

California Lamp Report 2001

Volume 1

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California Lamp Report 2001

1. Introduction

Opportunities for energy savings in the residential sector with efficient lighting technologies have gathered momentum over recent years. This is evidenced by the U.S. Environmental Protection Agency's and Department of Energy's introduction of the ENERGY STAR[®] labeling programs for dedicated fluorescent fixtures and screw-based compact fluorescent lamps (CFLs) in 1997 and 1999. At the same time, throughout the U.S., utilities and organizations promoting market transformation have launched marketing and incentive programs to promote efficient lighting programs.

Much has been written and estimates have been made of the penetration of these technologies in the marketplace. To date, estimates have relied on national shipments data, Department of Commerce data, census data, self-reports, telephone and mail-in surveys, limited on-site data, and the willingness of distributors and manufacturers to supply critical data. These data lack the timeliness and level of detail needed to provide program planners and evaluators with the information needed to gauge the effectiveness of their lighting initiatives. This is especially true at the state or individual utility service territory level.

As the third in a series of biannual reports,¹ this report offers a comprehensive look at the market for lamps in California and nationally using point-of-sales (POS) data from five major sales channels through which lamps are sold: food, drug, mass merchandiser, home improvement, and hardware stores. In particular, a computerized system has been developed that collects line-item detail on monthly lamp sales, beginning in July 1998. This report contains POS data through the period ending January 2001. The California data are further subdivided into the service territories of each of the state's investor-owned utilities (IOUs).

These data are processed and classified to garner information about overall lamp sales in the residential lighting market and provide information on lamp sales trends over time, geographic regions, and sales channels. More importantly, this report provides details for all major lamp types used in residences, with comparisons and market shares developed for lamps that are interchangeable in form and function. The inclusion of a national comparison area provides a further context in which to evaluate the success of the California initiatives.

¹ A four-page companion report titled *California Lamp Trends 2001, Volume 1* summarizes the findings in this report.

This report is an important element of the Residential Market Share Tracking Study (RMST).² One objective of the RMST is to track the market shares of high efficiency lighting technologies in California. The intent of the lighting element of the RMST study is to collect data to support the need of the IOUs to measure their program milestones for promoting CFLs in their respective service territories.³

Additionally, during the development of the lighting component of the RMST, it became clear that, beyond California, there is a widespread need in the lighting community to understand and evaluate the penetration of CFLs and other lamp technologies in the residential marketplace. Other entities, such as the federal ENERGY STAR labeling program, Consortium for Energy Efficiency (CEE), Northwest Energy Efficiency Alliance (NEEA), and a number of utilities, have expressed an interest in obtaining similar detailed data to measure the effectiveness of their national and/or regional lighting initiatives. By replicating this methodology in other regions, it would be possible to compare results for different program approaches, incentive levels, and demographic characteristics in the various regions.

The remainder of this report provides an overview of the key findings, discusses the lamp sales data, how the lamp data are classified, and the results of the market share analysis. This volume presents findings for the first two quarters of 2001. Because this data only represents half of the year, there are several instances throughout the report where it is not included in various charts and figures. This approach was taken in an effort to avoid confusion on the part of the reader.

2. Preview of Key Findings

A number of key findings were identified during the analysis of the lamp tracking data. Some general observations include the following.

- The data from the five market channels reveal total residential lamp sales counts for the U.S. to be approximately 2.14 billion per year, with California sales at approximately 197 million per year.
- Incandescent lamps dominate the unit sales of lamps with over three-fourths of the U.S. market. Other lamp types with significant market share of unit sales include specialty (14%), fluorescent (5%), and halogen (3%).
- The market share of CFLs in California increased to nearly 9% in 2001.
- In the second quarter of 2001, CFLs have more than eight times the market share of medium screw-based lamps in California than they do nationwide.

² Residential Market Share Tracking Study: First-Year Interim report, submitted by Regional Economic Research, Inc, submitted to Southern California Edison Company, November 2000.

³ Compact fluorescent lamps are promoted through California's Residential Lighting and Appliance Program.

- Growth in unit sales of CFLs has not been uniform across all types of CFLs, but has been strongly concentrated in 60-watt equivalent bulbs.
- Home improvement stores play a dominant role in efficient lighting sales in California. This is not surprising given the heavy focus on these stores by the state's lighting programs. However, grocery stores still sell a substantial percentage of incandescent bulbs and might be a useful channel in which to explore additional CFL sales opportunities.
- Halogen bulb sales have also grown because of heavy promotion by manufacturers. These products are likely competing with CFLs for the attention of consumers willing to try alternatives to standard incandescent light bulbs.
- 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%). This continued in the second quarter of 2001 when the market share of CFLs rose to 8.4%. This increase coincides with California's "energy crisis," which included rolling blackouts in early 2001. Further, most California residents saw significant increases in their electricity bills in April 2001, while residents in the SDG&E service territory saw their bills triple during the summer of 2000.

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. RER identified the numerous research firms that supply point-of-sales data and evaluated their product 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.⁴ 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 the Internet, small independent stores, and direct sales from the manufacturer to the consumer.⁵

The lighting data were 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 included universal product code (UPC), lamp-type indicator,

⁴ Ecos Consulting. *Lighting the Way to Energy Savings, Volume 2*. Prepared for the Natural Resources Defense Council. December 1999.

⁵ Discussions with industry professionals estimate lamp sales outside of the major retail channels at 10 to 20%.

location sold, retail sales channel, and monthly counts of units sold for nearly 10,000 different lamps.

Food Stores, Drug Stores, and Mass Merchandisers. Consumer sales data for food, drug, and mass merchandisers were obtained from ACNielsen.⁶ These sales data are collected from a sample of food stores with revenue over \$2 million, 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 51 regions and data from drug stores and mass merchandisers are collected from eight 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, RER used U. S. Census Bureau⁷ 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 requires certain assumptions about the demographic similarities of parts of California to the whole, and is likely not as accurate as the results that could be 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 the original sample sizes were substantial, but less precise for mass merchandisers and drug stores, because of the relatively small sample size.⁸

⁶ ACNielsen Company, Schaumburg, IL.

⁷ U.S. Census Bureau data obtained from www.census.gov for July 1998, July 1999, and July 2000.

⁸ Using population weighted expansion factors is a reasonable approach. However, we recognize that it does make the assumption 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

As stated above, 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 all lighting sales.⁹

Hardware and Home Improvement Center Stores. Consumer sales data for national and independent hardware and home improvement center stores were obtained from Triad Vista (Triad).¹⁰ Triad collects hardware and home improvement center data from stores across four distinct regions: Northeast, Midwest, South, and West. A stratified sample design is 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 are chosen to be representative of all stores across these four characteristics. These sample data are scaled to the regional or national level by comparing individual store sales volumes and number of stores to overall sales for a given region.¹¹ RER and Triad also worked to develop a similar system to develop projections for California and each of the utility service areas.

Lamp Classification

Lighting data were mapped into four major classes: fluorescent, halogen, incandescent, and special.¹² Fluorescents, halogens, and incandescents were further broken down into subcategories based on lamp configuration and application, as shown in Figure 1. Data acquired from the two data sources were similar in nature, but required different strategies to classify the data. Each data set contained at least one descriptor field that was key in identifying lamp type. Using a series of database queries, RER identified many of the lamps and classified the remainder manually.

Food Stores, Drug Stores, and Mass Merchandisers. This data set included only one descriptor field. This field included keywords and abbreviations that provided details about the lamp. The descriptor field used consistent terminology and a key was provided to these abbreviations. Using this key, RER ran a series of queries to search for keywords to classify the lamps.

merchandisers across regions, this assumption could lead to over or under reporting sales of certain lamp types.

⁹ From conversations with lighting industry professionals.

¹⁰ Triad Vista, a division of CCITriad, Livermore, CA.

¹¹ 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.

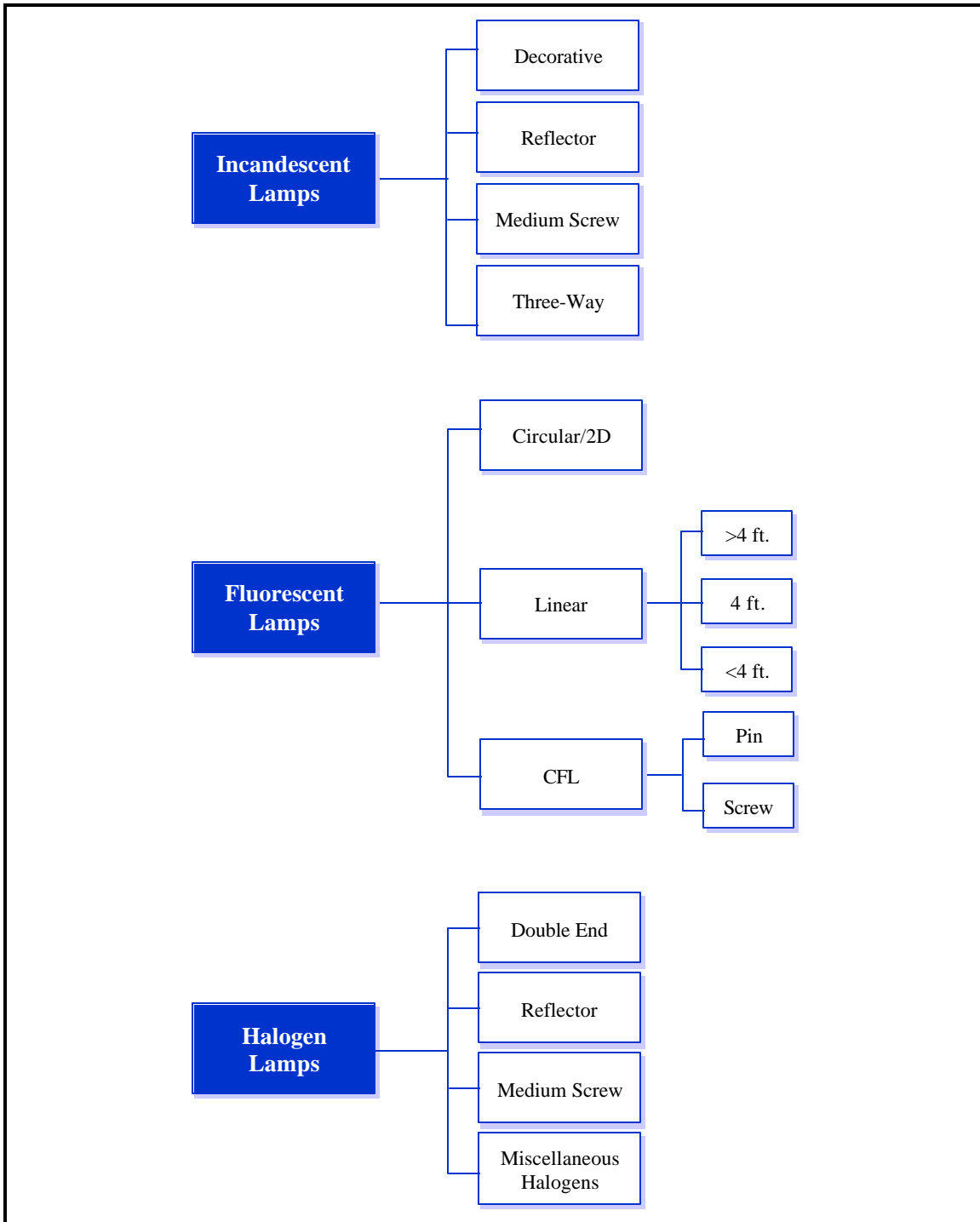
¹² Special lamps are those not used for general household lighting and include bug lamps, Christmas lights, night lights, and heat lamps among others.

Hardware and Home Improvement Center Stores. This data set included five descriptor fields. The first four fields indicated categories for the lamps and these fields alone classified 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 desired. The remaining lamps were classified using data contained in the fifth descriptor field, information from lighting experts, lighting manufacturers, and publications.

For both data sets, the descriptor fields sometimes contained 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, RER manually reviewed and corrected the data where necessary.

Ultimately, lamps were 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.

Figure 1: Lamp Classifications



4. Analysis and Findings

This section summarizes the analysis of the POS data and reports the subsequent findings. RER performed analysis on the overall residential lighting market with an emphasis on interchangeable lamps. The findings are presented such 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. The results are presented as follows:

- All sales versus residential sales,
- Lamp sales by market channel,
- Lamp sales by lamp classification,
- Total unit sales of medium screw-based lamps,
- California medium screw-based lamp sales over time,
- Sales by lamp type as a percentage of total sales for medium screw-based lamps,
- Sales per household of medium screw-based lamps,
- Sales of medium screw-based lamps by market channel,
- Sales of medium screw-based lamps by equivalent wattages, and
- Impact of lamp life on medium screw-based lamp shares.

All Sales versus Residential Sales

The data from the five market channels reveal total unit lamp sales counts for the U.S. to be approximately 2.17 billion per year, with California sales at approximately 197 million per year.¹³ Lamps were originally sorted into the five categories shown in Figure 2. This includes lamps of all types sold through the five major retail channels. 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.¹⁴ Using information from previous studies and lighting industry professionals, fluorescent lamps found in packages greater than 12 and halogen lamps found in packages greater than 8 were removed from the analysis. Purchasing fluorescent lamps in such bulk is rare for consumers and far more common with contractors. In addition, RER 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.

¹³ Based on ACNielsen and Triad Vista data from January 2000 to December 2000

¹⁴ Ecos Consulting. *Lighting the Way to Energy Savings, Volume 2*. Prepared for the Natural Resources Defense Council. December 1999.

By removing 30 million lamps (3 million in California) deemed commercial and/or industrial, the market share of fluorescents shifts slightly, as shown by comparing Figure 2 and Figure 3.

Figure 2: Total Lamp Sales – Food, Drug, Mass Merchandise, Hardware, and Home Improvement – California and U.S. – 2000

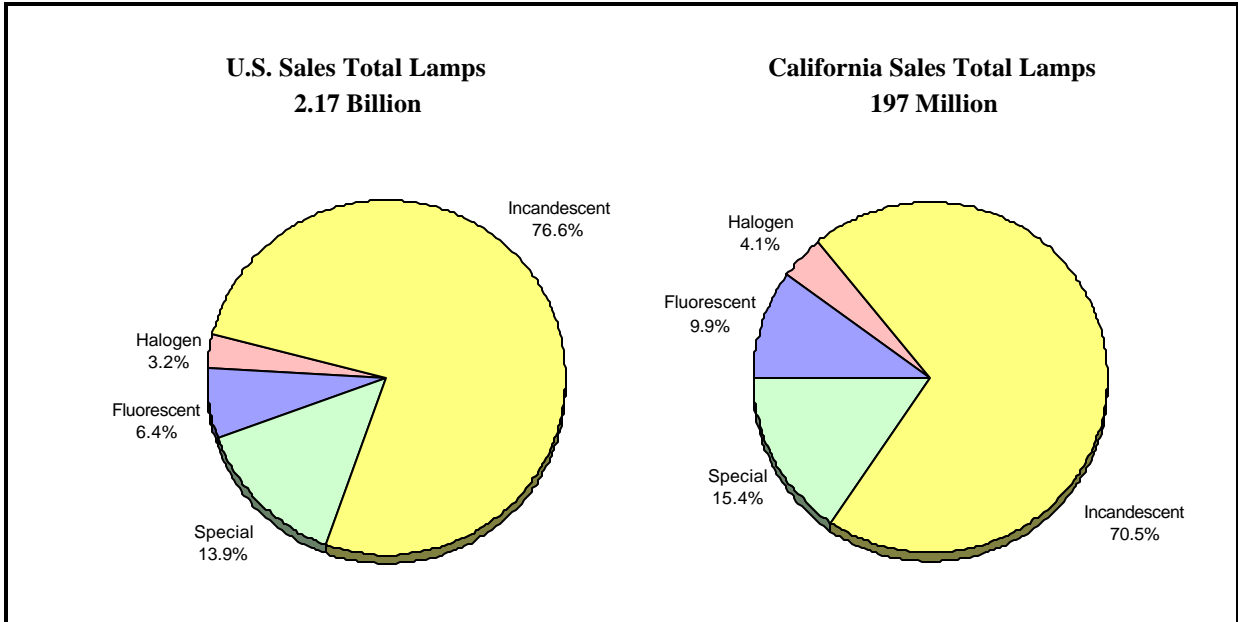
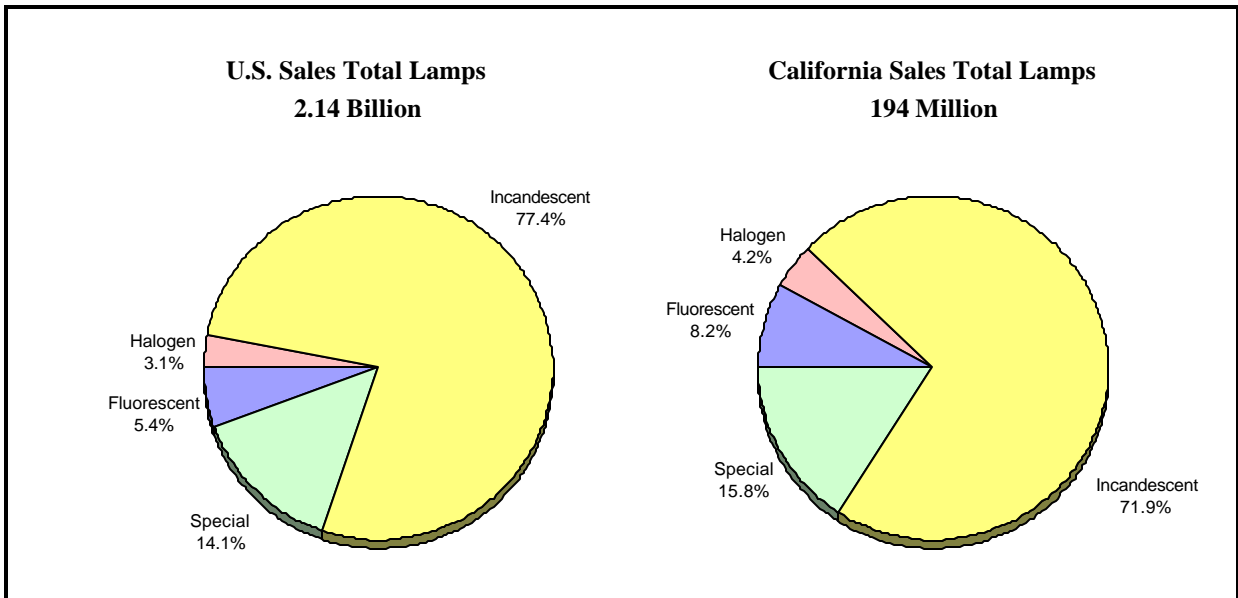


Figure 3: Residential Lamp Sales – Food, Drug, Mass Merchandise, Hardware, and Home Improvement – California and U.S. – 2000



All Sales by Market Channel

Comparing lamps by market channel reveals a shift in purchasing preferences for U.S. and California consumers. Figure 4 and Figure 5 show that hardware, home improvement centers, and drug stores account for a larger percentage of lamp sales in California than in the overall U.S. Correspondingly, mass market retailers contribute a smaller percentage of lamp sales in California than they do nationally. Residential lamp sales follow the same distribution as total lamp sales.

Figure 4: Total Lamp Sales by Market Channel – California and U.S. – 2000

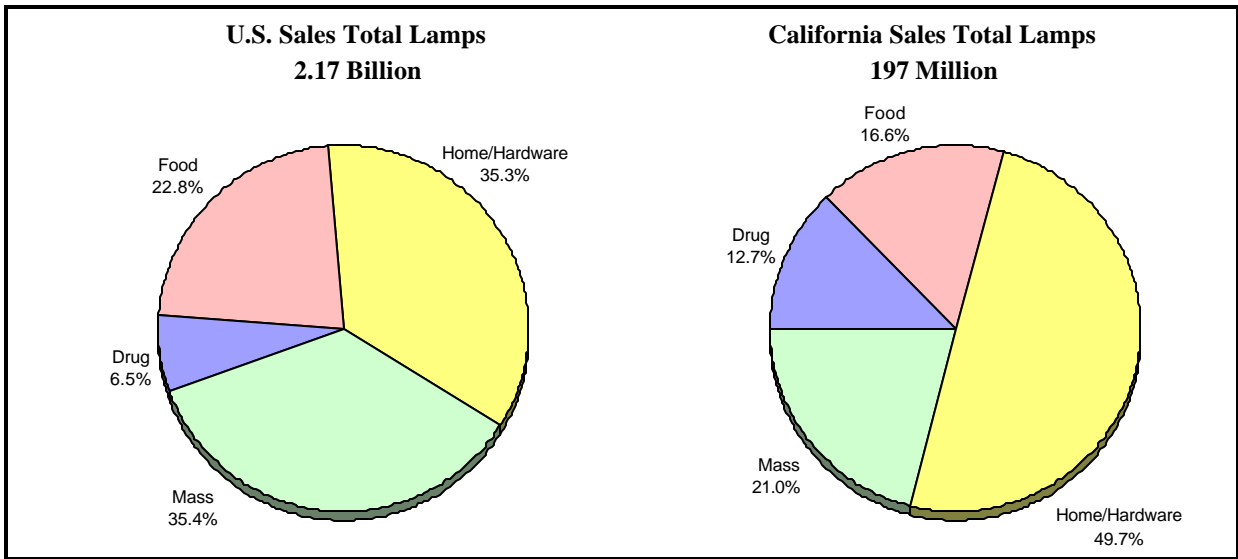
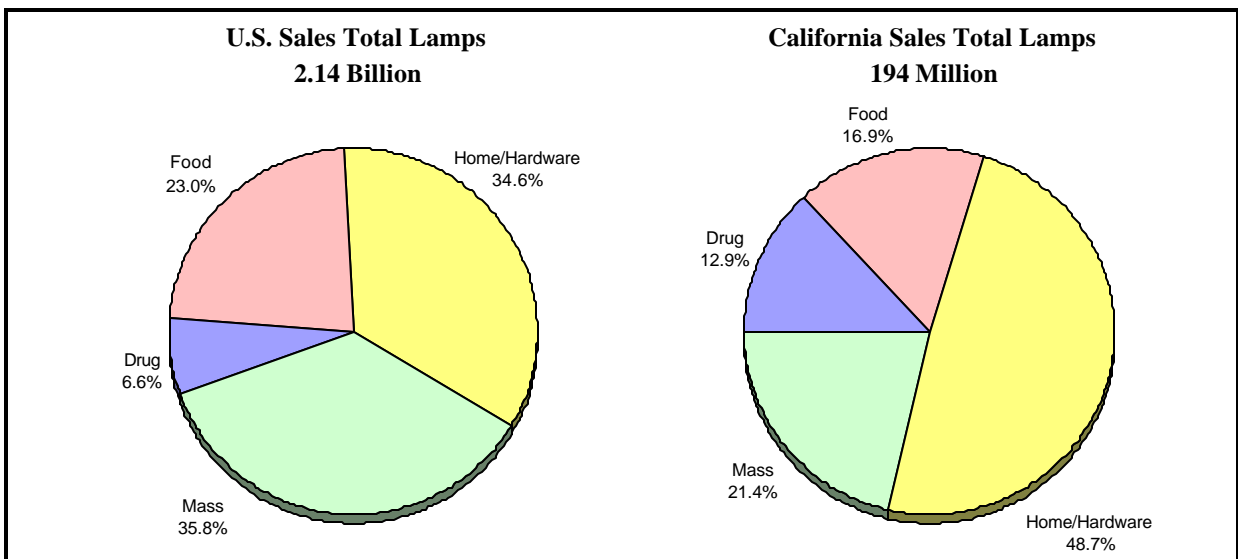


Figure 5: Residential Lamp Sales – By Market Channel – California and U.S. – 2000



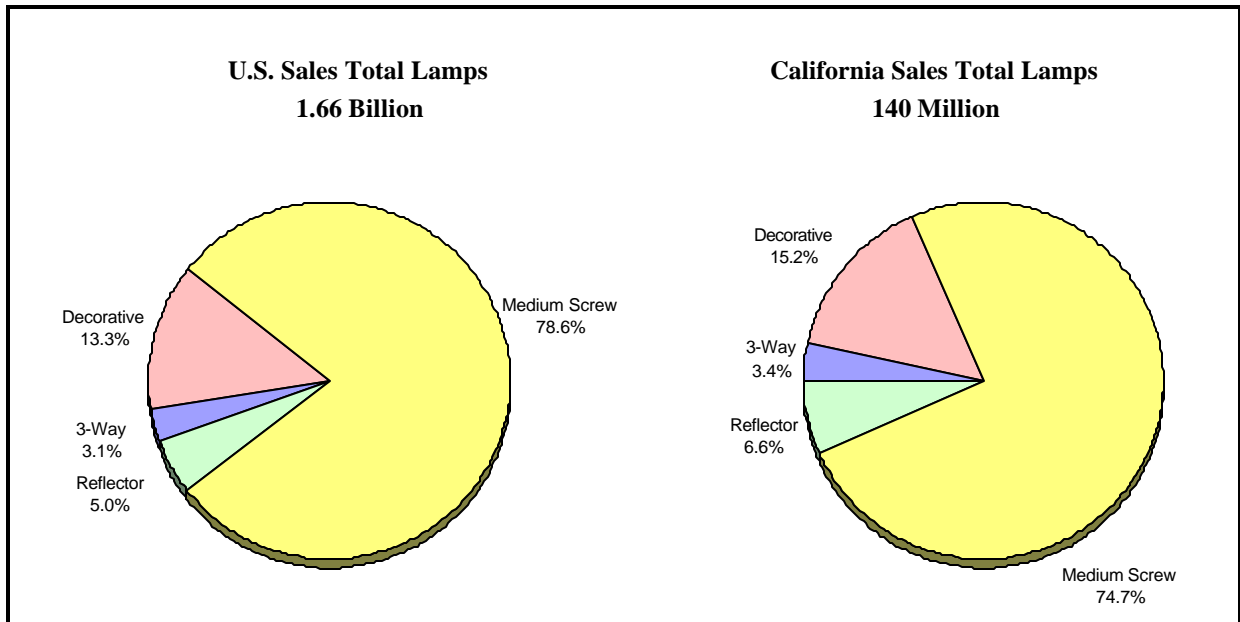
Sales by Lamp Classification

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 6 presents sales of incandescent lamps by type for the U.S. and California and shows that medium screw-based lamps dominate incandescent lamp sales. The data presented here includes both residential and nonresidential lamp sales. In both the U.S. and California, medium screw-based lamps account for approximately three-fourths of all incandescent unit sales, as shown in Figure 6. By lamp category, there is very little difference in the overall distribution of incandescent sales between the U.S. and California.

Figure 6: Incandescent Lamp Sales – by Type – California and U.S. – 2000



Fluorescents

Figure 7 presents total fluorescent lamp sales and Figure 8 presents residential fluorescent lamp sales by type for the U.S. and California. Comparing these two graphs reveals a considerable shift caused by the removal of lamps deemed for use in the commercial and industrial market.

Focusing only on residential sales shows that linear lamps dominate fluorescent lamps sales. As shown in Figure 8, 4-foot lamps comprise the largest share, while linear lamps under four feet are a distant second. In addition, CFL screw-ins and CFL plug-ins contribute a larger percentage to overall fluorescent lamp sales in California than in the U.S.

Figure 7: Total Fluorescent Lamp Sales – by Type – California and U.S. – 2000

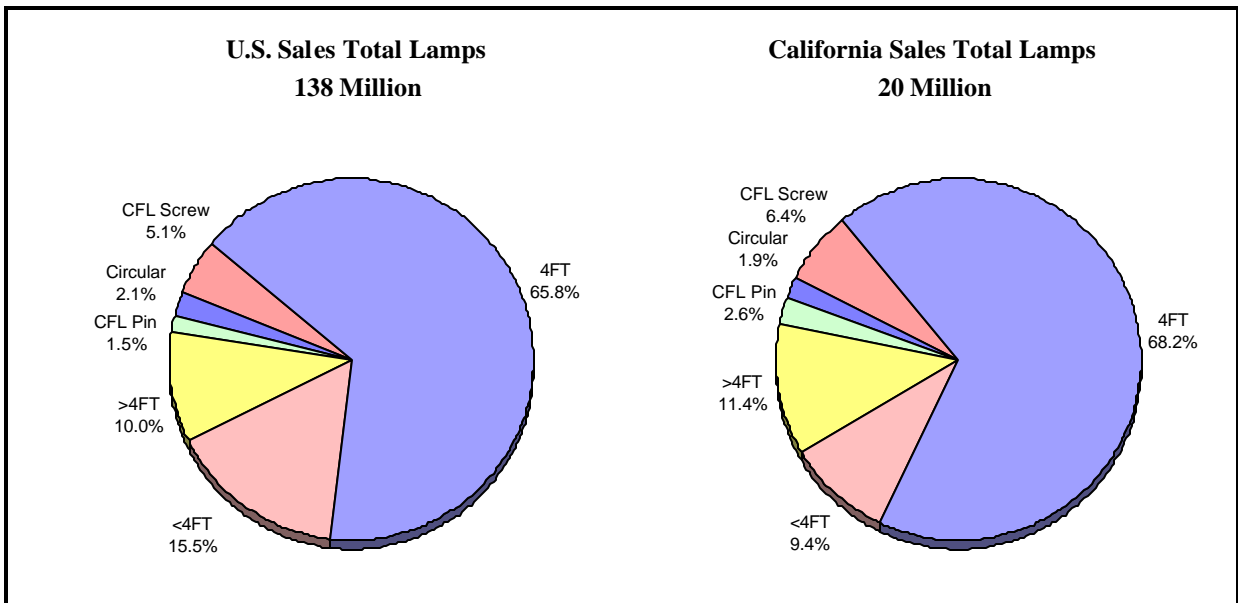
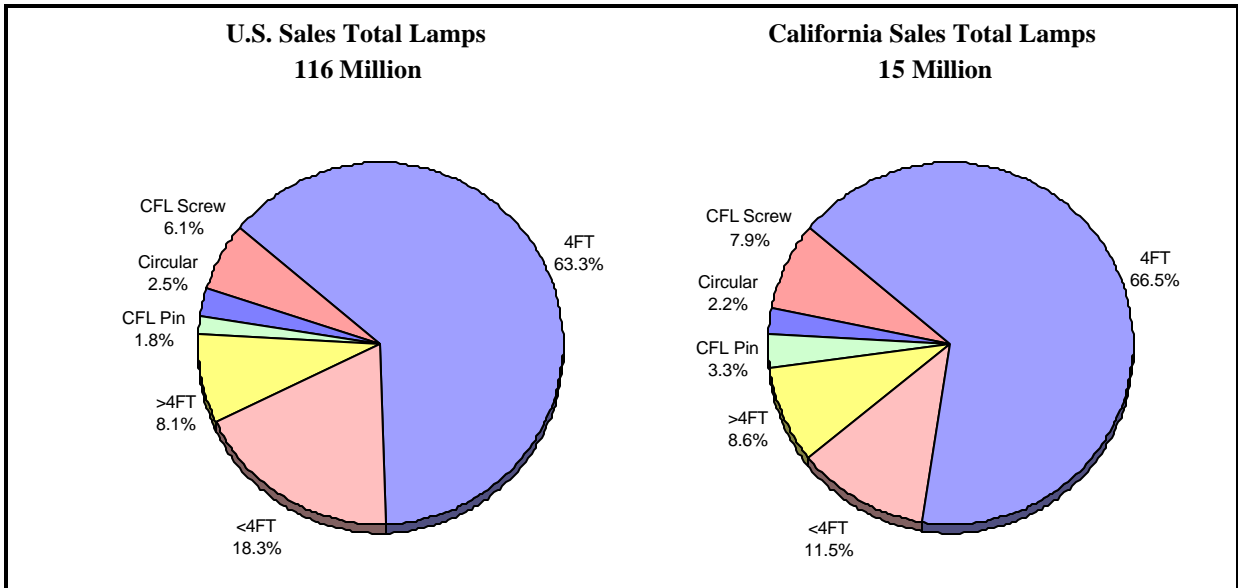


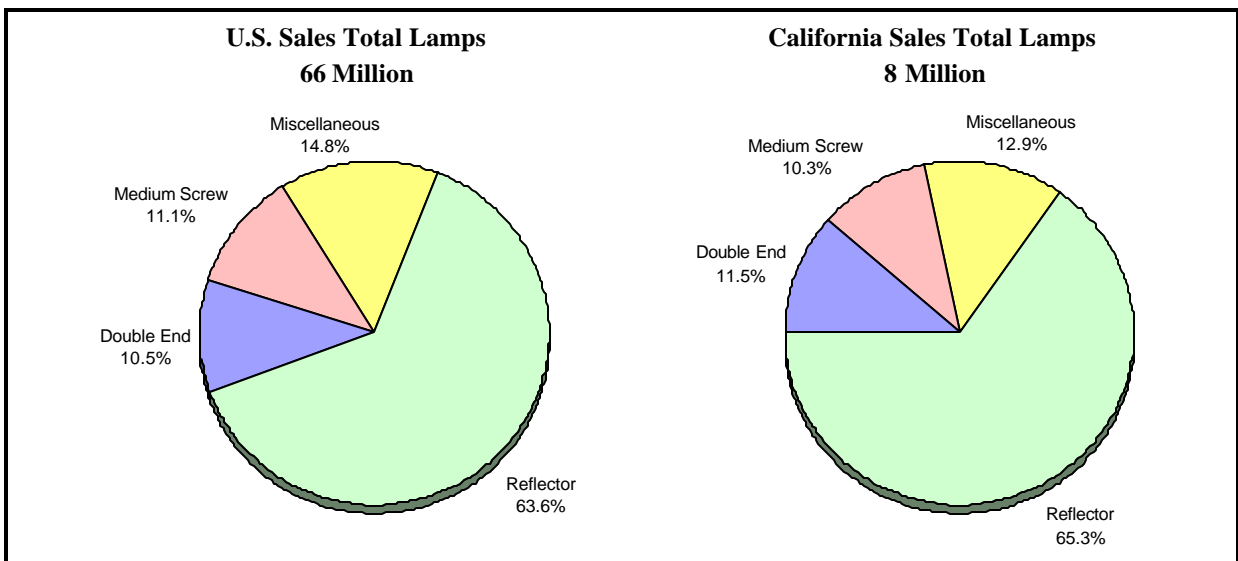
Figure 8: Residential Fluorescent Lamp Sales – by Type – California and U.S. – 2000



Halogens

Figure 9 presents residential halogen lamp sales by type for the U.S. and California. Of the three major lamp classifications for residential settings, halogens by far contribute the smallest share to overall lamp sales. As shown in Figure 9, reflectors dominate halogen lamp sales. Only subtle differences exist between the distribution in U.S. halogen sales and California halogen sales.

Figure 9: Residential Halogen Lamp Sales – by Type – California and U.S. – 2000



Total Unit Sales of Medium Screw-Based Lamps

Table 1 provides a snapshot of total unit sales of residential medium screw-based lighting for calendar year 1999, calendar year 2000, and the first half of calendar year 2001. 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.

CFL sales increased by 29% in California vs. 15% in the U.S., while halogen lamp sales rose 12.3% and 27.7% in the U.S. and California, respectively. These increases reflect meaningful shifts in product share within the lighting market, since overall lamp sales increased by less than 1% in California and the U.S. over the same period.

Lighting sales in California accounted for approximately 7.5% of overall U.S. sales during the first half of 2001. Interestingly, this number increases to almost 34% when looking specifically at CFLs.

Table 1: Residential Sales, Medium Screw-Based Lamps

Region	CFL			Halogen			Incandescent		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
U.S.	6,116,797	7,040,665	8,262,516	6,531,344	7,337,578	4,038,652	1,293,221,724	1,303,507,093	651,589,658
CA	973,307	1,256,552	2,789,620	648,016	827,251	439,500	104,322,292	104,288,997	46,592,160
SCE	239,399	334,361	815,672	185,631	244,399	124,141	32,637,194	32,588,072	14,856,568
SDGE	109,673	159,307	288,430	63,577	74,315	38,501	8,650,594	8,372,323	3,762,506
PG&E	391,118	431,236	1,172,127	247,814	305,365	168,862	43,933,573	43,344,983	19,045,568
Other	66,976	114,014	263,894	49,937	80,020	44,535	12,777,823	14,028,531	6,472,333

California Medium Screw-Based Lamp Sales over Time

Figure 10, illustrates the sales of medium screw-based incandescent bulbs for both California and the rest of the U.S. As shown in Figure 10, incandescent lamp sales peak during periods of less daylight (autumn and winter) and dip during periods of more daylight (spring and summer). However, the dip in the number of medium screw-based incandescent bulbs sold in California during the second quarter of 2001 is much larger than in the previous two years. Specifically, medium screw-based incandescent bulb sales was 15% lower in the second quarter of 2001 compared to the second quarter of 2000 in California but by only 1% in the rest of the U.S. There are several possible reasons for this decrease including the following.

- There has been a tremendous increase in sales of CFLs, as well as halogens. A combination of the increase in sales of these bulbs and their longer life¹⁵ 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, incandescents tend to be purchased 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.
- Due to the energy crisis in California, there has been a massive media campaign to inform Californians on ways to conserve energy. One of the least intrusive ways to save energy is to turn off lights when leaving a room. Other lighting energy saving measures include the installation of motion sensors and timers. These types of energy saving practices might have some effect on the number of bulbs needing to be purchased.

Figure 11, and Figure 12 illustrate California sales of medium screw-based CFLs and halogens, respectively. Similar to incandescent sales, halogen sales in California peak during periods of less daylight (autumn and winter) and dip during periods of more daylight (spring and summer). Over time, halogen sales have remained relatively constant. Incandescent lamp sales remained relatively constant until the second quarter of 2001 when bulb sales decreased by 22% compared to the second quarter of 2000. This drop off in incandescent sales coincides with a dramatic increase in CFL sales.

¹⁵ See the section Impact of Lamp Life on Medium Screw-Based Lamp Shares on page 33.

Figure 10: Incandescent Medium Screw-Based Lamp Sales by Quarter – California

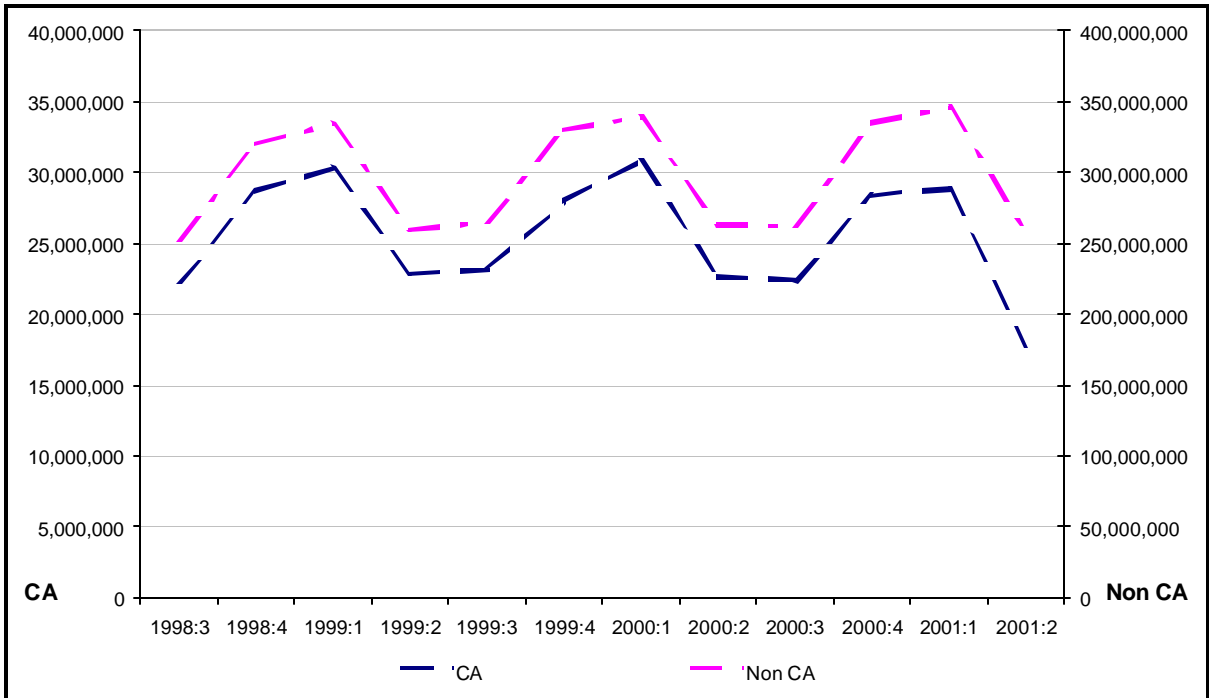


Figure 11: CFL Medium Screw-Based Lamp Sales by Quarter – California

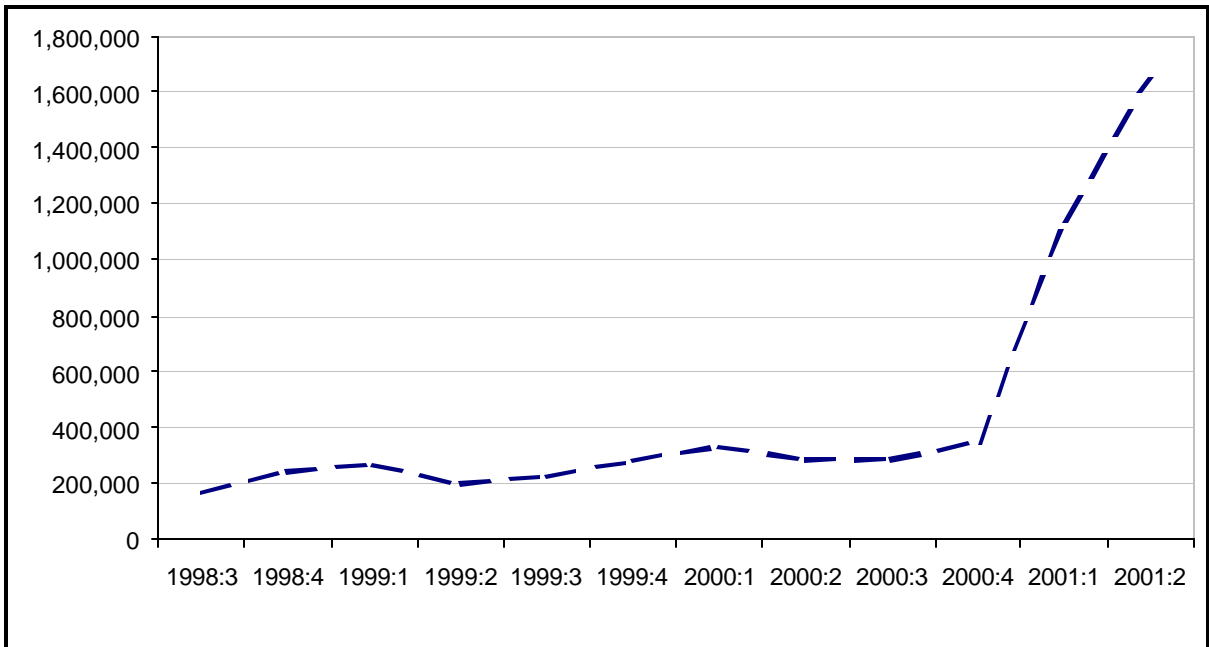
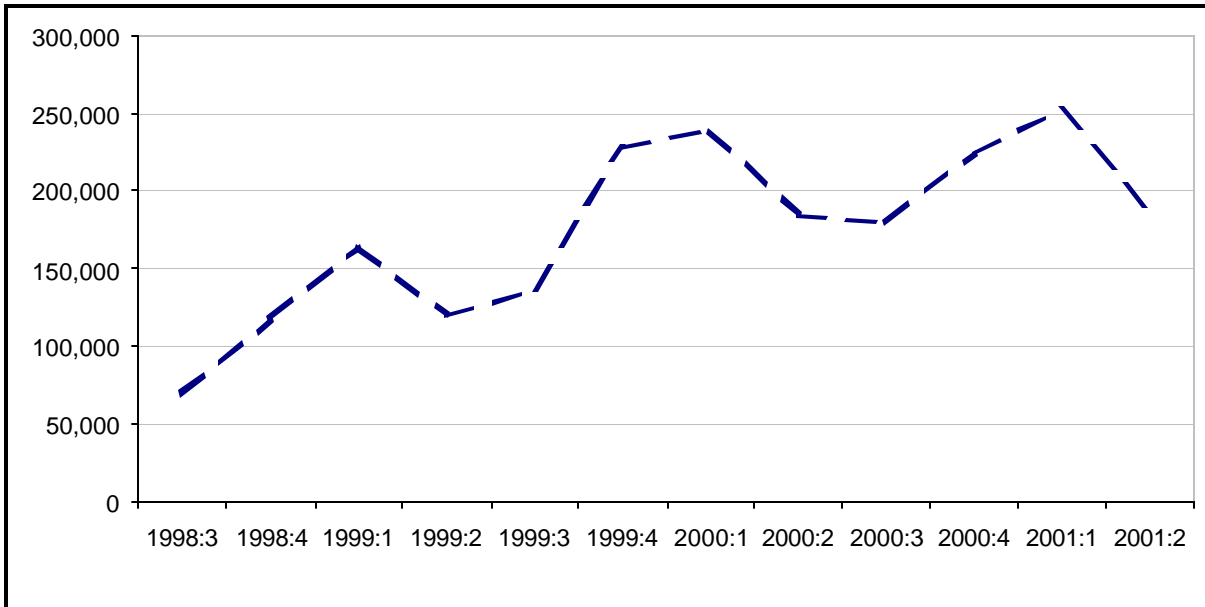


Figure 12: Halogen Medium Screw-Based Lamp Sales by Quarter – California



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

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

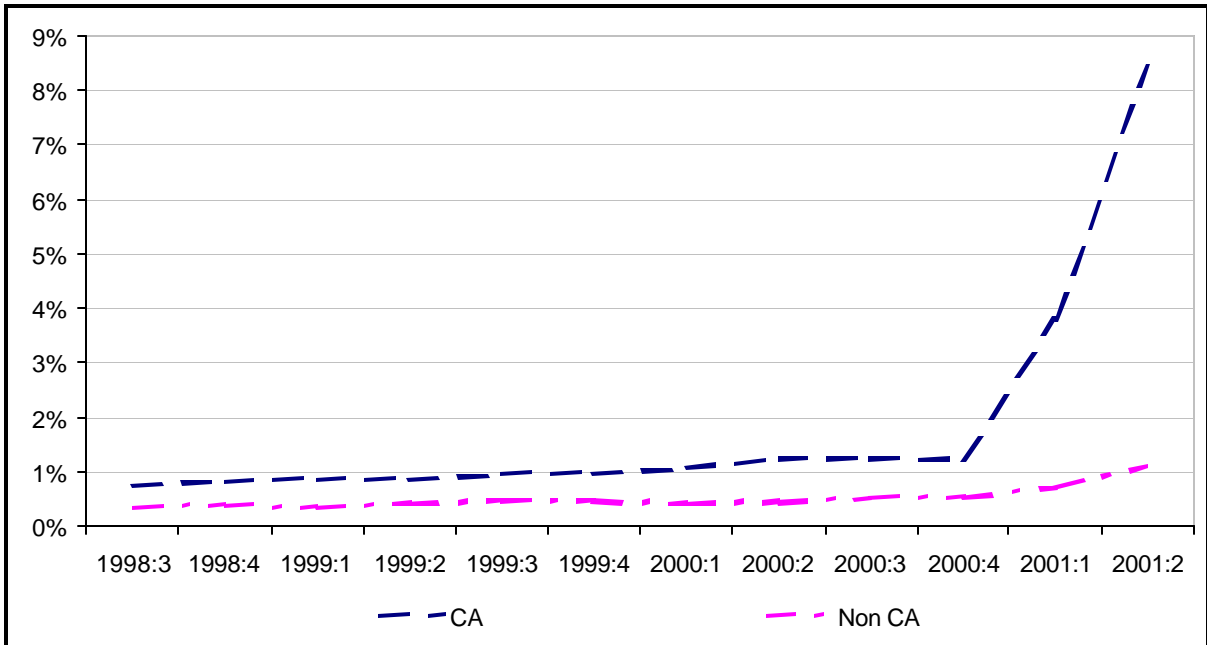
CFLs

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. 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. For the comparisons presented in the following analysis, only screw-based CFLs (including modular 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 13 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.¹⁶ Figure 14 presents the same information for each of the California IOU service territories and for the remaining non-IOU areas in California. The share of CFLs sold in California is consistently higher than for the rest of the U.S. CFL shares increased gradually from the third quarter of 1998 through the end of 2000 – shares ranged from 0.35% to 0.54%. As shown, the share of CFLs doubled from the fourth quarter of 2000 (0.54%) and the second quarter of 2001 (1.11%).

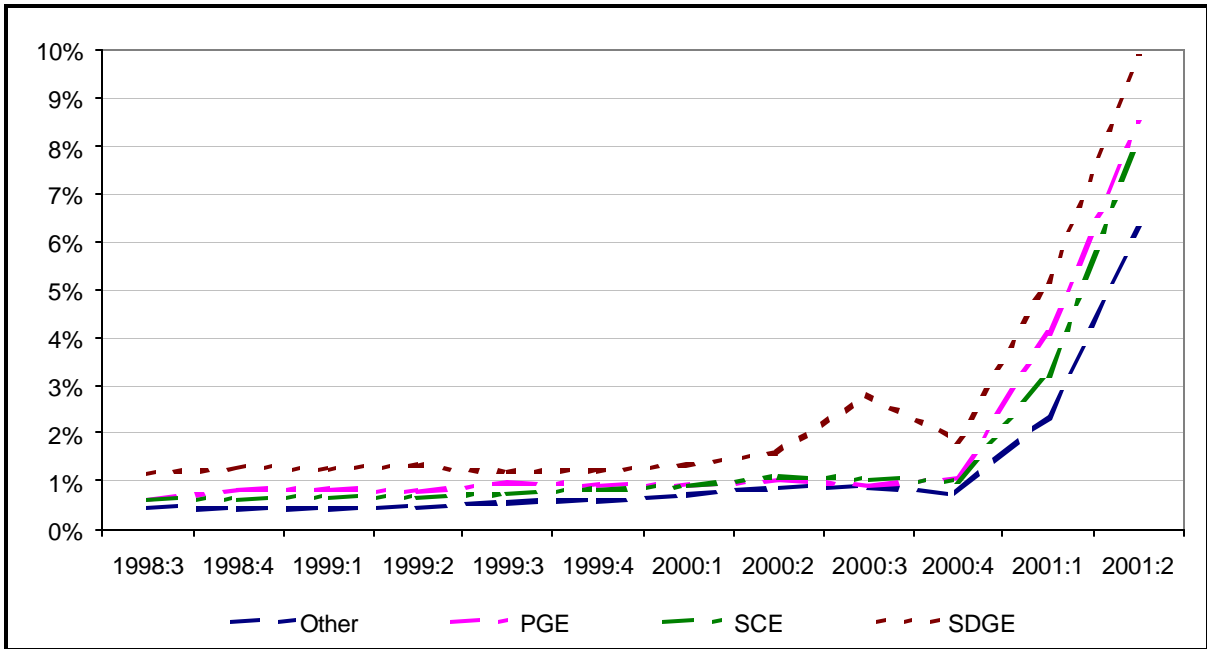
As shown in Figure 13, the market share of CFLs in California more than tripled from the fourth quarter of 2000 to the first quarter of 2001 (1.2% to 3.8%). This trend continued in the second quarter of 2001 when the market share of CFLs rose to approximately 8.4%. These increases coincide with California’s “energy crisis.” During the energy crisis, the state saw rolling blackouts in January and March of 2001. In addition, most Californians saw their electricity bills increase dramatically beginning in April 2001 after the state’s two largest utilities (PG&E and SCE) were allowed to increase their rates on March 27, 2001. Similarly, the increase in market shares of CFLs in SDG&E’s service territory in the third quarter of 2000 coincides with the rate increases those residents saw during the summer of 2001. SDG&E was allowed to un-freeze their rates in June 1999, but their customers did not see their bills triple until the summer of the following year.

Figure 13: CFL Share of Medium Screw-Based Lamps – California and the U.S. (non-California)



¹⁶ “The rest of the U.S.” includes all areas of the United States except California.

Figure 14: CFL Share of Medium Screw-Based Lamps – California IOUs and Other¹⁷



Halogens

Figure 15 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. With the development of new technologies and active promotion by manufacturers, the shares of halogen screw-based lamps have been increasing since 1998. Halogen shares in California have increased from 0.3% to nearly 1.0%. In the rest of the U.S., shares have increased from 0.2% to 0.7%. Figure 16 presents the same information for each of the California IOU service territories and remaining non-IOU areas of California.

¹⁷ “Other” includes territories in California not served by the IOUs.

Figure 15: Halogen Share of Medium Screw-Based Lamps – California and U.S. (non-California)

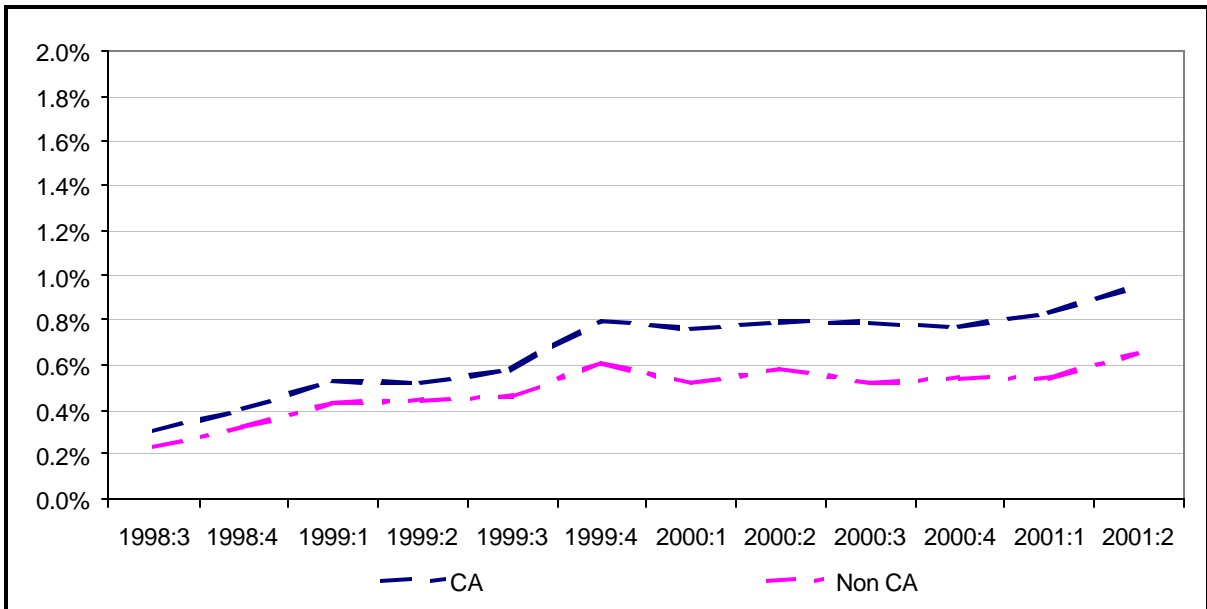
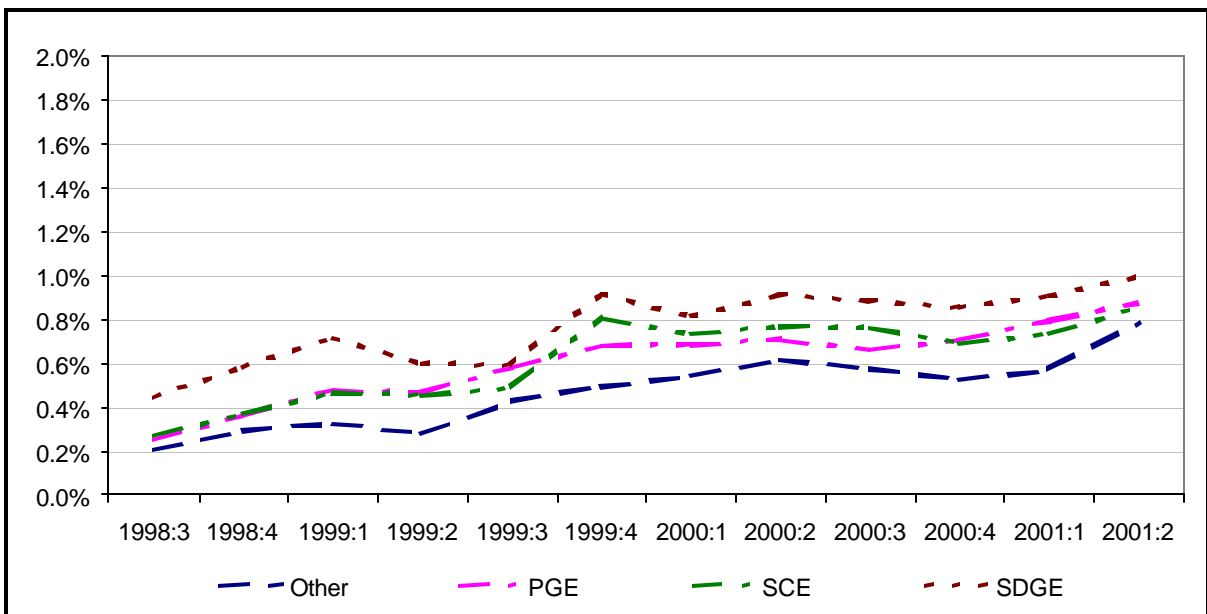


Figure 16: Halogen Share of Medium Screw-Based Lamps – California IOUs and Other¹⁸



¹⁸ "Other" includes territories in California not served by the IOUs.

Incandescents

Figure 17 illustrates the share of medium screw-based incandescents as a percentage of total medium screw-based lamps sold by quarter for California and the rest of the U.S. This graph shows that shares of incandescent sales, though still an overwhelming majority of medium screw-based lamp sales, have dropped approximately 10% in California over the past two quarters. As expected, incandescent shares in California have decreased more over time than in the rest of the U.S.

Figure 18 presents the same data for each of the California IOU service territories and for the remaining non-IOU areas in California. The large increase in the CFL share in the SDG&E service territory for the third quarter of 2000 caused the shares of incandescent lamps in the SDG&E service territory to drop off. Incandescent sales in each of the utility areas follow the same pattern as California as a whole; they decrease in the first two quarters of 2001.

Figure 17: Incandescent Share of Medium Screw-Based Lamps – California and U.S. (non-California)

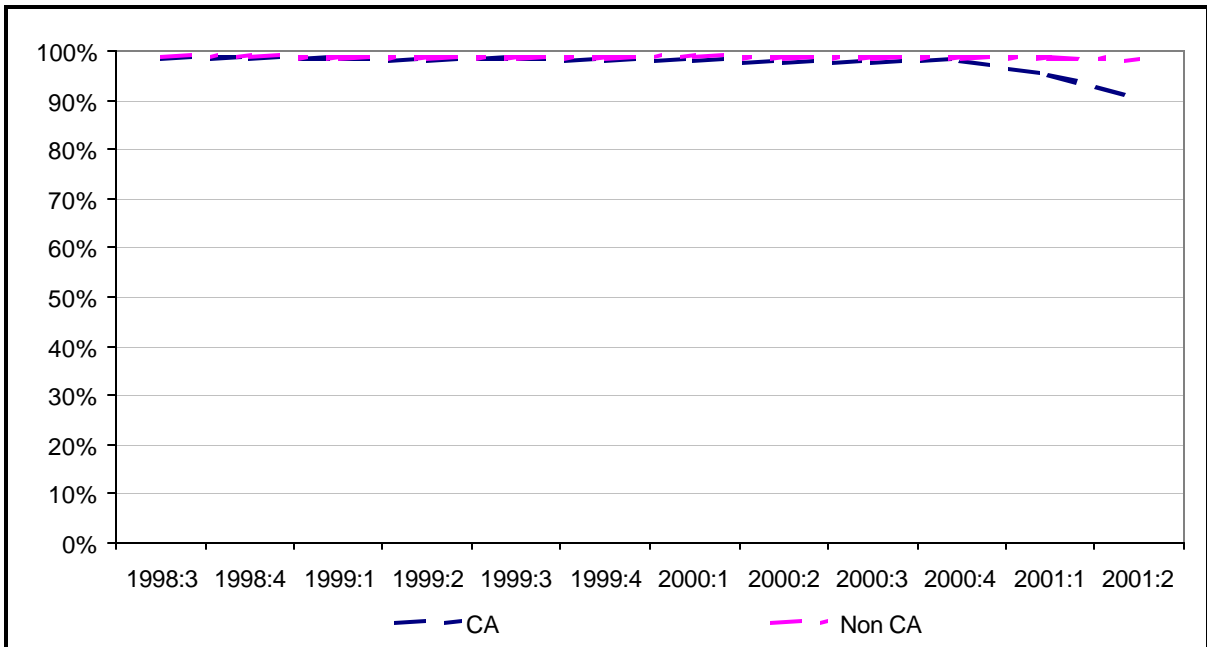
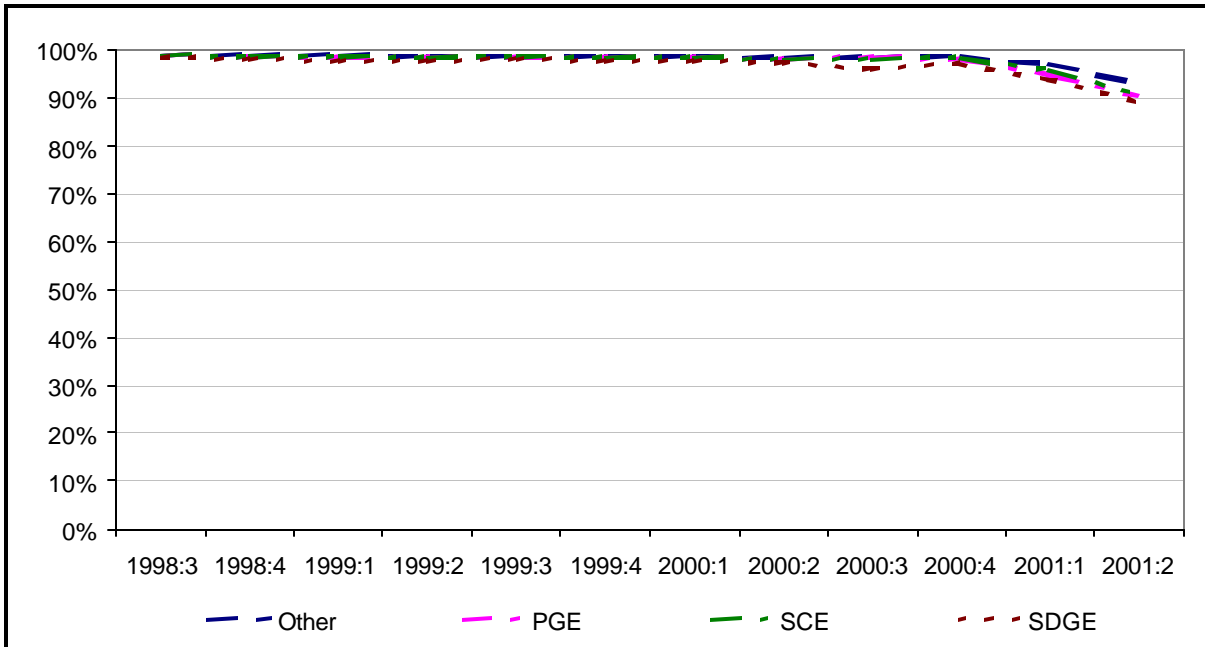


Figure 18: Incandescent Share of Medium Screw-Based Lamps – California IOUs and Other¹⁹



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.²⁰

Figure 19 and Figure 20 plot medium screw-based CFL and halogen sales, per household, over time and medium screw-based incandescents over time. Using number of households as a common denominator across a given year reveals that lighting sales are affected by seasons. Lighting sales of all types peak during periods of less daylight and dip during periods of more daylight. These same seasonal trends are also found in each IOU service territory. The large increase in CFL sales in California during the first two quarters of 2001 is also reflected in Figure 19.

¹⁹ “Other” includes territories in California not served by the IOUs.

²⁰ Population estimates from www.census.gov were used to determine approximate households per service territory, state, and U.S.

Figure 19: Medium Screw-Based CFL and Halogen Sales Per Household - California and U.S. (non-California)

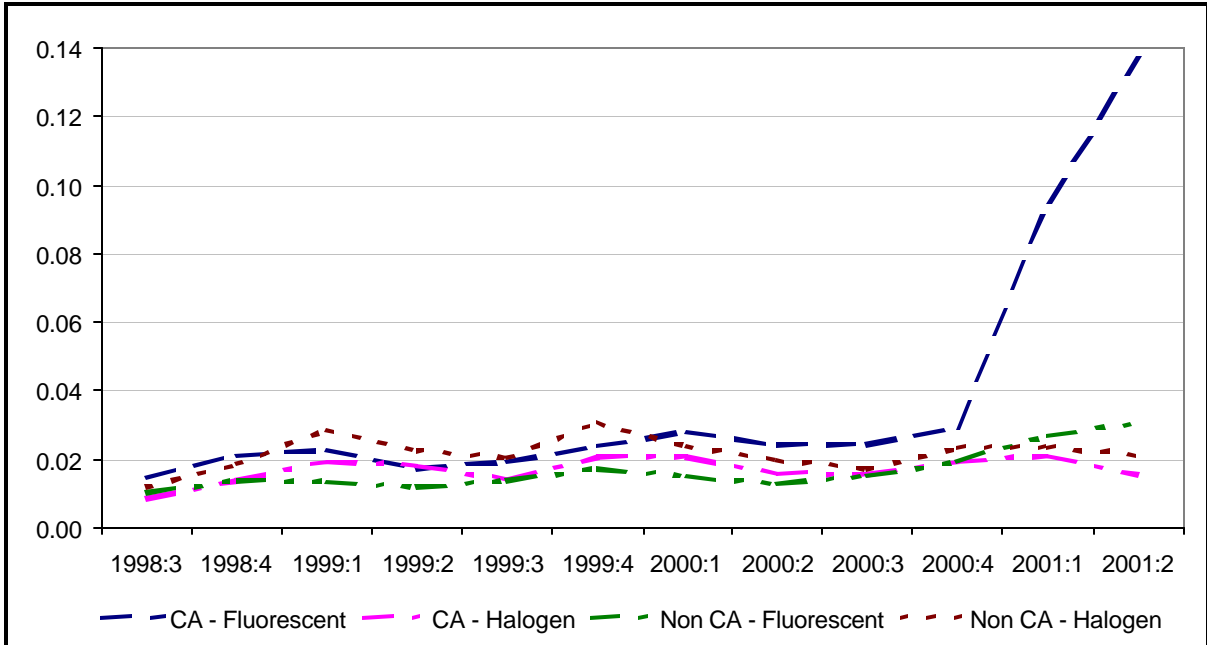
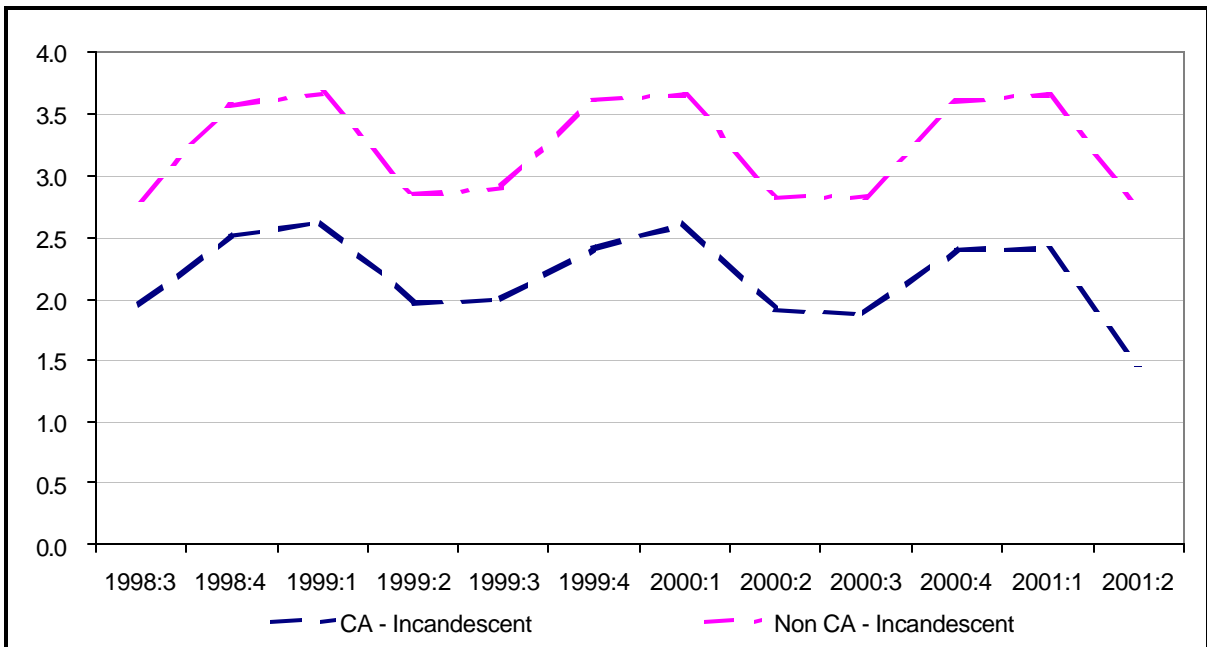


Figure 20: Medium Screw-Based Incandescents per Household – California and U.S. (non-California)



Because of this seasonality, comparisons are made on an annual basis. Table 2 summarizes data from 1999 and 2000. The table reveals that CFL and halogen sales per household are increasing in the U.S. and California. However, a comparison of incandescent sales per household between 1999 and 2000 show almost no difference. California shows a larger percent increase in halogen and CFL sales between 1999 and 2000 than in the rest of the U.S. On the other hand, both California and the rest of the U.S. saw a decrease in the number of incandescent bulbs sold per household between 1999 and 2000.

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

	1999	2000	Percent Increase or Decrease
U.S. (non-California)			
CFL	0.056	0.062	10.5%
Halogen	0.064	0.070	8.8%
Incandescent	13.025	12.914	-0.9%
California			
CFL	0.084	0.106	26.3%
Halogen	0.056	0.070	24.9%
Incandescent	8.987	8.792	-2.2%

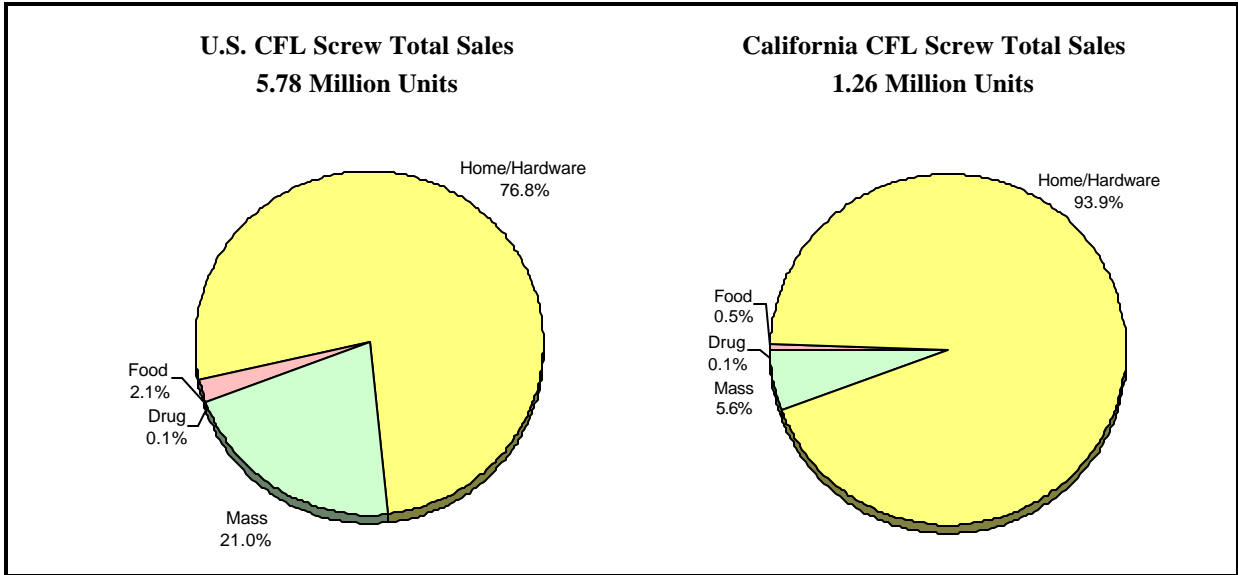
Sales of Medium Screw-Based Lamps by Market Channel

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 21 illustrates sales of medium screw-based CFLs by market channel. In the U.S. and California, sales are dominated by hardware/home improvement stores. However, in California, hardware/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.

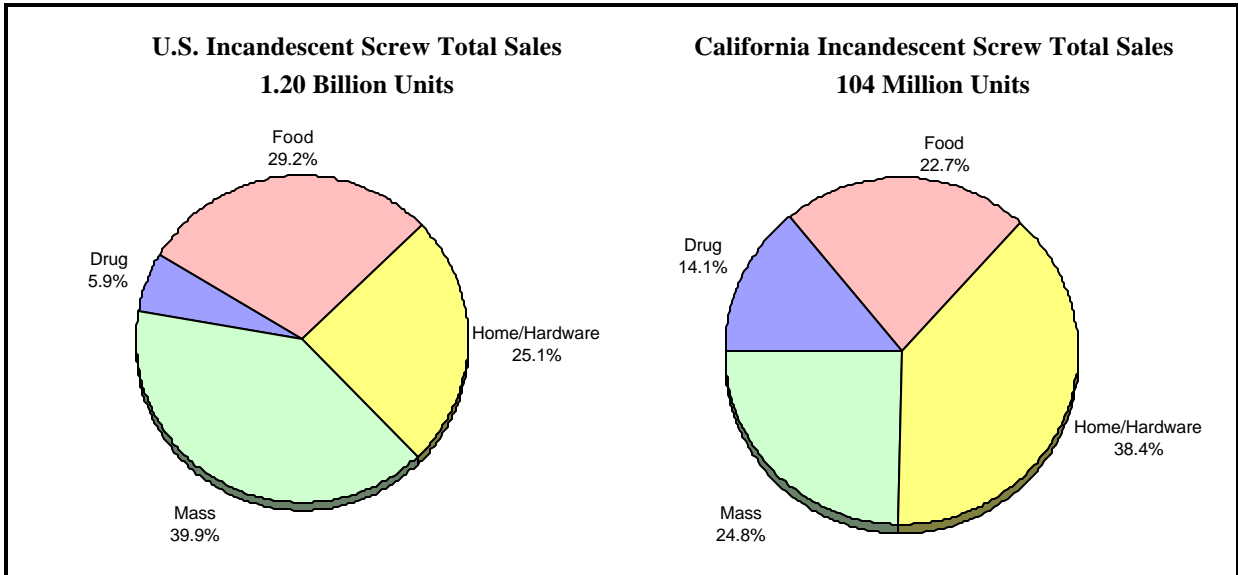
Figure 21: Medium Screw-Based CFL Sales by Retail Channel – California and U.S. (non-California) – 2000



Incandescents

Figure 22 shows incandescent lamp sales by market channel in the U.S and California. As shown, incandescent lamp sales are more evenly distributed between different sales channels than are CFLs. However, the California trend of more lamp purchases hardware/home improvement stores continues.

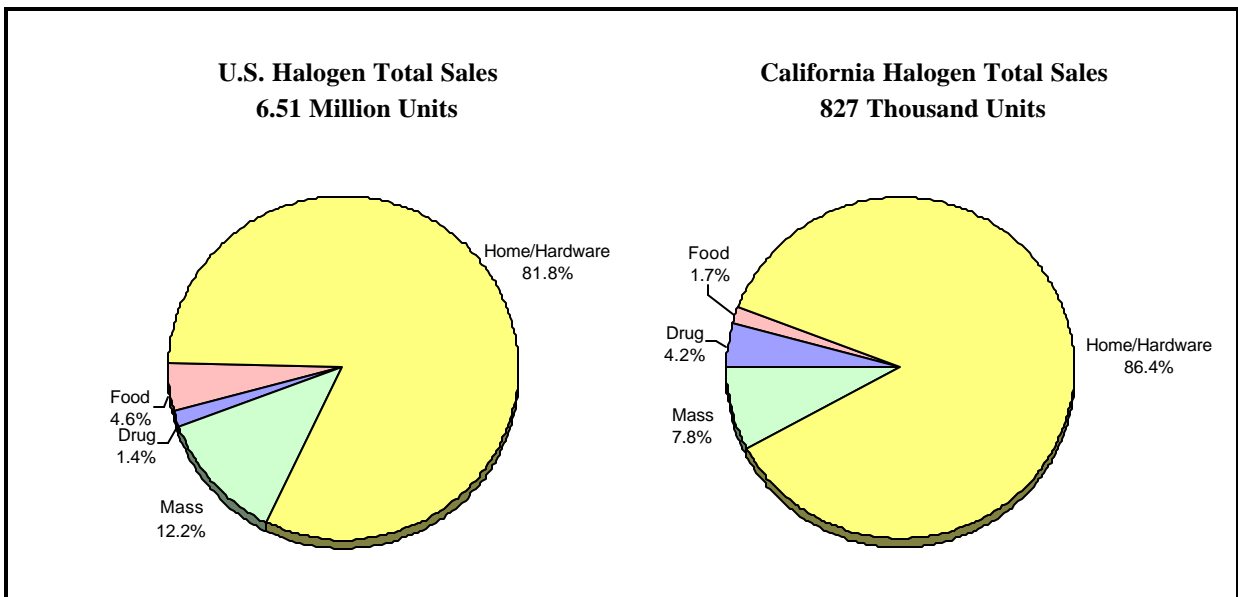
Figure 22: Medium Screw-Based Incandescent Sales by Retail Channel – California and U.S. (non-California) – 2000



Halogens

Figure 23 presents sales of medium screw-based halogens by market channel in the U.S. and California. Sales of medium screw-based halogens are sold primarily through hardware stores and home improvement centers. Again, California shows a large percentage of lamp purchases through hardware stores and home improvement centers.²¹ In comparison to Lamp Report 2000, Volume 1,²² food stores, drug stores, and mass merchandisers are selling a significantly larger percentage of medium screw-based halogen bulbs.

Figure 23: Medium Screw-Based Halogen Sales by Retail Channel – California and U.S. (non-California) – 2000



²¹ A caveat to the market shares of halogens by market channel should be noted. In particular, lighting showrooms and small specialty lighting stores arguably account for a significant amount of medium based halogen lamps unit sales. Insofar as the lamp tracking database does not account for these relatively small stores, the share of sales through the hardware and home improvement market channel might be overstated.

²² Regional Economic Research. *California Lamp Report 2000, Volume 1*. Submitted to Southern California Edison Company, January 2001.

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

Figure 24 and Figure 25 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 medium screw-based CFL sales generally range from double to triple those of pin-based CFLs and that, over time, relative shares of screw-based CFLs appear to grow while pin-based CFL sales stay relatively constant.

Figure 24: Medium Screw-Based CFL Sales and Pin-Based CFL Sales – California

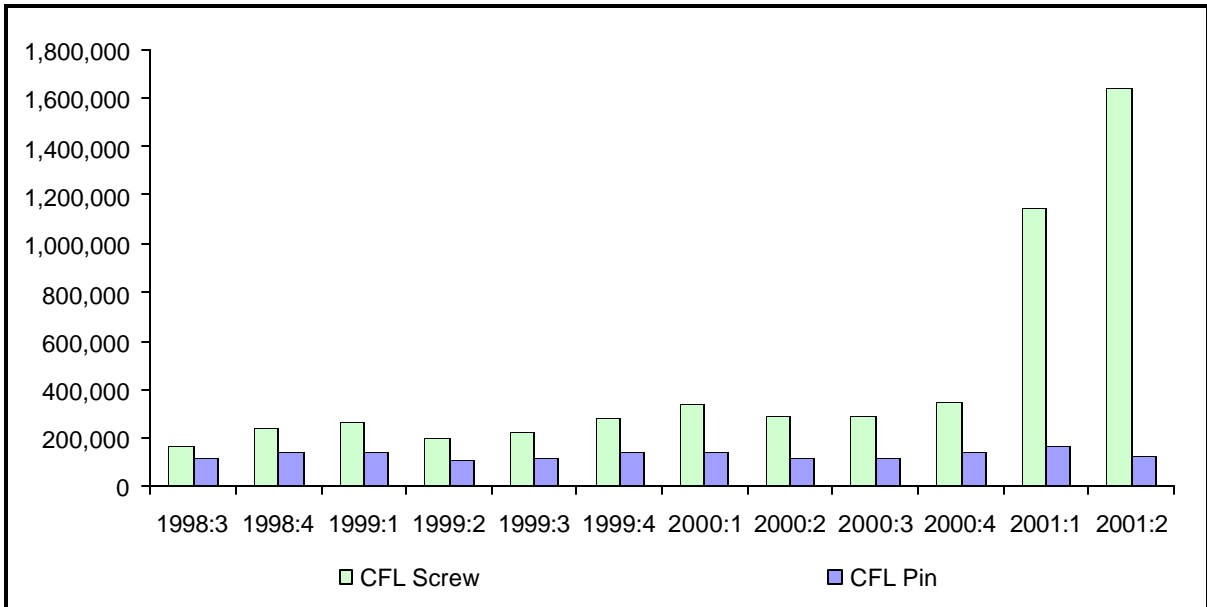
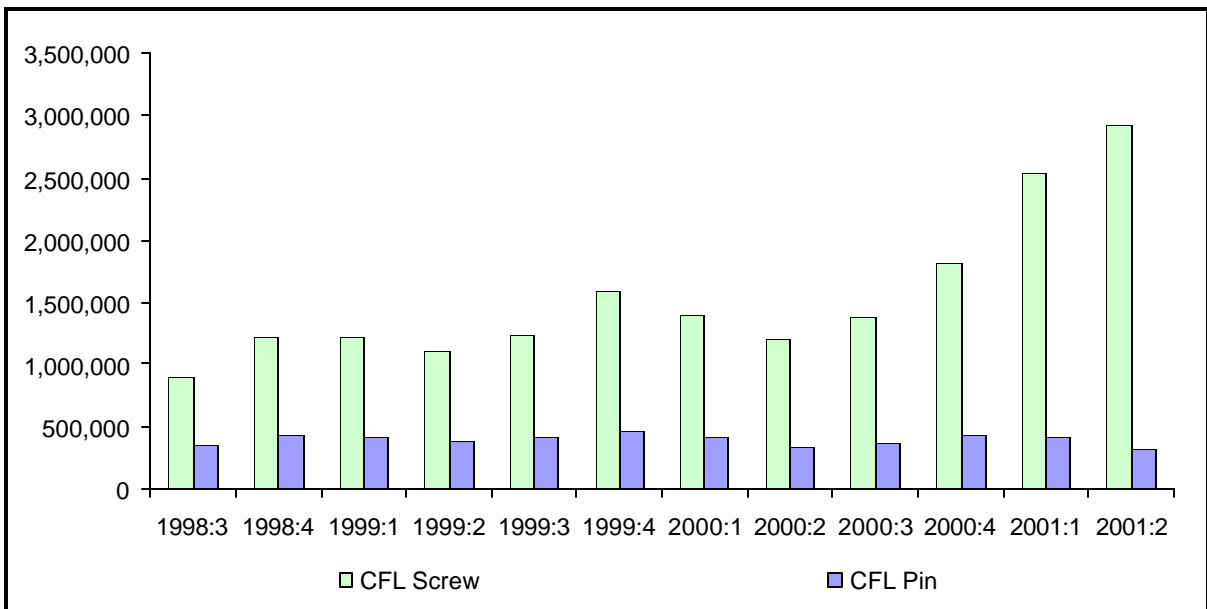


Figure 25: Medium Screw-Based CFL Sales and Pin-Based CFL Sales – U.S.



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,²³ lamps were sorted by equivalent lumen output, as shown in Table 3.

Table 3: Equivalent Wattages²⁴

CFL 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 26, Figure 27, and Figure 28 present sales of medium screw-based CFLs, incandescents, and halogens by wattage for California and the rest of the U.S. Comparing Figure 26 through Figure 28 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.

²³ Lighting Research Center. *Specifier Reports: Screwbase Compact Fluorescent Lamp Products, Volume 7, Number 1*. June 1999.

²⁴ Typical Incandescent Wattage is the most common incandescent lamp found for that wattage range, based on data from lamp manufacturers.

Figure 26: Medium Screw-Based CFL Sales by Wattage – California and U.S. (non-California) – 2000

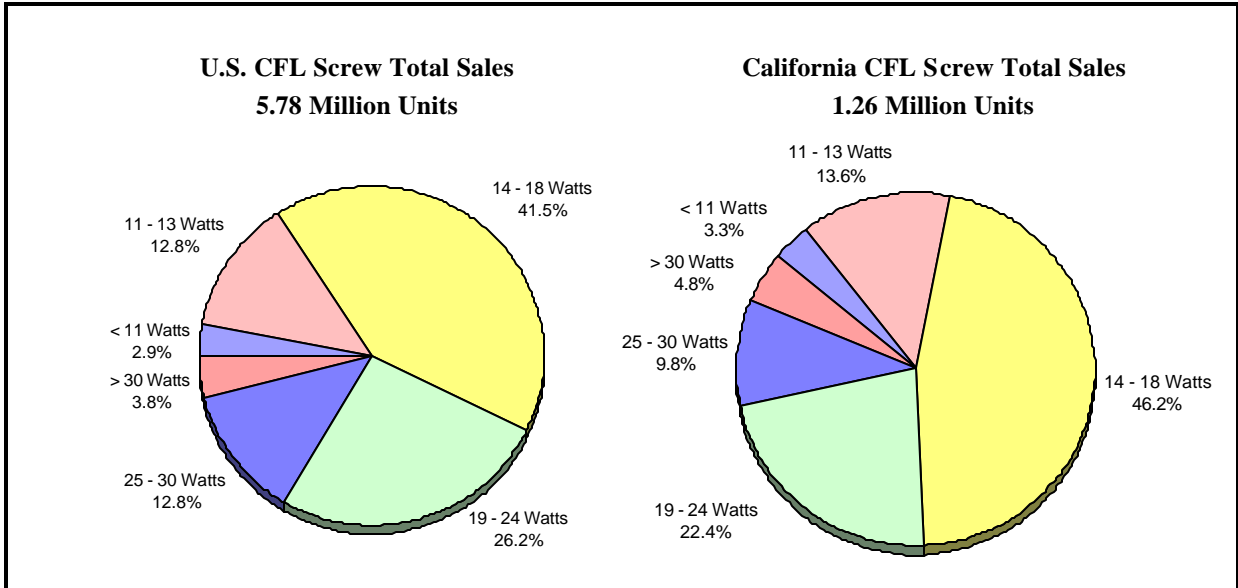


Figure 27: Medium Screw-Based Incandescent Sales by Wattage – California and U.S. (non-California) – 2000

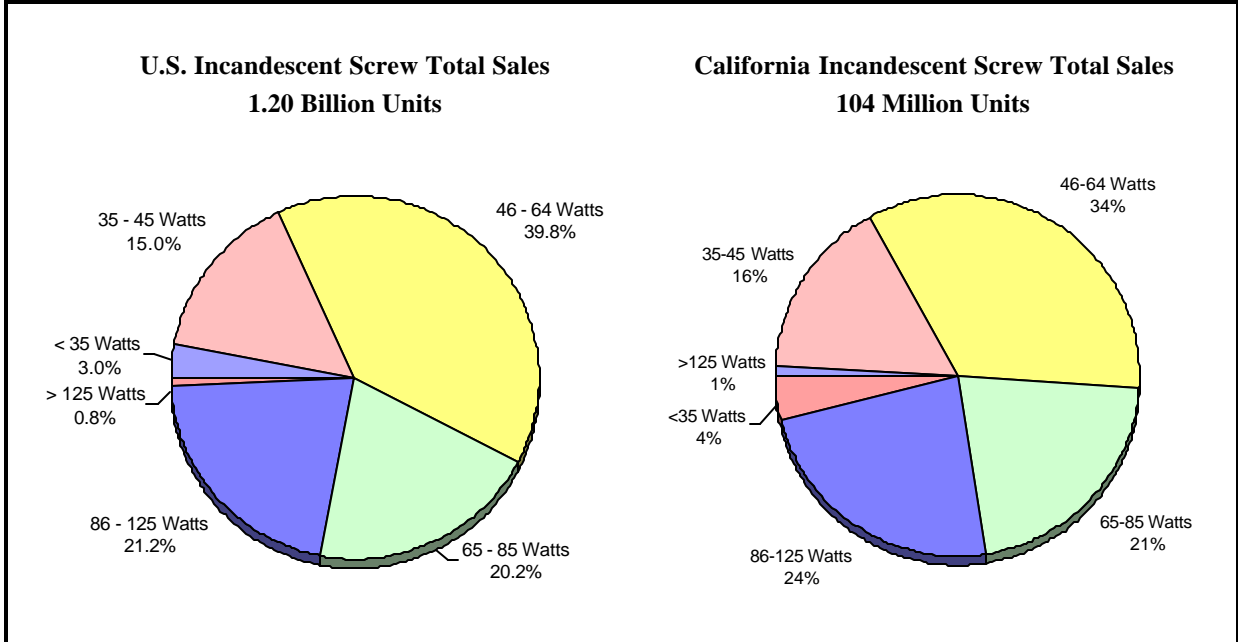


Figure 28: Medium Screw-Based Halogen Sales by Wattage – California and U.S. (non-California) – 2000

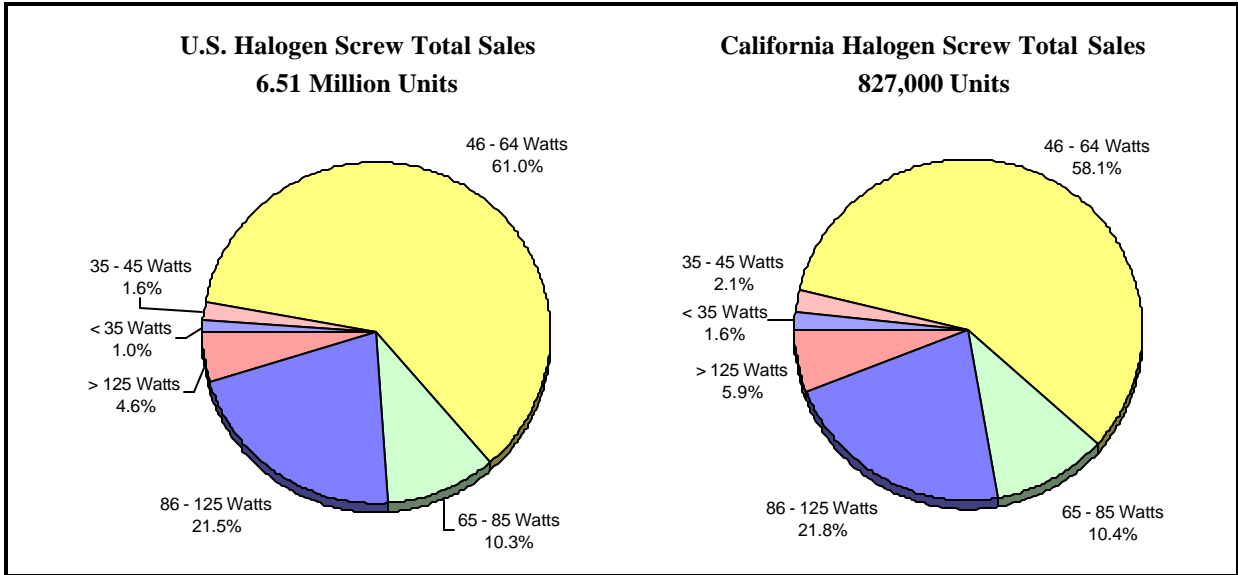


Figure 29 and Figure 30 illustrate medium screw-based CFL sales as a percentage of total medium-based lamp sales by wattage over time for California and the U.S., respectively. These figures reveal that CFLs are gaining the most market share in the wattage range with the highest sales volume, the 14-18 watt range (60-watt equivalent). As shown, this wattage range accounts for a large portion of the total increase in CFL medium screw-based lamps over the past two quarters. CFLs in the 11-13 and 19-24 watt ranges have also increased substantially over this period. This trend is much more pronounced in California than in the U.S., as shown by comparing Figure 29 and Figure 30.

Figure 29: Medium Screw-Based CFL Sales as a Percentage of Total Medium Screw-Based Sales, by Wattage – California

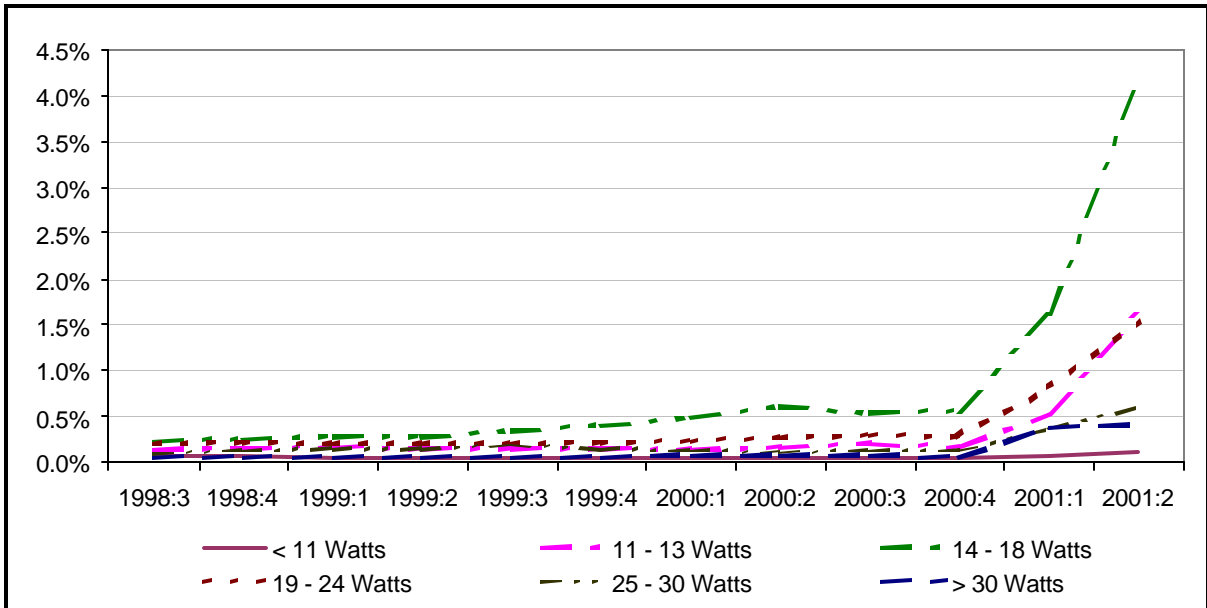


Figure 30: Medium Screw-Based CFL Sales as a Percentage of Total Medium Screw-Based Lamp Sales, by Wattage – U.S. (non-California)

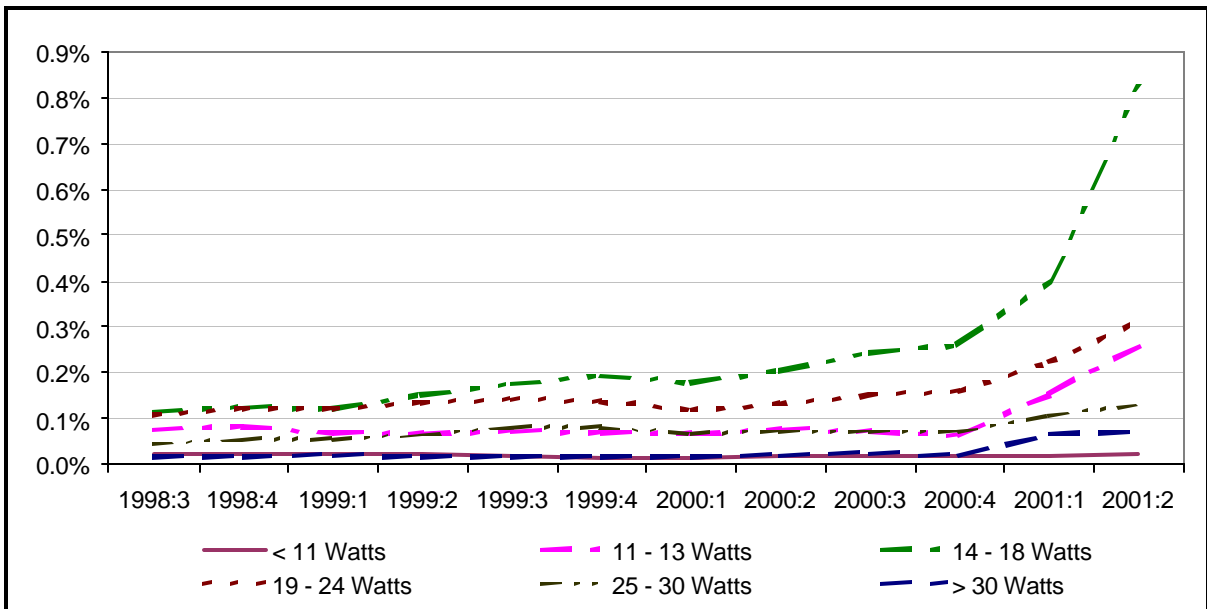


Figure 31 and Figure 32 illustrate medium screw-based halogen sales as a percentage of total medium-based lamp sales by wattage, over time for California and the U.S. Like CFLs, halogen screws in the 46-64 watt range (60-watt equivalent) are gaining the most market share. California and U.S. sales trends appear to be growing at similar rates over time.

Figure 31: Medium Screw-Based Halogens as a Percentage of Total Medium Screw-Based Lamp Sales, by Wattage – California

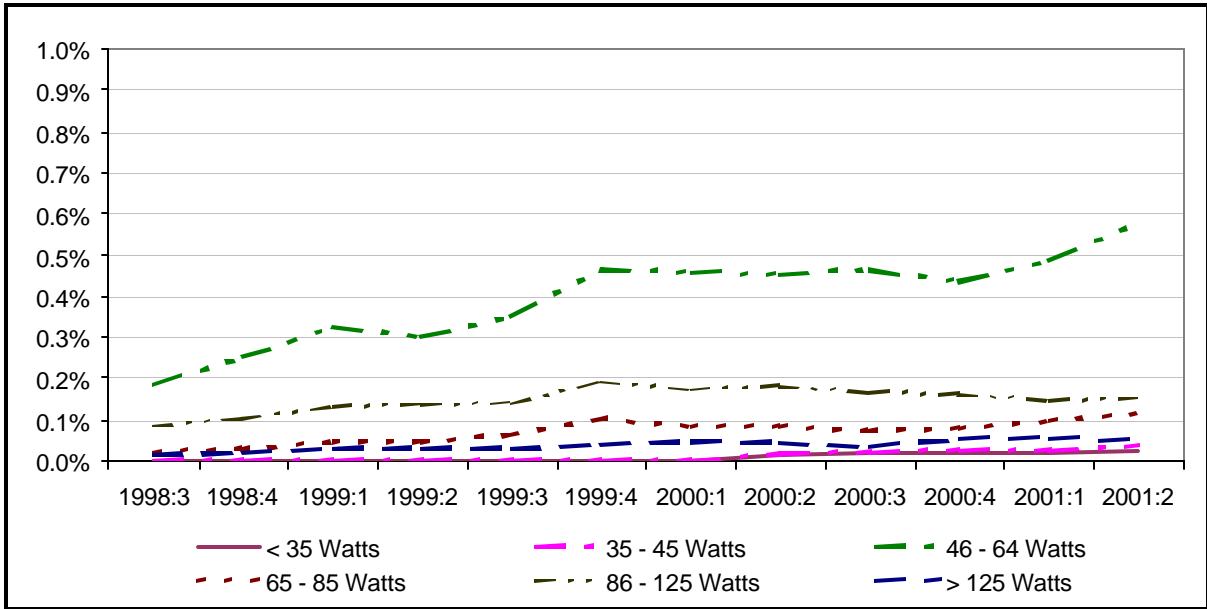
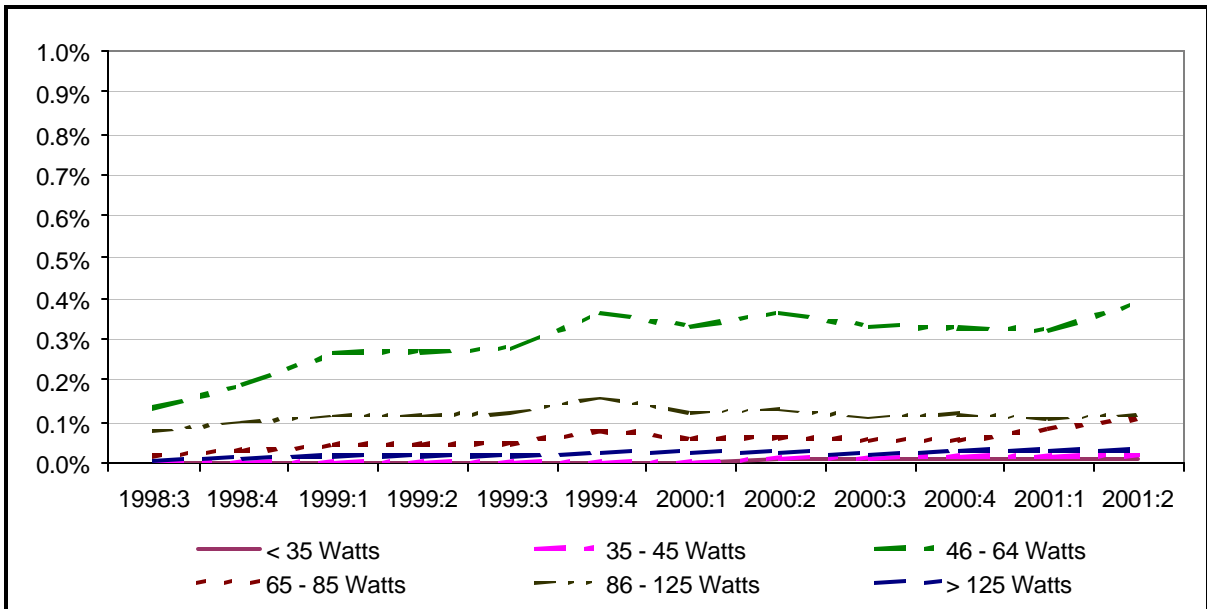


Figure 32: Medium Screw-Based Halogen Sales as a Percentage of Total Medium Screw-Based Lamp Sales, by Wattage – U.S. (non-California)



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, on average, a CFL will last 11 times longer than an incandescent bulb.²⁵ Therefore, the sale of one CFL is equal to selling 11 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 to capture a better estimate of the impact of CFL and halogen sales, first 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 2000, 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 2000, the CFL share of sales was approximately 1.2% in California. However, when taking into account that the life of each CFL is much longer than that of an incandescent bulb, the estimated market share is nearly 12%. Similarly, the lamp life normalized market share for halogen bulbs is higher than its share of sales—2.1% compared to 0.8%, in California.

Table 4: Medium Screw-Based Lamp Shares Based on Normalized Lamp Life – 2000

Lamp Type	Average Lamp Life (hours) ²⁶	Relative Life of Lamp*	Raw Sales		Lamp Life Normalized	
			U.S. Share	California Share	U.S. Share	California Share
Incandescent	875	1.0	99.0%	98.0%	93.3%	86.0%
Compact Fluorescent	10,000	11.4	0.5%	1.2%	5.1%	11.8%
Halogen	2,750	3.1	0.5%	0.8%	1.6%	2.1%

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

²⁵ Lamp life estimates are based on average data from lamp manufacturer catalogs.

²⁶ Lamp life estimates are based on average data from lamp manufacturer catalogs.

5. Summary of Key Findings

A number of key findings were identified from the analysis of the lamp tracking data. Some general observations include the following:

- The data from the five market channels reveal total residential lamp sales counts for the U.S. to be approximately 2.14 billion per year, with California sales at approximately 197 million per year.
- Incandescent lamps dominate the unit sales of lamps with over three-fourths of the U.S. market. Other lamp types with significant market shares of unit sales include specialty (14%), fluorescent (5%), and halogen (3%) lamps.
- The market share of CFLs in California increased to nearly 9% in 2001.
- In the second quarter of 2001, CFLs have more than eight times the market share of medium screw-based lamps in California than they do nationwide.
- Growth in unit sales of CFLs has not been uniform across all types of CFLs, but has been strongly concentrated in 60-watt equivalent bulbs.
- Home improvement stores play a dominant role in efficient lighting sales in California. This is not surprising given the heavy focus on these stores by the state's lighting programs. However, grocery stores still sell a substantial percentage of incandescent bulbs and might be a useful channel in which to explore additional CFL sales opportunities.
- Halogen bulb sales have also grown because of heavy promotion by manufacturers. These products are likely competing with CFLs for the attention of consumers willing to try alternatives to standard incandescent light bulbs.
- 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%). This continued in the second quarter of 2001 when the market share of CFLs rose to 8.4%. This increase coincides with California's "energy crisis," which included rolling blackouts in early 2001. Further, most California residents saw significant increases in their electricity bills in April 2001, while residents in the SDG&E service territory saw their bills triple during the summer of 2000.