

California Lamp Report 2003

Prepared for:

Southern California Edison
2131 Walnut Grove Avenue
Rosemead, California 91770

Project Manager

Richard Pulliam

Prepared by:

Itron, Inc.
11236 El Camino Real
San Diego, California 92130
(858) 481-0081



July 15, 2004

Table of Contents

California Lamp Report 2003	1
1. Introduction	1
2. Overview	1
3. Lamp Sales Data	2
<i>Point-of-Sale Data Sources</i>	2
<i>Lamp Classification</i>	4
4. Residential Lamp Sales	6
<i>All Sales versus Residential Sales</i>	7
<i>Sales by Bulb Type</i>	7
<i>Sales by Market Channel</i>	8
<i>Sales by Lamp Classification</i>	8
5. Medium Screw-Based Lamp Sales	10
<i>Medium Screw-Based Lamp Sales over Time</i>	11
<i>Sales by Lamp Type as a Percentage of Medium Screw-Based Lamp Sales</i>	14
<i>Sales per Household of Medium Screw-Based Lamps</i>	17
<i>Sales of Medium Screw-Based Lamps by Market Channel</i>	19
<i>Sales of Medium Screw-Based CFLs versus Pin-Based CFLs</i>	24
<i>Sales of Medium Screw-Based Lamps by Equivalent Wattages</i>	25
<i>Impact of Lamp Life on Medium Screw-Based Lamp Shares</i>	28
6. Summary of Key Findings	29
7. Next Steps	30

California Lamp Report 2003

1. Introduction

This report discusses the analysis of residential lighting equipment, which is one aspect of the larger California Residential Market Share Tracking (RMST) effort.¹ This element of the RMST study collects data to support California's investor-owned utilities (IOUs) in their efforts to measure program milestones for promoting CFLs in their respective service territories.²

2. Overview

Efficient lighting has been an area of increasing interest since the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) created the dedicated fluorescent fixtures and screw-based compact fluorescent lamp (CFL) portion of the ENERGY STAR[®] program. Many areas of the country have focused on efficient lighting in order to implement a wide variety of market transformation efforts. Historically, estimates on the market penetration of these highly efficient lighting technologies relied on industry shipments data, self-reports, and surveys. These data sources lacked the detail necessary for a comprehensive analysis of marketplace behavior.

The data used for the analysis in this report are timely and contain the level of detail needed to offer a comprehensive look at the market for lamps. Specifically, point-of-sales (POS) data from five major sales channels through which lamps are sold (food, drug, mass merchandiser, home improvement, and hardware stores) contain line-item detail³ on monthly lamp sales for both California⁴ and the entire nation. These data are used to obtain information about overall lamp sales in the residential lighting market, as well as provide lamp sales trends over time, in different geographic regions, and for a variety of sales channels. Including a national comparison area provides a context in which to evaluate the

¹ Other measures tracked as a part of this effort are appliances, HVAC, and new construction. Results for these measures are found in the following reports, which are available on www.CALMAC.org: *California Residential Efficiency Market Share Tracking – Appliances 2002*; *California Residential Efficiency Market Share Tracking – HVAC 2003*; *California Residential Efficiency Market Share Tracking – New Construction 2001*.

² Compact fluorescent lamps are promoted through California's Residential Lighting and Appliance Program.

³ Each line item contains such detailed information as the manufacturer, UPC, watts, package size, and quantity sold.

⁴ The California data are further subdivided into the California IOU service territories.

success of California's lighting initiatives. This report presents the analysis of POS data for July 1998 through December 2003.

The remainder of this report provides an overview of the key findings, discusses the lamp sales data, details how the lamp data are classified, and shows the results of the market share analysis.⁵

3. Lamp Sales Data

Point-of-Sale Data Sources

Most large retail stores today employ bar code scanners and computers to automatically maintain product inventory, pricing, and sales data. These data are sampled and aggregated by specialized market research firms and available for a wide range of consumer products. Itron identified the numerous research firms that supply POS data and evaluated their products for use in this study. Ultimately, POS data were purchased for the retail channels through which residential light bulbs are typically sold: food stores, drug stores, mass merchandisers, and home/hardware stores.⁶ Though most lamps sold to the residential market are through these channels, it should be noted that the data analyzed in this report do not include sales through other relatively smaller channels, such as club warehouse stores, the Internet, small independent stores, and direct sales from the manufacturer to the consumer.⁷

The lighting data are purchased in an unprocessed spreadsheet format and then converted into a structured electronic database categorized by various levels of product efficiency and performance. These data include universal product code (UPC), lamp-type indicator, location sold, retail sales channel, and monthly counts of units sold for nearly 14,000 different lamps. This database is updated every time a new set of data is received for analysis. Therefore, the figures contained in this report are continually updated with each report released.

Food Stores, Drug Stores, and Mass Merchandisers

Consumer sales data for food, drug, and mass merchandisers are obtained from ACNielsen.⁸ These sales data are collected from a sample of food stores with revenue over \$2 million,

⁵ A four-page companion report titled *California Lamp Trends 2002, Volume 2* summarizes the findings in this report.

⁶ Ecos Consulting. *Lighting the Way to Energy Savings, Volume 2*. Prepared for the Natural Resources Defense Council. December 1999.

⁷ Discussions with industry professionals estimate lamp sales outside the major retail channels at 10 to 20%.

⁸ ACNielsen Company, Schaumburg, IL.

drug stores with revenue over \$1 million, and mass merchandisers with revenue over \$1 million from major metropolitan areas (regions) across the U.S. Data from grocery stores are collected in 52 regions and data from drug stores and mass merchandisers are collected from 11 regions.

ACNielsen uses a stratified sample design to measure consumer sales across different geographic regions and retailers. ACNielsen projects sample data from individual stores to represent sales data across a given region. This projection is based on a “ratio estimation” procedure, which uses a combination of total store counts and dollar sales volume to weight store level data up to a regional level. ACNielsen uses this same process to project regional data to national data. The sample selection process also accounts for socioeconomic differences such as urban vs. rural, city vs. suburb, ethnic vs. non-ethnic, high income vs. low income, etc. This sampling strategy provides a complete picture of these retail channels, taking into account variances by retailer, geography, and other factors.

A couple of caveats to these data should be noted. First, sales data for food stores, mass merchandisers, and drug stores cover only specific major metropolitan and regional areas. As such, Itron used U. S. Census Bureau⁹ population data to scale these regional and metropolitan sales to the California state level and to individual IOU service territories. Specifically, sales data from California metropolitan areas were expanded to represent sales data for all of California using population as the weighting factor. Total California sales were then proportioned to each of the IOU service territories and areas not covered by the IOUs by using a combination of utility service area maps and population data. This approach required certain assumptions about the demographic similarities of parts of California to the whole, and is likely not as accurate as the results that could have been obtained by doing a customized (and costly) sampling in all parts of the state. This scaling process is likely to be reasonably accurate for grocery stores, where original sample sizes were substantial, but less precise for mass merchandisers and drug stores, due to of the relatively small sample size.¹⁰

A second caveat is that these data cover only stores above a certain sales volume threshold that use computerized inventory control. As such, it does not count smaller “mom and pop” stores, which might collectively account for 10 to 20% of lighting sales in food and drug stores.¹¹

⁹ U.S. Census Bureau data obtained from www.census.gov for July 1998, July 1999, and July 2000.

¹⁰ Using population weighted expansion factors is a reasonable approach. However, the project team recognizes that it does assume that lamp sales per household through these channels in areas outside the regions covered by the data are the same. To the extent promotional and product offering differ by mass merchandisers across regions, this assumption could lead to over or under reporting sales of certain lamp types.

¹¹ From conversations with lighting industry professionals.

Additionally, a large mass merchandiser discontinued supplying detailed data to ACNielsen. Detailed data is still available for the other large mass merchandiser stores in both California and the rest of the U.S., but ACNielsen's estimates no longer include the chain that dropped out of the sample. However, while this chain does not provide skew level detail, they have agreed to provide ACNielsen with their total U.S. lamp sales, by manufacturer. Therefore, since 2002, the project team uses store counts and sales volumes, combined with a ratio of the missing retailer's portion of the mass market, to weight up the data to estimate the entire mass market in California.

Hardware and Home Improvement Center Stores

Consumer sales data for national and independent hardware and home improvement center stores are obtained from Triad Vista (Triad).¹² Triad collects hardware and home improvement center (H&H) data from stores across four distinct regions: Northeast, Midwest, South, and West. A stratified sample design was used to develop the sample. The four main characteristics behind the sample selection process are retailer, geographic region, store type, and store size. Sample stores have been chosen to be representative of all stores across these four characteristics. These sample data have been scaled to the regional or national level by comparing individual store sales volumes and number of stores to overall sales for a given region.¹³ Itron and Triad also worked to develop a similar system to develop projections for California and each of the utility service areas.

Unfortunately, as of December 2002 national chain home centers no longer provide point-of-sale (POS) data for lamps. However, beginning in the second quarter of 2001, sales data for H&H were available separately which made it possible to estimate 2003 sales for home centers using trends observed over the last five years. Therefore, throughout this report, dashed lines are used to indicate sales/shares that include the estimated home improvement center results.

Lamp Classification

Lighting data are mapped into four major classes: fluorescent, halogen, incandescent, and special.¹⁴ Fluorescents, halogens, and incandescents are also further broken down into subcategories based on lamp configuration and application, as shown in Figure 1. Specifically, lamps are first broken out by base type. Medium screw-based bulbs are separated from all other base types since most can be replaced by a CFL screw-based bulb.

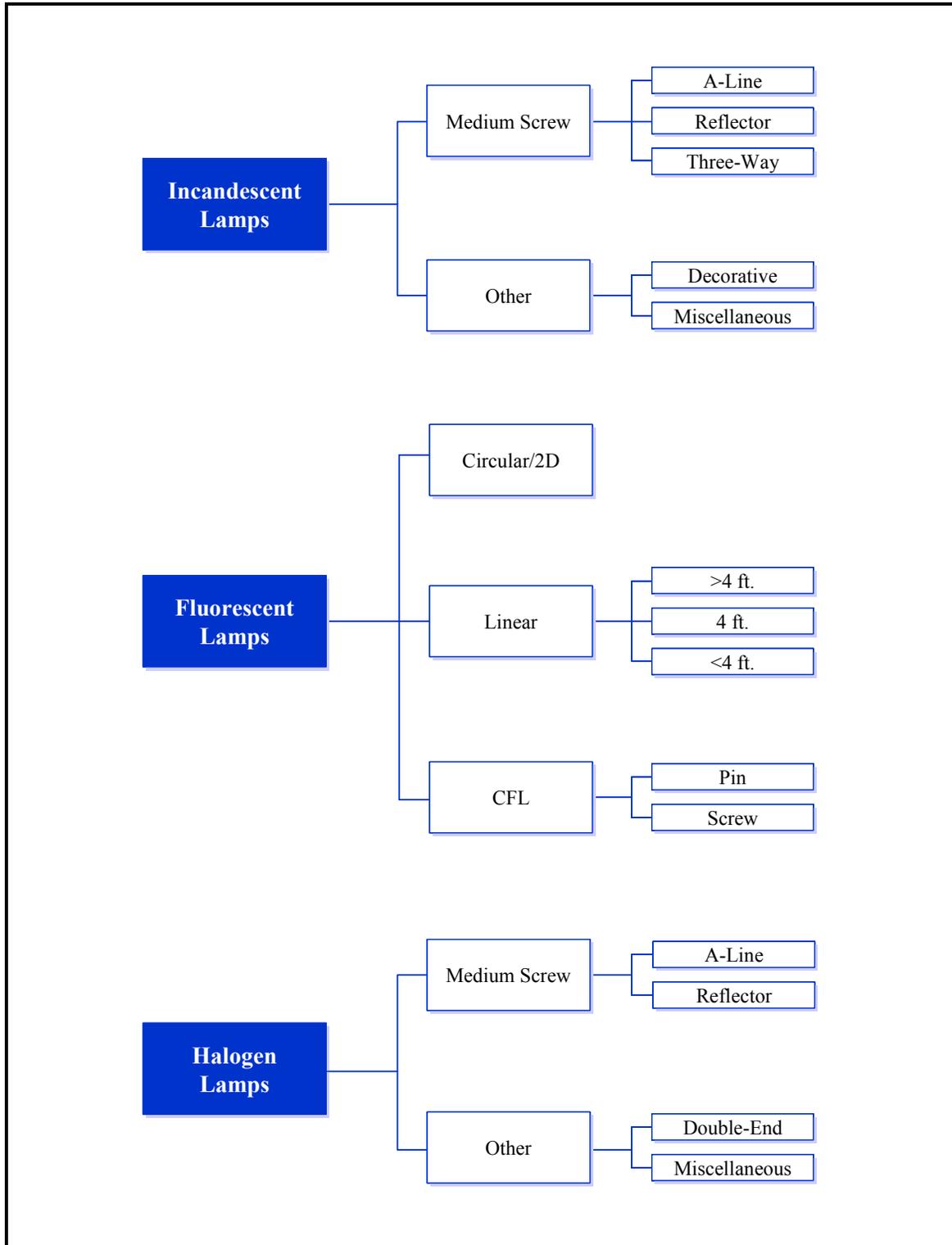
¹² Triad Vista, a division of CCITriad, Livermore, CA.

¹³ It should be noted that one strength of the Triad data is that it contains a census of store outlets for a number of the home improvement and hardware chains. As such, no weighting is required for these elements of the data.

¹⁴ Special lamps are those not used for general household lighting and include bug lamps, Christmas lights, nightlights, and heat lamps among others.

“Other” based bulbs include small (typically decorative, i.e., candle and flame-tipped bulbs) and large screw-based bulbs as well as pin-based bulbs.

Figure 1: Lamp Classifications



The data from the two POS data sources are similar in nature, but require different strategies to classify. Each data set contains at least one descriptor field that is key to identifying lamp type. Using a series of database queries, Itron identifies many of the lamps and classifies the remainder manually using manufacturer websites and catalogs.

Food Stores, Drug Stores, and Mass Merchandisers

This data set includes only one descriptor field. This field included keywords and abbreviations that provided details about the lamp. The descriptor field uses consistent terminology and a key was provided to these abbreviations. Using this key, Itron runs a series of queries every time a new data set is received in order to search for keywords to classify the lamps.

Hardware and Home Improvement Center Stores

This data set includes five descriptor fields. The first four fields indicate categories for the lamps. These fields classify the majority of the lamps. However, for many line items, the information in these fields did not provide the level of detail required to classify the lamps as needed by the project team. The remaining lamps are then classified using data contained in the fifth descriptor field. These descriptors are combined with information from lighting experts, lighting manufacturers' websites and catalogs, and publications in order to correctly classify the remaining lamps.

For both data sets, the descriptor fields sometimes contain ambiguous terms that could cause improper classification of lamps (i.e., a descriptor with keywords that could classify the line item into multiple lamp categories). To ensure data quality, Itron continually reviews the data manually and corrects the data where necessary.

Ultimately, lamps are sorted to allow for comparisons between lamps that are compatible and used for the same general purpose while preserving information on all lamps so that general lighting trends and other information could be harvested.

4. Residential Lamp Sales

This section summarizes the analysis of the POS data and reports the subsequent findings. Itron performs analysis on the overall residential lighting market with an emphasis on interchangeable lamps. The findings are presented so that comparisons can be made based on different variables including time, sales channel, wattage, and other variables of interest. This analysis provides insight on the shape of the residential lighting market nationally, in California, and in each IOU service territory.

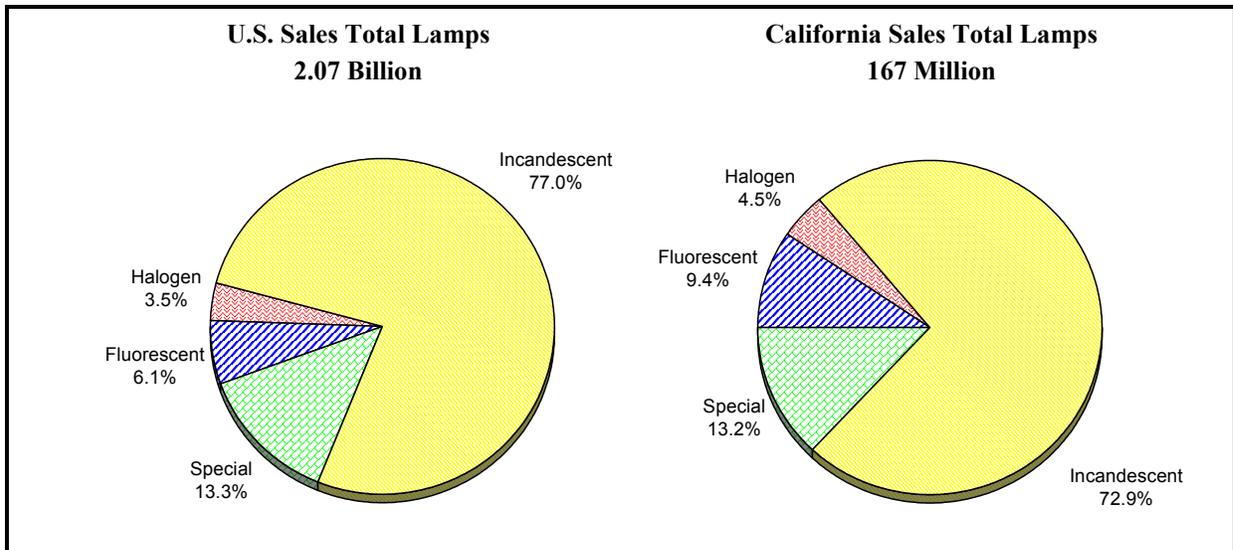
All Sales versus Residential Sales

The data from the five market channels were originally sorted into the following four categories: incandescent, fluorescent, halogen, and special. However, lamps sold through these channels are not necessarily used in the residential sector. For example, hardware stores and home improvement centers sell to contractors, which in turn use the lamps in commercial jobs.¹⁵ Using information from previous studies and lighting industry professionals, fluorescent and incandescent lamps found in packages greater than 12 and halogen lamps found in packages greater than eight were removed from the analysis. Purchasing fluorescent lamps in such bulk is rare for consumers and far more common with contractors. In addition, Itron determined that HID lamps and fluorescent tubes greater than four feet should be removed from analysis because the vast majority of these lamps are used in the commercial/industrial sector.

Sales by Bulb Type

Comparing lamps by bulb type reveals that there is a slightly larger market share of fluorescent bulbs in California than there is in the U.S. Figure 2 shows that in California, fluorescent bulbs are 9.4% of lamp sales, while in the U.S., fluorescent bulbs comprise only 6.1% of lamp sales.

Figure 2: Lamp Sales – by Type – 2003

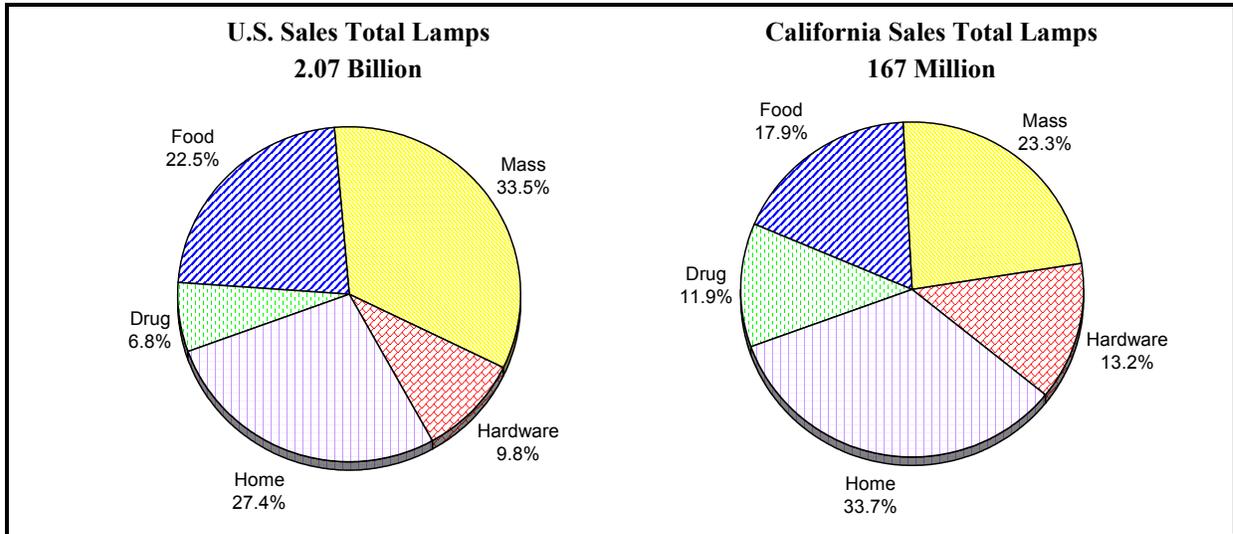


¹⁵ Ecos Consulting. *Lighting the Way to Energy Savings, Volume 2*. Prepared for the Natural Resources Defense Council. December 1999.

Sales by Market Channel

Comparing lamps by market channel reveals a shift in purchasing preferences for U.S. and California consumers. Figure 3 shows that hardware stores and home improvement centers¹⁶ account for a larger percentage of lamp sales in California than in the overall U.S. Correspondingly, mass merchandisers contribute a smaller percentage of lamp sales in California than they do nationally.

Figure 3: Lamp Sales – by Market Channel – 2003



Sales by Lamp Classification

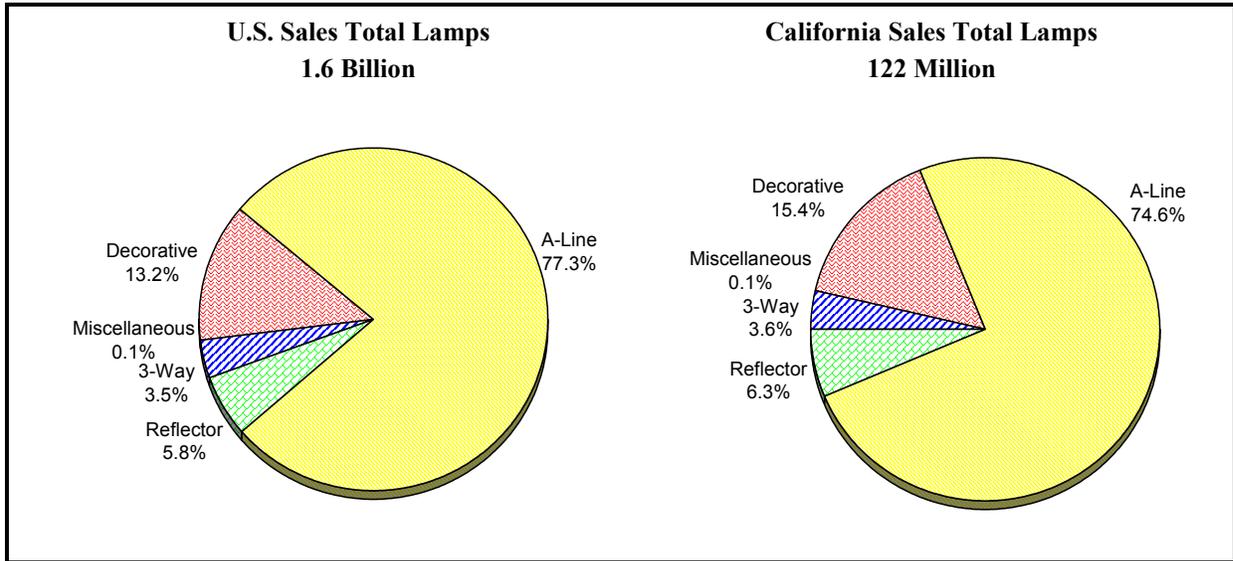
Using the lamp classification strategy in Figure 1, relative counts of each subcategory within incandescents, fluorescents, and halogens are presented below. This section details how sales in each of these lamp classes are distributed by specific lamp type.

Incandescents

Figure 4 presents sales of incandescent lamps by type for the U.S. and California and shows that a-line medium screw-based lamps dominate incandescent lamp sales. In both the U.S. and California, these lamps account for approximately three-fourths of all incandescent unit sales.

¹⁶ Note that as explained in Section 3, as of December 2002 national chain home centers no longer provide point-of-sale (POS) data for lamps. However, 2003 sales for home centers throughout this report were estimated using trends observed over the last five years.

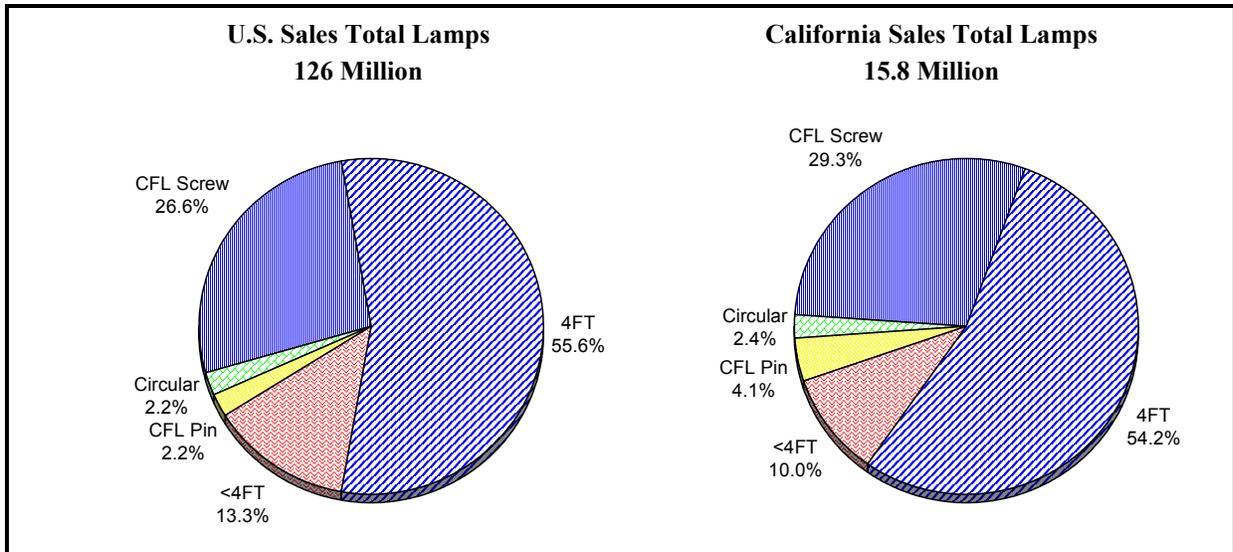
Figure 4: Incandescent Lamp Sales – by Type – 2003



Fluorescents

Figure 5 presents fluorescent lamp sales by type for the U.S. and California. As shown, 4-foot lamps comprise the largest share. CFL screw-ins have the second largest share of the fluorescent lamp market both in California and the U.S. Additionally, CFL screw-ins and CFL plug-ins contribute a larger percentage to overall fluorescent lamp sales in California than in the U.S.

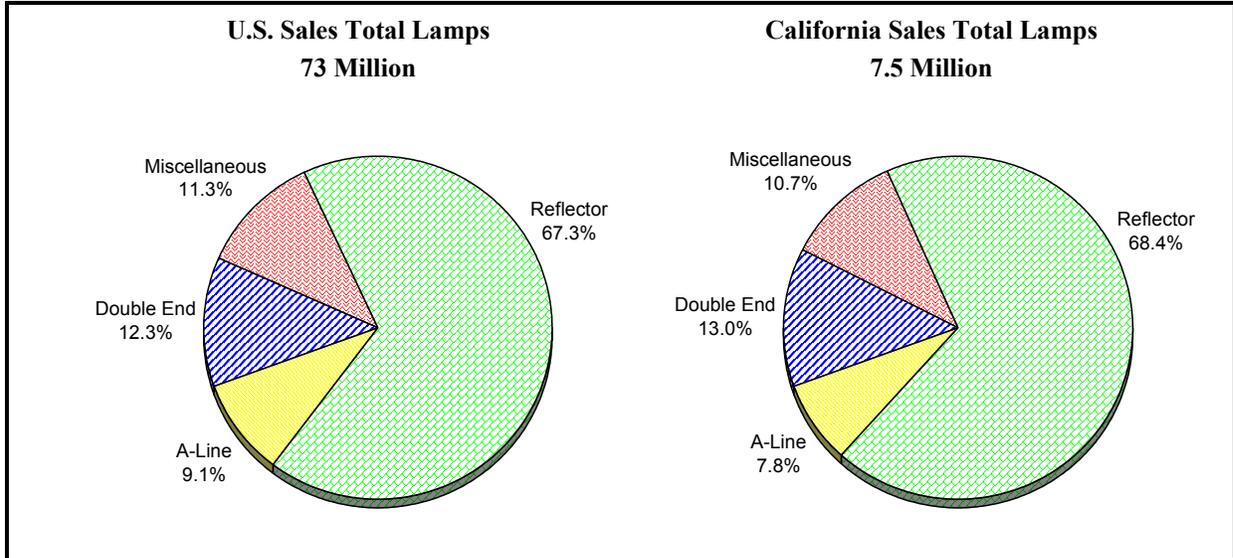
Figure 5: Fluorescent Lamp Sales – by Type – 2003



Halogens

Figure 6 presents residential halogen lamp sales by type for the U.S. and California. Of the three major lamp classifications for residential settings, halogens contribute the smallest share to overall lamp sales. As shown in Figure 6, reflectors dominate halogen lamp sales. Only subtle differences continue to exist between the distribution in U.S. halogen sales and California halogen sales.

Figure 6: Halogen Lamp Sales – by Type – 2003



5. Medium Screw-Based Lamp Sales

Table 1 provides a snapshot of total unit sales of residential medium screw-based lighting for calendar years 2000 through 2003. This table provides some perspective on the number of light bulbs sold annually across the U.S. and the respective shares of California and the IOU service areas. Sales of medium screw-based bulbs in California account for approximately 7.6% of overall U.S. sales during 2003.

Sales of medium screw-based bulbs decreased in both California and the U.S. between 2000 and 2001. Specifically, sales of medium screw-based incandescent bulbs decreased by approximately 22 million (19%) in California and 53 million (4%) in the U.S. During this same period, CFLs sales increased by nearly 15.3 million in the U.S. and 4.6 million in California.

Table 1: Annual Medium Screw-Based Lamp Sales (in thousands)

Region	CFL				Halogen				Incandescent			
	2000	2001	2002	2003	2000	2001	2002	2003	2000	2001	2002	2003
U.S.	6,733	22,043	27,036	33,517	6,432	7,779	6,568	6,703	1,355,147	1,301,783	1,277,198	1,232,906
CA	1,154	5,740	4,462	4,634	722	750	620	586	114,558	92,768	95,062	90,964
SCE	326	1,678	1,214	1,369	227	229	186	184	35,458	29,711	30,469	30,132
SDGE	156	505	356	434	64	69	61	60	9,040	7,342	7,348	7,197
PG&E	414	2,538	2,141	1,999	264	277	220	196	47,883	37,566	38,384	35,246
Other	259	1,019	752	541	167	175	154	50	22,177	18,149	18,860	12,935

* For lamp sales prior to 2000, please see: *California Residential Efficiency Market Share Tracking – Lamps 2001*.

Medium Screw-Based Lamp Sales over Time

Figure 7 illustrates the sales of medium screw-based incandescent bulbs for both California and the rest of the U.S.¹⁷ As shown, incandescent lamp sales peak during periods of less daylight (autumn and winter) and dip during periods of more daylight (spring and summer). Aside from the seasonal nature of incandescent lamp sales, they remained relatively constant until the second quarter of 2001 when bulb sales decreased by 21% compared to the second quarter of 2000 for California. This drop off in incandescent sales coincides with a dramatic increase in CFL sales. There are several possible reasons for this decrease.

- There has been a tremendous increase in sales of CFLs. A combination of the increase in sales of these bulbs and their longer life¹⁸ is one reason that the replacement market for medium screw-based incandescent bulbs has become smaller.
- CFLs tend to be purchased in packs of one or two and consumers tend not to purchase spare replacement bulbs. On the other hand, consumers tend to purchase incandescents in packs of four, six, or eight. As such, the ramp up in CFL sales could cause a disproportionate decrease in incandescent sales. Interviews with industry experts suggest that a ratio of four to one would be reasonable.
- Some of the decreased incandescent sales between 2000 and 2001 may be attributed to the energy crisis in California. During 2001, there was a massive media campaign to inform Californians on ways to conserve energy. Some of the recommended measures may have had an effect on the number of bulbs needed in the market.

¹⁷ “The rest of the U.S.” includes all areas of the United States except California.

¹⁸ See the section Impact of Lamp Life on Medium Screw-Based Lamp Shares on page 28.

After the decrease in 2001, California’s incandescent sales remained fairly stable during 2002. During 2003, sales in mass merchandiser and hardware stores remained the same but sales in food and drug stores dropped slightly. Therefore, after estimating sales in home improvement centers, total sales in California are estimated to have decreased approximately 4%.¹⁹

Figure 7: Incandescent Medium Screw-Based Lamp Sales by Quarter

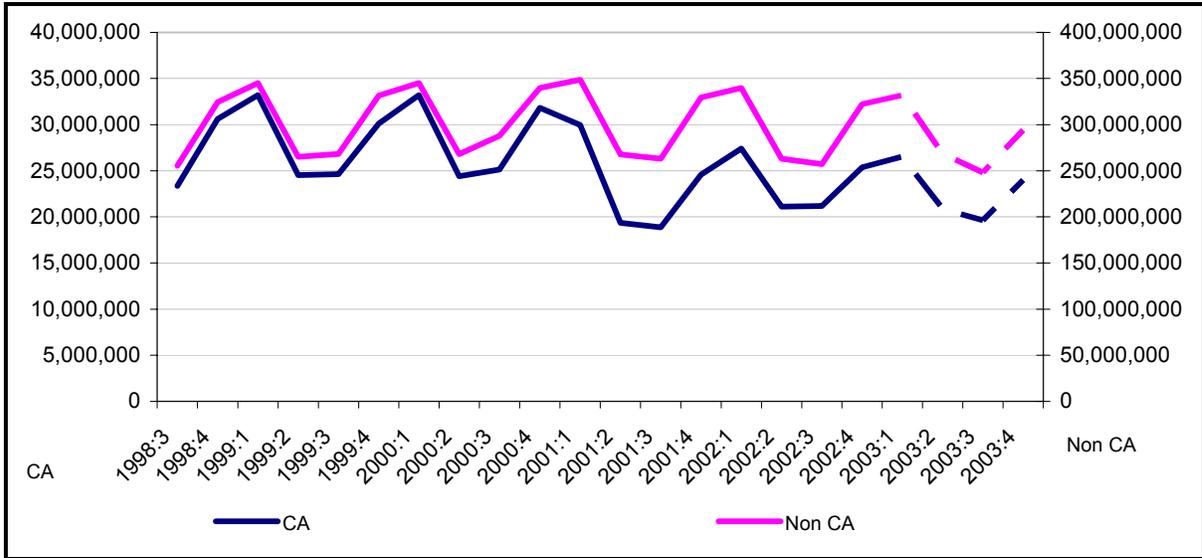


Figure 8 illustrates sales of medium screw-based CFLs for California and the rest of the U.S.²⁰ CFL shares in California spiked during the second quarter of 2001, corresponding with the California energy crisis. After the spike, California’s CFL sales declined throughout 2002, while CFL sales in the rest of the U.S. continued to climb. During the first half of 2003, California’s CFL sales increased for the first time since 2001 and sales in the rest of the U.S. hit their highest numbers to date at nearly 10 million in the second quarter. The increases seen during early 2003 were primarily from sales in mass merchandise stores. Through conversations with retailers, there were tremendous sales of CFLs of one manufacturer’s bulbs, through one retail chain.

¹⁹ Note that the dotted lines in Figure 7 represent the sum of the actual results for drug, food, mass merchandise, and hardware stores and estimated results for home centers.

²⁰ “The rest of the U.S.” includes all areas of the United States except California.

Figure 8: CFL Medium Screw-Based Lamp Sales by Quarter

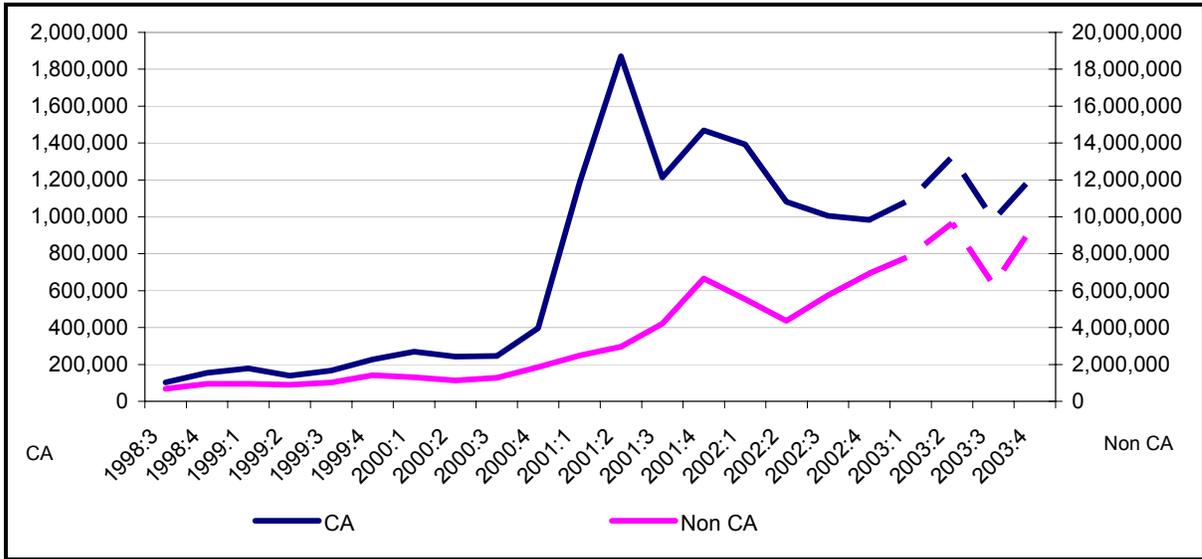
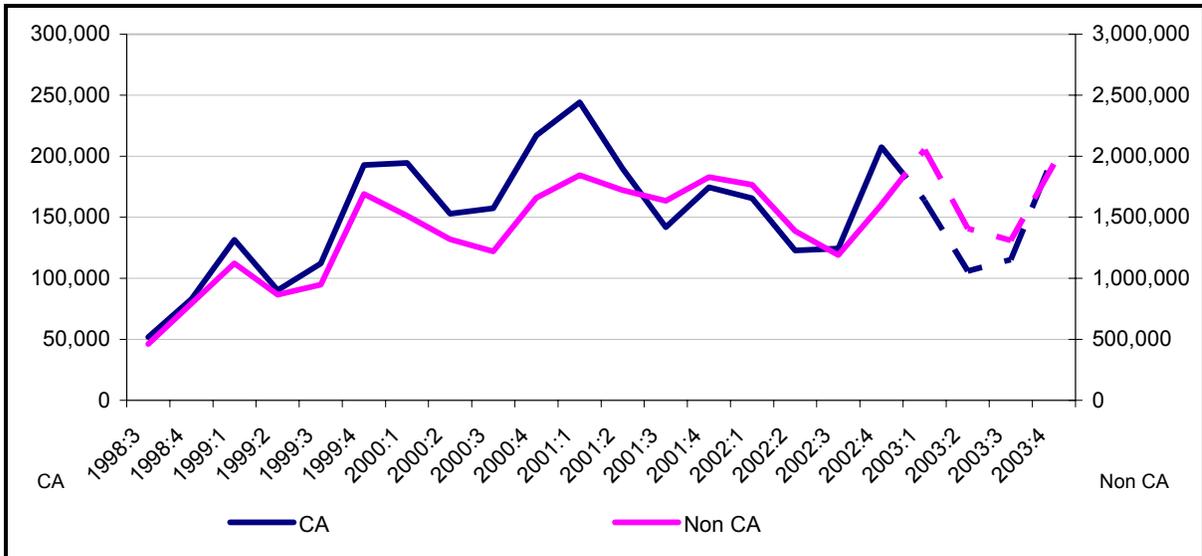


Figure 9 illustrates sales of medium screw-based, a-line, halogen bulbs for California and the rest of the U.S.²¹ Over the last four years, annual halogen sales were relatively constant with some minor fluctuations.

Figure 9: Halogen Medium Screw-Based Lamp Sales by Quarter



²¹ "The rest of the U.S." includes all areas of the United States except California.

Sales by Lamp Type as a Percentage of Medium Screw-Based Lamp Sales

Analysis in this section focuses on interchangeable medium screw-based lamps sold for use in residential buildings. This section presents the shares of each medium screw-based lamp type as a percentage of all medium screw-based a-line lamps.

CFLs

An important element of the RMST study is to determine the market share of CFL lamps in the residential sector. For purposes of this analysis, the market share of CFLs is defined to be the share of CFLs among lamps of similar type and application.²² Given this definition, the most logical comparisons are between the medium screw incandescents, medium screw halogens, and medium screw CFLs. It should be noted that although pin-based CFLs could be a replacement for incandescents, these CFLs require a special socket ballast or dedicated fixture to operate. Thus, for the comparisons presented in the following analysis, only screw-based CFLs were included because these can directly replace a medium screw-based incandescent or halogen lamp without changing or modifying the fixture. In addition, efforts in California to promote CFLs are focused on ENERGY STAR compliant lamps, which are screw-based.

Figure 10 illustrates the share of medium screw-based CFLs as a percentage of total medium screw-based lamps sold by quarter for California and the rest of the U.S.²³ As shown, the market share of CFLs in California more than tripled from the fourth quarter of 2000 to the first quarter of 2001 (1.2% to 3.8%). The highest share shown in Figure 10 occurs during the second quarter of 2001 when the market share of CFLs rose to approximately 8.7%. As previously mentioned, that peak in share coincides with California's "energy crisis." Throughout 2002, California's CFL market share continued to decrease. In 2003, California's CFL market share began to increase for the first time since 2001 reaching 6% in the second quarter of 2003 and then hovering just below 5% during the last two quarters. On the other hand, the CFL market share in the rest of the U.S. has continued to increase each year since 2000 from just under a half of a percent in 2000 to nearly 2% in 2002 and then to 2.5% in 2003.

²² Before 2002, most CFLs available were intended to replace the typical a-line incandescent bulb. Therefore, the results presented in this report since 2000 have compared CFLs to a-line medium screw-based incandescents and halogens. However, over the last couple of years, lamp manufacturers have begun to produce a wider variety of CFLs including 3-way and dimmable lamps, reflectors, and globe shaped CFLs. Therefore, beginning in the 2004 Lamp Report, an additional analysis will be conducted comparing each subcategory of CFL to its incandescent and halogen counterparts.

²³ "The rest of the U.S." includes all areas of the United States except California.

Figure 10: CFL Share of Medium Screw-Based Lamps

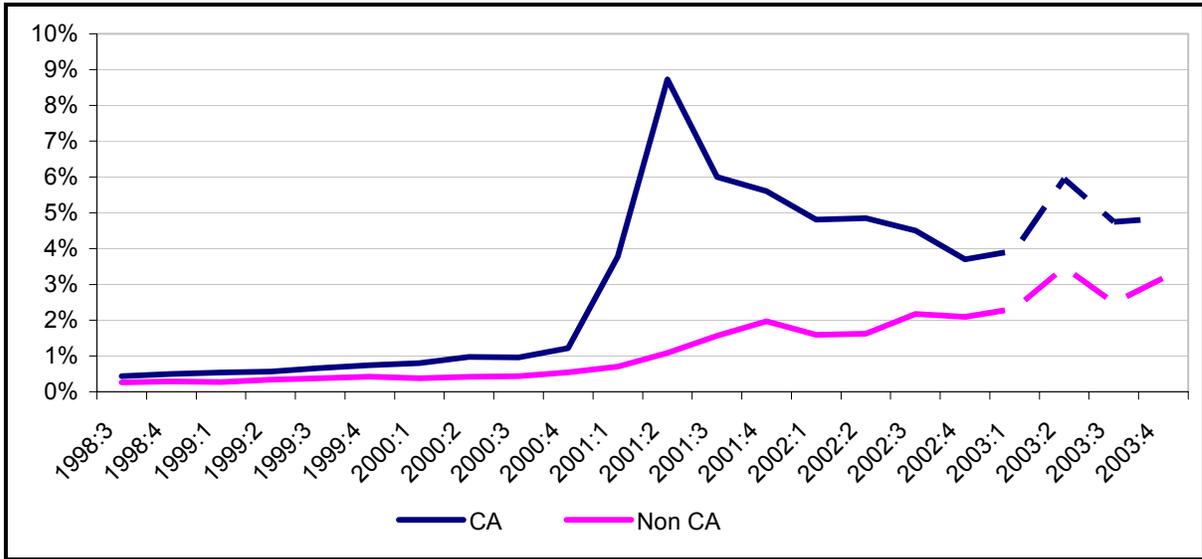
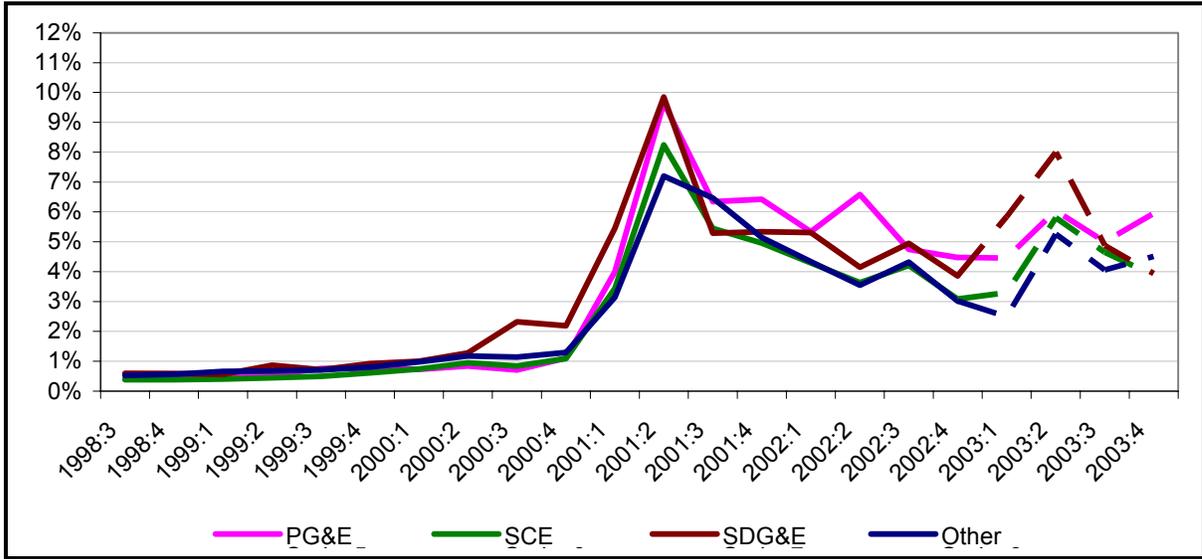


Figure 11 presents the medium screw-based CFLs as a percentage of total medium screw-based lamps sold by quarter for each of the California IOU service territories and for the remaining non-IOU areas in California. Figure 11 reveals that CFL lamp share trends are similar across utility service areas prior to 2000. Noticeable differences, however, were first observed in third quarter of 2000 when SDG&E CFL share spiked to over 2% which coincided with their customers' high energy bills. The next noticeable difference in trends occurred in mid 2002 when the CFL share in PG&E's service area increased to 6.5%, while shares in the other utility regions declined. By early 2003, shares in all regions had dropped considerably since the peak in 2001. Then in mid-2003, CFL shares in SDG&E's territory skyrocketed to 8.6%, nearly reaching its all-time high during the 2001 energy crisis. This short-lived increase is due to increased CFL sales in food stores during the first and second quarters of 2003 that were not seen in the rest of the state. Similarly, PG&E's increase in the fourth quarter of 2003 is due to increased CFL sales in both drug and food stores.

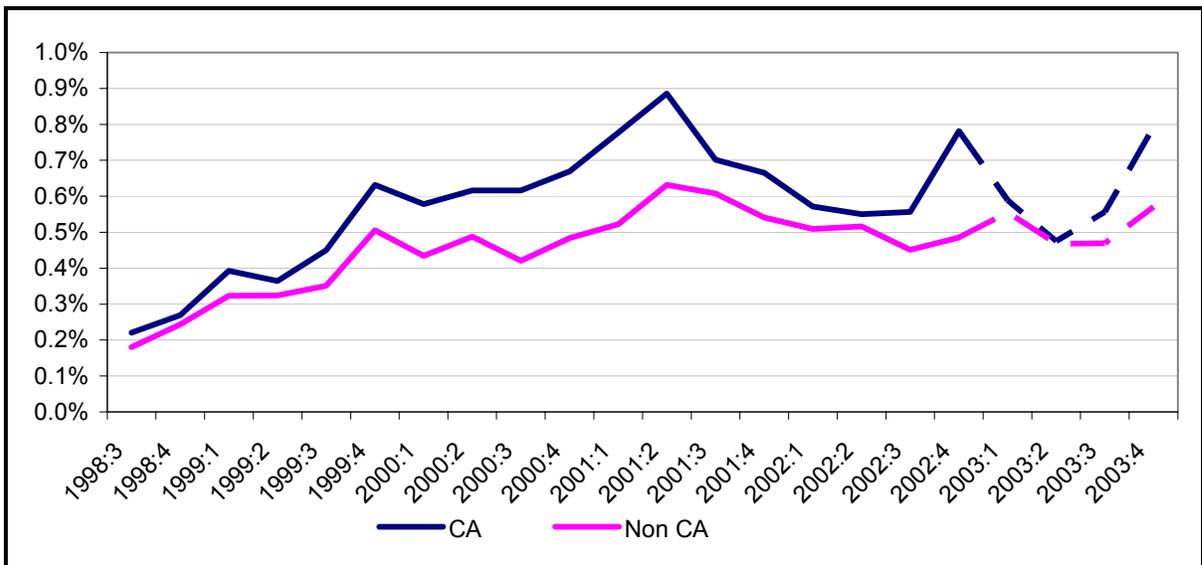
Figure 11: CFL Share of Medium Screw-Based Lamps – California IOUs and Other²⁴



Halogens

Figure 12 illustrates the share of medium screw-based halogens as a percentage of screw-based lamps sold by quarter for California and the rest of the U.S. Figure 12 illustrates that halogen shares in California increased from 0.2% to 0.9% from 1998 to 2001, but have leveled off over the last two years. A similar trend appeared in the rest of the U.S.

Figure 12: Halogen Share of Medium Screw-Based Lamps

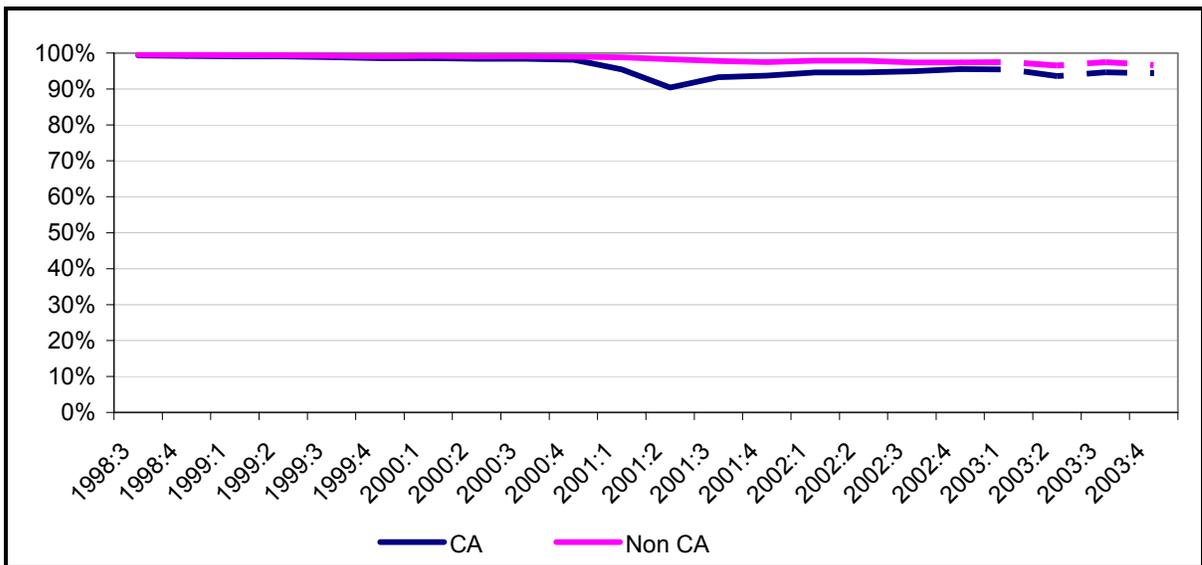


²⁴ "Other" includes territories in California not served by the three electric IOUs.

Incandescents

Shares of incandescent sales, though still an overwhelming majority of medium screw-based lamp sales, dropped almost 10% in California during the first two quarters of 2001. Their market share did rebound slightly later that year, as well as throughout 2002. As with CFLs, incandescents showed little change from quarter to quarter during 2002. Overall, the graph clearly illustrates that incandescent shares in California have decreased more over time than in the rest of the U.S. However, the gap between the two is becoming continually smaller.

Figure 13: Incandescent Share of Medium Screw-Based Lamps



Sales per Household of Medium Screw-Based Lamps

Another way to analyze the data is by reviewing overall lamps sold by household. This analysis takes into account the variation in number of households over time and normalizes the sales figures to reflect these changes. The results provide an estimate of how many CFLs, halogens, and incandescents are typically purchased per household.²⁵ Figure 14 and Figure 15 plot medium screw-based CFL and halogen sales, per household, over time and medium screw-based incandescents over time.

As shown in Figure 14, approximately 0.1 CFLs were sold per household in California each quarter of 2003. In other words, nearly 1 in 2 households in California bought a CFL during 2003. CFL sales per household in the rest of the U.S., which had been slowly gaining on California since late 2001, caught up to California’s CFL sales per household in the fourth quarter of 2003.

²⁵ U.S. Census Bureau data obtained from www.census.gov for July 1998, July 1999, and July 2000 were used to determine approximate households for California and the U.S.

Figure 14: Medium Screw-Based CFL and Halogen Sales Per Household

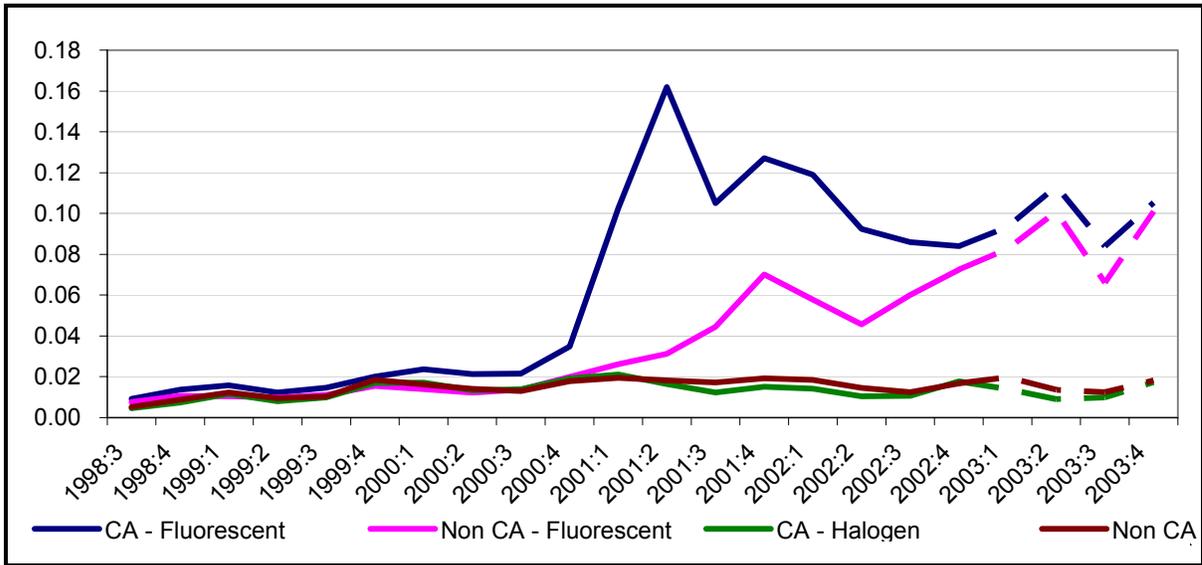
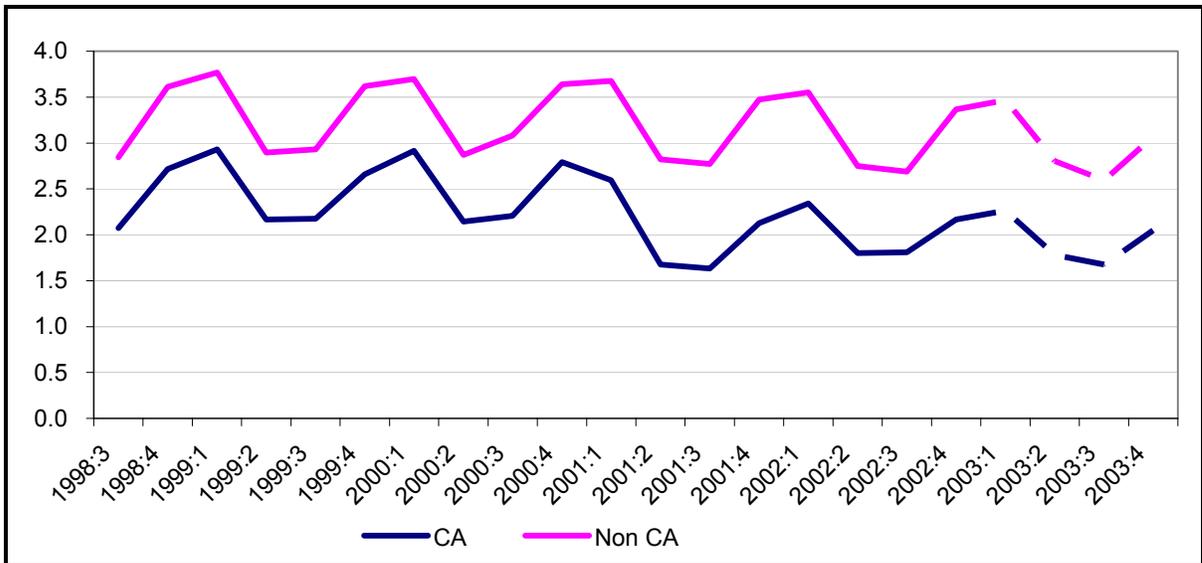


Figure 15 indicates that unlike CFL sales, sales of incandescent medium screw-based bulbs are seasonal. As shown, more bulbs are bought per household during periods of less daylight—the fourth and first quarters.

Figure 15: Medium Screw-Based Incandescents per Household



Because of this seasonality, comparisons are made on an annual basis. Table 2 summarizes data from 1999 to 2003. The table reveals that CFL sales per household are increasing in the U.S. Incandescent sales per household over time are decreasing. California's results again show a larger percent increase in CFL sales between 2000 and 2001 than in the rest of the U.S. In 2003, there is a large increase relative to 2002 in the number of CFLs per household for the U.S. CFLs per household increased to 0.30 from 0.24, while California showed minimal change from 2002 to 2003.

Table 2: Annual Medium Screw-Based Lamps Sold per Household

	1999	2000	2001	2002	2003
U.S. (non-California)					
CFL	0.047	0.060	0.172	0.236	0.302
Halogen	0.051	0.061	0.074	0.062	0.064
Incandescent	13.217	13.292	12.743	12.358	11.937
California					
CFL	0.063	0.101	0.497	0.381	0.396
Halogen	0.046	0.063	0.065	0.053	0.050
Incandescent	9.930	10.058	8.031	8.121	7.771

Sales of Medium Screw-Based Lamps by Market Channel

This section breaks down medium screw-based lamps by type and by market channel. This analysis provides insight on where consumers typically purchase light bulbs.

CFLs

Figure 16 illustrates sales of medium screw-based CFLs by market channel in 2003, while Figure 17 and Figure 18 provide CFL sales, by market channel, by quarter from 2000 through 2003. Figure 16 shows that, in California and the rest of the U.S., hardware/home improvement stores dominate CFL sales. In California, home improvement stores comprise a larger percentage of CFL sales than in the rest of the U.S. Mass merchandisers play a more significant role in overall U.S. lamp sales than in California.

Figure 16: Medium Screw-Based CFL Sales by Retail Channel – 2003

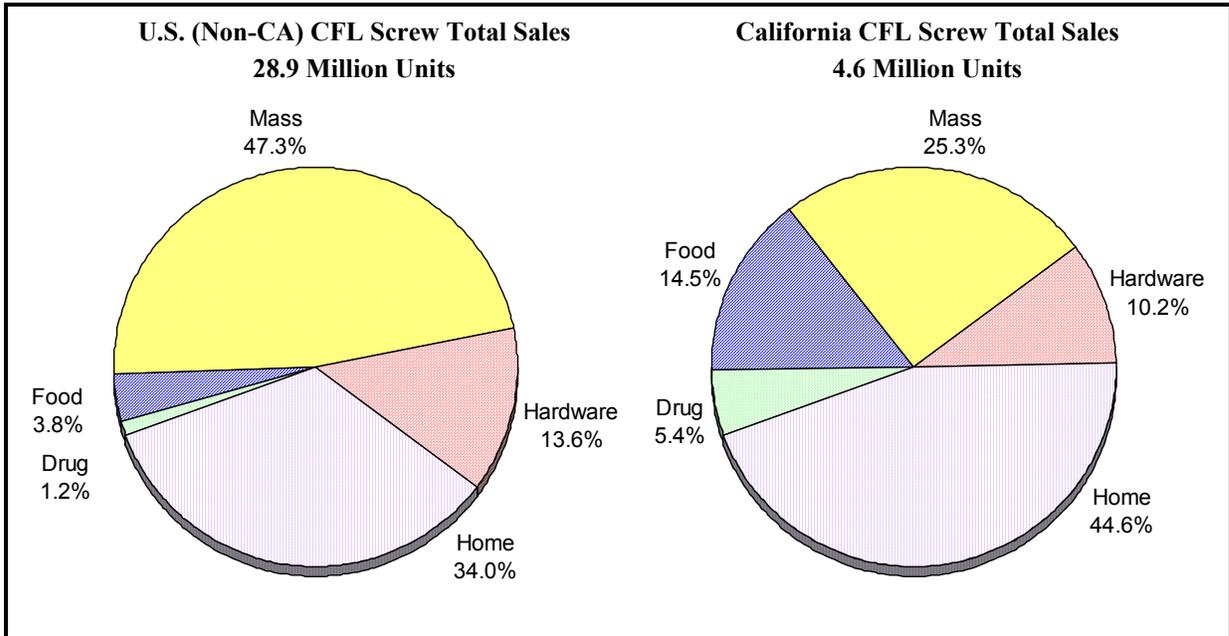


Figure 17 shows that while home improvement centers have had the largest share of California CFL sales since early 2000, mass merchandisers are slowly beginning to sell an increasing share of CFLs. For example, in 2000 mass merchandisers sold approximately 6% of the CFLs that were sold in California. However, in 2003 25% of the CFLs sold were bought at mass merchandiser stores. Figure 18 shows that this trend started earlier and is even more dramatic in the rest of the U.S. where mass merchandisers sold 23% of the CFLs in 2000 and 47% in 2003.

Figure 17: Medium Screw-Based CFL Sales by Retail Channel – California

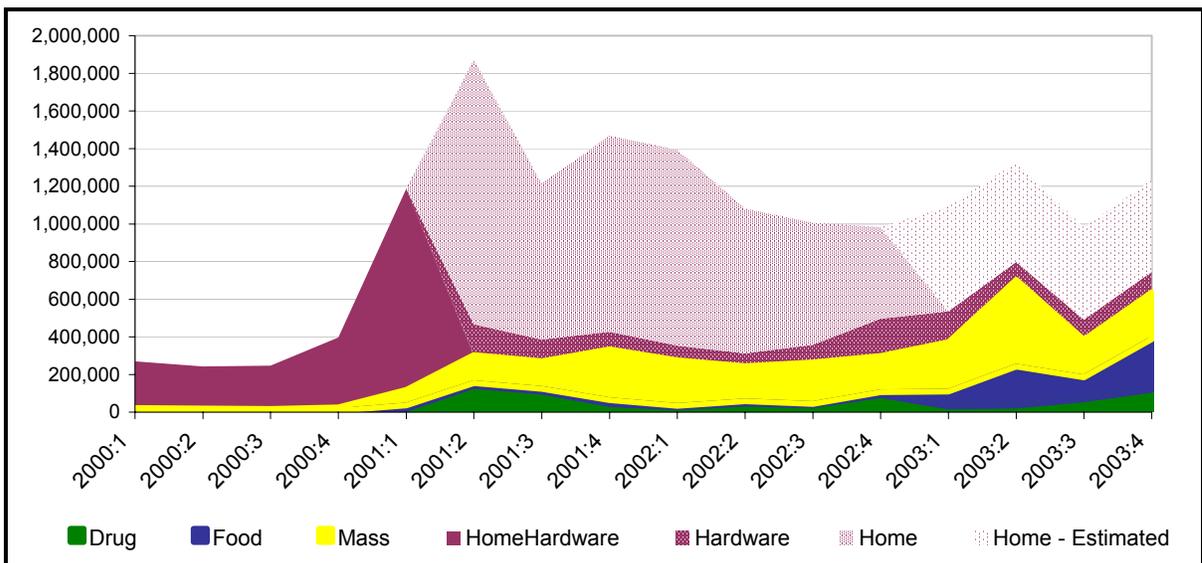
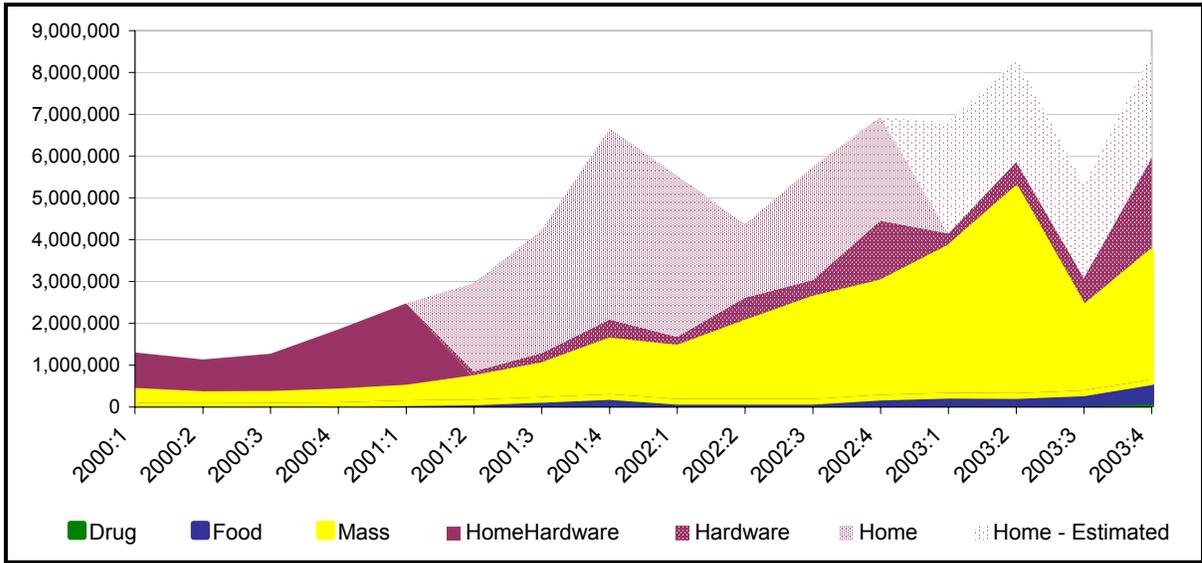


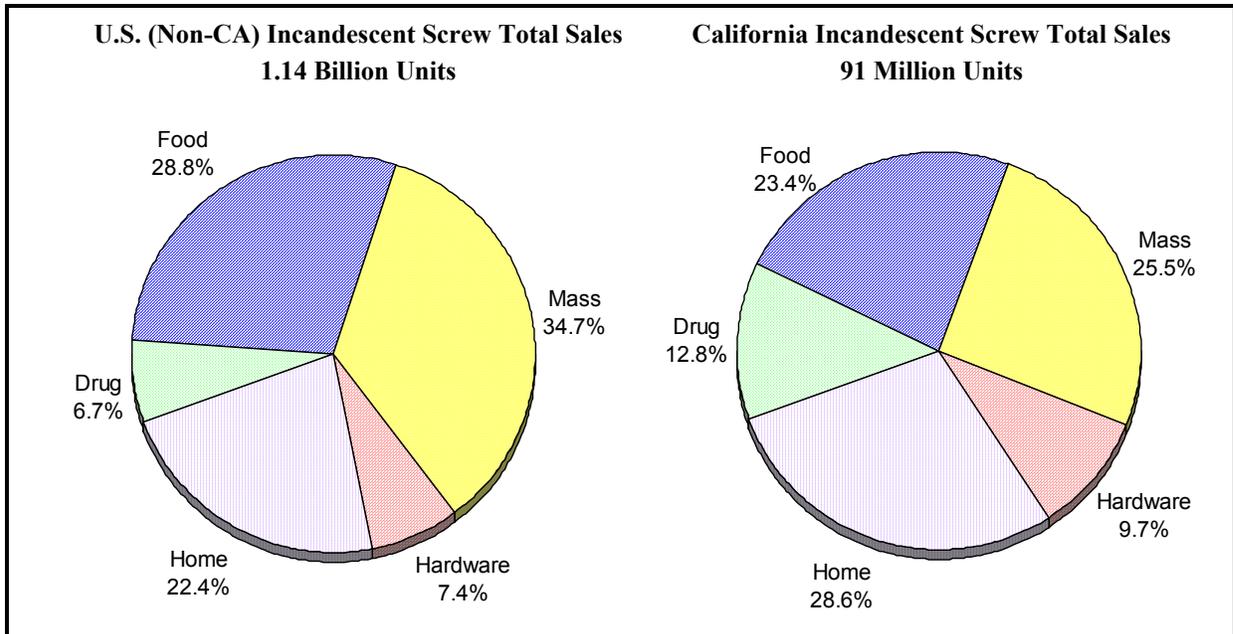
Figure 18: Medium Screw-Based CFL Sales by Retail Channel – U.S. (non-CA)



Incandescents

Figure 19 shows incandescent lamp sales by market channel in the U.S and California, while Figure 20 and Figure 21 provide medium screw-based a-line incandescent lamp sales by market channel and quarter from 2000 through 2003. As shown, incandescent lamp sales are distributed more evenly between sales channels than are CFLs. However, similar to CFLs, the percentage of lamp sold through home improvement stores is greater in California than in the rest of the U.S.

Figure 19: Medium Screw-Based Incandescent Sales by Retail Channel – 2003



The relative distribution of medium screw-based a-line incandescent lamp sales have remained approximately the same over the last four years. While home improvement centers and hardware stores had a small decrease in sales in California, Figure 20 shows that the distribution of sales among channels has remained constant. In addition, Figure 21 shows that mass merchandisers in the rest of the U.S. have sold a large share of medium screw-based a-line incandescent lamps consistently since 2000 (35%).

Figure 20: Medium Screw-Based Incandescent Sales by Retail Channel – California

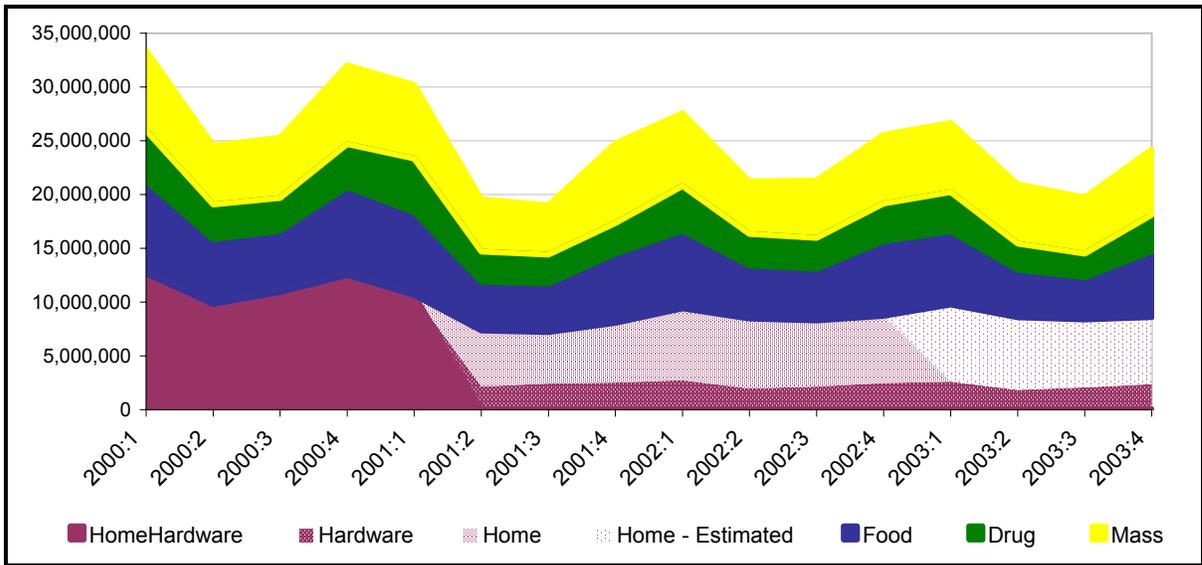
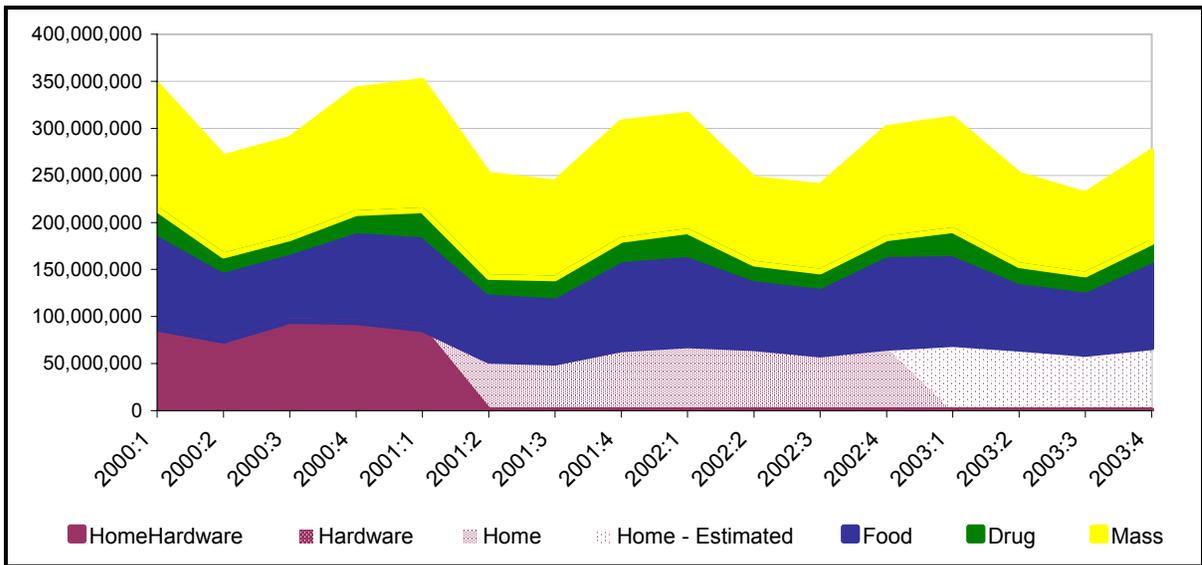


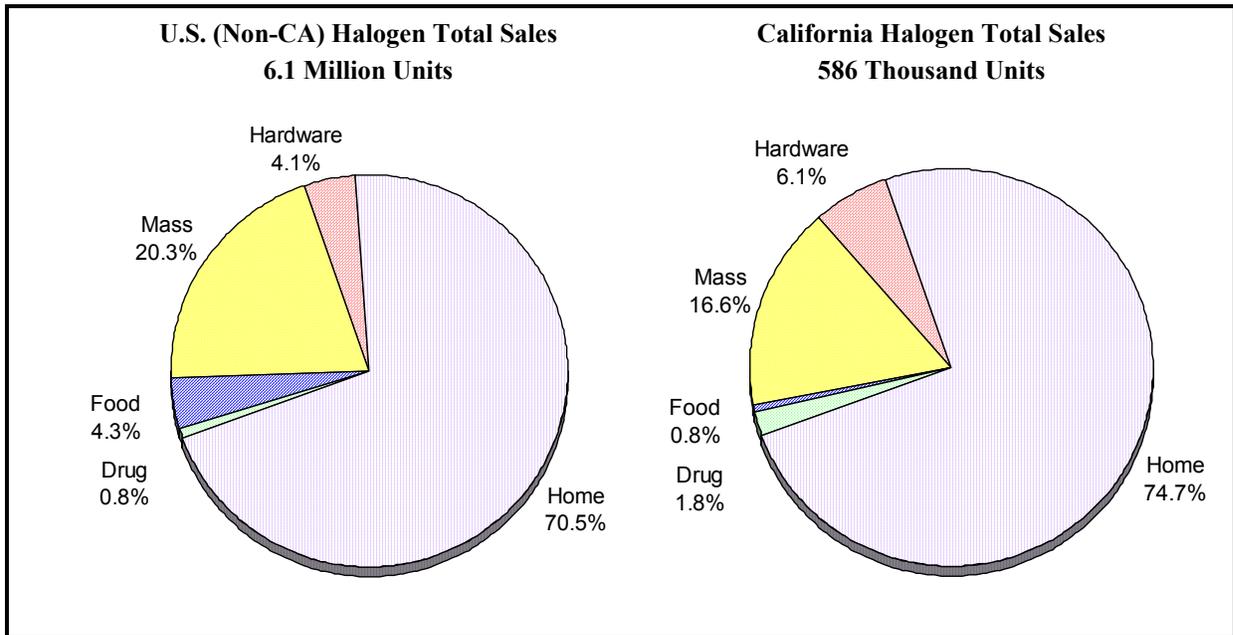
Figure 21: Medium Screw-Based Incandescent Sales by Retail Channel – U.S. (non-CA)



Halogens

Figure 22 presents sales of medium screw-based halogens by market channel in the U.S. and California. As shown, sales of medium screw-based halogens are sold primarily through home improvement stores.

Figure 22: Medium Screw-Based Halogen Sales by Retail Channel – 2003



Sales of Medium Screw-Based CFLs versus Pin-Based CFLs

Figure 23 and Figure 24 present sales of screw-based CFLs versus sales of pin-based CFLs by quarter for California and the U.S., respectively. These graphs show that while medium screw-based CFL sales increased significantly starting in 2001, pin-based CFL sales have remained relatively constant in California and the U.S. over the last five years.

Figure 23: Medium Screw-Based CFL Sales and Pin-Based CFL Sales – California

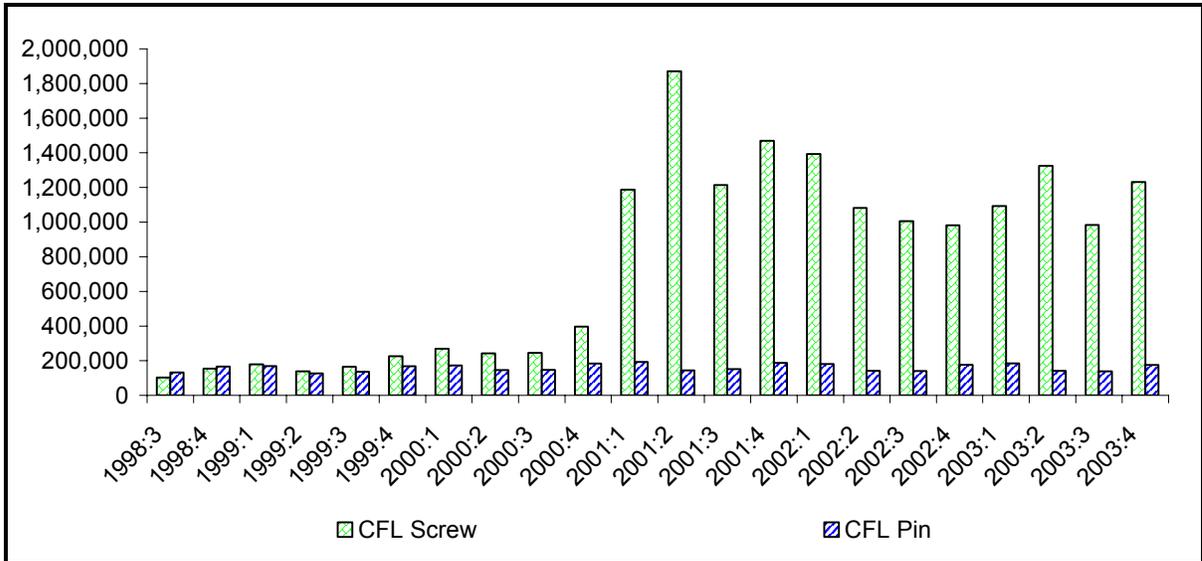
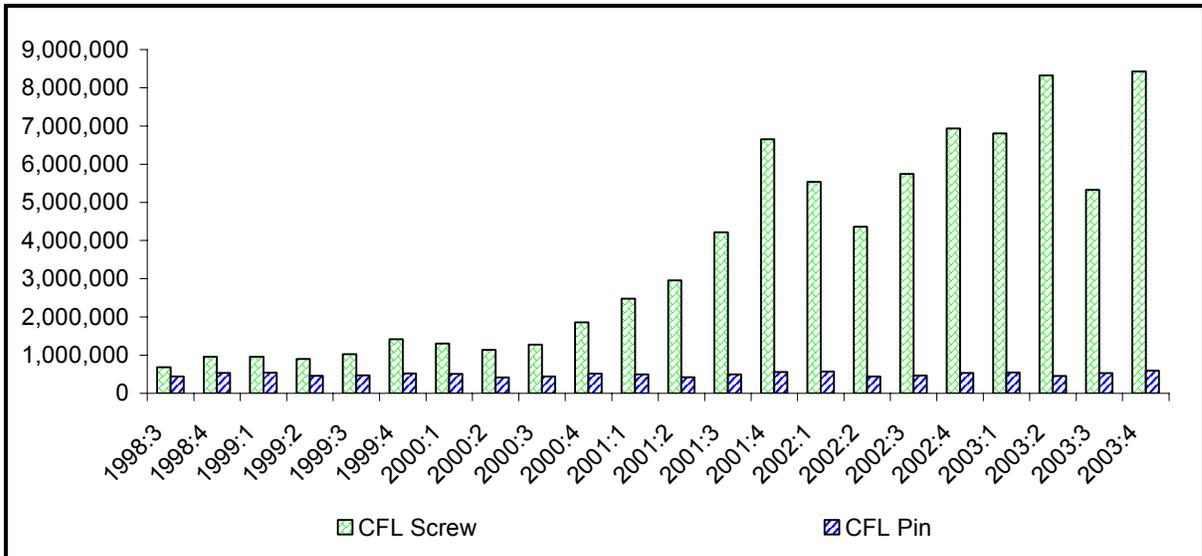


Figure 24: Medium Screw-Based CFL Sales and Pin-Based CFL Sales – U.S. (non-California)



Sales of Medium Screw-Based Lamps by Equivalent Wattages

When replacing medium screw-based incandescent lamps with CFLs, it is important to maintain a comparable light level. Lumen output measures the amount of light produced by a lamp and this measure is closely approximated by lamp wattage. Using information from lamp manufacturers and the Lighting Research Center,²⁶ lamps were sorted by equivalent lumen output, as shown in Table 3.

Table 3: Equivalent Wattages²⁷

CFL Wattage Range	Incandescent/Halogen Range	Typical Incandescent Wattage	Typical Lumen Output
11-13	35-45	40	450
14-18	46-64	60	800
19-24	65-85	75	1,150
25-30	86-125	100	1,550
30+	125+	150	2,500

Figure 25, Figure 26, and Figure 27 present sales of medium screw-based CFLs, incandescents, and halogens by wattage for California and the rest of the U.S. Comparing Figure 25 through Figure 27 reveals that the most commonly purchased incandescent and halogen lamps are in the 46-64 watt range, typically 60-watt lamps. Correspondingly, CFLs that provide the equivalent light levels of the 60-watt incandescents are the most commonly sold lamps (42%), followed closely by CFLs that provide the equivalent light levels of the 75-watt (33%). For all three lamp types, the shares by wattage in California are similar to those in the rest of the U.S.

²⁶ Lighting Research Center. *Specifier Reports: Screwbase Compact Fluorescent Lamp Products, Volume 7, Number 1*. June 1999.

²⁷ Typical Incandescent Wattage is the most common incandescent lamp found for that wattage range, based on data from lamp manufacturers.

Figure 25: Medium Screw-Based CFL Sales by Wattage – 2003

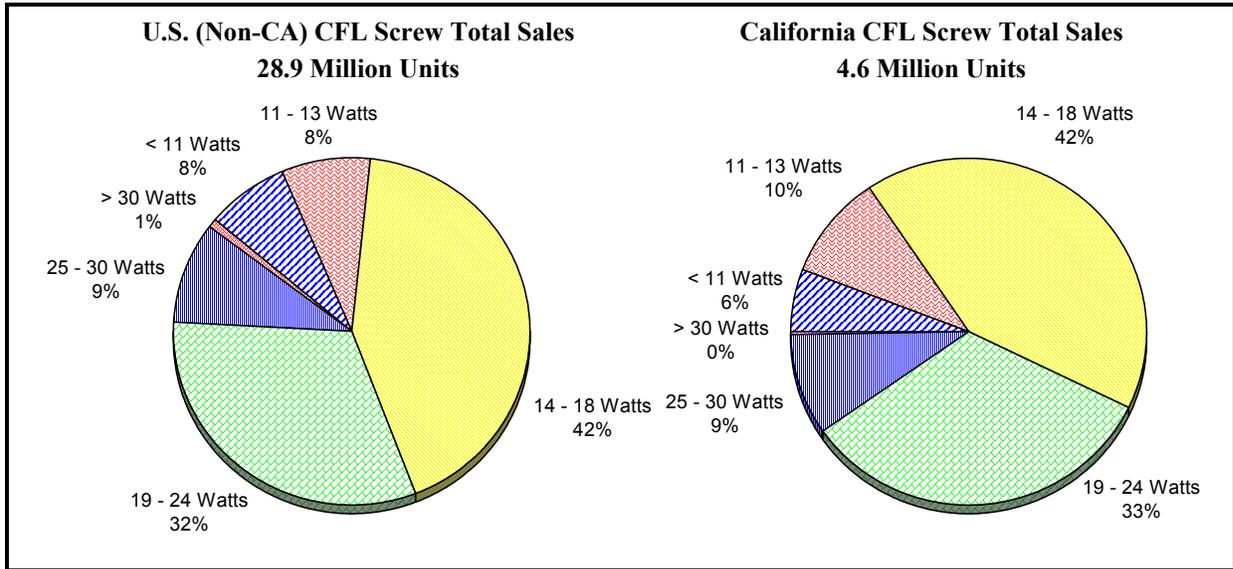


Figure 26: Medium Screw-Based Incandescent Sales by Wattage – 2003

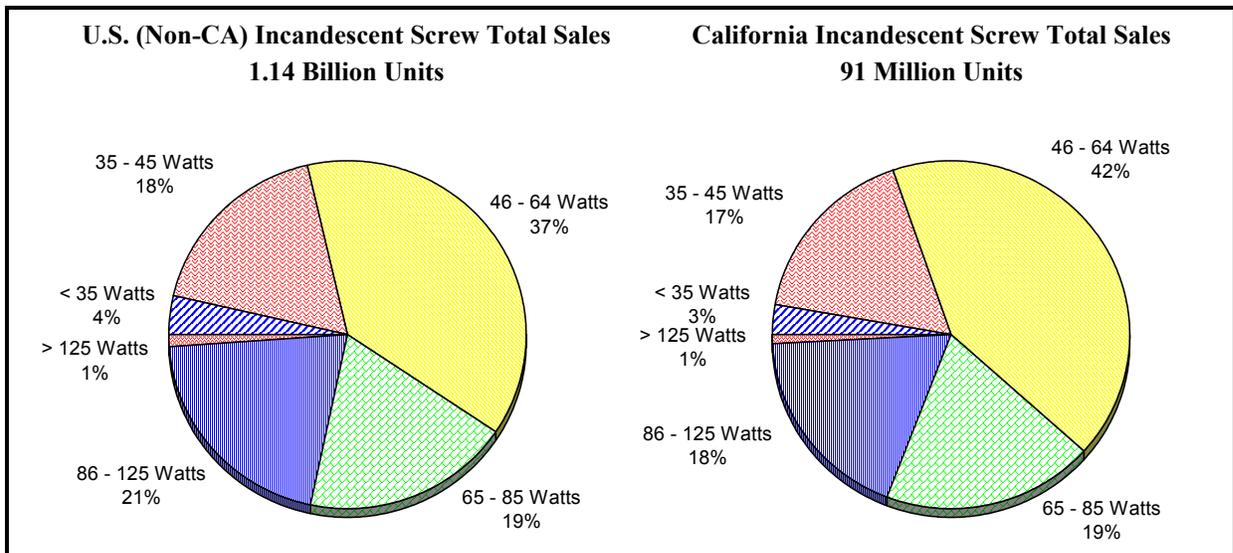


Figure 27: Medium Screw-Based Halogen Sales by Wattage – 2003

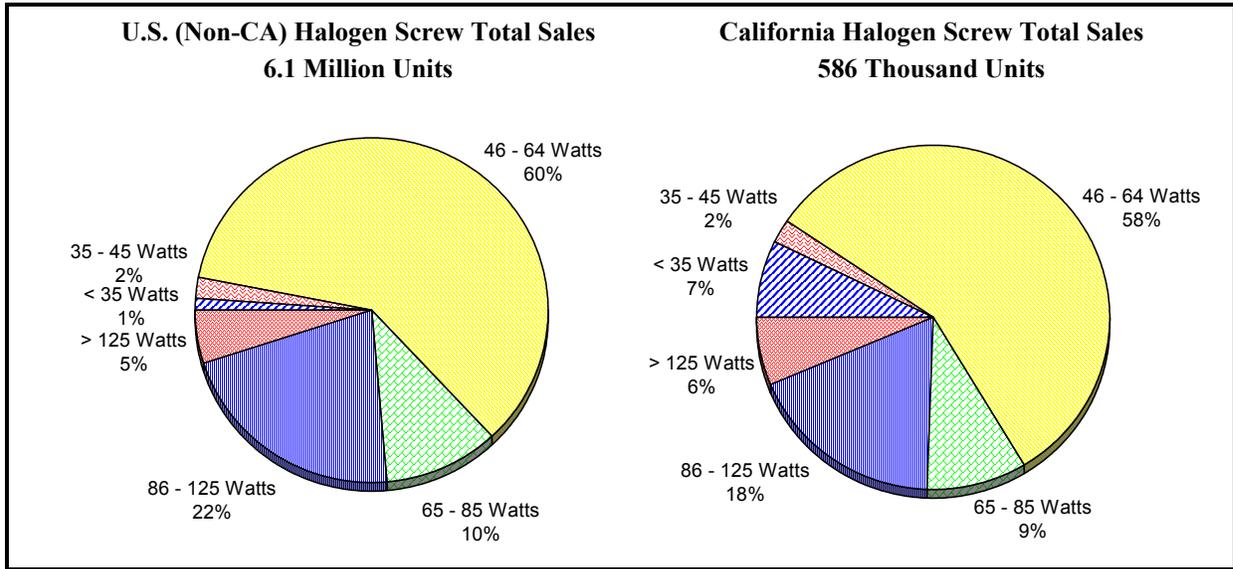


Figure 28 and Figure 29 illustrate medium screw-based CFL sales as a percentage of total medium-based lamp sales by wattage over time for California and the rest of the U.S., respectively. These figures reveal that CFLs in the 14-18 watt range (60-watt equivalent) account for a large portion of the total increase in CFL medium screw-based lamps in 2001 and 2002. In 2003, however, CFLs in the 19-24 watt ranges have increased substantially and have overtaken CFLs in the 14-18 watt range. This same trend is seen in the rest of the U.S.

Figure 28: Medium Screw-Based CFL Sales as a Percentage of Total Medium Screw-Based Sales, by Wattage – California

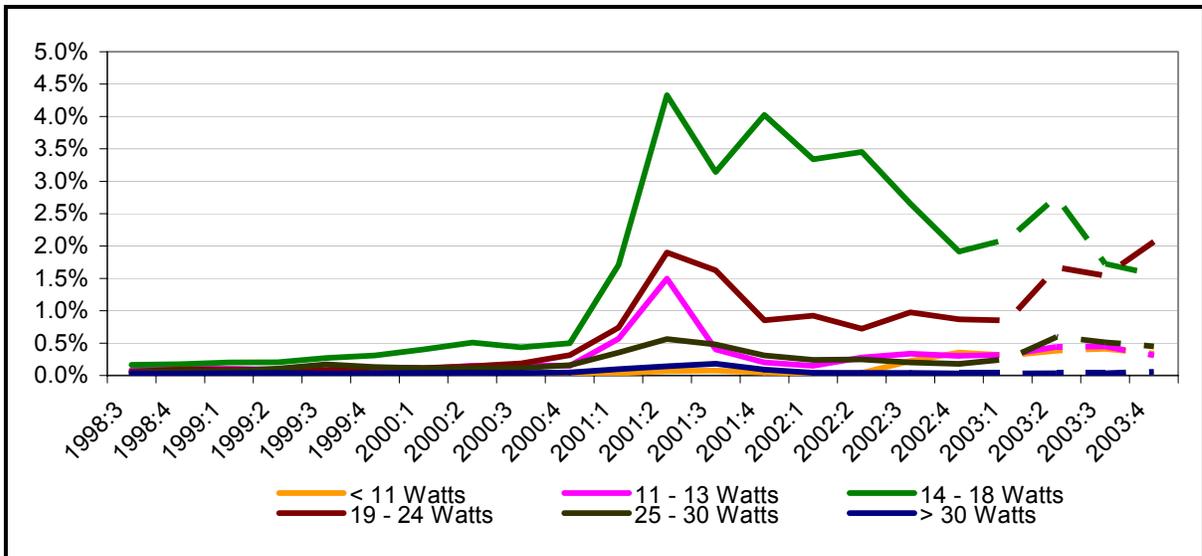
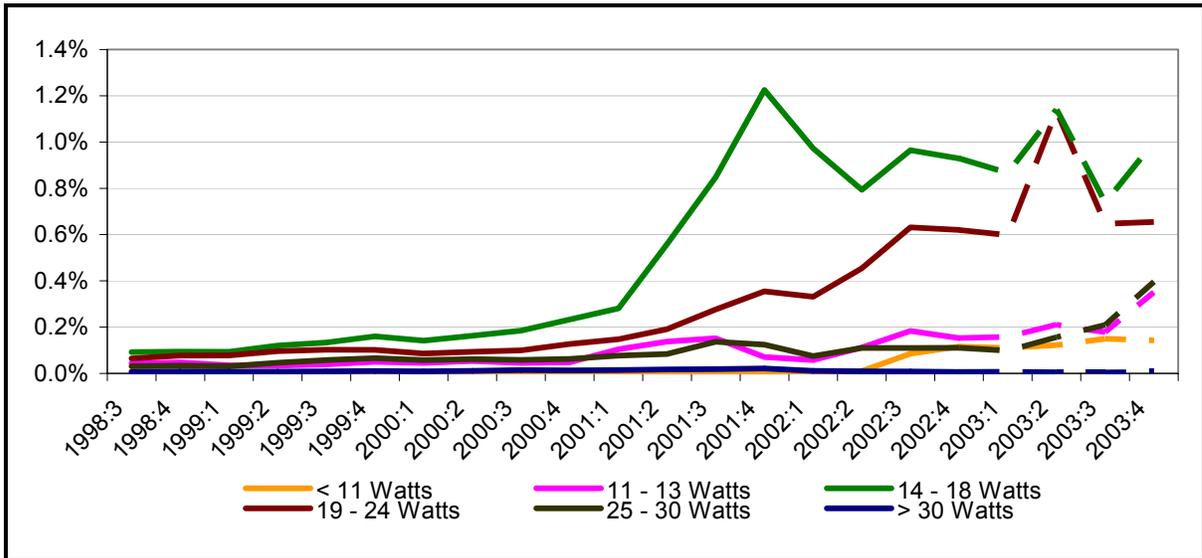


Figure 29: Medium Screw-Based CFL Sales as a Percentage of Total Medium Screw-Based Lamp Sales, by Wattage – U.S. (non-California)



Impact of Lamp Life on Medium Screw-Based Lamp Shares

The percentage of medium screw-based CFL and halogen sales as a percentage of total medium screw-based bulbs sold does not entirely capture their impact in the market. The sale of one CFL is not equivalent to the sale of one incandescent, because, a typical CFL will last six to ten times longer than an incandescent bulb.^{28,29} Therefore, the sale of one CFL is equal to selling many incandescent bulbs. Likewise, the sale of one medium screw-based halogen bulb is the equivalent of selling three incandescent bulbs. The technologies of CFLs and halogens require far fewer replacements and fewer subsequent purchases by the consumer.

To try and capture a better estimate of the impact of CFL and halogen sales, the relative life of each lamp type was calculated by using the average lamp life, in hours, for each lamp type. Then, by using the share of sales for each bulb type in 2003, a lamp life normalized market share was calculated. Table 4 shows the results of this analysis. As shown, by weighting the lamp counts by relative lamp life, the impact of CFLs and halogens in the marketplace are higher than when simply looking at their shares of sales. In 2003, the CFL share of sales was approximately 4.8% in California. However, when taking into account that the life of each CFL is much longer than that of an incandescent bulb, the estimated

²⁸ Lamp life estimates are based on average data from lamp manufacturer websites.

²⁹ Note that the CFL life used in this report (8,000 hours) is less than in previous reports (10,000 hours). This is due to recent testing of CFLs which has shown that the new generation (twisters, dimmables, 3-ways, etc.) of CFLs do not last as long as the previous generation (triples, quads, circlines, etc.).

market share is approximately 31%. Similarly, the lamp life normalized market share for halogen bulbs is higher than its share of sales—1.4% compared to 0.6%, in California.

Table 4: Medium Screw-Based Lamp Shares Based on Normalized Lamp Life – 2003

Lamp Type	Average Lamp Life (hours)	Relative Life of Lamp*	Raw Sales		Lamp Life Normalized	
			U.S. Share	California Share	U.S. Share	California Share
Incandescent	875	1.0	97.0%	94.6%	80.1%	67.3%
Compact Fluorescent	8,000	9.1	2.5%	4.8%	18.5%	31.3%
Halogen	2,750	3.1	0.5%	0.6%	1.3%	1.4%

* Relative Life of Lamp is Average Lamp Life divided by Average Incandescent Lamp Life

6. Summary of Key Findings

A number of key findings are identified from the analysis of the lamp tracking data. Listed below are some general observations.

- Incandescent lamps dominate the unit sales of lamps with three-fourths of the U.S. market. Other lamp types with significant market shares of unit sales include specialty (13%), fluorescent (6%), and halogen (3.5%) lamps. Lamp sales in California are distributed approximately the same way.
- The market share of residential medium screw-based CFLs in California decreased from 5.8% in 2001 to 4.5% in 2002, and then increased to 4.8% in 2003.
- The CFL market share in the rest of the U.S. has slowly made gains on California’s CFL market share over the last few years. At the end of 2001, CFLs had more than four times the market share of medium screw-based lamps in California (5.8%) than they did nationwide (1.3%). However, by 2003 California’s CFL market share (4.8%) was less than double that of the rest of the U.S. (2.5%).
- Growth in unit sales of CFLs has not been uniform across all types of CFLs, but has been strongly concentrated in 14-18 watt and 19-24 watt bulbs (equivalent to a 60-watt and 75-watt incandescents).
- Mass merchandisers are beginning to sell more CFLs. In 2000, mass merchandisers sold only 6% of the total CFLs sold in California, whereas in 2003, they sold just over 25% of the total CFLs sold in California. Similarly, mass merchandisers in the rest of the U.S. sold nearly half of all CFLs sold.

7. Next Steps

The data analyzed in this report, prior to 2003, include lamps sold through channels that sell approximately 80% to 90% of residential lamps. (The other 10% to 20% of residential lamps are sold through other smaller channels, such as the Internet, small independent food stores, club warehouse stores, and direct sales from the manufacturer to the consumer.) However, since home centers stopped providing data in 2003, the data available from the market research firms no longer include efficiency sales from this important source.

This loss of home center data, coupled with a growing interest in market penetration tracking by energy efficiency organizations outside of California, has facilitated efforts to expand POS data sources. In particular, efforts are currently underway to develop a partnership with the ENERGY STAR program to track the national market penetration of CFLs. Central to this new endeavor are the efforts of the ENERGY STAR implementation contractor to collect POS data from retail partners not currently represented in the data obtained from market research firms, including home centers and club warehouse stores. If these efforts are successful, the additional data will be invaluable in evaluating the progress of the national ENERGY STAR program and improving estimates of market shares for California.