Residential Market Share Tracking

Lamps

Submitted to:

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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.

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. 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 sale 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.

This report is an important element of the Residential Market Share Tracking Study (RMST).[1] 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.[2]

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.

2. Preview of Key Findings

A number of key findings were identified from the analysis of the lamp tracking data, which include the following:

- The data from the five market channels reveal total lamp sales counts for the U.S. to be approximately 2.20 billion per year, with California sales at approximately 217 million per year.
- Incandescent lamps dominate the unit sales of lamps with over 70% of the U.S. market. Other lamp types with significant market share of unit sales include specialty (14%), fluorescent (7%), and halogen (3%) lamps.
- The lamp tracking data indicate that California was not only exhibiting greater market share for efficient residential lighting at the beginning of the study period, but that it expanded that leadership over the last two years. CFLs now have nearly three times the market share of medium screw based lamps in California than they do in the nation as a whole.
- 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.

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

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

- 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 substantially as a result 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.

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.[3] 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.[4]

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, 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.[5] 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.

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

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

5 ACNielsen Company, Schaumburg, IL.

ACNielsen uses a stratified sample design to measure consumer sales across different geographic region 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 Bureau[6] 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.[7]

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.[8]

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).[9] Triad collects hardware and home improvement center sample data came

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

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

8 From conversations with lighting industry professionals.

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

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.[10] 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.[11] 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.

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.

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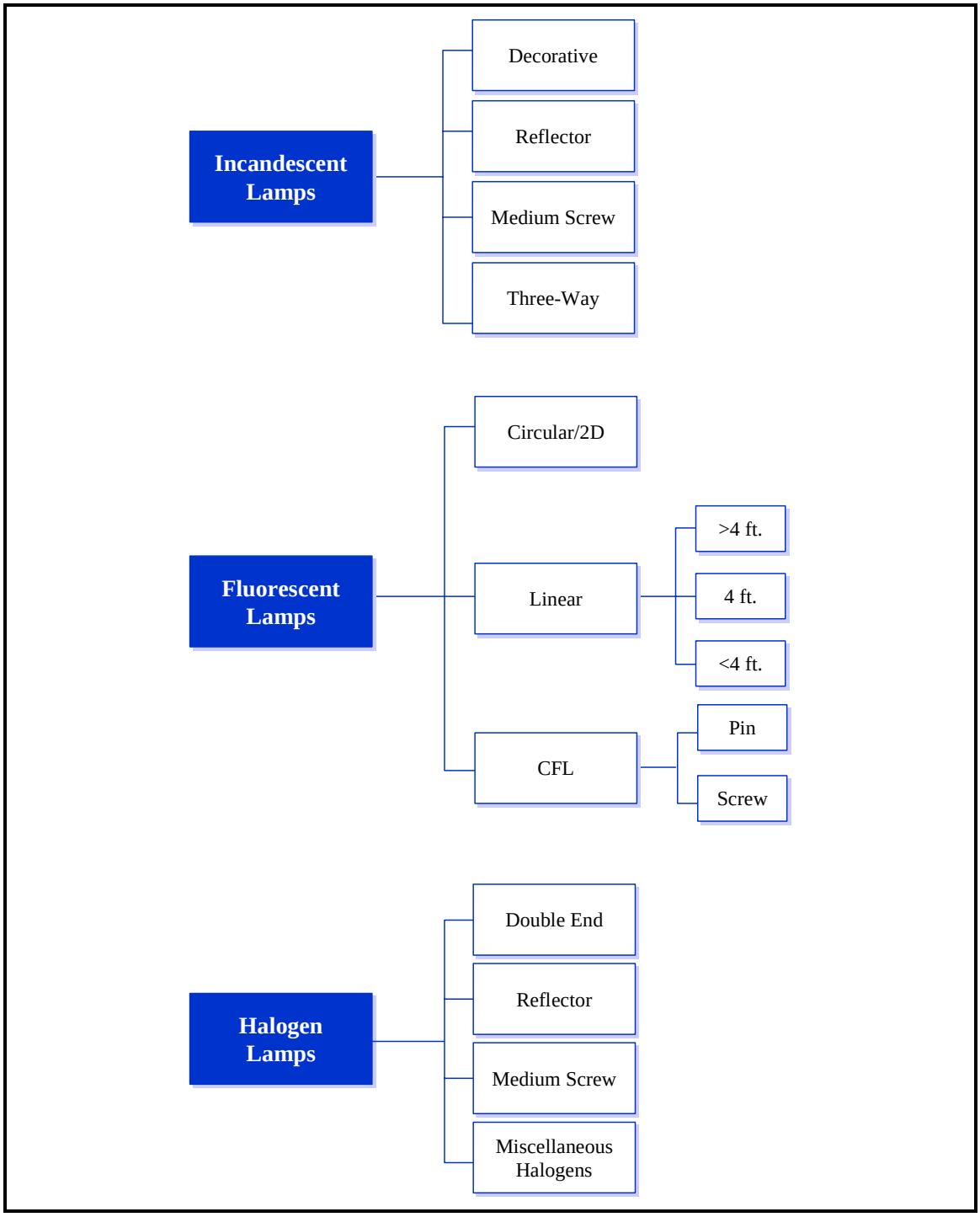
[10] It should be noted that one strength of the Triad data is that it contains a census of store outlets for a number of the home improvement and hardware chains. As such, no weighting is required for these elements of the data.

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

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 2.20 billion per year, with California sales at approximately 217 million per year.[12] 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.[13] Using information from previous studies and lighting industry professionals, fluorescent lamps found in packs greater than 12 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.

By removing 40 million lamps (6 million in California) deemed to be commercial and/or industrial, the market share of fluorescents shifts slightly, as shown by comparing Figure 2 and Figure 3.

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[12] Based on ACNielsen and Triad Vista data from July 1999 through June 2000

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

Figure 2: Total Lamp Sales – Food, Drug, Mass Merchandise, Hardware and Home Improvement – California and U.S. – 1999-2000

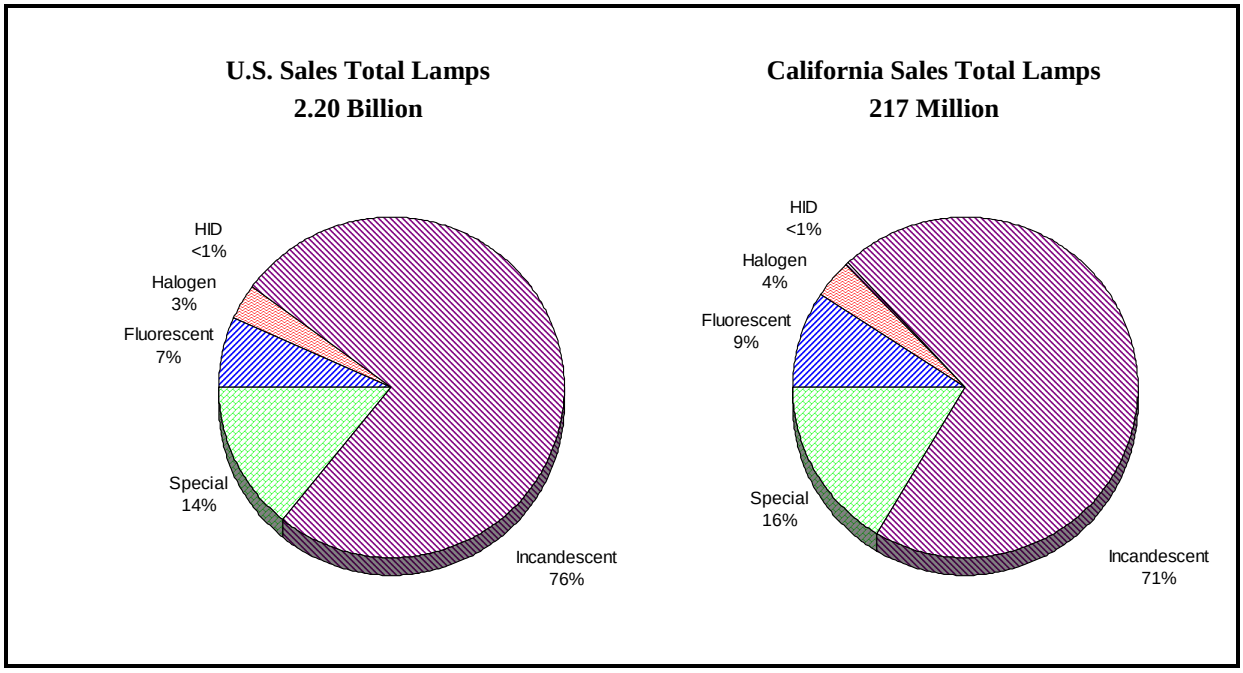
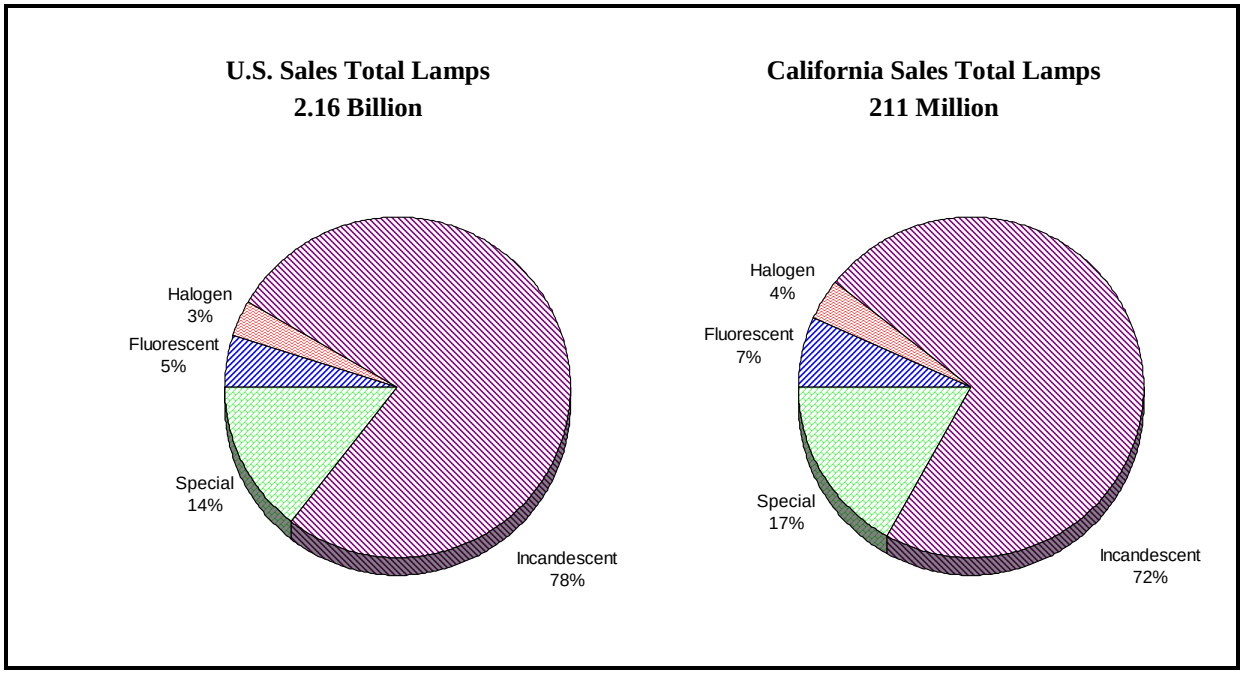


Figure 3: Residential Lamp Sales – Food, Drug, Mass Merchandise, Hardware and Home Improvement – California and U.S. – 1999-2000



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 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. – '99-00

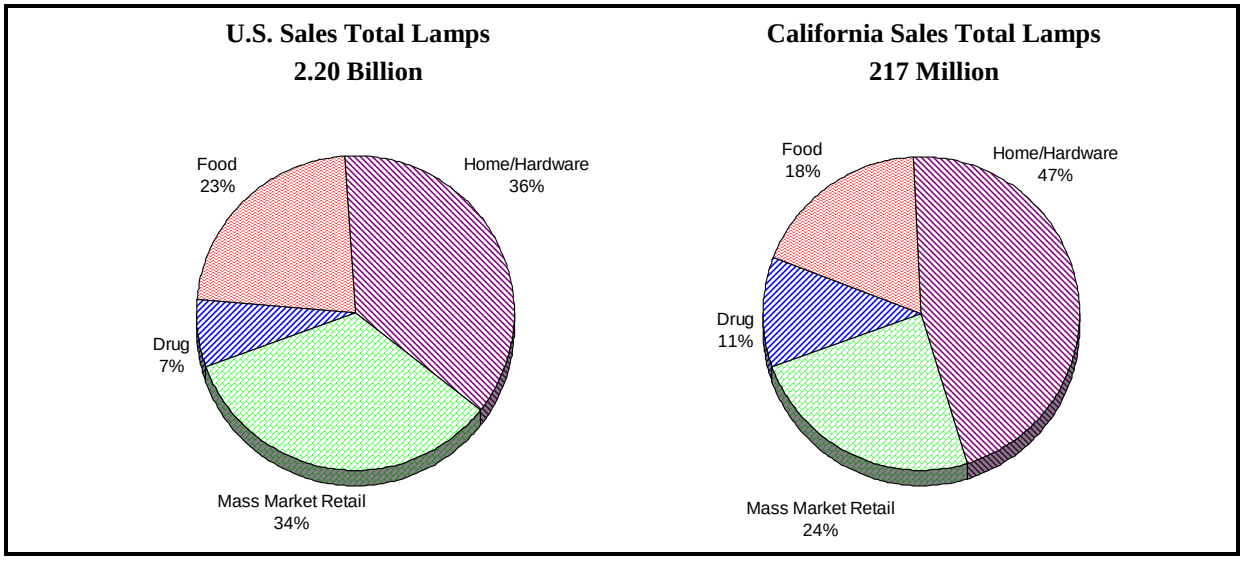
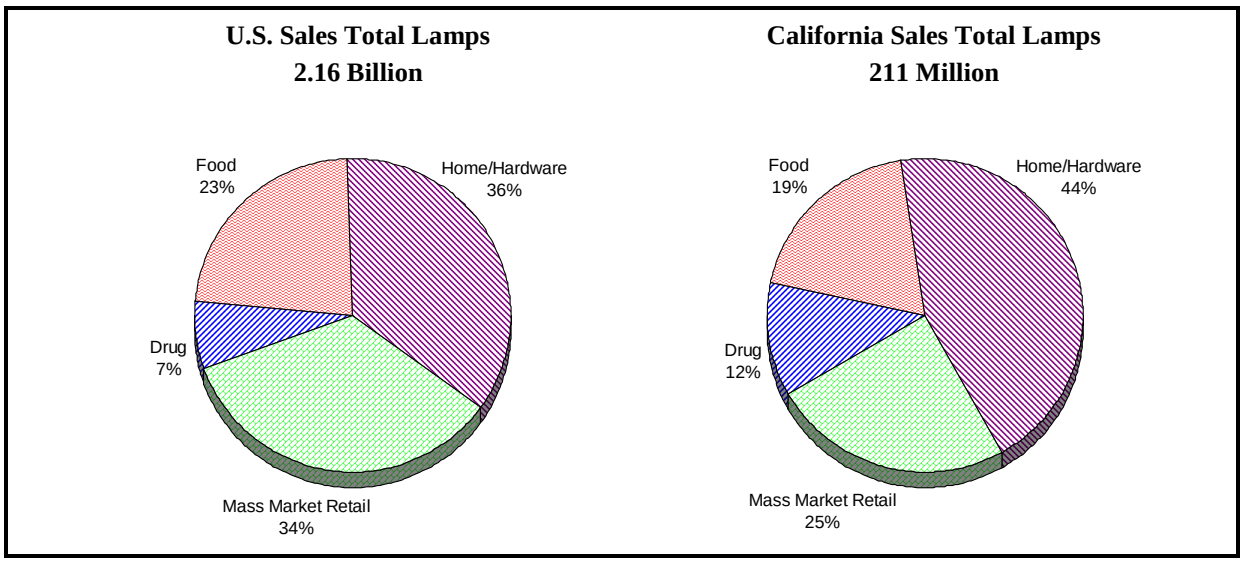


Figure 5: Residential Lamp Sales – By Market Channel – California and U.S. – 1999-2000



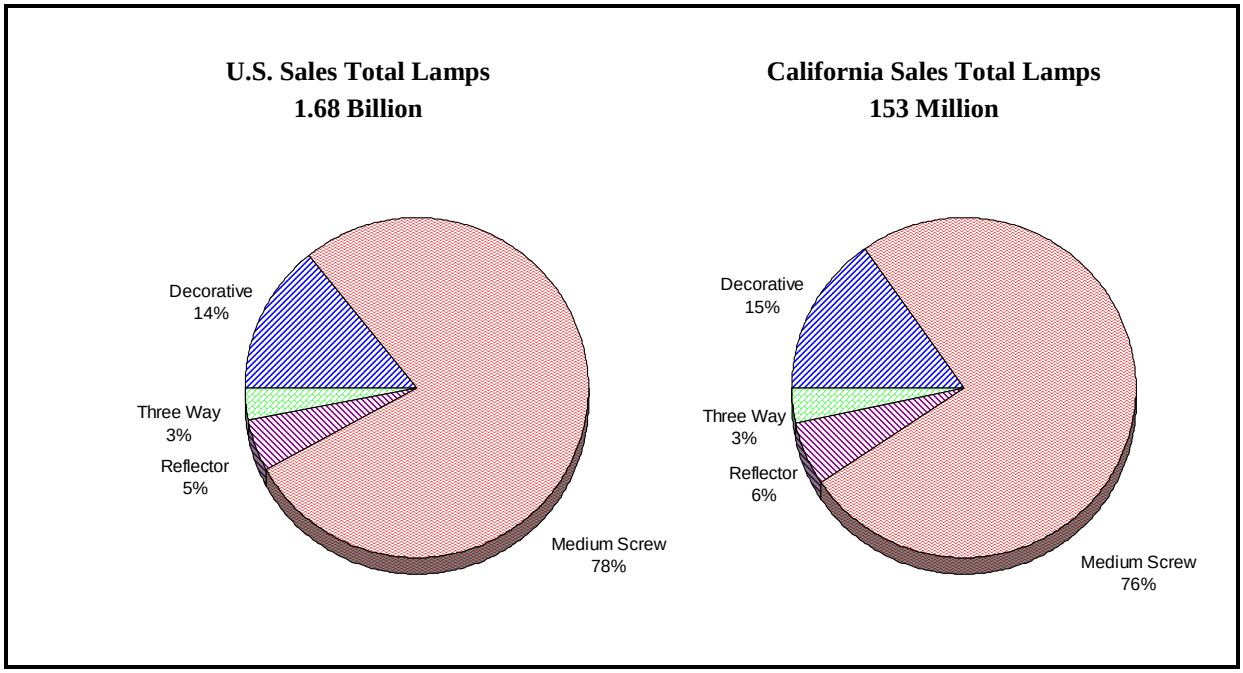
Sales by Lamp Classification

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. In both the U.S. and California, medium screw-based lamps account for greater than 75% 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. – 1999-2000



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 4 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. – 1999-2000

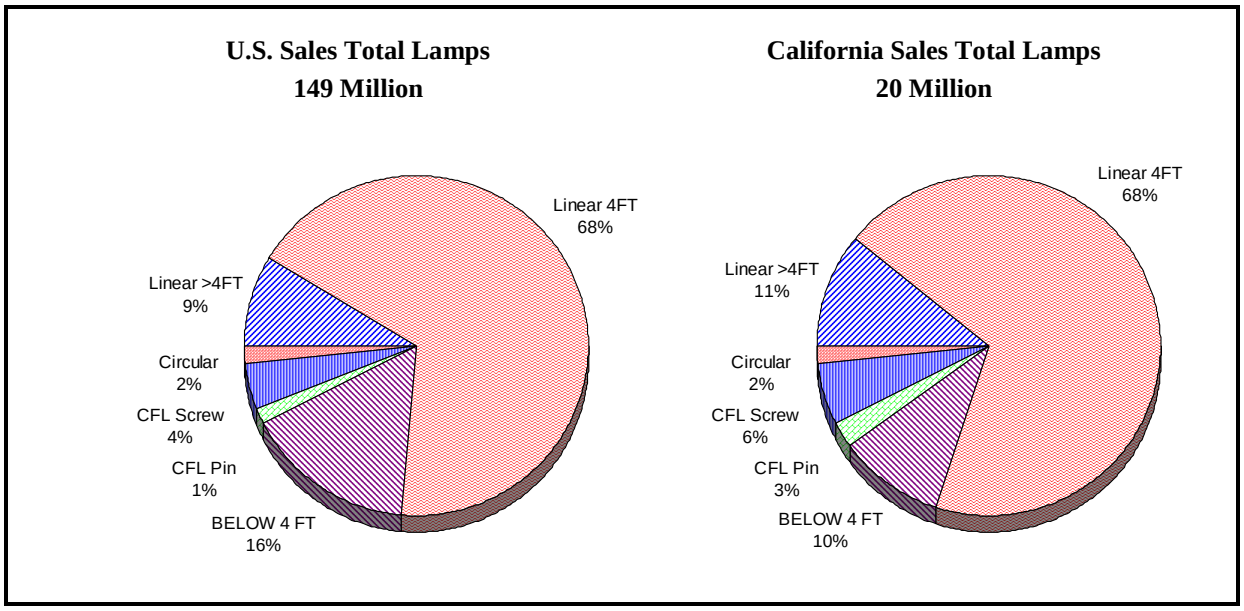
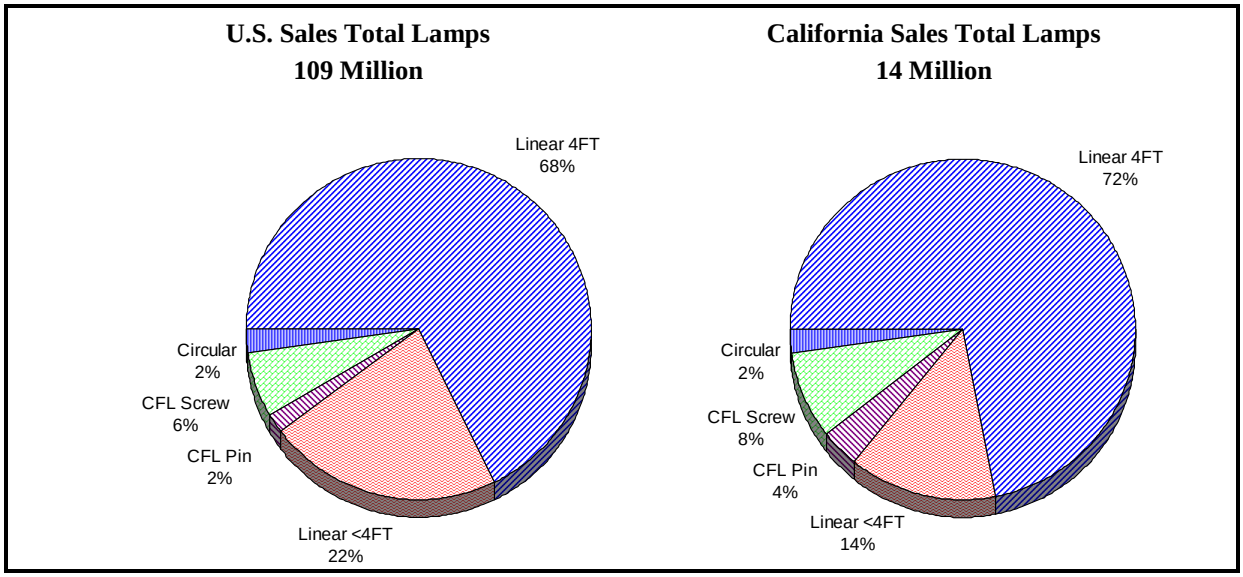


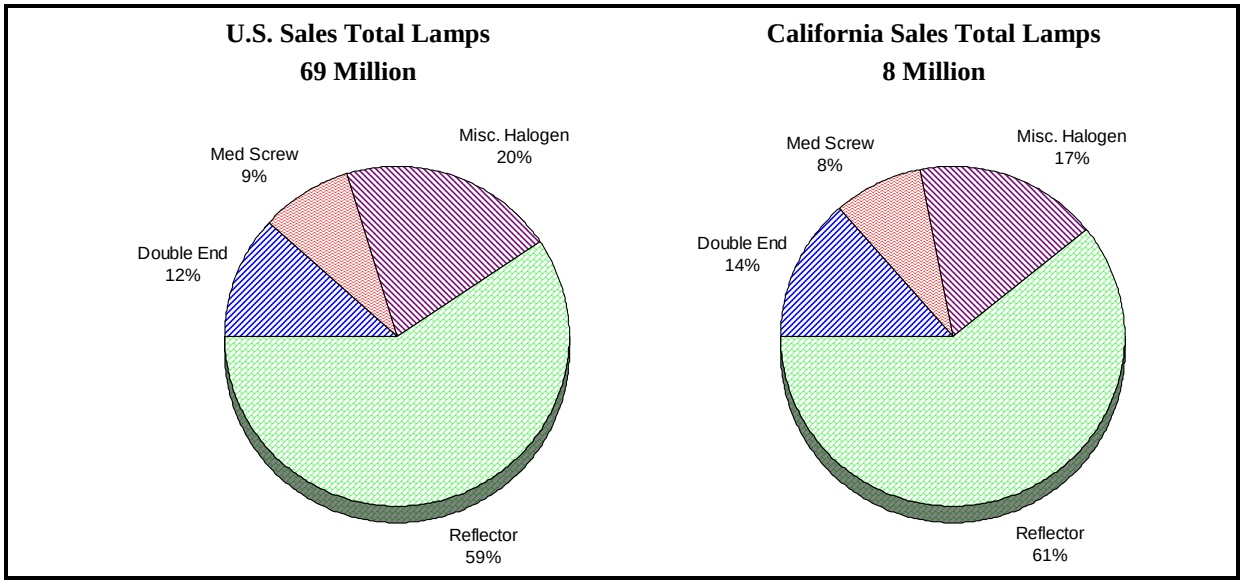
Figure 8: Residential Fluorescent Lamp Sales – by Type – California and U.S. – 1999-2000



Halogens

Figure 9 presents 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. Reflectors dominate halogen lamp sales. As shown in Figure 9, these lamps comprise approximately 60% of all halogen sales in the U.S. and California. Only subtle differences exist between the distribution in U.S. halogen sales and California halogen sales.

Figure 9: Halogen Lamp Sales – by Type – California and U.S. – 1999-2000



Total Unit Sales of Medium Screw-Based Lamps

Table 1 provides a snapshot of total unit sales of medium screw-based lighting from July 1998 through June 1999 (year one) and July 1999 through June 2000 (year two). 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.

The general trend shows that lamp sales are increasing between year one and year two, regardless of lamp type. CFL sales increased by 27.3% in California vs. 21.8% in the U.S. The largest increase occurred for halogen lamps, where sales rose 75.7% in the U.S. and rose 93% in California. These increases reflect meaningful shifts in product share within the lighting market, since overall lamp sales increased by only 2.0% in California and 3.0% in the U.S. over the same period.

Year two shows that from July 1999 to June 2000, California accounted for about 8.8% of overall national lighting sales, but a remarkable 17.5% of national CFL sales. The data also reveal that CFL sales rose in each of the California utility service territories.

Table 1: Total Sales, Medium Screw-Based Lamps

Region	CFL		Halogen		Incandescent	
	1998-1999	1999-2000	1998-1999	1999-2000	1998-1999	1999-2000
U.S.	5,423,326	6,605,844	3,411,994	5,994,913	1,266,273,191	1,301,094,411
CA	907,899	1,155,713	347,081	670,682	113,860,317	115,617,060
SCE	224,023	303,279	97,912	209,356	35,413,142	35,264,419
SDGE	112,340	119,767	43,574	66,278	8,943,354	9,093,664
PG&E	350,864	437,809	113,179	230,249	47,235,159	48,220,702
Other	220,672	294,858	92,416	164,798	22,277,707	22,999,889

California Medium Screw-Based Lamp Sales Over Time

Figure 10, Figure 11, and Figure 12 illustrate California sales of medium screw-based incandescents, CFLs, and halogens, respectively. As shown in Figure 10, incandescent lamp sales in California peak during periods of less daylight (autumn and winter) and dip during periods of more daylight (spring and summer). Figure 11 and Figure 12 show this trend for CFLs and halogens as well. Over time, incandescent lamp sales seem to remain relatively constant, while CFL and halogen sales are increasing.

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

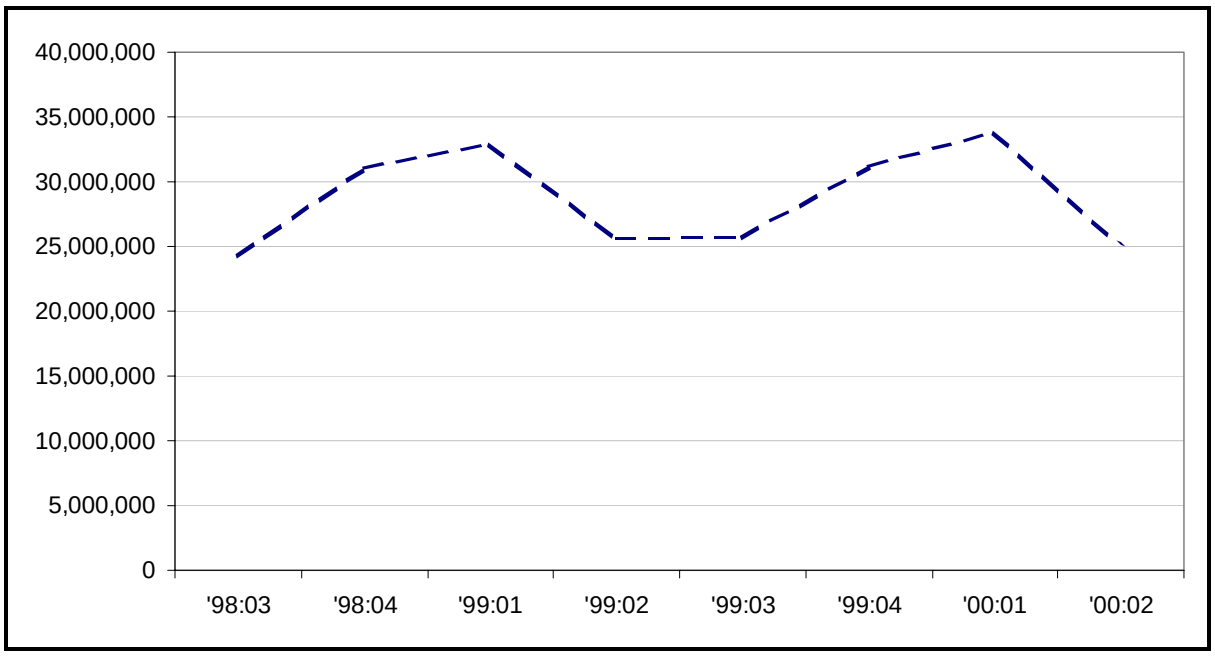


Figure 11: CFL Medium Screw-Based Lamp Sales by Quarter – California

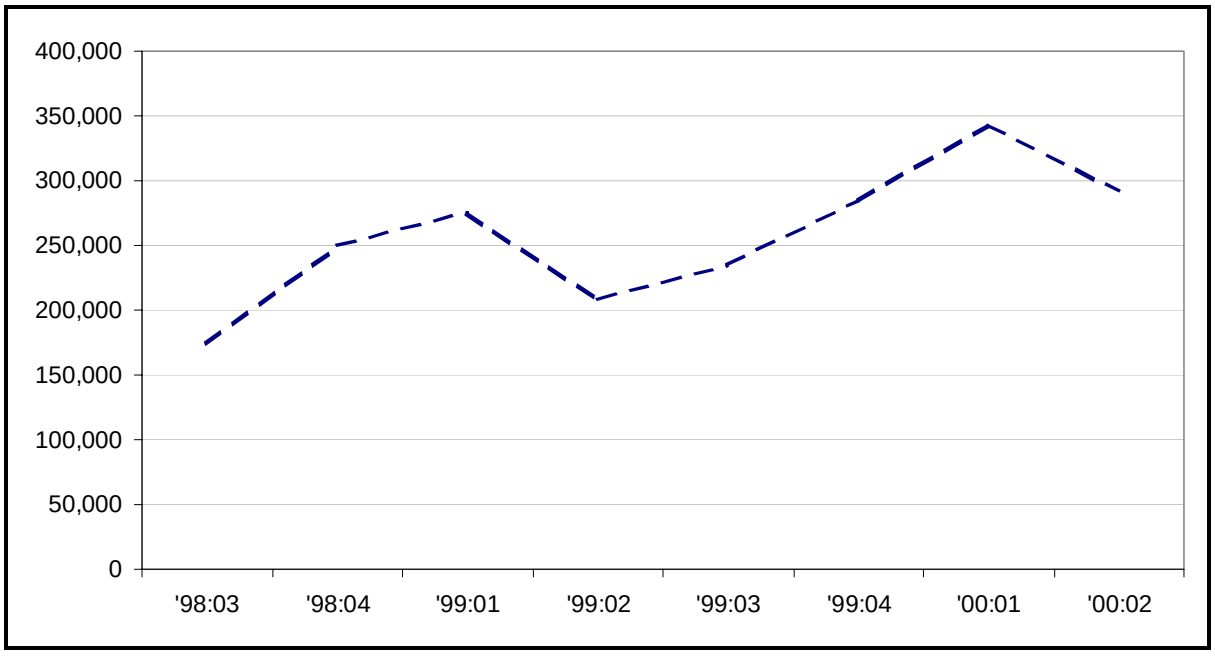
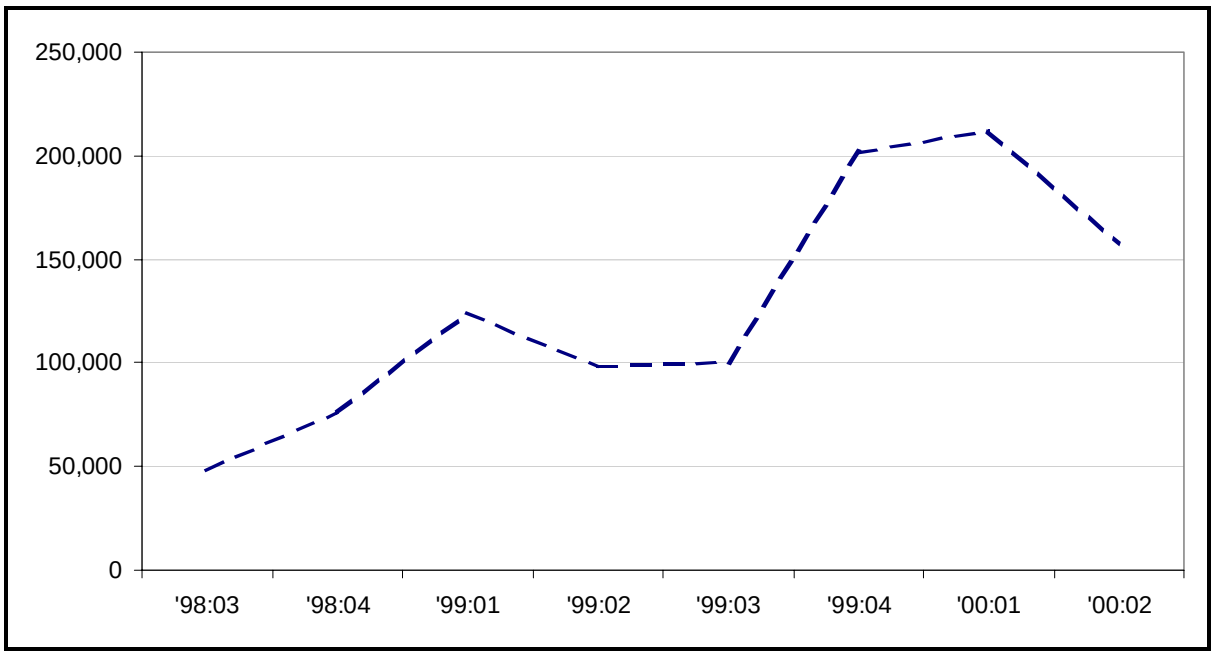


Figure 12: Halogen Medium Screw-Based Lamp Sales by Quarter – California



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

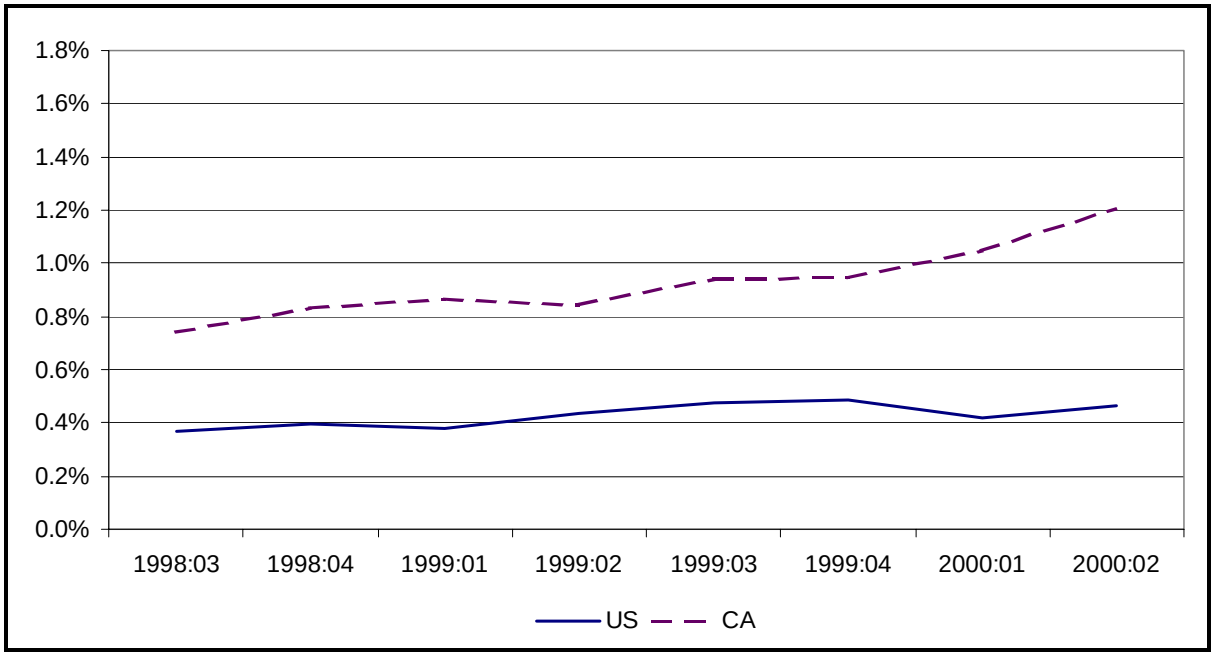
Analysis in this section focuses only on medium screw-based lamps because of their interchangeability. This section presents the shares of each medium screw-based lamp type as a function of all medium screw-based lamps.

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.

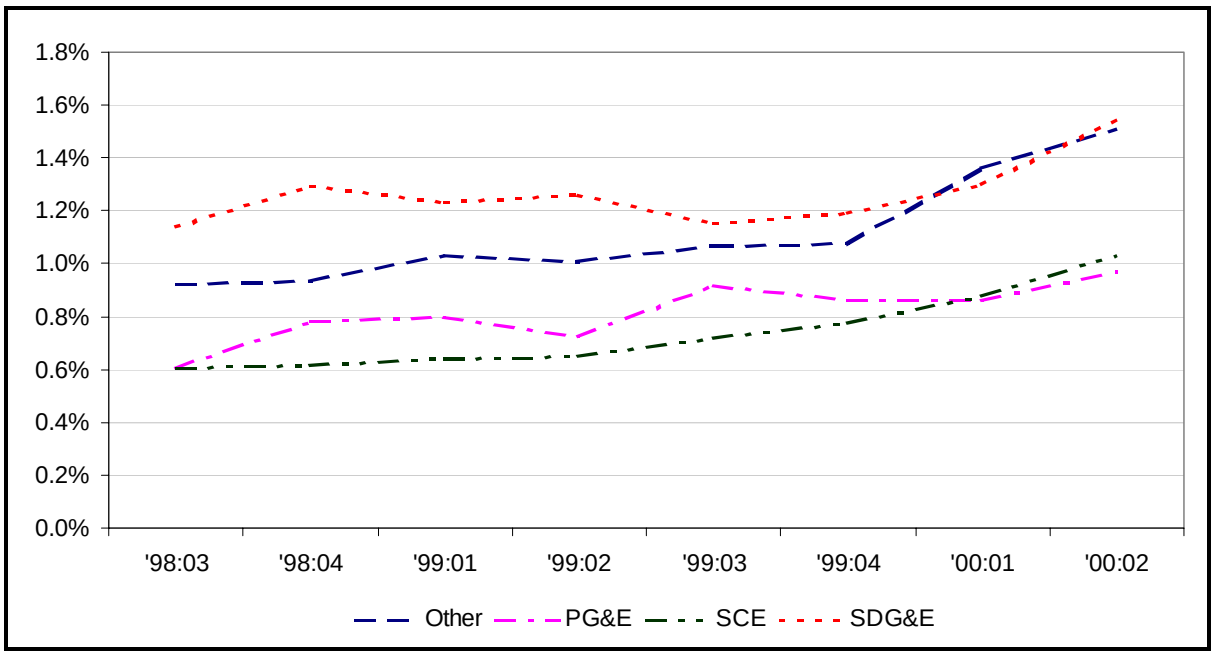
Figure 13 illustrates the share of medium screw-based CFLs as a percentage of total medium screw-based lamps sold by quarter for California and the rest of the U.S.[14] Although shares of CFLs in the overall market are low, the CFL market share increases over time in both markets. The share of CFLs in California is substantially higher than for the U.S. Further, CFL shares appear to be increasing significantly over the last year in California. Figure 14 presents the same information for each of the California IOU service territories and for the remaining non-IOU areas in California. While the CFL share in the third quarter of 1998 was roughly twice as high in California as the national average, it was nearly three times as high by the second quarter 2000.

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



[14] "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 Other[15]



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. Halogen screw sales as a percentage of total medium screw-based lamps are increasing, as evidenced in Figure 15. With the development of new technologies and active promotion by manufacturers, these lamps are also gaining market share. Figure 16 presents the same information for each of the California IOU service territories and remaining non-IOU areas of California.

[15] "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)

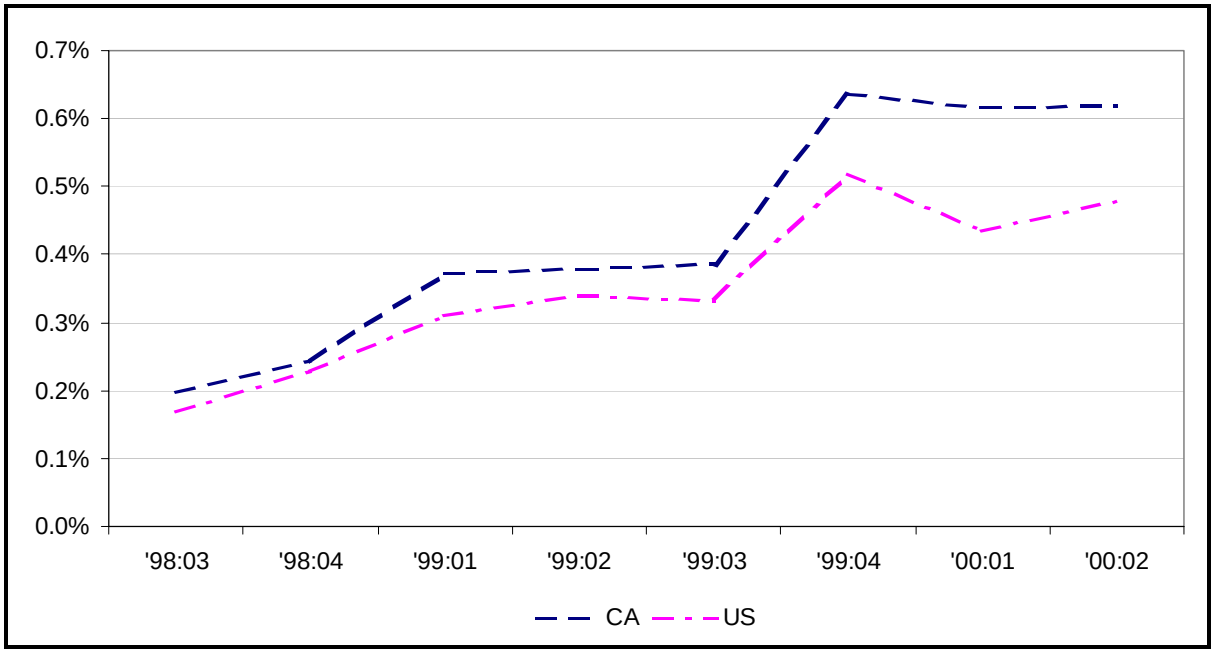
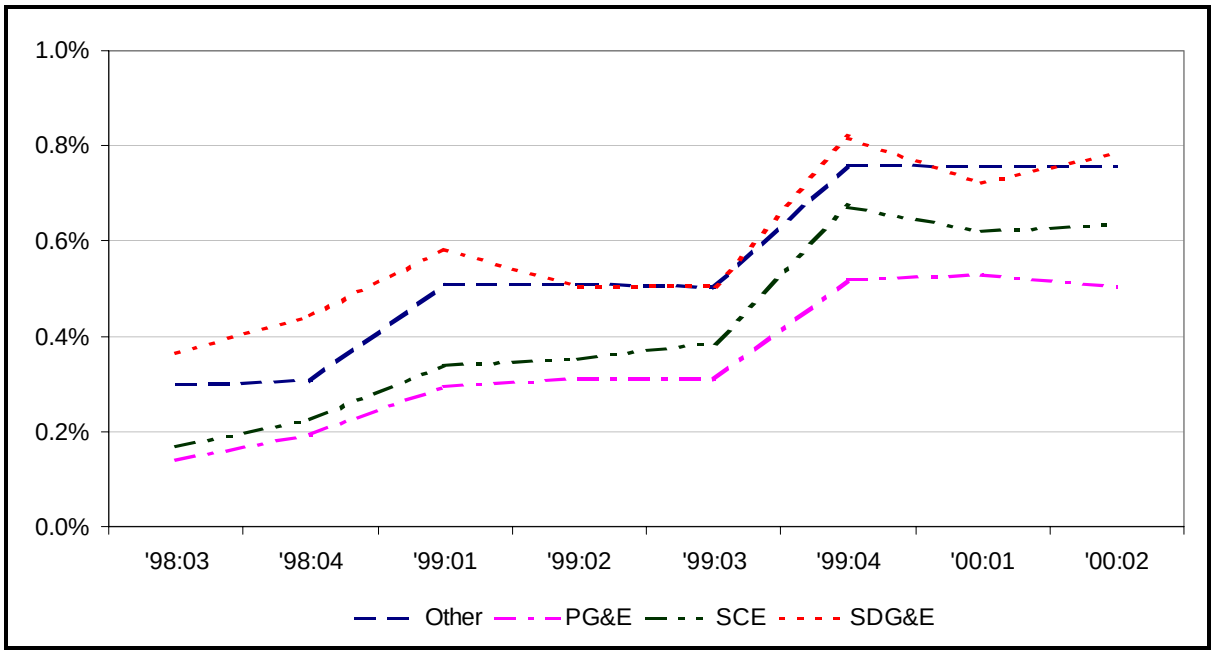


Figure 16: Halogen Share of Medium Screw-Based Lamps – California IOUs and Other[16]



16 "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 over the past two years. As expected, incandescent shares in California have dropped more significantly over time than in the U.S.

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

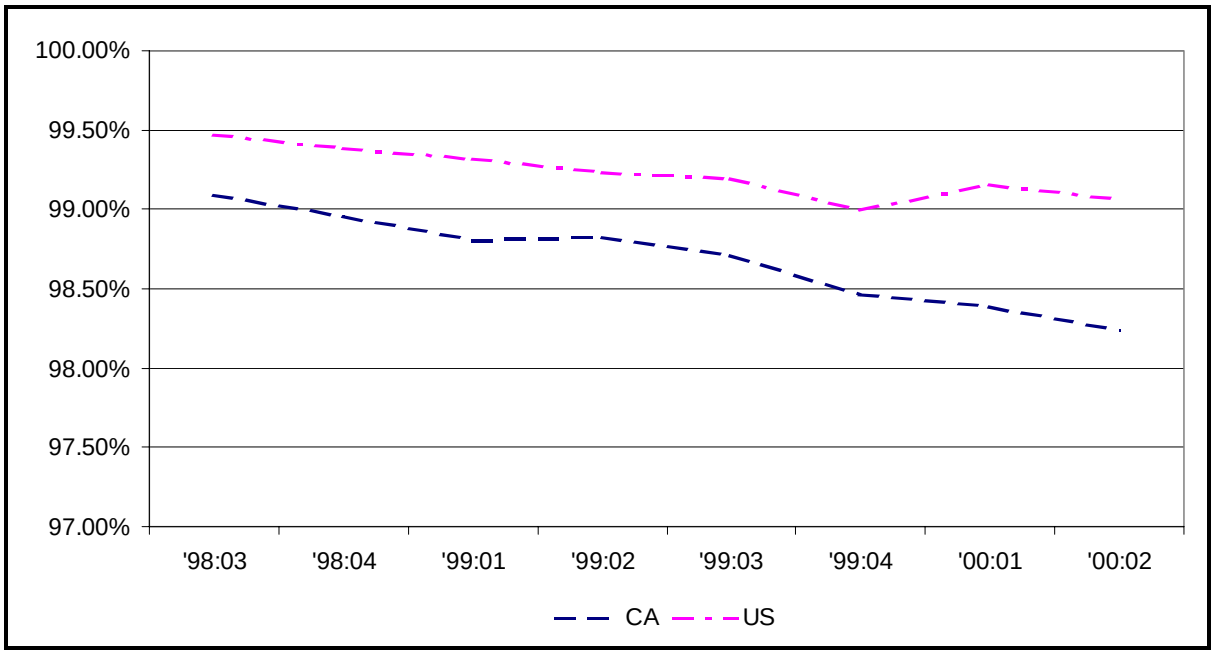
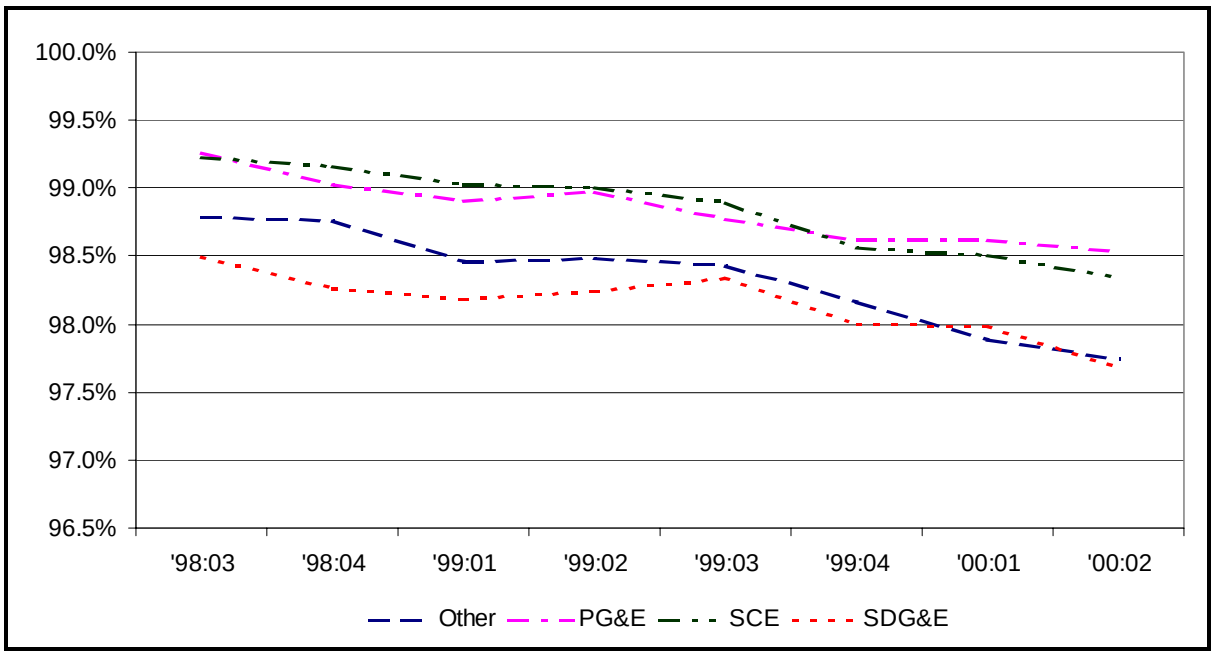


Figure 18: Incandescent Share of Medium Screw-Based Lamps – California IOUs and Other[17]



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.[18]

Figure 19 and Figure 20 plots medium screw-based CFL and halogen sales 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 trends are illustrated in Figure 19 and Figure 20. These same seasonal trends are also found in each IOU service territory.

[17] "Other" includes territories in California not served by the IOUs.

[18] Population estimates from www.census.gov were used to determine approximate households per service territory, state, and U.S. July 1998 data were used for year one and July 1999 data were used for year two.

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

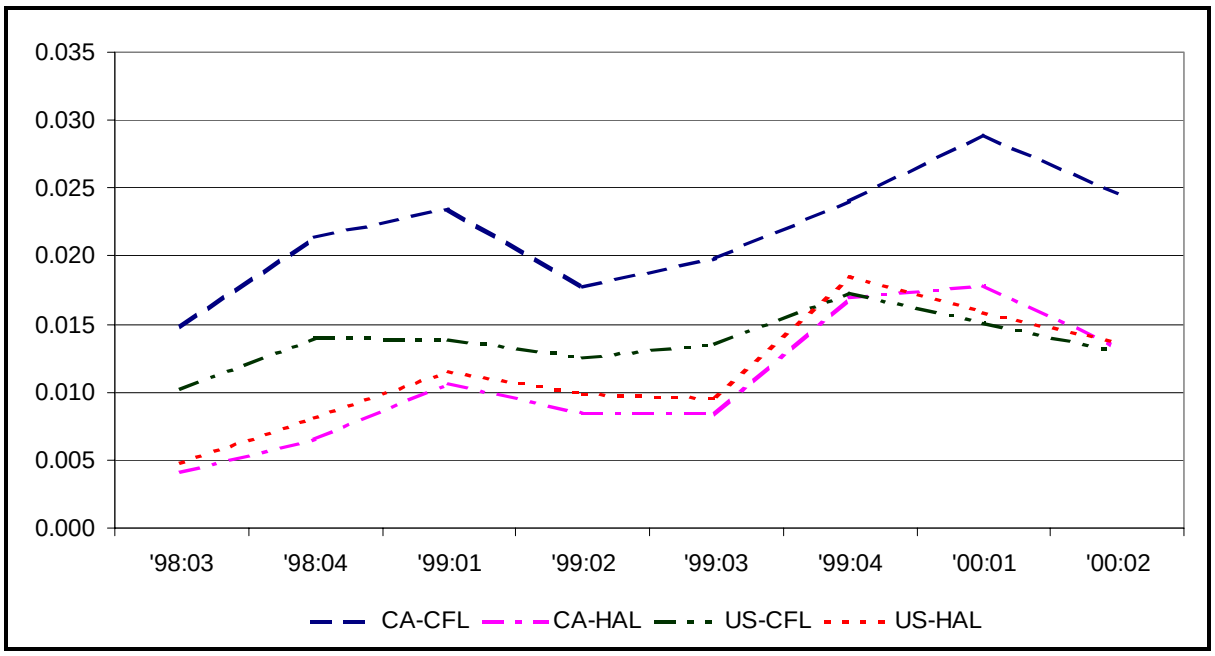
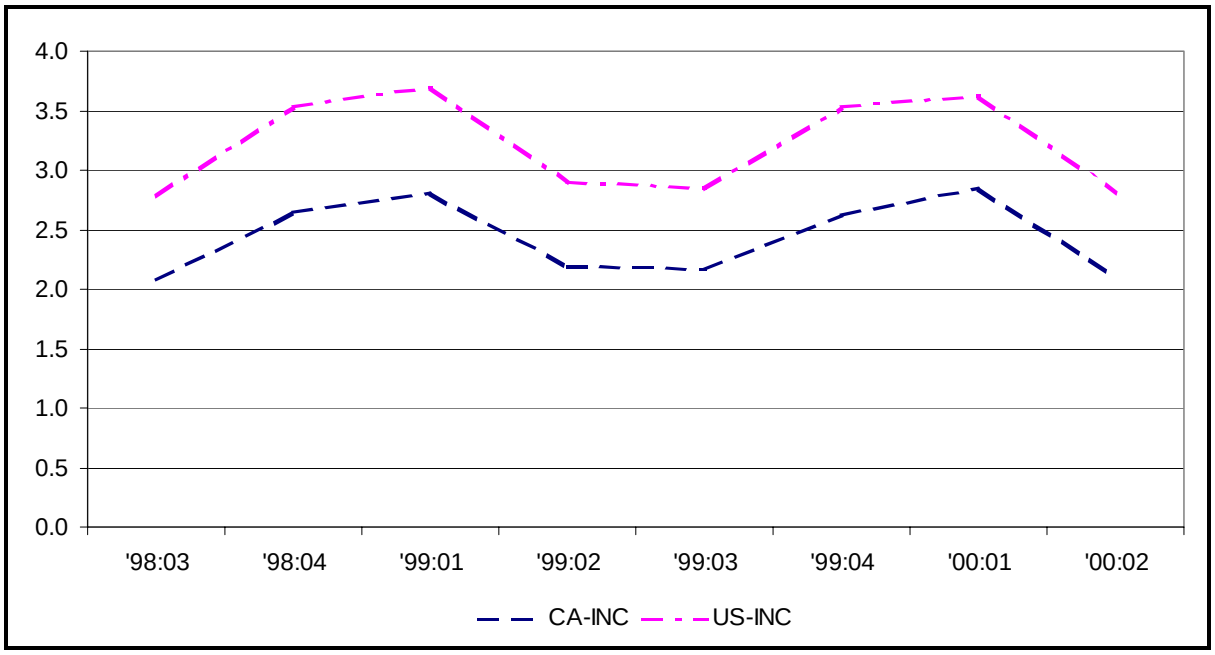


Figure 20: Medium Screw-Based Incandescents per Household – California and U.S. (non-California)



Because of this seasonality, comparisons are made on an annual basis. Table 2 summarizes data from the twelve-month periods of July 1998 through June 1999 and July 1999 through June 2000 and 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 year one and year two show almost no difference. California shows a larger percent increase in halogen and CFL sales between year one and year two, while changes in incandescent sales in the U.S. and California were both less than 1%.

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

	1998-1999	1999-2000	Percent Increase or Decrease
U.S. (non-California)			
CFL	0.050	0.061	20.7%
Halogen	0.034	0.059	73.7%
Incandescent	12.901	13.271	2.9%
California			
CFL	0.077	0.098	27.3%
Halogen	0.029	0.057	93.2%
Incandescent	9.719	9.869	1.5%

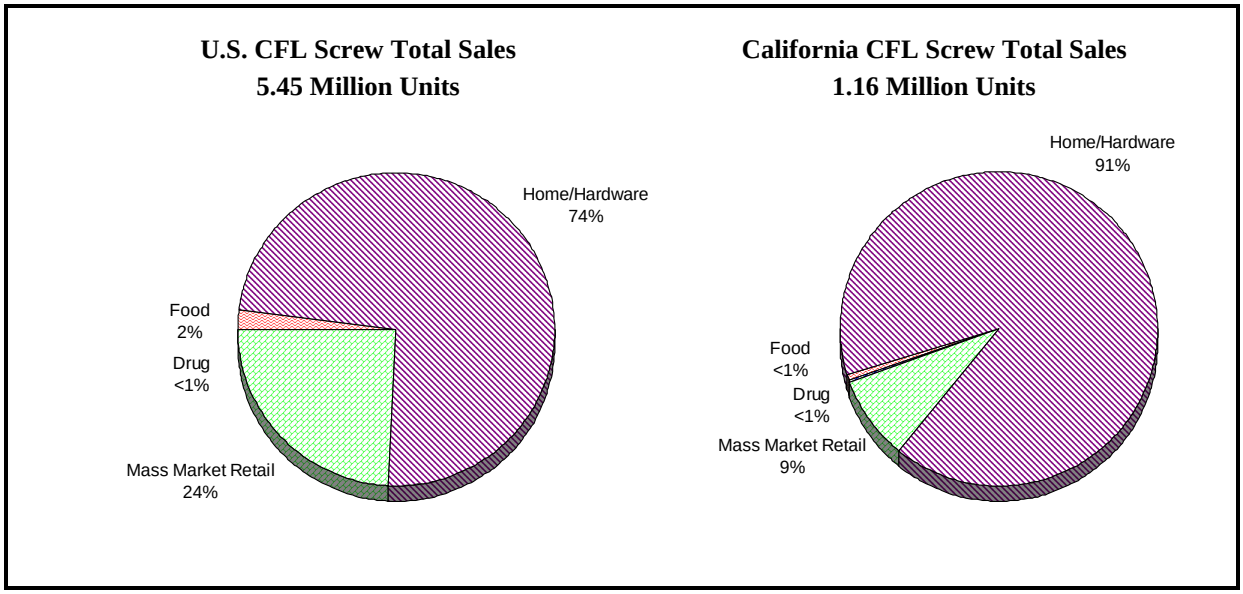
Sales of Medium Screw-Based Lamps by Market Channel

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 seem to be dominated by hardware/home improvement stores. However, in California, hardware and home improvement stores seem to comprise a significantly larger percentage of CFL sales than in the U.S. Mass merchandisers play a more significant role in overall U.S. lamp sales than in California. This trend is consistent across all utility service areas.

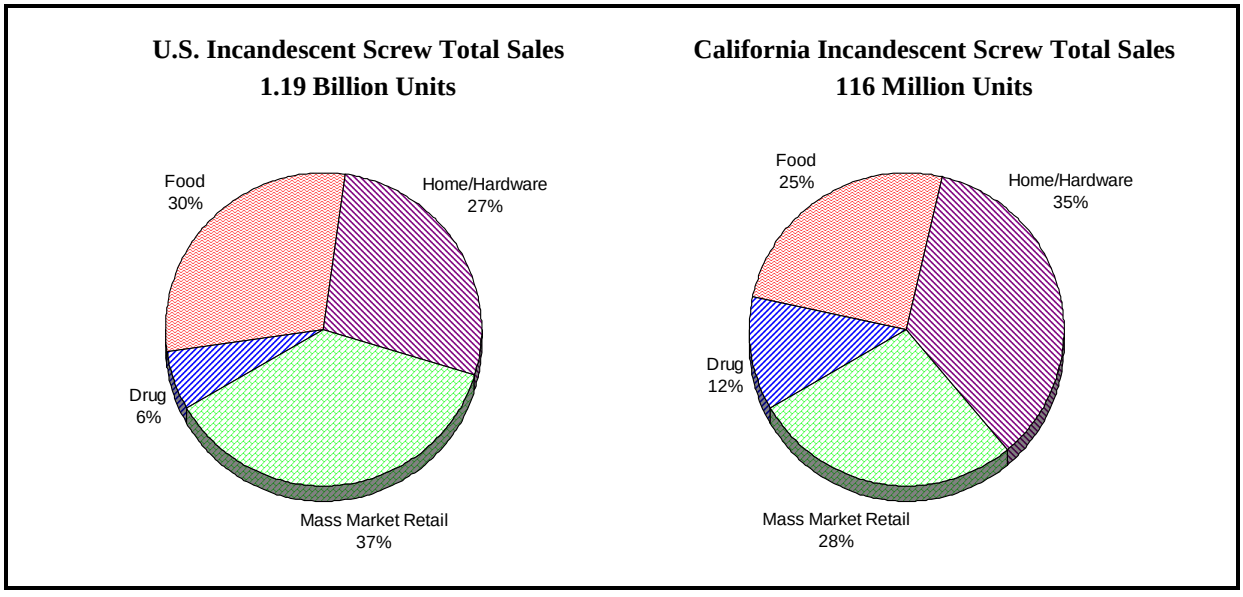
Figure 21: Medium Screw-Based CFL Sales by Retail Channel- California and U.S. (non-California) - 1999-2000



Incandescents

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

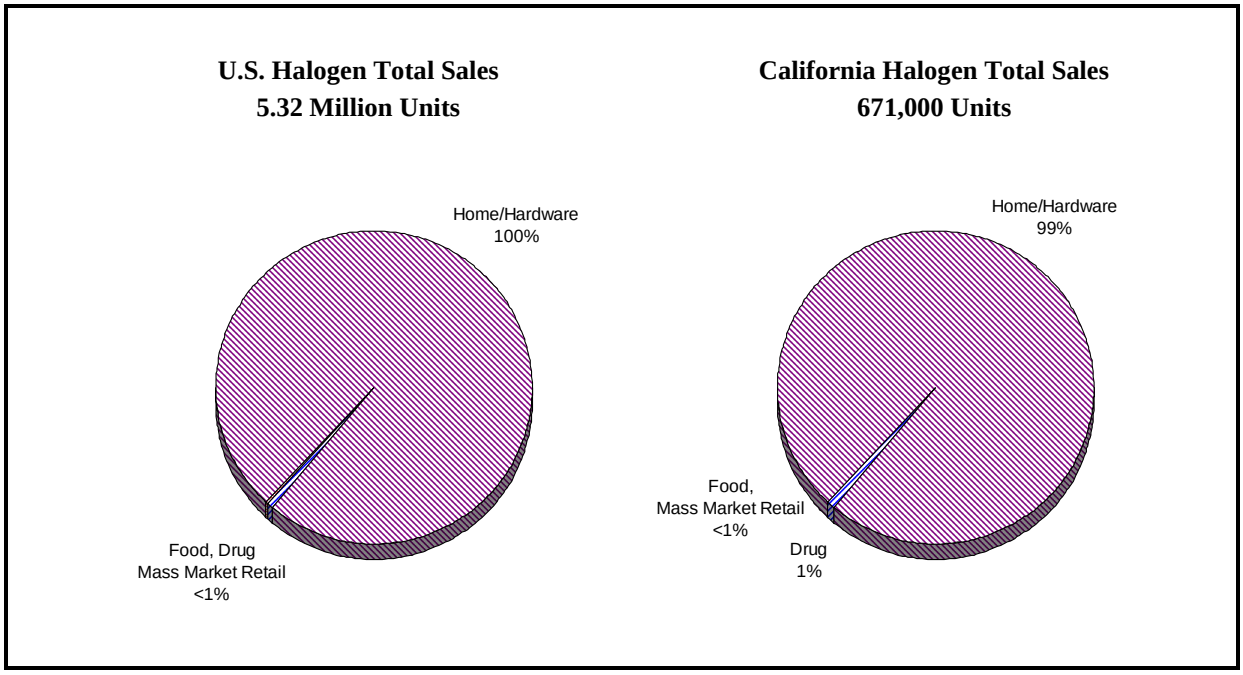
Figure 22: Medium Screw-Based Incandescent Sales by Retail Channel- California and U.S. (non-California) - 1999-2000



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,[19] with nearly 100% of all sales occurring through this channel.

Figure 23: Medium Screw-Based Halogen Sales by Retail Channel –California and U.S. (non-California) - 1999-2000



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 are generally double 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.

[19] 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.

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

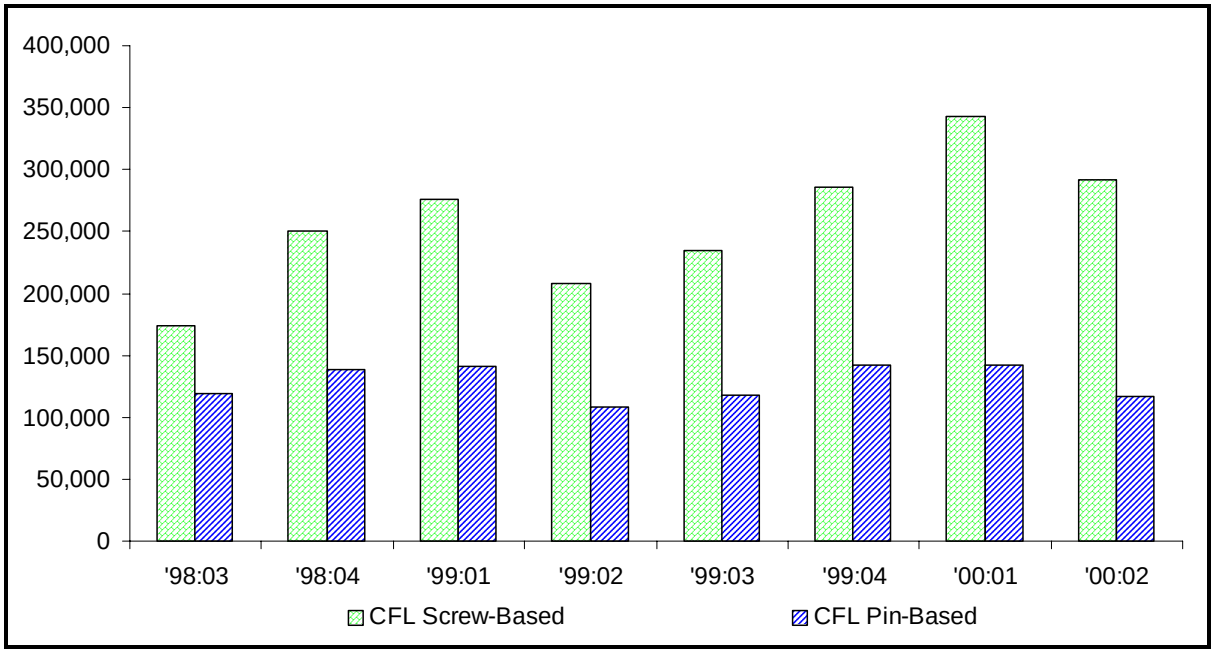
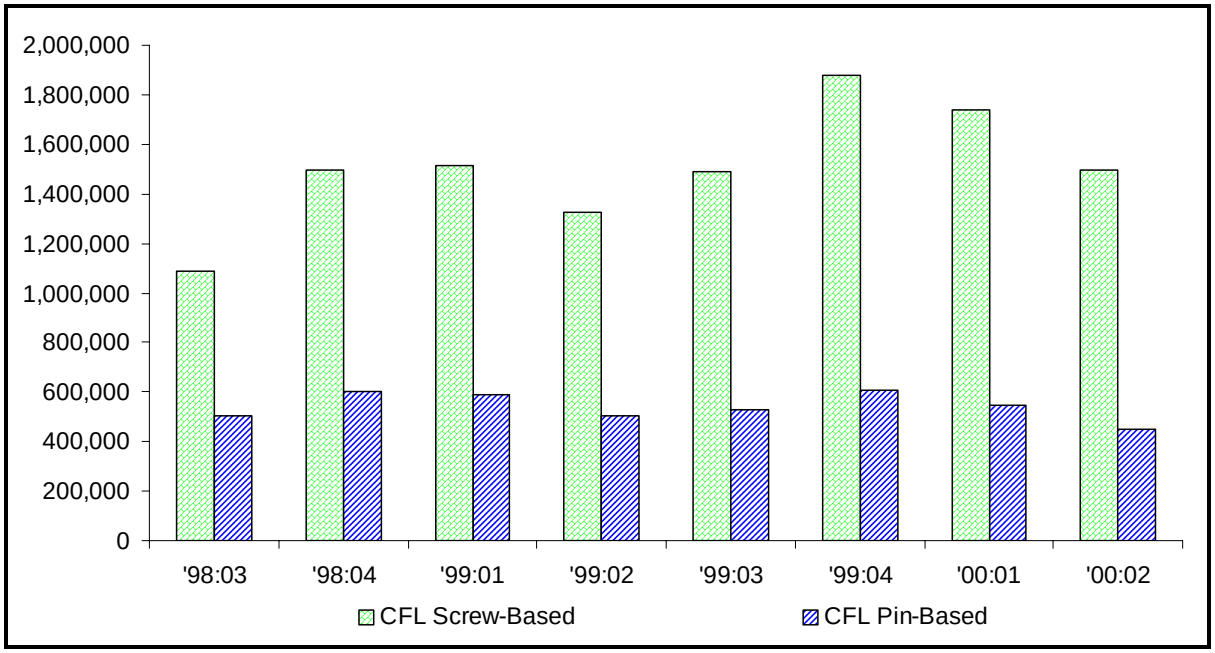


Figure 25: Medium Screw-Based CFL Sales and Pin-Based CFL Sales – U.S.



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,[20] lamps were sorted by equivalent lumen output, as shown in Table 3.

Table 3: Equivalent Wattages[21]

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, incandscents, 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.

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

[21] 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) – 1999-2000

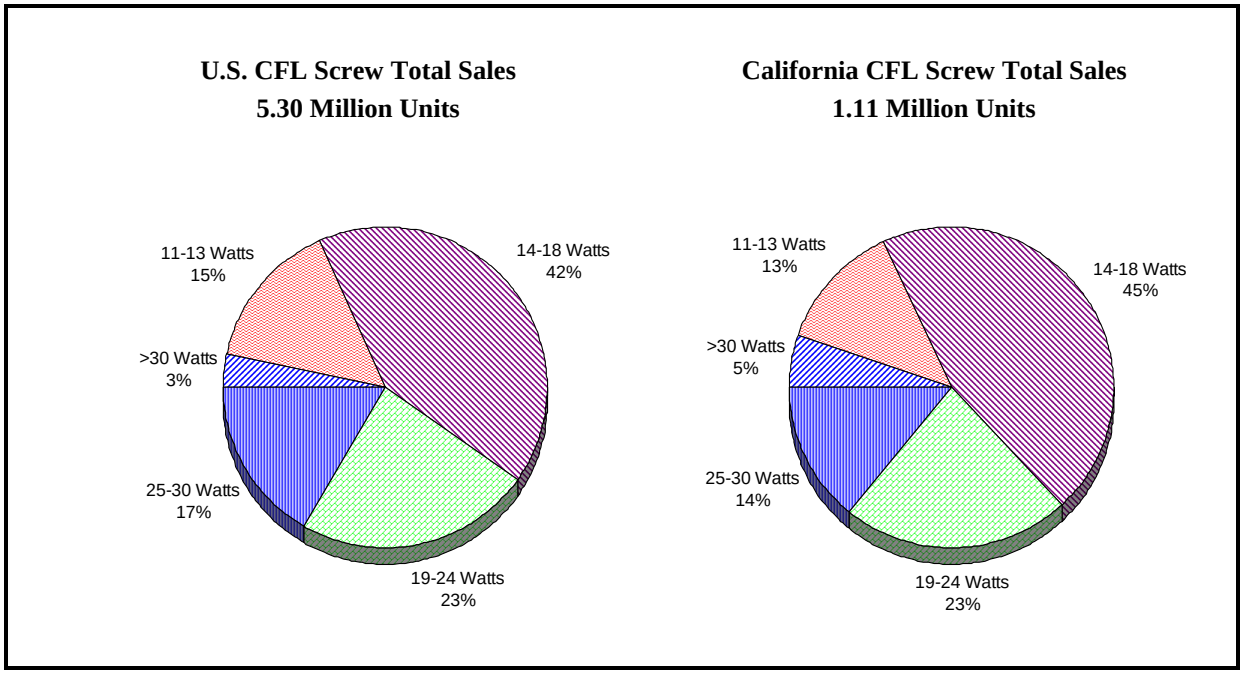


Figure 27: Medium Screw-Based Incandescent Sales by Wattage – California and U.S. (non-California) – 1999-2000

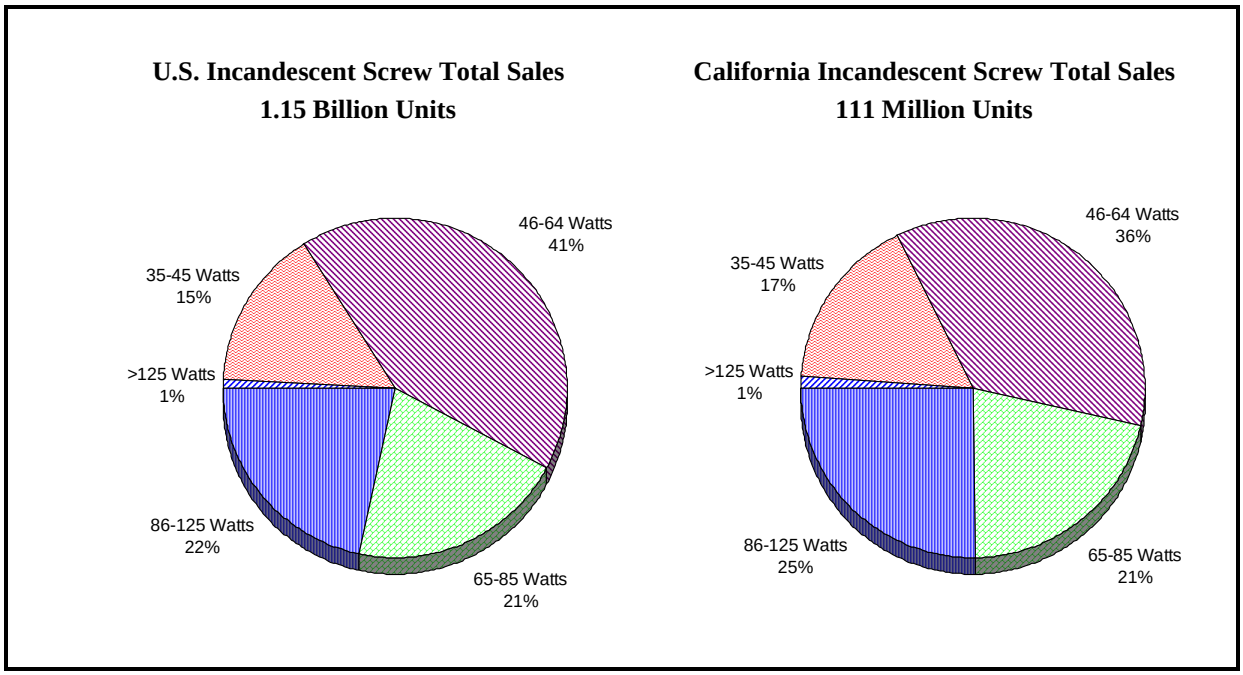


Figure 28: Medium Screw-Based Halogen Sales by Wattage – California and U.S. (non-California) – 1999-2000

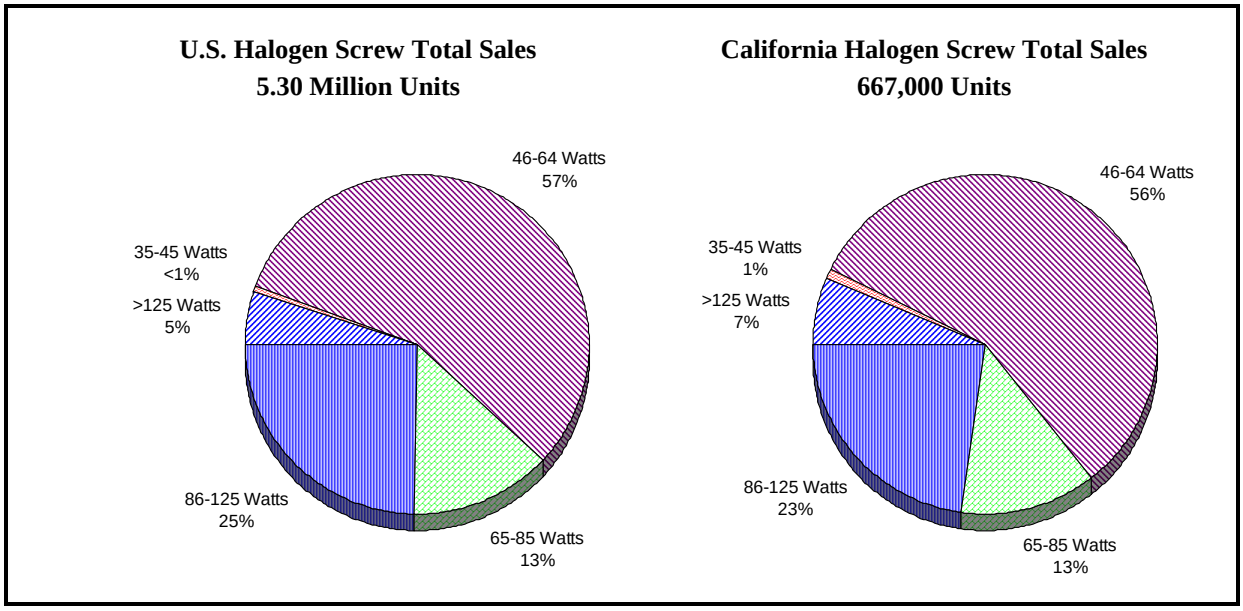


Figure 29 and Figure 30 illustrate medium screw-based CFL sales as a percentage of total medium-based lamp sales by wattage, over time for California and the U.S. This figure reveals that CFLs are gaining the most market share in the wattage range with the highest sales volume, the 14-18 watt range (60-watt equivalent). 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

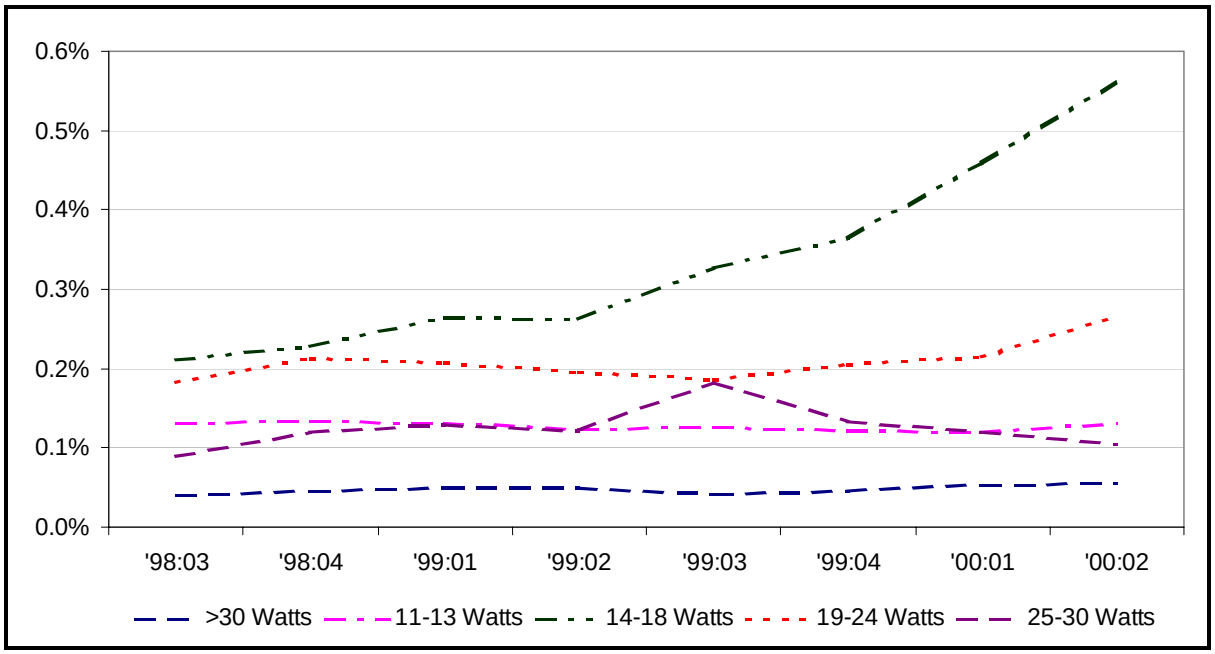


Figure 30: Medium Screw-Based CFL Sales as a Percentage of Total Medium Screw-Based Lamp Sales, by Wattage – U.S. (non-California)

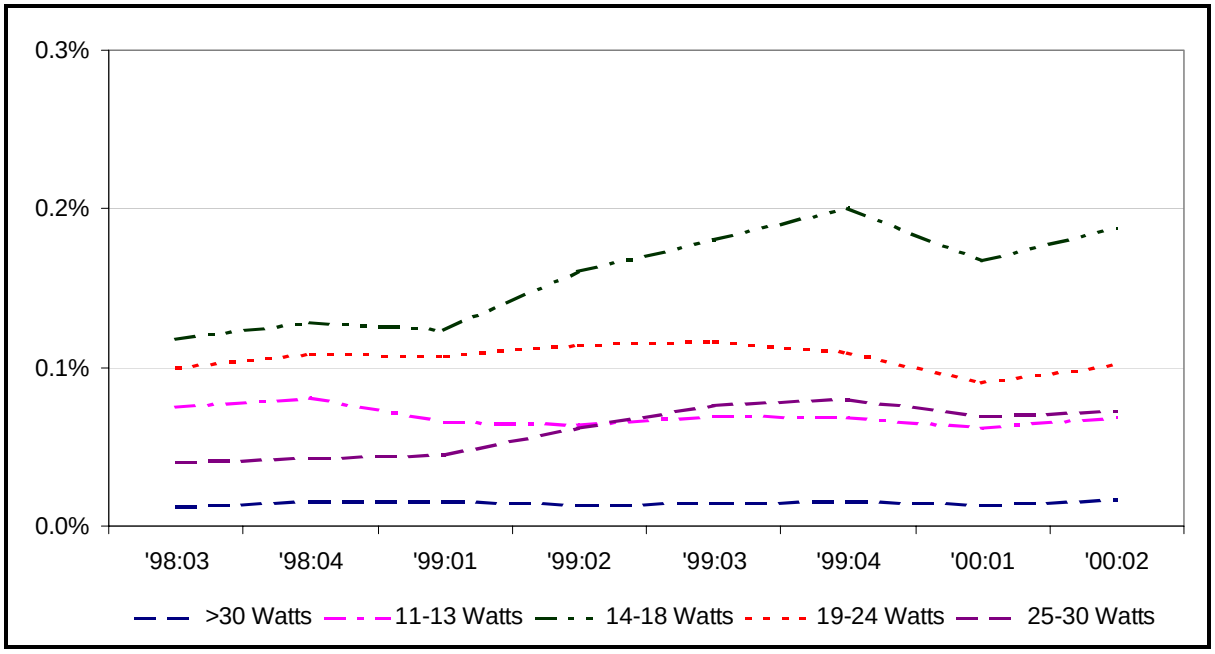


Figure 31 and Figure 32 illustrate medium screw-based halogen sales as a percentage of total medium-based lamp sales by wattage, over time for California and the U.S. Like CFLs, halogen screws in the 46-64 watt range (60-watt equivalent) are gaining market share. Again, California sales trends are accelerating at a faster rate than those of the U.S.

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

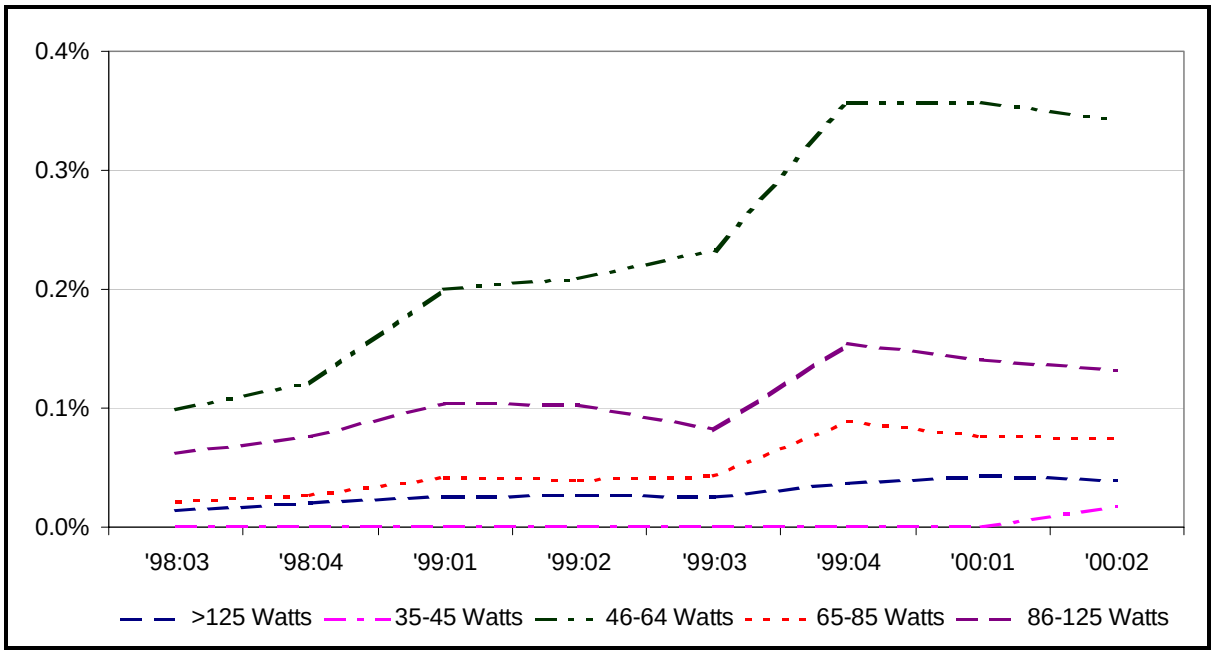
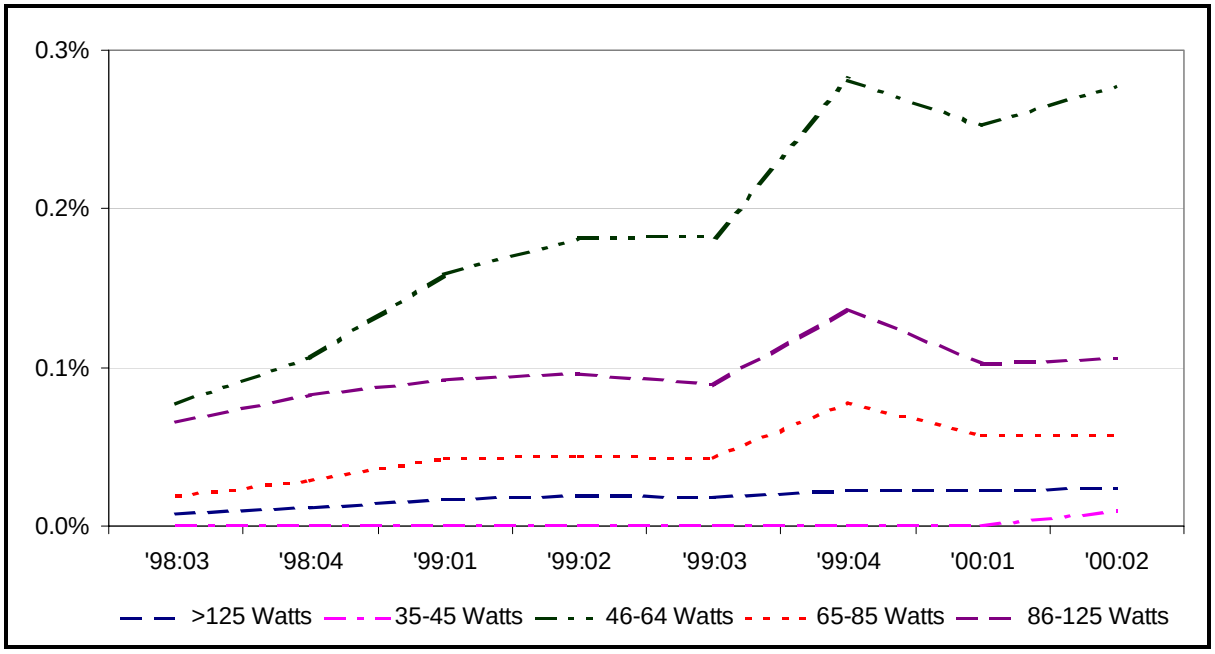


Figure 32: Medium Screw-Based Halogen Sales as a Percentage of Total Medium Screw-Based Lamp Sales, by Wattage - U.S. (non-California)



Impact of Lamp Life on Medium Screw-Based Lamp Shares

Market shares of CFLs and halogen sales can be misleading. Because a typical compact fluorescent will last longer than 11 incandescent lamps and a halogen will last longer than three incandescents, these technologies require far fewer replacements and fewer subsequent purchases by the consumer.[22] Similarly, from a socket occupancy standpoint, each sale of a CFL by a retailer is the equivalent of selling about 12 incandescent bulbs at one time. Another way to approximate market share is to normalize the lamp life of each lamp type, such that one-on-one comparisons can be made between incandescents, halogens, and CFLs. By weighting the lamp counts by relative lamp life, the impact of CFLs and halogens in the marketplace are better measured. As shown in Table 4, normalizing the data causes CFL shares to increase by a factor of ten in the U.S. and California, respectively. Similarly, halogen shares increase by approximately a factor of three.

[22] Lamp life estimates are based on average data from lamp manufacturer catalogs.

Table 4: Medium Screw-Based Lamp Shares Based on Normalized Lamp Life-1999-2000

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	1.00	99.04%	98.44%	93.24%	88.30%
Compact Fluorescent	10,000	11.43	0.50%	0.98%	5.41%	10.09%
Halogen	2,750	3.14	0.46%	0.57%	1.35%	1.61%

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

5. Summary of Key Findings

A number of key findings were identified from the analysis of the lamp tracking data, which include the following.

- The data from the five market channels reveal total lamp sales counts for the U.S. to be approximately 2.20 billion per year, with California sales at approximately 217 million per year.
- Incandescent lamps dominate the unit sales of lamps with over 70% of the U.S. market. Other lamp types with significant market share of unit sales include specialty (14%), fluorescent (7%), and halogen (3%) lamps.
- The lamp tracking data indicate that California was not only exhibiting greater market share for efficient residential lighting at the beginning of the study period, but that it expanded that leadership over the last two years. CFLs now have nearly three times the market share of medium screw-based lamps in California than they do nationwide as a whole.
- 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 substantially as a result 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.