average unit price of LED lamps overall; however, the proportion of wireless-enabled lamps in the data is low.

In addition to significant changes in average unit price among all lamp technologies, the distribution of unit prices also varied between 2016 and 2017, as shown in Figure 14. A larger proportion of LED lamps fell into the $0–$2 range, the $2–$4 range, and the $4–$6 range in 2017 than in 2016, and fewer LED lamps fell into most price categories $8 and higher. As in 2016, LED lamps show the widest range of prices, which demonstrates the wide array of choices and features available to consumers of this technology. The distribution of CFL lamp prices flattened somewhat in 2017, with a smaller proportion of lamps falling in the $2-$4 range than in 2016; the difference largely falls into higher price categories. The distribution of incandescent lamps continued to cluster around $0–$2, while the distribution of halogen lamps shifted toward the lower end, with a larger proportion falling in the $0–$2 and $2–$4 ranges in 2017 as compared to 2016.

**Figure 14: Percent of Lamps in Price Range by Lamp Type**



## 3.1 PRICE BY LAMP SHAPE

Table 9 shows the average and median unit price for A-line lamps. A-line CFL, incandescent, and halogen lamps show almost no change in average or median unit price between 2016 and 2017, while average unit LED A-line lamp prices fell by $3.23 between 2016 and 2017. These results indicate that the program sponsors should continue to monitor price trends in Massachusetts and in areas where lighting programs are not offered.

**Table 9: Average and Median Price by Lamp Type, A-line Lamps**

| | Average | | Median | |
|---|---|---|---|---|
| | 2016 | 2017 | 2016 | 2017 |
| *n* | 4,812 | 3,859 | 4,812 | 3,859 |
| LED | $10.15 | $6.92*† | $9.44 | $5.97† |
| CFL | $5.48 | $5.03 | $4.33 | $4.00 |
| Halogen | $2.64 | $2.57 | $2.25 | $2.25 |
| Incandescent | $2.72 | $2.74 | $2.25 | $2.25 |

* Significantly different from 2016 at the 90% confidence level.
† Wireless-enabled lamps were excluded from 2017 calculations. Wireless-enabled lamps represent 3% of LEDs in 2017, and impact the average weighted price of LEDs in 2017 by $0.98. Due to inconsistencies in the 2016 wireless-enabled variable, comparable averages excluding these lamps could not be calculated.

As was the case for A-line lamps, the average unit price of reflector LEDs fell abruptly (by $4.48) compared to the average unit price of other reflector lamp technologies (Table 10). CFL, incandescent, and halogen reflector lamps saw slight decreases in average unit prices over this period.

**Table 10: Average and Median Price by Lamp Type, Reflector Shapes**

| | Average | | Median | |
|---|---|---|---|---|
| | 2016 | 2017 | 2016 | 2017 |
| *n* | 2,962 | 2,432 | 2,962 | 2,432 |
| LED | $14.41 | $9.93*† | $12.99 | $8.00† |
| CFL | $8.47 | $7.16 | $8.49 | $7.99 |
| Halogen | $9.14 | $9.04 | $8.98 | $8.97 |
| Incandescent | $5.65 | $5.37 | $4.99 | $4.99 |

* Significantly different from 2016 at the 90% confidence level.
† Wireless-enabled lamps were excluded from 2017 calculations. Wireless-enabled lamps represent 3% of LEDs in 2017, and impact the average weighted price of LEDs in 2017 by $0.82. Due to inconsistencies in the 2016 wireless-enabled variable, comparable averages excluding these lamps could not be calculated.

Regardless of lamp shape, the average unit price of LEDs fell across the board in 2017 compared with 2016. The patterns for other lamp technologies, especially of less common shapes, is not as clear. Table 11 shows the average unit price by both lamp type and shape. Candle/flame-shaped halogen and fluorescent lamps decreased in average price by a relatively large amount over the period. The average unit price of incandescent and halogen lamp technologies of most lamp shapes decreased by some amount over the period, except for reflector and globe shaped halogen lamps, which increased in average price.

**Table 11: Average Unit Price by Lamp Type and Lamp Shape**

| | Year | LED | CFL | Halogen | Incandescent |
|---|---|---|---|---|---|
| A-line | 2016 | $10.15 | $5.48 | $2.64 | $2.72 |
| | 2017 | $6.92*‡ | $5.03 | $2.57 | $2.74 |
| Reflector/Flood | 2016 | $14.41 | $8.47 | $9.14 | $5.65 |
| | 2017 | $9.93*‡ | $7.16 | $9.04 | $5.37 |
| Candle/Flame | 2016 | $9.20 | $3.79 | $3.77 | $1.68 |
| | 2017 | $7.42*‡ | $0.75* | $1.08* | $1.26* |
| Globe | 2016 | $10.23 | $7.36 | $2.31 | $2.66 |
| | 2017 | $7.49*‡ | $7.76 | $4.01* | $2.43* |
| Bullet/Torpedo | 2016 | $6.77 | $5.60 | $7.44 | $3.17 |
| | 2017 | $5.59*‡ | $9.84* | $6.11* | $2.52* |
| Other | 2016 | $16.27 | $7.75 | $9.42 | $2.33 |
| | 2017 | NS† | $9.02* | NS† | $2.41 |

* Significantly different from 2017 at the 90% confidence interval.
† Not shown. insufficient sample size for comparison.
‡ Wireless-enabled lamps were excluded from 2017 calculations. Wireless-enabled lamps represent 3% of LEDs in 2017, and impact the average weighted price of LEDs in 2017 in this table by $0.07–$0.98. Due to inconsistencies in the 2016 wireless-enabled variable, comparable averages excluding these lamps could not be calculated.

## 3.2 PRICE BY ENERGY STAR STATUS

The price of both ENERGY STAR and non-ENERGY STAR LEDs fell by a relatively large amount from 2016 to 2017, as shown in Table 12. The drop in average unit price of ENERGY STAR LEDs was $0.51 greater than the drop in average unit price of non-ENERGY STAR LEDs. Specifically, the price of ENERGY STAR LEDs fell an average of $3.68, while non-ENERGY STAR LEDs fell an average of $3.17. This demonstrates the role of the program in reducing the average price of ENERGY STAR LEDs beyond baseline average unit price reductions that occurred among all LEDs due to other market forces. On average, ENERGY STAR LEDs were $1.31 cheaper than their non-ENERGY STAR counterparts in 2017. As expected, program-incentivized ENERGY STAR LED lamps in the shelf stocking data were less expensive on average than non-program ENERGY STAR LED lamps in both 2016 and 2017. In this price analysis, an LED is considered ENERGY STAR if it is labeled as such on the package, or verified via other sources.

### Table 12: Average and Median Unit Price by ENERGY STAR LEDs

| | Average | | Median | |
|---|---|---|---|---|
| | 2016 | 2017† | 2016 | 2017† |
| *n* | 4,196 | 4,126 | 4,196 | 4,126 |
| ENERGY STAR | $10.73 | $7.05* | $9.49 | $5.49 |
| Program | $6.98‡ | $5.83‡ | $8.51‡ | $5.22‡ |
| Non-Program | $10.39‡ | $7.50‡ | $9.30‡ | $6.98‡ |
| Non-ENERGY STAR | $11.53 | $8.36* | $9.99 | $7.33 |

* Significantly different from 2016 at the 90% confidence level.
† Wireless-enabled lamps were excluded from 2017 calculations. Wireless-enabled lamps represent 3% of LEDs in 2017, and impact the average weighted price of LEDs in 2017 in this table by $0.50 –$2.08. Due to inconsistencies in the 2016 wireless-enabled variable, comparable averages excluding these lamps could not be calculated.
‡ Due to the distribution of lamps among channels, program and non-program average prices were computed using the same methodology as shelf share calculations to diminish the impact of outliers. Consequently, the wide range of channel weights, 2016 average program and on-program ENERGY STAR prices do not bracket the overall ENERGY STAR price.

In 2017, ENERGY STAR LED lamps were less expensive than their non-ENERGY STAR counterparts in all channels, as shown in Table 13. Almost four out of five LED lamps in Discount stores were ENERGY STAR lamps in 2017, a good indication that the program also has an impact on hard-to-reach customers. However, as shown in Figure 7, incandescent lamps still accounted for 50% of shelf share in the Discount channel. Additionally, more than one-half of LED lamps available were ENERGY STAR in Grocery Stores and Supermarkets, Hardware, Home Improvement, and Lighting and Electronics stores. The share of ENERGY STAR LEDs increased by about one-third in Home Improvement centers, and by about two-fifths in Mass Merchandise stores.

The change in average unit price and availability of ENERGY STAR CFLs in Table 13 most likely reflects the removal of program support for this technology and changes in ENERGY STAR standards. Unlike in 2016, ENERGY STAR CFLs in 2017 were often more expensive than non-ENERGY STAR CFLs on average. The availability of ENERGY STAR CFLs also fell across the board; this aligns with the fact that fewer CFLs are eligible for ENERGY STAR certification according to recently revised standards.

**Table 13: Average Unit Price & Availability of ENERGY STAR Lamps by Channel**

| Channel | Year | LED† | | | CFL | | |
|---|---|---|---|---|---|---|---|
| | | ESTAR | Non | Avail. | ESTAR | Non | Avail. |
| Discount | 2016 | $2.35 * | $4.45 * | 74% | $1.93 | $4.57 * | 62% |
| | 2017 | $1.20 | $2.32 | 78% | $2.35 | $1.45 | 33% |
| Grocery & Supermarket | 2016 | $15.06 * | $13.63 * | 55% | $4.68 | $8.77 * | 52% |
| | 2017 | $9.71 | $10.13 | 51% | $7.32 | $5.11 | 39% |
| Hardware | 2016 | $11.62 * | $14.74 * | 46% | $5.16 * | $7.90 * | 42% |
| | 2017 | $9.58 | $12.14 | 57% | $7.49 | $9.77 | 10% |
| Home Improvement | 2016 | $8.01 * | $9.54 * | 30% | $4.04 | $5.50 * | 57% |
| | 2017 | $5.35 | $6.16 | 64% | $4.08 | $6.29 | 20% |
| Lighting & Electronics | 2016 | $3.03 * | $28.07 * | 62% | – | – | 4% |
| | 2017 | $8.50 | – | 52% | – | – | 0% |
| Mass Merchandise | 2016 | $7.85 * | $8.35 * | 29% | $2.88 | $3.07 * | 73% |
| | 2017 | $4.54 | $5.69 | 47% | – | $5.30 | 0% |
| Membership Club | 2016 | $6.57 * | $9.22 | 45% | $2.69 | – | 100% |
| | 2017 | $3.79 | $5.64 | 41% | $2.19 | $2.50 | 75% |

* Significantly different from 2017 at the 90% confidence level.
† Wireless-enabled lamps were excluded from 2017 calculations. These lamps represent 3% of LEDs in 2017 and their inclusion would increase the average price in Home Improvement stores by $1.14. The effect in most channels is much smaller however, usually 0¢. Due to inconsistencies in the 2016 wireless variable, comparable averages excluding these lamps could not be calculated.

## 3.3 Price by Display Location

As shown in Table 14, the results from the shelf-stocking visits indicate that LED lamps were displayed in a greater variety of locations throughout the store than other lamp technologies, including in glass display cases, at the register, and on special racks. The average unit price of LED lamps found at the register or in a wing stack was very low (under two dollars), representing some of the lowest average prices among any lamp type or display location. CFLs did not feature prominently in as many higher-visibility areas, though they were found in clearance areas. Table 14 shows average *observed* unit price, by which we mean a unit sale price is substituted for a listed unit price, if present, when computing the average.

### Table 14: Average Observed Unit Price by Display Location & Lamp Type†

| | *n* | LED | CFL | Halogen | Incandescent |
|---|---|---|---|---|---|
| Upper Shelf | 3,353 | $7.38 | $5.40 | $6.34 | $2.39 |
| Middle Shelf | 2,999 | $7.33 | $6.46 | $6.45 | $3.16 |
| Lower Shelf | 2,701 | $7.63 | $6.44 | $4.89 | $3.05 |
| Endcap | 289 | $3.86 | $8.70 | $1.91 | $2.34 |
| Wing Stack | 32 | $1.37 | – | – | $2.54 |
| Shipper | 44 | $1.89 | – | $4.44 | $1.60 |
| Register | 7 | $1.78 | – | $6.00 | – |
| Rack | 3 | $1.41 | – | – | – |
| Clearance | 36 | $12.51 | $9.21 | $7.12 | $4.63 |
| Other | 49 | $6.83 | – | $4.99 | $1.79 |

As previously discussed, the average unit price of LED lamps fell from 2016 to 2017. Within display location, the average unit price of LEDs found in wing stacks fell substantially, suggesting some inexpensive LED products are being promoted prominently. Seventy percent of LED lamps displayed on wing stacks and 73% of LED lamps displayed on endcaps were ENERGY STAR in 2017 (Table 15).

### Table 15: Average Unit Price by Display Location and Lamp Type

| | Year | LED | ESTAR | CFL | Halogen | Incandescent | n |
|---|---|---|---|---|---|---|---|
| Upper Shelf | 2016 | $11.17 | 32% | $6.34 | $6.26 | $2.51 | 3,646 |
| | 2017 | $7.88*§ | 51% | $5.48* | $6.34 | $2.39 | 3,335 |
| Middle Shelf | 2016 | $11.52 | 43% | $6.15 | $6.52 | $3.10 | 3,996 |
| | 2017 | $7.83*§ | 59% | $6.56 | $6.54 | $3.17 | 2,963 |
| Lower Shelf | 2016 | $13.59 | 46% | $5.91 | $5.46 | $3.36 | 3,089 |
| | 2017 | $8.05*§ | 49% | $6.48 | $4.91* | $3.06* | 2,655 |
| Endcap | 2016 | $6.68 | 62% | $3.20 | $5.28 | $3.33 | 267 |
| | 2017 | $4.48§ | 73% | $8.70* | $1.95* | $2.35 | 280 |
| Wing Stack† | 2016 | $4.20 | 74% | $0.33 | $4.02 | $1.56 | 149 |
| | 2017 | $1.73*§ | 70% | – | $4.44 | $2.03 | 75 |
| Clearance | 2016 | $11.65 | 41% | $5.06* | $7.49 | $8.06 | 21 |
| | 2017 | $16.24§ | 47% | $12.09 | $9.49 | $6.91 | 36 |
| Other‡ | 2016 | $6.25 | 53% | $7.44 | $4.21 | $2.10 | 134 |
| | 2017 | $12.27*§ | 47% | – | $5.34 | $1.79 | 59 |

† *Wing Stack* includes *Shipper*.
‡ Other includes *Register*" *Rack*, and *Glass Display Case*.
* Significantly different from 2016 at the 99% confidence level.
§ Wireless-enabled lamps were excluded from 2017 calculations. Wireless-enabled lamps represent 3% of LEDs in 2017, and impact the average weighted price of LEDs in 2017 by $0 – $6.02. Due to inconsistencies in the 2016 wireless-enabled variable, comparable averages excluding these lamps could not be calculated.

# 4 EISA Coverage and Exemptions

Data tables for each figure are included in Appendix A. Click or control-click on a figure to jump to the corresponding table; do the same on a table title in the appendix to jump back to the figure.

This section examines the potential impact that The Energy Independence and Security Act (EISA) of 2007 (EISA) has had and will have on shelf-stocking patterns.

## 4.1 EISA Background

EISA laid out initial standards to be implemented between 2012 and 2014 (Phase I) and a schedule of events that would lead to increased standards in 2020 (Phase II) and 2025 (Phase III). The act envisioned the DOE issuing rulemakings that would take effect in 2020 and 2025. However, it also included a provision (backstop) that would go into effect in those years should the DOE fail to complete a rulemaking in accordance with the act or if the final DOE rulemaking did not produce savings greater than or equal to the savings of the backstop provision.

### 4.1.1 Current Status

Phase I of EISA went into effect in a staged process from 2012 through 2014. Phase I increased the efficacy requirements of the most common general service lamps (GSLs) by about 28-30%. The standards essentially required that all GSLs provide the same efficacy as common Halogen lamps.

On January 19, 2017, the DOE issued two rulemakings related to Phase II of EISA and indicated that the rules would go into effect as scheduled in January of 2020. The rules specifically cited an efficacy standard of 45 lumens per Watt (equivalent to the backstop provision). In addition, the rules redefined GSL to include seven previously exempt categories of lamps and expanded the covered lumen range.

In March of 2017, the National Electrical Manufacturers Association (NEMA) filed a petition asking the DOE to re-open and complete the rulemakings. On July 7, 2017, the DOE and NEMA reached a settlement: NEMA agreed to withdraw its petition and the DOE agreed to complete the GSL rulemaking and other associated regulatory activities. While we have been unable to obtain a copy of any settlement agreement, our understanding is that the DOE agreed to do the following:

- Issue a Notice of Data Availability (NODA) requesting market data for GSL incandescent lamps and other incandescent lamps. This data will be used to help determine whether standards for incandescent lamps should be amended.
- Issued August 2017: https://www.regulations.gov/document?D=EERE-2017-BT-NOA-0052-0001.

- Based on a review of data provided through the NODA, issue final rules for vibration and rough service lamps re: the backstop. Initially estimated for September of 2017 – still not issued as of March 2018.
- Issue a Supplemental Notice of Proposed Rulemaking (SNOPR) for GSL lamps. This would be expected to include standards for GSL LEDs. Initially estimated first quarter of 2018 – likely to be delayed.

### 4.1.2 Uncertainty

While we expected DOE to present revised rules in September 2017, we still have not heard anything on their intended actions as of March 2018. However, we know that the DOE has left enforcement specifics somewhat vague, has indicated that a sell-through period is likely, and has allowed for a possible delay in enforcement for some bulb categories. Final determination will be based on an ongoing dialog with lighting industry stakeholders.

As currently drafted, EISA Phase II will prohibit the manufacture, import, and sale of non-compliant bulbs. This may mean that, unlike Phase I, where the effects of EISA lagged implementation, Phase II effects may precede implementation (planned for January 1, 2020). While the Department of Energy (DOE) has left Phase II enforcement specifics somewhat vague, preliminary indications are that a sell-through period is likely, and DOE specifically said that they may delay enforcement for some bulb categories.

For additional details on the history of EISA, current status, and likely outcomes, please see the RLPNC 17-9: Market Assessment Report.

### 4.1.3 Categorizing Lamps

To categorize lamps, we carefully reviewed the existing rulemakings for Phase I and Phase II and prepared a flow chart to help determine EISA compliance on a lamp-by-lamp basis.

EISA Phase I standards cover GSLs, including standard A-line lamps, covered and bare spiral CFLs, and omnidirectional LEDs in the 310-2600 lumen range. For Phase I, the DOE specifically identified 22 lamp types that were exempt from the EISA efficiency standards. Table 16 provides a listing of all 22 Phase I exempt GSL categories, as well as approximate national sales (as estimated by the DOE). Based on the existing rules for Phase II, the DOE plans to discontinue exemptions for seven important categories (highlighted in bold in Table 16). In addition, Phase II standards raise the maximum lumen range to 4,000.

See Appendix B for flow charts depicting how EISA compliance for the two phases was determined, and to observe the differences between Phase I and Phase II eligibility.

**Table 16: EISA Exemptions**

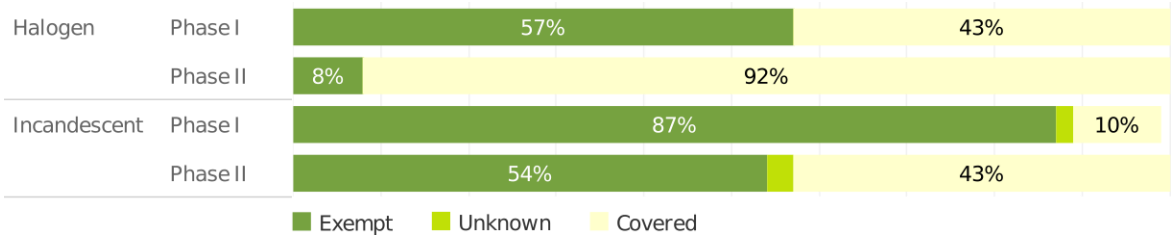
| Number | GSL Exempt Category | Approx. Sales (DOE) | Status |
|---|---|---|---|
| 1 | Appliance Lamp | 2 million | Maintain |
| 2 | Black Light Lamp | <1 million | Maintain |
| 3 | Bug Lamp | <1 million | Maintain |
| 4 | Colored Lamp | <2 million | Maintain |
| 5 | Infrared Lamp | <1 million | Maintain |
| 6 | Left-Hand Thread Lamp | <1 million | Maintain |
| 7 | Marine Lamp | <1 million | Maintain |
| 8 | Marine Signal Service Lamp | <1 million | Maintain |
| 9 | Mine Service Lamp | <1 million | Maintain |
| 10 | Plant Light Lamp | <1 million | Maintain |
| **11** | **Reflector Lamp** | **30 million** | **Discontinue** |
| **12** | **Rough Service Lamp** | **11 million** | **Discontinue** |
| **13** | **Shatter-Resistant Lamp** | **0.7 Million** | **Discontinue** |
| 14 | Sign Service Lamp | 1 million | Maintain |
| 15 | Silver Bowl Lamp | 1 million | Maintain |
| 16 | Showcase Lamp | <1 million | Maintain |
| **17** | **3-Way Lamp** | **33 million** | **Discontinue** |
| 18 | Traffic Signal Lamp | <1 million | Maintain |
| **19** | **Vibration Service Lamp** | **7 million** | **Discontinue** |
| 20 | G shape Lamp with diameter of five inches or more | 0.9 million | Maintain |
| **21** | **T shape lamp of 40 W or less or length of ten inches or more** | **10 million** | **Discontinue** |
| **22** | **B, BA, CA, F, G16-1/2, G25, G30, S, M-14 lamp of 40 W or less** | **72 million** | **Discontinue** |

## 4.2 EISA Shelf-Stocking Analysis

In the rest of this section, we explore shelf-stocking data for incandescent and halogen lamps by EISA categorization (exempt or covered) for Phase I and Phase II separately.

A larger proportion of lamps are covered by Phase II than by Phase I. This is not surprising, given that Phase II stands to remove exemptions and close loopholes present in Phase I. Almost nine out of ten incandescent lamps currently on shelves are exempt according to Phase I, whereas around one-half are exempt under Phase II. Similarly, the number of halogen lamps exempt under Phase II is only 8%, down from almost 60%.

### Figure 15: EISA Exemption Status by Lamp Type




Almost nine out of ten lamps on shelves in Hardware stores were exempt according to Phase I standards, whereas less than half of lamps sold in Hardware stores were exempt according to Phase II. All observed bulbs in Lighting & Electronics stores were LEDs; therefore, this channel is omitted from Figure 16.

### Figure 16: EISA Exemption Status by Channel for Inefficient Lamps

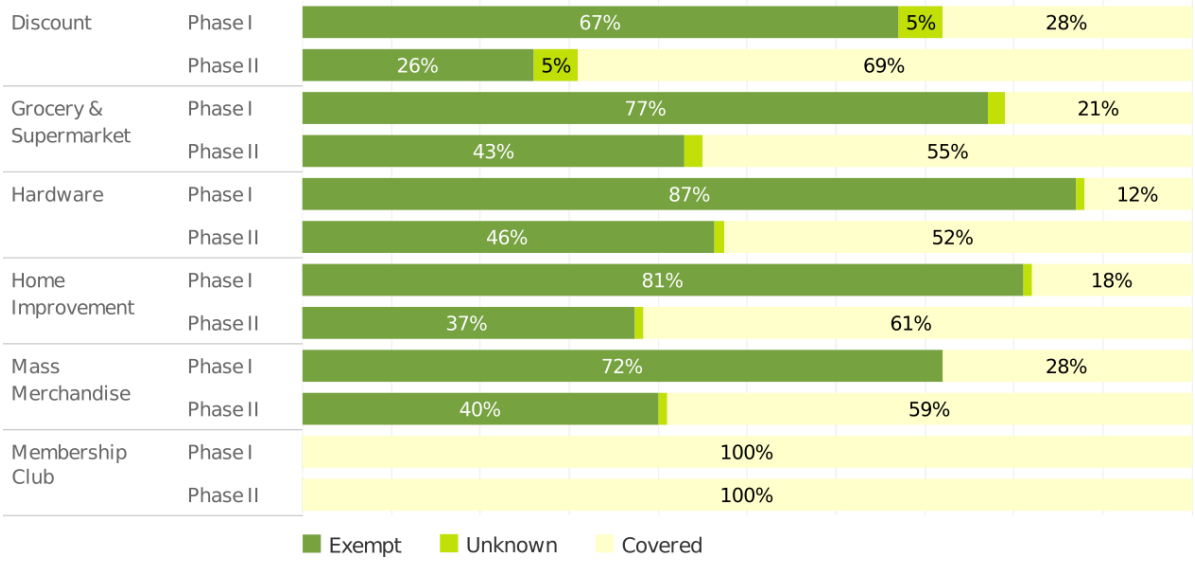



Table 17 isolates EISA-exempt lamps and shows the proportion of exempt lamps in the sample found in each retail channel. Our analysis shows that over one-half of all EISA-exempt incandescent lamps, according to both the Phase I and Phase II standards, were in Hardware stores. Nearly two out of three (65%) Phase I-exempt and almost four out of five (78%) Phase II-exempt halogen lamps were also in Hardware stores. Hardware stores tend to offer a wider range of specialty lamps compared to other channels; many retail channels only stock the most commonly purchased products. Given this, it is less surprising that we found that the majority of EISA-exempt lamps were in this channel.

About one-fifth of EISA-exempt incandescent bulbs, according to both Phase I and Phase II standards, were in Grocery Stores and Supermarkets. The total number of inefficient lamps in Hardware and Supermarket channels was large compared to other channels, partly accounting for the prevalence of exempt lamps in these channels. A large proportion of incandescent lamps in our sample was also in the Home Improvement channel, but fewer of these lamps were EISA-exempt. Note that since 100% of inefficient lamps in the shelf-stocking data at Membership Clubs were covered, and 100% of bulbs at Lighting & Electronics stores were LEDs, these channels are not shown in Table 17.

**Table 17: EISA Phase I and Phase II Exempt Lamps by Channel & Lamp Type**

| Channel | Phase I | | Phase II | |
|---|---|---|---|---|
| | Halogen | Incandescent | Halogen | Incandescent |
| *n* | 948 | 3,033 | 158 | 1,499 |
| Discount | 1% | 3% | 1% | 2% |
| Grocery & Supermarket | 10% | 21% | 6% | 20% |
| Hardware | 65% | 51% | 78% | 53% |
| Home Improvement | 15% | 11% | 9% | 10% |
| Mass Merchandise | 9% | 14% | 6% | 14% |

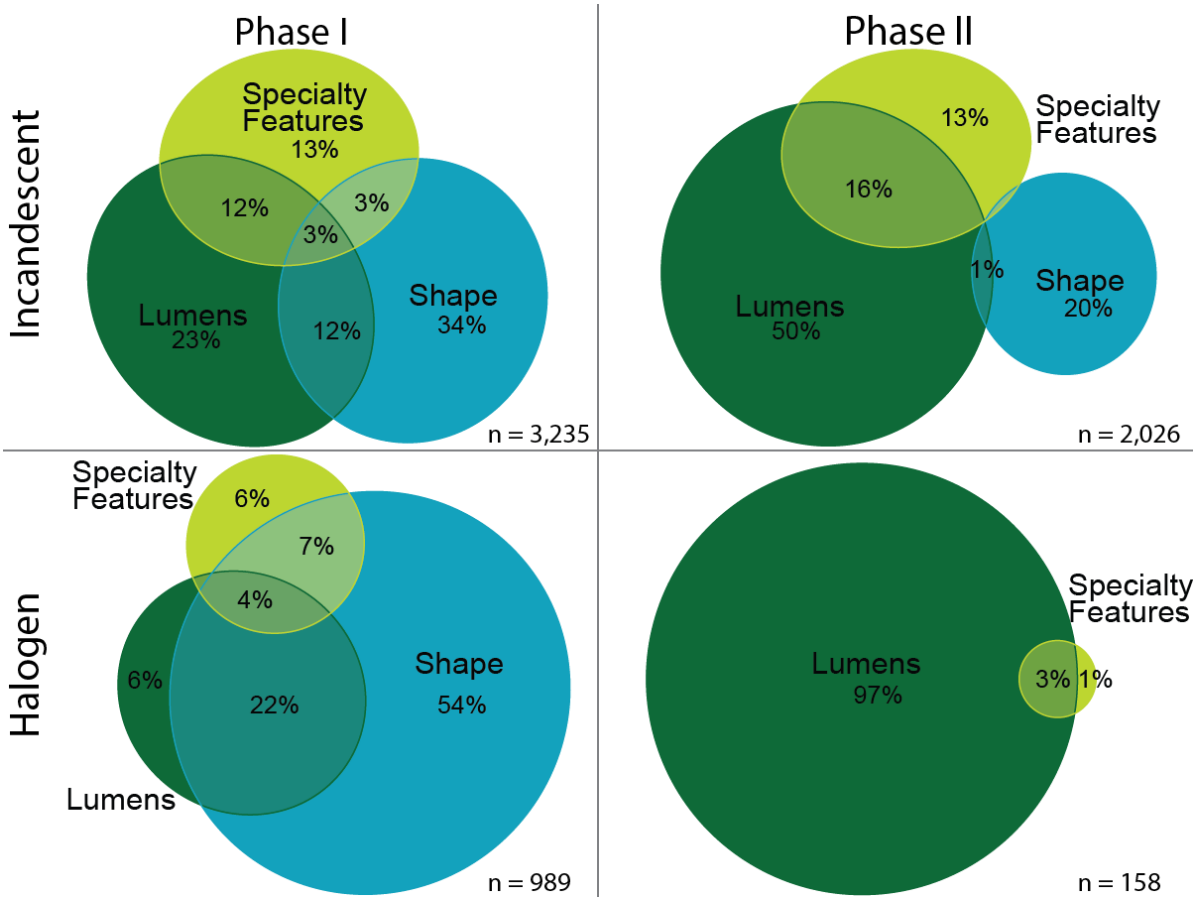
Figure 17 breaks down EISA-exempt halogen and incandescent lamps by the reasons for their exemption. For example, the figure shows whether a lamp was exempt due to the lumen standard, specialty features exemptions, lamp shape exemptions, or a combination of these reasons. As show in Figure 15, the percent of both halogen and incandescent lamps that would be considered exempt in Phase II decreased. As stated, EISA Phase II will remove exemptions and close loopholes, especially in the specialty features exemption category; Table A-10 provides an overview of EISA coverage based on lumens, specialty features, and shape. Figure 17 shows the following breakdowns:

- The proportion of EISA-exempt incandescents exempt due to lamp shape fell overall from 52% in Phase I to 21% in Phase II.
- The proportion of EISA-exempt halogens exempt due to lamp shape fell to zero in Phase II from 87% in Phase I.
- One-third of EISA-exempt halogen lamps were exempt for more than one reason in Phase I.
- All halogen lamps exempt due to specialty features in Phase I were covered in Phase II.[8]

A proportion of lamps were also exempt from EISA standards due to base type; however, base type standards did not change between Phase I and Phase II, so base exemptions are not shown in Figure 17.

[8] The data noted rough service and three-way lamp characteristics independently from other specialty features. However, all other specialty features were combined into a binary variable and could not be disaggregated. It is possible some vibration service or shatter-resistant lamps are present in Phase II totals.

## Figure 17: EISA Exempt Lamps: Reasons for Exemption



# Appendix A Data Tables

Click or control-click on a table title to jump to the corresponding figure in the body of the report; do the same on the figure to jump back to the data table. Note: the table numbering in this section is deliberately contrived to match figure numbers in the main body of the report in order to facilitate cross-referencing with figures in the body of the report.

### Table A-1: Statewide Shelf Share by Non-Linear Lamp Type

| Year | LED | CFL | Halogen | Incandescent |
|---|---|---|---|---|
| 2016 | 37% | 17% | 14% | 31% |
| 2017 | 51%* | 7%* | 9%* | 33%* |

* Statistically significant from 2016 at the 90% confidence level.

### Table A-6: Program and ENERGY STAR Non-Linear Lamp Shelf Share in 2017

| Channel | ENERGY STAR | Program ESTAR% | Program ESTAR | Other ESTAR | Non-ESTAR |
|---|---|---|---|---|---|
| Discount | 79% | 84% | 66% | 13% | 21% |
| Supermarket | 65% | 84% | 55% | 10% | 35% |
| Hardware | 72% | 68% | 49% | 23% | 28% |
| Home Improvement | 64% | 29% | 19% | 45% | 36% |
| Lighting & Electronics | 54% | 44% | 24% | 30% | 46% |
| Mass Merchandise | 53% | 80% | 42% | 11% | 47% |
| Membership Club | 41% | 29% | 12% | 29% | 59% |
| Statewide | 65% | 68% | 46% | 20% | 35% |

Program ESTAR = ENERGY STAR × Program ESTAR%
Other ESTAR = ENERGY STAR- Program ESTAR

### Table A-7: Statewide Shelf Share by Non-Linear Lamp Type 2010–2017

| Year | LED | CFL | Halogen | Incandescent |
|---|---|---|---|---|
| 2010 | 2% | 37% | 12% | 48% |
| 2011† | 5% | 50% | 9% | 36% |
| 2012 | 8% | 62% | 6% | 24% |
| 2013 | 5% | 68% | 10% | 16% |
| 2014† | 17% | 50% | 12% | 20% |
| 2015† | 29% | 32% | 13% | 25% |
| 2016 | 38% | 18% | 15% | 32% |
| 2017 | 51% | 7% | 9% | 33% |

† Data are interpolated.

## Table A-8: Statewide Shelf Share of Non-Linear Lamps by Shelf Location

| Location | 2016 | | | | | 2017 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | L | F | H | I | n | L | F | H | I | n |
| Upper Shelf | 30% | 16% | 7% | 47% | 3,684 | 35%* | 5%* | 9%* | 50%* | 3,412 |
| Middle Shelf | 31% | 16% | 12% | 40% | 4,069 | 50%* | 5%* | 12%* | 33%* | 3,080 |
| Lower Shelf | 20% | 22% | 21% | 37% | 3,145 | 43%* | 6%* | 19% | 32%* | 2,804 |
| Endcap | 73% | 8% | 3% | 16% | 283 | 81%* | 2%* | 9%* | 8%* | 340 |
| Wing Stack† | 74% | 13% | 8% | 5% | 150 | 97%* | 0%* | 1%* | 2% | 83 |
| Clearance | 17% | 76% | 2% | 5% | 21 | 43%* | 26%* | 14% | 17% | 41 |
| Other‡ | 39% | 2% | 14% | 46% | 141 | 85%* | 0% | 1%* | 14%* | 67 |

† Includes *Shipper* location.
‡ Includes *Register*, *Glass Display Case*, and *Rack* locations.
* Statistically significant from 2016 at the 90% confidence level.
L = LED, F = Fluorescent, H = Halogen, I = Incandescent

## Table A-9: Shelf Share by Non-Linear Lamp Type and Channel

| Channel | L | F | H | I | Year | L | F | H | I | Channel |
|---|---|---|---|---|---|---|---|---|---|---|
| Discount | 3% | 51% | 11% | 35% | 2010 | 4% | 37% | 15% | 43% | Home Improvement |
| | 3% | 62% | 9% | 27% | 2011† | 7% | 53% | 11% | 30% | |
| | 2% | 73% | 6% | 19% | 2012 | 9% | 69% | 7% | 16% | |
| | 0% | 71% | 0% | 28% | 2013 | 18% | 26% | 8% | 47% | |
| | 5% | 53% | 5% | 36% | 2014† | 29% | 21% | 10% | 40% | |
| | 11% | 35% | 10% | 45% | 2015† | 41% | 15% | 11% | 33% | |
| | 16% | 17% | 15% | 53% | 2016 | 52% | 10% | 13% | 26% | |
| | **34%*** | 12% | **4%*** | 50% | 2017 | **55%*** | **6%*** | 12% | 27% | |
| Grocery & Supermarket | 2% | 27% | 8% | 63% | 2010 | 1% | 34% | 11% | 53% | Mass Merchandise |
| | 2% | 31% | 6% | 60% | 2011† | 1% | 45% | 8% | 46% | |
| | 2% | 36% | 5% | 57% | 2012 | 1% | 56% | 4% | 39% | |
| | 10% | 32% | 10% | 48% | 2013 | 3% | 56% | 6% | 35% | |
| | 12% | 33% | 10% | 44% | 2014† | 18% | 38% | 10% | 33% | |
| | 15% | 35% | 11% | 40% | 2015† | 34% | 21% | 15% | 30% | |
| | 17% | 36% | 11% | 36% | 2016 | 49% | 3% | 19% | 28% | |
| | **42%*** | **7%*** | 13% | 38% | 2017 | **60%*** | **2%*** | **11%*** | 28% | |
| Hardware | 3% | 33% | 17% | 46% | 2010 | 5% | 72% | 3% | 20% | Membership Club |
| | 2% | 60% | 11% | 27% | 2011† | 24% | 60% | 2% | 13% | |
| | 0% | 86% | 4% | 9% | 2012 | 44% | 47% | 2% | 7% | |
| | 11% | 21% | 19% | 48% | 2013 | 4% | 82% | 4% | 10% | |
| | 18% | 17% | 20% | 45% | 2014† | 30% | 59% | 5% | 7% | |
| | 25% | 12% | 21% | 41% | 2015† | 55% | 35% | 5% | 3% | |
| | 32% | 8% | 22% | 38% | 2016 | 81% | 12% | 6% | 0% | |
| | 33% | **6%*** | **20%*** | **41%*** | 2017 | 85% | 8% | 7% | 0% | |
| Lighting & Electronics | 64% | 18% | 5% | 12% | 2016 | | | | | |
| | **100%*** | **0%*** | **0%*** | **0%*** | 2017 | | | | | |

† Data are interpolated for this year.
* Significantly different from 2016 at the 90% confidence level.

## Table A-10: Inefficient Lamp Shelf Share by Lumens

| Lumens | Equivalent Incandescent | Halogen | | Incandescent | |
|---|---|---|---|---|---|
| | | 2016 | 2017 | 2016 | 2017 |
| <310 | <40W | 13% | 8% | 28% | 28% |
| 310–749 | 40W | 33% | 38% | 41% | 46%* |
| 750–1049 | 60W | 18% | 20% | 8% | 7% |
| 1050–1489 | 75W | 18% | 20% | 10% | 7% |
| 1490–2600 | 100W | 13% | 12% | 7% | 6% |
| >2600 | >100W | 5% | 3% | 6% | 7% |

## Table A-11: Shelf Share by Channel and Lamp Shape

| Channel | Year | A-Line | Reflector | Other |
|---|---|---|---|---|
| Discount | 2016 | 56% | 16% | 28% |
| | 2017 | 50% | 22% | 28% |
| Grocery & Supermarket | 2016 | 53% | 18% | 30% |
| | 2017 | 48%* | 17% | 34% |
| Hardware | 2016 | 35% | 29% | 36% |
| | 2017 | 36% | 31% | 33%* |
| Home Improvement | 2016 | 42% | 29% | 28% |
| | 2017 | 40% | 30% | 30% |
| Lighting & Electronics | 2016 | 27% | 45% | 28% |
| | 2017 | 42% | 52% | 6%* |
| Mass Merchandise | 2016 | 52% | 22% | 27% |
| | 2017 | 50% | 19% | 31% |
| Membership Club | 2016 | 52% | 44% | 4% |
| | 2017 | 51% | 35% | 14% |
| Statewide | 2016 | 46% | 24% | 31% |
| | 2017 | 43%* | 24% | 34%* |

* Significantly different from 2016 at the 90% confidence level.

## Table A-12: Comparing Shelf Share to Sales by Channel

| Channel | 2016 InfoScout | | | | | 2017 InfoScout | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | L | F | H | I | *n* | L | F | H | I | *n* |
| Discount | 0% | 17% | 43% | 40% | 94 | *4* | *3* | *0* | *1* | 8 |
| Grocery & Sprmkt | 4% | 7% | 33% | 55% | 94 | *0* | *0* | *6* | *0* | 6 |
| Hardware | *0* | *1* | *0* | *1* | 2 | *4* | *0* | *1* | *0* | 10 |
| Home Imprvmnt. | 19% | 33% | 19% | 28% | 1,095 | 33%* | 14%* | 18% | 36%* | 362 |
| Lighting & Elect. | *1* | *0* | *0* | *0* | 1 | *0* | *0* | *0* | *0* | 0 |
| Mass Merch. | 18% | 17% | 29% | 36% | 874 | 49%* | 6%* | 25% | 20%* | 496 |
| Membership Club | 62% | 28% | 10% | 0% | 239 | 91%* | 0%* | 9% | 0% | 186 |

*Italicized sales data is insufficient to calculate accurate percentages.*
* Statistically significant from 2016 at the 90% confidence level.

| Channel | 2016 Program | | 2017 Program | |
|---|---|---|---|---|
| | L | F | L | F |
| Discount | 43% | 57% | 100% | <1% |
| Grocery & Sprmkt | 53% | 47% | 100% | <1% |
| Hardware | 80% | 20% | 100% | 0% |
| Home Imprvmnt. | 92% | 8% | 100% | 0% |
| Lighting & Elect. | 100% | 0% | 100% | <1% |
| Mass Merchandise | 100% | 0% | 100% | 0% |
| Membership Club | 92% | 8% | 100% | 0% |

For shelf share data, see Table A-10.

## Table A-13: Percent of Lamps in Price Range by Lamp Type

| | 2016 | | | | 2017 | | | |
|---|---|---|---|---|---|---|---|---|
| | L | F | H | I | L | F | H | I |
| n | 4,196 | 1,039 | 2,060 | 4,007 | 4,245 | 341 | 1,445 | 3,491 |
| $2 | 9%* | 14% | 19%* | 47%* | 17% | 16% | 24% | 50% |
| $4 | 11%* | 29%* | 19%* | 31% | 16% | 23% | 25% | 33% |
| $6 | 10%* | 20% | 18% | 14%* | 16% | 18% | 16% | 11% |
| $8 | 13% | 13% | 17%* | 5%* | 13% | 14% | 11% | 4% |
| $10 | 15%* | 12% | 14%* | 2%* | 11% | 13% | 9% | 1% |
| $12 | 9% | 4% | 5% | 1% | 9% | 6% | 5% | 1% |
| $14 | 8%* | 3% | 6%* | 1% | 6% | 4% | 8% | 0% |
| $16 | 8%* | 2% | 1%* | 0% | 3% | 4% | 2% | 0% |
| $18 | 4%* | 1% | 0% | 0% | 2% | 1% | 1% | 0% |
| $20 | 5%* | 1% | 0% | 0% | 2% | 0% | 1% | 0% |
| $20+ | 8%* | 0% | 0% | 0% | 6% | 1% | 0% | 0% |

* Significantly different from 2016 at the 90% confidence level.

## Table A-14: EISA Exemption Status by Lamp Type

| Type | *n* | EISA | Exempt | Covered | Unknown† |
|---|---|---|---|---|---|
| Halogen | 1,483 | Phase I | 57% | 43% | 0% |
| | | Phase II | 8% | 92% | 0% |
| Incandescent | 3,605 | Phase I | 87% | 10% | 2% |
| | | Phase II | 54% | 43% | 3% |

† Compliance cannot be determined for lamps with unknown lumen or wattage values.

## Table A-15: EISA Exemption Status by Channel

| Channel | n | EISA | Exempt | Covered | Unknown† |
|---|---|---|---|---|---|
| Discount | 177 | Phase I | 67% | 28% | 5% |
| | | Phase II | 26% | 69% | 5% |
| Grocery & Supermarket | 985 | Phase I | 77% | 21% | 2% |
| | | Phase II | 43% | 55% | 2% |
| Hardware | 2,587 | Phase I | 87% | 12% | 1% |
| | | Phase II | 46% | 52% | 1% |
| Home Improvement | 595 | Phase I | 81% | 18% | 1% |
| | | Phase II | 37% | 61% | 1% |
| Mass Merchandise | 738 | Phase I | 72% | 28% | 0% |
| | | Phase II | 40% | 59% | 1% |
| Membership Club | 6 | Phase I | 0% | 100% | 0% |
| | | Phase II | 0% | 100% | 0% |

† Compliance cannot be determined for lamps with unknown lumen or wattage values.

## Table A-16: EISA Exempt Lamps: Reasons for Exemption

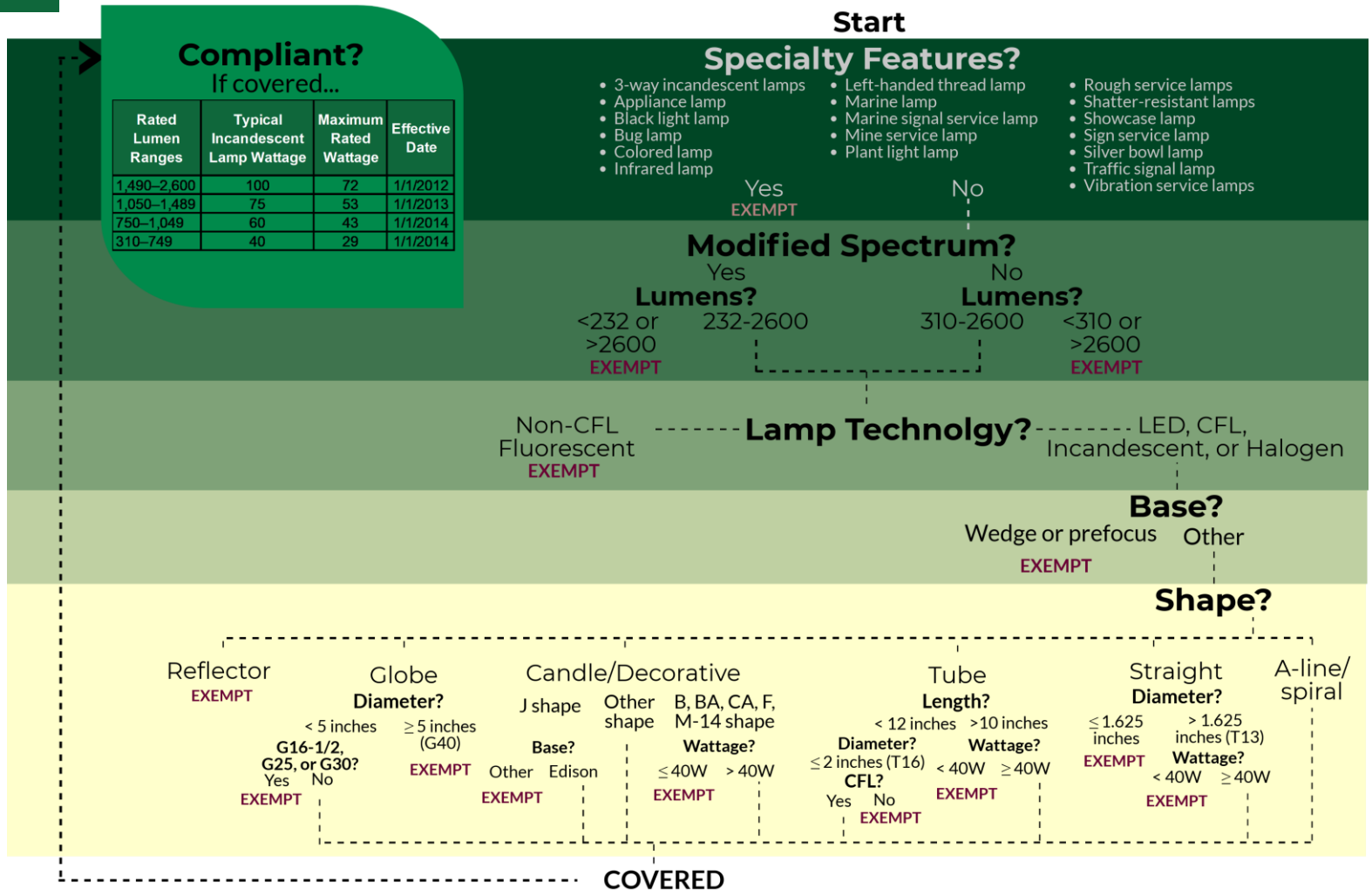
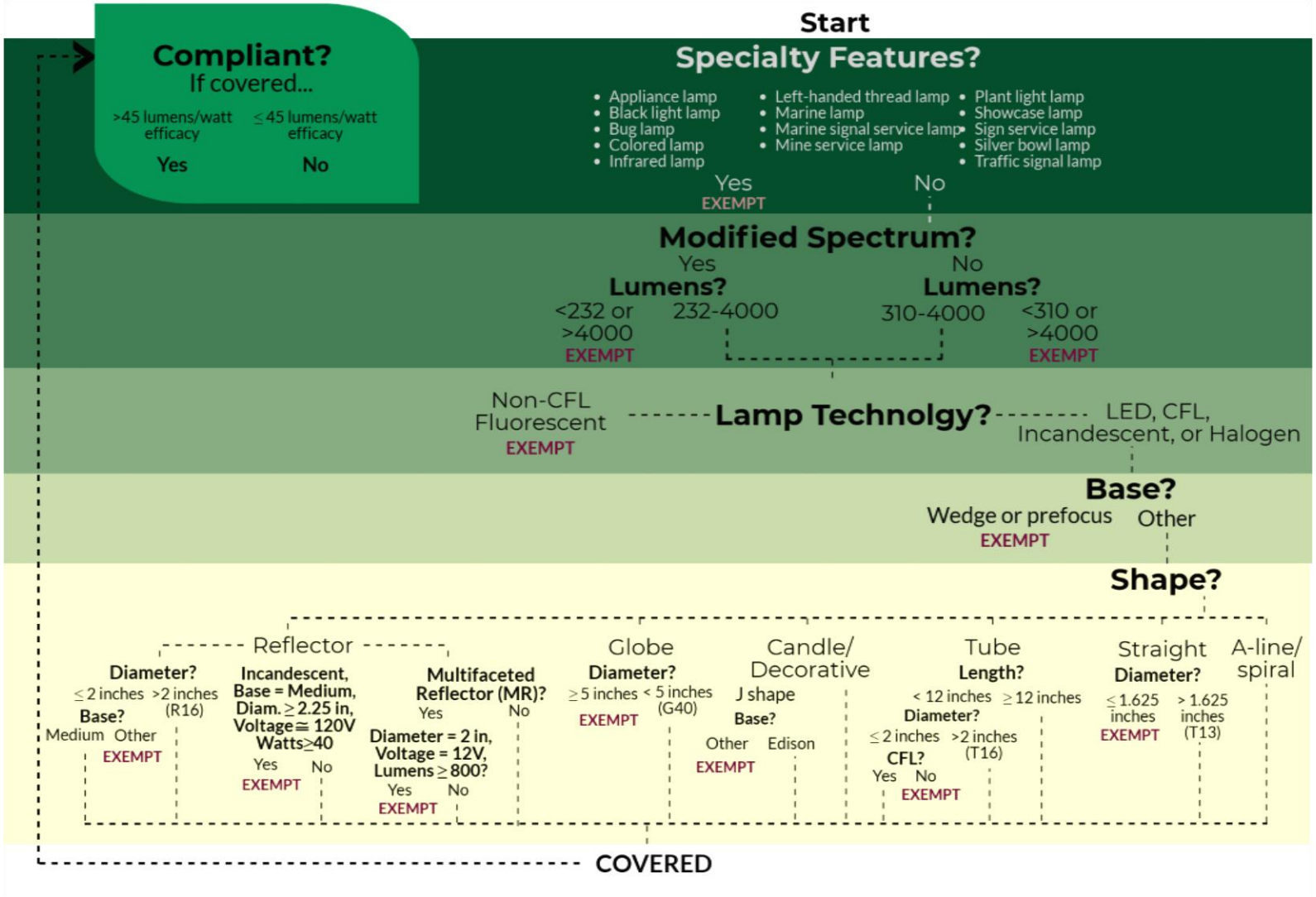
| Exemption Qualification | Lamp Type | EISA | *n* | Exempt | Covered |
|---|---|---|---|---|---|
| Lumens | Halogen | Phase I | 1,483 | 8% | 92% |
| | | Phase II | 1,483 | 19%* | 81% |
| | Incandescent | Phase I | 3,371† | 45% | 55% |
| | | Phase II | 3,371† | 37%* | 63% |
| Specialty Features | Halogen | Phase I | 1,483 | 10% | 90% |
| | | Phase II | 1,483 | 0% | 100% |
| | Incandescent | Phase I | 3,605 | 31% | 69% |
| | | Phase II | 3,605 | 18%* | 82% |
| Shape | Halogen | Phase I | 1,483 | 52% | 48% |
| | | Phase II | 1,483 | 0% | 100% |
| | Incandescent | Phase I | 3,605 | 47% | 53% |
| | | Phase II | 3,605 | 12%* | 88% |
| Base | Halogen | Phase I & II | 1,483 | 14% | 86% |
| | Incandescent | Phase I & II | 3,605 | 0% | 100% |

† Smaller sample size for lumens qualification than overall incandescent sample due to missing data.
* Significantly different from Phase I at the 90% confidence level.

# B Appendix B EISA Flow Charts

Discussion of EISA is in the EISA Coverage and Exemptions section.

## Figure 18: EISA Phase I Coverage and Compliance Flow Chart



## Figure 19: EISA Phase II Coverage and Compliance Flow Chart