



# Compact Fluorescent Lamps Market Effects Final Interim Report

Prepared by  
**The Cadmus Group, Inc.: Energy Services Group**  
**(formerly Quantec, LLC)**  
**KEMA**  
**Itron, Inc.**  
**Nexus Market Research**  
**A. Goett Consulting**

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## **EXECUTIVE SUMMARY**

The electric Investor-Owned Utilities (IOUs) in the State of California—Pacific Gas and Electric (PG&E or PGE), San Diego Gas & Electric (SDG&E or SDGE), and Southern California Edison (SCE)—have been operating energy-efficiency programs, with the most recent iteration of these programs implemented in 2006 for a three-year program cycle that ended in 2008. The California IOU programs are some of the longest-running energy efficiency efforts in the country, particularly for compact fluorescent lamps (CFLs).<sup>1</sup> Most of the state’s IOUs began implementing small-scale pilot programs in the late 1980s, with full-scale programs up and running by 1992. The California IOU efficiency programs are also some of the country’s largest in terms of funding. In 2006, the California IOUs claimed energy-efficiency-induced energy savings that represented over 1% of their combined electric sales, one of the highest energy savings rates in the U.S. In 2006-2007, the IOUs paid incentives on over 53 million CFLs through the Upstream Lighting Program.<sup>2</sup>

The IOU energy efficiency programs’ maturity, program size, and use of both resource acquisition and market transformation strategies may lead to changes in the CFL market, measured not just in terms of direct energy savings and peak demand reductions, but in terms of other progress indicators, including changes in awareness, attitudes, behaviors, product offerings, and reduced product retail prices and production costs. These other factors may create short-term and potentially long-term market structural and operational changes, which may in turn result in energy and demand savings. To the extent these market changes are program-induced, indirect savings (savings not derived from program participation, i.e., savings from participant and nonparticipant spillover) are the program’s market effects additional to direct program impact savings.

The California Impact Evaluation Protocol<sup>3</sup> is quite specific about not including market effects and nonparticipant spillover in savings estimates to avoid counting them towards utility energy efficiency savings goals. However, in an October 2007 Decision (D.07-10-032), the CPUC directed its staff to explore (during 2008-2009) the ability to credibly quantify and credit “nonparticipant spillover” market effects. The CPUC further directed its staff to report their findings following the process evaluation and market impact studies of the 2006-2008 program cycle on the ability of current protocols to measure such “nonparticipant spillover” savings and to propose possible revisions to market effects protocols, utility savings goals, and/or performance incentive mechanisms for subsequent action by the CPUC. As part of the study effort, the CPUC is examining possible market effects in three areas: CFLs, residential new construction, and high-bay lighting. Working with the CPUC, the California Institute for Energy and Environment (CIEE) developed Study Plans for (and is assisting in overseeing) each of these market effect studies.

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<sup>1</sup> The CFLs discussed throughout this report are low-wattage screw-ins.

<sup>2</sup> Total CFLs based on utility quarterly reporting to the CPUC for the IOU programs that offer incentives to upstream players, such as manufacturers or distributors, to “buy down” the cost of CFLs.

<sup>3</sup> State of California Public Utilities Commission, 2006

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For the CFL Market Effects Study, the Residential Retrofit Impact Evaluation Team was chosen by CIEE and the CPUC to investigate the cumulative effects of California's energy-efficiency programs on the CFL market. The study has three primary objectives:

- Understand the cumulative effects of California's energy-efficiency programs on the CFL market.
- Quantify 2006-2008 kWh and kW savings (if any) caused by the above potential market effects and not claimed as direct or participant spillover savings.
- Support the CPUC's strategic planning efforts by clarifying whether savings from potential market effects can be quantified with sufficient reliability to be treated as resources.

The CFL Market Effects Team began this study in March 2008. As required by the Market Effects Protocol, the Team's first undertaking was a scoping study designed to: help gain a better understanding of the evolution of California and U.S. CFL markets; characterize California's current CFL program offerings; provide integrated market and program theories for California's CFL programs; review CFL market effects studies conducted in other regions of North America; and gain a better understanding of the data sets available for the evaluation of possible CFL market effects in California. The CFL Market Effects Scoping Study and Work Plan was finalized on October 31, 2008, and was made available to the public via posting on the CPUC's Website shortly thereafter.

In undertaking this work, the CFL Market Effects Team is not presupposing any particular result: the Team is neutral as to whether there will be market effects and, if there are, whether they will be positive, negative, or some combination thereof.

### **ES.1 Overview of the CFL Market Effects Interim Report**

The CFL Market Effects Scoping Study and Work Plan laid out a number of tasks through which the Team will assess the cumulative effects of the California IOUs' energy-efficiency programs on the CFL market. This report presents the preliminary findings from the following tasks:<sup>4</sup>

- CFL market and program evolution
- Regression analysis
- CFL user telephone survey
- Manufacturer and retailer interviews

There are a number of additional data collection and analysis activities still remaining, including:

- In-home lighting audits
- Shelf stocking survey
- Attribution analysis
- Net savings analysis

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<sup>4</sup> While the majority of work on these tasks has been completed, portions of some tasks are ongoing.

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- Program-induced market effects on CFL pricing
- Sustainability analysis

As the time frame for the CFL market effects evaluation runs from March 2008 through August 2009, this interim report is intended to provide a midstream snapshot of progress made to date as well as to lay out the remaining evaluation tasks. While a number of the primary data collection activities, analyses, and coordination efforts have started, most remain works-in-progress. Because much work remains to be completed and the evaluation's ultimate findings are contingent on the completion and triangulation of results of each individual task, all findings presented in this report should be considered preliminary and subject to change.

### ES.2 Methodology and Data Sources

As noted, the CFL Market Effects Interim Report combines data—some quantitative, some qualitative, in nature—from numerous sources to provide a clear picture of possible market effects observed to date. Each section builds upon a different set of data to formulate a strong, comprehensive approach.

The Market Evolution section provides a description of California's CFL market and program evolution from the late 1980s to the present. It contains: a description of the California IOU programs; data on consumer purchases, awareness, and retail CFL prices; and a qualitative assessment of cumulative historic market effects, based on program manager and stakeholder interviews and a review of prior California IOU CFL program evaluations. This documentation of the program and market histories provides a context for the 2006-2008 market effects assessment.

The Regression Analysis utilized a more quantitative approach to conceptualize CFL sales and related sources. For this effort, the Team utilized Cadmus' analysis of preliminary ENERGY STAR qualified sales data, collected on CFL sales by ENERGY STAR Partner Retailers. The data, first available for 2007 sales, cover the 50 U.S. states and are organized by state. These data represent sales of about 290 million CFLs, approximately 72% of all U.S. CFL sales in 2007. The CFL Market Effects Team also collected data about factors that may affect household purchases of CFLs, including:

- Information about CFL programs in each state collected from public utility commission and utility Websites, the DSIRE database, and the 2007 Consortium for Energy Efficiency Residential Lighting Program National Summary.
- State-level information from the U.S. Census Bureau and the Energy Information Administration about possible economic and demographic drivers of CFL purchases, including electricity prices, incomes, education, dwelling characteristics, ages, and various measures of awareness of CFLs and energy efficiency.
- Information about the saturation of national partner retailers (in terms of number of stores and square footage) from company Websites.

To take a snapshot of CFL sales in the last three years and three months, the CFL Market Effects Team conducted a telephone survey with over 2,400 respondents in four states. Respondents to the survey in California were randomly selected from residential customers within the California IOU service territories, in proportion to the number of customers from each utility. The IOU



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programs promoted CFL sales within IOU service territories only, not the entire state; so tracking efforts were adjusted accordingly. Respondents in the three comparison states—Georgia, Kansas, and Pennsylvania—were selected through random-digit dialing (RDD). All respondents were responsible for purchasing light bulbs for their households. The surveys targeted a minimum of 100 respondents per state who had purchased CFLs in the past three months. The status of other groups of interest—including CFL purchasers from 2006 through 2008, non-users, non-purchasers, and those unaware of CFLs—was monitored but no quotas were set. The surveys were conducted using computer-assisted telephone interviewing (CATI), from October 6 through November 23, 2008.

Another key data collection activity to yield information for analysis of current and historical retail CFL sales patterns was interviews with upstream market actors (manufacturers and retailers). Findings in this section are based on 33 in-depth interviews.<sup>5</sup> Individuals interviewed included:

- Representatives of 16 lighting manufacturers<sup>6</sup> who participated in the 2006-2008 California Upstream Lighting Program (ULP). One of these manufacturers dropped out of the program in 2007. Together, these manufacturers accounted for about 94% of ULP sales.<sup>7</sup>
- Representatives of 16 lighting retailers who also participated in the 2006-2008 California ULP. These retailers accounted for almost 75% of ULP program sales and represented all the major retail channels participating in the program.
- A representative of one lighting retailer who did not participate in the 2006-2008 California ULP.

Additional data sources, such as in-home verifications and retailer shelf stocking studies, will provide further insights into the completed activities, and will be addressed as part of the Final Report.

### ES.2.1 Limitations

Although the CFL Market Effects Team made every effort to provide a dependable and comprehensive collection of data, there are limitations to some of the information provided. For example, biases associated with quantitative data generally arise from the limited data available, which the CFL Market Effects Team will be attempting to minimize through the incorporation of additional data sources in our ongoing analyses. The qualitative data, in contrast, may be affected by potential response bias due to respondent self-interest. We are attempting to minimize these by supplementing participant interviews with nonparticipant interviews in upcoming project tasks. The specific potential sources of bias we encountered are as follows:

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<sup>5</sup> Thirty of the interviews were conducted with a single manufacture/retailer representative, and three were conducted with two representatives; so a total of 36 representatives participated in the interviews.

<sup>6</sup> For the sake of simplicity and brevity, we use the term “manufacturers” to generically refer to companies that supply CFL products to California retailers. In some cases, these companies own their own manufacturing facilities, while in other cases they contract out manufacturing capacity and are essentially resellers or importers.

<sup>7</sup> Because we do not yet have complete 2008 ULP tracking data, these estimates are based on 2006-2007 tracking data.

- Some of the qualitative interview results were from dialogues primarily with (currently and/or previously) participating stakeholders.<sup>8</sup> Those results theorize how the programs influenced the market from the perspective of those who participated, evaluated, designed, or implemented the program. Therefore, these should not be viewed as completely unbiased sources.
- The baseline comparison approach, used in the CFL telephone survey analysis, assumed a non-program area that is the theoretical equivalent to California in the absence of a CFL program. In the CFL telephone survey, social response bias may have occurred (a problem inherent in survey research). This bias could have been more pronounced in non-program areas, as evidenced in the self-rated environmental awareness responses, which were higher in non-program areas.
- One limitation in the data used for the regression analysis was that the dependent variable excluded major retail channels, through which sales varied widely across the major groups of interest. Similarly, the binary term that indicates program versus non-program area was simplistic in that there were, in fact, various levels of programs. Data constraints limited the Team from incorporating a more sophisticated measure of program activity. Further, the lack of reliable, cross-sectional time series data on CFL sales prevented the Team from looking at trends over time and possible lag effects.

### **ES.3 Findings**

#### **Objective 1: Cumulative Effects of the California Programs on the CFL Market**

Several “leading market indicators” were examined as part of this study, through a review of both primary and secondary data. These data included interviews with CFL retailers and manufacturers as well as residential lighting program managers, policymakers, and evaluation consultants, who were very familiar with historic California or other residential lighting programs across the nation. Key preliminary conclusions regarding cumulative market changes and potential market effects are presented below.

##### *Awareness of CFLs*

- ***California IOU consumer awareness of CFLs increased from 58% in 1998 to 96% in 2008.*** In non-program states, consumer awareness was currently 92% in 2008. The difference between 2008 CFL awareness in and out of California was statistically significantly (at 90/10 confidence/precision levels<sup>9</sup>).

##### *Attitudes and Acceptance of CFLs*

- ***The percentage of California IOU households purchasing CFLs increased substantially in the last decade.*** For example, in 1998, just 17% of California IOU households had purchased a CFL within the past year and a half; in 2001, 35%

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<sup>8</sup> During the next phase of this study, the Team will interview non-participating manufacturers and retailers. The perspectives of these trade allies will then be reviewed in conjunction with all of the study's other primary and secondary data.

<sup>9</sup> Statistical significance is given at the 90/10 confidence/precision levels throughout this analysis.

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households had purchased one or more CFLs; and, in 2003, the purchase rate increased to 56%. By 2008, 77% of California IOU households had reportedly purchased at least one CFL.

No comparable historical data exists for non-program states for the 1998-2005 time period. However, from 2006-2008, 47% of California households purchased at least one CFL, compared to 44% of households in non-program states that purchased one or more CFLs during this same timeframe.

- ***Nearly eight out of ten (79%) households in California said they currently use at least one CFL inside or outside their home, significantly (at the 90% confidence level) more than the 66% of households in the Comparison Area who were currently using CFLs.***
- ***Overall consumer satisfaction with CFL performance increased*** as bulb quality improved. Prior to 2004, Californians' average satisfaction rating for CFLs was 6.3 (out of 10). Californians' satisfaction rating increased to 7.4 during the 2004-2005 time period, and to 8.1 in 2006. In the most recent CFL User Survey, California and Comparison Area respondents gave high overall (and not statistically different) satisfaction ratings of 8.3 and 8.2, respectively (out of 10) to CFLs currently in their homes.

#### *CFL Availability*

- ***CFL product availability increased nationally, particularly in the last few years.*** The ENERGY STAR Website listed a total of 117 manufacturers around the world producing 2,405 ENERGY STAR-qualified CFL models during 2007, an increase of approximately 700 models (41%) from 2006. The number of bare mini-spiral CFL models produced in 2007 increased by 85% over the number produced in 2006, from 476 to 882 models.
- ***Many lighting manufacturers and retailers attributed their entrance into the California retail CFL market, at least in part, to the ULP. The ULP introduced CFLs to additional distribution channels, such as ethnic groceries and discount (dollar) stores that had not previously been offering CFLs.*** Slightly less than two-thirds of the current ULP-participating manufacturers were not selling CFLs in California at retail prior to joining the ULP, and just over one-quarter of the participating retailers surveyed were not selling any CFLs at all before joining the ULP.<sup>10</sup>

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<sup>10</sup> The availability of CFLs in ethnic groceries, dollar stores, and "non-traditional" distribution channels in non-program states was not explored during the manufacturer interviews. Additional information about the proportion of CFLs sold through traditional and non-traditional distribution channels in both California and non-program states will be gathered through the shelf stocking survey; results of this work will be presented in the Final Report.

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### *CFL Price*

- *CFL production costs over the last ten years declined, according 9 of the 12 manufacturer respondents.*<sup>11</sup>

In additional efforts to assess cumulative effects of California programs on the CFL market, the CFL Market Effects Team investigated—qualitatively—the influence of the California IOU programs on the overall CFL market outside of California. The results of these interviews<sup>12</sup> indicate:

- Many participating stakeholders felt the combined effects of the energy crisis, media attention, and the large-volume California incentive program helped to create a cycle of events that significantly accelerated CFL market progress.
- Stakeholders reported that other program areas were mainly impacted by adopting the upstream program model used in California, and by the high volume of incentives that helped to both increase availability and lower retail CFL prices nationwide.
- A large majority of manufacturers (81%) and retailers (65%) believed the California rebate programs influenced the sales level of CFLs in other states.
- Participating stakeholders consistently reported that more recent, broad market events, such as Wal-Mart's CFL initiative, lighting efficacy regulation, and the consumer response to climate change, have all benefited from the market groundwork laid during 2001 to 2004/2005 by the California programs.

Although the study noted substantial changes in awareness of CFLs, attitudes and acceptance of CFLs, CFL availability, and CFL retail prices, these changes may simply be due to market changes and not market effects (i.e., they may have occurred for reasons other than the California energy-efficiency programs). The Market Effects Team assessed these alternative hypotheses and whether or not these changes could be attributed to the California programs. The results of this analysis, summarized in Table 1, indicated that for most indicators the market effects could

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<sup>11</sup> For the sake of simplicity and brevity, we use the term “manufacturers” to generically refer to those companies which supply CFL products to California retailers. In some cases, these companies own their own manufacturing facilities, while in other cases they contract out manufacturing capacity and are essentially resellers or importers. The Team did not have enough information to definitively determine which companies own their own manufacturing capacity and which do not. Further complicating the distinction between manufacturers and resellers/importers, some companies started as manufacturers and then sold their factories and became resellers, whereas others started as resellers and have recently acquired factory capacity.

<sup>12</sup> To date, the majority of interviews conducted with upstream market actors have been with manufacturers and retailers who have participated in the California IOUs' lighting programs. Interviews with non-participating upstream market actors will take place during the next phase of this study.

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not be determined with a high degree of confidence due to the fact that much of the evidence was qualitative in nature.

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**Table 1. Assessment of Market Change vs. Market Effect\***

Type of Change	Observed Market Changes- 1998-2008	Program Causality Hypothesis	Alternative Causal Factors or Hypotheses	Evidence Supporting Program Hypothesis—Market Effects Caused by Programs	Preliminary Strength of Existing Evidence for Market Effect**	Data Sources Used to Date	Expected Data from Forthcoming Sources
Awareness	Consumer awareness of CFL bulbs increased from 28% in 1990 to 58% in 1999 to 96% in 2006.	Program Advertising in the form of mass media and POP materials used between 1998 and 2008 caused a significant part of this increase in awareness.	ENERGY STAR labels, concern over climate change, and/or private market advertising campaigns led to the increase in awareness.	Manufacturer and retailer interviews stated that CA programs increased awareness but stated other factors also increased awareness.	Moderate: Other factors could have caused increase in awareness	Participating manufacturer and retailer interviews; CFL User Survey in CA and the Comparison Area	Nonparticipating manufacturer and retailer interviews
Availability	The number of retail sales channels offering CFLs increased from two in 2000 (mass merchandisers and home improvement) to seven distinct sales channels in 2008.	Increase in customer awareness and program eligibility requirements that require sales in new channels led to more stocking of bulbs in new sales channels.	Competition between retailers and or sales channels led to an increase in CFL product availability in multiple sales channels.	Only 1/3 of current manufacturers sold CFLs in CA before the ULP programs. 100% of new entrants reported they entered the market because of the CFL program. These new manufacturers negotiated with the new retail sales channels (grocery, drug, discount stores) to offer CFLs in the CA market.	Moderate: Manufacturers directly reported program influence	Participating manufacturer and retailer interviews	Nonparticipating manufacturer and retailer interviews; Shelf Stocking Survey in CA and the Comparison Area
Retail CFL Prices	CFL production costs over the last ten years declined, according to 75% of the manufacturer respondents.	Increase in CFL production capacity and payment of rebates to upstream manufacturers led to lower retail CFL prices.	Competition to increase CFL shipments to Europe and other parts of the world led to price declines; Chinese manufacturing policy/ investment bankers made decisions independent of programs.	7 of 12 manufacturers reported that the CA CFL programs were a motivator behind their decisions to expand capacity, which led to lower prices. The rebates also directly decreased retail prices for a majority of CFLs sold in CA.	Moderate/Weak: Need actual pricing data from full set of distribution channels in comparison states to make a full determination.	Participating manufacturer and retailer interviews	Nonparticipating manufacturer and retailer interviews; Collection of pricing data through shelf stocking surveys in CA and the Comparison Area

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Type of Change	Observed Market Changes- 1998-2008	Program Causality Hypothesis	Alternative Causal Factors or Hypotheses	Evidence Supporting Program Hypothesis—Market Effects Caused by Programs	Preliminary Strength of Existing Evidence for Market Effect**	Data Sources Used to Date	Expected Data from Forthcoming Sources
CFL Sales in CA†	CFL sales per household in CA went from 1.1/1.9 (low/high estimates) in 2005 to 4.2 in 2007.	Program-induced lower CFL retail prices and increased awareness; greater availability (due to the program) led to the increase in CFL sales per household.	Media effects and increase in the desire to take action to combat climate change contributed to increase in CFL sales.	The majority of manufacturers and retailers believed program-induced CFL retail price reductions helped customers overcome the first-cost barrier—thereby helping customers become more familiar and comfortable with improved CFLs—and enabled new retail channels to carry CFLs.	Moderate/Weak: Manufacturers reported that other factors also influence sales, CA programs likely accelerated changes	Participating manufacturer and retailer interviews; CFL User Survey in CA and the Comparison Area	Nonparticipating manufacturer and retailer interviews; In-Home Lighting Survey in CA and the Comparison Area
CFL Sales in CA†	CFL sales/household in CA went from 1.1/1.9 (low/high estimates) in 2005 to 4.2 in 2007.	CA programs between 2005 and 2007 induced a higher rate of CFL sales in CA relative to other regions of the country where no rebate programs existed.	Key buying and distribution decisions made by WalMart and Home Depot from 2000 to 2004 led to nationwide increases in CFL sales between 2005 and 2007.	Sales/household in CA were higher in CA in 2005-2007 compared to baseline estimates from comparison states.	Weak: Reliable sales per HH data are not available for all years	CFL User Survey in CA and the Comparison Area	In-Home Lighting Survey in CA and the Comparison Area; Shelf Stocking Survey in CA and the Comparison Area
<p>* Note that these ratings are preliminary and may be altered as the Team collects additional data and performs additional analyses.  ** As this study takes a preponderance of evidence approach, a “strong” rating indicates that multiple approaches/data sources all indicate the program led to a positive market change, a “moderate” rating indicates that one approach/data source led to a positive market change and/or that some of the evidence is qualitative and/or subject to potential sources of bias, and a “weak” rating indicates one approach/data source led to a positive change while other(s) did not and/or that the evidence is qualitative and/or subject to potential sources of bias. A “weak” rating does not necessarily mean that the market change or market effect did not occur; rather, it signifies that the market change or effect is not demonstrated through the current body of evidence.  † Although the “Type of Change” and “Observed Market Changes 1998-2008” are the same for these rows, the information contained in the other columns is not.</p>							

## **Objective 2: Quantify 2006-2008 kWh and kW Savings Caused by Market Effects**

To recognize any potential energy and demand savings from market effects, the programs must show progress, not just in the indicators presented above, but, ultimately, in an increase in CFL sales (i.e., nonparticipant spillover). In making this determination, the research had to estimate the extent of program versus non-program sales, then calculate a baseline estimate for CFL sales that would have occurred in absence of any program activity.

In embarking on this effort, the Team recognized that recent evidence from other CFL market effects studies in other states has shown the national CFL market has expanded rapidly in recent years, and that market effects are a complex and dynamic process that unfolds over time, whereas sales provide a snapshot of a single variable at a single point of time. Despite the method's limitations, the CFL ME Team believed characterizing both the numbers and the patterns of CFL sales in California and the Comparison Area would help us understand the market's status in both areas. This information can then be used to help to build a case regarding the existence or non-existence of market effects.

### ***Program vs. Non-Program Sales***

Several data sources, including program tracking data, point-of-sale data, and ENERGY STAR National Retailer Partner data, were examined to develop an estimate of total 2007 CFL sales in California. These data indicated that 55.6 million CFLs were sold in California in 2007. Reported program sales during this same period were approximately 40.7 million CFLs. Program sales, therefore, represented nearly three-quarters of all CFL sales in California.

### ***Recent Sales***

Based on the CFL User Survey respondents, (statistically significant) fewer California households have recently bought a light bulb of any type in California than in the Comparison Area (47% versus 57% of respondents, respectively). Of the households who recently purchased at least one light bulb, comparable percentages purchased CFLs in California and the Comparison Area—28% in California and 29% in the Comparison Area (not a statistically significant difference).

### ***Estimates of Baseline Sales***

CFL sales that would have occurred in the absence of any program activity were examined using several analytical approaches. None of the approaches used to date were able to provide evidence of market effects from California's 2006-2008 ULP:

- ***Historical Data.*** The CFL Market Effects Team examined historical sales in both California and other regions of the United States. The research indicated baseline sales estimates varied widely by source/method, though the data consistently trended upward over time. These data indicated that in recent years, even non-program states have caught up to California in terms of CFL sales per household in a given year.
- ***Regression Analysis*** This approach is based on the concept that the sales of energy-efficient products, including CFLs, can be predicted as a function of a comprehensive list of explanatory variables, including program activity levels, socio-economic



characteristics, energy prices, population distribution (urban/suburban/rural), and other variables. The findings from this analysis showed that the demand for CFLs appeared to be positively related to the number of big box stores, electricity prices, and the percentage of householders between the ages of 25 and 44. However, there was no evidence of a positive relationship between the existence of CFL programs and ENERGY STAR Partner CFL sales per household in a cross-section of U.S. states based on a comparison of one year of data for the available distribution channels. This finding indicated sales in the ENERGY STAR partner stores were quite strong both in states with and without CFL program activity.

- **Telephone Surveys.** The findings from the CFL User Survey in California and three comparison states revealed that, in late-summer and fall of 2008, CFL sales per household were higher in the Comparison Area than in California. The average number of CFLs purchased per household in the three months prior to the survey was 1.1 in California and 1.2 in the Comparison area. However, from 2006-2008, CFL sales per household were slightly higher in California than in the Comparison Area. Forty-seven percent of California respondents estimated that they purchased CFLs over the three years prior to the survey, while in the Comparison Area, 44% of respondents estimated that they purchased CFLs over the same time period.<sup>13</sup>

### ***Hypotheses to Explain Findings***

Taken together, these interim findings did not provide evidence that additional market effects in the form of energy/demand savings (nonparticipant spillover) can be unequivocally claimed due to the California IOU programs for the 2006-2008 time period. Instead, different conclusions were derived from different components of the study. For example, while the CFL User Survey results indicated there was little or no difference between California and the Comparison Area (implying no market effects), the upstream actor interviews did exhibit indications of market effects. The CFL Market Effects Team developed a number of hypotheses to explain these inconsistent findings. During the remainder of this evaluation, the Team will attempt to assess the validity of each of the following hypotheses.

- ***Erosion of Incremental Market Effects Over Time (Spillover Hypothesis).*** California's programs may have caused market effects in both California and nationally in the past but, at this point, sales and awareness in the national market are very similar to conditions observed in California. Therefore, the California programs are likely no longer generating incremental market effects beyond any positive net impacts they may be generating, and any differences between California and other states have largely eroded.
- ***Increasing CFL Saturation in California, Leading to Fewer Recent CFL Sales per Household.*** Because of the long expected useful life of CFLs, as the saturation of CFLs increases, one would expect to see fewer sales of all bulbs—including CFLs and incandescents—per household. Data from the CFL User Survey seemed to suggest this hypothesis may be playing a role in the lower number of CFL sales per household in California versus the Comparison Area.

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<sup>13</sup> This difference was not statistically significant.

- ***Dominance of Large National ENERGY STAR Partners in Driving up Sales Nationally.*** The analysis showed national ENERGY STAR Partner square footage was consistently a very strong predictor of ENERGY STAR Partner CFL sales across U.S. states. This fact, coupled with the lack of significance of the program variable in the regression analysis, suggests large ENERGY STAR retailer partner (e.g., Wal-Mart and Home Depot) sales may currently have such an overwhelming effect on the national CFL market that variations in the larger retailers' presence in each state simply drown out the signal from all other influences on sales, including programs.
- ***Shift of Sales (i.e., Cannibalization) in California from Large National ENERGY STAR Partners to other Distribution Channels.*** The stakeholder interviews suggested the programs have succeeded in introducing and stimulating CFL sales in distribution channels that have not traditionally carried CFLs, such as ethnic groceries and discount stores. This could mean that CFL sales from non-traditional retail channels have come at the expense of CFL sales from more traditional channels (i.e., sales in non-traditional channels have "cannibalized" sales in the National ENERGY STAR Partner stores, therefore the overall CFL sales per household for the Partner stores are lower).

### ***Importance of Estimating Market Effects Over Time***

It is important to note that any quantitative analysis is limited by the qualitative assessment, presented above, that the California IOU programs have arguably accelerated CFL sales throughout the U.S. Although the magnitude of this effect cannot be accurately estimated, the assessment revealed that market effects need to be estimated throughout a program's life cycle. In other words, a rigorous assessment of program versus estimated baseline sales conducted earlier in the life cycle of the California IOU CFL programs *might* have identified potential market effects. However, the interim results of this study indicated that recent CFL sales increased dramatically, even in states without CFL program activity, making it difficult for any program state, including California, to currently claim or quantify direct savings from market effects induced by their programs alone.

### **Objective 3: Clarify Whether Savings from Market Effects can be Quantified with Sufficient Reliability to be Treated as Resources**

While market effects for California IOU programs may exist, they are difficult to quantify and largely impact nonparticipants. As a result, they are typically not examined, and the California Impact Evaluation Protocol is quite specific about not including market effects and nonparticipant spillover in determining impacts of IOU programs.

At the time of this writing, our interim results indicate that CFL market effects due to the California IOU programs may have existed in the past (see, for example, CFL User Survey and preliminary manufacturer and retailer interview findings), but cannot currently be quantified with sufficient reliability to be treated as a resource. The Team will continue examining this preliminary finding through our ongoing research. As noted, rapid changes to the CFL market indicate that any reliability in estimating market effects requires more frequent measurement of key market indicators, most notably market sales. In fact, the industry widely views the ongoing performance of market effects studies—starting with the early years of a program's implementation—as a best practice approach. Had research quantifying market effects from California's CFL programs been undertaken earlier and on an ongoing basis, savings attributable

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to market effects from California's CFL programs may have been more easily demonstrated (if they, in fact, occurred). Consequently, given the increasing emphasis of the California CFL programs on specialty CFLs in the 2009-2011 program cycle, the CPUC should consider ongoing data collection and analysis to assess market effects for these products as soon as possible.

## **1. INTRODUCTION AND OVERVIEW TO THE MARKET EFFECTS**

### **APPROACH**

The electric Investor-Owned Utilities (IOUs) in the State of California – Pacific Gas and Electric (PG&E or PGE), San Diego Gas & Electric (SDG&E or SDGE), and Southern California Edison (SCE) – have been running energy-efficiency programs under the supervision of the California Public Utilities Commission (CPUC), with the most recent iteration of these programs rolled out in 2006 for a three-year program cycle, ending in 2008. These programs represent a significant effort to increase the reliability of energy delivery and to control costs for State ratepayers. Additionally, the programs represent an equally intense effort to manage the environmental impacts of energy consumption in California.

### **1.1 Background**

The California IOU programs are some of the longest-running efforts in the country, particularly for compact fluorescent lamps (CFLs).<sup>14</sup> Most of the state’s IOUs began implementing small-scale pilot programs in the late 1980s, with full-scale programs up and running by 1992. The California IOU efficiency programs are also some of the country’s largest. In 2006, all the California IOUs reported energy savings representing over 1% of electric sales, some of the highest in the U.S. In 2006-2007, the IOUs rebated over 53 million CFLs through the Upstream Lighting Program (ULP).<sup>15</sup>

Over the years, the California IOU efficiency programs have adopted a blend of traditional resource acquisition strategies (such as direct financial incentives and direct installations for end-use customers), more modern resource acquisition strategies (such as manufacturer buy-down/retailer point-of-sale “buy-downs”), and market transformation strategies (such as consumer education, technical assistance, training, and cooperative advertising). The CFL programs, for example, have been intended to: work within existing market channels; increase the availability, diversity, and promotion of CFLs through supplier interventions; and increase consumer awareness, knowledge, acceptance, and purchases by affecting the supplier market and consumer marketing. The CFL program administrators have also supported the Program for Evaluation and Analysis of Residential Lighting (PEARL) and national ENERGY STAR lighting efforts in monitoring and improving product quality through funding quality assurance efforts. In addition, the CFL programs have coordinated with and leveraged the national ENERGY STAR program and other California local and statewide programs, such as Flex Your Power (FYP).

The IOU efficiency programs’ maturity, program size, and use of both resource acquisition and market transformation strategies may have led to market effects. These market effects may take the form of direct energy savings and peak demand reductions, or other progress indicators, including changes in awareness, attitudes, behaviors, product offerings, and reduced product retail prices and production costs. These other potential types of impacts could create short-term and potential long-term market structural and operational changes that may result in energy and

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<sup>14</sup> The CFLs discussed throughout this report are low-wattage screw-ins.

<sup>15</sup> Total CFLs based on utility quarterly reporting to the CPUC for the IOU programs that offer incentives to manufacturers to “buy down” the cost of CFLs.

demand savings. To the extent market changes are program-induced, indirect savings (savings not derived from program participation) would be the program's additional effects.

While market effects for California IOU programs may or may not exist, they are difficult to quantify and would largely impact nonparticipants. As a result, they are typically not examined. In fact, the California Impact Evaluation Protocol is quite specific about not including market effects and nonparticipant spillover in determining impacts of the IOU programs:<sup>16</sup>

Current impact evaluations of energy-efficiency programs are limited to addressing the direct impacts of the program on participants and estimating participant spillover impacts.<sup>17</sup> Program-influenced changes on the way a market operates or on nonparticipants are addressed in the Market Effects Evaluation Protocol.

## **1.2 Overview of the CFL Market Effects Study**

In a Decision in October 2007 (D.07-10-032), the California Public Utilities Commission (CPUC) directed their staff to explore (during 2008-2009) the ability to credibly quantify and credit "nonparticipant spillover" market effects. The Market Effects Protocol provides the following definition of market effects:

A change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficient products, services, or practices and is causally related to market interventions..." where a "market" is defined as "...the commercial activity (manufacturing, distributing, buying and selling) associated with products and services that affect energy usage."<sup>18</sup>

The Market Effects Protocol acknowledges two types of market effects are recognized in the energy-efficiency industry:

- Those that are occurring now as a result of how programs are changing markets; and
- Those that are forecasted to occur later (after the program has been discontinued) due to the changes established or put into motion by the program.<sup>19</sup>

The Protocol clearly states, however, that it was designed to measure only the first of these two categories – that is, current market effects.<sup>20</sup>

The CPUC directed their staff to report their findings following the process evaluation and market impact studies of the 2006-2008 program cycle on the ability of current protocols to measure such "nonparticipant spillover" savings and to propose possible revisions to market effects protocols, utility savings goals, and/or performance incentive mechanisms for subsequent

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<sup>16</sup> California Evaluation Protocols, p. 36.

<sup>17</sup> For a thorough evaluation, impact evaluations should estimate direct program savings and participant spillover savings. Whenever possible, these estimates need to be distinct estimates and not a combined estimate across the two. Current CPUC policy states only direct program savings will be counted towards program and administrator goals and performance (i.e., excluding participant and nonparticipant spillover).

<sup>18</sup> California Evaluation Protocols, pp. 143-145.

<sup>19</sup> Ibid.

<sup>20</sup> Note that because this analysis will not include market effects forecasted to occur later, total market effects may be greater than those estimated here.

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action by the CPUC. As part of the study effort, the CPUC is examining possible market effects in three areas: CFLs, residential new construction, and high-bay lighting. Working with the CPUC, the California Institute for Energy and Environment (CIEE) developed Study Plans for, and is assisting in overseeing, each of these market effect studies.

For the CFL Market Effects Study, the Residential Retrofit Impact Evaluation Team was chosen by CIEE and the CPUC to investigate the cumulative effects of California's energy-efficiency programs on the CFL market. The study has three primary objectives:

- Understand the cumulative effects of California's energy-efficiency programs on the CFL market.
- Quantify 2006-2008 kWh and kW savings (if any) caused by the above potential market effects, and not claimed as direct or participant spillover savings.
- Support the CPUC's strategic planning efforts by clarifying whether savings from potential market effects can be quantified with sufficient reliability to be treated as resources.

The study is being performed as an addendum to the CPUC scope of work for the Residential Retrofit Impact Evaluation Team. Extensive synergies exist between the data collection needed for the CFL market effects evaluation, which is designed to meet the requirements of the Market Effects Protocol and allow the measurement of the indirect/nonparticipant effects across utility programs affecting the CFL market, and the data collection efforts already underway for the Upstream Lighting Program impact evaluation, which is designed to meet the requirements of the Impact Evaluation Protocol for measurement of direct savings. These synergies include: interviews with retailers and manufacturers; in-store visits; in-home surveys; and consumer intercept surveys. The data needs of the CFL market effects study, however, go beyond those of the Upstream Lighting Program evaluation, requiring the exploration of additional topics, increased sample sizes, and far more comprehensive collection and analysis of additional CFL sales data. While the two projects are being performed simultaneously, their planning, analysis, and reporting are being maintained separately.

The CFL Market Effects Team began this study in March 2008. As required by the Market Effects Protocol, the Team's first undertaking was a scoping study designed to: help gain a better understanding of the evolution of the California and U.S. CFL markets; characterize California's current CFL program offerings; provide integrated market and program theories for California's CFL programs; review CFL market effects studies conducted in other regions of North America; and gain a better understanding of the data sets available for the evaluation of possible CFL market effects in California. The CFL Market Effects Scoping Study and Work Plan were finalized on October 31, 2008, and made available to the public via posting on the CPUC's Website shortly thereafter.

In undertaking this work, the CFL Market Effects Team is not presupposing any particular result: that is, the Team is neutral on whether there will be market effects and, if there are, whether they will be positive, negative, or some combination thereof.

### **1.3 Overview of the CFL Market Effects Approach**

Market effects can be measured through analysis of the difference between total energy-efficiency market share realized in the presence of a program and the market share that would have occurred in absence of any program activities. Given external influences on the CFL market, including a Wal-Mart initiative to double its sales of CFLs, promotion of CFLs by the popular press as a strategy for individuals to address climate change, and the recently passed Energy Bill requiring more efficient lighting beginning in 2012, it is clear that a number of important other factors are influencing and will continue to influence CFL sales in future years. The baseline sales estimates, therefore, will be critical for also assessing the importance of these other influencing factors.

There are at least three approaches to estimating baseline sales:

- Examining sales per household in a group of comparison states that do not offer CFL programs;
- Developing a regression model to predict sales per household as a function of program activity and other influencing factors;
- Selecting a set of retailers and comparing California sales to sales in comparable metropolitan areas that do not have programs.

#### ***Comparison State Approach***

The primary approach for estimating baseline CFL sales in California is to examine per household CFL sales for a comparison group of states that do not have utility or government sponsored programs to promote CFLs.<sup>21</sup> The presumption is that the CFL sales in these states approximate what sales would have been in California in absence of the CFL programs.

The selection of the comparison states was based on a mix of socio-economic indicators, including median household income and education levels (% graduated from college) comparable to those in California. This approach has been implemented successfully in recent evaluations of programs in Wisconsin and Massachusetts. The primary shortcoming of using this methodology is that no single state really directly compares with California, which is often considered a country unto itself when examining its size (land area is third in U.S.), population (first in U.S.), economy (first in U.S. and between seventh and tenth in the world depending on sources), resources (oil, gas, minerals, tourism etc) and politics. To mitigate this issue, a comparison group of three states (Georgia, Kansas, and Pennsylvania) – as opposed to a single comparison state – was selected.

#### ***Regression Model Approach***

Another approach for estimating baseline sales is the use of a regression model. The concept is that CFL sales can be predicated as a function of a comprehensive list of explanatory variables, including the level of program activity, socio-economic characteristics, energy prices, population center distribution (urban/suburban/rural), and other variables.

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<sup>21</sup> Section 6 of this report describes, in detail, the approach that was taken to select the comparison states.

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The primary advantage of the regression based approach is that it can control for a comprehensive list of factors that can impact CFL sales. In addition, the regression model approach can explore alternative scenarios, identifying best practices for program design and the most effective program features for increasing CFL sales. This component supports forward looking program design and provides administrators with information on optimal incentive levels, incentive structures, marketing techniques, and other program features.

The primary limitation of the regression based approach, however, is that it requires estimates of CFL sales for as many states as possible. The cost of collecting primary data on CFL sales for all states is prohibitive, and the POS data offer limited coverage (at a high cost) for all states, so the model will have to rely on secondary sources, notably the EPA data.<sup>22</sup> Due to the data limitations, the CFL Market Effects Team presents the regression based approach as a supplement to the comparison state based approach.

### ***Store-to-Store Comparison Approach***

The third approach to estimating baseline sales is to compare CFL sales for a selected retail chain or set of chains both in California and a set of carefully matched stores both in and out of California. Advantages of this approach, identified in the CIEE Study Plan, are that it may provide data over a period of years (depending on the cooperativeness of the retailers) and, by providing data in multiple states, it helps to balance out the exogenous (non-program) variables that impact CFL sales.

While the store-to-store comparison offers a potential approach to estimating baseline sales, the CFL Market Effects Team has selected not to pursue this approach for a number of reasons:

- ***Retailer store sales vary dramatically based on socio-economic variables and other factors.*** Retailer CFL sales will vary dramatically between stores based not only on program activity, but on the socio-demographics and other variables presented above. The process of matching stores is problematic, particularly without the use of a regression model that can control for as many variables as possible.
- ***The product market share will vary dramatically by state.*** The ULP in California has made tremendous progress in promoting CFL sales in distribution channels that have historically had low CFL sales, including grocery stores and bargain (e.g., dollar) stores. These sales may be “cannibalizing” CFL sales from some of the larger national retailers in California, thus leading to lower estimates of CFL sales for some of the large national chains (e.g., Home Depot or Lowes) in California when compared to similar stores elsewhere.

### ***Possible Unintended CFL Market Effects***

Public comments, posted in response to the June 2008 release of the draft Compact Fluorescent Lamps (CFL) Market Effects Scoping Study Findings and Work Plan suggested the CPUC CFL Market Effects Team focus additional attention on possible unintended market effects of the

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<sup>22</sup> Although the Nielsen Company and Activant offer POS data for CFL sales by state, the data are both costly and there is some question regarding the accuracy of the data at the state level.



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California IOUs' CFL programs. For this discussion, we define potential "unintended market effects" as IOU program-induced changes in the behavior of any market actor, or in any CFL product, that inadvertently reduces or slows CFL production, stocking, sales, adoption, installation, or price reductions. Some potential unintended market effects may, for example, result in consumers shifting their purchases from CFLs to less efficient alternatives such as incandescent bulbs. Other potential unintended market effects may result in consumers purchasing fewer of a specific CFL product type (e.g., specialty CFLs) because they are instead purchasing another CFL product type (e.g. standard spirals), or purchasing fewer CFLs from one retail channel (e.g. large home improvement stores) because they are purchasing CFLs through other retail channels (e.g. grocery, discount stores) instead.

In terms of their effects on the number of CFLs sold, potential unintended market effects are likely offset by the positive effects the program has had on the CFL market. As described in the *Compact Fluorescent Lamps Market Effects Scoping Study Findings and Work Plan* (final version, dated October 31, 2008) we will measure the "net effects" (that is, the positive effects less the unintended, possibly negative effects) of the IOUs' CFL programs on the CFL market through a quasi-experimental sales data analysis. Preliminary findings from the quasi-experimental sales data analysis are presented in Sections 2 through 5 of this report:

- Section 2.2.3 describes historic CFL sales in California to provide context for the 2006-08 sales data
- Section 3 describes our preliminary regression model results that examine CFL sales as a function of a number of explanatory variables (e.g., level of program activity, socio-economic characteristics, energy prices)
- Section 4 presents results from the CFL (telephone) User Survey that we are using to develop baseline CFL sales estimates for California for the 2006-08 time frame
- Section 5 presents preliminary findings from interviews with CFL manufacturers and retailers, including questions/answers related to possible unintended market effects.

The quasi-experimental sales data analyses cannot, however, explain what the possible unintended market effects are, nor can they provide information about the possible magnitude of their effects on CFL sales. An understanding of the nature and the impacts of unintended market effects is important because:

- If the IOUs' CFL programs, and their Upstream Lighting Program (ULP) in particular, are indeed producing clear "winners" and "losers" in the CFL marketplace—whether these be CFL products or CFL suppliers—it will be useful from a policy and program planning perspective to know who or what these are and the relative significance of each.
- With this understanding the IOUs may be able to make the ULP program more effective by mitigating some or all of the unintended market effects the program may be causing.

Our list of possible unintended effects on the CFL market includes:

- Retailer cannibalization.
- Discouraging CFL innovation and specialty CFL products.
- Adversely affecting CFL quality and performance.

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- Adversely affecting sales of non-program discounted CFLs.
- Contributing to concerns about mercury contained in CFLs.
- Contributing to the belief that buying a CFL means you have done your part for energy efficiency and therefore are not inclined to take further energy-saving actions.

A brief summary of each potential unintended market effect, as well as a description of the primary research/data collection activities the Team plans to undertake to assess the significance and magnitude of each effect, are discussed in the revised memorandum the Team prepared for the CPUC dated November 26, 2008 (see:

[http://www.energydataweb.com/cpucFiles/18/UnintendedCFLMarketEffects\\_2.pdf](http://www.energydataweb.com/cpucFiles/18/UnintendedCFLMarketEffects_2.pdf)).

### 1.4 Overview of the CFL Market Effects Interim Report

The CFL Market Effects Scoping Study and Work Plan laid out a number of tasks through which the Team will assess the cumulative effects of the California IOUs' energy-efficiency programs on the CFL market. These include:

- Primary data collection activities:
  - o CFL User Telephone Survey (Task 1C):<sup>23</sup> Conducted in California as well as in three baseline comparison states; queries consumers about their familiarity with CFLs, CFL purchases, and CFL usage to gain insight into the differences between CFL market penetration rates in California and non-program states.
  - o In-home Lighting Audits (Task 1D): Conducted in California as well as in three baseline comparison states to verify respondents' answers to the CFL User Survey and to gain insight into the saturation of CFLs in homes in the comparison states.
  - o Shelf Stocking Survey (Task 1E): Conducted in California as well as in three baseline comparison states as another means of estimating and comparing CFL sales in California to those in the non-program states
  - o Manufacturer and retailer interviews (Task 1G): Designed to supplement the manufacturer and retailer interviews conducted for the Residential Retrofit Impact Evaluation by: (1) eliciting information from non-participating large/national retailers, (2) eliciting information from non-participating smaller/independent retailers in California and the comparison states, and (3) incorporating questions explicitly related to market effects.
- Analyses:
  - o CFL market and program evolution (incorporates Tasks 1A, 1B, 2C, 3, and 6): Describes the history of the CFL market and CFL promotional programs in California and throughout the U.S. in terms of both quantitative (e.g., CFL sales, CFL retail prices) and qualitative (e.g., consumer familiarity and satisfaction with CFLs) metrics.

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<sup>23</sup> The task numbers included shown here (and later in this report) are the task numbers used in the CFL Market Effects Scoping Study and Work Plan.

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- o Comparison state analysis (Task 2A): The Team's primary approach to estimating the market effects attributable to the IOUs' CFL programs; compares CFL sales in baseline states, where minimal/no CFL promotional activity has taken place, to sales in California to gain an understanding of what the CFL market in California would have looked like in the absence of programs.
- o Regression analysis (Task 2B): As another means of analyzing the market effects attributable to the IOUs' CFL programs, the Team is developing a statistical model that estimates CFL sales as a function of a number of explanatory variables. While data for this analysis are not available for all retail channels through which CFLs are sold, the Team is using the regression-based analysis in an effort to understand state-level determinants of CFL purchases for the retail channels for which data are available. (Data are available for the retail channels responsible for the majority of CFL sales).
- o Attribution analysis (Task 7): Pulls together results from the primary data collection activities and earlier analyses to estimate the number of CFLs attributable to the IOUs' CFL programs, beyond those attributable either directly from programs or through participant spillover.
- o Net savings analysis (Task 8): Computes the energy and demand savings attributable to the program from market effects.
- o Program-induced market effects on CFL pricing (Task 5): Assesses the effect of the IOUs' CFL programs on the retail prices of CFLs.
- o Sustainability analysis (Task 9): Assesses what would happen to California's CFL market were the IOUs' programs to be discontinued or significantly scaled back.
- Coordination Efforts:
  - o Customer intercept surveys (Task 1F).
  - o Leveraging Marketing and Outreach (M&O) evaluation activities (Task 4).
  - o Coordination with Residential Retrofit Evaluation and DEER Database Teams.
  - o Other Inter-Contract Group Coordination.

As the time frame for the CFL market effects evaluation runs from March 2008 through August 2009, this interim report is intended to provide a midstream snapshot of the progress made to date as well as to lay out the remaining evaluation tasks. While a number of the primary data collection activities, analyses, and coordination efforts have already begun, most are still works-in-progress. Because there is still much work to be done, and because the ultimate findings of this evaluation are contingent on the completion and triangulation of results of each individual task, all of the findings presented in this report are preliminary and subject to change.

The remainder of this report documents the status, next steps, and (where applicable) preliminary results for each task. It is organized as follows:

- Section 2 discusses the evolution of the CFL market and CFL programs over the past decade;
- Section 3 describes the regression model approach and provides preliminary results;

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- Section 4 presents results from the CFL User Survey;
- Section 5 discusses preliminary findings from interviews with upstream market actors (manufacturers and retailers)
- Section 6 describes recently-started and soon-to-be-initiated evaluation activities; and
- Section 7 presents the timeline for the remainder of the CFL market effects study.



## **2. CFL PROGRAM AND MARKET EVOLUTION**

This section provides a description of California's CFL market and program evolution from the late 1980s to the present. It contains a description of the California IOU programs, data on consumer purchases and awareness and CFL retail prices, and a qualitative assessment of cumulative historic market effects based on program manager and stakeholder interviews and a review of prior California IOU CFL program evaluations. This documentation of the program and market history provides a context for the 2006-2008 market effects assessment; an understanding of this context may be of critical importance if, as appears possible, the most significant impacts of the California IOUs' programs on the CFL market occurred prior to 2007. References for all data sources are provided in Appendix A.

### **2.1 CFL Program History**

This section provides an overview of the history of the California IOUs' CFL programs from the late 1980s to the present. We also present summary information about related programs in California and the rest of the nation.

#### **2.1.1 California's IOU Programs**

##### ***First Generation CFL Programs (1989 to 1997)***

The California IOUs have promoted the use of CFLs by their residential customers through various programs since 1989. The programs were established in response to the introduction of more advanced CFLs (e.g., those that incorporated electronic ballasts) to the marketplace. The earliest programs were delivered through a combination of approaches, including direct installation, direct mail coupons, direct mail CFL sales, and retailer/manufacturer rebates. The early programs also included marketing and educational components, such as the provision of informational materials to CFL recipients.

These first-generation programs were intended to introduce CFLs to the marketplace and to generate energy savings for the utilities. They were not sustained statewide – or even utility territory-wide – efforts; rather, they focused on specific customer or supplier segments and on specific delivery mechanisms expected to deliver cost-effective energy savings. The CFLs promoted through these programs were typically modular (i.e., the ballast and lamps came as physically separate units) as opposed to the integral models (i.e., where ballasts and lamps are a single unit) such as the spiral CFLs widely promoted in later years. The CFLs were also not widely available in retail channels, were costly, and were not yet widely applicable for general-purpose use.

PG&E's first program was a direct mail coupon for \$4 per CFL, resulting in the purchase of more than 60,000 CFLs by PG&E residential customers from 1989 to 1991. PG&E also offered a \$7 per CFL rebate to retailers starting in late 1990, resulting in sales of 158,000 CFLs and a direct mail program in 1991 that resulted in sales of 125,000 bulbs.

In 1992, PG&E initiated a program that offered rebates to CFL manufacturers who distributed CFLs (quads and circulines) to hardware, grocery, drug, discount, or lighting specialty stores,

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and offered them for sale at a target price. A total of about 500,000 CFLs were sold through this program in 1992 and 1993.

PG&E also installed over 200,000 CFLs during in-home energy audits from 1991 to 1994, and an additional 45,000 CFLs through a 1993 direct install multifamily program.

From 1994 to 1997, PG&E discontinued its manufacturer cost credit program and replaced it with a consumer education campaign. This campaign was intended to educate customers on CFLs' cost savings benefits, generate trade interest, aid new distribution, and motivate target audiences to buy selected, high-performance products.

From 1990-1992, SDG&E purchased over 200,000 CFLs in bulk from two manufacturers and distributed them to customers via direct installation during in-home energy audits and through customer contacts with field office personnel. SDG&E introduced a retail program in 1992, wherein it partnered with the manufacturer Lights of America and four retail chains in its service territory (totaling 38 stores) to sell CFLs (quads and circulines) at \$5.99 each. More than 55,000 CFLs were sold through this program during 1992 and 1993.

SDG&E continued to use direct installation and customer giveaways in addition to the retail program (its primary means of CFL distribution) through 1997, ultimately distributing nearly 1.6 million CFLs to customers.<sup>24</sup>

SCE introduced a \$5 manufacturer buy-down in 1994, with 700 retail stores – representing the major retail chains in its service territory – participating. Over 600,000 CFLs were shipped to retailers in 1994 through this program. SCE offered a similar program in 1996, ultimately distributing 90,000 CFLs to participating retailers.<sup>25</sup> Table 2 presents an overview of IOU activities for the first generation of programs described above.

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<sup>24</sup> Hagler Bailly Consulting, Inc., 1998

<sup>25</sup> XENERGY Inc., 1996.

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**Table 2. Overview of First Generation IOU Lighting Program Activities (1989 to 1997)**

Strategy/ Delivery		Program Year(s)	
		1989-1991	1992-1997
Context		Introductory Programs – mostly giveaways and coupons	Some direct engagement of retailers and manufacturers, but not sustained or widespread
Financial Incentives	Consumer rebates, manufacturer buy-down	Approx. 200,000	Approx. 300,000
Giveaways	Direct install, direct mail, community events	Approx. 1,200,000	Approx. 1,900,000
Upstream Market Support	Salesperson training	None	
	Merchandising support, field visits	Limited merchandising support	
	Co-op advertising	None	
Downstream Marketing	Utility	Some, though not sustained or widespread	
	Other Statewide entities	None	
Market Actor Participation		Limited	
Lighting Products		Early models, typically modular, large size	
Total Program Budget		Unknown	

***Market Transformation Programs (1998 to 2000)***

In 1997, the CPUC stated the purpose of energy-efficiency programs should be to transform the market for energy-efficient goods and services so individual customers and suppliers in the future competitive market would make more rational choices.<sup>26</sup> California’s IOUs developed statewide designs for their major 1999 energy-efficiency programs to be consistent with these market transformation objectives. One such statewide market transformation program was the California Residential Lighting and Appliance Program, which was designed to address barriers to the adoption of energy-efficient appliances and lighting products. The program focused primarily on influencing the supply-side of the market to increase the production, stocking, promotion, and sales of energy-efficient appliances and lighting products.

During the program’s first year, the downstream activities conducted in prior years were continued, but the program’s emphasis shifted toward generating upstream market effects. The program offered manufacturer incentives, retailer salesperson incentives and training, co-operative advertising, and in-store merchandising support. In the year 2000, for example, over 3,000 salespeople were trained in more than 600 retail locations throughout California. Also in 2000, trained contractors visited over 1,100 retailers to assist in product merchandising, and a total of \$1.8 million was spent on co-operative retailer advertising.

<sup>26</sup> XENERGY Inc., 1999.



***Resource Acquisition Programs (2001 to Present)***

In 2001, the program's emphasis shifted from a long-term market transformation orientation to a focus on immediate energy and peak demand savings. This shift in policy was instigated by the California energy crisis, which intensified in the summer of 2001 with anticipated and real shortages of energy supply during peak hours. Utilities ultimately rebated over 7 million CFLs in 2001 in response to the state's energy policy shift. Upstream market actor support, such as salesperson training, was sharply reduced.

The 2002 program was designed to build on the prior program's successes by leveraging existing retailer and manufacturer partnerships and continuing to increase the supply of ENERGY STAR lighting products in the marketplace through the use of discounts. The 2002 program did not include an emphasis on supplier support functions, such as co-operative advertising and salesperson training. Instead, the 2002 program relied on retailers and manufacturers to advertise the discount using their own point-of-purchase promotions.

The utilities offered both a manufacturer buy-down and a point-of-sale (POS)<sup>27</sup> retailer discount in 2002. Retailers were eligible to participate in the program's statewide POS retailer component if they had retail outlets in all three utilities' service territories and if they agreed to comply with the program's reporting requirements (i.e., agreed to track rebated sales electronically). Smaller and/or independent retailers were eligible to participate in the program via the manufacturer buy-down, and the utilities relied on manufacturers to recruit participating retailers for this program component. This program design element was successful in encouraging many independent chain and single-location retailers to participate without the utilities needing to expend significant marketing dollars to make the smaller/independent retailers aware of the program.

New to the 2002 lighting program was the CPUC's introduction of hard-to-reach targets, which were intended to expand the program's reach to trade allies and consumer segments that had not historically participated. The utilities were required to reserve 15% of their incentive budget for retailers located outside the major urban areas and 10% for groceries and drug stores.

The 2002 program budget totaled \$9.4 million, with \$7.7 million earmarked for product incentives. The program ultimately rebated over 3.5 million CFL products, mostly CF bulbs.<sup>28</sup> The 2003 Residential Lighting Program was largely a continuation of the program implemented in 2002.

The 2004-2005 program was also a continuation of the 2002 and 2003 programs, with some minor changes. From an implementation standpoint, the upstream lighting component of the 2004-2005 program was substantially the same program as in 2002 and 2003. In 2004, however, the Residential Lighting Program and the Home Energy Efficiency Rebate Program were combined to form the Statewide Single-Family Energy Efficiency Rebate Program to streamline internal operations for the utilities. In addition, program budgets were nearly doubled during the

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<sup>27</sup> POS refers to the location where a transaction occurs—in this case, the retail location where a CFL was purchased.

<sup>28</sup> While the Team understands the majority of rebates were paid for compact fluorescent bulbs, some rebates were also paid for CFL fixtures. From the data currently available for the 2002 program we are not able to determine the percentage of all rebated CFL products that were bulbs versus the percentage that were other CF products.

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2004-2005 period as a result of the state's return to integrated resource planning, with additional funding added to the public goods charge pool.

The 2004-2005 program shifted from the earlier wattage tier incentive structure to a lumen tier incentive structure, with higher incentives for bulbs with higher lumen output (and for fixtures that accommodated higher-lumen bulbs). This shift was made to address the issue that CFLs with the same wattages do not necessarily emit the same light levels (lumens are a more accurate reflection of brightness than is wattage). The program's lumen standards were based on recommendations from ENERGY STAR about equivalent incandescent light output. The tiers generally follow the same wattage ranges as in prior program years, but they better reflect equivalent incandescent light levels. The change in tiers was made behind the scenes in agreements between the IOUs and manufacturers, and was not apparent to consumers.

The buy-down mechanism comprised the vast majority of the program's lighting incentives during 2004-2005, which were paid directly to lighting manufacturers. Grocery stores were responsible for more than 40% of total manufacturer buy-down dollars for lighting during 2004-2005. POS incentives, in contrast, accounted for only a small percentage of 2004-2005 program incentives. The 2004-2005 Program had hard-to-reach goals, similar to those set for the 2002 program, with a focus on non-urban lighting retailers, drug stores, and groceries.

The 2006-2008 Program continued the prior years' market-based strategies by offering both buy-down and POS options to the state's energy-efficient lighting product suppliers. As in 2004-2005, the vast majority of program sales were through manufacturer buy-downs. As is common with utility-sponsored lighting programs around the U.S., the most active manufacturers were small- to mid-sized manufacturers, whose only products are CFLs. While large manufacturers did participate, they did so at low levels. In total, roughly 15 to 20 manufacturers participated; among large manufacturers, Philips was notable for its non-participation.

Program implementation strategies became more directed and sometimes targeted specific zip codes or other geographic areas, and specific non-participating market channels. For example, the currently targeted retail channels include small grocery chains and other retail establishments that either have not historically carried CFLs or have historically carried only non-ENERGY STAR CFLs.

No hard-to-reach goals were set for the 2006-2008 programs as the CPUC decided to stop tracking hard-to-reach customer and market segment participation levels.

The 2006-2008 program was heavily influenced by the state's increased attention to global warming, specifically by the passage of Assembly Bill 32, the California Global Warming Solutions Act of 2006. The CPUC dramatically increased the energy savings targets for the state's IOUs, and the Upstream Lighting Program was tapped to meet a large fraction of these goals through unprecedented numbers of CFL program incentives. During the first two years of the 2006-2008 program, approximately 56 million CFL products were incentivized by the program.

Table 3 provides an overview of the program's evolution over the last decade.

- **Context:** As shown in the table, the regulatory context shifted several times over the last decade, causing major changes in program design and focus. The California energy crisis of 2000 and 2001 caused the program to abandon many of its non-incentive market

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strategies. Later, the state's aggressive efforts to combat global warming resulted in a dramatic increase in budget.

- **Financial Incentives:** The program incentive volume has shifted over time, mostly in response to the changing context. During the market transformation era, the program eschewed customer rebates, whereas during the energy crisis, the program rebated over 7 million CFLs. Over the past two years, the program paid out over 50 million incentives as part of the state's strategy to reduce carbon emissions.
- **Upstream Market Actor Support:** During the market transformation era, the program was predominantly focused on non-incentive market support, such as salesperson training. The state's energy crisis led to a dramatic scaling back of these activities. Later programs required participating market actors to provide in-store promotional materials and advertising.
- **Downstream Marketing:** Throughout the program's lifetime, the IOUs have used traditional methods to raise program awareness levels among their residential customers, using bill inserts and other mass marketing materials. In response to the energy crisis, the state launched a very prominent advertising campaign called Flex Your Power (FYP) that consisted of high-profile television, print, and radio advertisements appealing to the state's residents to conserve energy. In 2002 and beyond, the campaign was scaled back and more closely tied to other IOU energy-efficiency programs such as Upstream Lighting, encouraging residents to adopt energy-efficient measures such as ENERGY STAR programmable thermostats and CFLs.
- **Market Actor Participation:** Much of the program's focus during the market transformation era was on recruiting market actors to produce, stock, prominently display, and promote energy-efficient lighting products. As market actor participation increased, the program shifted its focus away from big box chains to less traditional retail channels, such as grocery, drug, and discount stores.
- **Lighting Products:** The products promoted by the program evolved over time in response to changing market conditions. Once ENERGY STAR specifications were in place for CFLs, the program exclusively promoted ENERGY STAR products. As the market took off for spiral CFLs, the program encouraged suppliers to also carry specialty CFLs and light emitting diodes (LED)s.

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**Table 3. Overview of IOU Lighting Program Activities (1998–2007)**

Strategy/ Delivery		Program Year(s)					
		1998-1999	2000	2001	2002-2003 <sup>1</sup>	2004-2005	2006-2008
Context		Initiation of California market transformation programs	Full-scale implementation of market transformation program	California energy crisis; shift towards immediate energy savings	Resource acquisition, but program still market-based	Added procurement funding	CPUC dramatically expands California IOUs' energy savings targets to meet the state's Energy Action Plan
Financial Incentives	Consumer rebates, manufacturer buy-down	600,000	100,000	8 million	7 million	20 million	56 million (estimated for 2006-07)
Upstream Market Support	Salesperson training	Start-up	Significant	None			
	Merchandising support, field visits	Start-up	Significant	Participating suppliers required to do most of the in-store advertising; limited program support			
	Co-op advertising	None	Significant				
Down-stream Marketing	Utility	Traditional methods such as bill inserts, information on Website, limited radio, print and TV advertisements					
	Other Statewide entities	None	None	Aggressive FYP Mass Market Campaign in response to energy crisis	Sustained FYP Mass Market Campaign		
Market Actor Participation		Less than 10 – mostly big box stores, exclusively manufacturer buy-down		Around 40 – mostly big box stores and retailer POS incentives, but with more small hardware and independent stores	More than 75 – explicit focus on non-traditional retail channels such as drug, grocery and discount; decreasing focus on big box stores – almost exclusively manufacturer buy-down		
Lighting Products		Early generation CFLs, fixtures and torchieres	Added focus on sub-CFLs	Exclusively ENERGY STAR lighting products		Focus on lumen equivalents and specialty CFLs	
Total Estimated Program Budget		\$30 million	\$33 million	\$36 million	\$10 million per year	\$18 million per year	\$50 million per year

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### 2.1.2 California IOU's Program Theory and Logic Model

The overarching goals of the first phase of programs were to introduce CFLs to the marketplace and to generate energy savings for the California IOUs.

During the late 1990s, the state shifted its energy-efficiency program focus towards achieving market transformation, and the California IOUs realigned their program goals accordingly. From the late 1990s until the state's energy crisis, the programs' goals were to address the existing market barriers by increasing the production, stocking, promotion, and sales of energy-efficient lighting products as well as to increase customer education and awareness about energy-efficiency and energy-efficient products.

Once the effects of the energy crisis were broadly felt across the state in 2001, the programs shifted their emphasis to achieving immediate energy savings. Nonetheless, they maintained their focus on market-based strategies, working through existing market channels to achieve increased sales. The programs focused on overcoming the first-cost market barrier, but also addressed product quality (by working with the national ENERGY STAR program and with the PEARL, described below), and product availability (by encouraging manufacturer and supplier competition for the incentive pool).

In 2002, the programs incorporated hard-to-reach goals into its design in response to a CPUC directive, and focused on broadening CFL availability beyond urban areas and traditional retail channels, such as home improvement and mass merchandise chains. From 2002 to the present, the programs have continued to focus on achieving immediate energy savings by providing product incentives to an increasingly broad mix of manufacturers and retailers.

Table 4 shows the programs' goals, the market barriers they addressed over time, and indicators of market progress towards reducing these barriers. A "P" indicates a primary market barrier the programs were intended to reduce; an "S" indicates a secondary barrier. The indicators, listed in the column immediately to the right of the barriers, were measured over time by market research studies and program evaluations.

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**Table 4. Program Goals, Market Barriers, and Market Progress Indicators**

Market Barrier	Market Progress Indicator	Phase / Goal		
		Phase 1: First Generation Goal: Introduce product to consumers and suppliers; save energy	Phase 2: Market Transformation Goal: Increase the production, stocking, promotion, and sales of energy-efficient lighting products	Phase 3: Market-Based Resource Acquisition Programs Goal: Achieve immediate energy savings
Consumer awareness	Rate of awareness	P	P	
Consumer purchase	Rate of purchase		P	P
CFL quality	Consumer satisfaction	S	P	S
CFL retail price	Average sales price	P	P	P
CFL availability	Number of retailers stocking/manufacturers producing program-qualifying products	S	P	P
CFL diversity	Number of models/brands/styles stocked by retailers and produced by manufacturers		P	S
CFL promotion	Retailer salesperson knowledge, manufacturer and retailer promotional materials	S	P	S

The detailed program theory for the 2006-2008 upstream lighting approach is reflected in the logic model presented in Figure 1. By coordinating program design, encouraging customer and retailer participation through direct outreach, and by encouraging manufacturer participation through incentives, the programs seek to increase the demand for CFLs, increase the volume and decrease the cost of the product, reduce performance uncertainty, and encourage the adoption and availability of new products (with improved energy efficiencies and/or additional functionality).

The cost and availability are the result of increasing economies of scale, adoption of product as “common practice” and increasing market presence in non-program settings.

With an eye toward developing a truly useful logic model, this diagram was designed to be as simple as possible while at the same time capturing all of the basic elements of the theory and the linkages among these elements. The elements of the logic model are:

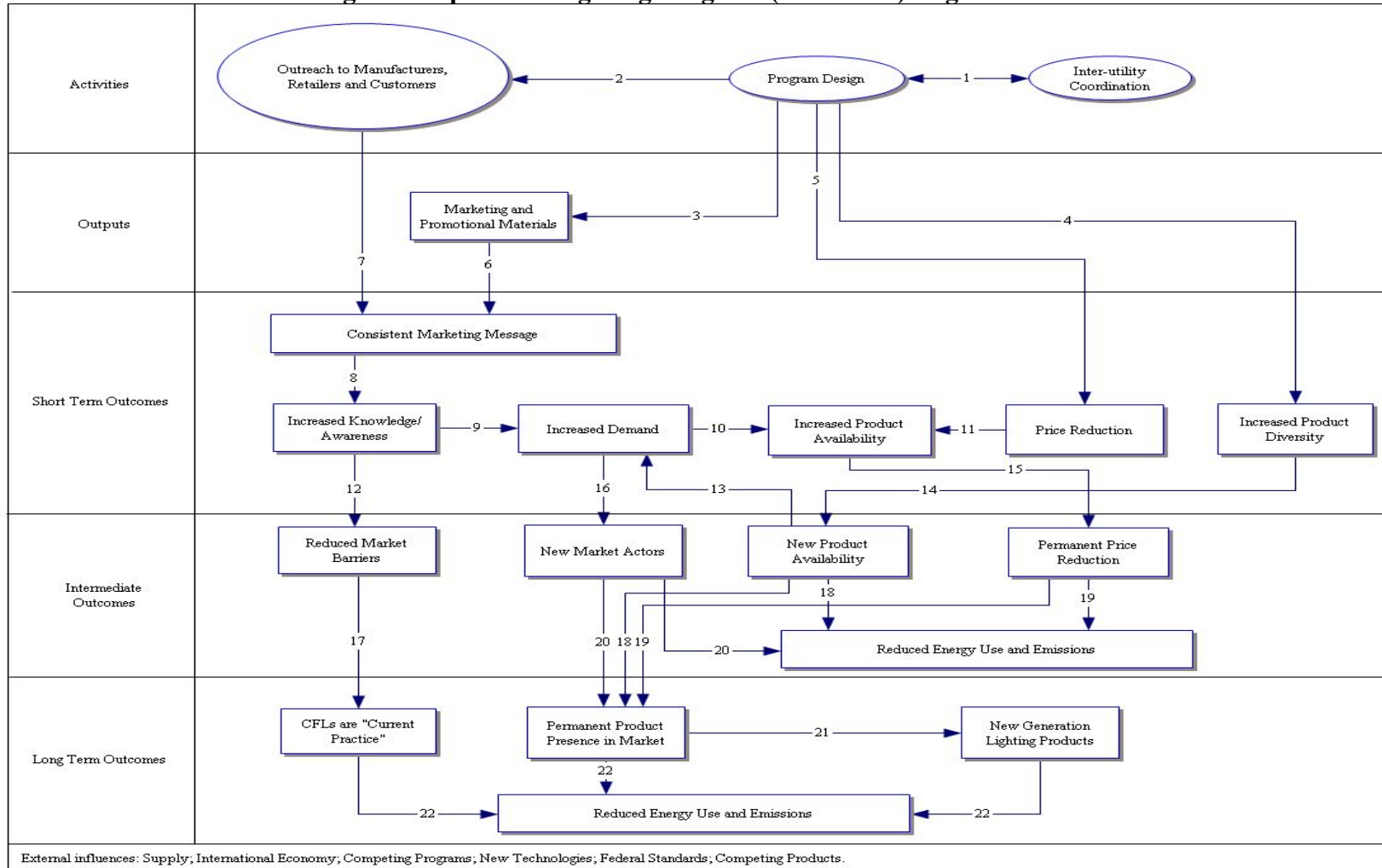
- **Activities** that the program undertakes. In this case they are coordination among the utilities, program design activities, and outreach, including incentives.
- **Outputs** that the program produces. These are primarily outreach materials, including store displays, events, advertising, and direct outreach.

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- **Outcomes** that result:
  - In the **short-term** we expect to see changes in awareness and knowledge, some price effects, and increasing product availability and diversity.
  - In the **medium-term** we expect to see the effects deepen to encompass a reduction of market barriers, increased product availability, increased price effects, reduced energy use and emissions, and increasing effects outside of the program.
  - Finally, the **long-term** outcomes include fundamental changes in the way customers view CFLs, their ubiquitous availability in the market, and the beginning of a transition to the next lighting technology.

Table 5 describes the linkages among the elements and presents a list of progress indicators proposed to evaluate the elements and their linkages.

Figure 1. Upstream Lighting Program (2006-2008) Logic Model





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**Table 5. Upstream Lighting (2006-2008) Logic Model Links:  
 Working Hypotheses and Indicators**

Link	Working Hypotheses	Indicators
1	Inter-utility coordination ensures that the program is a consistent, state-wide activity and that utility efforts are coordinated	Meetings scheduled; work papers; agreements; program changes
2	Outreach to manufacturers encourages the availability of product and marketing to retailers; outreach to retailers ensures program participation and increases availability of market channels; outreach to customers addresses information barrier and raises awareness	Satisfaction with the program, the products, and the marketing materials; number of events, bill inserts, and promotional materials
3	Consistent program design leads to consistent development of outreach materials	Content of outreach materials; number of program announcements and promotions; availability of materials
4	Program design encourages increasing diversity of product	Measures added, modified or deleted; lumen output increases
5	Program incentives reduce the price of available measures	Comparison of price before, during and after sales events; comparison of price for participating and non-participating retailers and manufacturers
6	The development of marketing materials in a standardized way will lead to consistent marketing messages.	Lack of confusion among retailers and customers on marketing messages.
7	Standardized outreach to manufacturers, retailers and customers will lead to consistent marketing messages	Lack of confusion among retailers and customers on marketing messages
8	Consistent marketing message leads to increased information and awareness	Customer general knowledge of benefits of CFLs; customer awareness of products, availability and advantages
9	Increased knowledge and awareness leads to increased demand for product	Increasing customer satisfaction, increased sales of program and non-program products
10	Increased demand leads to increased product availability	Increasing sales during non-program periods; increased sales in nonparticipating retailers; new manufacturers entering the market
11	Price reduction due to direct program effects affect the price of non-program products	Product prices in nonparticipating retailers; product prices for non-participating products
12	Customer market barriers are decreased due to increased knowledge and awareness among retailers and customers.	First cost; performance uncertainty; knowledge and awareness
13	Increased customer demand for CFLs leads to new products and new product availability	New products, price reductions; new market actors
14	Program incentive structure leads to new products and new product availability	Increasing lumen quality; three-way and other specialty product availability

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Link	Working Hypotheses	Indicators
15	Increased availability lowers costs on a permanent basis	Nonparticipant retailer price differential decreased; non-participating product price differential approaches zero; no differences between event and non-event prices.
16	New actors enter the market	New manufacturers; product available in non-mass market outlets, specialty stores, etc.
17	CFLs become standard bulbs	Number of sockets increases; incandescents replaced with CFLs; older CFLs replaced with the same or better models; sales of incandescent bulbs decrease; reduced energy use and emissions
18 19 20	New products, low prices and increased availability lead to CFLs being a commodity product like incandescents	Overall sales; reduced energy use and emissions
21	New technologies begin to penetrate the market and replace CFLs	LED bulb sales
22	Market saturation of CFLs and introduction of new technologies lead to long-term energy and environmental impacts	Reduced energy use; reduced emissions

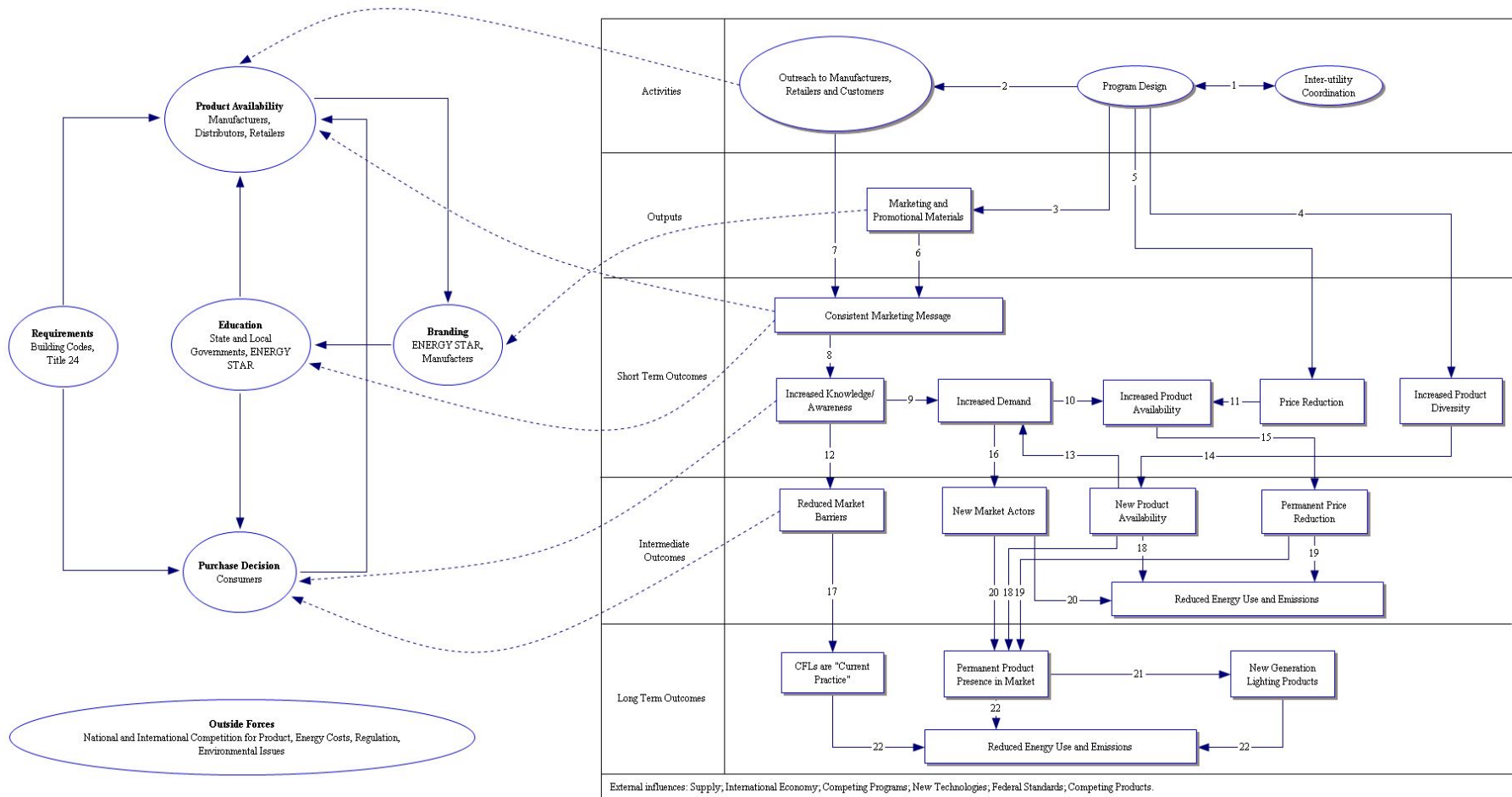
***Integrated Market and Program Logic Model***

Figure 2, on the following page, combines the preliminary<sup>29</sup> market logic model with the ULP logic model to show how the IOU program interacts with the overall market. The dotted lines show the alignment of the ULP to the market model. With the exception of the mandatory requirements (which are addressed by the IOU non-retail programs<sup>30</sup>), there appears to be good congruence.

<sup>29</sup> These models are still works in progress: as the project moves forward they will be updated/refined to incorporate greater detail and background for evaluation hypotheses.

<sup>30</sup> The ULPs account for over 95% of the California IOUs' CFL savings claims; non-retail programs were therefore not modeled.

Figure 2. CFL Market and IOU ULP (2006-2008) Logic Model



### **2.1.3 Other Relevant CFL Programs**

This section describes other relevant programs implemented in California or in other parts of North America over the past two decades.

#### ***State of California FYP Advertising Campaign***

The FYP campaign began in 2001 as a statewide marketing and outreach program to promote the benefits of energy efficiency and to aid the California IOUs' existing efficiency programs. FYP is still in operation today. The campaign utilizes many forms of marketing and outreach to disseminate information related to energy efficiency. It relies heavily on partnerships developed between the IOUs, residents, government agencies, nonprofit organizations, businesses, and institutions to educate Californians. The main focuses of the campaign are the environmental, energy, and economic benefits of improved efficiency.<sup>31</sup>

Between 2001 and 2004, the FYP campaign advertised efficient lighting solutions simultaneously with the national ENERGY STAR promotions (Change a Light, Change the World) run during the fall. When the Flex Alert Network was created in 2004, the campaign shifted its timing to the summer months to substitute Flex Alerts for their regular advertising, thus avoiding paying the high price for short-notice television advertising.

In 2006, the campaign began to also target hard-to-reach communities; FYP collaborated with the Spanish language television station Univisión and their former Univisión Television Energy Efficiency Marketing (UTEEM) campaign, and also incorporated the former Reach for the Stars campaign. The targeting of California's large Spanish-speaking population as well as its rural population significantly increased the reach of the FYP campaign. Altogether, the FYP campaign estimates approximately 95% of Californians saw or heard FYP messages an average of 37 times on television and radio during the summer of 2006 (July 5 through October 1, 2006).<sup>32</sup>

In 2007, the FYP campaign concentrated on CFLs and energy-efficient cooling systems. Advertisements were run in rotation between June 11 and the end of September 2007. Outdoor advertising (e.g., posters in BART stations) was not product specific, but it supported the underlying global warming messaging of the other media. Online advertisements supported the CFL and cooling campaigns equally. Ethnic media also ran FYP advertisements for CFLs, including television and radio in several Asian languages in the San Francisco and Los Angeles areas and Spanish-language radio in the San Francisco, Los Angeles, San Diego, and Fresno areas. The campaign also ran newspaper ads in multiple languages for both CFLs and cooling systems (these were also concentrated in the San Francisco, Los Angeles, San Diego, and Fresno areas).<sup>33</sup>

In 2008, the FYP campaign produced and ran TV, radio, outdoor, and online advertisements focusing on CFLs as well as energy-efficient cooling systems and appliances. The 2008

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<sup>31</sup> Efficiency Partnership, 2007. "About Flex Your Power" from <http://www.fypower.org/about/>.

<sup>32</sup> Efficiency Partnership, 2006. The total FYP ad impressions in Summer 2006 (excluding UTEEM and the rural and Asian efforts) were 893,209,377.

<sup>33</sup> McGuire, Wally, 2008. Total ad impressions throughout the 2007 summer campaign totaled nearly 881 million (excluding UTEEM, rural, and Asian efforts).

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campaign differed somewhat from the 2007 campaign, including to the extent that the 2008 outdoor campaign was product-specific (whereas the 2007 outdoor campaign focused on a more general global warming message). The bulk of the campaign's ads in 2008 ran in rotation for approximately 13 weeks starting in mid-June and ending in mid-September, although some outdoor advertisements ran for a somewhat longer period.<sup>34</sup> The FYP statewide reach for the television and radio portion of the media effort was at 95% of the state.

### ***National ENERGY STAR Program***

The U.S. Environmental Protection Agency (EPA) introduced ENERGY STAR in 1992 as a voluntary labeling program designed to identify and promote energy-efficient products as part of an effort to reduce greenhouse gas emissions. The first ENERGY STAR labels were developed for computers and computer monitors. Over the next three years, EPA expanded the label to include additional office equipment as well as residential heating and cooling equipment. In 1996 the agency began partnering with the U.S. Department of Energy (DOE) for some product categories. The ENERGY STAR label can now be found on lighting products, major household appliances, home electronics, new homes, and commercial and industrial buildings.<sup>35</sup>

For lighting, the ENERGY STAR label designates not only that a product is energy efficient, but also is of high quality. The latest CFL specifications (CFL Criteria Version 4.0), released by DOE in February 2008 and slated to become effective in December 2008, cover both medium screw-based and candelabra-based CFLs.<sup>36</sup> They include requirements addressing CFL performance as well as three other major components of compact fluorescent technology and production:

- **Performance.** Version 4.0 requires improvements in bulb performance over the prior specifications, particularly with regard to efficacy, color rendering, and start-up time.
- **Color temperature.** Each qualifying ENERGY STAR CFL will be designated as one of six correlated color temperatures (e.g., soft white). This specification is intended to improve consumer understanding of available CFL options and to improve consumers' ability to select an appropriate bulb for each application.
- **Safety.** The criteria impose the following limitations on mercury content for bulbs:
  - o Bulbs under 25 watts may not exceed 5 milligrams of mercury per bulb; and
  - o Bulbs between 25 and 40 watts may not exceed 6 milligrams of mercury per bulb.

The criteria also impose mandatory language on bulb packaging that reminds purchasers to recycle their CFLs and refers them to the following Websites: [www.epa.gov/bulbrecycling](http://www.epa.gov/bulbrecycling) or [www.lamprecycle.org](http://www.lamprecycle.org).

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<sup>34</sup> Total targeted ad impressions for all media types for the Summer 2008 campaign (excluding the UTEEM and rural efforts) was more than 1.3 billion, based on the primary target audience of Adults 35-64.

<sup>35</sup> U.S. EPA, n.d.

<sup>36</sup> U.S. EPA, 2008a.

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- **Testing.** Bulbs must go through a third-party testing program to qualify under the new criteria. The program includes specific high-heat testing requirements for reflector bulbs.<sup>37</sup>

### ***National Change-A-Light, Change the World Program***<sup>38</sup>

The Change-A-Light, Change the World program of the EPA is a nationwide market transformation program created in 2001. The program aims to increase customer awareness toward ENERGY STAR CFLs and lighting products and to provide a nation-wide unified message for consumers. The annual nationwide Change-A-Light campaign begins in October during national Energy Awareness Month, and continues through November.

Change-A-Light partners play an integral role in the program and have traditionally included manufacturers, retailers, utilities, and Energy Efficiency Program Sponsors (EEPS) from all areas of the country. Change-A-Light implementers provide advertising materials for the partners, including images, templates, and a resource Website. In 2003, EPA reported that 160 partners had joined the Change-A-Light campaign and that number had grown to 250 partners by 2004. In 2005, the campaign expanded to include over 300 retail, EEPS, manufacturers, governments, schools, non-profit, and industrial sector partners from all around the country.

The Change-A-Light campaign has consistently conducted national media outreach to print, radio, TV and online outlets for earned media coverage. Some sponsors also conduct their own advertising campaigns, which include ENERGY STAR campaign messaging. Key highlights from ENERGY STAR Qualified Products Progress Updates in 2003, 2004, 2005, and 2006 include:

- In 2003, national media outreach generated 12 million ad impressions.<sup>39</sup> (2003 QPPU)
- Print advertising from ENERGY STAR Partners supporting the 2004 campaign reached a combined circulation of 31 million consumers. (2004 QPPU)
- Nearly 42 million radio listeners heard the campaign message through more than 950 radio spots in support of the 2005 campaign. (2005 QPPU)
- A new campaign print public service announcement (PSA) for the 2006 campaign garnered placements in Entertainment Weekly, Scientific American, Better Homes & Gardens, Money, and US News & World Report. (2006 QPPU)

An important aspect to the Change-A-Light program is the annual lighting partner meeting. Starting in 2001, this meeting has brought together both national and regional manufacturers, retailers, and utilities to discuss changes in energy efficient lighting, incentives, and encourage new products for the market. This collaboration of industries help utilities decide which products to incent; retailers, which products to carry; and manufacturers, where product demand lies.

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<sup>37</sup> Karney, Richard H., 2008.

<sup>38</sup> Information from Laura Orfanedes, The Cadmus Group, Personal Correspondence 10/7/08, and ENERGY STAR Qualified Product Progress Updates, 2003-2006

<sup>39</sup> Ad impressions are the estimates of the number of "viewings" consumers have (or are expected to have) of a particular ad. Each instance of someone looking at an ad (online, TV, poster in a mass transit station, etc.) is considered one ad impression.

### ***National CFL Quality Assurance Initiatives***

#### *Program for the Evaluation and Analysis of Residential Lighting*

In December 2000, the Natural Resources Defense Council organized a roundtable for energy-efficiency administrators interested in testing the performance of residential lighting products. Entitled the PEARL, the group included the Northwest Energy Efficiency Alliance, Bonneville Power Administration, Northeast Energy Efficiency Partnerships member utilities, the New York State Energy Research and Development Authority, Wisconsin utilities, the Sacramento Municipal Utilities District, and the California IOUs. The member organizations were concerned with the performance of certain ENERGY STAR lighting products promoted by their programs and with the lack of self-policing mechanisms within the lighting industry to ensure CFL reliability and compliance with ENERGY STAR specifications after CFLs become available to retail consumers.

The Lighting Research Center (LRC) at Rensselaer Polytechnic Institute in New York tests products for PEARL against current ENERGY STAR specifications. In the seven cycles conducted between 2000 and 2007, LRC has tested 156 CFL models from 29 manufacturers and 52 hard-wired fixtures from 20 manufacturers for compliance. The tests include four parameters: efficacy, 1,000-hour lumen maintenance, lumen maintenance at 40% of rated lifetime,<sup>40</sup> and rapid cycle stress tests.<sup>41</sup> As of April 2008, LRC was working on its eighth and final cycle of CFL testing.

PEARL does not have the authority to disqualify or de-list products from ENERGY STAR, but it does provide test results to PEARL sponsors, which then pass them on to the EPA and DOE. Manufacturers whose products are tested also get copies of the results.

#### ***Third-Party Testing and Verification Program***

The ENERGY STAR Criteria 4.0 for CFLs taking effect in December 2008 require manufacturer, distributor, and retailer partners of ENERGY STAR to participate in a Third-Party Testing and Verification Program that uses independent, third-party laboratories accredited by the National Voluntary Laboratory Accreditation Program.<sup>42</sup> According to the ENERGY STAR criteria,<sup>43</sup> the goals of the Third-Party Testing and Verification Program are to:

- Develop a CFL testing program to aid DOE in maintaining quality control of the ENERGY STAR CFL Program;

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<sup>40</sup> This is the sole exception to PEARL's testing against ENERGY STAR specifications: rather than testing 100% of rated life, PEARL tests 40% of rated life.

<sup>41</sup> PEARL, 2007.

<sup>42</sup> As of this writing, the National Voluntary Lab Accreditation Program is still under development and PEARL is continuing its current round of testing (a process that takes 9 to 12 months). When the current round of PEARL testing is complete, the involved parties will decide whether or not to continue PEARL. It is possible, but not a foregone conclusion, that the National Voluntary Lab Accreditation Program may eventually replace PEARL.

<sup>43</sup> U.S. EPA, 2008a.

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- Develop a mechanism that provides added assurance to both ENERGY STAR CFL program sponsors and to manufacturer competitors that qualified products do, in fact, meet the ENERGY STAR criteria;
- Provide a basis upon which DOE can disqualify products that do not meet ENERGY STAR specifications; and
- Maintain the precepts of the ENERGY STAR Program, the highest of which is that the consumer receives superior products that perform as advertised.

The Third-Party Testing and Verification Program will conduct random off-the-shelf testing of ENERGY STAR CFLs and provide results of these to applicable manufacturers. The program will be managed using funds derived from a percentage of the testing fees. Eleven separate tests will be conducted for bare spirals – the four tests performed as part of PEARL, plus base, correlated color temperature (CCT), color rendering index (CRI), run-up time, starting time, interim life test at 40% of rated lifetime, and power factor. Separate sets of tests and verification procedures will be conducted depending on the CFL type (e.g., for bare outdoor reflectors, covered outdoor reflectors, and indoor reflectors designed for use in recessed downlights).

### ***CFL Programs Outside of California***

There are a number of states operating CFL programs outside of California. These states include (but are not limited to) Arizona, Connecticut, Illinois, Massachusetts, Michigan, Nevada, New Hampshire, New Mexico, New York, Oregon, and Washington. Some have been operating programs for a relatively short period of time (e.g., New Mexico), while others initially operated partial-year programs that have recently evolved into year-long programs (e.g., Illinois). Still others have been operating for nearly as long as the California programs. Similar to the evolution of California programs', programs in the latter group have changed over the years: they were generally started as rebate or reward programs and then moved to manufacturer buy-down and retailer upstream programs. They all tend to promote lighting products with the ENERGY STAR label and have adopted the PEAL quality standards. Below are brief descriptions of three long-running, non-California CFL programs.

#### *Northwest CFL Programs (Northwest Energy Efficiency Alliance)*

The Northwest Energy Efficiency Alliance (NEEA) launched its first residential lighting market initiatives in 1997 to accelerate the awareness and use of high-efficiency CFLs and fluorescent light fixtures among residential customers. The programs provided financial incentives to manufacturers to increase product availability and reduce product price. In 2004, the program coordinated with national efforts such as ENERGY STAR's Change-A-Light, Change-the-World campaign and the lighting quality research conducted by PEARL. In 2005, NEEA coordinated a regional manufacturer buy-down to reduce the market price of CFLs in the region and establish promotional distribution channels to move high-quality, low-priced products into the market. NEEA continued with the regional promotions in 2006-07 and expanded to include non-traditional CFL distribution channels such as drug and grocery stores and eliminated large do-it-yourself chains and wholesale clubs.



*Wisconsin CFL Programs (Focus on Energy)*

The Wisconsin Focus on Energy lighting program or the Residential Lighting Program (RLP) began in 1998 and focuses on promoting ENERGY STAR lighting products. The RLP is marketed under the annual Change-A-Light, Change-the-World campaign and works with the entire manufacturing and distribution chain of ENERGY STAR lighting products to accelerate consumer awareness and knowledge, attract retail partners, and increase both the availability and purchase of these products. In 2007, 86% of program rebates were paid for CFLs used for residential purposes, 7% for commercial purposes, 2% for agricultural purposes, and 5% for multifamily purposes.

*New England CFL Programs (Northeast Energy Efficiency Partnership, NEEP)*

New England CFL programs consisted of direct install and rebates in the late 1980s and evolved to include the promotion of ENERGY STAR-labeled products in the late 1990s. NEEP began upstream programs such as the Negotiated Cooperative Promotions (NCP) in the early 2000s. The majority of NEEP's programs today are mainly upstream buy-down programs. Due to the success of these programs, residential lighting programs accounted for 22% of total utility energy savings achieved in New England in 2004. The mean number of CFLs per home was 6.7 in Massachusetts and 6.8 in Connecticut. Also in 2004, 8% of all bulb sockets in Massachusetts and 7% of all sockets in Connecticut contain CFLs.<sup>44</sup> By 2007 the saturation of CFLs in Massachusetts climbed to 21.4%.<sup>45</sup>

## **2.2 CFL Market History**

This section presents a description of relevant market events that have likely affected the California market for CFLs. It also presents CFL demand and supplier market data. Most of the market data presented are based on evaluations of prior California IOU programs, which were intended to track indicators of market change and progress toward addressing barriers to CFL sales. (Market barriers are discussed in more detail above and summarized in Table 4).

### **2.2.1 Relevant Market Events**

***California Energy Crisis of 2000-2001***<sup>46</sup>

From the summer of 2000 through 2001, California residents were influenced by the economic, political, and financial effects of the state's energy crisis. Electricity market deregulation legislation enacted in 1996 had set the stage for surging wholesale prices, rate freezes, blackouts, and higher electricity rates for all customer classes.

Consumers were affected primarily through blackouts. The threat of continual blackouts was pervasive, as businesses expected the worst and residents feared economic turmoil as a result. Many consumers also saw their electric rates restructured, resulting in some California residents paying higher electricity prices. High natural gas prices in 2000 caused by a cold winter and a

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<sup>44</sup> Kates and Bonanno. 2005

<sup>45</sup> Hoefgen et .al. , 2008

<sup>46</sup> Xenergy, 2002, Rasmussen, T. , 2006

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booming economy also contributed to the consumer perception of an energy market out of control. Moreover, the threat of higher electricity prices made front-page news day after day, alarming the public into expecting huge rate hikes, especially as PG&E filed for bankruptcy.

In addition to the extensive media attention covering the crisis, the State of California began an intensive campaign called FYP (introduced above) to encourage residents and businesses to conserve energy. The campaign consisted of repeated mass media advertisements with simple, behavioral conservation steps people could take to save energy and help mitigate the effects of the crisis. Newspaper columnists and consumer interest segments on the news then began to offer basic conservation tips as well, and California residents were inundated with messages to “do your part” and turn off lights, adjust thermostats, and use appliances during off-peak times.

Many of the conservation messages that the state and media disseminated to residents were commonsense reminders to do what many said they should have already been doing. The crisis caused residents to engage the conservation ethic that they had learned from their parents, grandparents, and teachers. The utility companies had also been advertising conservation messages for decades, encouraging residents to turn off lights and to make investments in energy-efficient equipment. It is likely those past utility conservation messages resonated with residents as they were encouraged by media and government to do their part and conserve.

### ***Increased Attention to Global Warming***

As oil prices exceeded \$100 per barrel in much of 2008, and climate change has continued to draw mainstream consumer culture (carbon neutral products, hybrid cars, etc.) and political conversation (green collar jobs, cap-and-trade schemes, etc.), the issue of energy efficiency has again become prominent.<sup>47</sup> CFLs are increasingly seen as a relatively easy, inexpensive way to achieve immediate energy savings and resulting decreases in carbon dioxide (CO<sub>2</sub>) emissions due to their wide availability, relatively low retail price, and huge energy-saving potential. The EPA’s ENERGY STAR Change-a-Light, Change the World campaign has received over 1.2 million pledges from Americans to change at least one incandescent bulb in their homes to a CFL.<sup>48</sup> Other “green” Websites, such as Yahoo! Green, have similar pledges, inducing consumers to install CFLs to reduce carbon dioxide emissions and fight global warming. National and local media also suggest CFLs as one of the easiest ways to help increase energy efficiency and mitigate climate change.

### ***Wal-Mart’s Sustainability Initiatives***

The huge mass retailer set aggressive goals in an attempt to “green” its reputation. Due to the scale of its supply chain and high volume of customers,<sup>49</sup> Wal-Mart has the ability to make a dramatic market impact. One of the corporation’s sustainable product goals, introduced in 2007, was to sell 100 million CFLs. That goal was reached in October of 2007,<sup>50</sup> with support from

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<sup>47</sup> Frank, 2008

<sup>48</sup> U.S. EPA, 2008b

<sup>49</sup> More than 68,000 supplier partnerships, 1.5 million associates (i.e., retailer sales staff), and 100 million customers per week (Wal-Mart Corporation, 2008b)

<sup>50</sup> Wal-Mart Corporation, 2008a

NEEA and other program administrators, state, and regional lighting initiatives. According to Wal-Mart, “Selling CFLs makes it easier for its customers to be part of the carbon solution.”

### ***Regulation of Light Efficacy***

In early 2007, Australia introduced a plan to phase out incandescent bulbs and replace them with CFLs. Other countries and the European Union followed suit.<sup>51</sup> The California state legislature considered an outright ban on incandescent bulbs in late 2007. The nationwide energy bill signed into law by President Bush in December 2007 mandates general service bulbs must meet increased efficacy requirements over the next 4 to 12 years.<sup>52</sup> The Energy Independence Security Act's increased efficacy requirements will be fully effective by 2014. Increases in efficacy requirements for incandescent reflectors and fluorescent bulbs will become effective within 36 months of the Act's signing. The increased efficacy requirements for general service incandescent bulbs will be fully effective by 2014. Advanced incandescent bulbs and halogen bulbs will meet the early requirements, while CFLs and light-emitting diodes (LEDs) will likely meet the long-term goals.<sup>53</sup>

### **2.2.2 Leading Market Indicator Data**

This section presents time series data on leading indicators of the desired market change, which in this case is increased CFL sales and market share. The market and program theory hypothesize that increases in consumer awareness and purchases of CFLs precede and may predict increases in CFL sales and market share. Changes in leading market indicators were expected to precede changes in ultimate (e.g., CFL sales) and lagging (e.g., CFL saturation) indicators.

Most market data presented in this section pertain to California IOU customers. However, in the few cases where directly comparable national data exists, these are also presented.

### ***Consumer General Energy Efficiency Knowledge, Awareness and Attitudes***

The California utilities' market transformation programs not only intended to raise awareness and knowledge levels about energy-efficient lighting products, but also about energy efficiency in general. In fact, prior to launching their market transformation programs, the IOUs had been educating consumers through bill inserts and other means to save energy in general through conservation measures, such as turning off lights. Figure 3 below shows California consumer self-reported knowledge of ways to save energy at home over time. The average knowledge level jumped from 1998 to 2001, at the peak of the energy crisis. After the energy crisis, consumers rated themselves slightly lower than during the crisis, but higher than before the crisis.

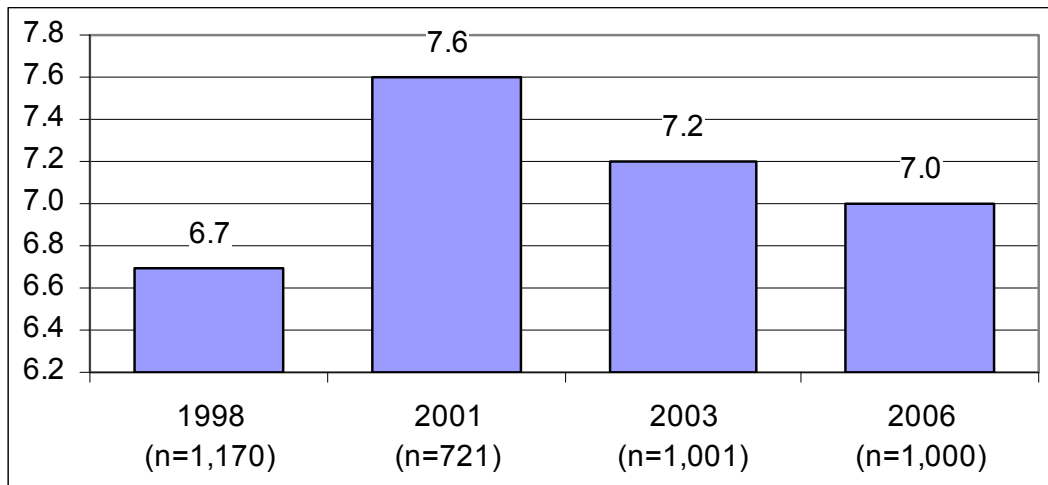
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<sup>51</sup> Asia Pacific Economic Corporation, 2008

<sup>52</sup> U.S. House of Representatives, 2007

<sup>53</sup> Ibid.

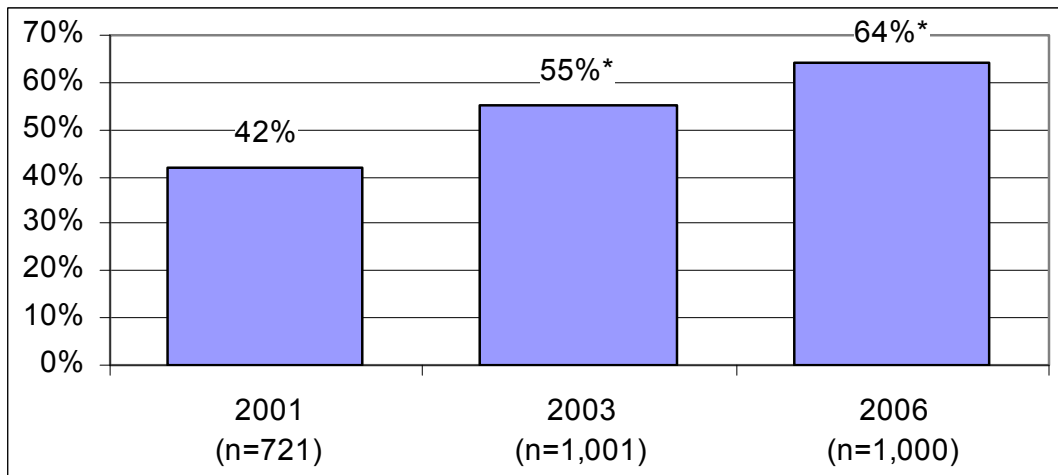
**Figure 3. California Consumers' Self-Assessment of Knowledge of Ways to Save Energy At Home**  
*Mean Rating (1= not at all knowledgeable and 10=extremely knowledgeable)*



Source: Itron and KEMA, 2006.

Figure 4 shows California consumers' self-reported awareness of ENERGY STAR: specifically, whether they had seen or heard of ENERGY STAR prior to the telephone survey through which these data were gathered. The fraction aware of ENERGY STAR has increased over time, up to 64% by 2006.

**Figure 4. California Consumer Awareness of ENERGY STAR (Unaided)**

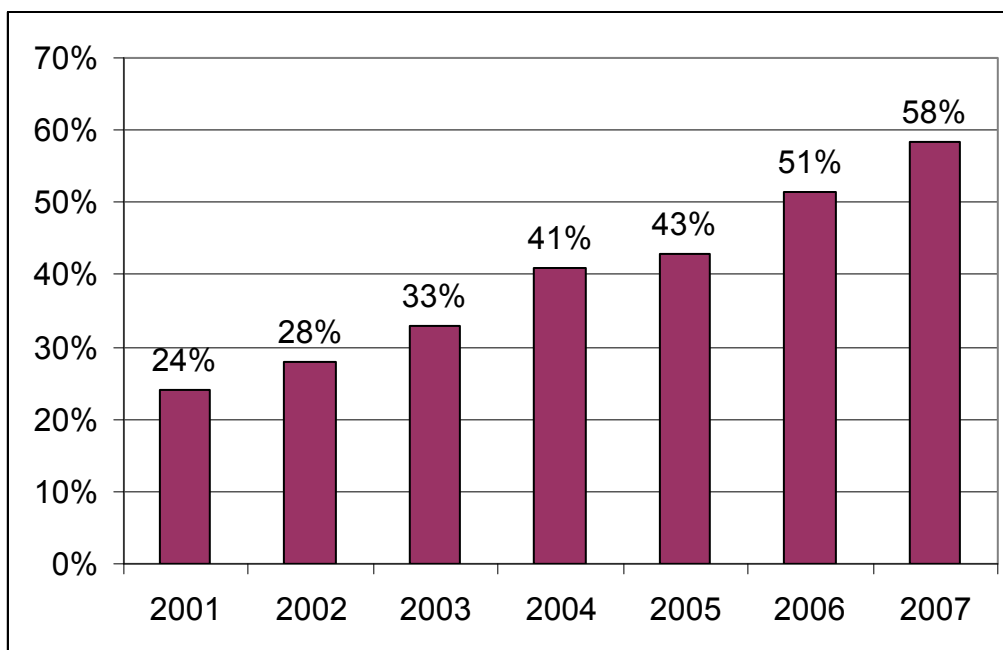


Source: Itron and KEMA, 2006.

\*Difference from prior year is statistically significant at the 90 percent level of confidence

Figure 5 shows unaided awareness of ENERGY STAR for the nation as a whole, based on the 2007 National ENERGY STAR survey. These data indicate 2006 awareness of ENERGY STAR is higher in California (64%) than it is nationally (51%).

**Figure 5. National Consumer Awareness of ENERGY STAR (Unaided)**



Source: U.S. EPA, 2008c.

Table 6 shows California consumer attitudes regarding energy efficiency and conservation over time. Attitudes have remained fairly constant and favorable, though in 2006 consumers were more likely to express a positive attitude about saving energy for environmental reasons.

**Table 6. California Consumers' Agreement with Statements Regarding Energy Efficiency and Conservation**

*Mean rating (1 = strongly disagree; 10 = strongly agree)*

Statement	Survey Year			
	1998	2001	2003	2006
My life is too busy to worry about energy-related improvements in my home.	3.7	2.7	2.9	2.7
It is possible to save energy without sacrificing comfort by being energy-efficient.	7.7	7.9	8.3	8.2
It is worth it to me for my household to use less energy in order to help preserve the environment.	7.7	8.2	8.1	8.8
When considering purchasing appliances or other equipment, I typically consider both the price and the operating costs, not just the price.	*	*	*	8.8
N	1,170	721	1,001	500

Source: Itron and KEMA, 2006.

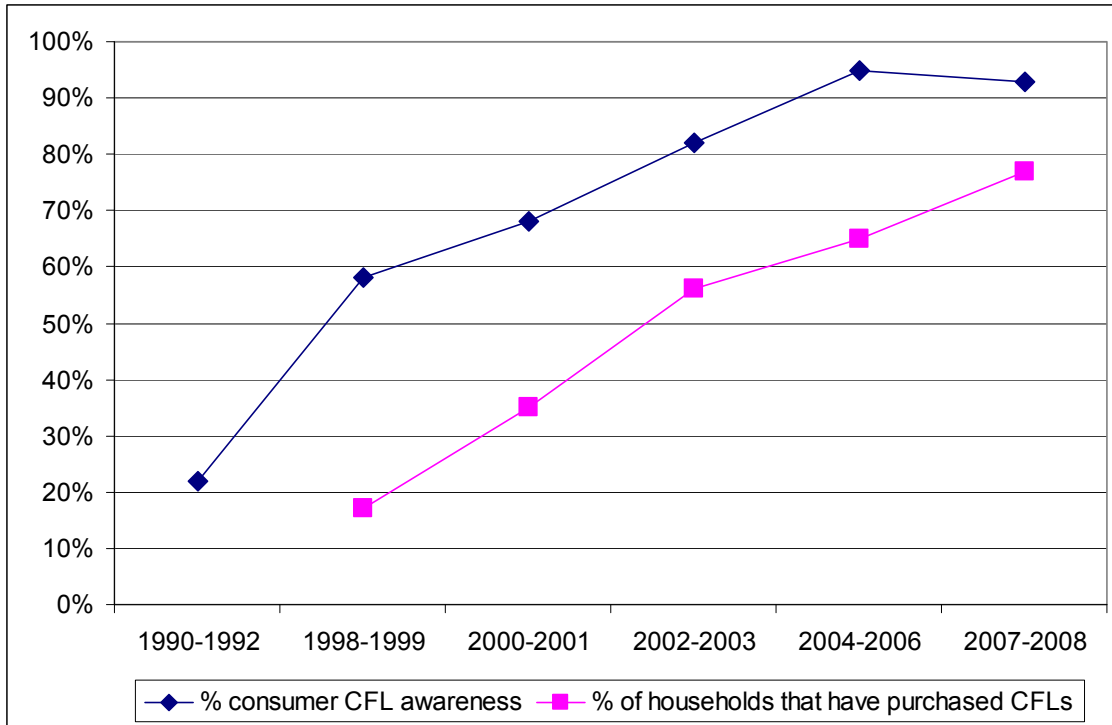
\* New question in 2006 survey.

***Consumer CFL Awareness and Purchase Rates***

Figure 6 below shows the change in the percentage of California IOU households aware of CFLs and have purchased them over time.

- **1990-1992:** During the California IOUs' initial CFL program phase, the CFL awareness rate was very low: 22% of 1992 SDG&E CFL program participants had prior experience with CFLs.
- **1998-1999:** Just prior to the launching of the California IOUs' residential lighting market transformation program in 1998, 58% of California IOU customers were aware of CFLs, and 17% had purchased a CFL within the past year and a half.
- **2000-2001:** In 2001, during the energy crisis and the final year of the California IOUs' residential market transformation programs, 68% of California IOU customers were aware of CFLs, and 35% had purchased one or more CFLs.
- **2002-2003:** After two years of sustained California IOU upstream incentives, the rate of awareness among California IOU customers increased to 82% in 2003, and the purchase rate increased to 56%.
- **2004-2006:** After another three years of even larger-scale California IOU upstream incentive programs, awareness reached 95% in 2006. During 2004 and 2005, 65% of Californians bought CFLs.
- **2007-2008:** By 2008 93% of Californians are reportedly aware of CFLs, and 77% have bought CFLs.

Figure 6. California Consumer Awareness and Purchase Rate



Sources:

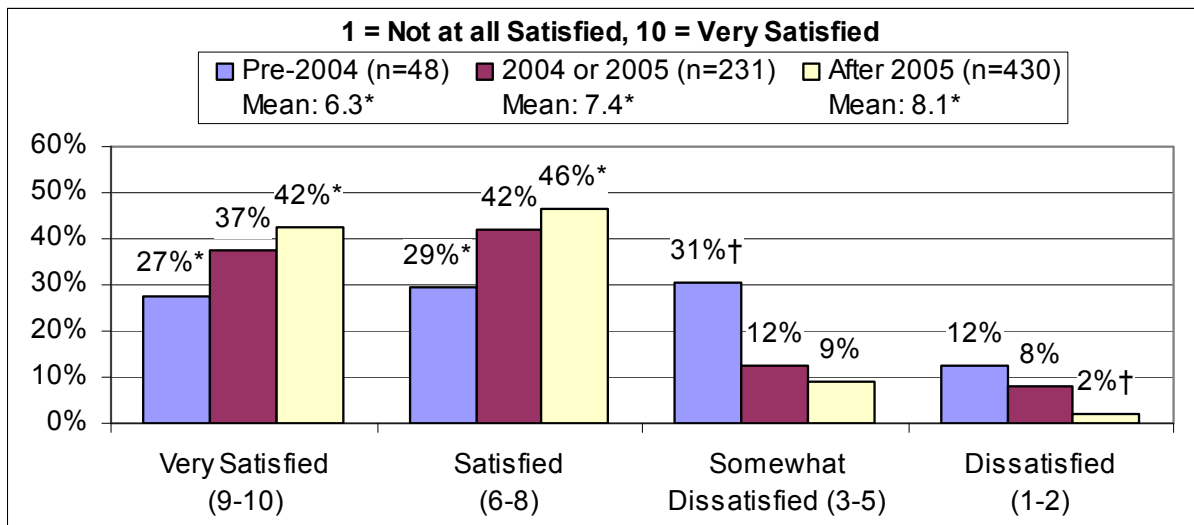
1990-1992: Boutwell, B. et al., 1993 (SDG&E data only);  
1998-1999 and 2000-2001: XENERGY Inc., 2002;  
2002-2003 and 2004-2005: Itron and KEMA, 2006;  
2007-2008: First Wave California CFL User Survey, 2008.

Notes: the 1990-1992 estimate is for SDG&E service territory only, and is of program participants; the 1998-1999 purchase rate estimate is only for purchases from mid-1997 through end of 1998; the 2004-2006 purchase rate estimate is only for purchases between 2004 and 2005.

### Consumer Satisfaction with CFLs

Consumer satisfaction with CFL performance has increased in California as bulb quality has improved, likely in response to updates to ENERGY STAR product specifications and continuous manufacturer improvements. Figure 7 shows consumer satisfaction is higher for CFLs purchased more recently in comparison to CFLs purchased prior to 2004.

**Figure 7. California Consumers' General Satisfaction with CFLs by Date of Most Recent CFL Purchase, 2006**



Source: Itron and KEMA, 2006.

\* Differences are statistically significant at the 90 percent level of confidence.

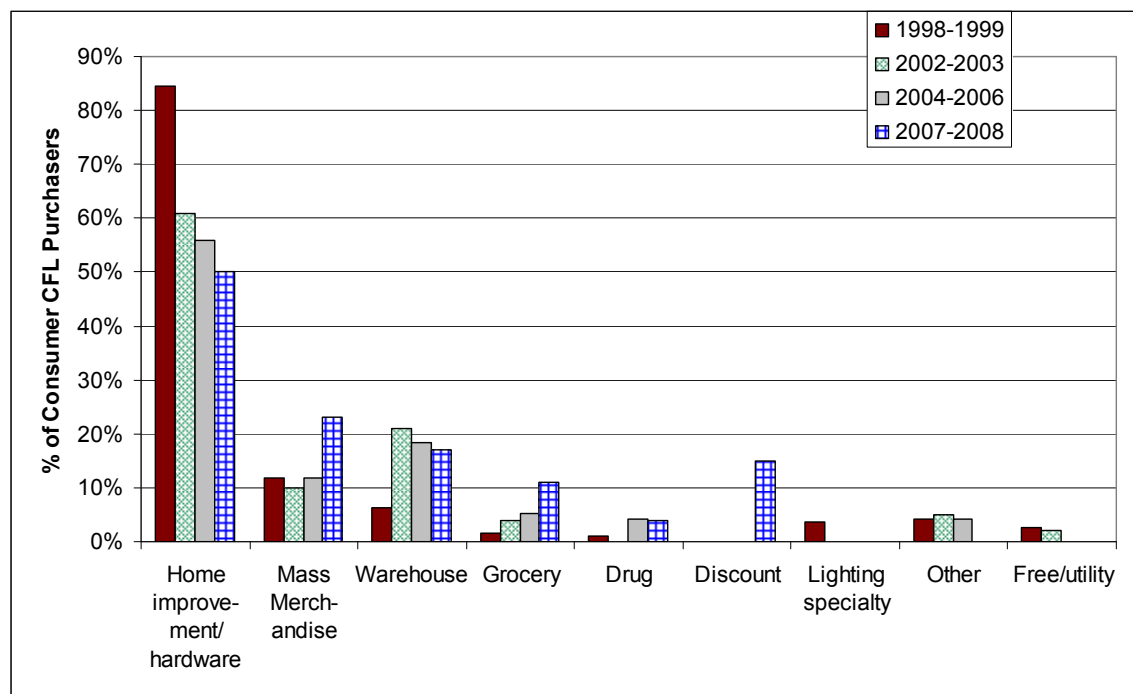
† Differences from other Purchaser Groups within satisfaction category are statistically significant at the 90 percent confidence level.

### ***CFL Purchases by Retail Channel***

Over the last decade, distribution of CFL sales by retail channel has changed. In the late 1990s, most purchasers bought their CFLs in home improvement or hardware stores, which tend to dedicate a substantial portion of shelf space to lighting in general. In recent years, drug, grocery, and discount stores have begun stocking and selling CFLs. Figure 8 below shows the distribution of retail channels where California households have bought CFLs over time, based on consumer telephone survey self-reports.



Figure 8. Where California CFL Purchasers Have Bought Their Most Recent CFLs



Sources:

1998-1999: Hagler Bailly Consulting, Inc., 1998;  
2002-2003: XENERGY Inc., 2003;  
2004-2006: Itron and KEMA, 2006;  
2007-2008: First Wave California CFL User Survey, 2008.

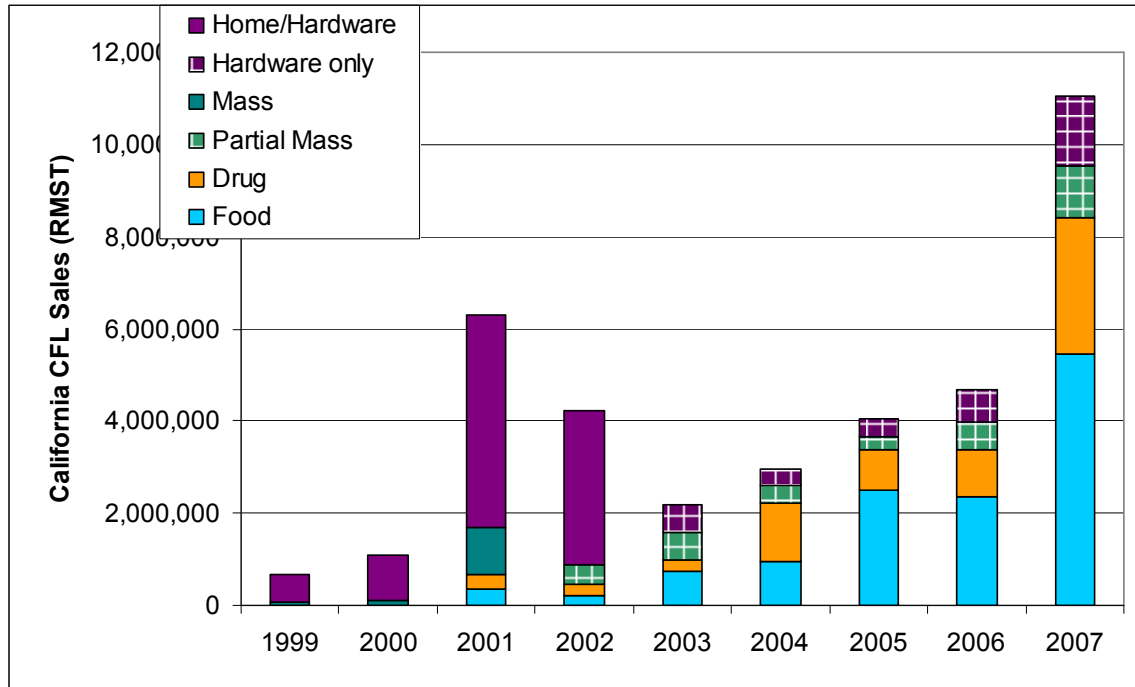
Notes: 1998-1999 – data are for CFLs purchased between January 1996 and June 1997 (1.5 years); 2002-2003 – data are for CFLs purchased between January 2002 and June 2003 (1.5 years); 2004-2006 – data are for the purchasers' most recent CFL purchase as of early 2007 (so no multiple mentions; whereas, the other data captured multiple mentions due to the possibility of more than one purchase occasion occurred in more than one retail channel); 2007-2008 – data are for CFLs purchased between March and June 2008.

Figure 9 below presents the distribution of CFL sales by retail channel based on the Residential Market Share Tracking Study<sup>54</sup> conducted by Itron on behalf of the CPUC and the California IOUs since 1999. The data represent a subset of lamp sales through large food, drug, and hardware stores and some mass merchandisers (and notably exclude warehouse or membership clubs such as Costco and Sam's Club – a channel through which the California IOUs have directed a substantial fraction of program incentive dollars from 2001 on – as well as discount stores such as 99 cent stores, which sold a nontrivial number of California IOU rebated CFLs over the last few years). In 2007, this data source represented less than one-quarter of total sales in California due to the huge volume of IOU program sales that occurred through the excluded channels. However, given the lack of other available, reliable data, these partial data are presented despite their limitations.

Although some notable channels were excluded from this study, the data given below nonetheless show the trend of increasing sales from food and drug stores.

<sup>54</sup> Itron, 2008a.

Figure 9. Subset of California CFL Sales by Retail Channel

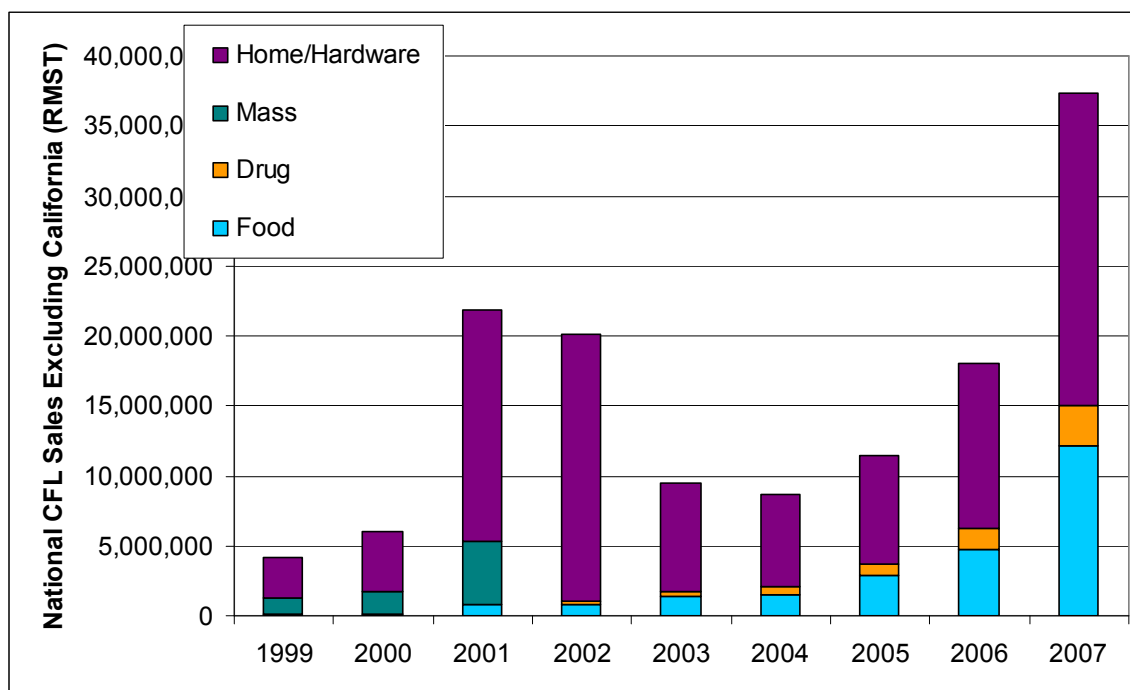


Source: Itron, 2008a.

Note: Some channels are excluded such as warehouse/membership clubs and discount stores during the entire study period, a large mass merchandiser from 2002 on and the home improvement store channel from 2003 on.

Figure 10 below shows national CFL sales by retail channel, excluding California. These data have many of the same caveats as the California data shown above, although the home improvement store data are more complete for the later years. Once again, given the lack of other available, reliable data, these partial data presented despite their limitations. Sales through drug store channels have been much higher in California than the rest of the nation in the last several years

**Figure 10. Subset of National (Non-CA) CFL Sales by Retail Channel**



Source: Itron, 2008a.

Note: Some channels are excluded, such as warehouse/membership clubs and discount stores during the entire study period, a large mass merchandiser from 2002 on, and the home improvement store channel from 2003 on.

### ***CFL Average Retail Price***

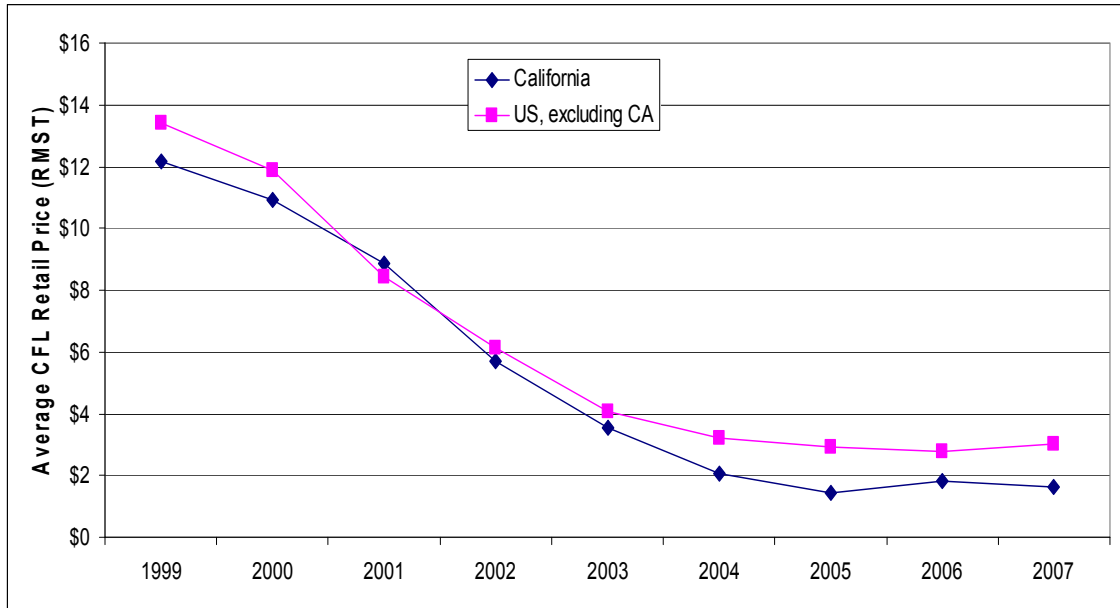
Over the last decade, the average CFL retail price has declined steadily, in both California and the rest of the nation.

Figure 11 presents historic pricing data based on POS data collected by the Residential Market Share Tracking Study.<sup>55</sup> Through 2001, the data include most mass merchandisers, and, through 2002, the data include the large home improvement store channel.

Even though the data shown in Figure 11 exclude some important channels where consumers buy CFLs, they are valuable in showing price trends for a subset of sales through other important retail sales channels. Note that the data incorporate price decreases resulting from California IOU program incentives and, likewise, the national data also reflect any program or other rebates.

<sup>55</sup> Itron, 2008a.

Figure 11. CFL Average Retail Price – California (Including Program Incentives) and the Rest of the Nation



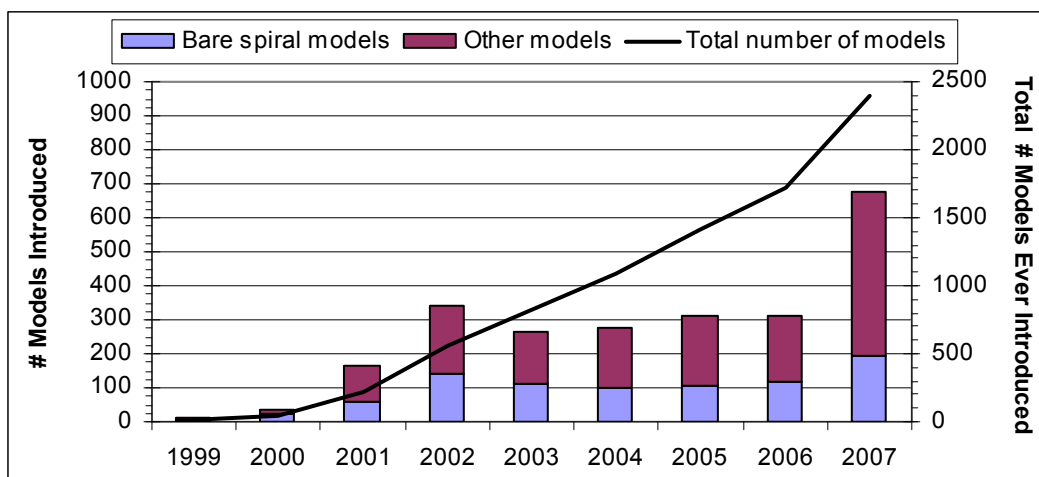
Source: Itron, 2008a.

Note: Some channels are excluded, such as warehouse/membership clubs and discount stores during the entire study period, a large mass merchandiser from 2002 on, and the home improvement store channel from 2003 on.

### Product Availability

The ENERGY STAR Website listed a total of 2,405 ENERGY STAR-qualified CFL models produced during 2007 by 117 manufacturers around the world. Figure 12 illustrates the number of ENERGY STAR-qualified CFL models on the U.S. market since 1999, by style.

Figure 12. Number of ENERGY STAR CFL Models by Style Category, 1999-2007



Source: U.S. EPA, 2008d.

Note: Models retired from company product lines are included in this figure, but not in any other figures or tables in this section of the report.

### *Bulb Styles*

Bare spiral and mini-spiral (also known as twister and mini-twister) CFL models are the most common styles of ENERGY STAR-qualified CFLs, representing nearly two-thirds of total models produced in 2007. Today, however, there are a wide variety of qualified CFL models on the market. Table 7 lists the styles of qualified CFL models available, in order from most to least commonly produced in 2007.

The number of bare mini-spiral CFL models produced in 2007 increased by 85% over the number produced in 2006, from 476 to 882 models. Bare mini-spiral CFLs accounted for 37% of total CFLs models produced in 2007 (up from 26% of total models produced in 2006), while the number of bare spiral models decreased by 8% within the same period (from 36% in 2006 to 28% in 2007). This may reflect the shift toward smaller-sized spiral CFLs.

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**Table 7. Number of ENERGY STAR CFL Models by Style, 2006 and 2007**

CFL Style	2006		2007		Change From 2006 to 2007	
	# Models Produced	% of Total Models Produced	# Models Produced	% of Total Models Produced	# Models Produced	% Change in # of Models
Bare- mini-spiral (mini-twister)	476	26%	882	37%	406	85%
Bare spiral (twister)	655	36%	671	28%	16	2%
Covered reflector	236	13%	336	14%	100	42%
Covered A-line	135	7%	165	7%	30	22%
Covered globe	114	6%	141	6%	27	24%
Other	212	11%	210	9%	-2	-1%
Total	1,828	100%	2,405	100%	577	4%

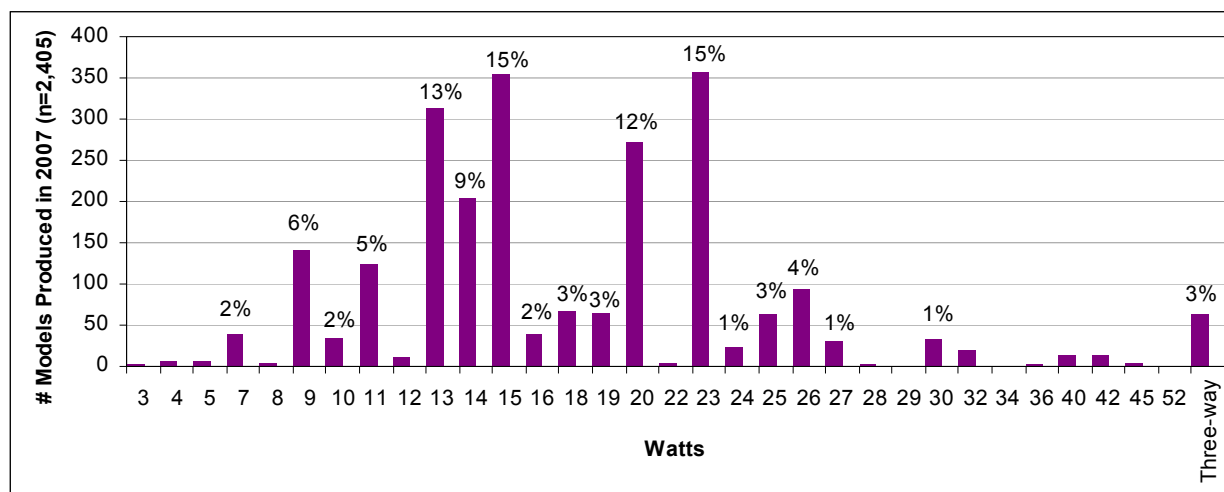
"Other" model types include bare triple-tube, covered bullet, bare quadruple-tube, covered candle, bare twin-tube, bare circuline, and covered post (each of which represents less than 5% of ENERGY STAR CFL models produced in 2007).

Source: U.S. EPA, 2008d

*Bulb Wattage*

ENERGY STAR CFL wattages range from 3 to 52 Watts. Figure 13 provides the numbers of separate CFL models currently manufactured, by CFL wattage category, as of the end of 2007. Seventy-one percent of the qualified models produced in 2007 were between 13 and 23 Watts, while 15 Watt and 23 Watt CFLs each represented 15% of the total models produced. Three-way CFLs represented 3% of the models produced in 2007.

**Figure 13. Number of ENERGY STAR CFL Models by Bulb Wattage, 2007**



Source: U.S. EPA, 2008d.

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*Bulb Manufacturers*

Table 8 shows the 10 manufacturers that produced the largest number of CFL models in 2007. Combined, these companies produced 43% of the total ENERGY STAR CFL models available. Less than 14% of the CFL models manufactured in 2007 were produced by the three largest, multiproduct lighting manufacturers (Osram Sylvania, GE, and Philips). Several of the top CFL producers are active only (or primarily) in the energy-efficient lighting market.

Osram Sylvania moved up from the number two spot in 2006 to the number one spot in 2007, swapping places with TCP and increasing the number of models produced by 3%. Globe Electric, Inc., is new to the top 10 list in 2007 (up from number 16 in 2006), forcing Philips Lighting Company from the number 10 spot in 2006 to the number 11 spot in 2007. Globe Electric is headquartered in Quebec, Montreal, and, according to the company’s Website, its Globe Electric Company (USA) focuses its sales efforts on “retail channels such as food and drug stores, hardware and home improvement stores, and mass market and specialty market retail outlets.”<sup>56</sup>

**Table 8. Top 10 ENERGY STAR CFL Manufacturers by Number of Models Produced, 2007**

Company	# Models Produced in 2007	% Models Produced in 2007
1. Osram Sylvania Inc.	201	8%
2. Technical Consumer Products, Inc.	140	6%
3. Globe Electric, Inc.	126	5%
4. Feit Electric	123	5%
5. GE Consumer & Industrial	79	3%
6. The Home Depot	79	3%
7. Xiamen Topstar Lighting Co., Ltd.	78	3%
8. Greenlite Lighting Corporation	73	3%
9. Fujian Joinluck Electronic Enterprise Co., Ltd.	67	3%
10. Westinghouse Lighting Corporation	57	2%
Total	1,023	43%

Source: U.S. EPA, 2008d.

**2.2.3 Ultimate Market Indicator Data**

CFL market-level sales estimates, the ultimate indicators of market change, are presented in this section. Ultimate market indicators are measurements of the market event that the program is designed to address, which in this case is CFL sales. Program sales and baseline sales estimates, which may be combined with CFL market-level sales to estimate historic program net effects, are also presented. The section includes a discussion of the many caveats associated with the sales data, baseline data, and net effects approach applied to California. The focus of this interim

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<sup>56</sup> <http://www.globe-electric.com>

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report is on the years 2004 to 2007; the final CFL market effects report may include market-level, baseline, and program sales information for earlier years if the CPUC deems research into this additional historical information warranted.

### ***Market Level Sales***

For many years, the Residential Market Share Tracking Study<sup>57</sup> (RMST) has been the main source of estimates of total CFL sales for California. This ongoing study, published annually since 1999, presents analyses of aggregated POS data representing four of the key major retail channels through which lamps are sold: food, drug, mass merchandiser, and hardware stores. While RMST is a reliable source for historic CFL market share and product data, its data for the past several years has significant gaps – for example, the data do not include sales from warehouse stores such as Costco, some major home improvement and mass merchandise national chain stores, and small independent stores. RMST data for these years, therefore, does not track overall CFL sales in California. As mentioned earlier, in 2007 these data represent less than one-quarter of total sales in the state of California. However, given the lack of other reliable data on CFL sales over time in California, these data are presented despite their limitations.

In 2007, however, EPA began collecting CFL sales data from national ENERGY STAR retailer partners.<sup>58</sup> These data (referred to hereafter as “Cadmus ENERGY STAR sales data”) complement the RMST POS data, as the ENERGY STAR retailers primarily represent some of the nation’s largest home improvement retailers, mass merchandisers, and membership clubs.<sup>59</sup> These data can be combined with the RMST data to fill in the majority of CFL distribution channels. The remaining distribution channels that are not covered by either of these two data sources, most notably discount stores (e.g., dollar stores) and small groceries, can then be assumed to have CFL sales that – at a minimum – are equal to program sales reported through these channels. Table 9 summarizes the combined data sources for each distribution channel.

The results of the analysis, presented in Table 10, demonstrate that a minimum of 55.6 million CFLs were sold in California in 2007 and that RMST covers approximately 20% of total estimates sales in the state. Statewide CFL sales may have exceeded 55.6 million if any non-program sales occurred in distribution channels not covered by either RMST or Cadmus ENERGY STAR sales data, such as in discount stores and small groceries. For the retail

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<sup>57</sup> Itron, 2008a.

<sup>58</sup> CFL sales data from national ENERGY STAR retail partners are collected by The Cadmus Group on behalf of EPA. While these data are provided by retailers at the store or state level, all data used in this evaluation have been aggregated nationally to the retail channel level, or at the state level across all retail channels, to protect the confidentiality of the retailers. As of this writing EPA’s total annual ENERGY STAR CFL sales data for 2007 were still preliminary. To develop total sales estimates for this analysis, Cadmus began with these preliminary data and interpolated and projected them for missing time periods for some retailers. To address a previously noted concern that some of the EPA CFL sales data may have represented sales of CFL packages rather than sales of individual CFL bulbs, Cadmus also carefully examined all of the reported sales data and, as appropriate, worked with individual retailers to ensure all CFL counts used in this analysis represented individual bulb sales. The ENERGY STAR CFL sales data used in this study, therefore, reflect Cadmus’ analysis and do not represent the EPA estimates.

<sup>59</sup> Note that RMST, however, includes all CFLs, while the Cadmus data record only ENERGY STAR CFLs, and the IOU ULP tracking data record only ENERGY STAR CFLs that are sold through the program. The magnitude of this difference, measured as the percent of CFL sales that are non-ENERGY STAR, will be examined as part of the shelf stocking study in the final report.



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channels for which data does exist, the largest channels include the membership clubs and mass merchandisers (35% of all CFL sales), followed by large home improvement stores (21%).

**Table 9. Sources of CA CFL Sales Data by Distribution Channel<sup>60</sup>**

Distribution Channel	RMST	Cadmus	CA IOU ULP
Discount			√
Drug	√		
Large Grocery	√		
Small Grocery			√
Large Home Improvement	√	√	
Mass Merchandise	√	√	
Membership Clubs		√	
Hardware	√		
Other			√

Sources:

RMST: Residential Market Share Tracking Study (Itron, 2008b)

Cadmus: ENERGY STAR Partner Retailer Sales data

CA IOU ULP: Upstream Lighting Tracking Database

**Table 10. Market-Level CFL Sales Estimates for California by Distribution Channel (2007)**

Distribution Channel	Source	CA Sales (2007)	% of CA Sales (2007)
Discount	CA IOU ULP	6,824,855	12%
Drug	RMST	2,939,209	5%
Large Grocery	RMST	5,459,724	10%
Small Grocery	CA IOU ULP	7,897,902	14%
Large Home Improvement	Cadmus and ULP	11,717,792	21%
Membership Clubs/Mass Merchandise	Cadmus, RMST, and ULP	19,291,208	35%
Hardware	RMST	1,495,103	3%
Other	CA IOU ULP	6,990	<1%
Total		55,632,784	100%

Sources:

RMST: Residential Market Share Tracking Study (Itron, 2008b)

Cadmus: ENERGY STAR Partner Retailer Sales data

CA IOU ULP: Upstream Lighting Tracking Database

Cadmus and RMST: Combined to account for unique retailers

Because the Cadmus data are available only for 2007, however, this analysis could not be replicated for previous years. Instead, for 2005 and 2006, the Team extrapolated historic California CFL sales by using growth trends from other data sources. At the low end we used national CFL market-level sales trends derived from the U.S. Department of Commerce. At the

<sup>60</sup> Note the CA IOU ULP data include sales by all channel, but the RMST and Cadmus data, where available, are assumed to represent the total sales for the respective distribution channels. Thus checkmarks are included for the CA IOU ULP data only where no other data sources exist.

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high end we used growth rates derived from the state of Wisconsin’s historic CFL sales.<sup>61</sup> The Wisconsin sales data was selected for use in this analysis due to the high quality of the data and the presence of long-running CFL promotional programs in the state. As shown in Table 11, both the low and high estimates show a dramatic increase in per capita CFL sales from 2005 to 2007.

**Table 11. Market-Level CFL Sales Estimates for California (2005-2007)**

Estimates	Extrapolated Data		RMST, Cadmus, and ULP Data
	2005	2006	2007
California Market-Level CFL Sales (low / high estimate)	14,293,562/ 24,026,487	25,924,597/ 31,333,228	55,632,784
Number of California Households	12,994,359	13,174,862	13,308,346
California CFL Sales Per Household (low/high)	1.10 / 1.85	1.97 / 2.38	4.18

**Program Sales**

Estimates of program sales are based on utility tracking databases and are typically summarized and presented in periodic program evaluation reports. While estimates of program sales are much more straightforward than total market-level sales estimates, the Team may address a couple of issues in the study’s next phase. First, we may assess the accuracy and completeness of summary data provided in the program evaluation reports. Second, utility tracking databases show units that have been shipped in a given program year, but they do not provide the number of units actually sold during the given program year. While there are no definitive sources of program sales data by time period, our interviews with program managers and suppliers could help us develop estimates of actual sales (versus shipments to retailers) by program year.

Table 12 below shows estimates of California IOU Program shipments for 2004 through 2007.

**Table 12. California IOU Program CFL Shipment Estimates**

Estimates	Year			
	2004	2005	2006	2007
California IOU CFL Program Shipments	6,662,739	7,796,615	13,043,113	40,723,539
Number of California Households	12,812,960	12,994,359	13,174,862	13,308,346
California IOU CFL Program Shipments Per Household	0.52	0.60	0.99	3.06

Sources: 2004-2007 Program Shipments: Kema; Number of CA Housholds: U.S. Census Bureau.

<sup>61</sup> That is, using the 2007 California market-level sales estimate as a starting point, we extrapolated backward to 2006 and 2005 using the trends in market-level CFL sales growth from the U.S. Department of Commerce and Wisconsin data.

### ***Baseline Sales***

Baseline sales estimates are the sales level that theoretically would have occurred in a program's absence. The difference between total and baseline sales is often described as a program's net effects, or the extent of sales attributable to the program. Evaluators of upstream lighting programs across the nation have used various methods to estimate total and baseline sales to calculate program net effects, which may then be used to calculate a net-to-gross ratio by taking the ratio of program sales to total net effects. Net effects implicitly incorporate free-ridership, spillover, and cumulative market effects.

Previous impact evaluations of the California IOU upstream lighting programs have not used net effects methods to estimate program net impacts.<sup>62</sup> The 2004-2005 California IOU Single-Family Program (which included the Upstream Lighting Program) impact evaluation research plan stated the following reasons:

- “Data required to estimate CFL sales for California and for the U.S. are not currently reliable (i.e., since 2003, the Market Share Tracking study, which is the primary source of California and national CFL sales data, has excluded major home improvement retailers, and has always excluded warehouse stores, which account for a large fraction of program sales). Collecting these data directly from retailers requires a major effort and is not often comprehensive (due to resistance from retailers) and reliable (due to the need to rely on small samples for chains).
- Baseline sales estimates using this method are overstated for California in particular, because the large-scale interventions in lighting markets over time in the state have influenced the national market.
- This method implicitly captures the cumulative effects of the program, and it is probably impossible to use this method to isolate the effect of PY2004-2005 activities on the California and national lighting markets.”<sup>63</sup>

The research plan noted the net effects method has been used successfully for programs outside of California that are sufficiently small in scale to not impact the national market as well as for programs that were evaluated in a context that incorporated cumulative market effects.

For this study (and specifically for the CFL program and market evolution analysis), we are interested in cumulative effects; baseline sales and net effects data may therefore be useful. Likewise, the DEER study addressed at least some of the gaps in the California CFL sales data. However, baseline estimates implicitly include broader market effects so caution should be taken when applying baseline data and interpreting California IOU program net effects results.

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<sup>62</sup> Note that the method used to estimate a net-to-gross ratio for the 2004-2005 ULP, namely a participating supplier survey that elicited self-reported free-ridership ratios, was not free from validity concerns such as respondent bias and small sample size for some retail channels. It was, however, the one method that was not a priori excluded due to the evaluation context and budget.

<sup>63</sup> Itron and KEMA, 2006.

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Another important caveat is that California's CFL market is mature, with well over half of the population using CFLs, whereas the CFL markets in baseline areas (typically areas that have not yet had a CFL program) are just emerging. The majority of California residents have bought and installed CFLs. Many purchasers actually have several CFLs installed and even more in storage. Over the last two years or so, as national retailers such as Wal-Mart have begun to push CFLs across the nation, regardless of whether there are active CFL programs in the region or state, CFL sales even in non-program areas have taken off. This may be due to low CFL saturation leading to a rapid increase in purchases. Thus, non-program CFL sales per capita may not be a good approximation of what would have occurred in California had the programs ended, due to the possibility of a ramp-up effect in non-program areas.

Even given the caveats described above, the CFL Market Effects Team believes it is important to present publicly available estimates of baseline CFL sales from non-program areas and to compare these with estimates of California total market-level sales and California IOU program-level sales. We have reviewed many recent upstream lighting program net effect studies, and we present a summary of reputable and relevant sources in Table 13.

Note the table only lists caveats specific to each source; we believe, however, the overall caveats discussed above concerning cumulative spillover market effects to non-program areas and comparability issues between California's mature market and non-program areas' less-mature markets apply to the baseline/net effects method in general.

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**Table 13. Baseline CFL Sales Per Household Estimate Sources**

Source	Description	Method	Specific Caveats
DEER Low <sup>64</sup>	DEER CFL Net-to-gross report/2004-2005 Single-Family Rebate Program Evaluation	Assume that free-rider program sales equals baseline sales; source of free-ridership estimate is participating lighting supplier self-report, free-ridership telephone survey (sample size = 37 participating suppliers).	Very narrow interpretation (intended to be a lower bound); some believe the self-reported free-ridership estimate was based on too small a sample size and/or the supplier estimates are biased.
DEER High <sup>65</sup>	DEER CFL Net-to-gross report/2007 RMST	Assume CFL sales per household in states excluding California equals baseline sales.	Estimates of US sales excluding California are probably inaccurately low, as compared to more recent estimates of US sales excluding program areas (see NYSERDA and Massachusetts study estimates). However, the use of this baseline also includes sales from program areas, which biases the estimate upwards.
Wisconsin (Michigan) <sup>66</sup>	Wisconsin Focus on Energy CFL Market Effects Study	Retail sales from matched pairs of chains in Wisconsin and Michigan (a comparison non-program area), controlling for differences between participating and nonparticipating stores in both states.	The comparison state, Michigan, was chosen because of its comparability with Wisconsin. The analysis included adjustments to the Michigan data to be applicable for Wisconsin. The adjusted baseline data may not be an appropriate comparison for California.
BC Hydro (North and South Dakota) <sup>67</sup>	Direct and Market Effects of BC Hydro's 2006-07 Residential CFL	Based on consumer telephone survey self-reported CFL purchases during 2006 in North and South Dakota (sample size = 512 households).	Difficult for respondents to recall their CFL purchases over a specific period such as a calendar year, so levels of purchase might be inaccurate (note the method was used to compare purchases between program and non-program areas, which minimized the bias).
Massachusetts <sup>68</sup>	Massachusetts program CFL net effects assessment: results memo	Estimates of total sales in non-program areas of the US (expressed as a range with low and high estimates).	National CFL sales estimates, which underpin this method, vary widely depending on the source. Data on program sales estimates for some program areas are not readily available and were estimated. Resulting estimates are subjective.
NYSERDA <sup>69</sup>	NYSERDA program CFL net effects assessment: report appendix	Estimates of total sales in non-program areas of the U.S.	National CFL sales estimates, which underpin this method, vary widely depending on the source. Data on program sales estimates for some program areas are not readily available and were estimated. Resulting estimates are subjective.

Figure 14 presents baseline CFL sales per household based on sources described above. The top two lines show the high and low total market-level sales estimates for California (discussed above). Note that baseline sales for some regions/utilities are represented by a single point (in cases where only one year of data was available) whereas baseline sales for other regions/utilities are represented by a line connecting two or more points (in cases where two or more years of

<sup>64</sup> Itron, 2008b.

<sup>65</sup> Ibid.

<sup>66</sup> Glacier Consulting Group, LLC., 2008.

<sup>67</sup> Sampson Research, 2007.

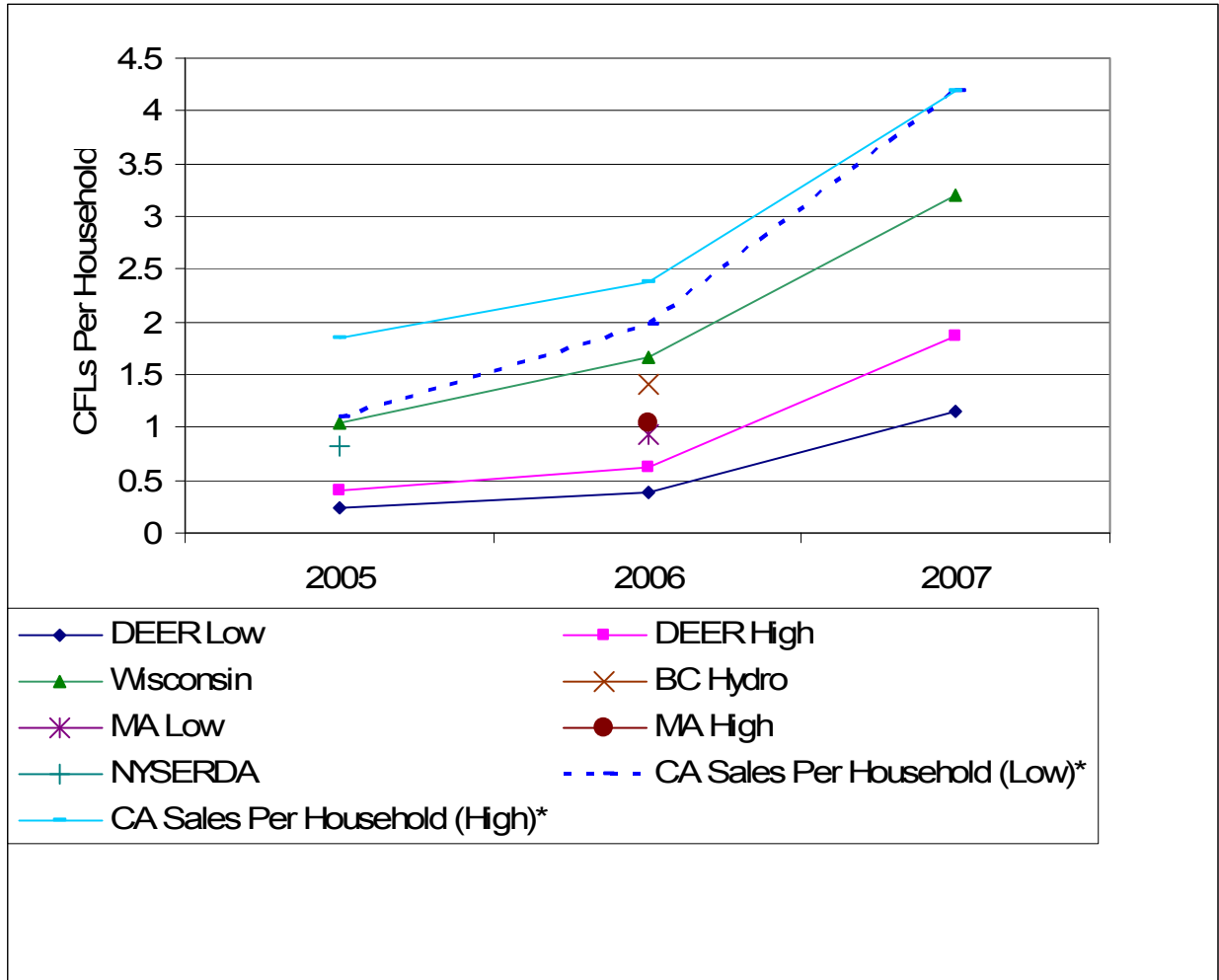
<sup>68</sup> Nexus Market Research, 2008.

<sup>69</sup> Summit Blue Consulting and Quantec, LLC., 2006

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data were available). Baseline sales estimates vary widely by source/method, though the data consistently trend upward over time.

**Figure 14. Baseline CFL Sales per Household Estimates**



The data from Figure 14 above is presented in Table 14. Total market-level sales per household are presented at the bottom of the table for comparison.

**Table 14. Estimates of Baseline CFL Sales per Household**

Baseline Source	Year		
	2005	2006	2007
DEER Low	0.23	0.38	1.16
DEER High	0.40	0.62	1.87
Wisconsin (Michigan)	1.04	1.66	3.21
BC Hydro (North and South Dakota)		1.40	
Massachusetts Low		0.94	
Massachusetts High		1.05	
NYSERDA	0.82		
Total California Market-Level Sales Per Household (Low/High)*	1.10 / 1.85	1.97 / 2.38	4.18

\* Values developed in Table 11 above.

### ***Historic Program Net Effects***

Figure 15 calculates the difference between the California total market-level sales per household and the baseline sales per household estimated in the other studies. The dashed line shows the average California IOU program sales per household.<sup>70</sup>

For 2005, the differences between California’s total market-level sales and the baselines from other regions range from 0.44 to 1.25, compared to program sales of 0.88 CFLs per household. For 2006, the differences range from 0.52 to 1.80, compared to program sales of 1.19 per household. And finally for 2007, the differences range from 0.97 to 3.02, compared to program sales of 1.12.

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<sup>70</sup> The average California baseline sales per household used in this table were calculated as the average of the low and high estimates shown in Table 14.

**Figure 15. Differences between (Average) California Market-Level Sales per Household and Other Studies' Baseline Sales Estimates**

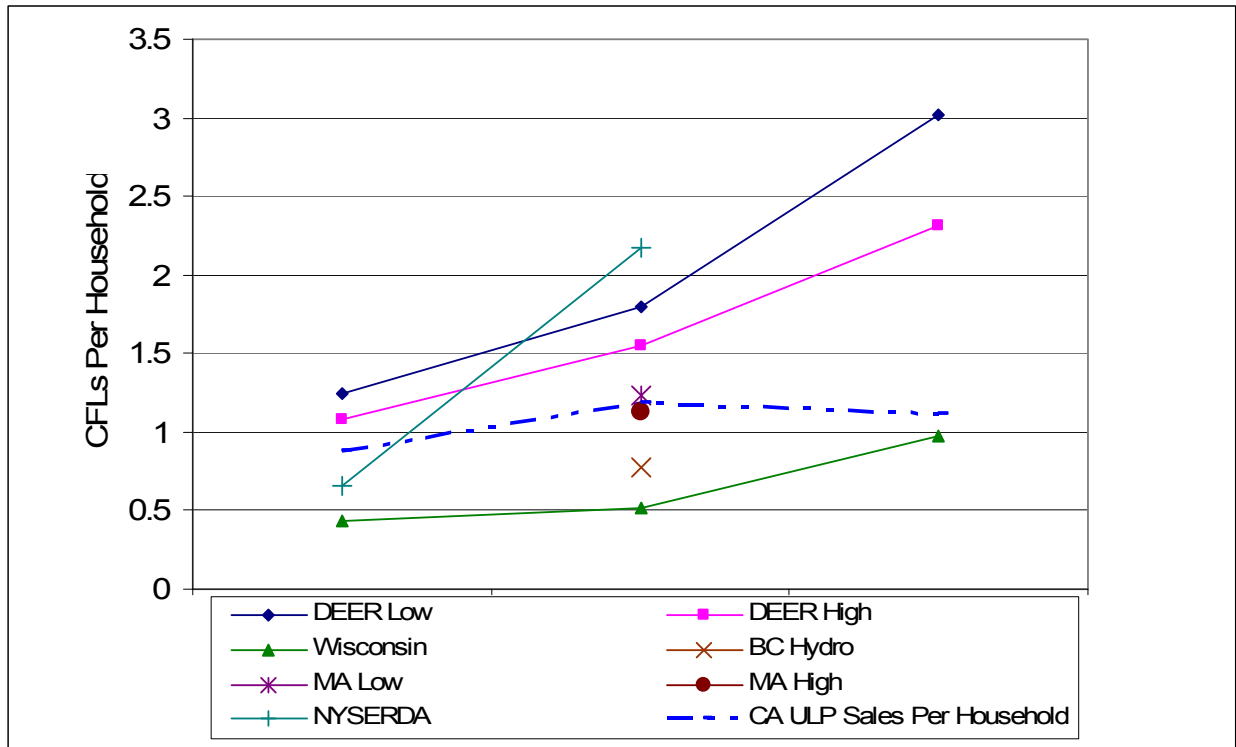


Table 15 below presents the data per household shown in Figure 15 above. The difference between the average California market-level sales and California IOU program sales per household are provided at the bottom of the table for comparison.

**Table 15. Differences between Average California Market-Level Sales per Household and Other Studies' Baseline Sales Estimates**

Baseline Source	Year		
	2005	2006	2007
DEER Low	1.25	1.80	3.02
DEER High	1.08	1.56	2.31
Wisconsin (Michigan)	0.44	0.52	0.97
BC Hydro (North and South Dakota)		0.78	
Massachusetts Low		1.24	
Massachusetts High		1.13	
NYSERDA	0.66		
Difference between Average California Market-Level Sales and California IOU Program Sales per Household	0.88	1.19	1.12



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Program net-to-gross ratios can be calculated as the ratio of net effects to total sales estimates, implicitly incorporating free-ridership, spillover, and cumulative market effects. Net effects per household for some regions/utilities are represented by a single point (in cases where only one year of data was available) whereas net effects per household for other regions/utilities are represented by a line connecting two or more points (in cases where two or more years of data were available).

Table 16 below presents total net effects estimates by year. These are computed by multiplying the per-household estimates from Table 15 above by the number of households in California (shown in Table 12). Total California net effects, calculated using the average California market-level sales estimate, are shown at the bottom for comparison.

**Table 16. Total Net Effects Estimates**

Baseline Source	Year		
	2005	2006	2007
DEER Low	16,177,977	23,648,877	40,191,205
DEER High	13,968,936	20,486,910	30,742,279
Wisconsin (Michigan)	5,652,546	6,785,054	12,909,096
BC Hydro (North and South Dakota)		10,210,518	
Massachusetts Low		16,270,955	
Massachusetts High		14,821,720	
NYSERDA	8,511,305		
California Net Effects (using average California market-level sales estimate)	11,370,064	15,612,211	14,905,348

Table 17 below presents the implied net-to-gross estimates based on the net effects data presented above (reflecting free-ridership, spillover, and cumulative market effects). As shown, depending on the source of baseline CFL sales estimates, program net-to-gross ratios range from 32% to 208%. The analysis shows steadily declining net-to-gross estimates throughout the negative net effects results from Figure 15 and Table 16 above. This analysis represents the finding from above, showing non-2006-08 three-year program period. Recall, however, the previously mentioned caveats about using non-program baseline comparisons to determine net impacts for the ULP. If the program caused broad, cumulative market effects in past years, those impacts would have been picked up even in non-program areas.

**Table 17. Historic Program Net-to-Gross Ratio Estimates<sup>71</sup>**

Baseline Source	Year		
	2005	2006	2007
DEER Low	208%	181%	99%
DEER High	179%	157%	75%
Wisconsin (Michigan)	73%	52%	32%
BC Hydro (North and South Dakota)		79%	
Massachusetts Low		125%	
Massachusetts High		114%	
NYSERDA	109%		

### **2.2.4 Lagging Market Indicator Data**

This section presents lagging indicators of market change, which are market events that follow changes in ultimate market indicators. As CFL sales and market share increase, eventually namely household penetration and saturation are also expected to increase.

#### ***Household CFL Penetration and Saturation***

Increases in household CFL penetration and saturation in California have followed CFL sales increases.<sup>72</sup> Figure 16 presents data on household CFL penetration (the percentage of households that have at least one CFL installed) and saturation (the percentage of all sockets that are filled with CFLs), with the 2000 and 2005 data based on the on-site surveys and the 2008 data based on self-reported telephone survey data validated by a small on-site sample.

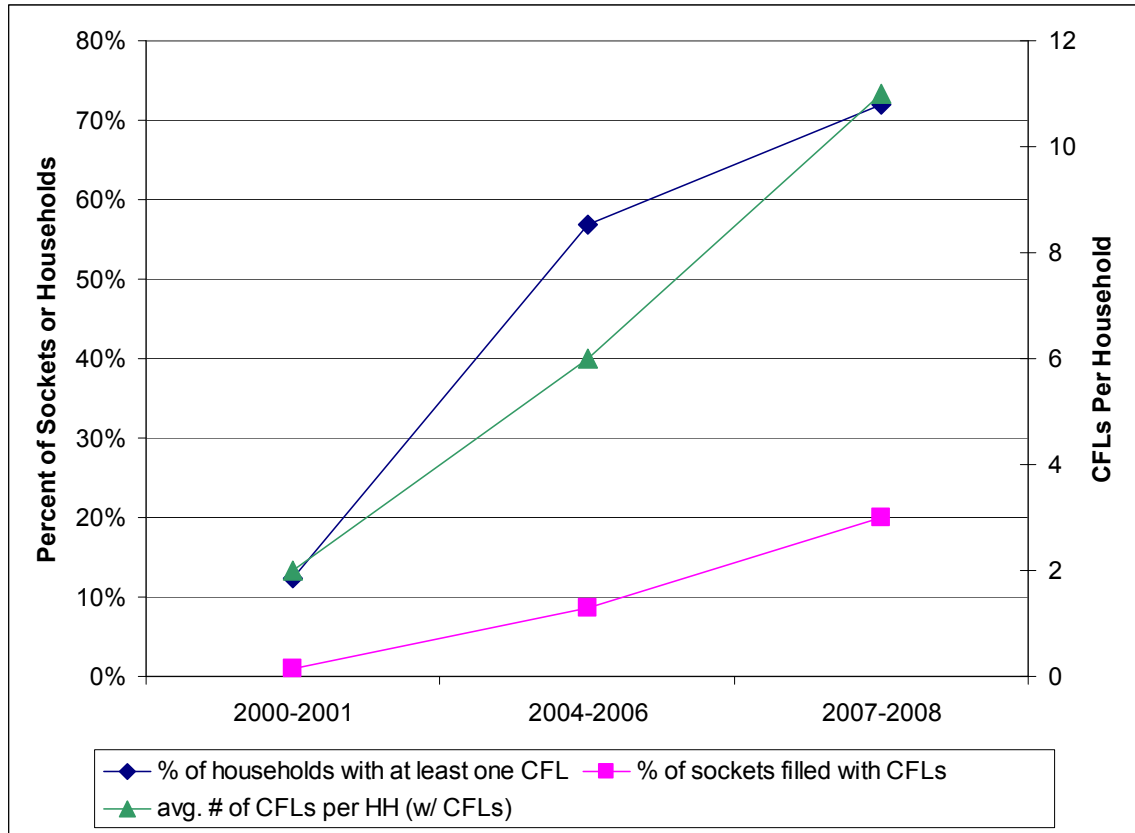
In 2000, only 12% of homes had one or more CFLs, with about 1% of residential sockets filled with CFLs. By 2005, the household CFL penetration and saturation rates were 57% and 9%, respectively. Currently (Fall 2008), penetration and saturation rates have reached 72% of households and 20% of sockets.

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<sup>71</sup> Note that the CFL Market Effects Team attempted to present data prior to 2003, but struggled with data availability and reliability (notably California market-level sales).

<sup>72</sup> For the purpose of this study, penetration is defined as the number of households with at least one CFL installed, and saturation is defined as the number of CFLs installed per household out of the total eligible lighting sockets.

**Figure 16. California Household CFL Penetration and Saturation**



Source: 2000-2001 and 2004-2005: RLW Analytics, 2005;  
 2007-2008: California CFL User Survey, 2008.

Note: the first two time-series data points are from on-site surveys, while the last series data points are from telephone self-reports, which were verified to be accurate by a small sample of nested, on-site surveys.

### 2.3 Qualitative Historic Market Effects Assessment

This section is based on an assessment of stakeholder interviews and prior California IOU market effects studies and program evaluations. We would like to integrate this section with the previous two sections to provide a comprehensive story of historic program market effects, as well as to integrate the historic story with the 2006-2008 story told by the main study. We plan to address these integration issues in the next report

### **2.3.1 Methods**

#### ***Interviews***

In October and November of 2008, senior members of the CFL Market Effects Team conducted 14 interviews with a total of 17 residential lighting program managers,<sup>73</sup> policymakers, and evaluation consultants, who were very familiar with historic California or other residential lighting programs across the nation. The breakdown of interviewees is as follows:

- California IOU program managers: 5
- California IOU evaluation managers: 3
- California policymakers: 2
- Evaluation consultants: 3 (1 California, 2 non-California)
- Other program managers: 4 (2 California, 2 non-California)

Note that the California evaluation consultant was interviewed to represent the viewpoint of California participating ULP retailers and manufacturers. The consultant was interviewing these participants for a related study, and reviewed relevant survey transcripts for the CFL market effects interview.

**Objective:** The interviews were intended to gather qualitative information about factors – including the historic California IOUs’ residential/upstream lighting programs – that have influenced California’s CFL market over time. Given the position of the vast majority of interview respondents, the qualitative information would be predominantly from the point of view of California ULP stakeholders. However, by interviewing many stakeholders representing different points in time and varying perspectives (e.g., program manager, evaluation manager, participating supplier), the CFL Market Effects Team hoped to yield information that was corroborated by multiple individuals, thus lending validity to the point of view. The Team also focused the interviews on “how” interviewees felt the program influenced the market, so the Team could assess the results in combination with our knowledge of the market and previous independent market studies and program evaluations.

**Time period:** While the relevant time period began in the late 1980s and continues to the present, the focus of the interviews was on the 1999 to 2005 time period, which covers the period when the CPUC focused on market transformation objectives, the California energy crisis, and the years following the crisis once the state reverted to a resource-acquisition focus. The majority of the respondents were most familiar with 2001 to the present. The Team has identified additional respondents who could provide more detail on the earlier years if this supplemental research is deemed appropriate by reviewers of this report.

**Geographic coverage:** The team focused mainly on California’s CFL market and factors inside the state that influenced it. However, we did touch upon the possible influence of programs and factors outside California. The Team has identified additional respondents who can address market evolution outside of California if further research is deemed appropriate. We have the

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<sup>73</sup> There are more interviewees than interviews because several of the interviews were conducted with multiple interviewees.

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option of following up with non-California respondents to further probe events and programs outside California.

**Interview approach:** Each California respondent was asked an open-ended question about what they felt were the major factors contributing to changes in the California CFL market over time. For each factor they listed, they were asked how and to what extent the factor contributed to market change. Respondents were then prompted with a list of factors (including the IOUs' programs, but also other events, such as the California energy crisis, and other regional and national programs, such as ENERGY STAR and PEARL), and were asked whether any factors they had not already discussed had contributed to market change and, if so, how and to what extent. Finally, California respondents were asked whether the IOU programs had caused any impacts outside the state and, if so, how and to what extent.

Each out-of-state respondent was asked whether they believed the California IOUs' programs had influenced their particular region, or if they were part of a national organization, the nation. If respondents answered "yes," they were asked how and to what extent California's programs had contributed to broader market change.

### *Literature Review*

The CFL Market Effects Team also reviewed prior California market effects studies and program evaluations from 1999 to the present.<sup>74</sup> In particular, we reviewed the baseline and market assessments of the 1999-2001 California Residential Lighting and Appliance Program, which included an assessment of the program's market effects.

We also identified and preliminarily reviewed additional studies, such as the U.S. Department of Energy study on the lessons learned from CFL programs, the Itron DEER 2004-2005 CFL net-to-gross assessment, a report on the manufacturing of CFLs in China<sup>75</sup> and other regional/state upstream CFL program evaluations. Although these studies were not included in this assessment, they may be incorporated into the final report if deemed appropriate.

The remainder of this section presents the results of both the interviews and the literature review. For most topics there were several individuals who could speak knowledgeably about the subject matter, typically from different perspectives. The CFL Market Effects Team combined the overlapping responses for each survey topic and developed a narrative over time. The Team found that a story emerged from this process, with broad consensus across interviewees on the major findings. This story was consistent with the earlier market studies and program evaluations that documented the historic program market effects.

As stated above, this story is primarily from the perspective of individuals who were major participants – either designing, evaluating or participating in–the program over time. These findings therefore represent one theory as to how the programs influenced the market over time.

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<sup>74</sup> Xenergy, 1999, Kema, 2002, Itron and KEMA 2006

<sup>75</sup> Global Sources, 2007.

### **2.3.2 Laying the Market Foundation**

According to evaluations of the 2001 through 2005 programs and to interview responses from California program suppliers, program managers and evaluators, the first California IOU residential lighting programs, introduced in the late 1980s, were intended to address product applicability and quality. At that time, CFLs were large and bulky, and the few small products suitable for residential applications had very poor performance. CFL product quality was generally poor in terms of color, early burn-out, and flickering. CFLs were available in limited retail outlets for \$15 or more each, with 3-way and dimmable CFLs at \$20 - \$30. CFLs were not prominently displayed or promoted.

There were essentially two tiers of lighting manufacturers producing CFLs: the “Big 3” (GE, Phillips, and Sylvania), where incandescent bulbs made up 99% or more of their production; and the second tier who only produced CFLs, such as TCP, Green Lite, Max Lite, and Feit. Many of the second tier manufacturers did not have their own brand, and produced private label bulbs and/or supplied direct to consumers and businesses via utility direct install programs.

Retailers sold very few CFLs due to high retail prices and low residential applicability. Products sat on shelves with little inventory turnover, and product improvements were not incorporated quickly.

Based on program evaluations, early California IOU program strategies from the late 1980s through mid- to late-1990s included:

- Large-scale direct install programs in multifamily common areas and small commercial buildings;
- Targeted customer outreach and giveaways to low-income customers;
- Engagement of manufacturers to produce better quality and smaller bulbs;
- Downstream customer incentives; and
- Customer education.

The programs were not overly ambitious in their downstream strategies due to very poor CFL availability.

According to California policymakers, prior program evaluations and California program managers and evaluators, during the late 1990s, in response to the CPUC market transformation directive, the utilities launched a coordinated and focused statewide program intended to address the barriers to adoption. The programs provided cooperative merchandising, salesperson training, and continued engaging manufacturers to address quality concerns. The programs offered limited upstream incentives and focused primarily on educating and supporting retailers.

The statewide coordinated approach allowed the utilities to generate greater interest and command more influence over suppliers, particularly among national chain retailers. The California IOUs also participated in other regional and national product quality initiatives, which

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created additional leverage on national suppliers. They promoted the sub-CFL,<sup>76</sup> spearheaded by the Pacific Northwest Lab and coordinated with the national ENERGY STAR product labeling program and the Consortium for Energy Efficiency.

According to national ENERGY STAR program managers, the national ENERGY STAR program developed specifications for minimum performance and quality standards for CFLs which simplified the process of identifying program-qualifying products. Additionally, the label provided a seal of approval for consumers, increasing their confidence in the product.

California program managers who had experience with the prior programs, as well as evaluators and policymakers, agreed that these early programs made progress in the following areas:

- Improving CFL product quality and applicability (particularly size fit to sockets/fixtures);
- Introducing CFLs to retailers and providing resources to assist them with successfully promoting and selling CFLs;
- Educating customers about CFLs, particularly their improved performance and wider applicability; and
- Laying the market foundation that allowed retailers and manufacturers to open up sales channels to scale-up CFL sales quickly in response to the huge demand increase in 2001.

### **2.3.3 Introduction of the Large-Scale Upstream Rebate Program in Response to the California Energy Crisis**

This section was developed by combining the information from the 2001 California lighting program evaluation with responses from the interviews with California program suppliers, managers and evaluators. The evaluation and interview responses were consistent. This was not surprising since (1) lighting suppliers, program manager and policymakers provided some of the information that was used to develop prior evaluation findings; (2) evaluators who were interviewed for this project were the authors of the prior evaluations; and (3) prior evaluation findings were presented to stakeholders, who incorporated findings into their future program designs, and who were likely to use the findings as the basis for how they view the program's influence on the market in the past.

During 2000-2001, as the state was experiencing rolling blackouts, and residents and businesses were facing higher electricity rates, the CPUC increased funding for energy-efficiency programs and directed the IOUs to offer large-scale resource acquisition programs to ease the impact of the state's supply constraints. The California IOUs shifted gears and launched a high-volume CFL rebate program to address one of the persistent remaining market barriers: high retail prices. According to program managers, they offered more than 7 million retailers instant discounts and manufacturer buy-down incentives, reducing the price of CFLs from \$7 or \$8 to \$3 or less.

Meanwhile, the state was inundated with media messages about the impacts of the energy crisis. The state's FYP campaign featured high-profile television, radio, and print advertisements

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<sup>76</sup> "In 1998 DOE launched a program designed to speed the market introduction in the United States of a new generation of smaller, brighter, and less expensive compact fluorescent lamps. The program, called the DOE Sub-CFL Program, emphasized the small size of the lamps, intending to overcome one of the primary market barriers to wider market acceptance of this technology." Ledbetter 2000.

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encouraging residents and business to conserve energy and, later, to adopt energy-efficiency measures such as CFLs and programmable thermostats. The mass media also began running stories on how to save energy, often prominently featuring CFLs.

Most California stakeholders and two non-California respondents supported the following theory of how the California CFL market progressed rapidly shortly following the energy crisis. California program managers and the second tier lighting manufacturers were able to provide the most specific information on a cycle of events that they believed occurred, creating a feedback loop that significantly accelerated CFL market progress:

- The high volume of rebates attracted the second tier manufacturers, who had been eager to break into the retail market, which had been dominated by the Big 3 manufacturers, and they engaged a broader pool of retailers in establishing their brands.
- The program successfully engaged Costco, which adopted the POS incentive and applied the discount to their pricing structure, offering CFLs at \$3 or less.
- Other national retailers began prominently displaying and promoting CFLs as they responded to the increase in consumer demand and competition with other retailers.
- Manufacturers – particularly those in the second tier – ramped up production and manufactured improved CFLs that complied with the program’s standards (ENERGY STAR label).
- Conditions in China’s manufacturing sector were ripe to respond to the increasing need for CFL production nationally and globally.
- The Big 3 manufacturers responded to competition from the second tier and began producing more, better quality CFLs, and offering them at lower prices to retailers. At least one large manufacturer moved its production facilities to China, which contributed to the company’s reduced manufacturing costs.
- Manufacturers flushed through their old CFL inventory, and incorporated new design changes on a much faster scale.
- Retail prices dropped in response to the direct effects of the program rebates and indirectly in response to the increase in production and supplier competition.
- Consumers had better experiences with the higher-quality CFLs, lower prices, and better applicability, fueling further increases in consumer demand.<sup>77</sup>

Evaluation results from the 2001 program showed CFLs had greatly improved from the early 1990s to 2001, such that consumers buying CFLs during the energy crisis could find and be generally satisfied with CFLs for many household applications. However, nagging quality issues continued to threaten to dampen the recent market progress. The National Resource Defense Council spearheaded the development of a third-party testing program (PEARL), which was

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<sup>77</sup> Both the program managers and the lighting manufacturers and retailers pointed to a number of ways in which California’s ULP helped to encourage higher-quality and more consumer-acceptable CFLs. These included requiring that program-eligible CFLs meet ENERGY STAR specifications (starting in the late 1990s), and introducing higher rebate levels for CFLs with higher lumen levels at a given wattage (in 2004). Also, even before the development of ENERGY STAR CFL specifications the ULP required that CFLs meet United Laboratories (UL) certification.



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coordinated nationally through participation by the California IOUs and other residential lighting program administrators (see Section 2.1.3). PEARL sponsors selected a sample of CFLs to purchase off-the-shelf to test for performance. Products that failed were delisted from ENERGY STAR and not allowed under utility rebate programs. Some California and three of the four non-California respondents believed that PEARL's efforts created a continuous mechanism for identifying and addressing CFL product quality issues at a crucial time of rapid market evolution, when CFLs were starting to penetrate the mass market. . The respondents who did not mention PEARL or emphasize its impacts tended to be those who were fairly new to California CFL programs.

The California program managers posit that their programs also had a more direct impact on the quality and performance of CFLs being promoted and sold in the state through their program design. The programs generated competition among suppliers to offer smaller sizes, lower prices to consumers, and more variety of products to a more diverse retailer pool through review and selection of manufacturer proposals for program rebates. Later, they tied their rebate levels to lumens instead of wattage, encouraging manufacturers to promote their products based on lumen equivalents to address consumer confusion around wattage equivalents. Often, the superior products sold through the programs would subsequently become standard. The large volume of rebate dollars contributed to an acceleration of CFL product improvements, and allowed the program to influence the next generation of CFL products.

Policymakers and evaluators in California have recently heard from first-tier CFL manufacturers that the quality of CFLs offered by second tier manufacturers to non-traditional retail channels (particularly discount and independent grocery stores) is relatively poor compared to first-tier manufacturers' products. These claims have neither been validated nor invalidated. Similarly, program managers' contention that their program design had a significant impact on product quality has not been confirmed either. There is, however, broader consensus around the impact of PEARL (of which the California utility program managers were members).

#### 2.3.4 Expansion of the CFL Retail Market

This section is based on a combination of information from the 2002 and 2004-2005 California IOU ULP evaluations and interview results from California program managers. The information presented is also supported by examination of program tracking data by retail channel from 2002 to the present.

Around 2002, the CPUC introduced hard-to-reach targets for all IOU energy-efficiency programs. For the ULP, these targets translated to a percentage of rebate dollars reserved for drug, grocery, and rural retailers. These targets, combined with the second tier manufacturers reaching beyond the national chain retailers to break into the retail market, created another wave of market effects, with significant numbers of CFLs being sold in retail channels that had not traditionally sold them in large quantities. First, the program made headway with the national drug and grocery store chains. The Big 3 manufacturers had historically preferred to sell incandescent bulbs in high volumes through drug and grocery stores and had resisted early program efforts to seriously promote CFLs to these channels. The second tier manufacturers, however, pushed hard on grocery store buyers and eventually broke through, and the Big 3 manufacturers followed suit.

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This paved the way for the program to penetrate regional and local grocery and drug stores, and later discount and ethnic stores. Expansion of CFLs into non-traditional retailers allowed CFLs to reach a much broader segment of the population. Before this market change, CFLs were sold mostly through home improvement and hardware stores. Once CFLs were widely available in drug and grocery stores territory-wide, including outlying rural areas, the CFL purchase base expanded rapidly.

More recently, the programs have begun to move away from big box retailers and have sold the majority of rebated CFLs through non-traditional retail channels, including discount and ethnic stores. Some market observers inside and outside of California believe this shift in strategy reflects a natural evolution of the market, with big box channels being succeeding in selling CFLs without much program support. Some California program managers and evaluators believe the shift in strategy was in response to 2004-05 California ULP evaluation results (both the net impact evaluation and the DEER net-to-gross update): these interviewees thought the 2006-08 program was designed move away from retail channels with low net-to-gross ratios and to focus on channels with high net-to-gross ratios.

### 2.3.5 Cumulative Market Effects and Their Sustainability

#### *California's CFL Market Progress*

Most California program stakeholders agree CFL products have improved dramatically over the last decade; they are brighter, last longer, and are smaller and more affordable. This contention is supported by lighting shelf surveys conducted across the nation, as well as by the CFL Market Effects Team's experience with CFLs as consumers over the years.

California program tracking data and program manager responses indicate that a wide range of retailers prominently stock and promote CFLs (at least during the program period) across the state, even in rural areas. A large number of manufacturers are producing CFLs, and a huge number of products are available. This market assessment is also corroborated by 2006-2008 California ULP evaluation research.

California program stakeholders were in general agreement that the California IOU programs, through their strategic initiatives and due to their large incentive budgets, have been a significant driver on market progress that has occurred in California over the last two decades. All supported the theory that the California energy crisis was crucial in creating the spark in 2001 that ignited consumer demand and accelerated the pace of market progress many times over. The handful of stakeholders who were involved with the program prior to 2001 believe strongly that the California IOUs' work in laying the groundwork prior to 2001 made it possible for CFLs to become one of the most common solutions available for California residents to respond to the energy crisis. FYP and other media attention also helped raise awareness of CFLs and drive home the call to action during the crisis. The one area in which interviewees differed in their responses was the relative importance of FYP and other media attention that helped raise awareness of CFLs and drive home the call to action during the crisis.

The majority of current program managers were not managing the programs prior to 2001 (or even prior to 2004 in some cases). They were therefore not knowledgeable about the prior programs and unable to respond to questions regarding prior programs' impacts. Some out-of-

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California program managers believe that the energy crisis, combined with the huge volume of incentives, were the main cause of market change, though they acknowledged they were not well-versed in prior California program efforts. One of these respondents questioned whether the California IOUs needed to incentivize such a large volume of CFLs year after year. This respondent felt that the programs may have been able to achieve similar market gains with a fraction of the incentives.

Non-California program managers and most California program managers agree the national ENERGY STAR labeling program and PEARL's efforts, where lighting program administrators coordinated nationally on product quality and performance standards, were also pivotal to creating a sustained, coordinated national strategy that continuously addressed product quality issues with suppliers. While these efforts have not addressed all concerns around CFL quality, the Team hypothesizes that they at least ensured poor quality and performance did not derail the huge market acceleration that began in 2001.

### ***Market Effects beyond California***

According to non-California program managers and evaluators and CFL suppliers, the California IOU programs' impacts have been felt beyond the state's borders in two key areas. First, many programs in other regions have adopted the upstream model used in California, which has been found to be the most efficient and effective design. The California IOUs' have laid the groundwork with suppliers so other regions can launch a program quickly, and suppliers are ready to supply product and be able to meet program requirements.

All but one non-California program managers and evaluators felt that the programs were likely to have made impacts through the large volume of purchases that occurred in 2001, which may have contributed to the decrease in CFL retail prices and opened supplier channels for the nation.

### ***Climate Change, Wal-Mart, and Lighting Efficacy Regulation***

Most interview respondents felt the increased awareness of climate change has become a motivator for consumers nationwide to save energy in the last two years. (One program manager was more skeptical about how influential the issue of climate change has been on California consumers' recent energy efficiency behaviors. This belief, however, was based mostly on personal opinion and anecdotes.) Some California program managers reported the California IOU programs and retailers have used climate concerns in their advertising, giving consumers more motivation to buy CFLs. One respondent went on to say that many people have successfully made the connection between climate change and household energy use, and they understand using CFLs over incandescent bulbs is an easy way to address the problem.

The same set of California stakeholders who felt strongly that early programs had laid the market foundation prior to the energy crisis said, however, that without the significant market progress that occurred over the last decade or more, CFLs would not be such an attractive solution for consumers. Likewise, these respondents feel that Wal-Mart was able to adopt an aggressive CFL initiative in 2006 in part because of major market progress made in California and the rest of the nation over the last decade. Wal-Mart was able to jump right in and have ready supply, good technology, and low price points.

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CFL suppliers and program managers report that other national retailers have followed suit and are selling CFLs across the nation, even in areas with no active residential or upstream lighting programs. One program manager said because Wal-Mart and other national retailers are expert merchandisers, they can offer CFLs for \$2.50 each without a program incentive, yet can sell large volumes due to prominent product placement and effective promotions. (Other non-California respondents offered more general descriptions of how Wal-Mart is able to successfully sell CFLs without program rebates.)

Legislation to mandate lighting efficacy levels is also believed by these same respondents to have been made possible in the last year or two due to what they perceive as these program-induced market effects.

Two of the non-California interviewees corroborated the theory that recent market progress in program and non-program areas as a result of climate change and Wal-Mart was possible due to prior CFL program-induced market progress. These respondents were considering the combined, synergistic market progress across program areas over the last decade. One of the respondents also said lighting efficacy regulation and Wal-Mart's recent CFL promotions are a sign the market for general purpose lighting is transformed.

#### ***Sustainability of Program-Induced Market Effects***

About half of interviewees believe if California upstream lighting programs ended today some, but not all, of the program-induced market progress would be sustained. (The other half did not have an opinion or were not asked related questions.)

The theory offered by one respondent, and agreed upon by most other respondents who offered opinions on sustainability of the programs' market impacts, is that the first wave of market progress – that is, the ready availability of a wide variety of good-quality CFLs, prominently displayed, and sold for reasonable prices (e.g., \$4 to \$5) by home improvement, big box, and hardware stores – would likely be sustained. Consumers who buy their lighting products at these outlets and who have become committed to using CFLs are likely to keep buying CFLs. This theory reflects what has occurred in the Pacific Northwest over the last few years as the regional incentive programs have largely excluded traditional channels, with sales levels in those channels staying relatively stable from the period with incentives to current period without incentives.

A few interviewees (a combination of California and non-California respondents) hypothesized the second wave of market progress has been mostly unique to California – that is, the non-traditional retailers selling huge numbers of CFLs to the broad population practically year-round – and is not likely to be sustained in the absence of an upstream program. The rationale behind this argument is non-traditional retailers are unlikely to remain committed to stocking and promoting CFLs at current wholesale prices without program incentives. Further, many consumers that have become used to buying CFLs in drug, grocery, ethnic, and/or discount stores at \$1 are also unlikely to seek out CFLs at big box or hardware stores and buy them at \$4 or \$5. One non-California respondent questioned whether these non-traditional channels could ever be transformed given they have not historically sold many lighting products in general.



### 3. PRELIMINARY REGRESSION MODEL RESULTS

#### 3.1 Background

One approach for estimating baseline sales and program influence is to use a regression model, which has been utilized successfully to estimate the impacts from programs promoting energy-efficient appliances.<sup>78</sup> The concept is sales of energy-efficient products, including CFLs, can be predicted as a function of a comprehensive list of explanatory variables, including the level of program activity, socio-economic characteristics, energy prices, population distribution (urban/suburban/rural), and other variables.

The primary advantage of the regression-based approach is that it can control for the impacts of multiple variables simultaneously and help identify the impacts of CFL programs and other demographic and economic variables on CFL purchases. In addition, the regression model approach can explore alternative scenarios, identifying the impact of programs based on different incentive structures, years in effect (i.e., newer vs. mature programs), and other potential program features. This can improve our understanding of the forces affecting household purchases and help identify variables that could potentially confound the estimation of market effects in the state comparison analysis.

The primary limitation of the regression-based approach, however, is that it requires estimates of CFL sales for as many states as possible. The cost of collecting primary data on CFL sales for all states is prohibitive, and the POS data offer limited coverage (at a high cost) for all states.<sup>79</sup> The model developed for this study, therefore, relied solely on the Cadmus ENERGY STAR Partner retailer sales data.<sup>80</sup> As discussed below, although these data represent nearly three-quarters of all national CFL sales in 2007, they exclude specific distribution channels, such as groceries and small hardware stores that are often targeted by mature CFL programs. Due to this data limitation, the CFL Market Effects Team presents the results of the regression-based approach solely as a supplement to the primary, comparison state-based approach.

While the coefficient for programs cannot, therefore, be interpreted as a simple measure of program impacts, the coefficient may yield some suggestive evidence about the impacts of programs on the general demand for CFLs.

##### 3.1.1 Development of the Model

Cadmus collected data on ENERGY STAR CFL sales, CFL programs, and economic and demographic characteristics for the United States in 2007, and estimated simple regression models to better understand household demand for CFLs. This section describes the regression framework, the limitations of the analysis, and preliminary results.

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<sup>78</sup> Rosenberg, M. (2003); Wilson-Wright, L.J. (2004).

<sup>79</sup> POS data would, however, include both ENERGY STAR and non-ENERGY STAR CFLs. Since utility and government-sponsored CFL programs promote (and therefore track) only ENERGY STAR CFLs, POS data is the only known source for non-ENERGY STAR CFL sales data.

<sup>80</sup> The Team's approach to adjusting and updating preliminary 2007 EPA CFL sales data so that it can be reasonably used in this evaluation's analysis is described in the previous section.

### 3.1.2 The Demand for CFLs

The first step in the development of the regression model was to conceptualize household demand for CFLs. Demand for CFLs is derived from household demand for lighting. Household demand for lighting is a function of the retail price of light bulbs and fixtures, the retail price of electricity, the size of the dwelling, income, and possibly the annual amount and seasonal variation in daylight. Economic theory would predict household demand for lighting (standard or efficient) should be negatively related to the prices of light bulbs and the retail price of electricity, while demand would be positively related to the size of the dwelling and income.

CFLs are an energy-efficient type of light bulb that can be used to satisfy the household's demand for lighting. As described above, the demand for CFLs is therefore expected to be a function of factors such as: overall household demand for lighting, the retail price of CFLs, the retail price of incandescents (the main alternative to CFLs), income, and awareness of energy efficiency (e.g., ENERGY STAR awareness).

A reduced form model of household demand for CFLs would thus account for the influences of the following factors:

- Dwelling characteristics
- Price of electricity
- Prices and availability of CFLs and incandescent bulbs
- Household income
- Awareness of energy efficiency

Economic theory would predict the demand for CFLs is positively related (i.e., as one goes up, the other goes up) to certain dwelling characteristics, the retail price of incandescent bulbs, and awareness of energy efficiency. Demand for CFLs should also be a function of the price of electricity, but the relationship between the price of electricity and CFLs is theoretically ambiguous. An increase in the price of electricity will dampen overall household demand for lighting, but may increase the demand for energy-efficient lighting. These effects may completely or partially cancel one another out.

### 3.1.3 Data Development: CFL Sales Data

Cadmus collects data on CFL sales by ENERGY STAR Partner Retailers. The data, first available for 2007 sales, cover the 50 U.S. states, and are organized by state. These data represent sales for roughly 290 million bulbs, approximately 72% of all U.S. CFL sales in 2007, and thus provide a valuable cross-sectional (across states) data set.<sup>81</sup> These data, however, have a number of limitations for this analysis, including:

- ***The sales data pertain only to ENERGY STAR partner retailers.*** ENERGY STAR CFL sales through non-partner retailers (e.g., grocery, small hardware, and discount stores) and all non-ENERGY STAR CFL sales are not accounted for in the sales data. This

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<sup>81</sup> Based on an estimated 397 million CFL sales nationally in 2007 (U.S. Department of Commerce 2007). EPA estimates that a total of 290 million ENERGY STAR qualified CFLs were sold in 2007 (EPA press release, January 15, 2008).

means the regression analysis explains only a portion of CFL sales in the U.S. In fact, these other distribution channels, which traditionally have lagged the national Partner do-it-yourself (DIY), mass merchandisers, and club stores in terms of CFL sales, are specifically targeted by a number of CFL programs (particularly mature CFL programs), such as the CA ULP. So the data, which are limited to the national retailer Partner stores, may more dramatically under-represent sales in states such as California and Massachusetts, while representing the majority of sales in states with active utility- or government-sponsored programs.

- ***The sales data are aggregated at the state level.*** Ideally the model would examine CFL purchases at the household or utility service territory level, but such data do not exist for enough program and non-program areas. A drawback of the state data is that any variations in CFL purchases between households within a state are not apparent. Differences in CFL purchases between urban and rural residents, poor and wealthy, and young and old are identified only on the basis of variation between states.
- ***The data pertain to a single year.*** Having only a single year of data is potentially a problem because CFL purchases in 2007 likely depended on the history of purchases in the state. For example, there may be “life-cycle” program or product effects, whereby purchases of CFLs first increase and then decrease. Life-cycle program or product effects can obscure true program impacts and are difficult to control for in cross-sectional regression analysis (i.e., an accurate measure of cumulative program impacts would require time-series and cross-sectional data).
- ***The analysis is not California-specific.*** The model analyzes the U.S. as a whole, rather than California on its own. Even if the other limitations described above were overcome, there may be phenomena unique to California that could limit the applicability of the model to the state.

#### **3.1.4 Data Development: Explanatory Variables of CFL Sales**

The CFL Market Effects Team has also collected data about factors that may affect household purchases of CFLs, including:

- Information about CFL programs in each state from public utility commission and utility Websites, the DSIRE database,<sup>82</sup> and the 2007 Consortium for Energy Efficiency Residential Lighting Program National Summary.<sup>83</sup>
- State-level information from the U.S. Census Bureau and the Energy Information Administration about possible economic and demographic drivers of CFL purchases, including electricity prices, incomes, education, dwelling characteristics, ages, and various measures of awareness of CFLs and energy efficiency.
- Information about the saturation of national Partner retailers (in terms of number of stores and square footage) from company Websites.

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<sup>82</sup> North Carolina Solar Center and the Interstate Renewable Energy Council.

<sup>83</sup> CEE 2007.



### 3.1.5 Regression Model

In describing the development of the regression model, it is important to emphasize the model is not a formal econometric model of household demand for CFLs: the model can reveal correlations but not causal relationships between household CFL purchases and state-level economic, demographic, awareness, and program variables.

Suppose ENERGY STAR CFL sales per household in state  $i$  ( $y_i$ ) are a linear function of state CFL programs ( $Z_i$ ), demographic and economic characteristics, and awareness of energy efficiency:

$$y_i = \alpha + Z_i\theta + X_i\beta + \varepsilon_i$$

where:

- $\alpha$ ,  $\theta$ , and  $\beta$  are coefficients to be estimated.
- $\varepsilon_i$  is a random error term reflecting unobservable factors affecting CFL sales.
- $Z_i$  is a binary variable equaling one if there were one or more CFL programs in the state in 2007 and zero otherwise.
- $X_i$  includes variables affecting the demand for ENERGY STAR CFL lighting in state  $i$ .

The explanatory variables in the model, their sources, and their expected effects are described in Table 18.<sup>84</sup>

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<sup>84</sup> Note that this is a static model, as most of the independent variables are contemporaneous with the dependent variable. The model does not currently allow for interactions between the dependent variable and lags of the independent variables. For example, the model does not capture how long states have had CFL programs in place. Future revisions to the model will experiment with more dynamic specifications.

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**Table 18. Regression Model Explanatory Variables**

Variable	Source	Expected effect on ENERGY STAR Partner CFL sales per household	Notes
Saturation of ENERGY STAR Retailers	Cadmus	+	Number of retailers per household or square feet of retail space per household may capture availability and retail price of ES CFLs
CFL Program	PUC and utility Websites, DSIRE database, CEC summary of CFL programs	+	See text
Average Retail Price of Electricity	Energy Information Administration, U.S. DOE, 2006	?	Effect is theoretically ambiguous. See text
Median Income (\$000)	American Community Survey, 2007	+	Effect may not be separately identifiable from effect of education
Median Number of Rooms	American Community Survey, 2007	+	Measured in terms of dwelling area (sq. feet) or number of rooms
Percent of Housing Units Occupied by Owner	American Community Survey, 2007	+	Owners pay utility bills and are more likely to reap benefits of energy efficiency measures
Percent of Household Heads Age 25-44	American Community Survey, 2007	+	Younger households may have greater awareness of energy efficiency
Percent of Household Heads Age 45-64	American Community Survey, 2007	-	Older households may have less awareness of energy efficiency
Percent of Working Population with College Education	American Community Survey, 2007	+	Educated consumers should have greater awareness of energy efficiency
Percent of Population in Urban Areas (Areas with 50,000+ Residents)	U.S. Census, 2000	?	Urban residents have smaller dwellings but also potentially more awareness of energy efficiency
Percent of Population White	American Community Survey, 2007	?	There may be differences in awareness of energy efficiency between racial groups
Percent of Population with Unaided Recognition of ENERGY STAR Brand	CEE, 2005	+	Recognition of ES brand should increase CFL purchases but may be highly correlated with presence of ES program

## 3.2 Preliminary Results

### 3.2.1 Summary Statistics

Table 19 provides summary statistics for the 50 states and for the subsamples of program and non-program states. Columns 1-5 show the number of observations, the mean, standard deviation, minimum value, and maximum value for each variable in the sample. The state

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average of ENERGY STAR Partner CFL purchases per household is 2.63, with a standard deviation of 0.6 and a minimum of 1.5 and maximum of 4.0.

Columns 6-8 show the mean characteristics of non-program and program states and the differences between the two groups. A notable finding here is states with programs that promote ENERGY STAR CFLs have *lower* ENERGY STAR Partner sales per household than non-program states. However, the difference is small (-0.2 bulbs) and not statistically significant at the 10% level. The similarity in mean ENERGY STAR Partner sales between program and non-program states could mean that CFL programs are ineffective. Alternatively, the result could mean that CFL programs are effective but:

- There is a third variable influencing program implementation and sales. Regression analysis may be able to identify this variable;
- The data are inadequate for measuring such an effect because they do not capture sales through non-ENERGY STAR partner channels;
- Spillover of California programs (and of CFL programs operated in other states) to non-program states obscures the programs' impact.
- Program impacts depend on program history that is not captured by the binary program variable.

As evident from an examination of columns 6-8, the main differences between program and non-program states are in median income, percentage of the working population with a college degree, percentage of population identifying as white, and percentage of the population recognizing the ENERGY STAR brand without aid. Program states have higher mean values for these variables than non-program states.

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**Table 19. Summary Statistics from Regression Model**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	N	Mean	Std Dev	Min	Max	Mean Non-program states	Mean Program states	D Mean (7) - (6)
ENERGY STAR Partner Retailer Sales per Household	50	2.63	0.56	1.54	3.96	2.71	2.54	-0.17
Number of ENERGY STAR Partner Retailers per 100,000 Population	50	4.26	0.90	2.15	6.56	4.41	4.09	-0.32
CFL Program	50	0.48	0.50	0	1	0	1	NA
Electricity Price (¢/kWh)	50	10.32	3.42	6.21	23.35	9.68	11.00	1.32
Median Household Income (\$000)	50	58.23	8.78	42.81	78.15	55.15	61.56	6.41***
Median Number of Rooms in Dwelling	50	5.46	0.30	4.60	6.10	5.44	5.48	0.04
Percent of Housing Units Occupied by Owners	50	59.97	3.68	49.64	67.35	59.97	59.97	0.00
Percent of Householders Age 25 to 44	50	35.47	2.39	31.02	41.79	35.24	35.72	0.48
Percent of Householders Age 45 to 64	50	38.87	1.87	34.36	43.86	38.55	39.21	0.67
Percent Adult Population Graduated College	50	26.35	4.66	16.50	37.00	24.36	28.50	4.13***
Percent of Population in Urbanized Areas (>50,000)	50	53.58	19.12	16.97	89.47	50.85	56.53	5.69
Percent of Whites in Population	50	79.20	12.85	26.73	96.21	74.63	84.16	9.53***
Percent of Population Unaided Recognition of ENERGY STAR Brand	39	21.89	10.35	4.00	43.30	16.18	27.91	11.73***

Notes: For data sources, see text. \*\*\* denotes difference between program and non-program states is statistically significant at the 99 percent level; that is, there is < 1% probability that the true difference is zero given the observed difference in means.

### 3.2.2 Regression Results

Table 20 shows results from ordinary least squares regressions in which the dependent variable is the number of ENERGY STAR CFL sales per household.<sup>85</sup> As the data pertain only to CFL sales

<sup>85</sup> The CFL Market Effects Team tested for heteroskedasticity using White's test, but could not reject the hypothesis of homoskedasticity. However, we also estimated the regression models by weighted least squares with weights equal to the number of households in the state. The OLS and WLS results are very similar.

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through national ENERGY STAR Partner retailers, the number of Partner retailers in the state (the number of stores per 100,000 population) is likely to be closely related to CFLs sales per household, and is thus included as an independent variable in each model. While the primary variable of interest is the CFL program variable – which indicates whether a state has programs in place to promote the purchase of CFLs (i.e., to investigate whether such programs increase CFL sales per household) – the coefficient on the CFL program variable should be interpreted cautiously given the shortcomings of the data.

The first model includes just the national Partner retailer saturation and CFL program variables. ENERGY STAR CFL sales per household are positively related to the saturation of Partner stores. Each big box store per 100,000 population increases CFL sales by approximately 0.25 CFLs per household. However, the coefficient on the CFL program variable is negative, small, and statistically insignificant – the opposite of what was expected.

Model 2 adds two economic variables: the retail price of electricity and median income. In theory, the effect of electricity prices on CFL sales is ambiguous, but model 2 shows residents in states with higher electricity prices purchased more CFLs.<sup>86</sup> In contrast, median income (in thousands of dollars), which was hypothesized to increase CFL purchases per household, did not have an effect. The coefficient on median income has the expected (positive sign), but it is not statistically significant. The coefficient on the CFL program is still negative and statistically insignificant.

Model 3 adds the median number of rooms in dwellings and the percent of owner-occupied homes. Both variables are expected to increase demand for CFLs. Median rooms has the anticipated sign, but it is not statistically significant. Surprisingly, percent of owner-occupied homes has a negative effect on CFL sales per household.<sup>87</sup> Electricity price is no longer statistically significant in this model; however, median household income has a positive and almost statistically significant impact. Every \$10,000 is associated with an additional 0.2 CFLs sold per household.

Model 4 model omits the basic economic drivers and includes variables that affect awareness of energy efficiency and CFLs. The percentage of households between the ages of 25 and 44 and CFL sales per household are positively correlated.<sup>88</sup> Every percentage point is associated with an increase in CFL sales per household by 0.1 units. The percentage of the working population with a college degree is not correlated with higher CFL purchases per household. The coefficient on the CFL program remains negative and statistically insignificant.

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<sup>86</sup> The Team also checked for a correlation between electricity prices and the existence of CFL programs and found the correlation in the rate data to be zero.

<sup>87</sup> In an attempt to explain this negative correlation, the Team explored possible correlations between owner-occupancy and age as well as owner-occupancy and percentage of urban versus rural populations (both age and urban/rural population variables were omitted from this model). This analysis found no statistically significant correlations between these sets of variables. In our ongoing analyses, we will continue exploring the negative correlation between owner occupancy and CFL sales per household. (Note that this pertains to Model 8, described below, as well).

<sup>88</sup> Note that Reid (2008, p. 2-262) also studied the average number of CFLs in use per household in the U.S. in 2007 and found the average number is increasing over the age groups 18-34 (2.8 CFLs), 35-54 (3.3 CFLs), and 55+ (3.8 CFLs). See: Reid, M., 2008. "Who's Buying CFLs? Who's Not Buying Them? Findings from a Large-Scale, Nationwide Survey." ACEEE 2008 Annual Conference.

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Model 5 adds two more variables that may be associated with awareness of energy efficiency and CFLs. The percentage of the population that identifies as white is negatively correlated with CFL purchases, suggesting that perhaps there was an omitted variable in this model. In subsequent regressions that control for income, house size, and ownership this variable loses its statistical significance. The percentage of the population in urbanized areas did not affect CFL purchases.

Models 6 and 7 combine the economic drivers and energy efficiency awareness variables. The coefficient on the CFL program is negative and statistically insignificant in both regressions. Electricity prices and percentage of young households have positive and statistically significant correlations with CFL purchases per household. None of the other variables besides big box retailers and percent of homes occupied by owner are statistically significant.

Model 8 is the last model and adds a new awareness variable, the percentage of adults who recognize without assistance the ENERGY STAR brand. This variable is available for 39 states and appears not to be correlated with the CFL program variable. Neither the recognition variable nor the CFL program variable has a statistically significant effect on ENERGY STAR CFL sales.

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**Table 20. ENERGY STAR CFL Sales per Household Regression Models**

	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5	MODEL 6	MODEL 7	MODEL 8
Intercept	1.504*** (0.377)	-0.463 (0.842)	2.005 (1.650)	-3.072 (2.398)	-1.218 (2.327)	0.107 (2.815)	0.280 (2.891)	4.089 (5.293)
Number of ENERGY STAR Partner Retailers per 100,000 Population	0.273*** (0.082)	0.458*** (0.097)	0.531*** (0.099)	0.306*** (0.090)	0.464*** (0.102)	0.510*** (0.093)	0.527*** (0.104)	0.692*** (0.183)
CFL Program	0.079 (0.148)	0.166 (0.145)	0.166 (0.140)	0.145 (0.154)	0.126 (0.162)	0.146 (0.134)	0.017 (0.171)	0.039 (0.267)
Electricity Price (¢/KWh)		0.064** (0.027)	0.032 (0.032)			0.060* (0.031)	0.048 (0.033)	0.008 (0.045)
Median Household Income (\$000)		0.010 (0.010)	0.019 (0.012)			0.016 (0.016)	0.015 (0.017)	0.018 (0.028)
Median Number of Rooms in Dwelling			0.120 (0.396)			0.019 (0.379)	0.143 (0.394)	0.747 (0.595)
Percent of Housing Units Occupied by Owners			0.061* (0.031)			0.041 (0.030)	0.039 (0.030)	0.094** (0.043)
Percent of Householders Age 25 to 44				0.091*** (0.032)	0.059* (0.032)	(0.031)	0.066* (0.034)	-0.006 (0.060)
Percent of Householders Age 45 to 64				0.030 (0.044)	0.03 (0.042)	0.029 (0.042)	0.019 (0.048)	0.095 (0.085)
Percent of Adult Population Graduated College				0.003 (0.020)	-0.003 (0.020)	-0.015 (0.027)	-0.016 (0.027)	-0.015 (0.034)
Percent of Whites in Population					-0.021* (0.007)		0.010 (0.008)	0.005 (0.012)
Percent of Population in Urbanized Areas (>50,000)					0.002 (0.005)		-0.001 (0.006)	0.008 (0.013)
Percent of Population Unaided Recognition of ENERGY STAR Brand								0.013 (0.012)
Adjusted R <sup>2</sup>	0.174	0.289	0.339	0.282	0.401	0.439	0.434	0.441
N	50	50	50	50	50	50	50	39

Notes: Dependent Variable is ENERGY STAR CFL Sales by ENERGY STAR Partner Retailer Per Household.

Models Estimated By OLS.

Standard error is shown in parentheses.

See Text For Data Sources.

\*\*\*, \*\*, \* Denotes Statistical Significance At The 1, 5, And 10 Percent Levels.

### 3.2.3 Future Enhancements to the Model

The regression results provide some insights into the determinants of household demand for CFLs. Demand appears to be positively related to the number of big box stores, electricity prices,

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and the percentage of householders between the ages of 25 and 44.<sup>89</sup> However, our model provides little evidence of a positive relationship between the presence of CFL programs and ENERGY STAR CFL sales per household through ENERGY STAR Partner retailers in a cross-section of U.S. states. This does not necessarily mean that CFL programs are ineffective. Rather, the result may reflect shortcomings of the data and/or the model specification.

The CFL Market Effects Team will be pursuing a number of improvements to the model to see if more can be learned. These improvements include:

- Refining the definition of the CFL program variable to better capture differences between states in program offerings and maturity. Presently, the ES program variable is binary and thus a very crude indicator of whether a state has any CFL programs. A better measure would capture differences in budgets, program maturity, targeted populations, targeted store types (i.e., identifying if the programs work with the National ENERGY STAR Partner retailers), etc.
- Exploring models that use sales per ENERGY STAR Retailer Partner storefronts as the dependent variable.<sup>90</sup> Initial attempts at this approach provided similar results to the model presented above. However, the development of the dataset, including ranking the states from highest to lowest based on sales per storefront, demonstrates a number of program states, including California, rank towards the top of the list (Table 21). In ENERGY STAR Partner Retailers, sales average 36,831 CFLs/storefront in program states and 32,366 CFLs/storefront in non-program states. A number of program states, including Iowa and Wisconsin, however, remain at the bottom of the list. These states, which use a coupon-based program that does not currently work with the National ENERGY STAR Partners demonstrates the need to further refine the definition of a program state in the model.
- If no model demonstrates a positive relationship between CFL programs and sales, then the Team will investigate a number of hypotheses further, including:
  - The “cannibalization” hypothesis which holds that CFL programs have a positive effect on sales, but, increasingly in states like California, a portion of CFL sales are moving from ENERGY STAR retail partners (i.e., traditional CFL vendors) to other more prevalent or convenient retail locations such as grocery and hardware stores. Because CFL sales at these non-traditional stores are not included in the Cadmus ENERGY STAR Partner sales data, the data may be missing a growing segment of the CFL market in program states.
  - The “life-cycle hypothesis” which holds that as programs succeed in increasing CFL saturations over time, the latent demand for CFLs in these program areas decreases. In the absence of programs, states with long histories of CFL programming would therefore exhibit lower current CFL sales than would states with no (or with relatively new) programs. Under this hypothesis, programs may still be exerting a significant

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<sup>89</sup> Using a survey of approximately 35,000 households, Reid (2008) also finds a strong relationship between residential prices and average CFLs in use per household in the U.S.

<sup>90</sup> Note that the regression model controls for ENERGY STAR Partner store saturation by including the number of such stores per 100,000 population in the model. The lower CFL sales (per household) in program states is therefore not a result of the greater saturation of ENERGY STAR Partner stores in non-program states.



positive effect on CFL sales in program areas – even if that effect is not evidenced by higher current sales in program areas. In fact, if the “life-cycle hypothesis” is true, a comparison of current CFL sales in California to those in non-program states would not be a valid approach to estimating program impacts.

Because the present model examines effects for a single year rather than over time, and because the CFL program variable is binary (i.e., provides a simple “yes/no” to describe whether or not CFL programs are present in each state), the model does not currently capture such effects. An expansion of the model to include variables that provide more information about program maturity may help capture this life cycle effect.

- o The “spill-over” hypothesis which maintains that the effectiveness of CFL promotions in California and other program states has spread to non-program states. If true, there would be little difference in current CFL purchases between program and non-program states. Spillover from program to non-program states could occur through either or both of two main mechanisms.

First, the retail price of CFLs could fall as the demand for CFLs in program states increases and economies of scale in production and distribution are achieved. (That is, the lower costs of production resulting from economies of scale could ripple through to reduce retail prices for all CFLs, regardless of where they are sold.) The drop in CFL prices could then increase the demand for CFLs in both program and non-program states.

Second, the success of the California and other utility- and government-sponsored CFL programs in introducing and promoting CFLs to consumers may have spurred national big box retailers and mass merchandisers to begin CFL promotions of their own. In so doing, these retailers may have implemented uniform CFL marketing strategies throughout all of their stores – regardless of whether the stores are in areas where utility/government CFL programs exist or not. The programs thus would have been responsible, at least in part, for increases in CFL sales in non-program states.

After running these 8 models with the program variable, the Team re-ran the models without the program variable. The exclusion of the program variable from the models did not affect the models’ results.

In our ongoing analyses, the CFL Market Effects Team will attempt to determine if one or more of these hypotheses can explain the absence of a relationship between CFL programs and sales per household. Additional planned analyses include calculating total sales predicted by the model for California and comparing this result to that total actual sales estimate for 2007.

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**Table 21. ENERGY STAR CFLs per Storefront for National Retailer Partners**

State	CFL Program Activity	ENERGY STAR CFL Sales	Number of ENERGY STAR Retailer Partner Storefronts	2007 ES CFL sales per storefront	Rank
Connecticut	Yes	4,204,309	77	54,601	1
New York	Yes	13,227,219	264	50,103	2
Maryland	No	5,708,603	121	47,179	3
Nevada	Yes	3,705,408	79	46,904	4
California	Yes	28,790,643	622	46,287	5
Washington	Yes	6,641,755	147	45,182	6
Vermont	Yes	391,137	9	43,460	7
Delaware	No	1,116,558	26	42,945	8
New Jersey	Yes	6,928,478	168	41,241	9
Florida	No	20,609,670	515	40,019	10
Massachusetts	Yes	4,531,040	115	39,400	11
Oregon	Yes	3,004,650	77	39,021	12
Virginia	No	8,389,149	216	38,839	13
Arizona	No	7,077,794	184	38,466	14
Texas	Yes	28,421,348	739	38,459	15
Pennsylvania	No	10,470,645	285	36,739	16
Montana	Yes	1,058,516	29	36,501	17
Illinois	Yes	12,410,513	343	36,182	18
Kansas	No	3,319,048	92	36,077	19
Colorado	Yes	5,377,408	152	35,378	20
Maine	Yes	1,463,608	42	34,848	21
South Dakota	Yes	817,437	24	34,060	22
Missouri	No	7,080,572	209	33,878	23
New Hampshire	Yes	1,988,774	59	33,708	24
Idaho	Yes	1,401,100	43	32,584	25
Oklahoma	No	4,705,136	150	31,368	26
North Carolina	No	8,797,280	282	31,196	27
Arkansas	No	3,869,136	125	30,953	28
Louisiana	No	4,591,513	149	30,816	29
Utah	Yes	2,602,274	85	30,615	30
Alabama	No	5,063,458	167	30,320	31
Kentucky	No	4,447,383	147	30,254	32
South Carolina	No	4,256,688	143	29,767	33
Tennessee	No	6,506,058	220	29,573	34
Nebraska	Yes	1,591,178	54	29,466	35
New Mexico	No	1,928,973	66	29,227	36
Rhode Island	Yes	632,300	22	28,741	37
Ohio	No	9,291,223	324	28,677	38
Mississippi	No	3,092,143	108	28,631	39
Wyoming	Yes	513,996	18	28,555	40
Georgia	No	8,555,139	300	28,517	41

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State	CFL Program Activity	ENERGY STAR CFL Sales	Number of ENERGY STAR Retailer Partner Storefronts	2007 ES CFL sales per storefront	Rank
Minnesota	Yes	4,084,835	146	27,978	42
Michigan	No	6,881,733	251	27,417	43
West Virginia	No	1,638,031	63	26,000	44
Indiana	No	5,597,590	216	25,915	45
Iowa	Yes	2,694,806	104	25,912	46
Wisconsin	Yes	4,259,102	172	24,762	47
North Dakota	No	504,337	21	24,016	48

## 4. CFL USER SURVEY RESULTS

### 4.1 Summary of Findings

This section summarizes the results of the CFL User Surveys. The surveys were fielded in the PG&E, SCE, and SDG&E service territories and three comparison states<sup>91</sup> – Georgia, Kansas, and Pennsylvania – and were intended to supplement the CFL User Surveys being conducted through the Residential Retrofit study. Key topics from these surveys addressed in this section include:

- Awareness and familiarity with CFLs
- Past and recent purchases of CFLs
- Use and storage of CFLs
- Satisfaction with CFLs
- Disposal of CFLs
- Awareness of the ENERGY STAR label
- Awareness and use of LEDs
- Environmental Attitudes
- Respondent demographics

The analysis compares survey findings from households in California IOU service territories (collectively, not separately) to a Comparison Area, which is a composite of survey data from Georgia, Kansas, and Pennsylvania – states that have no concentrated or sustained program activity to promote CFLs.<sup>92</sup> All data are weighted by the demographic characteristics of the California IOU service territory, as well as the number of households in that area, to facilitate comparison. The Comparison Area is intended to represent California in the absence of any IOU program activity that promotes CFLs.

While the results are not conclusive on their own, they do indicate signs of a market in which CFLs have wider consumer acceptance and in which demand for CFLs can be sustained in the absence of directed program support. Some key observations from the survey data are as follows:

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<sup>91</sup> A comparison of key demographic indicators for the survey states is included in this chapter. A detailed discussion of the comparison state selection process can be found in the Compact Fluorescent Lamps Market Effects Scoping Study Findings and Work Plan, October 31, 2008.

<sup>92</sup> In response to public concern about our use of Georgia as one of the comparison states, the Team separately performed the analysis described in this section without Georgia. Appendix C presents the CFL User Survey results for Comparison Area II—a composite of just the Pennsylvania and Kansas respondents—alongside the results shown here for Comparison Area I (i.e., a composite of respondents from all three states) for the major markers. As described in Appendix C, the results for Comparison Area II were not statistically different from the results for Comparison Area I.

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- Awareness of CFLs is nearly universal in and out of California (96% versus 92%), but Californians are significantly<sup>93</sup> more familiar with CFLs than those in the Comparison Area.
- Fewer CFLs were purchased by California households (estimated 10.0 million) than in the Comparison Area (estimated 10.8 million, adjusted to the California population) in the past three months.<sup>94</sup>

While the difference in estimated recent sales is not statistically significant, it may seem surprising as one would expect higher sales in California due to the CA IOU ULP. Evidence exists that higher sales in the Comparison Area may be a fairly recent development and non-program areas are playing “catch-up” with CFL purchases compared to California. Thus, it is possible that California sales per household are leveling off relative to non-program areas. Homes that use CFLs would already have them in many available sockets, and, because CFLs last longer than incandescents, they would not need to be replaced as often. Indicators of recent market expansion to non-program areas would include similar or higher *recent* CFL purchase rates in the Comparison Area, higher *long-term* purchases in California, more recent first uses of CFLs in the Comparison Area, more households using CFLs in California, higher saturation rates (number of installed CFLs/total household sockets) in California, higher CFL storage rates in California, and CFL purchases in a wider range of store types in California.

- **Recent Purchases.** Twenty-nine percent of households buying light bulbs in the Comparison Area purchased CFLs in the past three months, comparable to the 28% of households in California that did the same. The average number of CFLs purchased per household in the past three months was 1.1 in California and 1.2 in the Comparison Area. When examining purchasing households only, the average number of CFLs purchased was 7.1 per household in California over the past three months and 8.0 per household in the Comparison Area.
- **Long-Term Purchases.** Forty-seven percent of the respondents in California estimate they purchased CFLs over the past three years, with an average of 5.7 CFLs per household across California households, and an average of 12.2 CFLs among purchasing households in California. In the Comparison Area, 44% of respondents estimated they purchased CFLs over the past three years, or an average of 4.9 CFLs across all households, and 10.9 among purchasing households.
- **First Use.** Significantly more households in the Comparison Area learned about CFLs recently compared to California. Fifty-nine percent (59%) of households in California first used CFLs in the past three years, compared to 72% of households in the Comparison Area.
- **Households Using CFLs.** Nearly eight out of ten (79%) households in California say they currently use at least one CFL inside or outside their home, significantly more than the 66% of households in the Comparison Area who currently use CFLs.<sup>95</sup>

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<sup>93</sup> Throughout the discussion of survey findings, results reported as significant indicate that differences have been found at the 90% confidence level.

<sup>94</sup> Throughout the CFL User Survey analysis, references to recent CFL purchases in the past three months reflect purchases that had been made from August through November 2008.

<sup>95</sup> Estimates of the total number of CFLs in use will be updated with results of the on-site surveys.

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- **Saturation.** In accounting for all CFLs purchased over the past three years since January 1, 2006, respondents in both California and the Comparison Area estimate they have an average of 8.0 CFLs installed. Self-reporting of number of CFLs installed, however, may be unreliable, and is a focus of the In-Home (saturation) Survey which is discussed later in this report.
- **Storage.** Among CFLs purchased in the past three years, California households estimate an average of 1.5 bulbs are in storage (3.4 per purchasing household), compared to 0.9 in storage (2.3 in storage per purchasing household) in Comparison Area households. This translates into installation rates from three year purchases of 66% for California and 73% in the Comparison Area.
- **Variety of Store Types.** Households in the Comparison Area buy most of their CFLs from large home improvement stores (41%) and mass merchandise stores (37%, significantly more than the 12% in California). They buy fewer CFLs from other distribution channels, including significantly fewer from grocery (3% versus 8%) and drug stores (<1% versus 5%), two channels targeted by the California IOU program.<sup>96</sup>
- **Recycling.** The majority (69%) of households in California and Comparison Area (70%) identify no concerns associated with CFLs. Chief among the concerns identified are issues related to the safety or hazards associated with CFL disposal or breakage. Almost 8% in both areas say CFLs require special disposal or must be recycled and about 6% in both areas explicitly identify mercury as a concern. Significantly more households in California recycled or dropped their spent CFLs at a waste center compared to the Comparison Area (32% versus 19%). Even so, the majority of households in both areas threw spent CFLs in the trash, although significantly more did so in the Comparison Area (72%) compared to California (63%).

In summary, most customer survey indicators point to a national CFL market with vibrant CFL sales that is recently catching up with California, but with greater CFL sales and installations in California over the entire three-year period. However, these results are dependent on respondent self-reported data, and must be analyzed in context of other findings from this study, including the in-home audits and other sources of sales data. The CFL Market Effects Team will continue to explore the data more fully and incorporate these findings with the other evaluation tasks being conducted for this project.

## 4.2 Methodology

Respondents to the survey in California were randomly selected from residential customers within the California IOU service territories, in proportion to the number of customers from each utility (referred to throughout this section as “California,” even though it represents only households in the state served by the IOUs). The IOU program supported CFL sales within IOU service territories only, not the entire state, so our tracking efforts are adjusted accordingly. Respondents in the three comparison states – Georgia, Kansas, and Pennsylvania – (referred to throughout this report as the “Comparison Area”) were selected through random-digit dialing

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<sup>96</sup> In an effort to target California “hard-to-reach” populations, the 2006-08 ULP promoted CFLs in non-traditional CFL retail channels such as discount stores, drug stores, groceries, and small hardware stores.

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(RDD). All respondents were responsible for purchasing light bulbs for their households. The surveys targeted a minimum of 100 respondents who had purchased CFLs in the past three months in California and each of the Comparison States. The status of other groups of interest – including CFL purchasers from 2006 through 2008, non-users, non-purchasers, and those unaware of CFLs was monitored – but no quotas were set.

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Table 22 and Table 23 show the final disposition of all calls that were completed and attempted for this project. The surveys were conducted by PA Consulting, using computer-assisted telephone interviewing (CATI), from October 6 through November 23, 2008.



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**Table 22. Final Disposition of Telephone Surveys in California**

Utility	Measure	Completes	Target Completes	Percent Completed	Incidence Rate	Completed Interviews	Hard Refusals	Lighting Recruits	Missing/Non-working number	Language Barrier
PGE	Unaware	7	N/A	N/A	3%	278	199	154	277	35
	Non-Purchaser	33	N/A	N/A	12%					
	Non-User	39	N/A	N/A	14%					
	3mo CFL Purchaser	41	40	103%	15%					
	06-08 CFL Purchaser	159	N/A	N/A	57%					
SCE	Unaware	17	N/A	N/A	6%	291	244	156	263	71
	Non-Purchaser	52	N/A	N/A	18%					
	Non-User	37	N/A	N/A	13%					
	3mo CFL Purchaser	42	40	105%	14%					
	06-08 CFL Purchaser	137	N/A	N/A	47%					
SDGE	Unaware	11	N/A	N/A	8%	130	188	83	108	18
	Non-Purchaser	9	N/A	N/A	7%					
	Non-User	11	N/A	N/A	8%					
	3mo CFL Purchaser	18	20	90%	14%					
	06-08 CFL Purchaser	84	N/A	N/A	65%					

Unaware: Respondent unaware of CFLs

Non-Purchaser: Aware but has not purchased any CFLs in the last three years

Non-User: 3 mo CFL Purchaser: Purchased CFL in the last three months

06-08 Purchaser: Purchased CFL in the last three years

Note: Incidence rate is the percentage of the population called that complete the survey. The incidence may sum to greater than 100% because respondents may be counted in more than one category.

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**Table 23. Final Disposition of Telephone Surveys in Comparison States**

State	Measure	Completes	Target Completes	Percent Completed	Incidence Rate	Completed Interviews	Hard Refusals	Lighting Recruits	Missing/Non-working number	Language Barrier
KS	Unaware	28	N/A	N/A	5%	525	824	175	860	16
	Non-Purchaser	106	N/A	N/A	20%					
	Non-User	103	N/A	N/A	20%					
	3mo CFL Purchaser	106	100	106%	20%					
	06-08 CFL Purchaser	281	N/A	N/A	54%					
PA	Unaware	45	N/A	N/A	7%	653	1042	227	639	22
	Non-Purchaser	131	N/A	N/A	20%					
	Non-User	136	N/A	N/A	21%					
	3mo CFL Purchaser	103	100	103%	16%					
	06-08 CFL Purchaser	331	N/A	N/A	51%					
GA	Unaware	53	N/A	N/A	9%	579	1303	203	1585	31
	Non-Purchaser	118	N/A	N/A	20%					
	Non-User	122	N/A	N/A	21%					
	3mo CFL Purchaser	97	100	97%	17%					
	06-08 CFL Purchaser	298	N/A	N/A	51%					

Unaware: Respondent unaware of CFLs

Non-Purchaser: Aware but has not purchased any CFLs in the last three years

Non-User: 3 mo CFL Purchaser: Purchased CFL in the last three months

06-08 Purchaser: Purchased CFL in the last three years

Note: Incidence rate is the percentage of the population called that complete the survey. The incidence may sum to greater than 100% because respondents may be counted in more than one category.

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The survey instrument was based on the CFL User Survey, Wave 1, conducted as part of the California Residential Retrofit project. Many questions were repeated verbatim from that survey; modifications were also made to a few questions to provide clarification, some questions were omitted, and new questions were added that were relevant to assessing CFL market effects. With the exception of some questions specifically addressing the California IOU CFL program, the same survey questions were used in California and all comparison states. The survey questionnaire is included in Appendix B.

Throughout this analysis, we compare California findings with the Comparison Area. We assume CFL sales and usage patterns in the Comparison Area approximate baseline market conditions for California – that is, sales that would have occurred in California in the absence of IOU program intervention. States in the Comparison Area were chosen because they do not have long-term or significant histories of utility- or regional government-sponsored programs to promote CFLs, and because they share various socio-economic indicators with California.<sup>97</sup>

This approach has been implemented successfully in recent evaluations of programs in Wisconsin and Massachusetts. The primary shortcoming of using this methodology is that no single state really directly compares with California, which is often considered a country unto itself when examining its size (land area is third in U.S.), population (first in U.S.), economy (first in U.S. and between seventh and tenth in the world depending on sources), resources (oil, gas, minerals, tourism etc) and politics. In fact, economic studies often compare California to other countries instead of states since it has such a large economy. To mitigate this issue, a comparison group of states – as opposed to a single comparison state – was selected.

The CFL Market Effects Team recognizes that there are other possible shortcomings with the comparison state approach. One problem is that manufacturer and retailer sales strategies in program and non-program states may be interdependent. Some manufacturers and retailers may make decisions about how to sell CFLs in one state or region based on what they are doing in another. California sales may spill over into neighboring states because of regional ordering patterns. We also recognize that California programs have possibly impacted the national market and thus have influenced our baseline Comparison Area.

Selection of the comparison states was based on an examination of state-by-state socio-economic indicators (including households, population, income, and education) from the 2006 American Community Survey to identify those most appropriate for comparison with California. A detailed discussion of the methodology used to select the Comparison States can be found in Section 6.2.1.

All survey data are weighted to represent households in the California IOU service territories. Telephone survey respondents' demographic characteristics do not always mirror those of the general population. The weighting scheme helps correct differences, so estimates better reflect purchasing habits of households in California and the Comparison States. Weighting the Comparison States to California household demographics also adjusts for differences between the actual demographics in California and the Comparison States, reflecting the fact that there is

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<sup>97</sup> A comparison of key demographic indicators for the survey states is included in this chapter. A detailed discussion of the comparison state selection process can be found in the Compact Fluorescent Lamps Market Effects Scoping Study Findings and Work Plan, October 31, 2008.

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no such thing as a perfect comparison state. When presenting results, all results are weighted, unless otherwise indicated.

The weighting scheme is based on tenancy (owner/renter status) and the educational status of respondents, variables which help to predict lighting purchase patterns.<sup>98</sup> Our reference for weighting is the 2003 California Energy Commission's Consortium RASS<sup>99</sup> database, which allows us to represent the demographic characteristics of the California IOU service territories rather than the entire state, as would be the case with data sourced from a broader source such as the U.S. Bureau of the Census American Community Survey (ACS).<sup>100</sup> Because the RASS data were collected in 2003, the CFL Market Effects Team applied the California population growth rate from 2003 to 2007, as observed in ACS and applied it to the RASS data to get a more accurate estimate of the current household population. The weights for the California survey are calculated as the ratio of the RASS population to survey respondents for each category in the targeted demographics. The CFL Market Effects Team also created weights for the comparison states by applying the same RASS populations to the corresponding survey characteristics in each survey state before combining the datasets into the Comparison Area. The resulting Comparison Area is a construct that replicates the demographics and number of households of the California IOU service territory.

This section presents selected variables from the telephone survey and compares California to the Comparison Area.

### 4.3 Awareness and Use of Energy-Efficient Lighting

The survey asked a series of questions to assess respondents' familiarity with and experience using CFL bulbs. Virtually all respondents in California (95.8%) and the Comparison area (91.6%) are familiar with CFLs by name or brief description (Figure 17). As Table 24 shows, in California, 38% of respondents rate themselves as "very familiar" with CFLs, significantly<sup>101</sup> more than the 33% giving a similar rating in the Comparison Area. Similarly, significantly more respondents in the Comparison Area (13%) compared to California (6%) rate themselves as 'not at all familiar' with the technology. In California, those not at all familiar with CFLs in Table 24 include 4.2% who are not aware of CFLs and 2.0% who are aware of CFLs, but say they are not familiar with them. In the Comparison Area, those not at all familiar with CFLs include 8.4% who are not aware of CFLs and 4.7% who are aware of CFLs, but say they are not familiar with them.

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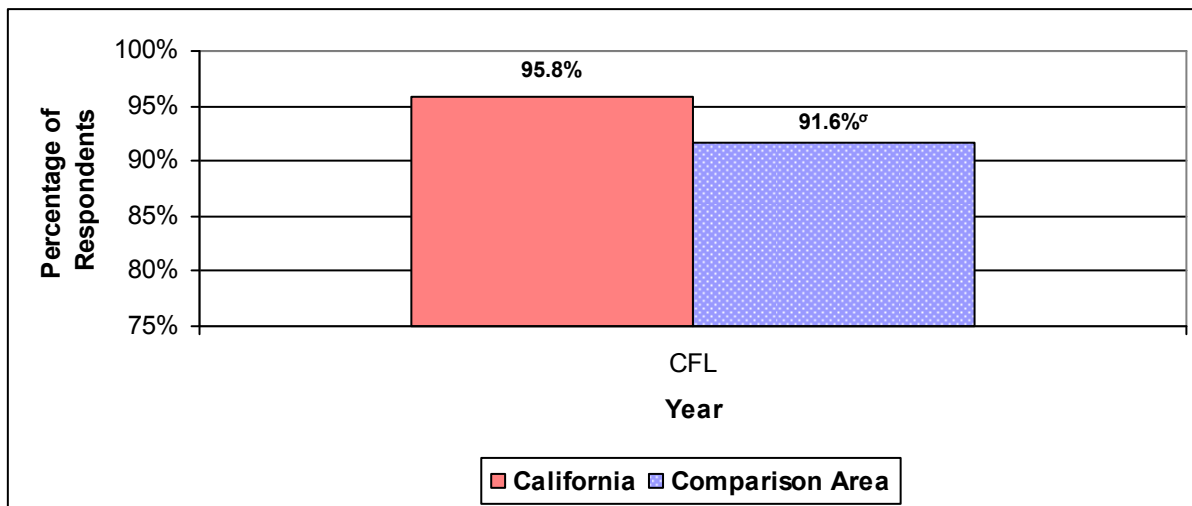
<sup>98</sup> This pattern has been noted in the Market Progress and Evaluation Report (MPER) for the 2007 Massachusetts ENERGY STAR Lighting Program, Final Report. Submitted to Cape Light Compact, Massachusetts Electric Company, Nantucket Electric Company, NSTAR Electric Company, Western Massachusetts Electric Company, and Unitil by Nexus Market Research, Inc., RLW Analytics, Inc., and Dorothy Conant. July 1, 2008.

<sup>99</sup> <http://websafe.kemainc.com/RASSWEB/DesktopDefault.aspx?tabindex=0&tabid=1>, Accessed December 3, 2008.

<sup>100</sup> The *American Community Survey* is a yearly survey conducted by the United States Bureau of the Census (Census Bureau) that provides population, household, and other estimates for the years that fall between decennial censuses. Unlike the decennial census, the ACS is based on a statistical sample of the population. Census Bureau "2007 Survey Multi-year Profiles for California, Georgia, Kansas, and Pennsylvania." *American Community Survey*. <http://factfinder.census.gov>. Accessed November 21, 2008.

<sup>101</sup> Throughout this report, the symbol 'σ' is used to indicate that results between California and the Comparison Area are significantly different at the 90% confidence level.

**Figure 17. Awareness of CFLs**  
(base – all respondents; California n=699, Comparison Area n=1757)<sup>σ</sup>



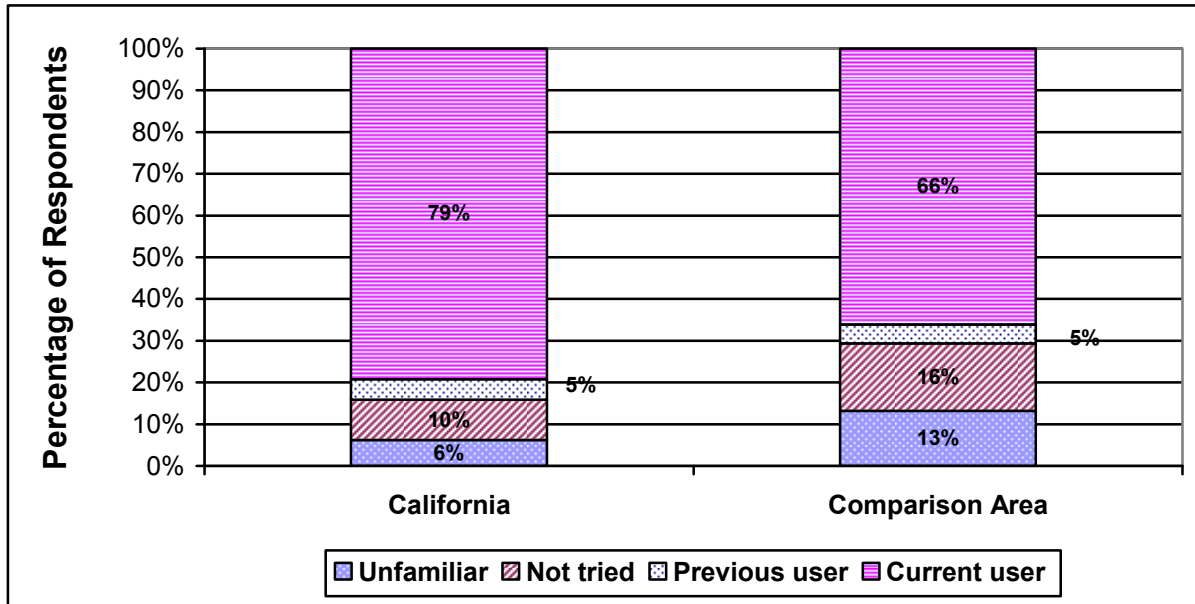
**Table 24. Level of Familiarity with CFLs**  
(base – all respondents; results weighted to CA IOU households)

	California	Comparison Area
n	699	1757
Very familiar – 1	38.1	32.5 <sup>σ</sup>
Somewhat familiar – 2	37.7	33.6 <sup>σ</sup>
Slightly Familiar – 3	17.2	20.0
Not at all familiar – 4	6.2	13.1 <sup>σ</sup>
Don't know/Refused	0.7	0.8

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

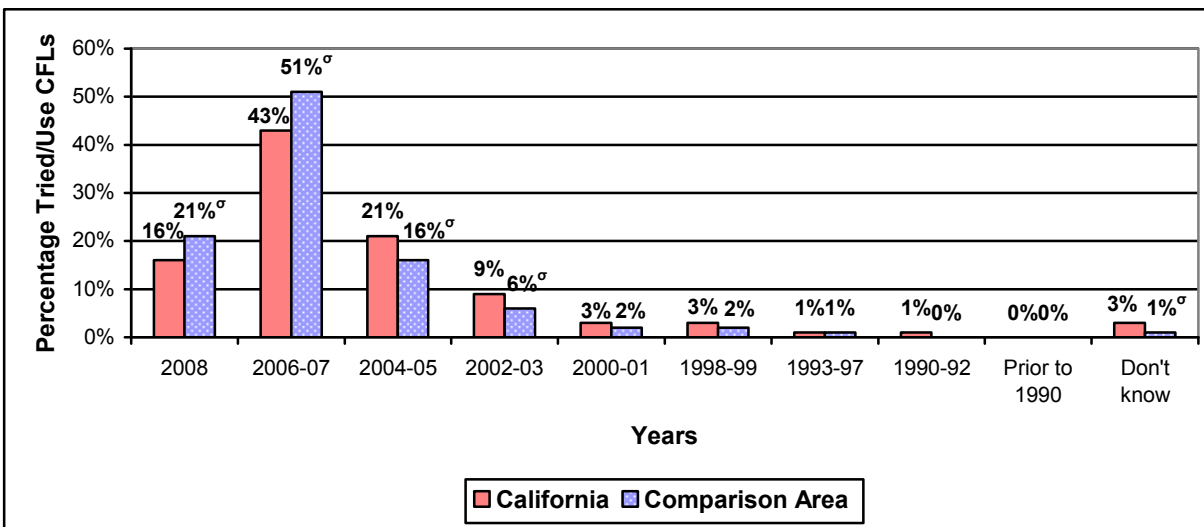
The survey asked respondents familiar with CFLs to describe their past and current use of the products. Nearly eight out of ten (79%) households in California say they currently use at least one CFL inside or outside their home (referred to throughout this report as “current users”), significantly more than the 66% of households in the Comparison Area who currently use CFLs. Another 5% of households in California have previously tried but no longer use CFLs, and 10% are familiar with CFLs but have not yet tried them. As Figure 18 shows, significantly more households in the Comparison Area (16%) have not yet tried CFLs, but about the same number (almost 5%) have been previous users.

Figure 18. Use of CFLs  
 (base – all respondents)



Significantly more households in the Comparison Area learned about CFLs recently compared to California. Six out of ten (59%) households in California first used CFLs in the past three years, and 72% of households in the Comparison Area first used them in the past three years. Significantly more households in California (30%) first used CFLs three to six years ago compared to the Comparison Area (22%). That time frame roughly corresponds to the increased support of CFLs by California IOUs in the wake of the 2000 and 2001 energy crisis. Thirty-eight percent (38%) of households in California first began using CFLs more than three years ago, compared to 27% in the Comparison area (Figure 19).

**Figure 19. First Use of CFLs**  
(base –respondents who have tried or currently use CFLs)<sup>a</sup>



The average California household (comprised of both those who currently use CFLs and those who do not use CFLs) currently has 7.5 CFLs installed, versus 6.3 in the Comparison Area. Among current users of CFLs, the average number of CFLs currently in use is 9.7 in California and 9.6 in the Comparison Area. (Table 25).

**Table 25. Number of CFLs Currently Installed in Households**  
(base –current users of CFLs)

	California	Comparison Area
N	540	1200
1 or 2	11.4%	16.8% <sup>σ</sup>
3 or 4	14.1	18.5 <sup>σ</sup>
5 or 6	17.4	14.6
7 or 8	12.3	10.1
9 or 10	14.5	9.6 <sup>σ</sup>
11 to 20	23.7	22.3
Over 20	6.6	8.1
Average number CFLs installed –		
Current Users	9.7	9.6
All Households	7.5	6.3

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

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Across California IOU territory, 7.2 million households (those with at least one CFL) currently use an estimated 70 million CFLs. In contrast, weighting the Comparison Area to the CA IOU household population, a total of 6.1 million households would use an estimated 58.4 million CFLs (Table 26).

**Table 26. Overall Estimated Number of CFLs Currently Installed  
 (base – current users of CFLs)**

	California	Comparison Area
n	540	1200
Households with Product	7,198,785	6,093,124
Number in Use	70,065,826	58,441,385

As Table 27 shows, among California households that have tried or currently use CFLs, an average of 5.7 CFLs are in storage. Throughout the state, this translates to over 29 million CFLs in storage. In the Comparison Area, an average of 4.7 CFLs are in storage (for households that have tried or currently use CFLs). Assuming the Comparison Area has the CA IOU household population, there would be an estimated 17 million CFLs in storage, significantly less than currently estimated in California.

**Table 27. Storage of CFLs  
 (base – respondents who have tried/now use CFLs)<sup>a</sup>**

	California	Comparison Area
N	400	748
Average # in storage, those who tried/now use CFLs	5.7	4.7 <sup>σ</sup>
Number of CFLs currently in storage	29,211,893	17,249,986

<sup>a</sup> Don't know responses removed from analysis.

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

The reasons why households are storing CFLs provides some insight into whether or not they will ever be used. In California, the vast majority of respondents (89%) indicate that the CFLs are being stored for future use. As Table 28 shows, only 10% indicate that CFLs are being stored because they did not fit or work well in certain applications. While exhibiting the same storage trend in the Comparison Area, significantly more households (94%) are storing CFLs for future use, and significantly fewer (6%) are storing them because they did not fit or work well in certain applications. Note that bulbs that did not fit/work in fixture, however, may still get installed in the future.



**Table 28. Why Storing CFLs**  
**(base – respondents currently storing CFLs, multiple response)**

		California	Comparison Area
	n	418	752
Why Storing	For future use	88.9%	93.5% <sup>σ</sup>
	Do not fit/work in fixture	10.2	5.7 <sup>σ</sup>
	Don't know/refused	1.0	0.8

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

#### 4.4 Recent Bulb Purchases

Nearly half of all households (47%) in California purchased light bulbs in the past three months. Of those households purchasing bulbs, 28% purchased CFLs, 58% purchased incandescents, and 46% purchased some type of specialty bulb. As Table 29 shows, in the Comparison Area, significantly more households purchased light bulbs in the past three months than in California; this is consistent with having fewer of their sockets filled with longer-lasting CFLs, hence needing bulbs more often – over half of all households purchasing at least one light bulb (57%). Of those purchases, 29% purchased CFLs, 61% purchased incandescents, and 43% purchased specialty bulbs.

**Table 29. Recent Bulb Purchasers – Past Three Months**  
**(base – all respondents)**

	California	Comparison Area
All Bulbs	47.3%	56.6% <sup>σ</sup>
CFLs	28.3	28.9
Incandescents	58.2	61.1
Specialty *	46.0	43.1

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

\* Specialty bulbs were defined in survey as “other types of bulbs, besides regular incandescent light bulbs and CFLs. T might include halogen bulbs, long fluorescent tubes and other types of specialty bulbs.”

The survey also asked respondents to estimate the number of each type of light bulbs that they purchased over the past three months. Households in California purchased an average of 3.7 bulbs in the past three months, including 1.1 CFLs, 1.4 incandescents, and 1.2 specialty bulbs (Table 30). Among only light bulb purchasing households, an average of 7.9 bulbs were purchased in the past three months. Light bulb purchasing households in the Comparison Area purchased more incandescent bulbs than California purchasers: 47% for the Comparison Area

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versus 39% for California households. Again, this is consistent with having fewer CFLs installed in the Comparison Area.

Across all households in the Comparison Area, households purchased an average of 5.0 bulbs over the past three months, including 1.2 CFLs, 2.3 incandescent bulbs, and 1.5 specialty bulbs. Among only the light bulb purchasing households, an average of 8.7 bulbs were purchased in the past three months.

Respondent self-reporting of light bulb purchases is difficult, given the frequency of bulb purchases and relative dollar amount spent, compared to major energy-using purchases (e.g., appliances such as a new refrigerator). As a result, respondents recall over a year (the unit of time of interest for evaluation purposes because it incorporates annual program effects and seasonality in purchase behavior) may be less reliable, with a three-year estimate (matching the California 2006-2008 program cycle) being especially unreliable. Restricting the purchase time frame to a three-month period allows more accurate respondent recall, but it can be limiting if seasonality of purchases or program efforts are important variables in purchase behavior.

**Table 30. Recent Bulb Purchases – Past Three Months  
(Average number bulbs for all purchasing households; base – all products purchased)<sup>a</sup>**

		CFLs	Incandescent	Specialty	All Bulbs
California	unweighted n	99	194	162	341
	Average # Purchased in past 3 months, All Households	1.1	1.4	1.2	3.7
	Percentage Purchased in past 3 months, Purchasing Households <sup>b</sup>	29%	39%	33%	7.9
Comparison Area	unweighted n	295	585	442	992
	Average # Purchased in past 3 months, All Households	1.2	2.3	1.5	5.0
	Percentage Purchased in past 3 months, Purchasing Households	23%	47%	29%	8.7

a Don't know responses removed from sample size and calculation.

b Purchasing households of each type of bulb.

As Table 31 shows, over the past three months, households in California purchased an estimated 35 million light bulbs, including 9.9 million CFLs, 13.5 million incandescents, and 11.5 million specialty bulbs. Purchases of all types of light bulbs in the Comparison Area were higher, although not significantly so. Assuming the California IOU population in the Comparison Area, during the same time period, an estimated 5.3 million households purchased about 46 million light bulbs, with 10.8 million CFLs, 21.8 million incandescent, and 13.5 million specialty bulbs.

**Table 31. Estimated Number of Recent Bulb Purchases – Past Three Months  
 (base – all respondents)**

		All Bulbs	CFL	Incandescent	Specialty
California	unweighted n	341	99	194	162
	# Households Purchasing	4,413,925	1,249,896	2,569,194	2,032,326
	# Purchased	34,996,493	9,998,281	13,501,886	11,496,326
	Average # Purchased, Purchasing households		8.0	5.3	5.7
Comparison Area	unweighted n	992	295	585	442
	# Households Purchasing	5,288,240	1,532,100	3,228,368	2,281,157
	# Purchased	46,227,160	10,814,322	21,864,599 <sup>σ</sup>	13,548,239
	Average # Purchased, Purchasing households		7.1	6.8	5.9

Another 1.5 million CFLs were given to households in California during the past three months, and 677,030 were giveaways in the Comparison Area (Table 32). Given the limited giveaways sponsored by the CA IOUs during this time and lack of initiatives in the comparison states, this seems to indicate that organizations other than utilities are now promoting and actually giving away CFLs.

**Table 32. Estimated Number of CFLs Distributed through Giveaways –  
 Past Three Months (base - all respondents)**

	California	Comparison Area
CFLs Given	1,458,926	677,030

#### **4.5 CFL Purchases By Distribution Channel**

According to the CFL User Survey in California, almost 49% of all California CFL sales were from large home improvement stores such as Home Depot and Lowe’s. Membership clubs, such as Costco and Sam’s Club, account for close to 16% of all CFL sales. Other popular retail sources for CFL shoppers in California include groceries (8% of CFL sales) and discount stores (6%), such as 99¢ Stores and Dollar Stores. As Table 33 shows, in the Comparison Area 43% of all CFLs were sold through home improvement stores and significantly more CFLs (compared to California) at mass merchandise stores (30%). However, significantly fewer CFLs in the Comparison Area compared to California were purchased at drug stores (<1% versus 5%), and groceries (3% vs. 8%). These differences probably reflect IOU program efforts in California to focus on sales of CFLs through grocery stores, membership clubs, and discount stores. As Table 33 shows, 34% of the CFLs rebated by the IOU program were in grocery stores and 9% were in drug stores.

**Table 33. CFL Purchases by Retail Distribution Channel**  
**(base – respondents purchasing CFLs; respondents may have purchased bulbs at more than one type of store)**

	IOU Sales by Distribution Channel*	Households Purchasing Bulbs by Distribution Channel		Bulbs Purchased by Distribution Channel	
	California	California	Comparison Area	California	Comparison Area
n	40,723,539	102	267	9,998,281	10,814,322
Large home improvement	7.7%	45.5%	40.6%	48.6%	42.5%
Membership club	21.1	14.0	5.9 <sup>o</sup>	15.5	9.6
Mass merchandise	4.5	12.4	36.5 <sup>o</sup>	5.1	29.7 <sup>o</sup>
Discount	16.8	10.1	6.0	5.8	3.2
Grocery	34.9	6.4	4.5	7.6	2.6 <sup>o</sup>
Drug	6.5	5.8	0.3 <sup>o</sup>	5.1	.2 <sup>o</sup>
Small hardware	6.6	2.6	3.3	4.1	1.7
Lighting electronics	1.9	1.2	0.9	.6	.7
Other	0.0	2.0	2.0	7.5	10.0

\* Source: 2007 IOU Program sales, percent of units rebated

<sup>o</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

The California IOU programs work within existing market channels to increase the availability of CFLs and provide products to consumers at a discounted price. Incentivized CFLs also have a label from the IOU programs affixed to the product packaging, and additional point-of-purchase (POP) material may be displayed at the retailer, but the consumer has no obligation to provide a coupon or identify themselves to receive the discount. As a result, the consumer may not necessarily be aware that the California IOU program made the product available to them through the retailer. The survey asked respondents who had purchased CFLs if they knew whether or not that the CFLs they purchased were part of a utility promotion or utility sponsored sale. As Table 34 shows, 26% of the CFLs purchased by California households in the survey were attributed to the California IOU Program, while 4% of CFLs in the Comparison Area were attributed to a utility program (despite there being no or minimal utility programs in the Comparison Area). Note these results are only self-reported, and cannot be verified on-site because the ULP bulbs do not contain any marking or indication of a program bulb. Also given the relatively low-profile that the program has in the eyes of the consumer, many program participants may not be aware that the products they have purchased are program supported.

**Table 34. Recollection of Utility Incentive for CFL Purchase**  
**(base – respondents purchasing CFLs; respondents may have purchased bulbs at more than one type of store)**

	California	Comparison Area
n	99	294
Total # of CFL Purchased 3 months	9,998,281	10,814,322
Total # of CFLs IOU Program Recalled for	2,624,852	424,307
%	26%	4%*

\* Excluded 1 outlier

## 4.6 2006-08 CFL Purchases

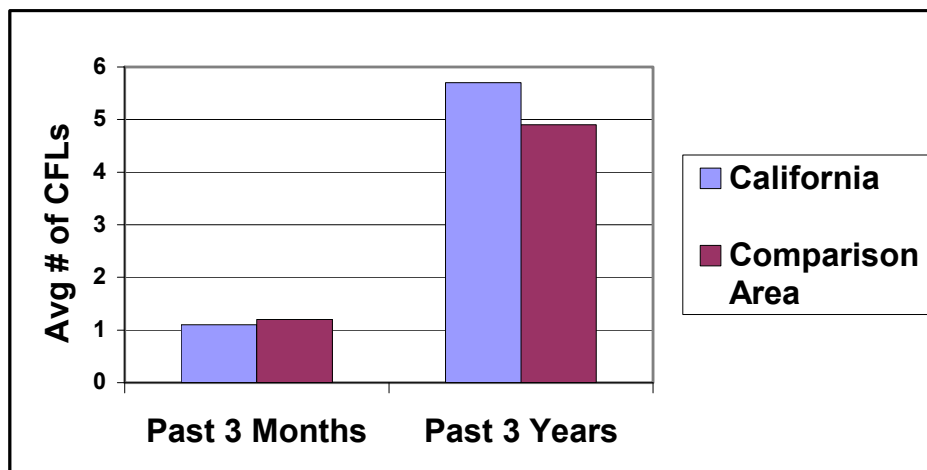
The survey asked respondents a series of questions about CFL purchases over the past three years, from 2006 through 2008. As noted, respondents' recall of past light bulb purchases tends to be poor, but this information can provide some information about the general magnitude of CFL purchases and allow for comparisons over time. As Table 35 shows, based on respondent recollection of purchases, households in California purchased an estimated 53 million CFLs over the past three years, with an average of 5.7 CFLs per all households in California and with an average of 12.2 CFLs in purchasing households. In the Comparison Area, households purchased an estimated 4.5 million CFLs over the past three years, or an average of 4.9 CFLs per household and 10.9 per purchasing household. Figure 20 shows the average number of CFLs purchased by all households in California and the Comparison Area in the past three months and the past three years.

**Table 35. CFL Purchases – 2006-2008**  
**(base – all respondents)**

	California	Comparison Area
n	341	820
Past 3 months	9,998,281	10,814,322
# CFL Purchased 2006-2008 <sup>a</sup>	53,010,614	45,309,241
Average # Purchased 2006-2008, All Households	5.7	4.9
Average # Purchased 2006-2008, Purchasing Households	12.2	10.9
% of Households that Purchased CFLs in 2006-2008	46.6%	44.4%

<sup>a</sup> Including bulbs purchased in past 3 months

Figure 20: Average Number of CFLs Purchased Across All Households



Among the CFLs purchased since January 1, 2006, there are an estimated 3.5 CFLs installed per household across all homes in California, the same number as in the Comparison Area. Among households with CFLs, both California and the Comparison Area have an estimated 8 CFLs installed. Across all homes in California, about 1.5 CFLs purchased in the past three years are in storage, whereas all households in the Comparison Area have about 1 CFL in storage. Among CFL users, households in California have 3.4 CFLs in storage, and those in the Comparison Area have a significantly fewer 2.3 CFLs in storage. The CFL installation rate for CFL purchasers in California is 66% and in the Comparison Area it is 73% (Table 36).

Table 36. Installation and Storage of CFLs – Past Three Years  
(base – all respondents; weighted to CA IOU households for each state)<sup>a</sup>

		n	Average # of Products, all households	Average # of Products, households with CFLs
California	Installed	322	3.5	8.0
	In Storage	319	1.5	3.4
Comparison Area	Installed	800	3.5	8.0
	In Storage	793	0.9	2.3 <sup>c</sup>

<sup>a</sup> "Don't know" responses have been removed from the calculations.

<sup>b</sup> Not including bulbs purchased in past 3 months

<sup>c</sup> Sum of installed and in-storage products does not necessarily equal total products, due to the fact that some products may have been removed from service, or may be unaccounted for by respondent.

<sup>d</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

#### 4.7 Status of CFLs Purchased in Past Three Months

Among products purchased in the past three months, purchasing households in California have slightly but not significantly fewer CFLs installed than do households in the Comparison Area

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(4.4 and 5.2 CFLs, respectively). California households also have more recently purchased CFLs in storage than do households in the Comparison Area (4.1 and 3.8 CFLs, respectively). None of these differences are significant (Table 37).

**Table 37. Installation and Storage of CFLs Recently Purchased – Past Three Months (base – all respondents)<sup>a</sup>**

		n	Average # of Products, all households	Average # of Products households with CFLs
California	Installed	118	0.7	4.4
	In Storage	93	0.5	4.1
Comparison Area	Installed	312	0.9	5.2
	In Storage	219	0.5	3.8

<sup>a</sup> Don't know responses have been removed from the calculations.

<sup>b</sup> Includes bulbs given to participants in past three months.

<sup>c</sup> Number of bulbs reported installed or in storage exceeds bulbs purchased and given the in past three months by 144,321 weighted bulbs

## 4.8 Satisfaction with CFLs

The survey asked respondents to rate their satisfaction with a number of attributes related to CFLs using a scale of 0 to 10, with 0 being 'not at all satisfied' and 10 being 'very satisfied.' As Table 38 shows, California respondents give high overall satisfaction ratings to CFLs currently in their homes. They also give high ratings to having a constant light output/no flickering and the brightness of light. California respondents give the lowest satisfaction ratings to CFL lifetimes before burning out and retail price. Overall satisfaction in the Comparison Area is about the same as in California, and respondents in the Comparison Area also give high satisfaction ratings to having a constant light output/no flickering. While the Comparison Area also gives the lowest ratings to CFLs' lifetimes before burning out and retail price, these ratings are significantly lower than in California, perhaps because more of them were first exposed to CFLs after they had been improved and had decreased in price. These satisfaction ratings may be influenced in part because the IOU programs have supported PEARL and the national ENERGY STAR lighting program to monitor and improve product quality by funding quality assurance efforts and encouraging suppliers in California to provide CFLs that go beyond the ENERGY STAR standards.

**Table 38. Satisfaction with Factors Related to CFLs**  
**(base – respondents who previously used or currently use CFLs)<sup>a</sup>**

	California (n=564)	Comparison Area (n=1228)
	Average	Average
Overall satisfaction with CFLs currently in home	8.3	8.2
Constant light output/no flickering	8.4	8.6
Brightness of light	8.0	7.8
Fit in light fixtures	7.9	7.9
Amount of time to light up	7.9	7.3
Color of light	7.7	7.6
Look in light fixtures	6.9	6.5
How long CFLs last before burning out	6.4	5.3 <sup>σ</sup>
Retail Price	6.4	5.3 <sup>σ</sup>

<sup>a</sup> Don't know responses removed from the analyses.

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

The survey asked respondents who rated their overall satisfaction anything less than ‘10 – very satisfied’ to describe why they are not completely satisfied with CFLs. A large number of respondents in California (31%) and the Comparison Area (26%) had no complaints about CFLs. Many of the issues identified were very specific and the sample sizes were small, so they were grouped by general categories to provide a flavor of the types of issues respondents encounter.

Issues related to light quality are among the chief issues identified. These include: the time it takes for CFLs to reach full brightness, issues related to light output (both too bright and not being bright enough), and light color. Other reasons for dissatisfaction are related to physical or technical limitations of CFLs, such as the bulb shape and their fit in fixtures, bulb appearance, or the fact some CFLs do not work with dimmers and three-way fixtures. Another major category of dissatisfaction focuses on safety or hazards associated with CFLs, such as mercury content. Significantly more respondents in California versus the Comparison Area were concerned with the brightness of CFLs and the ability to use CFLs on a dimmer. Significantly more respondents in the Comparison Area versus California were concerned with the mercury content in CFLs, that CFLs are fragile or break easily, CFL expense, and using CFLs in cold weather.



**Table 39. Reasons for Dissatisfaction with CFLs**  
**(base – respondents not satisfied with CFLs; multiple response)**

	California	Comparison Area
n	286	535
None identified	30.6%	25.6%
Light Quality		
Take too long to come on/come to full brightness	9.1	10.9
Not bright enough	8.9	8.2
Too bright	3.4	1.8
Brightness (unspecified)	3.4	1.1 <sup>σ</sup>
Light color	7.2	6.8
Burn out/did not last	3.0	5.3
Flickering	1.5	0.8
Light quality	1.1	0.2
Humming/buzzing noise	1.1	0.6
Interfere with other electronics	0.6	0
Do not work in cold weather/outdoors	0	1.1 <sup>σ</sup>
Physical/Technical Features		
Size/Shape/Fit of fixture	8.8	7.3
Appearance/Unattractive	5.5	8.0
Can't be used on dimmer	3.7	1.5 <sup>σ</sup>
No 3-Way	2.2	1.8
Safety/Hazards		
Mercury/Disposal	3.4	6.1 <sup>σ</sup>
Health/Fire Hazard	0.9	0.9
Fragile, break too easily	0.3	1.4 <sup>σ</sup>
Bad for environment	0.3	0.6
Other		
Expensive	1.9	6.7 <sup>σ</sup>
Need more info/wattage info/savings evidence	1.9	1.7
Other (misc.)	1.3	1.9

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

#### **4.9 Concerns with CFLs and CFL Disposal**

The survey asked respondents if they were aware of any concerns associated with CFLs. The majority (69%) of households in California and Comparison Area (70%) identify no concerns associated with CFLs. Chief among the concerns identified are issues related to the safety or hazards associated with CFL disposal or breakage. Almost 8% in both areas say CFLs require special disposal or must be recycled, and about 6% in both areas explicitly identify mercury as a concern. Small numbers of respondents in both areas identify other safety issues, such as fire hazard, hazards of broken bulbs, and smell on burn-out.

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Table 40 lists another set of concerns that small numbers of respondents in both areas identify, related to technology limitations of CFLs, such as light color, brightness (both too bright and not bright enough), and poor fit in fixtures. Other concerns include those related to CFL retail price, appearance, or information needs, such as needing better wattage equivalency information or better ways of documenting savings.

**Table 40. Concerns Associated with CFLs**  
**(base – all respondents; multiple response)**

	California	Comparison Area
n	667	1590
None	69.3%	69.5%
Mercury/Hazards		
Requires special disposal/Must be recycled	7.6	8.0
Mercury	5.5	6.3
Hazard if broken/fragile	0.8	1.2
Fire hazard	0.3	0.8
Smell on burn-out	0.1	0.1
Quality/Technical Features		
Color of light	1.6	0.2 <sup>σ</sup>
Not bright enough	1.4	1.1
Too bright	0.5	0.1
Poor fit in fixtures/Bulky	1.1	0.3 <sup>σ</sup>
Flickering	0.8	0.2 <sup>σ</sup>
Not for use with dimmer, 3-way, sensors, timer	0.8	0.6
Appearance/Do not like way they look	0.6	0.5
Slow start-up/Delay coming on	0.6	0.8
Burn out too soon/short life	0.2	0.3
Quality (misc.)	0.4	0.3
Other		
Expensive	1.5	1.4
Need more info about wattage/savings	0.5	0.4
Do not like/no benefits/not convenient	0.5	0.3
Other	5.9	6.3
Don't know	0.3	1.6 <sup>σ</sup>

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

The environmental benefits of using CFLs related to reduced electricity use and production needs include reduced air pollution and greenhouse gas emissions. CFLs containing mercury, which poses risks to exposed individuals and the environment, concerns many. Proper disposal of CFLs through a source that can recycle them mitigates the concern about mercury release, but collection and recycling programs are not available or accessible for all consumers. The survey asked respondents if they had concerns about CFL disposal.

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As Table 41 shows, the majority of respondents in California (59%) and the Comparison Area (62%) identify no concerns about CFL disposal. Concerns identified in the two areas are largely the same: 19% in both areas say they have a concern that CFLs require special disposal or must be recycled, and about 7% of respondents in California explicitly name mercury as a concern, versus 9% in the Comparison Area (significantly different). Significantly more respondents in California than the Comparison Area (3% versus 0%) also say they need more information about disposal or do not know how to properly dispose of CFLs.

**Table 41. Concerns with Disposal of CFLs**  
**(base – all respondents; multiple response; weighted to CA IOU households for each state)**

	California	Comparison Area
n	667	1591
None	59.0%	61.7%
Requires special disposal/Must be recycled	19.3	19.4
Mercury	6.7	9.2 <sup>σ</sup>
Need more information/Do not know how to properly dispose of CFLs	3.3	0 <sup>σ</sup>
Fire hazard	0.1	0.1
Other	6.3	4.0
Don't know	0	5.5 <sup>σ</sup>

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

As Table 42 shows, small proportions of households have disposed of at least some CFLs, but significantly more households in California compared to the Comparison Area have encountered this phase of CFL life (35% versus 26%). Significantly more households in California recycled or dropped their spent CFLs at a waste center compared to the Comparison Area (32% versus 19%). Even so, the majority of households in both areas threw spent CFLs in the trash, although significantly more did so in the Comparison Area (72%) compared to California (63%).

**Table 42. How Respondents Disposed of CFLs**  
**(base – respondents who have disposed of CFLs)**

	California	Comparison Area
n	667	1590
Respondent Has Disposed of CFLs	35.0%	25.6% <sup>σ</sup>
Respondent Has NOT Disposed of CFLs	63.3	72.7 <sup>σ</sup>
Don't know / Refused	1.6	1.7
n	239	418
Threw away in trash	62.8%	71.9% <sup>σ</sup>
Recycled/dropped off at waste center	31.7	18.6 <sup>σ</sup>
Still have/Storing	0.5	0
Other	9.7	6.2
Don't know	5.0	3.3

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

#### **4.10 ENERGY STAR Awareness**

Survey respondents were read the following brief description of the ENERGY STAR label:

The label is a blue and white label with the word 'energy' followed by a five-pointed star. ENERGY STAR labels are used by the Environmental Protection Agency and the Department of Energy to identify and label highly energy-saving lighting and appliances for consumers.

Respondents were instructed to use a scale of 0 to 10, with 0 being 'not at all familiar' and 10 being 'very familiar' to rate how familiar they were with the ENERGY STAR label. As Table 43 shows, respondents in California rate their familiarity higher than do respondents in the Comparison Area, but slightly fewer respondents in California compared to the Comparison Area say they have seen the ENERGY STAR label on CFL packaging or displays (44% versus 46%).

**Table 43. Familiarity with the ENERGY STAR Label**  
**(base – all respondents)**

	California	Comparison Area
n	683	1671
Level of familiarity with ENERGY STAR label on household products	6.4	5.4 <sup>σ</sup>
n	606	1408
Have seen ENERGY STAR label on CFL packaging or displays	44.2%	46.3%

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

### 4.11 Light Emitting Diodes (LEDs)

Light-emitting diodes are a solid-state lighting technology that for years has been used as indicator lights and novelty products in various small electronic applications. Recently, the technology has advanced into the household lighting market, and the ENERGY STAR program has initiated a qualification process to include LEDs as a new category of energy-efficient lighting. As the technology develops, LEDs are expected to exceed the lumen output and energy savings potential of CFLs and be adaptable to a wide range of household lighting applications. To gauge some initial awareness and adoption of LEDs in household applications, the survey asked respondents a series of questions about their awareness and use of the technology.

Over half of households (55%) in the California IOU service territory are familiar with LED products designed as lamps, fixtures, and bulbs intended for household use. About 8% of households say they currently use LED lamps, fixtures, or bulbs for regular household lighting. Table 44 shows awareness of LEDs in the Comparison Area is 50%, which is significantly less than in California, but a similar number say they currently use LEDs (6%). The on-site saturation study should provide additional information about the presence of these products.

**Table 44. Familiarity with LEDs**  
**(base – all respondents)**

	California	Comparison Area
n	699	1757
Familiar with LEDs	54.5%	50.4% <sup>σ</sup>
n	394	900
Currently using LED lamps, fixtures, or bulbs for regular household lighting	7.8%	6.3%

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

### 4.12 Environmental Attitudes

The survey included a short battery of questions intended to assess respondent attitudes related to energy and the environmental impact of energy use. Based on agreement and disagreement with a number of statements, Table 45 shows a pattern of respondent concern about energy and environmental issues and a willingness to pay more for efficient products or engage in behavioral adjustments to reduce energy consumption. Respondents from the Comparison Area were significantly more likely to disagree with the statements that suggest a lack of concern or ability to change their energy consumption patterns, which could indicate a stronger commitment to energy and environmental issues than respondents in California, or perhaps it could mean that people in California are more accustomed to state government and utility conservation efforts and think it is less up to them as individuals.

Specifically, respondents from the Comparison Area were more likely to disagree with the statement “*I am not very concerned about the amount of energy used in my home*” (89%) versus

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for California respondents (86%). Comparison area respondents were also significantly more likely to disagree with the statement “*People like me are such a small part of the whole energy consumption picture that it really doesn’t matter how I use energy*” (89%) versus California respondents (81%). Comparison Area respondents were significantly more likely to disagree with the statement “*I would not pay more for a product that was energy efficient*” (79%) versus California respondents (74%).

Subsequent analysis of the survey data will include an investigation of CFL purchases and agreement with these energy and environmental attitudes.

**Table 45. Agreement with Environmental Statements  
(base – all respondents)**

		California	Comparison Area
n		694	1685
I am not very concerned about the amount of energy used in my home.	Strongly disagree	67.8%	72.1% <sup>σ</sup>
	Somewhat disagree	17.7	16.4
	Somewhat agree	8.5	5.6 <sup>σ</sup>
	Strongly agree	6.1	5.9
n		681	1674
People like me are such a small part of the whole energy consumption picture that it really doesn’t matter how I use energy.	Strongly disagree	67.4%	68.7%
	Somewhat disagree	13.6	20.0 <sup>σ</sup>
	Somewhat agree	9.2	7.6
	Strongly agree	9.7	3.7 <sup>σ</sup>
n		692	1688
Every home should make a real effort to save energy.	Strongly disagree	1.3%	1.0%
	Somewhat disagree	1.0	0.6
	Somewhat agree	14.6	14.2
	Strongly agree	83.1	84.2
n		672	1632
I would not pay more for a product that was energy efficient.	Strongly disagree	44.8%	44.6%
	Somewhat disagree	29.5	34.0 <sup>σ</sup>
	Somewhat agree	16.0	13.6
	Strongly agree	9.6	7.7

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

### 4.13 Demographics

The following demographic comparisons are between the 699 California respondents and demographic information from The California Energy Commission's Consortium RASS.<sup>102</sup> The comparisons present the unweighted results from the California respondents compared to the

<sup>102</sup> <http://websafe.kemainc.com/RASSWEB/DesktopDefault.aspx?tabindex=0&tabid=1>

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RASS results, which are weighted by utility. As noted above, both the California and comparison states were weighted to reflect the home ownership and education as indicated by RASS. Also included are unweighted demographic comparisons from 579 respondents in Georgia, 525 respondents in Kansas, and 653 respondents in Pennsylvania. These are provided for illustrative purposes only; more detailed comparisons of these states to ACS will be provided in the final report.

Home ownership rates, education levels, and household incomes indicate the respondents to the 2008 California CFL User Survey seem to have a higher socioeconomic status than those reported through RASS. Respondents to the 2008 California CFL User Survey are most likely to own their homes (73%) (Table 46). This is a significantly higher percentage than the RASS data.

**Table 46. Home Ownership Status**  
(base – all respondents; households in IOU service territory, RASS)

	California (unweighted)	RASS	Georgia	Kansas	Pennsylvania
n	699	20,534	579	525	653
Own	75%	66% <sup>σ</sup>	86%	87%	86%
Rent	25	33 <sup>σ</sup>	14%	13	14
Don't know/Refused	0	1 <sup>σ</sup>		.2	0

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

Turning to socioeconomic status, the percentage of respondents from the 2008 California CFL User Survey having pursued education after high school (74%) is significantly higher than the RASS data (71%) (Table 47). Over one-half (51%) of the survey respondents have a college or graduate degree, compared to 44% for California residents overall, as represented by RASS data.

**Table 47. Educational Attainment**  
(base – all respondents, households in IOU service territory, RASS)

	California (unweighted)	RASS	Georgia	Kansas	Pennsylvania
n	699	20,534	579	525	653
Less than high school grad	8%	11% <sup>σ</sup>	7%	4	4
High school grad	16%	16%	23	23	33
Some college or Technical/Trade School grad	23%	27% <sup>σ</sup>	23	26	24
College graduate or Some graduate school	33%	28% <sup>σ</sup>	27	29	23
Graduate degree	18%	16%	17	11	12
Don't know/refused	3%	3%	4	6	4

<sup>a</sup> To increase comparability to RASS data, some categories have been combined

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

Respondents to the 2008 California CFL User Survey are more likely to have incomes greater than \$49,999 (Table 48). In particular, over one-third (38%) of the survey respondents report

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incomes greater than \$75,000, compared to 25% for California IOU customers, as represented by RASS data.<sup>103</sup>

**Table 48. Income Level**  
**(base – all respondents; households in IOU service territory, RASS)**

	California (unweighted)	RASS	Georgia	Kansas	Pennsylvania
N	699	20,534	579	525	653
Under \$20,000	7%	16% <sup>σ</sup>	10%	10	10
\$20,000 to \$49,999	17	28 <sup>σ</sup>	20	25	25
\$50,000 to \$74,999	17	16	15	19	17
\$75,000 to \$99,999	14	9 <sup>σ</sup>	12	10	10
\$100,000 to \$149,999	13	9 <sup>σ</sup>	10	7	7
\$150,000 and over	11	7 <sup>σ</sup>	7	4	4
Don't know/Refused	21	15 <sup>σ</sup>	26	25	27

<sup>a</sup> To increase comparability to RASS data, some categories have been combined

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

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<sup>103</sup> Income has been found to predict CFL usage, making it a good candidate for weighting purposes. However, survey respondents frequently refuse to answer this question. To weight by income, we would either have to assume categories for the missing data, or eliminate these respondents from the analysis. Education can be a proxy for income (positively correlated) and survey respondents tend to be more willing to provide this information, so we used it, along with tenancy, as a weighting variable for the CFL User Survey.





## 5. PRELIMINARY UPSTREAM MARKET ACTOR INTERVIEW FINDINGS

### 5.1 Summary of Findings

Another key data collection activity expected to yield valuable information for the analysis of current and historical retail CFL sales patterns as well as CFL pricing trends are interviews with upstream market actors (manufacturers and retailers). A total of 24 manufacturers supplied the CFLs rebated through the 2006-2007 ULP. The CFL Market Effects Team coordinated the incorporation of a series of additional questions that explicitly address market effects into the interview guides already being prepared as part of the Residential Retrofit evaluation. All the issues addressed through the manufacturer and retailer in-depth interviews, including these newly-added market effects topics, are as follows:

- Program participation characteristics, motivation.
- Sales data request, program sales confirmation.
- Recent program trends and policies.
- Free-ridership assessment
- Spillover, other market effects assessment.
- Supply chain characterization.
- Stocking practices (retailers only).
- Program leakage assessment.<sup>104</sup>
- Pricing practices.
- Market characterization (market share, policies, global sales).
- Product quality, recycling.
- Program satisfaction.

The findings in this section are based on the 33 in-depth interviews conducted to date.<sup>105</sup>  
Individuals interviewed include:

- Representatives of 16 lighting manufacturers<sup>106</sup> who participated in the 2006-2008 California Upstream Lighting Program (ULP). One of these manufacturers dropped out

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<sup>104</sup> Leakage is the sale of ULP-discounted CFLs to consumers who are not customers of the California IOUs (PG&E, SCE, and SDG&E). These sales may be to non-IOU customers in California or to non-California customers. Some internet sales of ULP-discounted bulbs have been identified, although the extent of these sales is still being assessed.

<sup>105</sup> In 30 of these cases a single manufacture/retailer representative was interviewed. In three of the cases we simultaneously interviewed two representatives of the same company. Therefore although 33 interviews were conducted, a total of 36 representatives participated in the interviews.

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of the program in 2007. Together, these manufacturers accounted for about 94% of ULP sales.<sup>107</sup>

- Representatives of 16 lighting retailers who also participated in the 2006-2008 California ULP. These retailers accounted for almost 75% of ULP program sales and represented all the major retail channels participating in the program.
- A representative of one lighting retailer who did not participate in the 2006-2008 California ULP.

The large majority of the lighting manufacturer interviews were conducted from July to September of 2008, and the majority of lighting retailer interviews were conducted from August to October 2008. Although each company was interviewed individually, we found that the lighting manufacturers and retailers generally told a consistent story. In cases where their perspectives differed, these differences usually corresponded with differences in market position (e.g., large, established manufacturers vs. new, smaller manufacturers) or retailer offerings (e.g., large home improvement vs. discount stores). Within these subgroups the perspectives were very similar. With a few exceptions, all of the statements made, or conclusions drawn, in this section are based on information obtained from both the manufacturer and retailer perspectives. The few exceptions are those questions that were addressed only to manufacturers or only to retailers.<sup>108</sup>

The interview guides we used in our discussions with manufacturers and retailers are presented in Appendix C.

### ***ULP Effects on California CFL Market Entry***

The California IOUs' ULP offered many lighting manufacturers the opportunity to enter the California retail CFL market for the first time. Only slightly more than a third of the current ULP-participating manufacturers were selling CFLs in California at retail prior to joining the ULP. Most of them entered this market during the 2001-2006 period. Those manufacturers who had not been selling any CFLs in California before getting involved with California lighting rebates programs rated these programs extremely significant (10 using a 10-point significance scale) in influencing their decisions to enter the California lighting market.

The entry of all these new manufacturers into the California CFL market caused a number of changes to the market. First these new manufacturer entrants introduced CFLs into retail channels where they were not previously sold, thereby introducing CFLs to customers who, because of price barriers, had not previously purchased CFLs. Second these new entrants have

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<sup>106</sup> For the sake of simplicity and brevity, we use the term "manufacturers" to generically refer to those companies which supply CFL products to California retailers. In some cases, these companies own their own manufacturing facilities, while in other cases they contract out manufacturing capacity and are essentially resellers or importers. The Team did not have enough information to definitively determine which companies own their own manufacturing capacity and which do not. Further complicating the distinction between manufacturers and resellers/importers, some companies started as manufacturers and then sold their factories and became resellers, whereas others started as resellers and have recently acquired factory capacity.

<sup>107</sup> Because we do not yet have complete 2008 ULP tracking data, these estimates are based on 2006-2007 tracking data.

<sup>108</sup> For example, the questions about production costs and capacities were only addressed to the manufacturers. Questions about how the California rebate programs have affected the allocation of shelf space for CFLs were only addressed to retailers.

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increased price competition in the California CFL market. For example, these new manufacturers are willing to sell their products at a lower markup than the more established brand-name manufacturers and in many cases offer their CFLs for free to the retailers they supply. This price competition has forced more established manufacturers to join the ULP. They did so because they had lost key accounts to the new manufacturer market entrants and because they received requests from their remaining retailers to become more price-competitive in the California market. More details about these market changes appear in Section 5.2.1 and Section 5.2.2.

Just over one-quarter of the participating retailers surveyed were not selling any CFLs at all before joining the ULP. This group includes retailers who do not sell items at prices above \$1 or 99¢. It also includes grocery stores that, while not restricted to the \$1/99¢ price limit, are selling in lower-income communities where shoppers are very price-sensitive. While the discounts offered by the ULP program certainly made it possible to sell CFLs in \$1/99¢ and discount grocery stores, it was the entry of new manufacturers into the California CFL market that made it happen. The ULP tracking data reveals that new manufacturer entrants are selling their CFLs almost exclusively through these discount retailers. Interviews with these new manufacturers revealed that they turned to discount retail channels in part because they could not make deals with more established CFL retailers such as big box and large home improvement chain stores.

#### ***ULP Effects on California CFL Product Offerings***

A number of manufacturers said that the California rebate programs had encouraged them to produce higher-quality products than they otherwise would have. For example, by offering higher rebate levels for CFLs with higher lumen levels at specific wattages, the ULP encouraged greater production of high efficacy CFLs. Other respondents explained that the ULP requirement that discounted CFLs meet ENERGY STAR specifications led to the production of CFLs with significantly longer hours of life than bulbs they had produced just a few years earlier. The program also affected the types of CFLs being produced. The ULP rebate structure influenced a shift to higher-wattage CFLs and also encouraged some manufacturers to produce more specialty CFLs.

When asked whether the ULP rebates had influenced their CFL stocking or packaging decisions, the responses varied significantly by retail channel. Most grocery, drug, small hardware, and \$1/99¢ retailers said that the ULP did influence their stocking and packaging decisions. ULP-induced changes included selling more CFL multi-packs, giving CFLs more prominent placement in their stores, and expanding the amount of year-round shelf space allocated to CFLs. In contrast, the national big box, mass merchandise, and large home improvement retailers said that the program had little or no influence on their stocking and packaging decisions.

#### ***ULP Effects on California CFL Production Costs, Volumes, and Efficiencies***

When asked whether their firms have experienced any reductions in CFL production costs over the last ten years, 75% of the manufacturers said that they had. The remainder consisted of manufacturers who only began producing CFLs in recent years (2005-2007) and who have actually seen their production costs go up. In fact, nearly all the manufacturers said that their CFL production costs have increased since 2006 due to higher material, labor and energy costs.

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The Team asked the twelve manufacturers who had seen their production costs drop over the last ten years whether they thought that the California lighting rebate programs had been important factors in influencing these cost reductions. Eleven of the twelve manufacturers said that these programs were factors although they differed as to their level of importance. While 7 of the 12 manufacturers gave the California lighting rebate programs importance ratings of 8 or greater, the remainder gave ratings in the 2 to 5 range. The mean rating was 7.2. In explaining their ratings, most manufacturers cited the impact of the California lighting programs on increasing sales volumes. The five manufacturers who gave lower ratings noted that many other states also have lighting programs or that the California lighting programs are not available year round.

The manufacturers who gave the higher influence ratings were mostly smaller manufacturers who had entered the California lighting market in the last four years and did not have much of a retail presence outside of California. Conversely the manufacturers who gave the lower ratings were mostly larger manufacturers who had been operating in the California CFL market for at least 10 years and have a significant retail presence outside of California. Some of these larger manufacturers started in California but have since greatly expanded their CFL market reach.

We asked the twelve manufacturers who said that the California lighting rebate programs had helped reduce their production costs by what percentage they had increased their manufacturing capacity in response to the California program. Seven of the twelve provided estimates, with a mean estimate of 150%. All but one of the manufacturers providing estimates were smaller manufacturers who had entered the California lighting market in the last four years and did not have much of a retail presence outside of California. This likely explains not only the size of the manufacturing increases (percentage increases tend to be larger from smaller baselines) but also their very ability to make these estimates. Manufacturers with much broader market presences would find it more difficult to disentangle the California program effects from their overall CFL manufacturing capacity increases. Only five manufacturers were willing estimate the percentage by which this California-induced increase in CFL manufacturing capacity reduced their average CFL production costs. Their estimates ranged from an 18% to a 30% reduction in average CFL production costs with a mean of 26% and a standard deviation of 6%.

We asked all 16 manufacturers how important a factor the California lighting programs were in increasing the demand for CFL products. Twelve of them gave the California programs a high importance rating: the mean was 8.3 (on a 10-point scale). Manufacturers cited the California programs' effects on lowering CFL retail prices as the main reason for their ratings.

All the manufacturers were also asked about the importance of the California lighting programs in driving technological improvements in their factories. All but three gave importance ratings of seven or greater (on a 10-point scale). The two manufacturers who gave the lowest ratings were both "Big 3" lighting manufacturers. The mean rating was 7.6. In explaining their ratings, most of the manufacturers pointed to two factors: 1) the programs' insistence on ever-higher CFL

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standards;<sup>109</sup> and 2) the sales volumes generated by the California programs gave them the revenue streams necessary to invest in research and development for product improvements.

We also asked the lighting manufacturers whether the performance improvements they had made to their CFLs would have happened sooner, later, or about the same time without the California lighting rebate programs. Almost two thirds said that their improvements would have occurred later without the programs. The remainder said that without the program their improvements would have occurred at about the same time as they actually did. When asked how much later, six of them provided estimates of anywhere from 6 months to 2.5 years with a mean estimate of 1.4 years. In addition, slightly over half of the retailers thought that their CFL product improvements would have happened later without these California programs.

### ***The Effect of the ULP on Barriers to CFL Purchase***

Ten of the sixteen manufacturer respondents and seven of the thirteen retailer respondents gave the 2006-2008 ULP credit for helping to mitigate some demand-side barriers to CFL purchase. Many manufacturers and retailers noted that by significantly reducing CFL retail prices, the ULP not only helped mitigate the customer cost barrier but also likely helped overcome some perception barriers by allowing some consumers to become familiar and comfortable with newly-improved CFL technologies for the first time. They also noted that reducing retail prices made CFLs available in retail channels that previously had not carried CFLs. Finally a couple of manufacturers credited the ULP for providing larger incentives for specialty CFLs and for promoting other emerging lighting technologies.

We also asked manufacturers and retailers an open-ended question about whether CFL product discount programs like California's ULP have affected consumer attitudes towards the quality of CFL products in any way. The most common response was that by lowering CFL retail prices the ULP is encouraging the introduction or reintroduction of consumers to newer, improved CFL technologies.

### ***The Effect of California Rebate Programs on Other States***

A large majority of manufacturers (81%) and retailers (65%) believe that the California rebate programs have had influenced the level of sales of CFLs in other states. By far the most common explanation was that other states had looked to the California programs as models (in particular, the general upstream lighting program concept) in creating their own rebate programs, which in turn had boosted sales. Other ways that manufacturers and retailers said the California rebate programs have influenced CFL sales in other states include increasing CFL production capacity, increasing general CFL awareness, and encouraging the broader distribution of better CFL products – like those with higher lumens per watts.

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<sup>109</sup> As noted earlier in this report, the California ULPs have incorporated a series of requirements to ensure higher-quality and more consumer-acceptable CFLs over time. These included requiring program-eligible CFLs to meet ENERGY STAR specifications (starting in the late 1990s), and introducing higher rebate levels for CFLs with higher lumen levels at a given wattage (in 2004). Even before the development of the ENERGY STAR CFL specifications, the ULP required CFLs to meet United Laboratories (UL) certification.

### ***Comparing the Influence of CFL Rebate Programs to Other CFL Market Drivers***

The CFL Market Effects Team named a number of possible drivers of increased CFL product sales and asked the manufacturers and retailers to rate how significant they thought the drivers were. Using a 10-point significance scale, both manufacturers and retailers gave the highest significance ratings to the rebate programs (9.1 and 8.5, respectively) and the second highest ratings to higher energy costs (8.4 and 8.0, respectively). Although the rebate programs got the highest ratings, these ratings were not significantly higher than some of the other CFL market drivers. Manufacturer and retailer ratings of the other CFL market drivers (beyond the higher energy costs mentioned above) included growing awareness of global warming (7.8 and 6.1 respectively), lower CFL production costs due to cheaper overseas production (7.6 and 7.1), CFL promotion campaigns by Wal-Mart, Home Depot, etc. (7.1 and 6.2), ENERGY STAR and Change-A-Light (6.9 and 6.3) and media stories about CFLs (6.9 and 5.9). This lends credence to the hypothesis of some that the initially strong influences of rebate programs on CFL sales levels have recently been diluted by other market drivers.

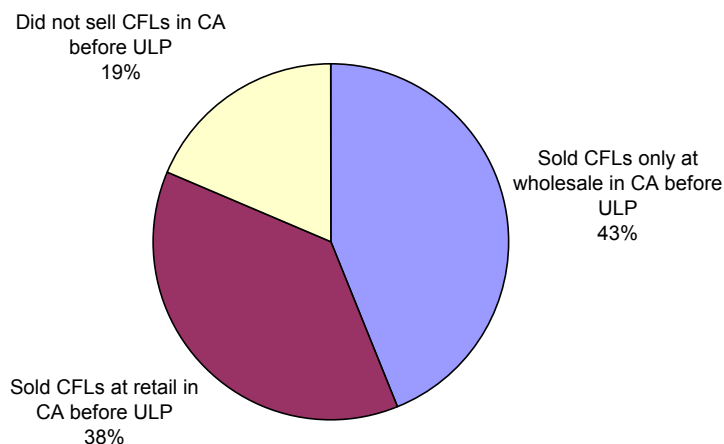
## **5.2 ULP Influence on CFL Market Evolution**

### **5.2.1 CFL Manufacturers – ULP Effects on Market Entry**

The California IOUs' ULP offered many manufacturers the opportunity to enter the California retail CFL market for the first time. Most of them entered this market during the 2001-2006 period. As Figure 21 shows, only slightly more than one-third of the current ULP-participating manufacturers were selling CFLs in California at the retail level prior to joining the ULP. Of those interviewed, the largest group included manufacturers who were selling CFLs exclusively at the wholesale level in California before becoming ULP participants. Such companies typically supplied construction companies, electrical distributors, hotels, casinos, and the Energy Service Companies (ESCOs), which installed lighting for California's Express Efficiency, Multifamily, and Low-Income programs. "Getting involved with the Upstream Program was another outlet for us to expand our business," one manufacturer commented. Some noted the ULP's requirement that CFLs meet ENERGY STAR specifications provided their companies with the necessary incentive to upgrade the quality of their CFL products (ENERGY STAR bulbs are not required for most sales to electrical distributors or builders).

Figure 21. CA CFL Retail Market Entry of ULP-Participating Manufacturers

n = 16



Four manufacturers had not been selling any CFLs in California before getting involved with California lighting rebate programs (including ULP, Express Efficiency, Multifamily, etc.). During the interviews, we asked these four manufacturers to rate the significance of the existence of the lighting rebate programs to their decisions to enter the California lighting market. Using a 0 to 10 scale – where 10 indicated “extremely significant” and 0 indicated “not at all significant” – all four manufacturers gave a significance rating of 10.

Even the manufacturers who had been selling CFLs in the California retail market before joining the ULP found the program offered new opportunities. Before the ULP, some of these manufacturers selling at the retail level had been doing so only through private retailer labels. These respondents saw the ULP as a branding opportunity. “We felt that it was a very good vehicle for us to develop a common brand name throughout California and the United States,” said one such manufacturer.

We also asked manufacturers whether the retail channels (e.g., grocery, large home improvement, etc.) through which they sold CFLs in California were the same retail channels through which they sold CFLs in other states. Almost all of them said the channels were the same. The exceptions were manufacturers that did not sell CFLs at retail before joining the ULP: most of these did not sell CFLs at retail in other states, but instead sell them through electrical distributors or government agencies.

The entries of all of these manufacturers into the California CFL market caused a number of changes to this market. First, as discussed in the next section, these new manufacturer entrants introduced CFLs into retail channels where they had not been previously sold, thereby introducing CFLs to customers who, because of price barriers, had not previously purchased CFLs.



Second, these new entrants have increased price competition in the California CFL market. For example, these new manufacturers are willing to sell their products at a lower markup than the more established brand-name manufacturers and, in many cases, offer their CFLs for free to the retailers they supply.<sup>110</sup> This aggressive pricing has allowed them to not only introduce CFLs into discount retail channels for the first time, but has also allowed them to make deals with some national chain retailers who previously had only dealt with the more established manufacturers. In fact, interviews with ULP program managers as well as manufacturers indicate these established manufacturers decided to join the ULP program because they had lost key accounts to the new manufacturer market entrants and because they received requests from their remaining retailers to become more price-competitive in the California market.<sup>111</sup>

### **5.2.2 CFL Manufacturers – ULP Effects on Product Offerings and Marketing Strategies**

Participating manufacturers were also asked whether the continuance of California’s lighting rebate programs over a number of years had any effect on the types of CFL products they sold or the way in which they sold them. The large majority of respondents (81%) said they were affected by the California programs. These effects included:

- *Encouraging manufacturers to produce higher-quality CFL products:* A number of manufacturers said the California rebate programs had encouraged them to produce higher-quality products. “[The ULP] has provided the volume necessary to justify the production processes required to meet the ENERGY STAR specifications as well as what the consumer is looking for in functionality,” said one manufacturer. “If it weren’t for the utility programs, I probably wouldn’t be selling almost all ENERGY STAR products,” said another.
- *Directing manufacturers toward producing specific CFL products:* A number of manufacturers noted they and their competitors produce the CFL products that earn the highest rebate levels from the ULP. “Any time the rebate structure is high in certain categories, then you will see a lot of those bulbs,” stated one manufacturer. For example, changes in the ULP rebate structure encouraged a shift from lower-wattage (e.g.,

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<sup>110</sup> These manufacturers are able to supply their CFLs for free because the ULP buy-down discounts exceed their costs of production. For example, some of the manufacturers cited costs of production for non-specialty CFLs in the range of \$1.20-\$1.40 per bulb; in contrast, buy-down discounts for non-specialty CFLs are most commonly in the \$1.75-\$2.00 range.

<sup>111</sup> For example, when the representative of one major lighting manufacturer was asked in 2008 why s/he had joined the ULP program, the representative said: “I think the number one reason was because the retailers ... were [receiving] requests for participation from other manufacturers and they wanted us to participate as well.” In a 2007 interview for the evaluation of California 2004-2005 Single-Family Rebate Program (which included the Upstream Lighting Program), a representative of a major lighting manufacturer said the company’s participation in the ULP was “at first, because our competition was and now it’s standard practice in the industry to participate in these programs.” A California IOU lighting program manager, who was interviewed in 2006 for this same 2004-2005 Single-Family Rebate Program evaluation said: “we started to see turn around in 2004-05 ... as these retailers were being approached with very attractive offers from manufacturers trying to leverage our utility program. It caused the major name brand manufacturers to sit up and take notice out of fear of losing shelf space in retail stores.”

10-13 W) to higher-wattage (e.g., 20-25 W) CFLs.<sup>112</sup> Higher rebate levels for CFLs with higher lumen levels at a specific wattages led to greater production of high-efficacy CFLs. Others manufacturers stated that the ULP requirement that discounted CFLs meet ENERGY STAR specifications led to the production of CFLs with significantly longer hours of life than bulbs they had produced just a few years earlier. Most recently, higher rebates for specialty CFLs (e.g., those with dimming capabilities) have encouraged some manufacturers to produce greater numbers of specialty CFLs. One manufacturer representative even suggested the spiral CFL shape itself may be a result of rebate program influences. “If you look at today’s spiral design, it probably wouldn’t have been the product of choice for a lot of manufacturers because it looks so different from everything else,” he said. “But probably utility programs had a big influence on consumers’ adoption and acceptance of those products.”

- *Moving manufacturers from exclusively wholesale to wholesale and retail sales channels:* As noted earlier, the ULP encouraged a number of lighting manufacturers who had previously supplied only construction companies, electrical distributors, large commercial customers, and ESCOs to enter the California retail lighting market.

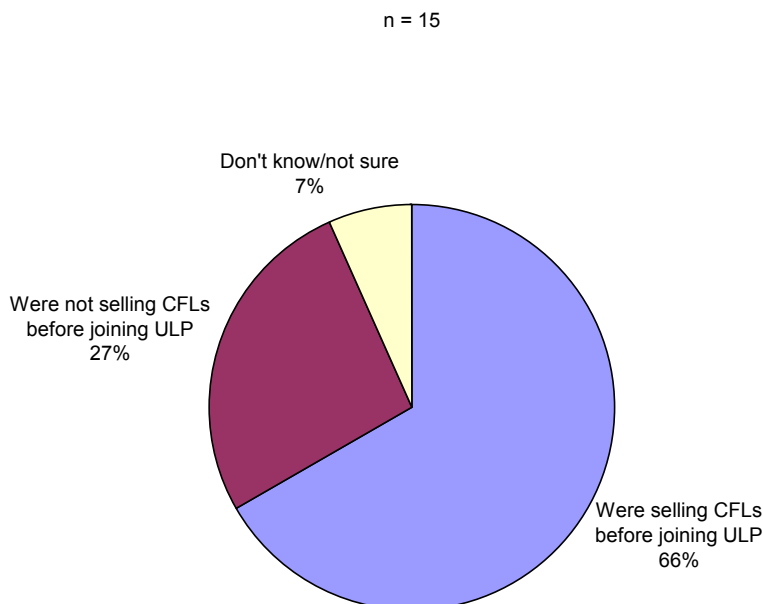
### **5.2.3 CFL Retailers – ULP Effects on Market Entry**

Just over one-quarter of the participating retailers surveyed were not selling any CFLs at all before joining the ULP (Figure 22). This group includes retailers who do not sell items at prices above \$1 or 99¢. “We sell everything for a dollar, nothing over, so that’s the only way we could sell that type of product,” explained one retailer. The group also includes grocery stores that, while not restricted to the \$1/99¢ price limit, are selling in lower-income communities where shoppers are very price-sensitive. “We didn’t sell any CFLs outside of the program and that’s because, frankly, our customers can’t afford them outside the program,” one discount grocer explained.

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<sup>112</sup> In the 2002 ULP, for example, more than 60% of the rebated bulbs were less than 18W, while in the 2004-2005 program less than one-third were. California IOUs favored the higher-wattage CFLs because they allowed for greater per-bulb energy saving claims ( $\Delta$  watts).

Figure 22. CA CFL Market Entry of ULP-Participating Retailers



Yet, while the discounts offered by the ULP program certainly made it possible to sell CFLs in \$1/99¢ and discount grocery stores, it was the entry of new manufacturers into the California CFL market that made it happen. The ULP tracking data reveals the new manufacturer entrants are selling their CFLs almost exclusively through these discount retail channels. Interviews with the new manufacturer entrants revealed they turned to discount retail channels, in part because they could not make deals with more established retail CFL channels such as big box and large home improvement chain stores.

Of the two-thirds of participating retailers who were selling CFLs before joining the program, almost all said they were selling ENERGY STAR CFLs before becoming ULP participants. However, the large majority of retailers in this group said the ULP was responsible for a significant increase in their CFL sales volume.

#### 5.2.4 CFL Retailers – ULP Effects on Product Offerings and Marketing Strategies

The survey queried participating retailers about whether the availability of the ULP rebates had any influence on their stocking or packaging decisions, such as the amount of shelf space devoted to CFLs or the number of CFL bulbs sold per package. The responses varied significantly by retail channel:

- The national big box, mass merchandise, and large home improvement retailers generally said the program had little or no influence on their stocking and packaging decisions. Two notable exceptions, however, were the two of the largest retailers in the group who said they use larger multi-packs for the ULP bulbs than for the “standard” CFL products they sell year-round and outside of California. These retailers explained that for price

setting and sales tracking purposes, it is useful to differentiate the pack size for the ULP bulbs from the standard CFL products.

- Most of the grocery, drug, small hardware, and \$1/99¢ retailers said the ULP influenced their stocking and packaging decisions. Changes made as a result of the ULP rebates included selling more CFL multi-packs, giving CFLs more prominent placement in their stores (e.g., end caps<sup>113</sup>), and expanding the amount of year-round shelf space allocated to CFLs.

Some retailers, however, noted that decisions to give CFLs more shelf space were prompted not only by the ULP, but also by the growing popularity of CFLs in general. “We’ve given CFLs a bigger presence in our planogram<sup>114</sup>...because they’ve become more popular bulbs and I can’t say that it’s directly attributable to the program,” said a drug retailer. “I’m sure the program... helps CFL sales grow and I guess, in a way, it has influenced it indirectly. But we allocate space to things that sell and CFLs are selling right now, so they get more space on the shelves.”

## **5.3 ULP Influence on CFL Production**

### **5.3.1 Background**

One theoretical market effect of the California CFL programs is they encouraged expansions in CFL production capacity, which in turn led to economies of scale reductions in CFL production costs, which finally led to reductions in CFL retail prices above and beyond any direct effects of the ULP rebates. To not lead the interviewees towards any such theory or conclusion, we asked the lighting manufacturers the following:

- Reductions in productions costs:
- Whether their firms have experienced any reductions in CFL production costs over the last ten years.
- [IF THEY HAD EXPERIENCED REDUCTIONS IN CFL PRODUCTION COSTS] How much these reductions in CFL production costs reduced the average per-bulb prices during this ten-year period.
- Causes of reductions CFL in manufacturing costs:
- [IF THEY HAD EXPERIENCED REDUCTIONS IN CFL PRODUCTION COSTS] What factors led to these reductions in manufacturing production costs.
- [IF THEY MENTIONED STATE/UTILITY REBATE PROGRAMS AS A FACTOR IN REDUCING THEIR PRODUCTION COSTS] When these rebate programs did influence these reductions in their manufacturing costs.
- The particular influence of the California rebate programs on manufacturing costs and capacities:

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<sup>113</sup> An end cap (sometimes spelled “endcap”) is the hub at the end of a retail store’s aisle where merchandise is displayed. End caps are highly visible from a store’s popular perimeter shopping areas and therefore are considered very important/valuable display locations.

<sup>114</sup> The planogram is a retailer term for a map of the store’s shelving space that shows which products are going on which shelves.

- [IF THEY HAD EXPERIENCED REDUCTIONS IN CFL PRODUCTION COSTS] Whether they thought the California lighting rebate programs in particular had been an important factor in influencing these reductions in their manufacturing costs. Manufacturers were asked to rate the importance using a 10-point scale and to explain their ratings.
- [IF THEY MENTIONED THE CALIFORNIA REBATE PROGRAMS AS A FACTOR IN INCREASING THEIR PRODUCTION CAPACITIES] How much they increased their manufacturing capacity in response to the California rebate programs and when these increases occurred.
- How important a factor the California lighting rebate programs, in particular, were in increasing demand for these CFL products. We asked them to rate the importance using a 10-point scale and asked them to explain their ratings.
- If the California rebate and discount programs went away after 2008, whether they thought their average production costs for CFLs would go up, down, or stay about the same.
- The particular influence of the California rebate programs on improvements in CFL production methods and products.
- How important a factor the California lighting rebate programs, in particular, were in encouraging technological improvements in the factories. The manufacturers were asked to rate the importance using a 10-point scale and to explain their ratings.
- If the California lighting rebate programs had not existed, whether the performance improvements they made to the CFLs they sell would have happened sooner, later, or at about the same time as they actually did. This same question was also asked of the lighting retailers.

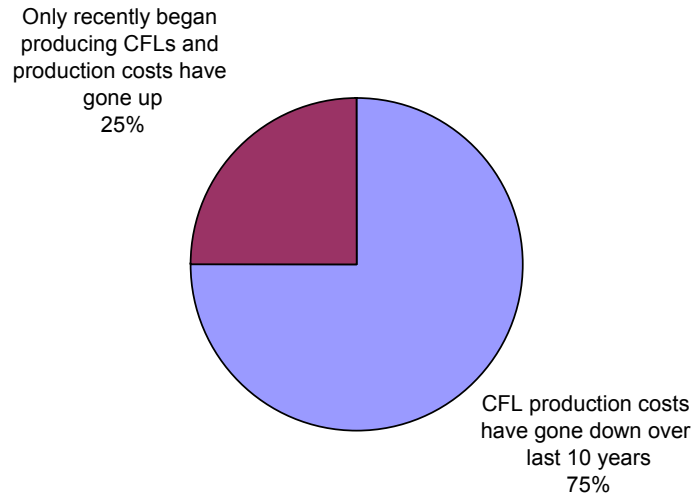
### **5.3.2 Findings**

#### ***Reductions in CFL Production Costs and Their Causes***

When asked whether their firms had experienced any reductions in CFL production costs over the last ten years, 75% of the manufacturers said that they had (Figure 23). The remainder consisted of manufacturers who only began producing CFLs in recent years (2005-2007) and who had actually seen their production costs go up. In fact, nearly all the manufacturers said their CFL production costs have increased since 2006. They cited a number of factors, including the weakening of the U.S. dollar in relation to the Chinese yuan, more expensive raw materials, higher labor costs in China, and higher oil prices that have resulted in increased shipping costs.

Figure 23. Trends in CFL Production Costs

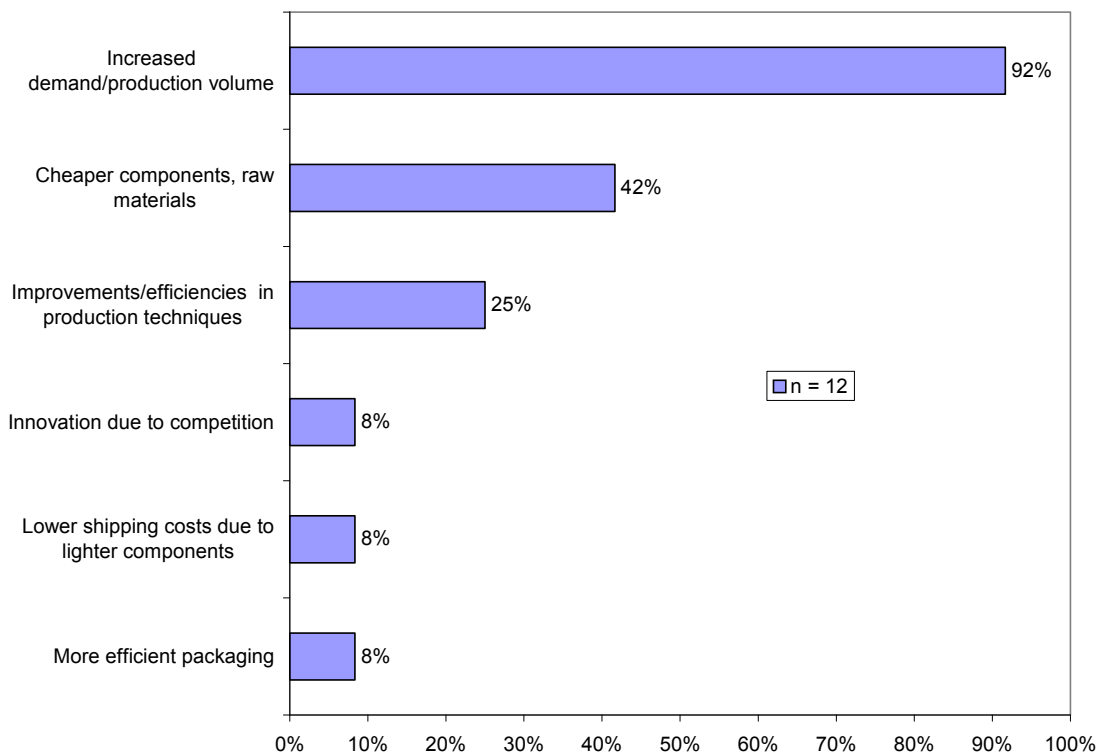
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Six manufacturers provided estimates of the size of the drops in their production costs over the past ten years. Their estimates ranged from 25%-60%, with a mean estimate of 39% and a standard deviation of 11%.

When asked about the factors that led to their reductions in manufacturing production costs, nearly all of the 12 manufacturers said it was due to increased CFL demand and production volume (Figure 24). The availability of cheaper components and raw materials as well as improvements in production techniques, such as automatic soldering, were also cited by multiple manufacturers.

Figure 24. Causes of Reduced CFL Production Costs

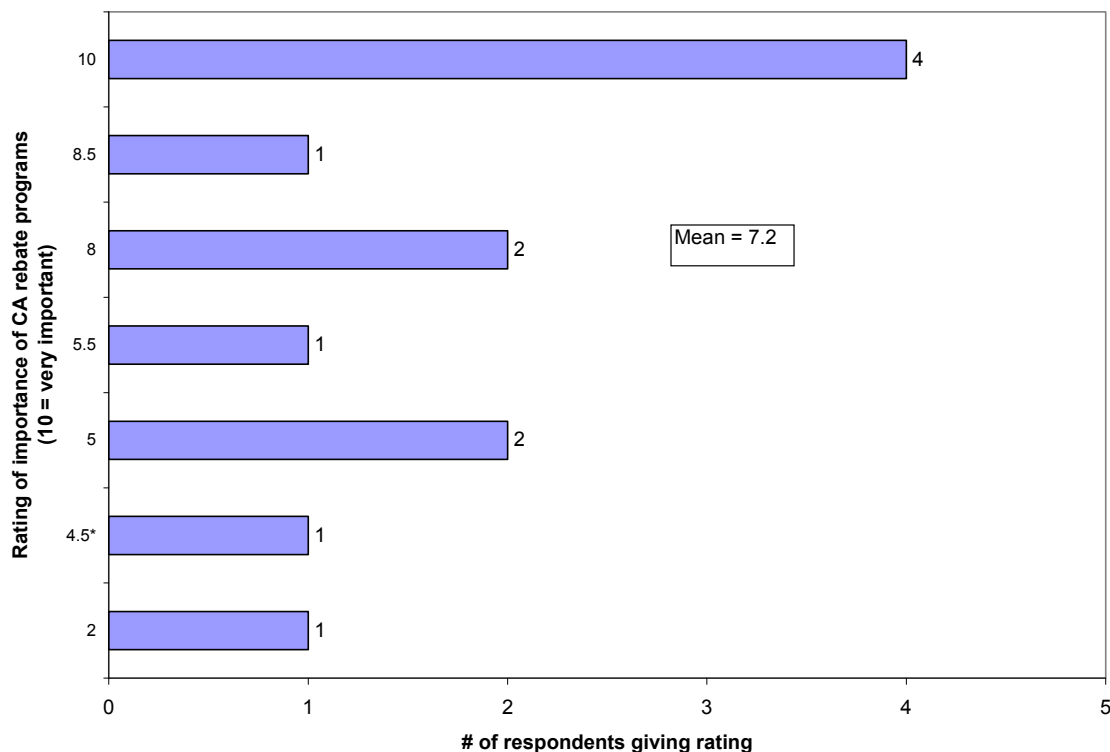


Eight of the 12 manufacturers provided estimates of the timing of the reductions in their production costs, but they differed as to when these cost reductions started, peaked, and ended. Five of the manufacturers said their cost reductions started in the 2000-2002 period. A sixth manufacturer said only when his company experienced the most significant cost reduction (2004). A seventh indicated only when the rebate programs began reducing their production costs (2006). The eighth manufacturer stated that his company's drop in production costs was fairly steady and incremental over the entire 1999-2008 period. As noted, there was a greater consensus about when the production cost reductions ended, with the majority of manufacturers saying production costs increased in the 2007-2008 period.

### ***Effect of Programs on Production Costs and Volumes***

We also asked the 12 manufacturers who had said their production costs had dropped over the last ten years whether they thought the California lighting rebate programs in particular had been an important factor in influencing the reductions in their manufacturing costs. We then asked them to rate the importance using a scale of 0 to 10, where 10 is "very important" and 0 is "not important at all." Eleven of the 12 manufacturers said these California lighting rebate programs were factors, although they differed as to the programs' level of importance. Figure 25 shows that while 7 of the 12 manufacturers gave the California lighting rebate programs ratings of 8 or greater, the remaining manufacturers gave ratings in the 2 to 5 range. The mean rating was 7.2. The 7 manufacturers who gave ratings of 8 or higher together accounted for almost half (47%) of ULP CFL sales.

Figure 25. Importance of CA Lighting Programs in Influencing Reductions in CFL Manufacturing Costs



\* This represents the average of two ratings the manufacturer gave: a 7-8 rating for the California rebate program influence four years ago, and a 1-2 rating for the influence of the California rebate program now. While the survey question used the past tense (i.e., “were”), it did not ask respondents for the specific time periods to which their ratings were applicable – e.g., “How important a factor were the California lighting rebate programs, in particular, in increasing demand for these CFL products?”

When asked to explain their ratings, most manufacturers cited the impact of the California lighting programs in terms of increasing sales volumes. The five manufacturers who gave lower ratings for the California program influence cited many other states also have lighting programs or the California lighting programs are not active for the whole year.

There appeared to be a relationship between the size and age of the lighting manufacturers and how highly they rated the influence of the California programs. Manufacturers who gave the higher influence ratings were mostly smaller manufacturers who had entered the California lighting market in the last four years and did not have much of a retail presence outside of California.<sup>115</sup>

Conversely, the manufacturers who gave the lower ratings were mostly larger manufacturers which had been operating in the California CFL market for at least 10 years and had a significant retail presence outside of California. Two of them were “Big 3” lighting manufacturers that sell

<sup>115</sup> While most of the manufacturers identified as “new” and “small” in this report are small in the sense that they generally do not have retail CFL sales outside of California, together they account for about one quarter of the ULP CFL sales.



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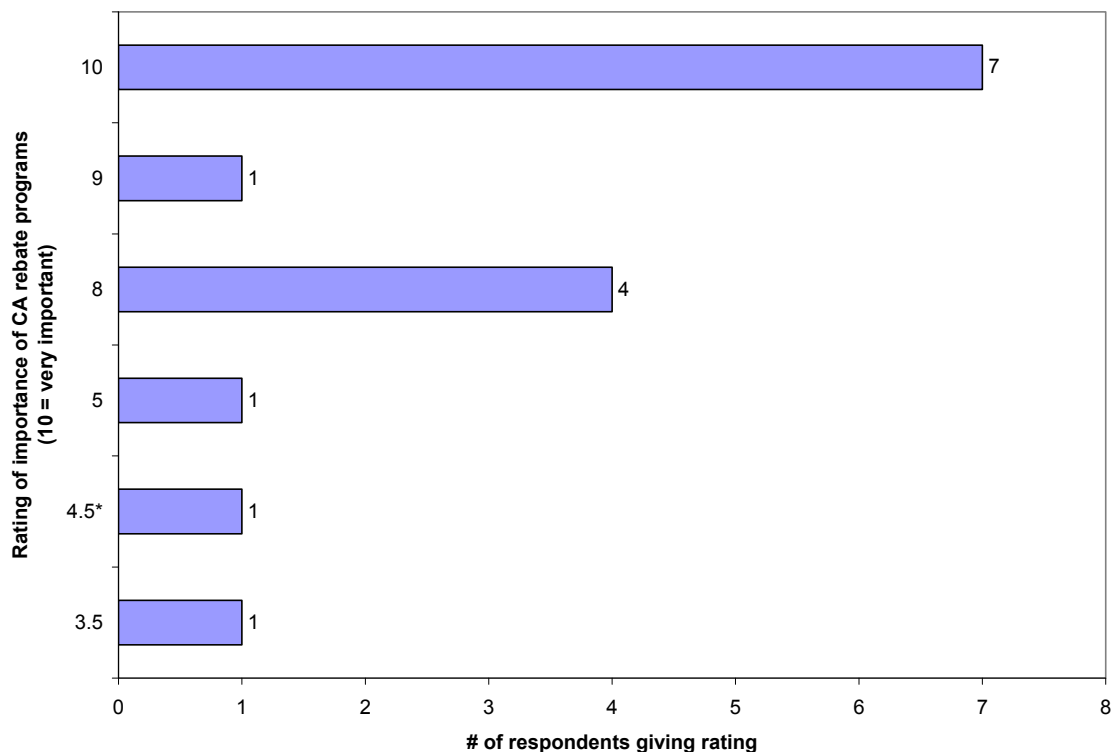
lighting products throughout the world. The others were large manufacturers that started in California, but have since greatly expanded their CFL market reach. One of these manufacturers gave a 7-8 rating for the California program's influence four years ago, and a 1-2 rating for the influence of the California rebate program now. This suggests that while the volume of CFL sales encouraged by the California programs once accounted for the majority of their sales, this is no longer the case. "The California volume was very important at the very beginning, you know, seven, eight years ago," explained one of these manufacturers. "...It was very important because it was a very significant part of the volume because the rest of the country hadn't caught on yet. And that's the time, between 1998 and 2004, of the biggest price drops because as the volume increased, the factories got better."

We asked the 12 manufacturers who said the California lighting rebate programs had been a factor in reducing their production costs the percentage by which they had increased their manufacturing capacity in response to the California program. Seven of the 12 were willing to provide estimates. The mean estimate was a 150% increase in manufacturing capacity, with three of the manufacturers providing estimates in the 30%-40% range and the other four providing estimates in the 100%-450% range. All but one of the manufacturers providing estimates were smaller manufacturers who had entered the California lighting market in the last four years and did not have much of a retail presence outside California. This likely explains not only the size of the manufacturing increases (percentage increases tend to be larger from smaller baselines), but also their very ability to make these estimates. Manufacturers with much broader market presences would find it more difficult to disentangle the California program effects from their overall CFL manufacturing capacity increases.

We found it even more difficult for lighting manufacturers to estimate the percentage by which this California-induced increase in CFL manufacturing capacity reduced their average CFL production costs. Only five manufacturers were willing to do so, although their estimates were surprisingly close. Their estimates ranged from an 18% to a 30% reduction in average CFL production costs, with a mean of 26% and a standard deviation of 6%. All five responses came from smaller manufacturers who had entered the California lighting market in the last four years and did not have much of a retail presence outside of California. Once again, this helps explain their ability to readily make such estimates when compared to manufacturers who have a broader market presence.

We asked all of the manufacturers how important a factor the California lighting programs, in particular, were in increasing the demand for CFL products over the past 10 years using a scale of 0 to 10 (where 10 is "very important" and 0 is "not important at all"). Figure 26 shows three-quarters of the manufacturers gave the California programs a high rating: the mean was 8.3. Manufacturers cited the California programs' effects on lowering CFL retail prices as the main reason for their ratings.

**Figure 26. Importance of CA Lighting Programs in Increasing Demand for CFL Products Over the Past 10 Years**

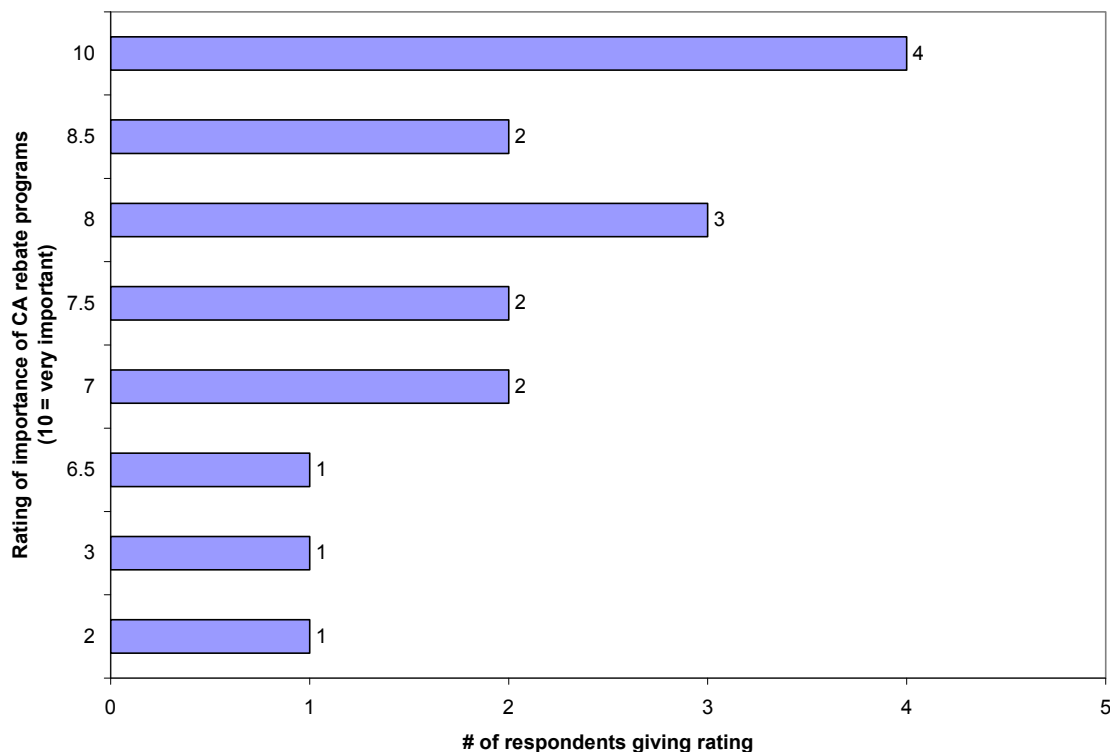


\* This represents the average of two ratings the manufacturer gave: a 7-8 rating for the California rebate program influence four years ago, and a 1-2 rating for the influence of the California rebate program now. The manufacturer chose to use the same rating as in the previous figure.

***Effect of the California Lighting Programs on Improvements in CFL Production Methods and Products***

All the manufacturers were asked about the importance of the California lighting programs, in particular, as factors in driving technological improvements in their factories. Once again, they were asked to use a scale of 0 to 10 where 10 is “very important” and 0 is “not important at all.” Figure 27 shows all but three of the manufacturers gave importance ratings of seven or greater. The two manufacturers who gave the lowest ratings were both “Big 3” lighting manufacturers. The mean rating was 7.6.

**Figure 27. The Importance of the CA Lighting Rebate Programs  
in Driving Technological Improvements in Their Factories**



In explaining their ratings, most manufacturers pointed to two factors. First was the programs' insistence on ever-higher CFL standards, beginning with the ENERGY STAR specifications, then the higher rebate levels for CFLs with higher lumen levels (at specified wattages), and finally – most recently – with the programs' push for “super CFLs.”<sup>116</sup> “I think the California programs have asked us to continually raise the bar,” said one manufacturer. “They encourage us to improve the quality and technology of a CFL,” said another manufacturer, “they really encourage us a lot.”

The manufacturers also said the sales volumes generated by the California programs gave them the revenue streams necessary to invest in research and development for product improvements. “You need quantity, you need the demand to drive technology, because without them, without money, a company cannot improve the quality of the product,” explained one manufacturer. “If [the manufacturers] make some money, then they will spend more in research and development and I believe that California has been a leader in doing that.”

The dissenting voices concerning the California rebate programs' influence on technological improvements came from two of the “Big 3” lighting manufacturers. “We have many retailers,

<sup>116</sup> The California utilities are currently working with lighting manufacturers to develop new specifications for “super CFLs” that would have to meet standards that are even more stringent than the ENERGY STAR specifications. The super CFLs would have improved color and color rendition, reduced flicker and noise, quicker time to full brightness, reduced mercury content, and improved performance in dimming applications.

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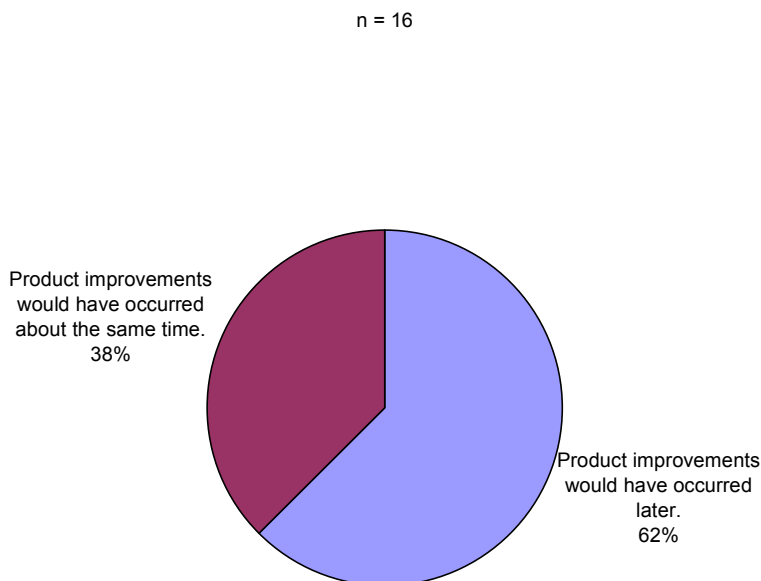
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and we sell products every day all across the country, so it's not driven by geography," said one of these manufacturers. "I'd say most of the manufacturers are doing those [technological improvements] anyway, because you want a competitive advantage, and you want to make your product better than the next guy's and you want your retail partner to have the best product in the market for the best value equation," said the other. "So we're not doing that because there's a utility program opportunity in California, we're doing it on a much larger scale to put the best product in the market that we can to meet consumer demands for it."

The lighting manufacturers were also asked, 'If the California lighting rebate and discount programs had not existed, do you think the performance improvements that have been made to the CFLs you sell would have happened sooner, later, or about the same time as they actually did?' Figure 28 shows almost two-thirds of the lighting manufacturers said their improvements would have occurred later without the programs. These manufacturers accounted for about 80% of ULP CFL sales. The remainder said that without the program their improvements would have occurred at about the same time as they actually did.

Although the manufacturers were not explicitly asked to explain their answers, eight of them did. One manufacturer who indicated his company's performance improvements would have occurred later, noted there would be less incentive to make these improvements without pressure from programs like the ULP. "The pressure is different when you don't have a regulatory group looking over," he said. "Without them, why would we worry about increasing the 6,000 to 8,000 to 10,000 hours [of bulb life]?" On the other hand, a manufacturer who thought his company's product improvement would have occurred at the same time in the absence of the rebate programs pointed to competitive pressures. "We will be continuing to improve what we have right now because there are just too many competitors out there," he said. "If we don't improve our stuff, other people are going to be ahead of us."

**Figure 28. Lighting Manufacturer Perspectives on When CFL Product Improvements Would Have Happened in the Absence of the California Lighting Programs**



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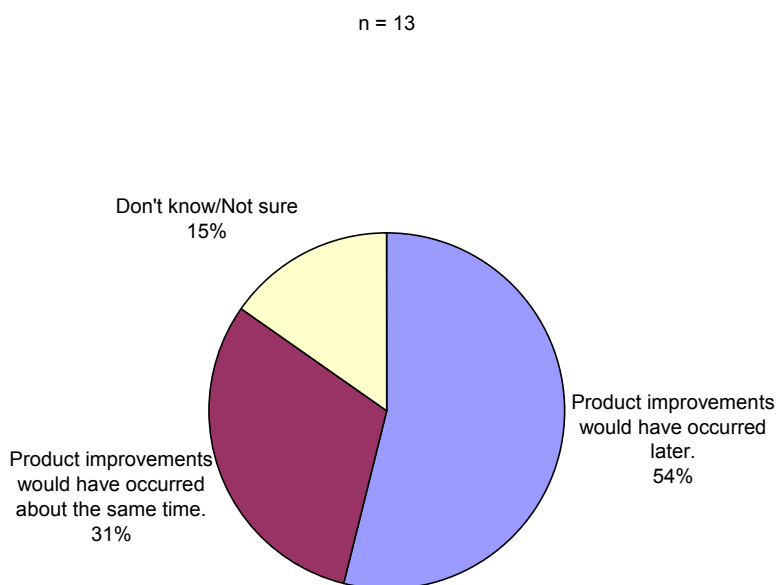
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The manufacturers who said their product improvements would have occurred later without the program were asked how much later these improvements would have occurred. Six of them provided estimates of anywhere from 6 months to 2.5 years, with a mean estimate of 1.4 years. In addition, two manufacturers said simply their product improvements would have occurred years later, but did not provide a precise time interval.

Lighting retailers were asked the same question as the manufacturers: ‘If the California lighting rebate and discount programs had not existed, do you think the performance improvements that have been made to the CFLs you sell would have happened sooner, later, or about the same time as they actually did?’ Figure 29 shows slightly over half of the retailers thought that these product improvements would have happened later.

In general, the retailer explanations for the timing of product improvements were similar to those of the manufacturers. “From the one manufacturer that I’ve heard the most from,” said one retailer who thought that product improvements would be delayed without the programs, “... it seems pretty apparent that their innovation is driven by making the utilities happy in order to get more allocations.” Conversely, when asked why he thought his product improvements would have occurred at about the same time without the program, another retailer pointed to “basic competition.”

**Figure 29. Lighting Retailer Perspectives on When CFL Product Improvements Would Have Happened in the Absence of the California Lighting Programs**



The retailers who said their product improvements would have occurred later without the program were asked how much later these improvements would have occurred. Only four provided estimates. One said 12 months, the second said three to five years, the third said “months or years,” and the last said “years.”

### 5.4 The Effect of the ULP Program on Barriers to CFL Purchase

Another interview question asked both lighting manufacturers and retailers about the most important factors limiting customer demand for CFL products. Figure 30 shows price/cost barriers and consumer fears/confusion about mercury contamination and CFL disposal were the barriers cited most often by manufacturers. Multiple manufacturers also cited five other demand-side barriers.

**Figure 30. Manufacturer Assessments of Most Important Factors Limiting Demand for CFL Products**

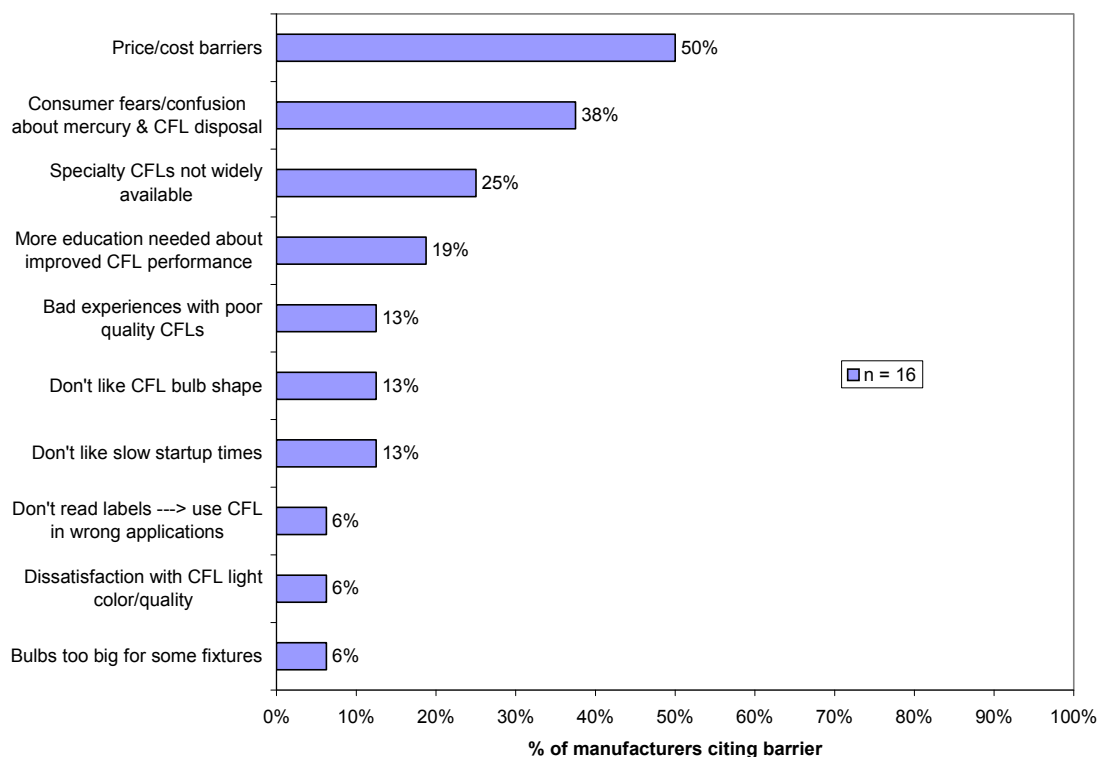
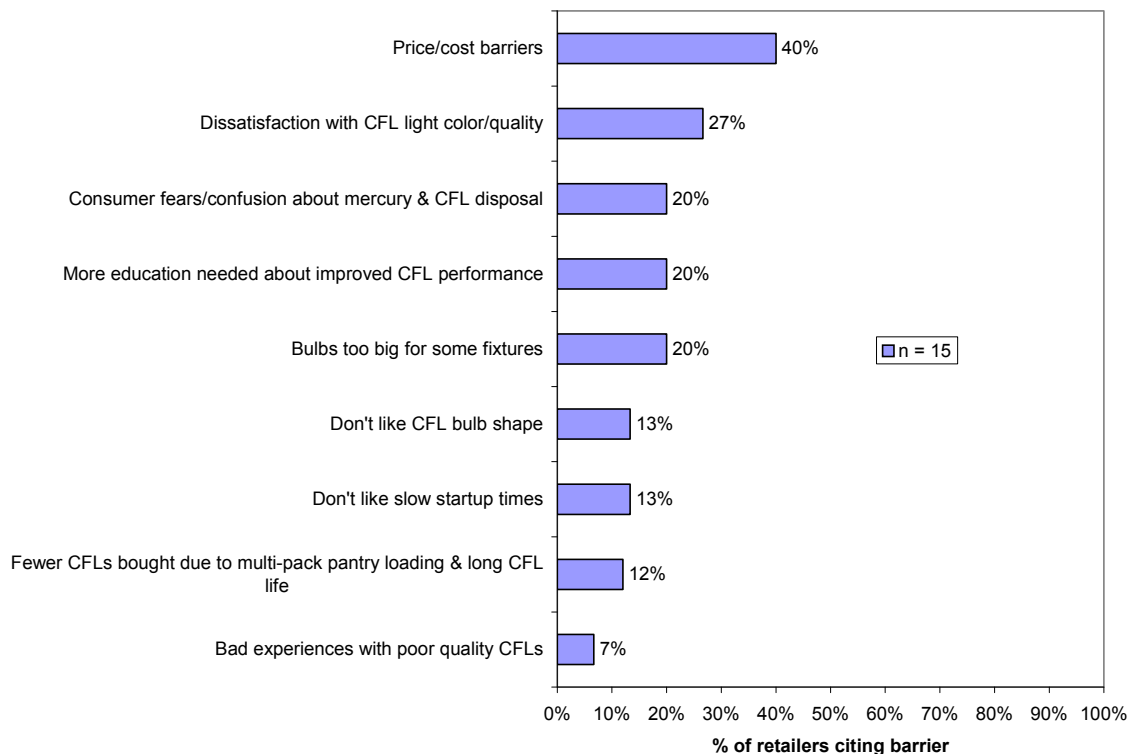


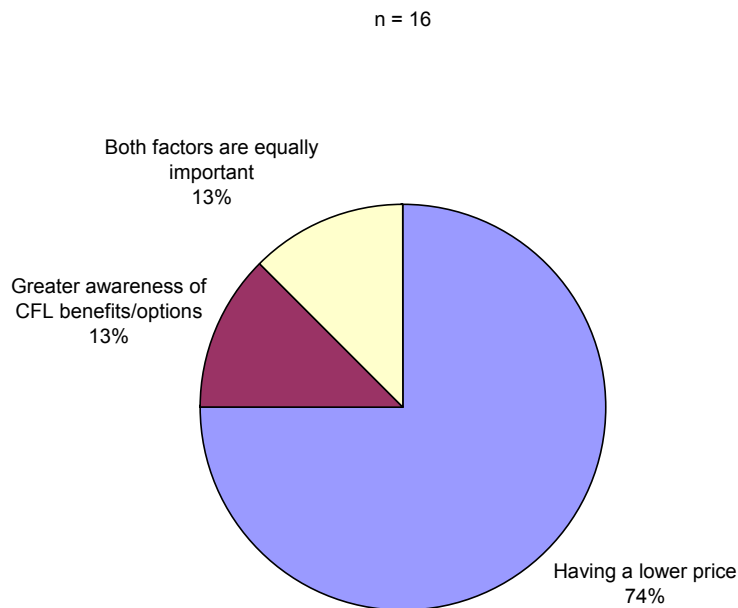
Figure 31 shows price/cost barriers and consumer dissatisfaction with CFL light color and quality were the barriers most often cited by retailers. In addition, multiple retailers cited at least six other demand barriers.

Figure 31. Retailer Assessments of Most Important Factors Limiting Demand for CFL Products



Both manufacturers and retailers claimed the recent economic downturn has made shoppers more price-sensitive and may have even led some consumers to shift from CFLs back to incandescents. The continuing importance of retail price as a barrier to CFL sales was reinforced by another question we asked manufacturers, namely: ‘What has a greater impact on the level of sales of CFL products: 1) having a lower level of price; or 2) having a higher awareness of CFL benefits and options?’ Figure 32 shows nearly three-quarters of the manufacturers responded that a lower price was the more important driver.

**Figure 32. Lower CFL Prices vs. Greater Awareness of CFL Benefits and Options as Drivers of CFL Product Sales**



Manufacturers and retailers were both asked whether the 2006-2008 California ULP played a role in reducing some of these demand barriers. Ten of the 16 manufacturer respondents and seven of the 13 retailer respondents gave the ULP program credit for helping mitigate some of these barriers. The most common responses included:

- *Reducing the consumer price barrier and increasing exposure to CFLs:* Many manufacturers and retailers noted that by significantly reducing CFL prices, the ULP not only helped mitigate the consumer cost barrier, but also likely helped overcome some perception barriers by allowing some consumers to become familiar and comfortable with newly-improved CFL technologies for the first time. They also noted reducing prices made CFLs available in retail channels that previously had not carried CFLs.
- *Promoting innovative efficient lighting technologies:* A couple of manufacturers gave the ULP credit for providing larger incentives for specialty CFLs as well as for promoting other new and emerging lighting technologies such as “super CFLs” and LEDs.

Manufacturers and retailers were also both asked whether they thought CFL product discount programs such as California’s Upstream Lighting Program affected consumer attitudes towards the quality of CFL products in any way. The most common response among both manufacturers and retailers was that by lowering retail CFL prices, the ULP is encouraging the introduction or reintroduction of consumers to newer, improved CFL technologies. “I think it’s probably a positive impact because a lot of people have very negative ideas of CFLs from when they came out years ago,” explained one retailer. “We definitely have better CFLs now than we did before. Again, it comes back to their willing to spend \$0.98 on a trial on something new versus \$3.20. If they try it, they might like it better.”



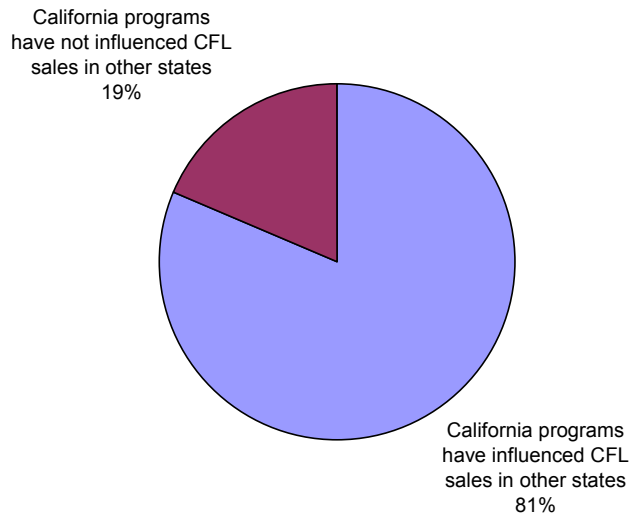
A couple of manufacturers wondered whether lowering retail CFL prices to a dollar or less might cause some consumers to think it might be a lower-quality product. Others, however, said the ENERGY STAR label and utility logos should reassure some skeptical consumers that these inexpensive bulbs are still quality products. “I think that when a consumer walks by and sees Southern California Edison is behind it, I think it adds a little bit of credibility to those people who haven’t tried it yet,” said one manufacturer. “The consumer sees that the utility is behind it, and the consumer trusts it more.”

### **5.5 Effects of the ULP on Other States**

Both manufacturer and retailer interviews asked respondents whether they thought the years of California rebates programs had influenced the level of sales of CFLs in other states. Figure 33 and Figure 34 show the large majority of manufacturers and retailers believe the California rebate programs have had these types of influences.

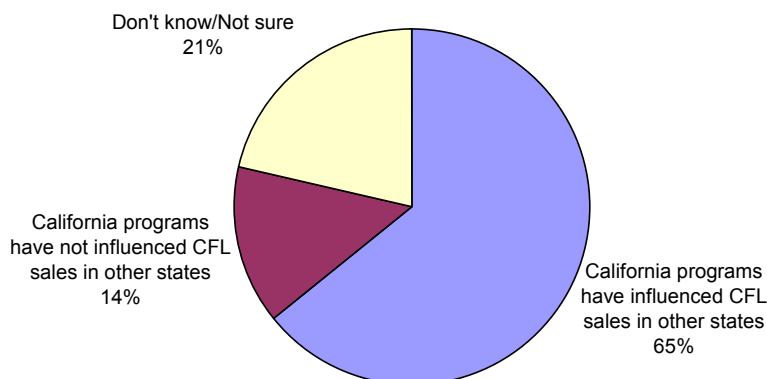
**Figure 33. Lighting Manufacturers’ Perspectives on Whether the Years of California Light Rebate Programs Have Influenced the CFL Sales Levels in Other States**

n = 16



**Figure 34. Lighting Retailers' Perspectives on Whether the Years of California Light Rebate Programs Have Influenced the CFL Sales Levels in Other States**

n = 14



We asked those responding affirmatively to explain how the California rebate programs might be influencing CFL sales in other states. By far the most common explanation was that other states had looked to the California programs as models in creating their own rebate programs, which in turn had boosted sales. “I think the California programs have influenced additional programs across the country for sure,” said one national retailer. “They’ve been a benchmark. I know that Texas and several other states are just beginning to utilize . . . success stories and best practices from California. That’s definitely had an influence.”

The fact that some states, such as New Jersey, have adopted rebate programs very similar to California’s has encouraged manufacturers who are used to the California model to participate in these new programs. The influx of new suppliers likely increases CFL price competition within the rebate programs offered in other states.

Other ways manufacturers and retailers said the California rebate programs have influenced CFL sales in other states include:

- *Increasing production capacity:* As discussed earlier, many manufacturers claim the California rebate programs encouraged them to increase their production capacity. These increased economies of scale are now benefiting CFL consumers in other states.
- *Increasing general CFL awareness:* “I think [the ULP] helped the [CFL] awareness out there,” stated one manufacturer. “It’s helping to drive it.” “The California market has been kind of a driver or an innovator in terms of the demands in the rest of the U.S., and what’s happening in consumer education and consumer knowledge,” said another manufacturer.
- *Encouraging the broader distribution of better CFL products:* One manufacturer noted how his company upgraded the lumen level of its 23W CFL from 1,380 lumens to 1,600

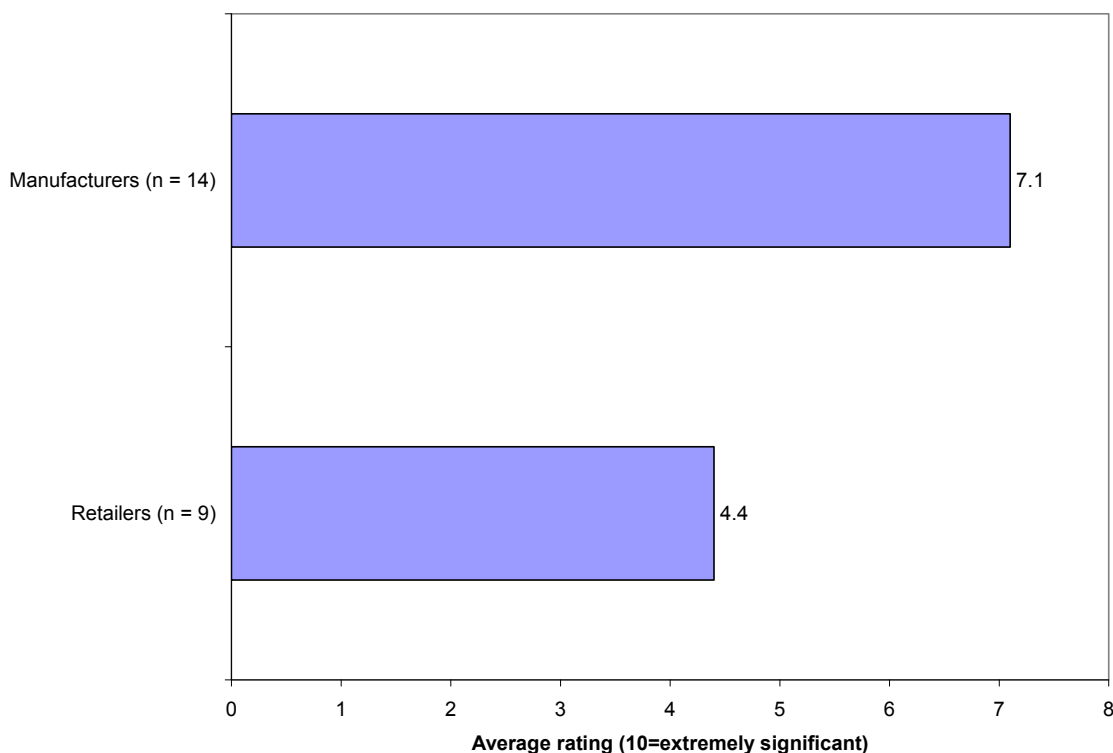
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lumens to get a larger \$2 rebate from the ULP. “And now across the entire country, I only sell the 23 Watt, 1,600-lumen lamp,” he said. “That was specifically done because the California utilities changed to go to lumens, not wattage. And now all of our lamps are brighter, nationally, across the country.” Another manufacturer said California has been a leader in developing ever-newer CFL technologies, such as the “super CFLs” currently under development.

The CFL Market Effects Team also asked both manufacturers and retailers: ‘How significant has been the influence of these years of California rebate programs on the price of CFLs in these other states?’ We asked the manufacturers and retailers to use a 0 to 10 scale, where 10 indicated “extremely significant” and 0 indicated “not at all significant.” Figure 35 shows the manufacturers gave a much higher average significance rating than the retailers. Although the respondents were not asked to explain their ratings, many provided explanations. The two most common explanations were: 1) the California rebate programs caused large increases in CFL sales volumes that in turn helped reduce CFL prices for non-California states; and 2) other states created rebate programs that not only imitated the structure of the California programs, but also tried to obtain CFL prices from suppliers comparable to those available in California.

**Figure 35. How Significantly California Rebate Programs Have Influenced CFL Prices in Other States**



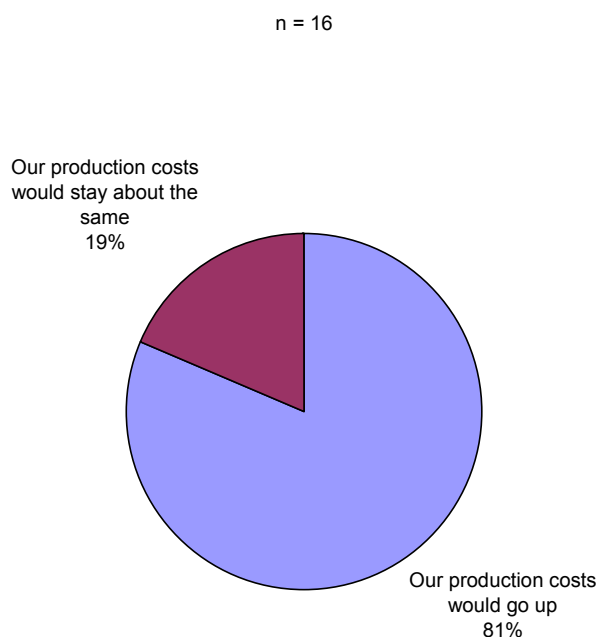
## 5.6 The Sustainability of the California CFL Market in the Absence of the ULP

An issue of great interest to regulators, program implementers, and program evaluators is the sustainability and self-sufficiency of the California CFL market. Has the California CFL market gained enough momentum from the years of rebate programs and from increasing consumer familiarity and comfort with CFL technologies to continue to be viable – and even robust – if CFL rebate programs such as the ULP were to go away? The interviews with lighting manufacturers and retailers raise doubts as to whether this market would be sustainable without the ULP, especially in the short term.

Manufacturers were first asked, if the California rebate programs were to go away after 2008, whether they thought their average production costs for CFLs would go up, down, or stay about the same. As shown in Figure 36 roughly three-quarters of the manufacturers thought their production costs would go up under these circumstances. Most respondents explained the increase in production costs would result from lost economies of scale. “We would have to develop the volumes elsewhere if California dropped off to ensure that we could maintain our current cost structures,” said one manufacturer, “It would be hurtful. It would be very painful.”

Four manufacturers pointed out their production costs have recently been on an upward trend anyway, and this trend would continue even if the California rebate programs were to continue. “I think they’re going to go up, but I don’t think it’s going to have anything to do with the California utilities,” said one such manufacturer. “The price changes that are going to occur are, based upon the dollar exchange rate in China ... and the fact that wages and everything else in China is going up in price.”

**Figure 36. What Direction CFL Production Costs Would Go if the California Lighting Rebate Programs Went Away after 2008**

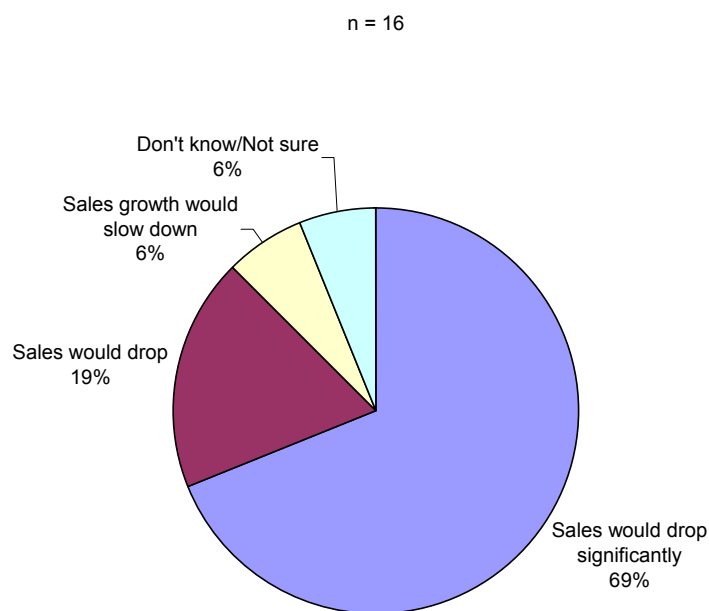


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Figure 37 shows that when asked, ‘If California eliminated its CFL rebate and discount programs starting in 2009 what effects would this have on the sales levels of CFL products in California?’ nearly all of the manufacturers said sales would drop, and over two-thirds said sales would drop significantly. Manufacturers who said their CFL sales would not drop if the California programs were eliminated were some of the larger ones. “We’d probably be pretty close to our manufacturing capacity with or without California,” said one of these manufacturers. “You have worldwide demand on CFLs, so the production is worldwide now and with or without California, worldwide production is just gigantic,” he added. “If my factory doesn’t sell to California, my factory sells it to Cuba, or my factory sells to Europe.” This respondent acknowledged, however, that the elimination of the California lighting rebate programs would have had a much greater impact on his company in the past. He explained, “Perhaps nine or ten years ago California utilities accounted for a higher percentage of our volume.”

**Figure 37. Manufacturers’ Perspective on What Would Happen to California CFL Sales Levels if CFL Rebate Programs Went Away in 2009**

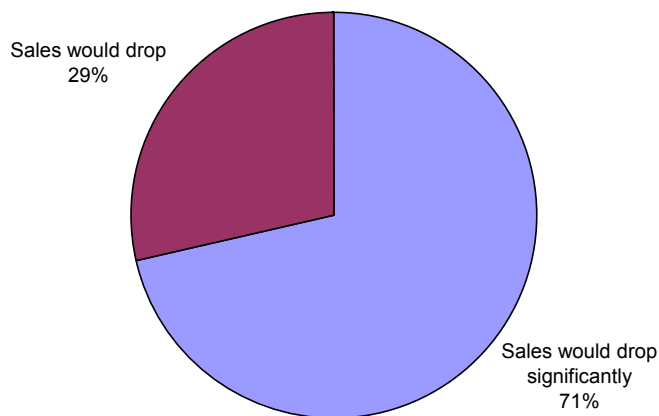


Retailers who were asked the same question responded similarly. Figure 38 shows all the retailers said there would be a drop in sales, and nearly three-quarters said there would be a significant drop in sales.

Some manufacturers and retailers speculated on what would happen to the CFL market following the sharp drop in sales that would occur after the elimination of the rebate programs. One predicted an immediate 30%-40% drop in California CFL sales, and “after that, it will continue to creep up year after year, depending on the cost of energy, supply and demand, and things of that nature.” One retailer thought the new lighting efficiency standards approved in a 2007 federal energy bill would be the impetus for the recovery of CFL sales, since incandescent bulbs would gradually be phased out.

**Figure 38. Retailers' Perspective on What Would Happen to California CFL Sales Levels if CFL Rebate Programs Went Away in 2009**

n = 14



Finally, we asked manufacturers: ‘Will manufacturers continue to develop and market CFLs without support from rebate and discount programs?’ Almost all manufacturers said they thought some manufacturers would continue CFL product development and marketing, although many indicated there would be significant changes in market dynamics. For example, they said it would be very difficult for some of the smaller manufacturers to continue without the rebate programs. Some of the smaller manufacturers confirmed this by saying they would either go out of business or see sharp declines in sales if the rebate programs were to go away. At least one manufacturer also indicated that if rebate programs disappeared, consumers would begin bearing the costs of CFL product improvements that had previously been subsidized by the rebates.

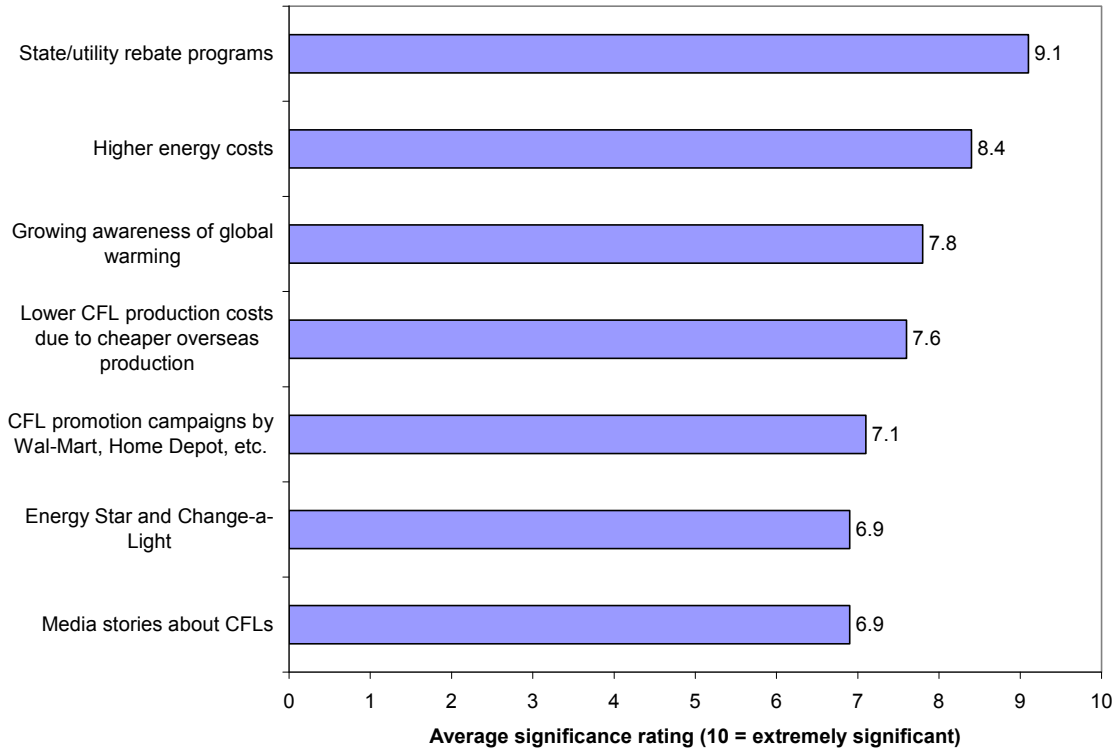
## **5.7 Comparing the Influence of CFL Rebate Programs to Other CFL Market Drivers**

In assessing the effects of the CFL rebate programs on CFL markets, it is useful to consider the effects of other possible drivers of CFL sales. The CFL Market Effects Team therefore named a number of possible drivers of increased CFL products sales and asked both the manufacturers and retailers to rate how significant they thought the drivers were. We asked them to use a scale of 0 to 10, where 10 indicated “extremely significant” and 0 indicated “not significant at all.”<sup>117</sup> Figure 39 and Figure 40 show the manufacturer and retailer ratings, respectively, for these potential CFL drivers.

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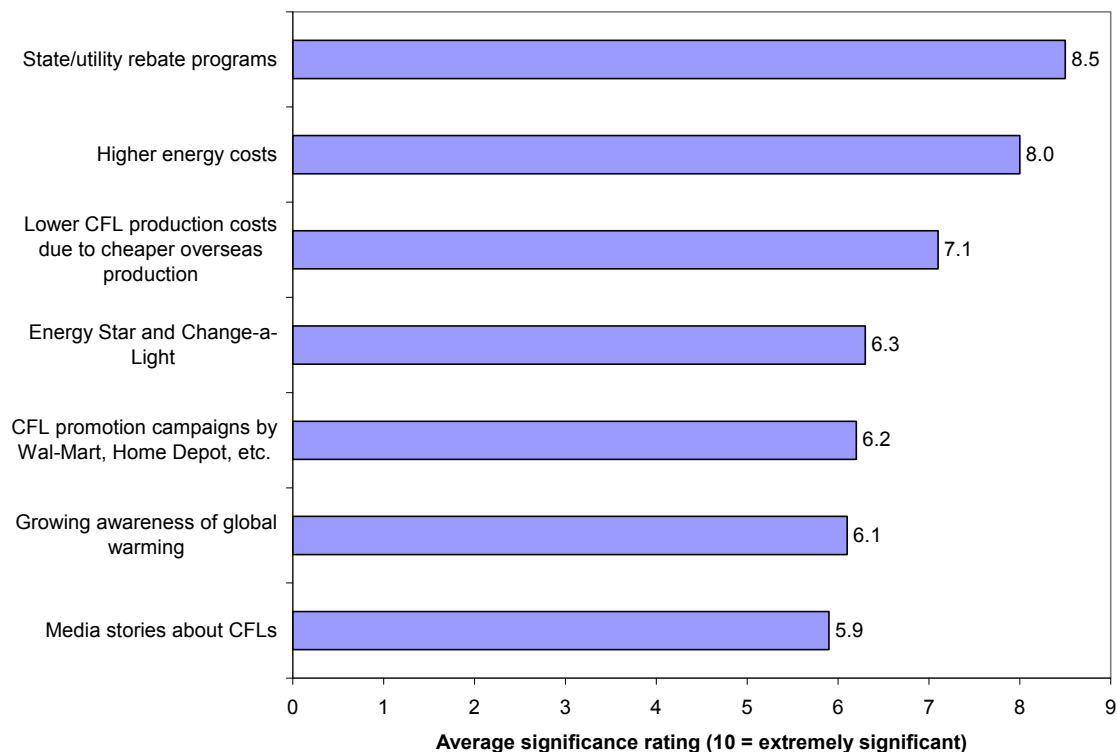
<sup>117</sup> The Team did not randomize the listing of the possible CFL drivers. Nonetheless, we did not observe any relation between the order in which the drivers were asked (see note with figure) and the ratings they received.

**Figure 39. Lighting Manufacturer Ratings of Relative Significance of Various CFL Market Drivers**



Note: Sample sizes for all questions were 16. Respondents were asked about one potential market driver at a time, in the following order: 1) rebate programs; 2) ENERGY STAR; 3) retailer promotion campaigns; 4) media stories; 5) cheaper overseas production; 6) global warming; and 7) higher energy costs.

**Figure 40. Lighting Retailer Ratings of Relative Significance of Various CFL Market Drivers**



Note: Sample sizes were 14-15 for all questions except the ENERGY STAR question (n = 12). Respondents were asked about one potential drive at a time, in the following order: 1) rebate programs; 2) ENERGY STAR; 3) retailer promotion campaigns; 4) media stories; 5) cheaper overseas production; 6) global warming; and 7) higher energy costs.

The preceding two figures show both manufacturers and retailers gave the highest significance ratings to the rebate programs and the second highest ratings to higher energy costs. The retailer significance ratings were lower than the manufacturers' for all CFL market drivers. Although the rebate programs got the highest ratings, these ratings were not significantly higher than some of the other CFL market drivers. This lends credence to the hypothesis of some that the initially strong influences of rebate programs on CFL sales levels have recently been diluted by other market drivers.

The manufacturers and retailers provided many explanations as to why they assigned specific significance ratings to the various CFL market drivers. Table 49 summarizes these explanations



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**Table 49. Reasons Why Lighting Manufacturers and Retailers Gave Higher or Lower Significance Ratings for Various CFL Market Drivers**

Possible CFL Drivers	Sample Reasons for Positive Ratings	Sample Reasons for Negative Ratings
State or utility rebate and discount programs?	<ul style="list-style-type: none"> <li>• Programs make CFLs affordable by lowering retail prices</li> <li>• CFL sales drop when programs are not active</li> </ul>	<ul style="list-style-type: none"> <li>• Some states do not have active rebate programs</li> </ul>
The Energy Star program including its Change-a-Light campaign?	<ul style="list-style-type: none"> <li>• Energy Star brand is recognizable indicator of quality</li> <li>• Change-of-light does create sales bump during October period</li> </ul>	<ul style="list-style-type: none"> <li>• Some manufacturers and retailers were not familiar with the Change-a-Light campaign               <ul style="list-style-type: none"> <li>o Short duration of Change-of-Light campaign limits its ability to increase sales</li> </ul> </li> </ul>
CFL promotion campaigns by some large retailers such as Wal-Mart, Home Depot, and Lowe's that are being done independently of any state or utility energy efficiency programs?	<ul style="list-style-type: none"> <li>• They frequently broadcast TV and radio ads which increase general consumer awareness of CFLs</li> <li>• They have access to national markets</li> </ul>	<ul style="list-style-type: none"> <li>• Some low-income consumers can't afford CFLs sold in Home Depot and Lowe's stores</li> </ul>
Media stories promoting the use of CFLs?	<ul style="list-style-type: none"> <li>• They are another way to increase awareness and knowledge of CFLs               <ul style="list-style-type: none"> <li>o Some media promotions of CFLs -- like Oprah's -- have created spikes in CFL demand</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Some media stories have focused on the mercury risks of CFLs</li> <li>• Local media stories only can impact a limited geographic area               <ul style="list-style-type: none"> <li>o These media stories usually don't reach ethnic shoppers</li> </ul> </li> </ul>
Reductions in CFL production costs and prices due to lower-cost overseas manufacturing and increases in CFL production capacity?	<ul style="list-style-type: none"> <li>• Lowering retail prices has made CFLs more affordable</li> <li>• Increased production capacity has solved some of the CFL supply constraints that occurred in 2006</li> </ul>	<ul style="list-style-type: none"> <li>• In recent years CFL production costs have actually been rising</li> </ul>
Growing consumer awareness about global warming?	<ul style="list-style-type: none"> <li>• Some areas of the country, like California, have a strong environmental ethic</li> </ul>	<ul style="list-style-type: none"> <li>• In some areas of the country, customers have some skepticism about global warming</li> </ul>
Higher energy costs?	<ul style="list-style-type: none"> <li>• In the current weak economy, people are trying to save money where they can</li> </ul>	<ul style="list-style-type: none"> <li>• The high first costs of undiscounted CFLs can make the payback period longer</li> </ul>

## **6. ONGOING ACTIVITIES AND NEXT STEPS**

### **6.1 Primary Data Collection**

#### **6.1.1 In-Home Lighting Audits (Task 1D)**

It is possible some CFL User Survey respondents in non-program states as well as respondents in California were not sufficiently aware of CFLs to reliably report how many they had and how many they had purchased. To validate reported purchases, the CFL Market Effects Team visited 70 households in each of the comparison states (Georgia, Pennsylvania, and Kansas) and in California during December of 2008.

The Team recruited households for the in-home visits while conducting the CFL User (telephone) Survey (fielded in October and November 2008). The In-Home Survey sample included both self-reported CFL users and non-users. Before scheduling in-home visits, the recruits were stratified by state, then by county within each state to ensure the sample was representative of the geographic population distribution within each state.

Prior to going into the field, the CFL Market Effects Team developed an on-site survey instrument (see Appendix D) and populated it with each respondent's telephone survey responses. The surveyors brought a hardcopy of the populated on-site instrument to each home; thereby enabling them to see – and attempt to verify – the number of CFLs each respondent reported through the CFL User Survey.

The CFL Market Effects Team developed and implemented a set of training materials to help ensure our field surveyors would adhere to a consistent set of protocols, had a consistent understanding of the survey instrument and Web-based data collection tool (described below), and would all respond similarly to conditions that might arise or observations they might make while in respondents' homes. The In-Home Survey Procedures Guide is presented in Appendix E.

While at respondents' homes, surveyors collected information on:

- The total number of CFLs currently installed in the home;
- The number of CFLs purchased during the past three months and those currently installed;
- The total number of CFLs currently in storage in the home; and
- The total number of medium, screw-based light sockets in the home.

Upon completion of each visit, the surveyor entered all data collected on the hardcopy of the on-site instrument into a Web-based collection tool created specifically for this effort. Once entered, the Team was able to immediately review and begin analyzing data.

While the field work for the in-home surveys was completed by the time of this writing, analysis of the results was still underway. The CFL Market Effects Team's analysis will include using the observed lighting counts to calibrate estimates of recent CFL purchases, CFLs currently installed, and CFLs in storage from the CFL User Survey. The Team will also use the in-home

visits to estimate the saturation of CFLs out of all eligible sockets. Saturation represents the cumulative effects of CFL purchases over the years, although it must be interpreted with caution, given the ongoing removal of CFLs. Complete analysis of the in-home surveys will be included in the CFL Market Effects Final Report.

### **6.1.2 Shelf Stocking Study (Task 1E)**

The CFL Market Effects Team will conduct in-store visits as another way to estimate CFL sales in California and the three comparison states. In California and each of the comparison states, the Team will visit 40 stores as a supplemental sample to the stores being visited as part of the Residential Retrofit impact evaluation. To develop the sample of stores, the Team will rely on the results of the CFL User Survey, determining how many CFLs and other bulb types respondents in each state have bought at each store type (retail channel), then selecting stores to visit that will represent that mix. Because the Team will be visiting only a limited number of stores per state, some weighting will be necessary – based on the number of stores in each category listed in Dun & Bradstreet or InfoUSA, but this proportional sampling approach (based off the CFL User Survey) will likely keep weighting to a minimum. Likely store types include:

- Grocery stores
- Price Clubs such as Costco
- Home Depot (separate category)
- Lowe's (separate category)
- Other home improvement stores
- Hardware stores
- Wal-Mart (separate category)
- Other mass merchandise or discount department stores, such as Kmart or Staples
- Drug stores such as Walgreens
- Convenience stores such as Seven-Eleven
- Specialty lighting or electrical stores
- Home furnishing stores such as a Bed, Bath and Beyond, or Pottery Barn
- Bargain stores such as the Christmas Tree Shop or Family Dollar

To begin each store audit, the auditor will ask each store manager, under strict confidentiality, for electronic sales records of all bulb sales during the study period. In addition, the auditor will record:

- Types of bulbs available for sale;
- Presence and dimensions of end cap displays for CFLs and other light bulbs;
- Location of CFLs in relation other types of bulbs;
- Location of promoted CFLs in relation to other types of bulbs;
- Inventory of bulbs, including information on:

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- o Manufacturer
- o Model number
- o Location
- o Quantity in pack
- o Number of packs (of that model) on the shelf
- o Retail price per package (before discount or sale)
- o Discount amount (if discount provided)
- o Sale price (if on sale)
- o Wattage
- o Lumens
- o Rated life
- o ENERGY STAR label on package
- o As well as:

Bulb Style	Base Type	Bulb Type	Features
Spiral	Screw	CFL	3-Way
Globe	Pin	Incandescent	Dimmable
A-Lamp	GU-Type	Halogen	
Torpedo/Bullet	Candelabra	LED	
Bug Light		Cold Cathode	
Spotlight/Reflector/Flood			
Circline			
Tube (Single, Double, Triple, Quad)			

In turn, after counting the number of packages of each unique type, the store manager will be asked to estimate how long it would take to sell that number of packages in the spring, summer, fall, and winter, and how long it would take to restock each package type. We will also confirm the current stocking and sales patterns are indicative of an average month. On that basis, we will estimate the annual sales of each package type at that store, validated when possible by electronic sales data. We will then project the sales estimates for individual stores to the population of stores in the state based on Dun & Bradstreet or InfoUSA data. This will provide a baseline sales estimate to compare to the estimate for each state.

The surveyors will ask store managers questions regarding their opinions on factors influencing light bulb sales. Specifically, we will ask if events such as a changing economy, energy prices, or environmental concerns have positive or negative impacts on ENERGY STAR lighting sales.

The retail in-store audits will also provide information on CFL pricing that we can use for comparisons of California CFL prices to Georgia, Pennsylvania, and Kansas CFL prices. We plan to use the in-store pricing data to analyze whether the incentives paid by utilities appears to be applied 100% to each individual package, applied across CFL types from a given manufacturer, or incompletely applied to the prices paid by California consumers.

The CFL Market Effects Team currently plans to conduct the in-store visits beginning in February, 2008.

## **6.2 Analysis**

In order to understand the potential market effects of California's CFL programs on retail sales, one must be able to develop reliable estimates of both current and baseline sales in the absence of programs (i.e., what would have happened: a dynamic baseline rather than a pre-post measurement). The first portion of this section focuses on the Team's approach to analyzing baseline CFL sales patterns. Estimates of current sales are presented and discussed above.

Once the baseline analysis has been completed, the Team will use it, in conjunction with data gathered through secondary sources, to estimate the CFL sales that can be attributed to the California IOU programs above those claimed as direct or participant spillover savings. These CFL streams will then be multiplied by the DEER database's most current unit energy and demand savings estimates to compute energy and demand savings attributable to market effects. Discussions of the attribution and net savings analyses are also included in this section.

In addition to analyzing the possible effect of California's lighting programs on CFL retail sales, the program and market theory suggest that the programs may also influence the retail prices of CFLs. The Team is therefore planning to conduct an analysis of program-induced market effects on CFL retail pricing, and the approach to this analysis is provided in this section.

The final portion of this section describes the Team's approach to assessing the extent to which market effects would continue were the IOU's CFL programs to be discontinued or scaled back.

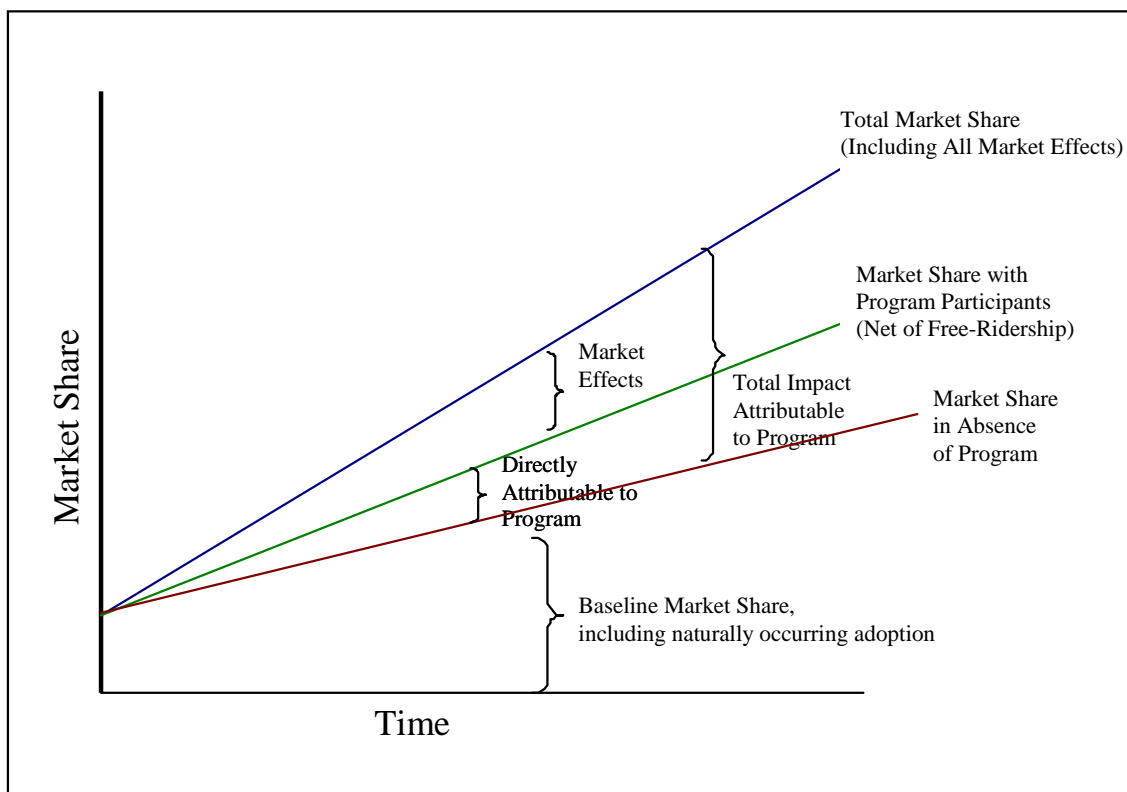
### **6.2.1 Comparison State Analysis (Task 2A)**

In theory, market effects can be measured through analysis of the difference between total energy-efficiency market share realized in the presence of a program and the market share that would have occurred in absence of any program activities. As noted earlier, the evaluation protocols limit analysis to impacts directly attributable (net of free ridership) to the California IOUs. In Figure 41, which illustrates the calculation of program impacts and market effects, directly attributable impacts would be based on the difference between the lower and middle lines. However, should market effects (e.g., nonparticipant spillover) exist, the actual savings should be the difference between the upper and lower lines.<sup>118</sup>

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<sup>118</sup> In order to avoid double counting, the analysis will subtract any known CFL sales already being claimed through the other programs, including those from municipalities and non-retail programs.

Figure 41. Calculation of Market Effects on CFL Sales<sup>119</sup>



Given external influences on the CFL market, including a Wal-Mart's initiative to double its sales of CFLs, promotion of CFLs by the popular press as a strategy for individuals to address climate change, and the recently passed Energy Bill requiring more efficient lighting beginning in 2012, it is clear a that number of important other factors are influencing and will continue to influence CFL sales in future years. The baseline sales estimates, therefore, are critical for also assessing the importance of these other influencing factors.

There are at least three approaches to estimating baseline sales:

- Examining sales per household in a group of comparison states that do not offer CFL programs – this is the CFL Market Effects Team's primary approach, and is the focus of this section's discussion.
- Developing a regression model to predict sales per household as a function of program activity and other influencing factors – the Team is conducting this analysis as a secondary approach to estimating baseline sales. Preliminary results are presented above.

<sup>119</sup> Note that this graph (including the magnitudes and slopes of the lines) was developed for illustrative purposes only. In fact, it is possible that some or all market effects could be negative; in the extreme case in which all market effects were negative, the "Total Market Share" line could be below the "Market Share in Absence of Program" line. The CFL Market Effects Team has elaborated on potential negative market effects and our plan for addressing them in a memorandum to the CPUC dated September 17, 2008.

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- Selecting a set of retailers and comparing California sales to sales in comparable metropolitan areas that do not have programs – because the California programs have focused in recent years on promoting CFLs in non-traditional retail channels, while in non-program states CFLs are believed to be sold predominately through traditional retail channels, a store-to-store comparison across state lines would be very challenging to implement. The CFL Market Effects Team has therefore opted not to pursue this approach.

### ***Selection of Comparison States***

As described above, the comparison state approach to baseline CFL sales estimation has been successfully implemented in recent evaluations of programs elsewhere in the U.S. However, since no single state really directly compares with California, the CFL Market Effects Team opted to use a comparison group of states for this evaluation.

The first step in the Team's selection of candidate comparison states was to examine state-by-state socio-economic indicators from the 2006 American Community Survey<sup>120</sup> to identify those most appropriate for comparison with California. The ACS data provided information on households, population, income, and education on a state-by-state basis. The percent of the state population that are college graduates was used as a proxy variable for education. Median income was used as the economic indicator variable.

Additional demographic data collected from the 2006 ACS were median age, percent English not primary language, percent foreign born, percent below the poverty line, and percent white. State-level political affiliation was calculated by using the 2004 presidential election results (<http://www.cnn.com/ELECTION/2004>) and the political affiliation of the 2004 state legislature elections (<http://www.ncsl.org>).

The CFL Market Effects Team also gathered data about all major big-box retailers from publicly available company-level Websites and SEC filings (i.e., 10-K filings). Information about the existence of CFL programs for each of the 50 U.S. states was collected from the *Residential Lighting Programs National Summary* prepared by Consortium for Energy Efficiency in September 2007, North Carolina State University's Database of State Incentives for Renewables and Efficiency (DSIRE.org) Website and state-and utility-level programs found on the web.

To rank the states according to income and education, an income/education index ranking was created. The first step was to calculate the absolute value of the difference between the reference California values and each of the other states' values. These values were then ranked – sorted in ascending order – and then weighted equally ((income rank\*0.5) + (education rank\*0.5)), enabling the Team to identify the states most similar to California. The top three candidates initially were Kansas, Pennsylvania, and Virginia.<sup>121</sup> Additional research, however, showed that Dominion Power, whose service territory covers a substantial portion of the state of Virginia, had recently implemented a CFL promotional program. The Team therefore removed Virginia as a

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<sup>120</sup> The 2006 ACS was the most current data available; it is published by the U.S. Census Bureau.

<sup>121</sup> Upon initial review of the rankings, the CFL Market Effects Team decided to exclude Hawaii and Alaska from consideration as candidate states because of their geographic remoteness from the rest of the U.S. Delaware was also eliminated from consideration due to its small size and large potential for cross-border effects—especially with Pennsylvania, a state which was already a likely candidate for the comparison analysis.

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candidate for this analysis and instead selected Georgia as the third comparison state. The results from the income/education index, along with information about Wal-Mart stores in each state, are below in Table 50.

**Table 50. Top 20 States according to Income/Education Index**

State Abbrev	Number of Households	Population	Income Rank	College Rank	Ranking: Combined	CFL Program(s)?	Ttl Wal-Mart SqFt/HH
CA	12,151,227	36,249,872					1.94
IL	4,724,252	12,777,042	4	1	2.5	Y	4.82
RI	405,627	1,061,641	2	4	3.0	Y	2.98
WA	2,471,912	6,374,910	3	7	5.0	Y	2.81
MN	2,042,297	5,154,586	6	6	6.0	Y	4.66
DE	320,110	852,747	5	10	7.5		3.98
HI	432,632	1,278,635	13	5	9.0		NA
UT	814,028	2,579,535	16	2	9.0	Y	7.98
NY	7,088,376	19,281,988	8	13	10.5	Y	2.10
AK	229,878	677,450	12	11	11.5		NA
KS	1,208,765	2,755,817	21	2	11.5		8.33
VA	2,905,071	7,640,249	7	23	15.0	Y	5.57
NE	700,888	1,763,765	20	11	15.5	Y	7.68
OR	1,449,662	3,691,084	24	7	15.5	Y	2.83
VT	253,808	620,778	14	17	15.5	Y	1.59
NH	504,503	1,311,821	18	15	16.5	Y	7.40
CO	1,846,988	4,766,248	1	33	17.0	Y	6.57
PA	4,845,603	12,402,817	15	20	17.5		4.46
WI	2,230,060	5,572,660	11	24	17.5	Y	6.03
GA	3,376,763	9,342,080	23	14	18.5		7.45
ND	272,352	637,460	28	17	22.5		6.93

***Estimating Sales in Comparison States***

Georgia, Kansas, Pennsylvania will all receive a comprehensive mix of primary and secondary data analysis to estimate CFL sales, closely replicating the approach in California. As described in other sections of this report, some of the data collection and preliminary analyses, such as combining the POS and EPA data, conducting and analyzing the CFL User Survey, and validating results of the CFL User Survey through the follow-up In-Home Survey, are already underway. Other data collection activities and analyses to estimate sales in the comparison states will be conducted in the coming months. These include further analysis of the CFL User Survey, analysis of the In-Home Survey, and conducting and analyzing the Comprehensive Shelf Stocking Survey and store manager interviews.

Data from all of these sources for each of the comparison states will be examined and compared to California for the same period (calendar year 2007). While CFL sales for the comparison states are influenced by the presence of retailer promotions (e.g., the Wal-Mart initiative), national campaigns (e.g., Change a Light, Change the World), increasing interest in climate



change and “green” products, and other potential influencing factors on CFL sales, they still lack the influence of utility or government sponsored CFL programs. The CFL sales in these states, therefore, are assumed to represent what sales would have been in California in absence of any utility/government programs and thus serve as the baseline estimate for California’s CFL sales.

### **6.2.2 Attribution Analysis (Task 7)**

The attribution task is really the analytical process of assembling and triangulating all study data, including sales data, market actor interviews and surveys, shelf and stocking data, analytical data (e.g., comparison states and regression modeling), and any additional findings, to explore overall consistency and “themes.” As noted in the CIEE Market Effects Study Plan, “attribution in this study will be based on a preponderance of evidence approach, under which the researcher attempts to construct an argument as to just what has transpired based on the convergence of evidence from a wide range of sources, and the consistency of this evidence with the program theory.”

The CFL Market Effects Team plans to identify all relevant net-to-gross adjustments, including free-ridership, participant spillover, and nonparticipant spillover. Free-ridership and participant spillover will be based on findings from the Residential Retrofit Impact Evaluation. The remaining “delta” in measured versus predicted market share, therefore, would be due to nonparticipant spillover, thus providing an estimate of sales due to market effects. That is,

$$\text{CFL ME from 2006-2008 CA IOU CFL Programs} = \\ \text{Total CA CFL Sales} -$$

$$(\text{Baseline Sales} + \text{IOU Program Sales} + \text{Participant Spillover} + \text{Non-IOU CFL Sales})$$

Where:

- **Total CA CFL Sales** = Total estimated sales of CFL bulbs in CA in 2006-2008
- **Baseline Sales** = Estimated 2006-2008 CA CFL sales in absence of any program activity
- **IOU Program Sales** = Direct CFL sales credited to the IOUs for 2006-2008 programs
- **Participant Spillover** = Participant spillover sales credited to the IOUs for 2006-2008 programs
- **Non-IOU CFL Sales** = Sales of 2006-2008 CA CFLs credited to non-IOU programs

When estimating “direct distributions” and “participant spillover distributions,” the CFL Market Effects Team will coordinate with the Marketing and Outreach (M&O) to ensure that CFLs in the state are not double-counted.

As suggested in the CIEE CFL Market Effects Study Plan, the CFL Market Effects will focus on the quantification of the market effects *realized* during the 2006-08 program timeframe, and will provide only qualitative insights into the portion of these savings that were also *caused* during 2006-08.

Due to data limitations and the timing of this study, the focus of this analysis will be on the 2007 program year. Because the attribution analysis is contingent on the findings from several other

components of this evaluation, it will be conducted toward the end of the study, during the summer of 2009.

### **6.2.3 Net Energy and Demand Savings Estimation (Task 8)**

The attribution analyses described in the previous section will result in a stream of CFL distributions or sales that are attributable to the IOUs' programs. These CFL streams will be multiplied by the deemed energy and demand savings from the most current version of the DEER database to estimate the total net energy and demand savings attributable to market effects.

These savings estimates from market effects will then be used to analyze impacts on the cost-effectiveness of California's CFL Programs. Although we expect these programs are already cost-effective, we will nonetheless document the resulting impacts on the programs' benefit/cost ratios. The net energy and demand savings analysis will be conducted in the summer of 2009, after most of the other evaluation tasks have been completed.

### **6.2.4 Program-Induced Market Effects on CFL Retail Pricing (Task 5)**

In addition to examining market effects on sales, the study will also examine market effects on the retail pricing of CFLs. There are a number of questions of interest concerning the retail prices of CFLs, including:

- What is the magnitude of the "multiplier" effect of manufacturer rebates on retail prices? (i.e., do the manufacturer incentives lead to higher, lower, or equivalent discounts on the retailer shelf?)
- What are the indirect effects of program promotions on prices of competing lighting products?
- Do those effects carry over to non-rebate periods or to other geographical areas?
- How do those effects vary by sales channel?
- Have the California CFL programs led to a decline, over time, in CFL retail prices in California and elsewhere?

There are also a number of questions concerning the price-related demand for CFLs, including:

- How much does a reduction in retail price stimulate sales of CFLs (i.e. what is the price elasticity of demand)?
- What is the cross price elasticity of demand for CFLs with incandescent bulb prices?
- Does the price elasticity change over different price ranges?
- Has the price elasticity changed over time (due to changes in awareness, concern about energy conservation, global warming, etc.)?

Many of these questions serve the needs of both the Residential Retrofit Impact Evaluation and the CFL Market Effects Study.<sup>122</sup> For example, one approach for estimating program impacts is

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<sup>122</sup> Thus this work is being cofunded by the res retro study and this study.

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to calculate the multiplier effect on retail prices, then use the price elasticity of demand to estimate the associated sales impacts. However, should the study find that the multiplier effect is greater than 1.0 (e.g., a \$1 manufacturer incentive leads to a \$2 retail price reduction), the additional price reduction and resulting increase in sales may be considered program spillover, and thus a market effect.

As described in greater detail in the CFL Market Effects Scoping Study and Work Plan (October 31, 2008) the pricing analysis will rely on a combination of quantitative data – POS data and stocking data collected during on-site retailer visits<sup>123</sup> – as well as on qualitative data from the upstream market actor surveys. All of the quantitative data sources will provide detailed information on the bulb type, the retail channel,<sup>124</sup> the month collected, and the exact retail price of the bulb. Note that the stocking studies will be conducted during both rebated and non-rebate periods in order to ensure that prices are collected during both periods.

The analysis of the pricing data will address a number of supply-side and demand-side questions. Supply-side analysis, relying on the POS, stocking data, and consumer intercept survey data, includes:

- **Comparative, descriptive statistics of retail prices.** This entails selecting a number of common product types (e.g., four-packs of 15w “twister” style bulbs) and comparing the price across a number of different parameters, including state, distribution channel, month, and rebated vs. non-rebated
- **Regression-based analysis of retail prices.** A regression model, commonly called an hedonic price index, will estimate the retail price as a function of variables such as rebate levels, bulb characteristics, distribution channel, state, and month.

The key output of the supply-side analysis is a quantitative estimate of the supply elasticity with respect to the rebate amount; in other words, how much the retail price is discounted for a given wholesale rebate level.

The demand-side analysis will include the development of a model of the retail demand for efficient lighting.<sup>125</sup> The primary way that any rebate program for efficient products (e.g. CFLs) stimulates sales is by making those technologies more affordable relative to inefficient ones (e.g. incandescent bulbs). That effect is represented in a lighting demand model through the relation between sales and the retail price of the efficient technology, along with other factors. Those “other” factors include the prices of competing (inefficient) technologies, as well as the delivery channel (e.g. hardware, chain store, etc.), bulb type, utility rates, and season. The price effect on sales is summarized in the price elasticity of demand for the efficient lighting, which represents the percentage increase in sales for a given percentage decrease in price.

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<sup>123</sup> The on-site retailer visits leverage research undertaken through the Residential Retrofit evaluation (e.g., the Abbreviated Shelf Stocking Survey undertaken in California) with research from this study (e.g., the Comprehensive Shelf Stocking Survey that will be conducted in the comparison states and at some additional retail sites in California).

<sup>124</sup> For some channels, retailer-specific data is expected to be available.

<sup>125</sup> Itron, a subcontractor on the Residential Retrofit Evaluation Team, is currently under contract with the IOUs to produce the 2007 lamp report, which will include development of a regression model to estimate CFL’s price elasticity using POS data on California lamp sales. The demand model proposed here will build upon the existing model but be more comprehensive in nature in that it includes sales outside of California, additional distribution channels (purchased for this study), and more rigorous in nature.

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Because only the POS data contain both sales and retail prices, the demand pricing models will have to rely on limited distribution channels.<sup>126</sup> The POS data do track sales over time, allowing the analysis to look at possible changes in elasticities over time, but only contain distribution channels that represent a limited percentage of all CFL sales.

The analysis offers the best “hard” data for analyzing retail price impacts on purchase behaviors. In addition, to mitigate impacts of these limitations, the Residential Retrofit Evaluation Team will explore the impacts of these other factors (e.g., incentive type and in-store promotions) through customer intercepts and focus groups.<sup>127</sup> Past evaluations and their contractors may have quantitative data on specific stores/retailers that could be gathered. The Market Effects project will work with M&O and FYP to get their data on store displays, partnerships, advertising, etc.

The data sources and analyses that will be conducted for this evaluation offer a number of strengths, such as providing excellent insight into how the incentives translate into retail discounts (i.e., the multiplier effect), and enabling the Team to determine if retail price decreases carry over to non-rebated products, are sustained during non-rebated periods, and vary by sales channel. The available data and defined approach, however, also contain a number of limitations and challenges. These include, for example, potential difficulties with identifying rebated bulbs through the POS data, and the lack of longitudinal information from the stocking pricing data. A more thorough discussion of the strengths and limitations of the approach is provided in the CFL Market Effects Scoping Study and Work Plan.

Analysis of the program-induced market effects will be conducted in early- to mid-2009.

### 6.2.5 Sustainability Assessment (Task 9)

The CPUC also wishes to examine the sustainability of the market effects, assessing the extent that market effects would continue should program activity be withdrawn or scaled back. As noted throughout this report, there are many external influences on the CFL market, including a Wal-Mart initiative to double the sale of CFLs, promotion of CFLs by the popular press as a strategy for individuals to address climate change, and the recently passed Energy Bill requiring more efficient lighting beginning in 2012.

To assess the extent to which the CFL market has already been transformed, as well as the extent to which these factors will continue to increase CFL sales in the absence of current program efforts, the CFL Market Effects Team has included a number of sustainability-related questions in the manufacturer and retailer interviews and in the CFL User Survey discussed earlier in this document. The Team adopted the approach developed in Massachusetts and devised interview guide and consumer survey questions that address the sustainability questions posed by Hewitt.<sup>128</sup>

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<sup>126</sup> The CFL Market Effects Team recognizes that there are serious limitations of this demand-side analysis because it is dependent on the POS data which represents a limited percentage of total CFL sales.

<sup>127</sup> These topics will also be explored through quantitative data on displays/promotions conducted through the programs, as well as coordinating with M&O and FYP to get the data on store displays, partnerships, advertising, etc.

<sup>128</sup> Hewitt, D.C. 2000. “The Elements of Sustainability.” In *Efficiency & Sustainability, Proceedings of the 2000 Summer Study on Energy Efficiency in Buildings*. Washington DC: American Council for an Energy-Efficient Economy. Pp. 6.179-6.190.

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Table 51 shows how Hewitt’s original questions could be rephrased to fit the CFL market, and also summarizes how the questions might be answered.<sup>129</sup> As applicable, these questions have been incorporated into the survey instruments and posed to respondents in terms of how they pertain to both rebates and to marketing campaigns.

**Table 51. Assessment of Sustainability of the CFL Market**

Issue	Example Response <sup>130</sup>
Will manufacturers continue to develop and market CFLs and will retailers continue to market them without individual regional program support? (Original: Has a private market developed to continue the facilitation?)	Yes. Several manufacturers have announced that they are building new, higher capacity factories in China to accommodate the increased international CFL market demands, and report that CFLs are profitable. The ENERGY STAR program has revised specifications for CFLs, fixtures using the GU-24 technology, and SSL in the form of LEDs, which will become effective during 2008, and manufacturers say they will have products meeting the new specs. CFL sales by California retailers not participating in the utilities’ program increased by over xx times from 2006 to 2008, to xx.x million units.
Are CFLs now a mainstream option? (Original: Has the profession or trade adopted it as a standard practice?)	Somewhat. Awareness of CFLs is nearly universal in California, but consumers still choose incandescents over CFLs for many applications. xx% of California households still do not use CFLs. CFLs are available in a broad range of store types, but drug stores, convenience stores, and discount stores still have limited offerings.
Would it be difficult or costly to revert to earlier equipment – that is, going back to incandescents? (Original: Would it be difficult or costly to revert to earlier equipment or practices?)	Not yet, but relatively soon: Federal legislation EISA 2007 passed in December of 2007 will phase out inefficient light bulbs beginning in 2012.
Are end-users requesting or demanding CFLs? Would there be sufficient consumer demand without regional program support? (Original: Are end-users requesting or demanding it?)	Yes. CFL sales have increased dramatically in areas without program support – 2008 sales in the non-program Comparison Area of Georgia, Kansas, and Pennsylvania are, respectively, xx million, xx million, and xx million CFLs, or x.x, xx, and x.x per household. However, consumer education is still important for encouraging consumers to use CFLs in more applications and to choose products that will satisfy their lighting needs. Also, about xx% of California households are still not using CFLs; most of those are aware of the technology, but have not used it yet.
Have the risks to private market actors for manufacturing or marketing CFLs been reduced or removed? (Original: Have the risks to private market actors been reduced or removed?)	Yes. Demand for CFLs nationwide and globally has increased. Many manufacturers announced plans to expand their manufacturing facilities in China this year. Federal EISA 2007 legislation will also encourage the development of more efficient lighting technologies, including incandescents, CFLs, and LEDs. However, the issue of CFL recycling to avoid unsafe mercury disposal still remains unresolved and will become an even more important issue with a greater number of spent CFLs requiring disposal in the coming years.
Are purchasers satisfied with CFLs? (Original: Are purchasers satisfied with it)	Yes. xx% of current CFL users are ‘satisfied’ or ‘very satisfied’ with the products.

<sup>129</sup> Modified from *Market Progress and Evaluation Report (MPER) for the 2007 Massachusetts ENERGY STAR Lighting Program*, prepared by Nexus Market Research for Cape Light Compact, National Grid, NSTAR, Western Massachusetts Electric, and Unitil, June 13, 2008.

<sup>130</sup> The text in this table is provided simply for illustrative purposes: it does not represent actual or expected findings from this study (we are not presupposing any results). Since the table is purely illustrative, numerical values are intentionally shown as “xx” so they cannot be misinterpreted.

If the study determines that the market has not been fully transformed, the CFL Market Effects Team will provide feedback on what else must be done, and for how long, to obtain a sustainable change. For example, there may be retail sales channels that warrant additional attention and outreach, and there may be additional “niche” opportunities for future program design (e.g., dimmable lights).

### **6.3 Evaluation Coordination Efforts**

#### **6.3.1 Customer Intercept Surveys (Task 1F)**

As part of the Residential Retrofit evaluation, the Team is conducting POS research with consumers purchasing lighting products at participating retailers throughout California. The research has been designed such that trained researchers “intercept” consumers after they have made a lighting purchase decision and recruit them to participate in a brief, in-aisle survey. Consumers are recruited immediately following their decision to purchase a particular light bulb (i.e., after they have placed it in their shopping cart or basket). This positioning and timing enables the researcher to discuss the range of available light bulbs in a particular store with a consumer who has just selected from among those products.

One of the key advantages of this research is that it allows an accurate identification of ‘program participants’ (i.e., purchasers of IOU-discounted CFLs) and, as such, it provides a rare opportunity for exploring how important the discount (and IOU sponsorship) was in influencing the specific purchase decision. This research also provides a meaningful exploration of the various other factors that may influence a consumer’s specific CFL purchase decisions, as well as their decisions to not purchase CFLs, such as prior awareness and experience, in-store displays and other promotional materials, product placement and accessibility, and so on. Finally, conducting research in the actual stores that are participating in the program (i.e., selling discounted CFLs) allows for examination of how the influences on purchasing decisions vary by retail channel. These insights will be useful in both the assessment of direct program impacts as well as market effects.

In addition, an abbreviated version of the shelf stocking survey developed for the CFL Market Effects study (i.e., the Comprehensive Shelf Stocking Survey) is being administered concurrent with, and at the same retail store sites as, the intercept research. As the Comprehensive Shelf Stocking Survey was being developed the Abbreviated Shelf Stocking Survey was revised so that, to the extent feasible and applicable, the two survey instruments collect the same data in the same manner. By designing the two instruments to be fairly similar the Team sought to simplify surveyor training (since some of the same staff may be fielding both surveys) and enable more straight-forward analyses of the data gathered through the two surveys.

The Abbreviated Shelf Stocking Survey provides an inventory of all CFL and incandescent bulb models available in the store within a specified range of wattage and styles and also gathers other details about the store’s lighting product display and signage. Data gathered through the Abbreviated Shelf Stocking Survey will be analyzed in conjunction with the analysis of the Comprehensive Shelf Stocking Survey.

The Residential Retrofit Team conducted the first two of a total of three waves of the survey in the summer and fall of 2008. The final wave of the survey will be conducted in the winter of 2009. Each wave will include a minimum of 400 intercepts completed at 80 stores.

### **6.3.2 Leveraging Marketing and Outreach (M&O) Evaluation Activities (Task 4)**

The objectives of the statewide M&O evaluation are twofold: first, to assess the attitudinal and behavioral impacts of the statewide umbrella marketing campaigns that support California's 2006-08 energy efficiency programs, and second to gain an understanding of the effect of these marketing efforts on individual programs, including California's CFL programs.

However, as described in the CIEE CFL Market Effects Study Plan, the timeframe for the M&O study does not directly overlap the timing of the CFL Market Effects study. The former is intended to assess the effects of the statewide marketing campaign implemented during 2006-08, while the latter is intended to assess the market effects that manifest themselves in the 2006-08 timeframe but are likely to have been caused by programs implemented in previous years.

Nevertheless, the M&O evaluation may help determine the role that the statewide marketing has played in generating market effects beyond those generated directly by the CFL programs. Assuming that statewide marketing has caused significant effects, the M&O evaluation could also help determine whether statewide marketing is currently continuing to contribute to market effects or whether changes in the market have become self-sustaining. The integration of the M&O evaluation results with the CFL market effects study may be an area for future research.

Based on several conference calls with the M&O Evaluation Team, the CFL Market Effects Team identified two of the M&O Team's activities on which we are collaborating through the current study:

- **Structural equation modeling (SEM)**, through which the M&O Team seeks to gain an understanding of the behavioral and other impacts of both the umbrella marketing program and the CFL lighting programs. The CFL Market Effects Team provided input to the M&O Team as they developed a consumer questionnaire.
- The literature and work conducted in other (non-energy) fields suggests that social networks may implicitly contribute to market effects by playing a valuable role in the diffusion of information and technologies. To gain some initial insight into the importance of social networks in the diffusion of CFLs, and to explore whether an in-depth social network analysis may be warranted in the future, M&O Team agreed to include questions about social networks (friends and family) in consumers' CFL purchase decisions as part of this survey. The survey also included questions about CFL awareness, recent (past 12 months) CFL and incandescent purchases, CFL and incandescent installation and storage, CFL price signals, future light bulb purchase intent, potential barriers to CFL purchases, utility program participation, awareness of and concern about energy efficiency and global warming, and awareness and importance of various energy-efficiency related advertising.
- As of this writing, the M&O Team had completed data collection for the questionnaire and was analyzing the data. The M&O Team expects to have preliminary results

available in February 2009. The CFL Market Effects Team will continue to collaborate with the M&O Team as the SEM analysis progresses.

- **A large-scale RDD survey** that tracks changes in awareness and behavior in California and one or more comparison states.<sup>131</sup> Working collaboratively with the CFL Market Effects, the M&O Team included questions about CFL awareness and purchase decisions in this survey. The two teams worked together to ensure that the M&O survey wording for CFL-related questions was consistent with that used in the Residential Retrofit evaluation surveys.
- As of this writing, the M&O Team had completed data collection for both of two waves of this RDD survey (in June and October 2008, with 800 respondents – including both English and Spanish speakers – per wave) and was in the process of analyzing the data. Like the SEM survey results, preliminary results from the RDD survey are expected to be available in February 2009.

The CFL Market Effects Team will continue to coordinate with the M&O Team through the remainder of this study.

### **6.3.3 Coordination with Residential Retrofit Evaluation and DEER Database Teams**

The CFL Market Effects Team has been, and will continue, working as a subgroup within the Residential Retrofit Evaluation Team. The CFL Market Effects Team contains the same members as the ULP subgroup, with a few additional members. Details are covered in bi-weekly teleconferences that focus on specific issues related to ULP and CFL market effects.

The Team has already worked with the DEER Team to review the sales data collected as part of the NTG updating analysis, and positive synergies have resulted. Some data collected, particularly during pricing analysis, will likely be useful for updating numbers or filling gaps in the DEER database. The CFL Market Effects Team will meet with the DEER Team to ensure that, where possible, the market effects' data collection efforts also will meet DEER's needs.

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<sup>131</sup> Note, however, that the comparison state(s) selected by the M&O team will be state(s) in which there are well-developed programs, both with and without mass media marketing efforts. The M&O comparison state(s) will therefore differ from the CFL market effects comparison states, so only the California responses to this survey may be valuable to the current study.





## **7. TIMELINE FOR THE REMAINDER OF THE EVALUATION**

This study is being performed on a timeline roughly coinciding with that of the ULP evaluation study because of overlap between two the studies. However, due to the CPUC's need for timely results to inform its strategic planning efforts, the CFL Market Effects Final Report will be submitted in August 2009. The final report will include updates to the: CFL market evolution discussion, preliminary regression model analysis, preliminary CFL User Survey analysis, and the preliminary upstream market actor findings presented in this interim report. The final report will also include:

- In-home audit results;
- Shelf stocking survey results;
- Comparison state analysis;
- Cumulative effect analysis;
- Retail pricing analysis;
- Final market effects based on all available data (POS/EPA data, CFL User Survey, in-home audit, upstream interviews, and shelf stocking study);
- Attribution analysis;
- Net savings;
- Sustainability analysis; and
- Based on our work on all of the project tasks, suggestions about possible revisions to market effects protocols, utility savings goals, and/or performance incentive mechanisms for subsequent action by the CPUC.

The schedule for completing the remaining study tasks is presented in Table 52 below.

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**Table 52. Timeline for Remainder of CFL Market Effects Study**

Task	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Task 1A: Analysis of Program Tracking Data								
Task 1B: Analysis of POS/EPA Data								
Task 1C: CFL User Survey								
Task 1D: In-home Lighting Audit								
Task 1E: Shelf Stocking Study								
Task 1F: Leveraging Customer Intercept Surveys								
Task 1G: Leveraging Upstream Interviews								
Task 2A: Comparison State Approach (Analysis)								
Task 2B: Regression Model Approach								
Task 2C: Comparisons to Results in Other Regions								
Task 3: Analysis of Cumulative Effects								
Task 4: Leveraging M&O Activities								
Task 5: Market Effects on CFL Retail Pricing								
Task 6: Market Effects on Other Progress Indicators								
Task 7: Attribution Analysis								
Task 8: Net Energy and Demand Savings Calculations								
Task 9: Sustainability Assessment								
Task 10: Ongoing Meetings and Coordination								
Task 11: Presentations and Reporting								

## **8. CONCLUSIONS**

The CFL Market Effects Study has three primary objectives:

- Understand the cumulative effects of California’s energy-efficiency programs on the CFL market.
- Quantify 2006-2008 kWh and kW savings (if any) caused by the above potential market effects and not claimed as direct or participant spillover savings.
- Support the CPUC’s strategic planning efforts by clarifying whether savings from potential market effects can be quantified with sufficient reliability to be treated as resources.

To begin to address these objectives, this interim report for the CFL Market Effects Study presents the results of a CFL program and market evolution analysis, a statistical analysis of CFL sales data, survey results with consumers in California and three selected comparison states, and interviews with CFL retailers and manufacturers. While a substantial amount of both primary and secondary research has gone into this report, it is important to note these results are still preliminary, and a significant amount of research remains to be conducted, including:

- Additional analyses of the existing datasets;
- Analysis of 280 in-home lighting audits in California and three comparison states;
- Analysis of CFL stocking surveys in 160 CFL retailers (total) in California and three comparison states;
- Analysis of interviews with additional retailers and manufacturers; and
- Analysis of POS pricing data.

These forthcoming tasks will help address a number of additional research questions, including validation of the telephone survey, in-home saturation of CFLs, stocking patterns (as both a progress indicator and a proxy for sales), and pricing patterns of CFLs in and out of California. Therefore, although the interim findings presented in this report suggest some powerful trends in the CFL market, the results are still preliminary and are not meant to be interpreted as final conclusions for this study.

### **8.1 Objective 1: Cumulative Effects of the California Programs on the CFL Market**

The California IOU programs are some of the longest-running energy efficiency efforts in the country, particularly for CFLs. The IOU efficiency programs’ maturity, program size, and use of both resource acquisition and market transformation strategies may lead to changes in the CFL market, measured not just in terms of direct energy savings and peak demand reductions, but in terms of other progress indicators, including changes in awareness, attitudes, behaviors, product offerings, and reduced product retail prices and production costs. Several “leading market indicators” were examined as part of this study, through a review of both primary and secondary data. These data include interviews with CFL retailers and manufacturers as well as residential lighting program managers, policymakers, and evaluation consultants, who were very familiar

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with historic California or other residential lighting programs across the nation. Key preliminary conclusions regarding cumulative market changes and potential market effects are presented below.

#### *Awareness of CFLs*

- **California IOU consumer awareness of CFLs increased from 58% in 1998 to 96% in 2008.** In non-program states, consumer awareness was 92% in 2008. The difference between 2008 CFL awareness in and out of California was statistically significantly (at the 90/10 confidence/precision levels).

#### *Attitudes and Acceptance of CFLs*

- **The percentage of California IOU households purchasing CFLs increased substantially in the last decade.** For example, in 1998, just 17% of California IOU households had purchased a CFL within the past year and a half; in 2001, 35% households had purchased one or more CFLs; and, in 2003, the purchase rate increased to 56%. By 2008, 77% of California IOU households reportedly purchased at least one CFL.

No comparable historical data exists for non-program states for the 1998-2005 time period. However, from 2006-2008, 47% of California households purchased at least one CFL, compared to 44% of households in non-program states that purchased one or more CFLs during this same timeframe.

- **Nearly eight out of ten (79%) households in California said they currently use at least one CFL inside or outside their home, significantly (at the 90% confidence level) more than the 66% of households in the Comparison Area who were currently using CFLs.**
- **Overall consumer satisfaction with CFL performance increased** as bulb quality improved. Prior to 2004, Californians' average satisfaction rating for CFLs was 6.3 (out of 10). Californians' satisfaction rating increased to 7.4 during the 2004-2005 time period, and to 8.1 in 2006. In the most recent CFL User Survey, California and Comparison Area respondents gave high overall (and not statistically different) satisfaction ratings (8.3 and 8.2, respectively, out of 10) to CFLs currently in their homes.

#### *CFL Availability*

- **CFL product availability increased nationally, particularly in the last few years.** The ENERGY STAR Website listed a total of 117 manufacturers around the world producing 2,405 ENERGY STAR-qualified CFL models during 2007, an increase of approximately 700 models (41%) from 2006. The number of bare mini-spiral CFL models produced in 2007 increased by 85% over the number produced in 2006, from 476 to 882 models.
- **Many lighting manufacturers and retailers attributed their entrance into the California retail CFL market, at least in part, to the ULP. The ULP introduced CFLs to additional distribution channels, such as ethnic groceries and discount (dollar) stores that had not previously been offering CFLs.** Slightly less than two-thirds of the current ULP-participating manufacturers were not selling CFLs in California at retail prior to joining

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the ULP, and just over one-quarter of the participating retailers surveyed were not selling any CFLs at all before joining the ULP.<sup>132</sup>

### *CFL Price*

- ***CFL production costs over the last ten years declined, according to 9 of the 12 manufacturer respondents.*** The remainder consisted of manufacturers who only began producing CFLs in recent years (2005-2007) and who have actually seen their production costs rise. In fact, nearly all manufacturers said their CFL production costs increased since 2006 due to higher material, labor, and energy costs.

To assess cumulative effects of the California programs on the CFL market, the CFL Market Effects Team investigated—qualitatively—the influence of the California IOU programs on the overall CFL market outside of California. The results of these interviews indicate:

- Many stakeholders felt that the combined effects of the energy crisis, media attention, and the large-volume California incentive program helped to create a cycle of events that significantly accelerated CFL market progress.
- Stakeholders reported that other program areas were mainly impacted by adopting the upstream program model used in California and by the high volume of incentives that helped to increase availability and lower retail CFL prices nationwide.
- A large majority of manufacturers (81%) and retailers (65%) believed the California rebate programs influenced the sales level of CFLs in other states.
- Participating stakeholders agreed that more recent, broad market events, such as Wal-Mart's CFL initiative, lighting efficacy regulation, and the consumer response to climate change, have all benefited from the market groundwork laid during 2001 to 2004/2005 by the California programs.

As noted, the study's goal was to estimate the cumulative effects of California's energy-efficiency programs on the CFL market. Although the study noted substantial changes in awareness of CFLs, attitudes and acceptance of CFLs, CFL availability, and CFL retail prices, these changes may simply be due to market changes and not market effects (i.e., they may have occurred for reasons other than the California energy-efficiency programs). The CFL Market Effects Team assessed these alternative hypotheses and whether or not these changes could be attributed to the California programs. The results of this and the quantitative analysis addressed later, demonstrate that most indicators of the market effects could not be determined with a high degree of confidence due to the fact that much of the evidence was qualitative in nature. Our preliminary findings are summarized in Table 53, below. It should be noted that these conclusions may change as the rest of the data is collected for the final report.<sup>133</sup>

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<sup>132</sup> The availability of CFLs in ethnic groceries, dollar stores, and "non-traditional" distribution channels in non-program states was not explored during the manufacturer interviews. Additional information about the proportion of CFLs sold through traditional and non-traditional distribution channels in both California and non-program states will be gathered through the shelf stocking survey later in this study.

<sup>133</sup> Note these interim findings are based on the California IOU programs for the 2006-2008 time period. As discussed below, a rigorous assessment of market effects conducted earlier in the life cycle of the California IOU CFL programs might have identified stronger evidence of market effects.

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**Table 53. Assessment of Market Change vs. Market Effect\***

Type of Change	Observed Market Changes- 1998-2008	Program Causality Hypothesis	Alternative Causal Factors or Hypotheses	Evidence Supporting Program Hypothesis—Market Effects Caused by Programs	Preliminary Strength of Existing Evidence for Market Effect**	Data Sources Used to Date	Expected Data from Forthcoming Sources
Awareness	Consumer awareness of CFL bulbs increased from 28% in 1990 to 58% in 1999 to 96% in 2006.	Program Advertising in the form of mass media and POP materials used between 1998 and 2008 caused a significant part of this increase in awareness.	ENERGY STAR labels, concern over climate change, and/or private market advertising campaigns led to the increase in awareness.	Manufacturer and retailer interviews stated that CA programs increased awareness but stated other factors also increased awareness.	Moderate: Other factors could have caused increase in awareness	Participating manufacturer and retailer interviews; CFL User Survey in CA and the Comparison Area	Nonparticipating manufacturer and retailer interviews
Availability	The number of retail sales channels offering CFLs increased from two in 2000 (mass merchandisers and home improvement) to seven distinct sales channels in 2008.	Increase in customer awareness and program eligibility requirements that require sales in new channels led to more stocking of bulbs in new sales channels.	Competition between retailers and or sales channels led to an increase in CFL product availability in multiple sales channels.	Only 1/3 of current manufacturers sold CFLs in CA before the ULP programs. 100% of new entrants reported they entered the market because of the CFL program. These new manufacturers negotiated with the new retail sales channels (grocery, drug, discount stores) to offer CFLs in the CA market.	Moderate: Manufacturers directly reported program influence	Participating manufacturer and retailer interviews	Nonparticipating manufacturer and retailer interviews; Shelf Stocking Survey in CA and the Comparison Area
Retail CFL Prices	CFL production costs over the last ten years declined, according to 75% of the manufacturer respondents.	Increase in CFL production capacity and payment of rebates to upstream manufacturers led to lower retail CFL prices.	Competition to increase CFL shipments to Europe and other parts of the world led to price declines; Chinese manufacturing policy/ investment bankers made decisions independent of programs.	7 of 12 manufacturers reported that the CA CFL programs were a motivator behind their decisions to expand capacity, which led to lower prices. The rebates also directly decreased retail prices for a majority of CFLs sold in CA.	Moderate/Weak: Need actual pricing data from full set of distribution channels in comparison states to make a full determination.	Participating manufacturer and retailer interviews	Nonparticipating manufacturer and retailer interviews; Collection of pricing data through shelf stocking surveys in CA and the Comparison Area

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Type of Change	Observed Market Changes- 1998-2008	Program Causality Hypothesis	Alternative Causal Factors or Hypotheses	Evidence Supporting Program Hypothesis—Market Effects Caused by Programs	Preliminary Strength of Existing Evidence for Market Effect**	Data Sources Used to Date	Expected Data from Forthcoming Sources
CFL Sales in CA†	CFL sales per household in CA went from 1.1/1.9 (low/high estimates) in 2005 to 4.2 in 2007.	Program-induced lower CFL retail prices, increased awareness, and greater availability led to the increase in CFL sales per household.	Media effects and increase in the desire to take action to combat climate change contributed to increase in CFL sales.	The majority of manufacturers and retailers believed program-induced CFL retail price reductions helped customers overcome the first-cost barrier—thereby helping customers become more familiar and comfortable with improved CFLs—and enabled new retail channels to carry CFLs.	Moderate/Weak: Manufacturers reported that other factors also influence sales, CA programs likely accelerated changes	Participating manufacturer and retailer interviews; CFL User Survey in CA and the Comparison Area	Nonparticipating manufacturer and retailer interviews; In-Home Lighting Survey in CA and the Comparison Area
CFL Sales in CA†	CFL sales/household in CA went from 1.1/1.9 (low/high estimates) in 2005 to 4.2 in 2007.	CA programs between 2005 and 2007 induced a higher rate of CFL sales in CA relative to other regions of the country where no rebate programs existed.	Key buying and distribution decisions made by WalMart and Home Depot from 2000 to 2004 led to nationwide increases in CFL sales between 2005 and 2007.	Sales/household in CA were higher in CA in 2005-2007 compared to baseline estimates from comparison states.	Weak: Reliable sales per HH data are not available for all years	CFL User Survey in CA and the Comparison Area	In-Home Lighting Survey in CA and the Comparison Area; Shelf Stocking Survey in CA and the Comparison Area
<p>* Note that these ratings are preliminary and may be altered as the Team collects additional data and performs additional analyses.  ** As this study takes a preponderance of evidence approach, a “strong” rating indicates that multiple approaches/data sources all indicate the program led to a positive market change, a “moderate” rating indicates that one approach/data source led to a positive market change and/or that some of the evidence is qualitative and/or subject to potential bias, and a “weak” rating indicates one approach/data source led to a positive change while other(s) did not and/or that the evidence is qualitative and/or subject to potential bias. A “weak” rating does not necessarily mean that the market change or market effect did not occur; rather, it signifies that the market change or effect is not demonstrated through the current body of evidence.  † Although the “Type of Change” and “Observed Market Changes 1998-2008” are the same for these rows, the information contained in the other columns is not.</p>							



## **8.2 Objective 2: Quantify 2006-2008 kWh and kW Savings Caused by Market Effects**

To recognize any potential energy and demand savings from market effects, the programs must show progress, not just in the indicators presented above, but, ultimately, in an increase in CFL sales (i.e., nonparticipant spillover). In making this determination, the research had to estimate the extent of program versus non-program sales, then calculate a baseline estimate for CFL sales that would have occurred in absence of any program activity.

In embarking on this effort, the Team recognized that recent evidence from other CFL market effects studies in other states has shown the national CFL market has expanded rapidly in recent years, and that market effects are a complex and dynamic process that unfolds over time, whereas sales provide a snapshot of a single variable at a single point of time. Despite the method's limitations, the CFL ME Team believed characterizing both the numbers and the patterns of CFL sales in California and the Comparison Area would help us to understand the CFL market's status in both areas. This information can then be used to help to build a case regarding the existence or non-existence of market effects.

### **8.2.1 Program vs. Non-Program Sales**

Several data sources, including program tracking data, point-of-sale data, and ENERGY STAR National Retailer Partner data, were examined to develop an estimate of total 2007 CFL sales in California. These data indicated that 55.6 million CFLs were sold in California in 2007. Reported program sales during this same period were approximately 40.7 million CFLs. Program sales, therefore, represent nearly three-quarters of all CFL sales in California.

### **8.2.2 Recent Sales**

Based on the CFL User Survey respondents, (statistically significant) fewer California households have recently bought a light bulb of any type in California than in the Comparison Area (47% versus 57% of respondents, respectively). Of the households who recently purchased at least one light bulb, comparable percentages purchased CFLs in California and the Comparison Area—28% in California and 29% in the Comparison Area (not a statistically significant difference).

### **8.2.3 Estimates of Baseline Sales**

CFL sales that would have occurred in the absence of any program activity were examined using several analytical approaches: a review of historical secondary data, a regression analysis, and telephone surveys with households in California and the three selected comparison states.

#### *Historical Data*

The CFL Market Effects Team examined historical sales in both California and other regions of the United States. One goal of this research was to determine how California CFL sales per household compared to baseline CFL sales per household from other studies. The research indicated that baseline sales estimates varied widely by source/method, though the data

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consistently trended upward over time. These data indicated that in recent years, even non-program states have caught up to California in terms of CFL sales per household in a given year.

### *Regression Analysis*

One approach for estimating baseline sales and program influence is through a regression model. This approach has been utilized successfully to estimate impacts from programs promoting energy-efficient appliances. This approach is based on the concept that the sales of energy-efficient products, including CFLs, can be predicted as a function of a comprehensive list of explanatory variables, including program activity levels, socio-economic characteristics, energy prices, population distribution (urban/suburban/rural), and other variables.

The regression analysis was developed using CFL sales data from national ENERGY STAR Partner Retailers, aggregated by state. These data did not include CFL sales through non-partner retailers (e.g., grocery, small hardware, and discount stores) nor any non-ENERGY STAR CFL sales. Nonetheless, the data represented close to 75% of all CFL sales nationwide. Note, however, that the percentage of all CFLs represented by the dataset likely varied by state (e.g., possibly very high in non-program states, but lower in program states that increased sales in non-ENERGY STAR partner stores). The dataset was selected for the regression analysis because it contained the most comprehensive, state-specific, sales information currently available.

The regression results provided some insights into determinants of household demand for CFLs. Demand appeared to be positively related to the number of big box stores, electricity prices, and percentage of householders between the ages of 25 and 44. However, ***there was no evidence of a positive relationship between the existence of CFL programs and ENERGY STAR Partner CFL sales per household in a cross-section of U.S. states, based on a comparison of one year of data for the available distribution channels.*** This finding indicated that sales in the ENERGY STAR partner stores were quite strong both in states with and without CFL program activity. It is important to note that the results may reflect shortcomings of the data and/or the model specification due to a lack of sufficient data to conduct an analysis of differences in CFL sales over time and through other distribution channels; and future refinements to the model may reach an alternative conclusion.

### *Telephone Surveys*

CFL User Surveys were fielded in California's IOU service territory and three comparison states: Georgia, Kansas, and Pennsylvania (states that had no concentrated or sustained program activity to promote CFLs). The three comparison states were selected based on their similarity to California in terms of characteristics thought likely to influence CFL sales. The Comparison Area was a composite of survey data from the three comparison states, and it was intended to represent California in the absence of any IOU program activity promoting CFLs. For the analysis, the Comparison Area was weighted to California's demographics to further limit the effects of differences between California and the other states. The findings reveal:

- ***In late-summer and fall of 2008, CFL sales per household were higher in the Comparison Area than in California.*** Fewer CFLs were purchased by California households (estimated 10.0 million) than in the Comparison Area (estimated 10.8 million, adjusted to the California population). The average number of CFLs purchased per household in the three months prior to the survey was 1.1 in California and 1.2 in the

Comparison area. When examining purchasing households only, the average number of CFLs purchased was 7.1 per household in California over the past three months and 8.0 per household in the Comparison Area.

- ***From 2006-2008, CFL sales per household were higher in California than in the Comparison Area.*** Forty-seven percent of California respondents estimated they purchased CFLs over the three years prior to the survey, with an average of 5.7 CFLs per household. In the Comparison Area, 44% of respondents estimated they purchased CFLs over the same time period, with an average of 4.9 CFLs per household.<sup>134</sup> Future research will attempt to validate these self-reported results through on-site visits to a subset of telephone survey respondents' homes.

#### **8.2.4 Hypotheses to Explain Findings**

Taken together, these interim findings did not provide evidence that additional market effects in the form of energy/demand savings (nonparticipant spillover) can be unequivocally claimed due to the California IOU programs for the 2006-2008 time period. That is, different conclusions were derived from the different components of the study. For example, while the CFL User Survey results indicated little or no difference between California and the Comparison Area (implying no market effects), the upstream actor interviews exhibited strong evidence of market effects. The CFL Market Effects Team developed a number of hypotheses to explain these findings, as presented below. Note that these hypotheses are not meant to be mutually exclusive; any combination of them may prove to be true.

##### *Erosion of Incremental Market Effects Over Time (Spillover Hypothesis)*

California's programs may have caused market effects in both California and nationally in the past, but, at this point, sales and awareness in the national market are very similar or identical to conditions observed in California. Therefore, the California programs are likely no longer generating incremental market effects beyond any positive net impacts they may be generating, and any differences between California and other states have largely eroded, leaving few interstate differences at the present time.

A number of factors make this hypothesis plausible, including: the aggressive CFL initiatives of Wal-Mart and other large, national retailers; growing nationwide awareness and concern about climate change; and lower retail prices of CFLs. Even the widespread distribution of multi-packs may play a role, allowing consumers to readily purchase six or eight CFLs in a single shopping trip and, depending on how many are installed, quickly achieve a saturation level that has taken years to reach in program states.

Findings that support this hypothesis, include:

- Although CFL sales per homes in the three months prior to the survey were lower in California (1.1) compared to the Comparison Area (1.2), sales in the three years prior to the survey were higher in California (5.7) compared to the Comparison Area (4.9).

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<sup>134</sup> Note that the difference in the percentages of respondents who purchased CFLs in California and the Comparison Area was not statistically significant.

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- Significantly more households in the Comparison Area learned about CFLs recently compared to California. Fifty-nine percent (59%) of households in California first used CFLs in the past three years, compared to 72% of households in the Comparison Area.
- Of those purchasing CFLs in the three months prior to the survey, households in the Comparison Area purchased 8.0 CFLs, compared to 7.1 CFLs for California homes.
- Installation rates of CFLs purchased in the three years prior to the survey were higher for the Comparison Area (73%) than for California (66%).

The upstream market actor interviews also provided evidence to support this hypothesis. For example, the CFL Market Effects Team named a number of possible drivers of increased CFL product sales, and asked manufacturers and retailers to rate how significant they thought the drivers were. Using a 10-point significance scale, both manufacturers and retailers gave the highest significance ratings to the rebate programs (9.1, 8.5) and the second highest ratings to higher energy costs (8.4, 8.0). Although the rebate programs received the highest ratings, these ratings were not significantly higher than some of the other CFL market drivers, including cheaper overseas production, ENERGY STAR, and Change-a-Light, CFL promotion campaigns by Wal-Mart and Home Depot. Furthermore, several manufacturer and retailer interviewees who cited strong market effects from the programs specifically volunteered that they thought these effects largely belonged to the past. This lends credence to claims that the influence of rebate programs on CFL sales levels has been diluted recently by other market drivers.

### *Increasing Saturation of CFL Sales in California Leading to Fewer Recent CFL Sales per Household*

Because of the long expected useful life of CFLs, as the saturation of CFLs increases, one would expect to see fewer sales of all bulbs—including CFLs and incandescents—per household. Data from the CFL User Survey seemed to suggest this hypothesis may be playing a role in the lower number of CFL sales per household in California versus the Comparison Area:

- Significantly more households in the Comparison Area purchased light bulbs in the past three months (57%) than in California (47%).
- Households in the Comparison Area purchased 5.0 bulbs of all types per household in the three months prior to the survey, compared to 3.7 bulbs per household in California.

The data indicated, therefore, that the Comparison Area homes not only purchased more CFLs per home, but also purchased more incandescents and specialty bulbs. In fact, if the sales figures are examined as a market share (the percent of all bulb sales that are CFLs), the CFL market share in California was higher (30%) than in the Comparison Area (24%). This suggests that the higher saturation of CFLs in California homes may be leading to fewer current bulb sales, and thus fewer CFL sales per home compared to the Comparison Area. However, when a consumer is in the market to purchase a new bulb, they are more likely to purchase a CFL (possibly replacing another CFL) in California than in the Comparison Area.

### *Dominance of Large National ENERGY STAR Partners in Driving up Sales Nationally*

The analysis showed that national ENERGY STAR Partner square footage was consistently a very strong predictor of ENERGY STAR Partner CFL sales across U.S. states. This, coupled

with the lack of significance of the program variable in the regression analysis, suggests that large ENERGY STAR retailer partner (e.g., Wal-Mart and Home Depot) sales may currently have such an overwhelming effect on the national CFL market that variations in the larger retailers' presence in each state simply drown out the signal from all other influences on sales, including programs. This hypothesis, however, needs to be further explored by refining the indicator variable for program activity in each state to account for differences in program design that may or may not specifically target these retailers.

### *Shift of Sales (i.e., Cannibalization) in California from Large National ENERGY STAR Partners to other Distribution Channels*

One explicit goal of the more recent California IOU programs was to introduce and stimulate CFL sales in distribution channels that have traditionally not carried CFLs, such as ethnic groceries and discount stores. While the stakeholder interviews suggest the programs have succeeded in realizing this goal, one possibility is that these sales have come at the expense of CFL sales in the more traditional distribution channels (i.e., sales in these other channels have “cannibalized” sales in the National ENERGY STAR Partner stores, therefore the overall CFL sales per household are lower). Future iterations of the regression model will continue to explore this hypothesis.

#### **8.2.5 Importance of Estimating Market Effects Over Time**

It is important to note that any quantitative analysis is limited by the qualitative assessment, presented above, that the California IOU programs have arguably accelerated CFL sales throughout the U.S. While this impact cannot be accurately quantified (there is no way to “undo” the significant program activity that has occurred in California), it means estimated baseline sales for all states—including the comparison states examined as part of this study—may be *overestimated*. In other words, sales outside California—and estimated baseline sales—may have been *lower* if no program activity had taken place in California.

Although the magnitude of this effect cannot be estimated, the assessment revealed that market effects need to be estimated throughout a program's life cycle. In other words, a rigorous assessment of program versus estimated baseline sales conducted earlier in the life cycle of the California IOU CFL programs *might* have identified potential market effects. However, the interim results of this study indicated that recent CFL sales increased dramatically, even in states without CFL program activity, making it difficult for any program state, including California, to currently claim or quantify direct savings from market effects induced by their programs alone.

### **8.3 Objective 3: Clarify Whether Savings from Market Effects can be Quantified with Sufficient Reliability to be Treated as Resources**

While market effects for California IOU programs may exist, they are difficult to quantify and largely impact nonparticipants. As a result, they are typically not examined, and the California Impact Evaluation Protocol is quite specific about not including market effects and nonparticipant spillover in determining impacts of IOU programs.

At the time of this writing, our interim results indicate that CFL market effects due to the California IOU programs may have existed in the past, but cannot currently be quantified with

sufficient reliability to be treated as a resource. The Team will continue examining this preliminary finding through our ongoing research. As noted, rapid changes to the CFL market indicate that any reliability in estimating market effects requires more frequent measurement of key market indicators, most notably market sales. In fact, the industry widely views the ongoing performance of market effects studies—starting with the early years of a program’s implementation—as a best practice approach. Had research quantifying market effects from California’s CFL programs been undertaken earlier and on an ongoing basis, savings attributable to market effects from California’s CFL programs may have been more easily demonstrated (if they, in fact, occurred). Consequently, given the increasing emphasis of the California CFL programs on specialty bulbs in the 2009-2011 program cycle, the CPUC should consider ongoing data collection and analysis to assess market effects for these products as soon as possible.

#### **8.4 Next Steps**

While a substantial amount of both primary and secondary research has gone into this report, these results are still preliminary, and the forthcoming research will provide additional insights into the findings and hypothesis presented in this report.



## **GLOSSARY OF ACRONYMS**

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ACS: US Census Bureau American Community Survey

CFL: Compact Fluorescent Lamp

DIY: Do-It-Yourself

DOE: US Department of Energy

EPA: US Environmental Protection Agency

EEPS: Energy Efficiency Program Sponsors

FYP: Flex Your Power

IOU: Investor Owned Utilities

LED: Light Emitting Diode

LRC: Lighting Research Center located at Rensselaer Polytechnic Institute in New York

NCP: Negotiated Cooperative Promotion

NEEA: Northwest Energy Efficiency Alliance

PEARL: Program for the Evaluation and Analysis of Residential Lighting

PG&E: Pacific Gas and Electric Company

POP: Point of Purchase

POS: Point of Sale

PSA: Public Service Announcement

RLP: Residential Lighting Program

RMST: Residential Market Share Tracking Study

SCE: Southern California Edison

SDG&E: San Diego Gas and Electric Company

ULP: Upstream Lighting Program



# **Appendix A**

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# **Appendix B**

## **CFL User Survey**

Upstream Lighting Program – CFL User Survey – Wave 2 – Draft 10-08-08				
Sampling Plan				
Respondent Type	Description	Relevant Questions/ Responses	Target Sample Size	Target Type
Unaware	Respondents who are unaware of CFLs, even after prompting	S1^=1 & S2^=1	100	Max
Non-Purchasers (CFLs)	Respondents who have never purchased any CFLs	Q_1=3	100	Max
Non-Users (CFLs)	Respondents who are currently not using or storing CFLs at their home	Q_2^=1 & Q_3^=1	100	Max
3mo CFL purchaser	Respondents who purchased CFLs within the last three months	Q_5=1 or Q_5=3	100	Min
06-08 CFL purchaser	Respondents who purchased CFLs since January 1, 2006	A2>0	300	Min
3mo purchaser	Respondents who purchased incandescents or CFLs within the last three months	OTH1=1 or Q_5=1 or Q_5=3	300	Max

[Ask if state =CA] Hello, my name is [interviewer name], and I'm calling on behalf of the California Public Utilities Commission. We are contacting households to discuss how you use different types of light bulbs in your home. May I speak with someone who is the most knowledgeable about household purchases? [EXPLAIN IF THERE IS MORE THAN ONE DECISION-MAKER WE ONLY NEED TO TALK TO ONE PERSON. ARRANGE CALL BACK IF RESPONDENT NOT AVAILABLE]

[Ask if state ^=CA] Hello, my name is [interviewer name] and I'm calling as part of a national study to discuss how you use different types of lighting in your home. I'm not selling anything. May I speak with someone who is the most knowledgeable about household lighting purchases? [EXPLAIN IF THERE IS MORE THAN ONE DECISION-MAKER WE ONLY NEED TO TALK TO ONE PERSON]

**Screener Section**

**S1** Before we get started, I'd like to ask you a few questions about your awareness of different types of light bulbs. Before this call today, had you ever heard of compact fluorescent bulbs, or CFLs?

1 Yes (SKIP TO S3)

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- 2 No
- 8 DON'T KNOW
- 9 REFUSED

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**S2** Compact fluorescent light bulbs – also known as CFLs – usually do not look like regular incandescent bulbs. The most common type of CFL is made with a glass tube bent into a spiral, resembling a soft-serve ice cream, and it fits in a regular light bulb socket. Before today, were you familiar with CFLs?

- 1 Yes
- 2 No (SKIP TO OTH1)
- 8 DON'T KNOW (SKIP TO OTH1)
- 9 REFUSED (SKIP TO OTH1)

**S3** How familiar are you with energy saving CFLs? Would you say that you are...

- 1 Very familiar
- 2 Somewhat familiar
- 3 Slightly familiar
- 4 Not at all familiar
- 8 DON'T KNOW (SKIP TO OTH1)
- 9 REFUSED (SKIP TO OTH1)

**Q\_1** Have you or anyone else in your household ever purchased or been given any compact fluorescent light bulbs or CFLs to use in a home?

- 1 Yes, R has
- 2 Yes, someone else has (ASK TO SPEAK TO THAT PERSON AND REPEAT INTRO)
- 3 No (SKIP TO Q\_2)
- 8 DON'T KNOW (SKIP TO Q\_2)
- 9 REFUSED (SKIP TO Q\_2)

**Q\_1a** In what year did you or someone else in your household purchase or receive your first CFL for use in your home?

- 1 2008
- 2 2007
- 3 2006
- 4 2005
- 5 2004
- 6 2003
- 7 2002
- 8 2001
- 9 2000
- 10 1998-1999
- 11 1993-1997
- 12 1990-1992
- 13 Other (Specify)
- 88 DON'T KNOW
- 99 REFUSED (SKIP TO Q\_2)

[ASK Q\_1B IF Q\_1A=13 ELSE SKIP TO Q\_1C]



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**Q\_1b** Was it... [READ LIST. RECORD ONLY ONE RESPONSE]

- 1 In 2008
- 2 2006 or 2007
- 3 Before 2006?
- 8 DON'T KNOW
- 9 REFUSED

[ASK Q\_1C IF Q\_1A=1 OR Q\_1B=1 ELSE SKIP TO Q\_2]

**Q\_1c** In what month of 2008?

Record Month \_\_\_\_\_  
-88 DON'T KNOW  
-99 REFUSED

[IF {{{Q\_1A= 1, 2 OR 3) OR (Q\_1B= 1, 2, OR 3)) AND (Q\_1C≠ JULY, AUGUST OR SEPTEMBER)}}  
THEN **06\_08\_CFL\_PURCH=1**]

[IF {{{Q\_1A= 1) OR (Q\_1B= 1)) AND (Q\_1C= JULY, AUGUST OR SEPTEMBER)}}  
THEN **3M\_CFL\_PURCH=1**]

**CFL User Section**

**Q\_2** Do you currently have any CFLs installed on the inside or outside of your home?

- 1 Yes
- 2 No (SKIP TO Q\_2c)
- 8 DON'T KNOW (SKIP TO Q\_2c)
- 9 REFUSED (SKIP TO Q\_2c)

**Q\_2a** About how many CFLs are currently installed on the inside or outside of your home?

- \_\_ (Enter # of CFLs)
- 8 DON'T KNOW (SKIP TO Q\_3)
- 9 REFUSED (SKIP TO Q\_3)

**Q\_2b** Did you have these same [Q\_2a quantity] CFLs installed three months ago?

- 1 Yes (SKIP TO Q\_3)
- 2 No
- 8 DON'T KNOW
- 9 REFUSED

**Q\_2c** About how many CFLs were installed on the inside or outside of your home three months ago?

- \_\_ (Enter # of CFLs)
- 8 DON'T KNOW
- 9 REFUSED

**Q\_3** Are you currently storing any CFLs at your home? This could be in your closet, your pantry, your garage, or anywhere at your home.

- 1 Yes
- 2 No (SKIP TO Q\_3c)
- 8 DON'T KNOW (SKIP TO Q\_3c)
- 9 REFUSED (SKIP TO Q\_3c)

**Q\_3a** About how many CFLs are you storing at your home?

- \_\_ (Enter # of CFLs)
- 8 DON'T KNOW (SKIP TO Q\_3C)
- 9 REFUSED (SKIP TO Q\_3C)

**Q\_3b** Were you storing these same [Q\_3a quantity] CFLs three months ago?

- 1 Yes (SKIP TO Q\_4)
- 2 No
- 8 DON'T KNOW
- 9 REFUSED

**Q\_3c** About how many CFLs were you storing at your home 3 months ago?

- \_\_ (Enter # of CFLs)
- 8 DON'T KNOW
- 9 REFUSED

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**Q\_4**[ASK IF Q\_3 = 1] Why are you currently storing CFLs?

For Q\_4\_1 –10:

- 0 Not mentioned
- 1 Mentioned

- Q\_4\_1** So that I have them on hand if a bulb burns out
- Q\_4\_2** Purchased more CFLs than I needed / in bulk / on sale
- Q\_4\_3** Bought them in bulk
- Q\_4\_4** Bought them on sale
- Q\_4\_5** Can't use them in certain rooms
- Q\_4\_6** Can't use them in certain applications (e.g. dimmer switch)
- Q\_4\_7** Didn't like having them installed
- Q\_4\_8** Other (SPECIFY)
- Q\_4\_9** Don't Know
- Q\_4\_10** Refused

*[IF Q\_1=3 SKIP TO OTH1, OTHERWISE ASK Q\_5]*

**Recent CFL Purchaser Section**

[IF 3M\_CFL\_PURCH=1 LEAD-IN WITH: “You mentioned that in the last three months, you have purchased or been given CFLs for use in your home.”]

**Q\_5** Have you purchased or been given any CFLs in the last three months to use in a home?

- 1 Yes, purchased
- 2 Yes, given (SKIP TO Q\_7)
- 3 Yes, both
- 4 No (SKIP TO A1)
- 8 DON'T KNOW (SKIP TO A1)
- 9 REFUSED (SKIP TO A1)

**Q\_6** Approximately, how many CFLs – in total – did you buy in the past three months to use in a home? If a package contained multiple CFLs, please count each CFL bulb separately.  
[PURPOSE OF THIS QUESTION IS TO GET RESPONDENT THINKING ABOUT THE NUMBER OF CFLS. WE WILL CONFIRM THAT THIS NUMBER MATCHES WITH THE RESPONSES TO THE SUBSEQUENT QUESTIONS ON QUANTITIES PURCHASED.]

- Enter #
- 0 None (SKIP to Q\_7)
- 8 Don't know (IF NONE GIVEN, SKIP TO A1)
- 9 Refused (IF NONE GIVEN, SKIP TO A1)

**Q\_6a1 to Q\_6a5** What was the name of this/these stores?

- 1 \$1 Super Store
- 2 98 Cent World
- 3 99 Cent Depot
- 4 99 Cent Mart
- 5 99 Cents Only
- 6 99 Cents Outlet Plus
- 7 99 Cents Plus
- 8 99 Ranch
- 9 Ace Hardware
- 10 Ace Maintenance Mart
- 11 Albertson's
- 12 All American Home Center
- 13 Arcadia Market
- 14 B & B Hardware
- 15 Best Way Supermarket
- 16 Big A Drugs
- 17 Big Lots
- 18 Big Save 98 Cents
- 19 Big Saver Food
- 20 Cal Do It Center
- 21 Cardenas Market
- 22 Cole Hardware
- 23 Contractor's Warehouse
- 24 Costco
- 25 CVS/Sav-On Drugs
- 26 D & M Gift Store

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- 27 Del Mar Supermarket
- 28 Discount Club 3
- 29 Dixieline Lumber
- 30 Dollar Club
- 31 Dollar K
- 32 Dollar Mart
- 33 Dollar Tree
- 34 Drug Emporium
- 35 El Toro Market
- 36 El Valle Discount
- 37 Food 4 Less
- 38 Foothill Builders Mart
- 39 Friedman Brothers Hardware
- 40 Fry's Electronics
- 41 Ganahl Lumber
- 42 Giant Bargain
- 43 Grant's Hardware
- 44 Grocery Outlet
- 45 Hannam Market
- 46 Hawaii Supermarket
- 47 Henry's Farmers Market
- 48 Home Depot
- 49 Hong Kong Market
- 50 JC 98 Cents Plus
- 51 Jumbo 99
- 52 Lamps Plus
- 53 Light Bulbs Etc.
- 54 Light Bulbs Unlimited
- 55 Light Concern
- 56 Lion Foods
- 57 Long's Drugs
- 58 Lowes
- 59 Marukai Market
- 60 Northgate Markets
- 61 Orchard Supply
- 62 Payless Foods
- 63 Q Bargain
- 64 Qualy Electric Supply Inc.
- 65 Ralph's
- 66 Rite Aid
- 67 San Gabriel Superstore
- 68 Shun Fat Supermarket
- 69 Smart & Final
- 70 Stater Bros
- 71 Super 99
- 72 Super Bargain Inc.
- 73 Superco Home Theater & Appliances
- 74 Superfood Warehouse
- 75 Superior Super
- 76 T.S. Emporium
- 77 Tashman's Hardware
- 78 Tawa Supermarket
- 79 Todo \$1 Only Store
- 80 Top Fancy Lighting
- 81 True Value Hardware
- 82 Under \$1 Store

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- 83 Valley Thrift Store
- 84 Victor's Lighting
- 85 Walgreen's
- 86 Wal-Mart
- 87 Winco Foods
- 88 Target
- 89 Sam's Club
- 90 Acme
- 91 Aldi
- 92 Genuardi's
- 93 Hen House Market
- 94 Hy-Vee
- 95 Pathmark
- 96 Price Chopper
- 97 Safeway
- 98 Save-A-Lot
- 99 Superfresh
- 999 Other
- 777 DON'T KNOW/REFUSED

**Q\_6a1aO to Q\_6a5aO** (If Q\_6a1 to Q\_6a5=999) What is the name of the store?

**Q\_6a1a to Q\_6a5a** (If Q\_6a1 to Q\_6a5=999 or 777) What is the store type?

- 1 Discount store, such as 99 Cent or Dollar Store
- 2 Grocery store
- 3 Small hardware store
- 4 Lighting or electronics store
- 5 Drug store
- 6 Large home improvement store, such as Home Depot, Lowe's or Orchard Supply
- 7 Mass merchandise store, such as Wal-Mart or Target
- 8 Membership club store, such as Costco or Sam's Club

**Q\_6b1 to Q\_6b5** In what city is the <INSERT STORE> store in?

**Q\_6c1 to Q\_6c5** How many packages, in total, did you buy from the [store] in [city] to use in a home?

\_\_\_ Enter number of packages of CFLs

**Q\_6d1\_1 to Q\_6d13\_5** Now, thinking about the [package] package - of the ones you bought from [store] in [city] to use in a home, how many CFLs were in the package?

\_\_\_ Enter number of CFLS in package

$[Q\_6d\_total = \sum Q\_6d1\_1 -- Q\_6d13\_5]$

**Q\_6e1\_1 to Q\_6e13\_5** And approximately what was the price of that package?

\_\_\_ Dollars  
-8 Don't Know

**Q\_6f1\_1 to Q\_6f13\_5** Do you know if this particular package of CFLs was part of a utility promotion or utility sponsored sale? There might have been a sticker on the package or a utility sign or display in the store.

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- 1 Yes
- 2 No

**Q\_6f1a\_1 to Q\_6f13a\_5** Did you buy more than one of this type of package at

- 1 Yes
- 2 No

**Q\_6f1b\_1 to Q\_6f13b\_13** How many did you buy?

\_\_ Number of this type of CFL package

[SKIP Q\_6\_CHECK IF Q\_6D\_TOTAL=Q\_6]

**Q\_6\_CHECK** We just discussed a total of [*Q\_6d\_total*] CFLs that you purchased at various stores in the last three months. Earlier you said that you purchased a total of [*Q\_6*] CFLs in the

last three months. Should I now use [*Q\_6d\_total*] as your estimate of the total number of CFLs you purchased in the last three months?

- 1 Yes
- 2 No [GO BACK TO Q\_6c1 AND CORRECT RESPONSES]
- 8 DON'T KNOW
- 9 REFUSED

**Q7** You mentioned that you [READ IF TOTAL CFLS>1 for Q\_6 or Q\_6i: also] have been given CFLs in the past three months, either by somebody else or at a CFL giveaway event. How many CFLs have you been given in the past three months?

- 0 None (SKIP TO Q\_8)
- \_\_ (Enter # of CFLs)
- 8 DON'T KNOW
- 9 REFUSED

**Q\_7a** Where or from whom did you receive these CFLs? [RECORD QUANTITY OF CFLS RECEIVED FROM EACH SOURCE]

- Q\_7a\_1** Utility (Specify)
- Q\_7a\_2** Sierra Club
- Q\_7a\_3** Girl/Boy Scout
- Q\_7a\_4** Sporting Event
- Q\_7a\_5** Employer/Business Meeting (Specify)
- Q\_7a\_6** Retail Store (Specify)
- Q\_7a\_7** School (Specify)
- Q\_7a\_8** Friend/family
- Q\_7a\_9** Other (Specify)
- Q\_7a\_10** Don't know
- Q\_7a\_11** Refused

**Q\_7bm\_1 to Q\_7bm\_12** What month did you receive these CFLs from (event/person)?

- \_\_ Month
- 8 Don't know
- 9 Refused

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**Q\_7bm\_1 to Q\_7bm\_12** What date did you receive these CFLs from (event/person)?

\_\_\_ Date  
-8 Don't know  
-9 Refused

**Q\_8** You mentioned that you bought or had been given  $[Q_6+Q_7]$  CFLs in the past three months. How many of these are currently installed inside or outside of your home?

\_\_\_ Enter # of CFLs installed  
-8 Don't know  
-9 Refused

**Q\_9** (If  $Q_3 = 1$ ) How many of the  $[Q_6+Q_7]$  CFLs you bought or had been given in the last three months are currently being stored at your home?

\_\_\_ Enter # of CFLs stored  
-8 Don't know  
-9 Refused

*[If  $Q_6+Q_7 = Q_8+Q_9$  SKIP TO  $Q_{11}$ ]*

**Q\_10** You mentioned that  $[Q_8]$  of the CFLs you purchased in the last three months are currently installed, and  $[Q_9]$  are currently being stored. What did you do with the other CFLs  $[(Q_6+Q_7)-(Q_8+Q_9)]$  you purchased or were given in the past three months that were neither installed nor stored? [RECORD QUANTITY OF CFLS FOR EACH RESPONSE]

- Q\_10\_1** They burned out
- Q\_10\_2** Using them in another home (ASK CITY, STATE WHERE HOME IS LOCATED)
- Q\_10\_3** Storing them in another home (ASK CITY, STATE WHERE HOME IS LOCATED)
- Q\_10\_4** Using them at office/work/other nonresidential location (ASK CITY, STATE WHERE OFFICE IS LOCATED)
- Q\_10\_5** Storing them in office/work/other nonresidential location (ASK CITY, STATE WHERE OFFICE IS LOCATED)
- Q\_10\_6** Gave them away (ASK IF THEY KNOW CITY, STATE WHERE THEY WENT)
- Q\_10\_7** Misplaced them
- Q\_10\_8** They broke
- Q\_10\_9** Returned them to the store
- Q\_10\_10** Installed them but later removed
- Q\_10\_11** Other (SPECIFY)
- Q\_10\_12** DON'T KNOW
- Q\_10\_13** REFUSED

*[TOTAL QUANTITY RECORDED IN  $Q_{10_1} - Q_{10_{13}}$  MUST EQUAL  $[(Q_6+Q_7)-(Q_8+Q_9)]$  FROM ABOVE]*

**Q\_10c** [ASK ONLY IF  $Q_{10_{10}} \geq 1$ ] You said  $[Q_{10_{10}}$  quantity] CFLs were installed but have since been removed. Why were the bulbs removed?

(DO NOT READ LIST, RECORD ALL THAT APPLY)

- Q\_10c\_1** Didn't like the color
- Q\_10c\_2** It took too long to start up
- Q\_10c\_3** It wasn't bright enough



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- Q\_10c\_4 Didn't like the way it looked
- Q\_10c\_5 It didn't fit
- Q\_10c\_6 It made noise / buzzed
- Q\_10c\_7 It didn't work in a dimmer switch
- Q\_10c\_8 It wasn't available in 3-way
- Q\_10c\_9 Other (Specify)
- Q\_10c\_10 Don't Know
- Q\_10c\_11 Refused

Q\_10d [ASK ONLY IF Q\_10\_10>=1] What happened to the bulbs that you installed but later removed? [RECORD DISPOSITION FOR EACH BULB INSTALLED BUT LATER REMOVED FROM Q\_10\_10]

- Q\_10d\_1 Storing them in this home
- Q\_10d\_2 They burned out
- Q\_10d\_3 Using them in another home (ASK CITY, STATE WHERE HOME IS LOCATED)
- Q\_10d\_4 Storing them in another home (ASK CITY, STATE WHERE HOME IS LOCATED)
- Q\_10d\_5 Using them at office/work/other nonresidential location (ASK CITY, STATE WHERE OFFICE IS LOCATED)
- Q\_10d\_6 Storing them in office/work/other nonresidential location (ASK CITY, STATE WHERE OFFICE IS LOCATED)
- Q\_10d\_7 Gave them away (ASK IF THEY KNOW CITY, STATE WHERE THEY WENT)
- Q\_10d\_8 Misplaced them
- Q\_10d\_9 They broke
- Q\_10d\_10 Returned them to the store
- Q\_10d\_11 Threw them away in the trash
- Q\_10d\_12 Recycled them
- Q\_10d\_13 Other (SPECIFY)
- Q\_10d\_14 DON'T KNOW
- Q\_10d\_15 REFUSED

[TOTAL QUANTITY RECORDED IN Q\_10\_10b\_0 – Q\_10\_10b\_14 MUST EQUAL QUANTITY FROM Q\_10\_10 ABOVE]

Q\_11 [ASK ONLY IF Q\_3 = 1] Have you installed any *other* CFLs in the past three months on the inside or outside of your home – that is, other than the [Q\_8] CFLs we just discussed?

- 1 Yes
- 2 No (SKIP to A1)
- 8 Don't know (SKIP to A1)
- 9 Refused (SKIP to A1)

Q\_11a How many *other* CFLs did you install in the past three months?

- \_\_ Enter #
- 8 Don't know
- 9 Refused

2006-2008 CFL Purchaser Section

AIntro Now I'd like to ask about any CFLs you've purchased more than three months ago.

**A1** *[Show if purchased CFLs in last three months: Not counting the [Q\_6] CFLs you purchased within the last three months that we just talked about,]* Have you purchased any CFLs at retail stores for use in a home since January 1, 2006?

- 1 Yes
- 2 No (SKIP TO OTH1)
- 8 DON'T KNOW (SKIP TO OTH1)
- 9 REFUSED (SKIP TO OTH1)

**A2** *[Show if purchased CFLs in last three months: Including the [Q\_6] CFLs you purchased within the last three months that we just talked about,]* How many CFLs – in total – did you buy since January 1, 2006 for use in a home? Please try to estimate the total number of CFL bulbs, as opposed to packages.

- \_\_\_ (Enter # of CFLs)
- 8 DON'T KNOW (SKIP to OTH1)
- 9 REFUSED (SKIP to OTH1)

**A3a** How many of these [A2] CFLs did you purchase in 2006 for use in a home? Your best estimate is fine.

- \_\_\_ # CFLs purchased in 2006
- 0 None
- 8 DON'T KNOW
- 9 REFUSED

**A3b** How many of these [A2] CFLs did you purchase in 2007 for use in a home? Your best estimate is fine.

- \_\_\_ # CFLs purchased in 2007
- 0 None
- 8 DON'T KNOW
- 9 REFUSED

**A3c** How many of these [A2] CFLs did you purchase in 2008 for use in a home? Your best estimate is fine.

- \_\_\_ # CFLs purchased in 2008
- 0 None
- 8 DON'T KNOW
- 9 REFUSED

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**A4** Of the [A2] CFLs you purchased since January 1, 2006, how many are currently installed on the inside or outside your home?

\_\_\_ (Enter # of CFLs)

-8 DON'T KNOW (SKIP TO OTH1)

-9 REFUSED (SKIP TO OTH1)

**A4a** Of the [A2] CFLs you purchased since January 1, 2006, how many are currently being stored at your home?

\_\_\_ (Enter # of CFLs)

-8 DON'T KNOW (SKIP TO OTH1)

-9 REFUSED (SKIP TO OTH1)

**A5** You mentioned that [A4] of the CFLs you purchased since January 1, 2006 are currently installed, and [A4a] are currently being stored. What did you do with the other [A2-(A4+A4a)] CFLs you purchased since January 1, 2006 that were neither installed nor stored?  
[RECORD QUANTITY OF CFLS FOR EACH RESPONSE]

**A5\_1** They burned out

**A5\_2** Using them in another home (ASK CITY, STATE WHERE HOME IS LOCATED)

**A5\_3** Storing them in another home (ASK CITY, STATE WHERE HOME IS LOCATED)

**A5\_4** Using them at office/work/other nonresidential location (ASK CITY, STATE WHERE OFFICE IS LOCATED)

**A5\_5** Storing them in office/work/other nonresidential location (ASK CITY, STATE WHERE OFFICE IS LOCATED)

**A5\_6** Gave them away (ASK IF THEY KNOW CITY, STATE WHERE THEY WENT)

**A5\_7** Misplaced them

**A5\_8** They broke

**A5\_9** Returned them to the store

**A5\_10** Installed them but later removed

**A5\_11** Other (SPECIFY)

**A5\_12** DON'T KNOW

**A5\_13** REFUSED

**[TOTAL QUANTITY RECORDED IN A5\_1 – A5\_13 MUST EQUAL A2-(A4+A4a) FROM ABOVE]**

**A5\_10a** [ASK ONLY IF A5\_10>=1] You said [A5\_10 quantity] CFLs were installed but have since been removed. Why were the bulbs removed?

(DO NOT READ LIST, RECORD ALL THAT APPLY)

- 1 Didn't like the color
- 2 It took too long to start up
- 3 It wasn't bright enough
- 4 Didn't like the way it looked
- 5 It didn't fit
- 6 It made noise / buzzed
- 7 It didn't work in a dimmer switch
- 8 It wasn't available in 3-way
- 9 Other (Specify)
- 10 Don't Know
- 11 Refused



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A5\_10b [ASK ONLY IF A5\_10>=1] What happened to the bulbs that you installed but later removed? [RECORD DISPOSITION FOR EACH BULB INSTALLED BUT LATER REMOVED FROM A5\_10]

A5\_10b\_0 Storing them in this home

A5\_10b\_1 They burned out

A5\_10b\_2 Using them in another home (ASK CITY, STATE WHERE HOME IS LOCATED)

A5\_10b\_3 Storing them in another home (ASK CITY, STATE WHERE HOME IS LOCATED)

A5\_10b\_4 Using them at office/work/other nonresidential location (ASK CITY, STATE WHERE OFFICE IS LOCATED)

A5\_10b\_5 Storing them in office/work/other nonresidential location (ASK CITY, STATE WHERE OFFICE IS LOCATED)

A5\_10b\_6 Gave them away (ASK IF THEY KNOW CITY, STATE WHERE THEY WENT)

A5\_10b\_7 Misplaced them

A5\_10b\_8 They broke

A5\_10b\_9 Returned them to the store

A5\_10b\_10 Threw them away in the trash

A5\_10b\_11 Recycled them

A5\_10b\_12 Other (SPECIFY)

A5\_10b\_13 DON'T KNOW

A5\_10b\_14 REFUSED

*[TOTAL QUANTITY RECORDED IN A5\_10b\_0 – A5\_10b\_14 MUST EQUAL QUANTITY FROM A5\_10 ABOVE]*

A6 *[Ask if A5\_3>=1 or A5\_5>=1 or A5\_10b\_0>=1 or A5\_10b\_3>=1 or A5\_10b\_5>1]*  
Approximately when do you think you will install the CFLs you currently have in storage?  
Will it be:

- 1 Within the next month
- 2 Within the next three months
- 3 Within the next six months
- 4 Within the next year
- 5 More than one year from now
- 6 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED

**Other Light Bulb Purchases Section**

Now I have a few questions about some other types of light bulbs you may have purchased recently.

**OTH1.** Have you purchased any incandescent light bulbs at retail stores for use in a home in the last three months?

- 1 Yes
- 2 No [SKIP TO OTH3]
- 8 DON'T KNOW [SKIP TO OTH3]
- 9 REFUSED [SKIP TO OTH3]

**OTH2.** How many incandescent light bulbs – in total – did you buy in the last three months for use in a home? Please try to estimate the total number of incandescent light bulbs, as opposed to packages.

Number of Incandescent Bulbs \_\_\_\_\_

- 8 DON'T KNOW
- 9 REFUSED

**OTH3.** During the past three months, how many other types of bulbs – BESIDES regular incandescent light bulbs and CFLs – did you purchase? This might include halogen bulbs, long fluorescent tubes, and other types of specialty light bulbs. [RECORD NUMBER OF BULBS. IF "DON'T KNOW," PROBE "IS IT LESS THAN OR MORE THAN 5 BULBS?" AND WORK FROM THERE TO GET ESTIMATE]

Number of Other Light Bulbs \_\_\_\_\_

- 8 DON'T KNOW
- 9 REFUSED

[IF OTH2>0 ASK OTH4 ELSE SKIP TO Q\_12INT]

**OTH4.** You mentioned that you purchased [OTH2] incandescent light bulbs in the last three months. What type of store(s) did you purchase these incandescent light bulbs from? [RANDOMIZE AND READ LIST. RECORD QUANTITY PURCHASED FROM EACH STORE TYPE. ASK 9 LAST]

- 1 Discount (such as 99 Cent, Dollar Store)
- 2 Grocery
- 3 Small Hardware
- 4 Lighting & Electronics
- 5 Drug
- 6 Large Home Improvement (such as Home Depot, Lowe's)
- 7 Mass Merchandise (such as Wal-Mart, Target)
- 8 Membership Stores (such as Costco, Sam's Club)
- 9 Other [Specify]
- 88 DON'T KNOW
- 99 REFUSED

**CFL User Characterization Section**

**Q\_12Int** Do you currently have any incandescent light bulbs installed in your home?

- 1 Yes
- 2 No (SKIP TO Q\_13)
- 8 DON'T KNOW (SKIP TO Q\_13)
- 9 REFUSED (SKIP TO Q\_13)

**Q\_12** When your next incandescent light bulb burns out, what will you do?

- 1 Replace it with another incandescent from storage/cabinet
- 2 Buy another incandescent from the store to replace it (SKIP TO Q\_13)
- 3 [ONLY READ IF Q\_3 = 1] Replace it with a CFL from storage/cabinet (SKIP TO

Q\_12b)

TO Q\_13) 4 Buy a CFL from the store and replace it (SKIP

- 5 Other (SPECIFY) (SKIP TO Q\_13)
- 8 DON'T KNOW (SKIP TO Q\_13)
- 9 REFUSED (SKIP TO Q\_13)

**Q\_12a** If you didn't have incandescents in storage/cabinet, what would you do?

- 1 Buy an incandescent from the store to replace it (SKIP TO Q\_13)
- 2 [ONLY READ IF Q\_3 = 1] Replace it with a CFL from storage/cabinet (SKIP TO Q\_13)
- 3 Buy a CFL from the store and replace it (SKIP

TO Q\_13)

- 4 Other (SPECIFY) (SKIP TO Q\_13)
- 8 DON'T KNOW (SKIP TO Q\_13)
- 9 REFUSED (SKIP TO Q\_13)

**Q\_12b** [ONLY READ IF Q\_3 = 1] If you didn't have any CFLs in storage/cabinet, what would you do?

- 1 Replace it with incandescent from storage/cabinet
- 2 Buy an incandescent from the store and replace it
- 3 Buy a CFL from the store and replace it
- 4 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED

**Q\_13** [ASK IF Q\_2=1] When your next CFL burns out, what will you do?

- 1 [ONLY READ IF Q\_3 = 1] Replace it with another CFL from storage/cabinet
- 2 Buy another CFL from the store to replace it (SKIP TO Q\_14)
- 3 Replace it with an incandescent from storage/cabinet (SKIP TO

Q\_13b)

- 4 Buy an incandescent from the store and replace it (SKIP TO Q\_14)
- 5 Other (SPECIFY) (SKIP TO Q\_14)
- 8 DON'T KNOW (SKIP TO Q\_14)
- 9 REFUSED (SKIP TO Q\_14)

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**Q\_13a** [ONLY READ IF Q\_3 = 1] If you didn't have any CFLs in storage/cabinet, what would you do?

- 1 Buy another CFL from the store to replace it (SKIP TO Q\_14)
- 2 Replace it with an incandescent from storage/cabinet (SKIP TO Q\_14)
- 3 Buy an incandescent from the store and replace it (SKIP TO Q\_14)
- 4 Other (SPECIFY) (SKIP TO Q\_14)
- 8 DON'T KNOW (SKIP TO Q\_14)
- 9 REFUSED (SKIP TO Q\_14)

**Q\_13b** If you didn't have any incandescents in storage/cabinet, what would you do? [READ ALL, ACCEPT ONLY ONE, ROTATE ANSWERS]

- 1 Replace it with another CFL from storage/cabinet
- 2 Buy another CFL from the store and replace it
- 3 Buy an incandescent from the store and replace it
- 4 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED

**Q\_15** (Ask if S1=1 or S2=1) In the past two years, have you had any CFLs that you installed but then removed before they burned out?

- 1 Yes
- 2 No (SKIP TO SAT1)
- 8 DON'T KNOW (SKIP TO SAT1)
- 9 REFUSED (SKIP TO SAT1)

**Q\_15a** What were the main reasons for removing the CFLs? [ACCEPT MULTIPLE, DO NOT READ]

For Q\_15a\_1 – 11:

- 0 Not mentioned
- 1 Mentioned

- Q\_15a\_1** Didn't like the color
- Q\_15a\_2** It took too long to start up
- Q\_15a\_3** It wasn't bright enough
- Q\_15a\_4** Didn't like the way it looked
- Q\_15a\_5** It didn't fit
- Q\_15a\_6** It made noise / buzzed
- Q\_15a\_7** Other (SPECIFY)
- Q\_15a\_8** Don't Know
- Q\_15a\_9** Refused
- Q\_15a\_10** It didn't work in a dimmer switch
- Q\_15a\_11** It wasn't available in 3-way

**Q\_15b** What type of bulb did you use to replace the CFL(s) you removed?

- 1 Incandescent
- 2 CFL
- 3 Both
- 4 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED





**CFL Satisfaction Section**

[ASK IF Q\_2=1 ELSE SKIP TO CD1]

**SAT1.** On a 0 to 10 scale, with 0 being not at all satisfied and 10 being very satisfied, how satisfied are you with the CFLs you currently have in your home?

Satisfaction Rating ( 0-10 )

-8 DON'T KNOW

-9 REFUSED

Using the same scale, how would you rate your satisfaction with... [ROTATE SAT2 – SAT9]

**SAT2.** The color of the light they provide?

**SAT3.** The brightness of the light they provide? [ASK SAT3a]

**SAT4.** The constant light output, that is, no flickering?

**SAT5.** The amount of time they take to light up?

**SAT6.** The way they fit into light fixtures?

**SAT7.** The way they look in light fixtures?

**SAT8.** How long they last before burning out?

**SAT9.** How much you paid for them?

[ASK SAT3a IF SAT3<10 ELSE SKIP TO SAT10]

**SAT3a.** Are they too bright or not bright enough?

1 Too bright

2 Not bright enough

-8 DON'T KNOW

-9 REFUSED

[ASK SAT10 IF SAT1<10 ELSE SKIP TO SAT11]

**SAT10.** In what other ways are you not completely satisfied with the CFLs you currently have in your home?

---

**SAT11.** Has there been any change in your level of satisfaction with CFLs used in your home over time?

1 Yes

2 No (SKIP TO SAT20)

-8 DON'T KNOW (SKIP TO SAT20)

-9 REFUSED (SKIP TO SAT20)

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In which of the areas we just discussed has there been a change, and has that change been positive or negative? [READ LIST IN SAME ORDER AS PRESENTED IN SAT2 – SAT 9. ALSO ASK ABOUT SAT10. RECORD POSITIVE CHANGE AS '1' AND NEGATIVE CHANGE AS '2.' RECORD NO CHANGE AS '0,' DON'T KNOW '-8' AND REFUSED AS '-9']

- SAT12.** Light color
- SAT13.** Light brightness
- SAT14.** Constant light output, no flickering
- SAT15.** The amount of time they take to light up
- SAT16.** The way they fit into light fixtures
- SAT17.** The way they look in light fixtures
- SAT18.** How long they last before burning out
- SAT19.** How much you paid for them

**SAT20.** Do you currently have any CFLs installed in dimmable or three-way fixtures? (By dimmable, I mean lighting fixtures where you can control the amount of light given off by the lamp by using a dimming switch. By three-way, I mean lighting fixtures that have an regular switch but also let you adjust the amount of light to two or three different levels, besides on and off.)

- 1 Dimmable
- 2 Three-way
- 3 Both
- 4 None (SKIP TO CD1)
- 8 DON'T KNOW (SKIP TO CD1)
- 9 REFUSED (SKIP TO CD1)

[ASK SAT21 IF SAT20=1 OR 3 ELSE SKIP TO SAT24]

**SAT21.** Are the CFLs you are using in dimmable fixtures made to work in dimmable fixtures, or are they just regular CFLs?

- 1 Made for dimmable fixtures
- 2 Regular CFLs
- 3 Other (Specify)
- 8 DON'T KNOW
- 9 REFUSED

**SAT22.** On a 0 to 10 scale, with 0 being not at all satisfied and 10 being very satisfied, how satisfied are you with the CFLs you currently using in dimmable fixtures?

- Satisfaction Rating ( 0-10 )
- 8 DON'T KNOW
  - 9 REFUSED

[ASK SAT23 IF SAT22<10 ELSE SKIP TO SAT24]

**SAT23.** In what ways are you not completely satisfied with the CFLs you currently using in dimmable fixtures?

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[ASK SAT24 IF SAT20=2 OR 3 ELSE SKIP TO CD1]

**SAT24.** Are the CFLs you are using in three-way fixtures made to work in three-way fixtures, or are they just regular CFLs?

- 1 Made for three-way fixtures
- 2 Regular CFLs
- 3 Other (Specify)
- 8 DON'T KNOW
- 9 REFUSED

**SAT25.** On a 0 to 10 scale, with 0 being not at all satisfied and 10 being very satisfied, how satisfied are you with the CFLs you currently using in three-way fixtures?

Satisfaction Rating ( 0-10 )  
-8 DON'T KNOW  
-9 REFUSED

[ASK SAT26 IF SAT22<10 ELSE SKIP TO CD1]

**SAT26.** In what ways are you not completely satisfied with the CFLs you currently using in three-way fixtures?

---

**CFL Disposal Section**

[ASK CD1 IF S1=1 OR S2=1 ELSE SKIP TO ES1]

**CD1.** Do you have any other concerns with the use or operation of CFLs? [DO NOT READ. ALLOW MULTIPLE RESPONSE]

1. None
2. (Mercury)
3. (Requires special disposal/Must be recycled)
4. (Fire hazard)
5. Flickering
6. Color of light
7. Too bright
8. Not bright enough
9. Slow start-up/Delay coming on
10. Burn out too soon/short life
11. Expensive
12. (Other) [Specify \_\_\_\_\_]
- 88 DON'T KNOW
- 99 REFUSED

**CD2.** Do you have any concerns with the disposal of CFLs? [DO NOT READ. ALLOW MULTIPLE RESPONSE]

1. None
2. (Mercury)
3. (Requires special disposal/Must be recycled)
4. (Fire hazard)
5. (Other) [Specify \_\_\_\_\_]
6. (Don't know)

**CD3.** Have you ever disposed of any CFLs that have broken, burned out, or are no longer useful?

- 1 Yes
- 2 No (SKIP TO ES1)
- 8 DON'T KNOW (SKIP TO ES1)
- 9 REFUSED (SKIP TO ES1)

**CD4.** How have you disposed of the CFLs after they broke, burned out, or were no longer useful? [DO NOT READ. ALLOW MULTIPLE RESPONSE]

- 1 Threw away in trash
- 2 Recycled / dropped off at hazardous waste center
- 3 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED

**ENERGY STAR Awareness Section**

**ES1.** Are you familiar with the ENERGY STAR label on household products?  
(The label is a blue and white label with the word "energy" followed by a five-pointed star. Energy Star labels are used by the Environmental Protection Agency and the Department of Energy to identify and label highly energy-saving lighting and appliances for consumers.)  
On a scale of 0 to 10, with 0 being not at all familiar and 10 being very familiar, how familiar were you with the Energy Star label before today?

Familiarity Rating ( 0-10 )  
-88 DON'T KNOW  
-99 REFUSED

[IF ES1<1 SKIP TO LED1]

**ES2.** Have you ever seen an Energy Star label on CFL packaging or on the display materials where CFLs are sold?

1 Yes  
2 No (SKIP TO LED1)  
-8 DON'T KNOW (SKIP TO LED1)  
-9 REFUSED (SKIP TO LED1)

**ES3.** Are you aware of any difference in the quality of CFLs that have the Energy Star label and CFLs that do not have this label?

1 Yes  
2 No (SKIP TO LED1)  
-8 DON'T KNOW (SKIP TO LED1)  
-9 REFUSED (SKIP TO LED1)

**ES4.** In what way is the quality of CFLs with the Energy Star label different than the quality of other CFLs? Anything else?

---

**Light Emitting Diodes**

**LED1.** Are you familiar with light emitting diodes or LED lights?

- 1 Yes
- 2 No (SKIP TO Q\_16)
- 8 DON'T KNOW (SKIP TO Q\_16)
- 9 REFUSED (SKIP TO Q\_16)

**LED2.** Have you ever heard of LED holiday lights?

- 1 Yes
- 2 No (SKIP TO LED4)
- 8 DON'T KNOW (SKIP TO LED4)
- 9 REFUSED (SKIP TO LED4)

**LED3.** Do you own any LED holiday lights that you are currently using or planning to use this holiday season?

- 1 Yes
- 2 No
- 8 DON'T KNOW
- 9 REFUSED

**LED4.** What other types of LED lamps, fixtures, or bulbs have you heard of? [DO NOT READ. ALLOW MULTIPLE RESPONSES]

- 0. None
- 1. Task/desk lamps
- 2. Undercabinet lighting
- 3. Light bulbs/screw in bulbs/GU-type bulbs
- 4. Recessed/can lighting
- 5. Night lights
- 6. Flashlights
- 7. Novelty fixtures
- 8. Other [Specify]
- 8 DON'T KNOW
- 9 REFUSED

**LED5.** Are you currently using any LED lamps, fixtures, or bulbs for regular household lighting?

- 1 Yes
- 2 No (SKIP TO Q\_16)
- 8 DON'T KNOW (SKIP TO Q\_16)
- 9 REFUSED (SKIP TO Q\_16)

**LED6.** What types of LED lamps, fixtures, or bulbs are you currently using? [DO NOT READ. ALLOW MULTIPLE RESPONSES]

1. Task/desk lamps
2. Undercabinet lighting
3. Light bulbs/screw in bulbs/GU-type bulbs
4. Recessed/can lighting
5. Night lights
6. Flashlights
7. Novelty fixtures
8. Other [Specify]
- 8 DON'T KNOW
- 9 REFUSED



**Nonresidential CFL Purchaser Section**

[ASK Q\_16 IF STATE=CA OTHERWISE SKIP TO EA1]

[Q\_16\_total=Σ(Q\_10\_4+Q\_10\_5+A5\_4+A5\_5)]

[If using or storing CFLs in nonresidential location from either Q\_10=4 or 5 or A5=4 or 5, skip Q\_16 and use the following as a lead-in for Q\_17: “You mentioned previously that you purchased or were given [Q\_16\_total] CFLs that you are now using or storing at your office, at work, or at some other nonresidential location. Including these [Q\_16\_total] CFLs.”]

**Q\_16** Have you or someone else in your household ever purchased any CFLs at retail stores and installed them at your office, at work or at some other nonresidential location?

- 1 Yes
- 2 No (SKIP TO EA1)
- 8 DON'T KNOW (SKIP TO EA1)
- 9 REFUSED (SKIP TO EA1)

**Q\_17** Since January 1, 2006, approximately how many total CFLs bulbs, not packages, did you or someone else in your household purchase at retail stores and install at your office, at work or at some other nonresidential location?

- \_\_ (Enter # of CFLs)
- 8 DON'T KNOW
- 9 REFUSED

**Q\_18** What type of nonresidential location did you install these [Q\_17] CFLs at?

- 1 Office (non-medical)
- 2 Restaurant/Food Service
- 3 Food Stores (including liquor stores and convenience stores)
- 4 Agricultural (greenhouses...)
- 5 Retail Stores
- 6 Warehouse
- 7 Health Care
- 8 Education
- 9 Lodging
- 10 Public Assembly (church, fitness center, theatre, library, museum, convention center, community center, other rec)
- 11 Services (gas, repair, etc)
- 12 Industrial
- 13 Laundry
- 14 Other (Specify)
- 8 Don't know
- 9 Refused

**Q\_19** Which of the following statements best describes why you bought the CFLs for use at your office, work or some other nonresidential location?

- 1 I just bought them for use in a lamp on or near my desk or workspace
- 2 I buy all of the lighting for my office, work or other nonresidential location
- 3 I wanted my office, work or nonresidential location to use CFLs and this was the only way to get them to use CFLs

- 8 DON'T KNOW
- 9 REFUSED

**Environmental Attitudes Section**

I am going to read you a few statements and I'd like you to tell me whether you strongly disagree, somewhat disagree, somewhat agree, or strongly agree. (Randomize EA1 to EA6)

- EA1.** I am not very concerned about the amount of energy used in my home. [Do you agree or disagree?] Is that strongly or somewhat? [CBEE, 1998; different scale]
- 1 Strongly Disagree
  - 2 Somewhat Disagree
  - 3 Somewhat Agree
  - 4 Strongly Agree
  - D (Don't know)
  - R (Refused)
- EA2.** People like me are such a small part of the whole energy consumption picture that it really doesn't matter how I use energy. [Do you agree or disagree?] Is that strongly or somewhat? [CBEE, 1998; different scale]
- 1 Strongly Disagree
  - 2 Somewhat Disagree
  - 3 Somewhat Agree
  - 4 Strongly Agree
  - D (Don't know)
  - R (Refused)
- EA3.** Every home should make a real effort to save energy. [Do you agree or disagree?] Is that strongly or somewhat? [CBEE, 1998; different scale, slightly different wording]
- 1 Strongly Disagree
  - 2 Somewhat Disagree
  - 3 Somewhat Agree
  - 4 Strongly Agree
  - D (Don't know)
  - R (Refused)
- EA4.** I would not pay more for a product that was energy efficient. [Do you agree or disagree?] Is that strongly or somewhat?
- 1 Strongly Disagree
  - 2 Somewhat Disagree
  - 3 Somewhat Agree
  - 4 Strongly Agree
  - D (Don't know)
  - R (Refused)

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**EA5.** Climate change is an important environmental issue. [Do you agree or disagree?] Is that strongly or somewhat? [Current M&O tracking survey, CA v. US; slightly different wording – used “global warming” instead and gets at whether or not respondents believe global warming is occurring; Summit Blue Flex Your Power Now! evaluation included this question in a recent survey for CA]

- 1 Strongly Disagree
- 2 Somewhat Disagree
- 3 Somewhat Agree
- 4 Strongly Agree
- D (Don't know)
- R (Refused)

**EA6.** I am willing to give up convenience in return for a product that is environmentally safe. [Do you agree or disagree?] Is that strongly or somewhat? [Flex Your Power marketing research survey in CA, used to segment market and identify characteristics most receptive to FYP advertising/messages]

- 1 Strongly Disagree
- 2 Somewhat Disagree
- 3 Somewhat Agree
- 4 Strongly Agree
- D (Don't know)
- R (Refused)

**Demographics Section**

We're almost finished. I just have a few questions about your household to make sure we're getting a representative sample of [utility] residents.

**D1** Do you own or rent your home?

- 1 Own
- 2 Rent
- 3 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED

**D2** In what type of building do you live? [READ LIST IF NEEDED]

- 1 A one-family home detached from any other house
- 2 A one-family home attached to one or more houses
- 3 A building with 2 apartments
- 4 A building with 3 or 4 apartments
- 5 A building with 5 or more apartments
- 6 A mobile home
- 7 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED

**D3** About when was this building first built? [READ LIST IF NEEDED]

- 1 Before 1970's
- 2 1970's
- 3 1980's
- 4 1990-94
- 5 1995-99
- 6 2000's
- 8 DON'T KNOW
- 9 REFUSED

**D4** How many square feet of living space are there in your residence, including bathrooms, foyers and hallways? (Exclude garages, basements and unheated porches.)

- 1 Less than 500
- 2 501 – 1000
- 3 1001 – 1500
- 4 1501 – 2000
- 5 2001 – 2500
- 6 2501 – 3000
- 7 Greater than 3000
- 8 DON'T KNOW
- 9 REFUSED

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- D5** How many full or half bathrooms do you have in your home?  
\_\_\_ (Enter # of bathrooms)  
-8 DON'T KNOW  
-9 REFUSED
- D6** How many bedrooms do you have in your home (If a one-room efficiency, or studio apartment, bedrooms=0)  
\_\_\_ (Enter # of bedrooms)  
-8 DON'T KNOW  
-9 REFUSED
- D7** Other than bedrooms and bathrooms, how many other rooms are there in your home? Do not count laundry rooms, foyers, unfinished storage spaces, porches, or garages.  
\_\_\_ (Enter # of other rooms)  
-8 DON'T KNOW  
-9 REFUSED
- D8** Including yourself, how many people currently live in your home year-round?  
\_\_\_ (Enter # of people)  
-8 DON'T KNOW  
-9 REFUSED
- D9** [IF D8=1] Which of the following best describes your age?  
1 Less than 18 years old  
2 18-24 years old  
3 25-34 years old  
4 35-44 years old  
5 45-54 years old  
6 55-64 years old  
7 65 or older  
-8 DON'T KNOW  
-9 REFUSED
- D10** [IF D8>1] Including yourself, how many people currently living in your home year-round are in the following age groups?
- D10a** \_\_\_ Less than 18 years old  
**D10b** \_\_\_ 18-24 years old  
**D10c** \_\_\_ 25-34 years old  
**D10d** \_\_\_ 35-44 years old  
**D10e** \_\_\_ 45-54 years old  
**D10f** \_\_\_ 55-64 years old  
**D10g** \_\_\_ 65 or older  
-8 DON'T KNOW  
-9 REFUSED
- D11** What is the highest level of education you have completed?  
1 no schooling  
2 less than high school  
3 some high school  
4 high school graduate or equivalent (e.g., GED)

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- 5 trade or technical school
- 6 some college
- 7 college graduate degree
- 8 some graduate school
- 9 graduate degree
- 77 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED

**D12** Which of the following best represents your annual household income from all sources in 2007, before taxes? Was it . . . ? (READ)

- 1 Less than \$20,000 per year
- 2 \$20,000-49,999
- 3 \$50,000-74,999
- 4 \$75,000-99,999
- 5 \$100,000-149,999
- 6 \$150,000-199,999
- 7 \$200,000 or more
- 8 DON'T KNOW
- 9 REFUSED

**D13** Are you Spanish/Hispanic/Latino?

- 1 Yes
- 2 No
- 8 DON'T KNOW
- 9 REFUSED

**D14** What is your race? [INDICATE ALL THAT APPLY]

- For D14\_1 – 16:
- 0 Not mentioned
  - 1 Mentioned

- D14\_1** White
- D14\_2** Black or African American
- D14\_3** American Indian or Alaska Native
- D14\_4** Asian
- D14\_5** Chinese
- D14\_6** Japanese
- D14\_7** Korean
- D14\_8** Vietnamese
- D14\_9** Filipino
- D14\_10** Native Hawaiian
- D14\_11** Pacific Islander
- D14\_12** Guamanian or Chamorro
- D14\_13** Samoan
- D14\_14** Other (SPECIFY)
- D14\_15** DON'T KNOW
- D14\_16** REFUSED

**D15** What is the primary language spoken in your home? (DO NOT READ)

- 1 English
- 2 Spanish

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- 3 Mandarin
- 4 Cantonese
- 5 Tagalog
- 6 Korean
- 7 Vietnamese
- 8 Russian
- 9 Japanese
- 10 Other (SPECIFY)
- 8 DON'T KNOW
- 9 REFUSED

**D16** RECORD GENDER

- 1 Male
- 2 Female
- 8 DON'T KNOW

**Lighting Follow-up Survey / Metering Study Recruitment Section**

[ASK CA RESPONDENTS]

**L1** In order to better understand how households like yours use different types of light bulbs, we are going to conduct another research study – sponsored by the California Public Utilities Commission and [utility name] in the near future. These studies will involve two visits to your home over a period of six months, and you will be paid \$100 for your time and participation in this part of the study. Can we have one of our researchers contact you to make an appointment for this upcoming phase of the research project?

- 1 Yes
- 2 No (ATTEMPT TO CONVERT)
- 8 DON'T KNOW (ATTEMPT TO CONVERT)
- 9 REFUSED (ATTEMPT TO CONVERT)

[ASK NON-CA RESPONDENTS]

**L2.** In order to better understand how households like yours use different types of light bulbs, we are going to conduct another research study. This study will involve an on-site visit, and you will be paid \$50 in appreciation of your time and cooperation. Can we have one of our researchers contact you to make an appointment for this upcoming phase of the research project?

- 1 Yes
- 2 No (ATTEMPT TO CONVERT)
- 8 DON'T KNOW (ATTEMPT TO CONVERT)
- 9 REFUSED (ATTEMPT TO CONVERT)



## **Appendix C**

### **CFL User Survey Results for Comparison Area II**

## **C. CFL USER SURVEY RESULTS EXCLUDING GEORGIA**

### **C.1 Overview**

As described in Section 4 of the main body of the CFL Market Effects Interim Report, the CFL User Survey was fielded in California IOU service territory and three comparison states – Georgia, Kansas, and Pennsylvania. In response to public comments expressing concern about our use of Georgia as one of the comparison states, the California results in this appendix are compared to those in two separate comparison areas:

- Comparison Area I is a composite of CFL User Survey results from Georgia, Kansas, and Pennsylvania
- Comparison Area II is a composite of results from Kansas and Pennsylvania (i.e., Georgia is excluded from Comparison Area II)

Key topics from the CFL User Survey were analyzed for Comparison Area II and the results are presented (alongside the results for California and Comparison Area I) below. These topics include:

- Awareness and familiarity with CFLs
- Past and recent purchases of CFLs
- Use and storage of CFLs

Consistent with the approach described in the main report, all data for Comparison Area II are weighted by the demographic characteristics of the California IOU service territory. As described in the remainder of this appendix, the results for Comparison Area II are consistently very similar to those for Comparison Area I.

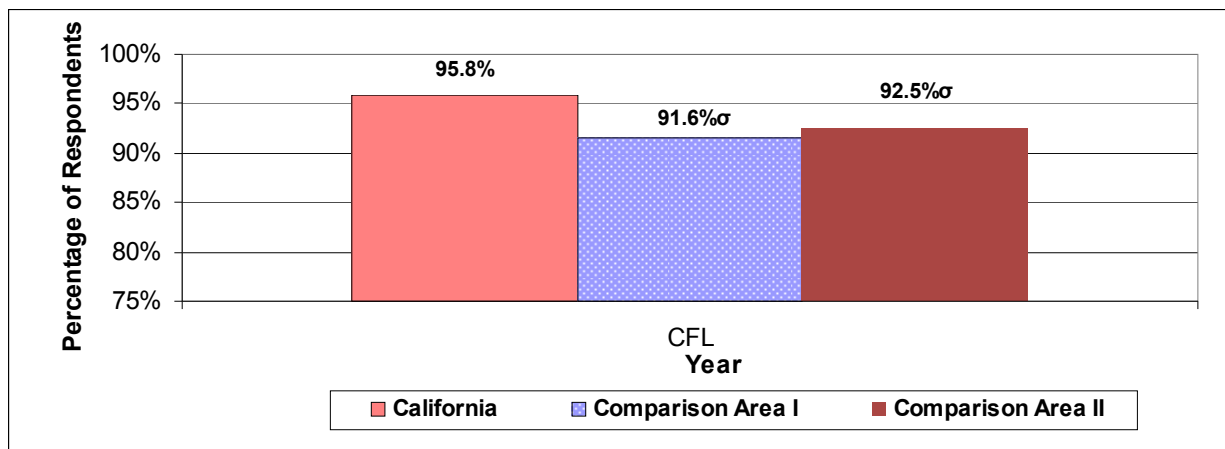
### **C.2 Awareness and Use of Energy-Efficient Lighting**

The survey asked a series of questions to assess respondents' familiarity with and experience using CFL bulbs. Virtually all respondents in California (95.8%) and Comparison Areas I and II (91.6% and 92.5%, respectively) are familiar with CFLs by name or brief description (Figure C-1). As Table C-1 shows, in California, 38% of respondents rate themselves as "very familiar" with CFLs, significantly<sup>1</sup> more than the almost 34% giving a similar rating in Comparison Areas I and II. On the other end, significantly more respondents in the Comparison Areas (13% and 12% for Comparison Areas I and II, respectively) compared to California (6%) rate themselves as 'not at all familiar' with the technology.

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<sup>1</sup> Throughout this report, the symbol 'σ' is used to indicate that results between California and either of the Comparison Areas are significantly different at the 90% confidence level.

**Figure C-1. Awareness of CFLs**  
(base – all respondents; California n=699, Comparison Area I n=1757, Comparison Area II n=1178)<sup>σ</sup>



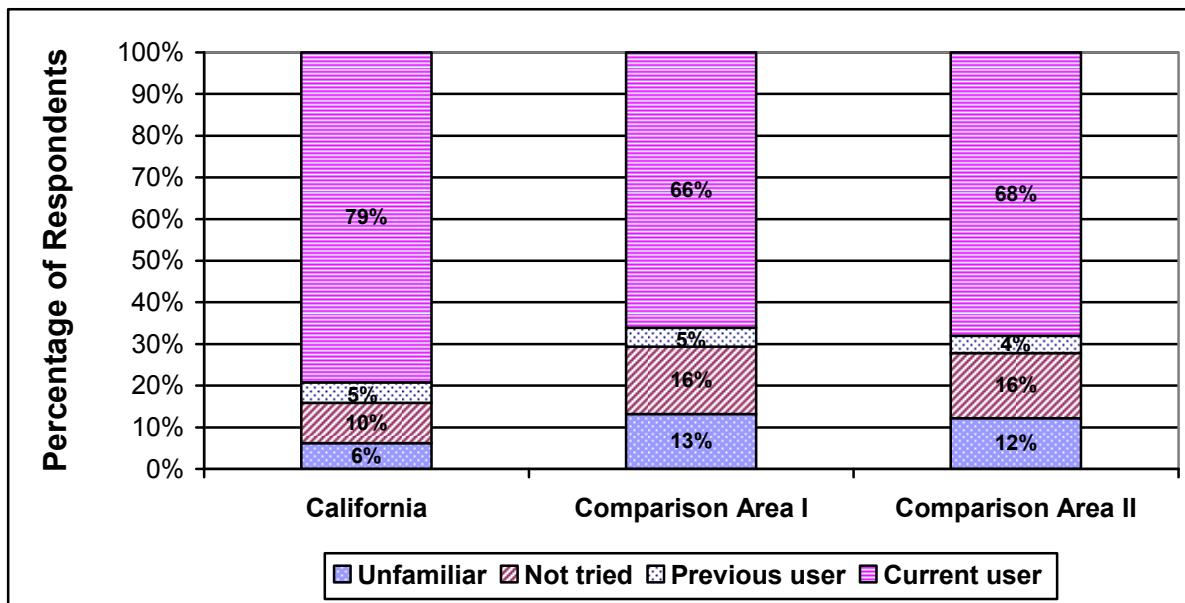
**Table C-1. Level of Familiarity with CFLs**  
(base – all respondents; results weighted to CA IOU households)

	California	Comparison Area I	Comparison Area II
n	699	1757	1178
Very familiar – 1	38.1	32.5 <sup>σ</sup>	32.7 <sup>σ</sup>
Somewhat familiar – 2	37.7	33.6 <sup>σ</sup>	33.8 <sup>σ</sup>
Slightly Familiar – 3	17.2	20.0	20.6 <sup>σ</sup>
Not at all familiar – 4	6.2	13.1 <sup>σ</sup>	11.9 <sup>σ</sup>
Don't know/Refused	0.7	0.8	0.9

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

The survey asked respondents familiar with CFLs to describe their past and current use of the products. Nearly eight out of ten (79%) households in California say they currently use at least one CFL inside or outside their home, significantly more than the 66% and 68% of households in Comparison Areas I and II, respectively, who currently use CFLs (Figure C-2). In addition, significantly more households in the Comparison Areas learned about CFLs recently compared to California: six out of ten (59%) households in California first used CFLs in the past three years, and 72% and 71% of households in Comparison Areas I and II, respectively, first used them in the past three years.

**Figure C-2. Use of CFLs**  
(base – all respondents)



The average California household currently has 7.5 CFLs installed, versus 6.3 in Comparison Area I and 5.9 in Comparison Area II. Among current users of CFLs, the average number of CFLs currently in use is 9.7 in California, 9.6 in Comparison Area I and 8.9 in Comparison Area II. (Table C-2).

**Table C-2. Number of CFLs Currently Installed in Households**  
(base –current users of CFLs)

	California	Comparison Area I	Comparison Area II
N	540	1200	823
1 or 2	11.4%	16.8% <sup>σ</sup>	16.5% <sup>σ</sup>
3 or 4	14.1	18.5 <sup>σ</sup>	20.0 <sup>σ</sup>
5 or 6	17.4	14.6	15.8
7 or 8	12.3	10.1	10.8
9 or 10	14.5	9.6 <sup>σ</sup>	9.5 <sup>σ</sup>
11 to 20	23.7	22.3	21.2 <sup>σ</sup>
Over 20	6.6	8.1	6.2
Average number CFLs installed –			
Current Users	9.7	9.6	8.9 <sup>σ</sup>
All Households	7.5	6.3	5.9 <sup>σ</sup>

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

### C.3 Recent Bulb Purchases

Nearly half of all households (47%) in California purchased light bulbs in the past three months. Of those households purchasing bulbs, 28% purchased CFLs. As Table C-3 shows, in the Comparison Areas, significantly more households purchased light bulbs in the past three months than in California; this is consistent with having fewer of their sockets filled with longer-lasting CFLs, hence needing bulbs more often – over half of all households purchased at least one light bulb (57% and 58% for Comparison Areas I and II, respectively). Of those purchases, 29% (Comparison Area I) and 30% (Comparison Area II) purchased CFLs.

**Table C-3. Recent Bulb Purchasers – Past Three Months**  
**(base – all respondents)**

	California	Comparison Area I	Comparison Area II
All Bulbs	47.3%	56.6% <sup>σ</sup>	57.5% <sup>σ</sup>
CFLs	28.3	28.9	30.1
Incandescents	58.2	61.1	58.8
Specialty *	46.0	43.1	43.8

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

\* Specialty bulbs were defined in survey as "other types of bulbs, besides regular incandescent light bulbs and CFLs. T might include halogen bulbs, long fluorescent tubes and other types of specialty bulbs."

The survey also asked respondents to estimate the number of each type of light bulb they purchased over the past three months. As shown in Table C-4, households in California purchased an average of 1.1 CFLs, compared to 1.2/1.1 CFLs in Comparison Areas I/II.

**Table C-4. Recent Bulb Purchases – Past Three Months**  
**(Average number bulbs for all purchasing households; base – all products purchased)<sup>a</sup>**

		CFLs	Incandescent	Specialty	All Bulbs
California	unweighted n	99	194	162	341
	Average # Purchased in past 3 months, All Households	1.1	1.4	1.2	3.7
Comparison Area I	unweighted n	295	585	442	992
	Average # Purchased in past 3 months, All Households	1.2	2.3	1.5	5.0
Comparison Area II	unweighted n	202	381	299	667
	Average # Purchased in past 3 months, All Households	1.1	2.3	1.6	5.0

a Don't know responses removed from sample size and calculation.

b Purchasing households of each type of bulb.

### **C.4 CFL Purchases By Distribution Channel**

The survey asked respondents who had purchased CFLs if they knew whether or not that the CFLs they purchased were part of a utility promotion or utility sponsored sale. As Table C-5 shows, 26% of the CFLs purchased by California households in the survey were attributed to the California IOU Program, while 4% of CFLs in both of the Comparison Areas were attributed to a utility program (despite there being minimal utility programs in Comparison Area I and none in Comparison Area II).

**Table C-5. Recollection of Utility Incentive for CFL Purchase**  
**(base – respondents purchasing CFLs; respondents may have purchased bulbs**  
**at more than one type of store)**

	California	Comparison Area I	Comparison Area II
N	99	295	202
Total # of CFL Purchased 3 months	9,998,281	10,814,322	10,673,407
Total # of CFLs IOU Program Recalled for	2,624,852	424,307	454,492
%	26%	4% <sup>σ</sup>	4% <sup>σ</sup>

### **C.5 2006-08 CFL Purchases**

The survey asked respondents a series of questions about CFL purchases from 2006 through 2008. As Table C-6 shows, based on respondent recollection of purchases, households in California purchased an estimated 53 million CFLs over the past three years, with an average of 5.7 CFLs per all households in California and with an average of 12.2 CFLs in purchasing households. In the Comparison Areas, households purchased an estimated 45 million CFLs in Area I and 43 million CFLs in Area II over the past three years, or an average of 4.9/4.6 CFLs per household and 10.9/10.2 per purchasing household for Comparison Areas I/II, respectively.

**Table C-6. CFL Purchases – 2006-2008**  
**(base – all respondents)**

	California	Comparison Area I	Comparison Area II
N	341	820	547
Past 3 months	9,998,281	10,814,322	10,673,407
# CFL Purchased 2006-2008 <sup>a</sup>	53,010,614	45,309,241	42,937,565
Average # Purchased 2006-2008, All Households	5.7	4.9	4.6
Average # Purchased 2006-2008, Purchasing Households	12.2	10.9	10.2 <sup>σ</sup>

<sup>a</sup> Including bulbs purchased in past 3 months

Among the CFLs purchased since January 1, 2006, there are an estimated 3.5 CFLs installed per household across all homes in California, the same number as in Comparison Area I, and slightly higher (though not significantly so) than the 3.2 installed per household in Comparison Area II.

**California Public Utilities Commission CFL Market Effects**  
**Energy Division Interim Report**

Across all homes in California, about 1.5 CFLs purchased in the past three years are in storage, whereas all households in both Comparison Areas have about 1 CFL in storage. Among CFL users, households in California have 3.4 CFLs in storage, and those in both Comparison Areas have a significantly fewer 2.3 CFLs in storage (Table C-7).

**Table C-7. Installation and Storage of CFLs – Past Three Years**  
**(base – all respondents; weighted to CA IOU households for each state)<sup>a</sup>**

		n	Average # of Products, all households	Average # of Products, households with CFLs
California	Installed	322	3.5	8.0
	In Storage	319	1.5	3.4
Comparison Area I	Installed	800	3.5	8.0
	In Storage	793	0.9	2.3 <sup>σ</sup>
Comparison Area II	Installed	532	3.2	7.4
	In Storage	527	0.98	2.3 <sup>σ</sup>

<sup>a</sup> “Don’t know” responses have been removed from the calculations.

<sup>b</sup> Not including bulbs purchased in past 3 months

<sup>c</sup> Sum of installed and in-storage products does not necessarily equal total products, due to the fact that some products may have been removed from service, or may be unaccounted for by respondent.

<sup>σ</sup> Results between California and the Comparison Area are significantly different at the 90% confidence level.

**C.6 Status of CFLs Purchased in Past Three Months**

Among products purchased in the past three months, purchasing households in California have slightly but not significantly fewer CFLs installed than do households in the Comparison Areas (4.4 in California, compared to 5.2 and 5.4 CFLs in Comparison Areas I and II, respectively). California households also have more recently purchased CFLs in storage than do households in the Comparison Areas. None of these differences are significant (Table C-8).

**Table C-8. Installation and Storage of CFLs Recently Purchased – Past Three Months**  
**(base – all respondents)<sup>a</sup>**

		n	Average # of Products, all households	Average # of Products households with CFLs
California	Installed	118	0.7	4.4
	In Storage	93	0.5	4.1
Comparison Area I	Installed	312	0.9	5.2
	In Storage	219	0.5	3.8
Comparison Area II	Installed	210	.97	5.4
	In Storage	146	.5	3.9

<sup>a</sup> Don’t know responses have been removed from the calculations.

<sup>b</sup> Includes bulbs given to participants in past three months.

<sup>c</sup> Number of bulbs reported installed or in storage exceeds bulbs purchased and given in the past three months by 144,321 weighted bulbs

## **Appendix D**

# **Upstream Market Actor Survey Instrument**



**Program Attribution, Market Effects, and Market Characterization  
Interview Guide  
for Executives of Large Lighting Retailers  
Participating in the 2006-2008 California Upstream Lighting Programs**

**I. Introduction**

**A. Contact Protocol**

1. Call potential interviewees to ascertain most appropriate interviewee. Obtain email address(es) of appropriate interviewees. If company refuses interview, determine reasons for refusal and if it's logistical in nature, try to find workaround.
  2. Send email interview invitation to appropriate interviewee. This invitation will include:
    - a) Explanation of purpose and scope of interview.
    - b) Explanation of time frame within which the interview will need to be completed.
    - c) Explanation of expected duration of interview and flexibility to complete interview over multiple sessions.
    - d) Instructions to propose a convenient interview time.
    - e) Contact information for interviewers.
    - f) Assurances of confidentiality.
    - g) A letter attachment from the CPUC explaining the importance of the interview.
  3. If target interviewee does not respond to the email invitation within a week, a follow-up call will be made to try to schedule an interview time, find an alternate interview target, or determine reasons for refusal.
  4. Once an interview time has been arranged, the interviewee will be emailed, a couple days in advance of the interview, a copy of the interview guide as well as a customized data table similar to Table 1 below. The email will contain additional assurances of confidentiality.
- B.** At the beginning of the interview, collect information on interviewee's position and overall responsibilities, and experience with the program.

**II. Program Participation Confirmation and Reasons for Participation**

- A.** Pacific Gas and Electric, Southern California Edison, and San Diego Gas and Electric jointly participate in an Upstream Lighting Program which provides per bulb or per fixture financial incentives to buy down the cost of energy efficient lighting products. According to our information your company has been selling lighting products that receive these manufacturer buydown incentives from this California Upstream Lighting Program during the 2006-2008 time period. Are you aware of your company's participation in this program? [IF UNAWARE, FIND SOMEONE WITH THE COMPANY WHO IS AWARE. IF THEY RECOGNIZE THIS PROGRAM BY A DIFFERENT NAME, EXPLAIN THAT FOR THE SAKE OF SIMPLICITY YOU'LL HENCEFORTH

- B. Besides getting these financial incentives, are there any other aspects of this California Upstream Lighting Program that your company has actively taken part in?
  - 1. [IF YES] What other aspects of this program has your company been involved in?
- C. About what year did your company first get involved with the California Upstream Lighting Program?
- D. Before becoming involved with the California Upstream Lighting Program, was your company involved in any other California energy efficiency programs that provide rebates or buydown discounts for energy-efficient lighting products?
  - 1. [IF YES] What programs were these? [IF REBATES MENTIONED, TRY TO DETERMINE IF THESE WERE UPSTREAM OR DOWNSTREAM (MAIL-IN REBATES, POINT-OF-SALE REBATES)]
  - 2. [IF YES] About when did this involvement begin and what was the nature of this participation?
- E. Was your company selling compact fluorescent bulbs or fixtures in California before getting involved with any of these California lighting rebate or discount programs?
- F. Was your company selling **Energy Star** compact fluorescent bulbs or fixtures in California before getting involved with any of these California lighting rebate or discount programs?
- G. What was your primary reason for getting involved with the California Upstream Lighting program?
- H. Did you have any other reasons for getting involved with the California Upstream Lighting program?
  - 1. [IF YES] What were these?

**III. 2006-2008 CFL Product Sales and California Upstream Lighting Program Trends**

- A. My next questions concern which CFL products you sell in California. Is this a topic that you are familiar with? [IF INTERVIEWEE IS

**B. Non-Specialty CFL Bulbs** [IF THEY SOLD NON-SPECIALTY CFL BULBS ELSE SKIP TO III. C.] First I'm going to ask you some questions about your sales of non-specialty CFL bulbs in California, both Energy Star and non-Energy Star. By "non-specialty" CFL bulbs I mean bulbs that do not have special functions or features such as reflectors, dimmability, three-way light levels, or flood lighting. Now earlier I emailed you a table that shows you a record of the types of non-specialty CFL bulbs that we have records of you selling through the ULP program along with some spaces for non-program sales that we were hoping you could fill in. [REPEAT ASSURANCES OF CONFIDENTIALITY]

**Table 1  
Sample Data Table**

Product Type	# Non-Specialty CFL Bulbs Through Upstream Lighting Program				# Non-Specialty CFL Bulbs Sold in California Not Through Upstream Lighting Program			
	2006	2007	Q1 2008	Total 2006-2008	2006	2007	Q1 2008	Total 2006-2008
<b>Non-Specialty CFL Bulbs of Type Sold Through Upstream Lighting Program</b>								
CFL INT INTEGRAL - 13 WATT >= 800 LUMENS - SCREW-IN	50,000	78,000	32,000	160,000	A	B	C	D
INTERIOR CF BULB - 23 WATT 1,100 TO 1,399 LUMENS	100,000	213,000	81,000	394,000	E	F	G	H
<b>Other Non-Specialty Energy Star CFLs Sold in California But Not Through Upstream Lighting Program</b>								
???								
???								
???								
<b>Non-Specialty Non-Energy Star CFLs Sold in California</b>								
???								
???								
???								

[IF NO, MAKE APPROPRIATE CORRECTIONS/CLARIFICATIONS]

1. Does the table I sent to you seem correct in terms of the types and volume of non-specialty CFLs you sold through the California Upstream Lighting Program?
  - a) [IF NO] [Record any corrections to the table]
2. Why did you choose to sell these particular products and packages through the California Upstream Lighting Program?
3. [IF THEY DID FILL IN NON-ULP DATA INTO TABLE THAT INDICATED NON-SPECIALTY ENERGY STAR CFLs SOLD IN CALIFORNIA IN 2006-2008 BUT NOT THROUGH ULP

- a) [IF THEY INDICATE MULTIPLE REASONS] Which of these reasons was the most important?
  - b) [IF NOT ALREADY EXPLAINED] What advantages, if any, did you see in not selling CFL bulbs through the program?
  - c) [IF NOT ALREADY EXPLAINED] What disadvantages, if any, did you see in not selling CFL bulbs through the program?
4. [IF THEY DID FILL IN NON-ULP DATA INTO TABLE THAT INDICATED NON-SPECIALTY NON-ENERGY STAR CFLs SOLD IN CALIFORNIA IN 2006-2008] I noticed that when you filled out the table you indicated that in the 2006-2008 period you sold non-specialty non-Energy Star CFLs in California. Why do you sell these rather than just Energy Star CFLs?
- a) [IF THEY INDICATE MULTIPLE REASONS] Which of these reasons was the most important?
  - b) What would have to change for you to only offer Energy Star CFLs for the CFLs you sell?
5. [IF THEY DIDN'T FILL IN NON-ULP DATA INTO TABLE] During the 2006-2008 period did you sell non-specialty Energy Star CFL bulbs in California that **did not** receive discounts from the Upstream Lighting Program?
- a) [IF YES] Are the bulb types and packages different from those you sell through the California Upstream Lighting Program?
    - a. [IF YES] How so?
  - b) [IF YES] Why didn't you sell these bulbs through the California Upstream Lighting Program?
6. [IF THEY DIDN'T FILL IN NON-ULP DATA INTO TABLE] During the 2006-2008 period did you sell non-specialty non-Energy Star CFL bulbs in California that **did not** receive discounts from the Upstream Lighting Program?

- a) [IF YES] What sorts of bulb types and packages were these non-specialty, non-Energy Star bulbs?
7. When discounts from the Upstream Lighting Program **were not** available, due to delays in program startup or product allocations for discounted CFLs running out, did you sell non-specialty Energy Star CFL bulbs in California?
- a) [IF YES] Were the bulb types and packages different from those you sell through the California Upstream Lighting Program?
- a. [IF YES] How so?
8. [IF THEY DIDN'T COMPLETE THE TABLE] Please provide your best estimate of what % of non-specialty CFL bulbs that you sold in California during the 2006-2008 period fit into the following categories:

First consider the non-specialty CFL bulbs that were discounted by the California Upstream Lighting Program (ULP). About what % non-specialty CFL bulbs that you sold in California during the 2006-2008 period did these account for?	_____ %
Next consider the non-specialty CFL bulbs that met Energy Star specifications but were not discounted by the program. About what % non-specialty CFL bulbs that you sold in California during the 2006-2008 period did these account for?	_____ %
Finally consider the non-specialty bulbs that did not meet Energy Star specifications. About what % non-specialty CFL bulbs that you sold in California during the 2006-2008 period did these account for?	_____ %
<b>Total non-specialty CFL bulbs sold in California during the 2006-2008 period</b>	<b>100%</b>

9. Do you sell non-specialty CFLs that you believe exceed Energy Star specifications? [IF NECESSARY, REMIND INTERVIEWEE OF ENERGY STAR SPECIFICATIONS]
- a) [IF YES] In what ways do these bulbs exceed Energy Star specification?

- b) [IF YES] What types (wattages, brands) of non-specialty CFL bulbs are these?
  - c) [IF YES] Why do you offer such non-specialty bulbs that exceeded Energy Star specifications?
  - d) [IF YES] About what percentage of the non-specialty CFL bulbs that you sold in California during the 2006-2008 period did these account for?
10. [IF THEY SOLD NON-SPECIALTY CFLS IN CALIFORNIA IN 2006-2008 THAT DID NOT RECEIVE CALIFORNIA UPSTREAM LIGHTING PROGRAM DISCOUNTS]. The California Public Utilities Commission and the California investor-owned utilities have sales data for the CFL products that your company sold through the California Upstream Lighting Program. However, they are also very interested in learning about prices and sales volumes for CFL products that were not sold through Upstream Lighting. If we provided assurances to protect the confidentiality of these sales data, would you be willing to share these data?
- a) [IF YES] What would be the next step for getting these data?

**C. Specialty CFL Bulbs** [IF THEY SOLD SPECIALTY CFL BULBS ELSE SKIP TO III. D]. Next I'm going to ask you some similar questions but this time about your sales of specialty CFL bulbs, both Energy Star and non-Energy Star. By "specialty" CFL bulbs I mean bulbs that have special functions or features such as reflectors, dimmability, three-way light levels, or flood lighting. [REPEAT QUESTIONS B1. – B10 EXCEPT SUBSTITUTE WORD "Specialty" for "Non-Specialty"]

**D. CFL Fixtures** [IF THEY SOLD CFL FIXTURES ELSE SKIP TO III. E.] Next I'm going to ask you some similar questions but this time about your sales of Energy Star-qualified CFL fixtures. [REPEAT QUESTIONS B1. – B10 EXCEPT SUBSTITUTE WORDS "CFL fixtures" for "Non-Specialty CFL bulbs"]

**E. Recent trends, policies for the California Upstream Lighting Program**

- 1. Are there certain types of CFL or LED bulbs or fixtures that the California Upstream Lighting Program has been encouraging your company to sell more than others?
  - a) [IF YES] Which products are these?

- b) Have there been differences between the California investor-owned utilities involved in this program in terms of which lighting products they have been encouraging?
    - a. [IF YES] What are these differences?
  - c) [IF YES] Do you agree with an emphasis on these products?
    - a. Why do you say this?
  - d) Are there certain types of the energy-efficient lighting products that you think the California Upstream Lighting Program should be promoting that they are not currently promoting?
2. Are there certain types of retailers that the California Upstream Lighting Program has been encouraging lighting manufacturers to partner with more than other retailer types?
- a) [IF YES] Which types of retailers?
  - b) [IF YES] Do you agree with an emphasis on these retailer types?
    - a. Why do you say this?
  - c) Are there certain types of retailers that you think the California Upstream Lighting Program should be focusing on more to encourage their sales of energy-efficient lighting products?
    - a. Why do you say this?
3. Before now were you aware that the California Upstream Lighting Program currently has a bulk purchase limit on how many CFLs, CFL fixtures, LED night lights or holiday lights can be included in a single customer purchase?
- a) What is your opinion on these bulk purchase limits?
  - b) [IF WERE AWARE OF BULK LIMITS] What, if anything, is your company doing to try to enforce these bulk limits?
    - a. [IF INVOLVED IN POLICING OF BULK LIMITS] The main purpose of the bulk purchase limits is to reduce the chance of CFL products discounted by the Upstream Lighting Program being sold outside of California. Have you

i. [IF YES] How do you think this happened?

c) Before now were you aware that lighting manufacturers who participate in the California Upstream Lighting Program are helping to enforce this rule by monitoring retailers for evidence of bulk sales?

**IV. Free Ridership and In-State Spillover**

A. My next questions are about the impact that the 2006-2008 California Upstream Lighting Program may have had on your California CFL products sales.

1. Do you think your company would have been selling CFL products during this 2006-2008 time period if the discounts of \$0.50-\$2.75 per bulb from this program had not been available?
2. Has the availability of these rebates had any influence on your stocking or packaging decisions, such as the amount of shelf space devoted to CFL's or number of CFL bulbs sold per package?

**B. Free Ridership**

1. **Non-Specialty CFL bulbs** [ASK IF THEY SAID YES TO IV. A. AND THEY SELL NON-SPECIALTY CFL BULBS ELSE SKIP TO IV.B.2.] According to our records in the 2006-2008 period you received California Upstream Lighting Program manufacturer buydown discounts of \$0.50-\$2.75 per bulb for the sale of the following types of non-specialty CFL bulbs [NAME TYPES]. If these manufacturer buydown discounts and program promotional materials had not been available during this 2006-2008 period, do you think your sales of these types of non-specialty Energy Star CFL bulbs would have been about the same, lower, or higher?

a) [IF HIGHER] Why do you say this? [RECORD RESPONSE AND THEN SKIP TO NEXT RETAILER CATEGORY]

b) [IF LOWER] By what percentage do you estimate your sales of non-specialty Energy Star CFL bulbs would be lower during this 2006-2008 period if these manufacturer buydowns and program promotional materials for non-specialty CFLs had not been available? [RECORD % DECREASE]

a. I want to make sure I understand you correctly. You estimate that your sales would have been [PERCENTAGE FROM QUESTION IV.B.1. b.] %



c) **Retailer add-on rebates:** When the California Upstream Lighting Program was providing manufacturer buydown discounts for non-specialty bulbs during the 2006-2008 period, did your company ever provide any of its own price discounts in addition to those provided by the Upstream Lighting Program?

a. [IF NO] Why not?

b. [IF YES] What were your reasons for providing these additional price discounts?

c. [IF YES] What was the typical range of these additional discounts on a \$ per bulb basis?

d. [IF YES] Were there particular types of bulbs that you were more likely to offer these additional discounts on?

i. [IF YES] What types of bulbs were these?

e. Using a scale of 0 to 10 where 10 equals “very likely” and 0 equals “not likely at all,” how likely were you to offer these additional price discounts if the manufacturer buydown rebates had not also been available?

2. **Specialty CFL bulbs** [ASK IF THEY SAID YES TO IV. A. AND SOLD SPECIALTY CFL BULBS OTHERWISE SKIP TO IV.B.3.] [REPEAT QUESTIONS IV. B. 1. a) – c) BUT SUBSTITUTE APPROPRIATE PRODUCT NAME AND REBATE LEVELS.]

3. **CFL fixtures** [ASK IF THEY SAID YES TO IV. A. AND SOLD CFL FIXTURES OTHERWISE SKIP TO V.B.4.] [REPEAT QUESTIONS IV. B. 1. a) – c) BUT SUBSTITUTE APPROPRIATE PRODUCT NAME AND REBATE LEVELS.]

4. **Effects of other California IOU programs/efforts**

a) Besides the discounts and the promotional materials, do you think the California Upstream Lighting Program does anything else that helps you sell non-specialty Energy Star CFL bulbs?

a. [IF YES] What else does the program do?

b) California also has a program called Flex Your Power that does mass advertising for CFL products and other energy efficient measures. Please indicate how significant you think this program is as a driver of increased CFL product sales in California in the 2006-2008 period. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant. [RECORD RATING]

a. Why do you give this rating?

c) In addition to the Upstream Lighting Program and the Flex Your Power Program some California utilities have also been involved in other campaigns to promote sales of CFL products such as the Energy Star Change-a-Light promotion. Please indicate how significant you think these promotions have been as a driver of increased CFL product sales in the 2006-2008 period. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant. [RECORD RATING]

a. Why do you give this rating?

**C. Program Effects on Non-discounted CFLs Sold in California in 2006-2008** [IF THEY SOLD NON-SPECIALTY CFLS IN CALIFORNIA IN 2006-2008 THAT DID NOT RECEIVE CALIFORNIA UPSTREAM LIGHTING PROGRAM DISCOUNTS ELSE SKIP TO SECTION V.]

1. You said earlier that you also sold CFL bulbs or fixtures in California in the 2006-2008 that did not receive discounts from the California Upstream Lighting Program. What effects, if any, do the program-discounted CFL bulbs or fixtures have on your sales levels of these non-program-discounted CFL bulbs or fixtures? [IF MECHANISM FOR THESE EFFECTS IS NOT EXPLAINED, PROBE FOR MECHANISM]

a) Would these effects vary depending on the type of CFL product?

a. [IF YES] How so?

b) Have these effects changed at all over this 2006-2008 period?

a. [IF YES] How so and about what time period did these effects change?

2. Does your company ever sell program-discounted CFL bulbs or fixtures and non-program-discounted CFL bulbs or fixtures at the same time?
  - a) [IF YES] Would you say this happens always, very often, sometimes, or not very often?
  - b) [IF YES] Do you promote these non-program-discounted CFL bulbs or fixtures differently than you do the program-discounted CFL bulbs or fixtures?
    - a. [IF YES] How are your promotional efforts different?
  - c) [IF YES] Do you think increased shopper foot traffic due to program-discounted CFL bulbs and fixtures has any impact on the sales of non-program discounted CFL bulbs or fixtures that are being sold at the same time?
    - a. [IF YES] Why do you say this?
  
3. What effects do you think program-discounted CFL bulbs or fixtures have on consumer expectations regarding prices of non-discounted CFL bulbs or fixtures?
  
4. You indicated that you sold the following types of non-specialty CFL bulbs in California during the 2006-2008 period that you did not sell through the ULP Program: [READ PRODUCT TYPES. IF THEY FILLED OUT THE TABLE, DIRECT THEM TO SPECIFIC ROW]. Do you think your sales of these types of non-specialty non-program-discounted CFL bulbs would be about the same, lower, or higher if the California Upstream Lighting program – with its manufacturing buydowns and promotional materials – did not exist during this time period?
  - a) [IF HIGHER] Why do you say this?
  - b) [IF HIGHER] By what percentage do you estimate your sales of these non-specialty non-program-discounted CFL bulbs would be higher during this period if the California Upstream Lighting Program did not exist during this 2006-2008 time period?  
[RECORD % INCREASE]
    - a. I want to make sure I understand you correctly. You estimate that your sales would have been

- c) [IF LOWER] Why do you say this?
  - d) [IF LOWER] By what percentage do you estimate your sales of these non-specialty CFL bulbs through [RETAILER CATEGORY] stores would be lower during this period if the California Upstream Lighting Program did not exist during this time period? [RECORD % DECREASE]
    - a. I want to make sure I understand you correctly. You estimate that your sales of non-program-discounted bulbs would have been [PERCENTAGE FROM QUESTION IV. D. 4. d.] % lower without the manufacturer buydowns. So if you actually sold 100 of these non-specialty CFLs in a given week, you think you'd have sold about [100 - (PERCENTAGE FROM QUESTION IV. D. 4. d. \* 100)] in that period if the California Upstream Lighting Program did not exist during this time period? [IF RESPONSE IS ≠ YES THEN CLARIFY ESTIMATED SALES DECREASE]
  - e) [IF SAME] Why do you say this?
  - f) [IF THEY INDICATED IN IV B. 1. THAT EFFECTS OF PROGRAM ON NON-PROGRAM NON\_SPECIALTY CFLS HAS CHANGED OVER 2006-2008 PERIOD, PROBE FOR HOW THESE SALES EFFECTS WOULD VARY OVER THE 2006-2008 PERIOD]
5. [REPEAT SEQUENCE IV. D. 4 FOR SPECIALTY CFLS OR CFL FIXTURES IF RELEVANT, MAKING SURE TO CHANGE PRODUCT DESCRIPTION IN QUESTIONS.]
- D. [IF THEY SOLD BOTH SPECIALTY AND NON-SPECIALTY CFLS] You said earlier that during the 2006-2008 period, you sold both non-specialty and specialty CFL bulbs through the California Upstream

- V. Early, Cumulative Effects of California Lighting Rebate Programs** – Up until now we have been talking about the effect of the California Upstream Lighting Program on CFL bulbs and products that you sold in California during the 2006-2008 period. Now I want you to think about the earlier and cumulative effects that the years of California lighting rebate and discount programs might have had on your company’s sales of CFL products.
- A. Have the years of California lighting rebate and discount programs had any effects on the types of CFL products you sell or the way that you sell them?
1. [IF YES] How so?
- B. [IF THEY SAID THAT THEY HADN’T BEEN SELLING CFL PRODUCTS IN CALIFORNIA BEFORE BECOMING INVOLVED IN CA LIGHTING REBATE PROGRAMS – E.G. II. E = “NO”] Earlier you said that your company was not selling CFL products in California before getting involved with any California lighting rebate or discount programs. How significant was the existence of the California lighting rebate or discount programs in your company’s decision to enter the California lighting market? Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.
- C. [IF THEY SAID THAT THEY HAD BEEN SELLING CFL PRODUCTS IN CALIFORNIA BEFORE BECOMING INVOLVED IN CA LIGHTING REBATE PROGRAMS – E.G. II. E = “YES”] Earlier you said that your company sold CFL products in California before getting involved with any of these California lighting rebate or discount programs. Do you have California CFL product sales data for this period before you became involved with the California lighting rebate or discount programs?
- a) [IF YES] If we provided assurances to protect the confidentiality of these sales data, would you be willing to share these data?
- a. [IF YES] What would be the next step for getting these data?
- D. Does your company sell CFL bulbs or fixtures in states other than California?

1. [IF YES] Does your company sell CFL bulbs or fixtures in any states that **do not** have utilities or state energy efficiency programs that offer manufacturer buydowns or point of sale rebates for these kind of lighting products?

a) [IF YES] Are you familiar with your company's CFL bulb or fixture sales activities in these states?

a. [IF YES] In these states without utility or state energy efficiency program rebates, do you promote your CFL products differently than you do in California?

i. [IF YES] How is this promotion different?

b. [IF YES] On a per-bulb basis, on average, how much lower are the prices of the California program-discounted CFL than the CFL bulbs that you sell in states that do not offer rebates or discounts from utilities or state energy efficiency programs?

b) [IF YES] If we provided assurances to protect the confidentiality of your data, would you be willing to share recent CFL product sales data for states other than California?

a. [IF YES] What would be the next step for getting these data?

c) [IF NO] Who would be another person at your company who is familiar with the sales of these CFL products in states that do not have utilities or state energy efficiency programs offering CFL product rebates or discounts? [RECORD NAME AND CONTINUE TO NEXT QUESTION]

E. California energy efficiency programs have been offering rebates and discounts on CFL bulbs for many years. Do you think these California programs have influenced the level of sales of CFLs in other states?

1. Why do you say this?

a) [IF NOT EXPLAINED IN THEIR ANSWER TO E1] How do the California lighting rebate programs influence the level of sales of CFLs in other states?

2. [IF YES] How significant has been the influence of these years of California rebate programs on the price of CFLs in these states? Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.
- F. For years California lighting rebate and discount programs have been working to improve the performance of CFLs as well as their acceptability as substitutes for incandescent bulbs. For example, these programs have long required Energy Star compliance and offered larger rebates for higher lumen levels at a given wattage level. What influences, if any, have these program requirements had on the performance of the CFLs that you sell?
- G. If the California lighting rebate and discount programs had not existed, do you think the performance improvements that have been made to the CFLs you sell would have happened sooner, later, or about the same time as they actually did?
1. [IF LATER] How much later would you have made these performance improvements?
- H. Have the California lighting rebate and discount programs influenced the way that you market your CFLs in other states?
1. [IF YES] How so?
- I. State or utility rebate and discount programs are only some of the factors that may be encouraging sales of CFL bulbs and fixtures. I'm going to name a number of possible drivers of increased CFL bulbs and fixtures. For each one I identify, please indicate how significant you think it is as a driver of increased CFL product sales during the 2006-2008 period. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.
1. State or utility rebate and discount programs? [RECORD RATING]
    - a) Why do you give this rating?
  2. The Energy Star program including its Change-a-Light campaign? [RECORD RATING]
    - a) Why do you give this rating?
  3. CFL promotion campaigns by some large retailers such as Wal-Mart, Home Depot, and Lowe's that are being done independently of any state or utility energy efficiency programs? [RECORD RATING]
    - a) Why do you give this rating?

4. Media stories promoting the use of CFLs? [RECORD RATING]
  - a) Why do you give this rating?
5. Reductions in CFL production costs and price points due to lower-cost overseas manufacturing and increases in CFL production capacity? [RECORD RATING]
  - a) Why do you give this rating?
6. Growing consumer awareness about global warming? [RECORD RATING]
  - a) Why do you give this rating?
7. Higher energy costs? [RECORD RATING]
  - a) Why do you give this rating?
- J. Have you seen any evidence that that some lighting products receiving discounts from the California Upstream Lighting Program are being sold out-of-state or through out-of-state buyers through the Internet?
  1. [IF YES]. What evidence have you seen?
- K. What do you think should be done to minimize the occurrence of out-of-state sales of lighting products receiving discounts from the California Upstream Lighting Program?

**VI. Supply Chain Characterization and Stocking Practices**

- A. Now I would like to ask you some questions about your supply chain. Of the CFL products that you sell in California, where are most of them manufactured?
  1. Are your CFL products that are discounted through the ULP-program manufactured in different places than those that are not discounted through the program? [IF YES, IDENTIFY DIFFERENT SOURCES]
- B. How long does it typically take from the time that you place an order with the manufacturer or distributor and the time that you receive delivery of this order in your stores?
  1. Approximately how much of this time is for manufacture?



2. Approximately how much of this time is for shipment?
  3. Approximately how much of this is for temporary warehousing and storage by the manufacturer or distributor?
  4. Approximately how much of this is for your own company's warehousing and storage?
- C. Are there any types of CFL products for which it takes significantly longer than this to receive after your order them?
1. [IF YES] Which products?
- D. What other factors could cause variations in these delivery times?
- E. Are your delivery times for CFL products that you sell through the Upstream Lighting Program different than those for other CFL products that you sell?
1. [IF YES] How so?
- F. At what point in the supply chain are the stickers and packages for the California Upstream Lighting Program applied?
- G. How are the sizes of shipments of program-discounted CFLs to your stores determined?
- H. Have your stores ever received shipments of program-discounted CFLs from manufacturers that were larger than you expected or ordered?
1. [IF YES] Has this happened frequently, occasionally, or rarely?
- I. Have your stores ever received shipments of program-discounted CFLs from manufacturers that came at an unexpected time?
1. [IF YES] Has this happened frequently, occasionally, or rarely?
- J. Is your process for ordering shipments of program-discounted CFLs different from your process for ordering shipments of other lighting products?
1. [IF YES] How is it different?
- K. Do your stores stock CFLs that are discounted by the California Upstream Lighting Program year round?

1. [IF YES] Do your stores stock approximately the same number of program-discounted CFLs year round?
  - a) [IF NO] Why not?
  
- L. [IF THEY SELL SPECIALTY CFLS] Are your stocking practices for specialty CFLs such as dimmable, 3-way, or reflector CFLs any different than those for non-specialty CFLs?
  - a) [IF YES] How so?
  
- M. [IF THEY SELL CFL FIXTURES] Are your stocking practices for CFL fixtures any different than those for non-specialty CFLs?
  - a) [IF YES] How so?
  
- N. How long will typical shipments of program-discounted non-specialty CFLs last in one of you stores before being sold out?
  
- O. [IF THEY SELL SPECIALTY CFLS] How long will typical shipments of program-discounted specialty CFLs last in one of you stores before being sold out?
  
- P. [IF THEY SELL CFL FIXTURES] How long will typical shipments of program-discounted specialty CFLs last in one of you stores before being sold out?
  
- Q. [IF THEY SELL NON-PROGRAM-DISCOUNTED CFL PRODUCTS] Do the CFLs bulbs that are discounted by the Upstream Lighting Program sell quicker, slower, or at about the same pace as other light bulbs that your store sells?
  
- R. If the supply of program-discounted non-specialty CFLs in your store sells out, what do you typically do?
  
- S. Is this process any different for specialty CFLs or CFL fixtures?
  1. [IF YES] How so?
  
- T. If one of your stores has program-discounted CFLs that remain unsold after a long period of time, what typically happens to these products?
  1. [IF MANUFACTURER/SUPPLIER RETAKES BULBS] Is this done as a condition of your contract with the manufacturer?
  
- U. Would this unsold inventory ever be sold out of California?

1. [IF YES] How might this happen?
  2. [IF YES] How would you know this?
- V. As noted earlier, there is evidence that some lighting products receiving discounts from the California Upstream Lighting Program are being sold out-of-state or through out-of-state buyers through the Internet. At what point in the supply and distribution chain do you think this might be happening?
- W. Do you track CFL products that you sell through the California Upstream Lighting Program that are lost due to breakage and other damage?
1. [IF YES] Do you just track damage/breakage to CFL products before they reach the retailer or also after?
  2. [IF YES] If we gave your company assurances of confidentiality, would you be willing to share information about your loss and breakage rates?

## **VII. Pricing**

- A. How much influence does your company have over the prices of the CFL products that you receive from manufacturers? Would you say that your company is very influential, somewhat influential, or not very influential?
- B. Some retailers use something called “keystone pricing” where the retail price is set at twice what the wholesale price is. Is this how you determine the retail price for the California Upstream Lighting Program CFLs products that you sell?
1. [IF NO] How do you determine the retail price for the program-discounted CFLs you sell?
- C. Some manufacturers participating in the California Upstream Lighting Program have been more aggressive than others and have offered their products to certain retailers for free. Have you ever received program-discounted CFLs for free?
1. [IF YES] How do you determine the retail price for these “free” CFLs?
- D. California CFL product prices have been declining in the last 10 years. Do you think this trend will continue, or will prices level off or even increase?
1. What factors are causing you to make this prediction?

- E. [IF THEY SELL NON-PROGRAM-DISCOUNTED CFLS ALSO] You said earlier that you also sell CFL products in California that do not receive buydown discounts from the California Upstream Lighting Program. Are the program-discounted CFL products typically sold at a lower retail price, a higher retail price, or at the same retail prices as the non-program-discounted bulbs?
1. On a per-bulb basis, on average, how much [LOWER/HIGHER] are the prices of the program-discounted CFL bulbs than the other CFL bulbs that you sell?
  2. On a per-fixture basis, on average, how much [LOWER/HIGHER] is the price on the program-discounted CFL fixtures than the other CFL fixtures that you sell?
  3. Are your pricing strategies for the products with California Upstream Lighting Program buydowns handled differently than non-program products?
    - a) [IF YES] How are these different?

### **VIII. Market Characterization**

- A. How would you characterize the current market for CFL products in California in terms of retailer market share? For example, are there a few major retailers responsible for the major share of product sales? Or are there a large number of major players?
- B. Where would you characterize your firm in terms of market share for the California CFL market?
- C. Are there factors inherent in the manufacturing, importing or distributing processes that have restricted the production and supply of CFL products in the past year or so? Please describe: [IF RESPONDENT CAN'T THINK OF ANYTHING, PROMPT WITH EXAMPLES SUCH AS SHORTAGES OF INPUTS USED IN MANUFACTURING PROCESSES (LABOR, CAPITAL, RAW MATERIALS), INADEQUATE INFRASTRUCTURE TO PRODUCE OR IMPORT PRODUCTS, OR BRING THEM TO MARKET, ETC.]
1. To what degree have these production and supply restrictions varied with the type of CFL product?
  2. How do these supply-side barriers compare to those for non-CFL products?

3. [IF SUPPLY BARRIERS IDENTIFIED] Has there been any progress recently to reduce these barriers?
    - a) [IF YES] What factors lead to the reduced barriers?
    - b) [IF NOT ALREADY MENTIONED] Did the 2006-2008 California Upstream Lighting Program play a role in reducing these barriers?
      - a. [IF YES] What role did it play?
    - c) Are there any supply-side barriers that have been increased due to the structure or timing of the California lighting rebate programs?
      - a. [IF YES] What are these?
      - b. [IF YES] How did/does the California programs create or increase these barriers?
  4. [IF SUPPLY BARRIERS IDENTIFIED] What, if anything, needs to happen to overcome the remaining supply-side restrictions?
- D. What are the most important factors that are limiting customer demand for CFL products? Please explain. [IF RESPONDENT CAN'T THINK OF ANYTHING, PROMPT WITH EXAMPLES SUCH AS LACK OF AWARENESS, PRODUCT PRICING, AND PERCEPTIONS REGARDING PRODUCT PERFORMANCE, BULB FIT, APPEARANCE, EARLY BURN-OUT, ETC. RECORD WHETHER ONE HAD TO PROMPT AND RANDOMLY ROTATE THE EXAMPLES USED IN THE PROMPT.]
1. To what degree have these demand barriers varied with the type of CFL product?
  2. [IF DEMAND BARRIERS IDENTIFIED] Has there been any progress recently to reduce these barriers?
    - a) [IF YES] What factors lead to the reduced barriers?
    - b) [IF NOT ALREADY MENTIONED] Did the 2006-2008 California Upstream Lighting Program play a role in reducing these barriers?
      - a. [IF YES] What role did it play?

- c) Are there any demand-side barriers that have been increased due to the structure or timing of the California lighting rebate programs?
        - a. [IF YES] What are these?
        - b. [IF YES] How did/does the California programs create or increase these barriers?
  - 3. [IF DEMAND BARRIERS IDENTIFIED] What needs to happen to overcome these demand-side barriers?
- E. Are you aware that in 2007 a federal Energy Bill was passed that requires new efficiency standards for light bulbs?
- 1. [IF YES] What do you think will be the impact of this 2007 Energy Bill on CFL sales and prices?
- F. What are your expectations for U.S. CFL product sales in 2008 and beyond?
- 1. Why do you say that?
- G. If California eliminated its CFL rebate and discount programs starting in 2009 what effects would this have on the sales levels of CFL products in California?
- H. What effects do you think the California Upstream Lighting Program has on the capability and willingness of lighting manufacturers to produce innovative CFL products?
- I. Do you sell CFL products in other countries besides the United States?
- 1. [IF YES] Are you familiar with your company's international sales trends?
    - a) [IF NO] Who would be another person at your company who is familiar with your company's international sales of CFL products? [RECORD NAME AND CONTACT INFORMATION AND SKIP TO SECTION IX]
    - b) [IF YES] How do your international sales trends for CFL products compare to those in the United States?
    - c) [IF YES] What do you think are driving these international sales trends?

**IX. Product Quality, Recycling**

- A. Do you think the quality of CFL products in recent years has been increasing, decreasing, or staying about the same?
  - 1. [IF THEY THINK QUALITY IS DECREASING] What factors do you think might be leading to the production of lower quality CFL products?
- B. What do you think should be done to improve the quality of CFL products?
- C. Do you think that CFL product discount programs like the California Upstream Lighting Program, have affected consumer attitudes towards the quality of CFL products in any way?
  - 1. [IF YES] In what way?
- D. How important is product quality in deciding what types or brands of CFLs you're selling in your store? Would you say that quality is very important, somewhat important, or not important at all?
  - 1. [IF NOT IMPORTANT AT ALL] Why do you say that?
- E. How can you tell whether the CFLs your stores are selling are quality products?
- F. Is your company doing anything to assure the quality of the CFL products it sells?
  - 1. [IF YES] What is your company doing to assure quality?
- G. Are there any CFLs you have stopped offering due to customer complaints related to quality?
  - 1. [IF YES] What types or brands of CFLs did you stop offering due to quality concerns?
- H. Energy Star's "CFL Criteria Version 4.0" was released in February 2008 and will become effective in November 2008. What do you think will be the impact of new Energy Star standards on CFL products and prices?
- I. The disposal of CFL products has become a major issue in recent years. Do you have standard recommendations you give to customers about how to recycle their CFLs?

1. [IF YES] What are these recommendations?
- J. Do you offer CFL recycling on-site in any of your stores?
  1. [IF NO] Have you ever considered doing this?
  2. [IF NO] What factors or barriers might keep you from offering CFL recycling on-site?

**X. Program Satisfaction**

Finally I would like to find out your level of satisfaction with the California Upstream Lighting Program

**A. Rebate Reservation, Program Verification Process**

1. Using a scale of 0 to 10 where 10 = very satisfied and 0 = very dissatisfied, how satisfied have you been with the rebate fund reservation process – that is, the process used by the utility to allocate a set amount of rebate dollars to participating stores?
  - a) [IF SATISFACTION RATING IS 0-5] Why do you say that?
2. Again using a scale of 0 to 10 where 10 = very satisfied and 0 = very dissatisfied, how satisfied have you been with the program tracking and verification process – that is, the process used by the utility to ensure that the CFL products that they are providing discounts for are being sold by retailers and are properly labeled and promoted?
  - a) [IF SATISFACTION RATING IS 0-5] Why do you say that?

**B. Rebate Levels and Coverage**

1. CFL bulbs [ASK ONLY IF THEY SELL CFL BULBS THROUGH THE PROGRAM]
  - a) Using this same satisfaction scale, how satisfied have you been with the level of manufacturer buydown rebates for CFL *bulbs*?
    - a. [IF SATISFACTION RATING IS 0-5] Why do you say that? For which bulb types are you unsatisfied with the rebate levels?
    - b) If the program, due to fund constraints, had to eliminate a manufacturer buydown rebate for one type of CFL bulb, which one should they choose? Why do say that?
2. CFL fixtures [ASK ONLY IF THEY SELL CFL FIXTURES THROUGH THE PROGRAM]
  - a) Using this same satisfaction scale, how satisfied have you been with the levels of manufacturer buydown rebates for CFL *fixtures*?



- a. [IF SATISFACTION RATING IS 0-5] Why do you say that? For which fixture types are you unsatisfied with the rebate levels?

**C. Marketing and Coordination with Retailers**

1. Using the same satisfaction scale, how satisfied have you been with the California Upstream Lighting Program's efforts to mass market CFL products?
  - a) [ASK ONLY IF SATISFACTION RATING IS 0-5] Why do you say that?
2. Using the same satisfaction scale, how satisfied have you been with the program's efforts to coordinate with retailers on in-store product placement and promotions?
  - a) [ASK ONLY IF SATISFACTION RATING IS 0-5] Why do you say that?
3. What effects, if any, does the inclusion of the utility logos have on the sales of your CFL products?

**D. Satisfaction with Program Staff and Program As a Whole**

1. Using the same satisfaction scale, how satisfied have you been with the program managers and other staff involved in the California Upstream Lighting Program?
  - a) [ASK ONLY IF SATISFACTION RATING IS 0-5] Why do you say that?
2. Using the same scale, how would you rate your level of satisfaction with the program in general?
  - a) [ASK ONLY IF SATISFACTION RATING IS 0-5] Why do you say that?
3. In what way could the program processes be improved?
4. Are you planning to participate in the program going forward?
  - a) [IF YES] Why do you say that?
5. Can you estimate what percentage of the CFL products you sold through the California Upstream Lighting Program during the 2006-2008 time period were installed in residential vs. nonresidential fixtures?

- a) [IF YES] What is your estimate of this breakdown?
6. “Many discount, grocery stores, and drug stores are participating in the California Upstream Lighting Program that did not sell Energy Star CFLs before joining this program. To what degree do you think these grocery, drug, and discount stores are creating new Energy Star CFL product sales as opposed to taking away Energy Star CFL sales that otherwise would have gone to national chain retailers such as Wal-Mart, Home Depot, or Lowe's?
- a) [IF RESPONDENT INDICATES THESE GROCERY, DRUG, OR DISCOUNT STORES MAY BE TAKING SALES FROM OTHER RETAILERS] Which retailers do you think these grocery, drug, or discount stores are taking Energy Star CFL product sales away from?
7. If your customers could not purchase CFL bulbs in your stores, for whatever reason, do you think they would buy incandescent bulbs instead or would they wait to buy their CFL bulbs from other retailers?
- a) [IF THEY INDICATE THEIR CUSTOMERS WOULD WAIT TO BUY CFL BULBS FROM OTHER RETAILERS] What other retailers do you think your customers would be buying their CFLs from?

**Program Attribution, Market Effects, and Market Characterization  
Interview Guide  
for Lighting Manufacturers Participating  
in the 2006-2008 California Upstream Lighting Programs**

**I. Introduction**

**A. Contact Protocol**

1. Call potential interviewees to ascertain most appropriate interviewee. Obtain email address(es) of appropriate interviewees. If company refuses interview, determine reasons for refusal and if it's logistical in nature, try to find workaround.
2. Send email interview invitation to appropriate interviewee. This invitation will include:
  - a) Explanation of purpose and scope of interview.
  - b) Explanation of time frame within which the interview will need to be completed.
  - c) Explanation of expected duration of interview and flexibility to complete interview over multiple sessions.
  - d) Instructions to propose a convenient interview time.
  - e) Contact information for interviewers.
  - f) Assurances of confidentiality.
  - g) A letter attachment from the CPUC explaining the importance of the interview.
3. If target interviewee does not respond to the email invitation within a week, a follow-up call will be made to try to schedule an interview time, find an alternate interview target, or determine reasons for refusal.
4. Once an interview time has been arranged, the interviewee will be emailed, a couple days in advance of the interview, a copy of the interview guide as well as a customized data table similar to Table 1 below. The email will contain additional assurances of confidentiality.

- B.** At the beginning of the interview, collect information on interviewee's position, overall responsibilities, and experience with the program..

**II. Program Participation Confirmation and Reasons for Participation**

- A.** Pacific Gas and Electric, Southern California Edison, and San Diego Gas and Electric jointly participate in an Upstream Lighting Program which provides per bulb or per fixture financial incentives to buy down the cost of energy efficient lighting products. According to our information your company has been receiving these manufacturer buydown incentives from this California Upstream Lighting Program during the 2006-2008 time period. Are you aware of your company's participation in this program? [IF UNAWARE, FIND SOMEONE WITH THE COMPANY WHO IS AWARE. IF THEY RECOGNIZE THIS PROGRAM BY A DIFFERENT NAME, EXPLAIN THAT FOR THE SAKE OF SIMPLICITY YOU'LL HENCEFORTH REFER TO THE PROGRAM AS "THE CALIFORNIA UPSTREAM LIGHTING PROGRAM."]

- B. Besides getting these financial incentives, are there any other aspects of this California Upstream Lighting Program that your company has actively taken part in?
  - 1. [IF YES] What other aspects of this program has your company been involved in?
- C. About what year did your company first get involved with the California Upstream Lighting Program?
- D. Before becoming involved with the California Upstream Lighting Program, was your company involved in any other California programs that provide rebates or buydown discounts for energy-efficient lighting products?
  - 1. [IF YES] What programs were these? [IF REBATES MENTIONED, TRY TO DETERMINE IF THESE WERE UPSTREAM OR DOWNSTREAM (MAIL-IN REBATES, POINT-OF-SALE REBATES)]
  - 2. [IF YES] About when did this involvement begin and what was the nature of this participation?
- E. Was your company selling compact fluorescent bulbs or fixtures in California before getting involved with any of these California lighting rebate or discount programs?
- F. What was your primary reason for getting involved with the California Upstream Lighting program?
- G. Did you have any other reasons for getting involved with the California Upstream Lighting program?
  - 1. [IF YES] What were these?

**III. 2006-2008 CFL Product Sales and California Upstream Lighting Program Trends**

- A. My next questions concern which compact fluorescent bulbs or fixtures you sell in California and what retail channels you sell them through. Is this a topic that you are familiar with? [IF INTERVIEWEE IS FAMILIAR, PROCEED. IF NOT FAMILIAR, GET ALTERNATIVE CONTACT NAME AND SKIP TO NEXT SECTION]
- B. **Non-Specialty CFL Bulbs** [IF THEY SOLD NON-SPECIALTY CFL BULBS ELSE SKIP TO III. C.] First I'm going to ask you some questions

about your sales of non-specialty CFL bulbs in California. By “non-specialty” CFL bulbs I mean bulbs that do not have special functions or features such as reflectors, dimmability, three-way light levels, or flood lighting. Now earlier I emailed you a table that shows you a record of the types of non-specialty CFL bulbs that we have records of you selling through the ULP program along with some spaces for non-program sales that we were hoping you could fill in. [REPEAT ASSURANCES OF CONFIDENTIALITY]

**Table 1**  
**Sample Data Table**

Retail Channel/Product Type	# Non-Specialty CFL Bulbs Through Upstream Lighting Program				# Non-Specialty CFL Bulbs Sold in California Not Through Upstream Lighting Program			
	2006	2007	Q1 2008	Total 2006-2008	2006	2007	Q1 2008	Total 2006-2008
<b>Non-Specialty CFL Bulbs of Type Sold Through Upstream Lighting Program</b>								
<b>Large Home Improvement</b>								
CFL INT INTEGRAL - 13 WATT >= 800 LUMENS - SCREW-IN	50,000	78,000	32,000	160,000	A	B	C	D
INTERIOR CF BULB - 23 WATT 1,100 TO 1,399 LUMENS	100,000	213,000	81,000	394,000	E	F	G	H
<b>Grocery</b>								
CFL INT INTEGRAL - 13 WATT >= 800 LUMENS - SCREW-IN	60,000	93,600	38,400	192,000	I	J	K	L
INTERIOR CF BULB - 23 WATT 1,100 TO 1,399 LUMENS	120,000	255,600	97,200	472,800	M	N	O	P
INTERIOR CF BULB - 23 WATT >=1,600 LUMENS	85,000	34,000	56,000	175,000	Q	R	S	T
<b>Other Non-Specialty Energy Star CFLs Sold in California But Not Through Upstream Lighting Program</b>								
<b>Channel?</b>								
???								
???								
???								
<b>Channel?</b>								
???								
???								
???								
<b>Non-Specialty Non-Energy Star CFLs Sold in California</b>								
<b>Channel?</b>								
???								
???								
???								
<b>Channel?</b>								
???								
???								
???								

- Does the table I sent to you seem correct in terms of the types and volume of non-specialty CFLs you sold through the California Upstream Lighting Program?

- a) [IF NO] [Record any corrections to the table]
2. Why did you choose to sell these particular products and packages through the California Upstream Lighting Program?
3. [IF THEY DID FILL IN NON-ULP DATA INTO TABLE THAT INDICATED NON-SPECIALTY ENERGY STAR CFLs SOLD IN CALIFORNIA IN 2006-2008 BUT NOT THROUGH ULP PROGRAM] I noticed that when you filled out the table you indicated that in the 2006-2008 period you sold non-specialty Energy Star CFLs in California that were not rebated by the California Upstream Lighting Program. Why didn't you sell these CFL bulbs through the program?
- a) [IF THEY INDICATE MULTIPLE REASONS] Which of these reasons was the most important?
- b) [IF NOT ALREADY EXPLAINED] What advantages, if any, did you see in not selling CFL bulbs through the program?
- c) [IF NOT ALREADY EXPLAINED] What disadvantages, if any, did you see in not selling CFL bulbs through the program?
4. [IF THEY DID FILL IN NON-ULP DATA INTO TABLE THAT INDICATED NON-SPECIALTY NON-ENERGY STAR CFLs SOLD IN CALIFORNIA IN 2006-2008] I noticed that when you filled out the table you indicated that in the 2006-2008 period you sold non-specialty non-Energy Star CFLs in California. Why do you sell these rather than just Energy Star CFLs?
- a) [IF THEY INDICATE MULTIPLE REASONS] Which of these reasons was the most important?
- b) What would have to change for you to only offer Energy Star CFLs for the CFLs you sell?
- c) What are the advantages and disadvantages of getting bulbs certified by Energy Star?
5. [IF THEY DIDN'T FILL IN NON-ULP DATA INTO TABLE] During the 2006-2008 period did you sell non-specialty Energy Star CFL bulbs in California that **did not** receive discounts from the Upstream Lighting Program?

- a) [IF YES] Are the bulb types and packages different from those you sell through the California Upstream Lighting Program?
    - a. [IF YES] How so?
  - b) [IF YES] What sorts of distribution channels did you sell these non-specialty Energy Star CFLs through?
  - c) [IF YES] Why didn't you sell these bulbs through the California Upstream Lighting Program?
6. [IF THEY DIDN'T FILL IN NON-ULP DATA INTO TABLE] During the 2006-2008 period did you sell non-specialty non-Energy Star CFL bulbs in California that **did not** receive discounts from the Upstream Lighting Program?
- a) [IF YES] What sorts of bulb types and packages were these non-specialty, non-Energy Star bulbs?
  - b) [IF YES] What sorts of retail channels do you sell these non-specialty, non-Energy Star bulbs through? [MAKE SURE TO CLARIFY WHICH BULB TYPES/PACKAGES WERE SOLD THROUGH WHICH RETAIL CHANNELS]
7. When discounts from the Upstream Lighting Program **were not** available, due to delays in program startup or product allocations for discounted CFLs running out, did you sell non-specialty Energy Star CFL bulbs in California?
- a) [IF YES] Were the bulb types and packages different from those you sell through the California Upstream Lighting Program?
    - a. [IF YES] How so?
  - b) [IF YES] What sorts of distribution channels did you sell these non-specialty CFLs through?
8. [IF THEY DIDN'T COMPLETE THE TABLE] Please provide your best estimate of what % of non-specialty CFL bulbs that you sold in California during the 2006-2008 period fit into the following categories:

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First consider the non-specialty CFL bulbs that were discounted by the California Upstream Lighting Program (ULP). About what % non-specialty CFL bulbs that you sold in California during the 2006-2008 period did these account for?	_ %
Next consider the non-specialty CFL bulbs that met Energy Star specifications but were not discounted by the program. About what % non-specialty CFL bulbs that you sold in California during the 2006-2008 period did these account for?	_ %
Finally consider the non-specialty bulbs that did not meet Energy Star specifications. About what % non-specialty CFL bulbs that you sold in California during the 2006-2008 period did these account for?	_ %
<b>Total non-specialty CFL bulbs sold in California during the 2006-2008 period</b>	<b>100%</b>

9. Did you sell non-specialty CFLs in the 2006-2008 period that you believe exceed Energy Star specifications? [REMIND INTERVIEWEE OF ENERGY STAR SPECIFICATIONS]
  - a) [IF YES] In what ways do these bulbs exceed Energy Star specification?
  - b) [IF YES] What types (wattages, brands) of non-specialty CFL bulbs were these?
  - c) [IF YES] Why do you offer such non-specialty bulbs that exceeded Energy Star specifications?
  - d) [IF YES] What sorts of distribution channels did you sell these better-than-Energy Star CFL bulbs through?
  - e) [IF YES] About what percentage of the non-specialty CFL bulbs that you sold in California during the 2006-2008 period did these account for?
  
10. [IF THEY SOLD NON-SPECIALTY CFLS IN CALIFORNIA IN 2006-2008 THAT DID NOT RECEIVE CALIFORNIA UPSTREAM LIGHTING PROGRAM DISCOUNTS]. The California Public Utilities Commission and the California investor-owned utilities have sales data for the CFL products that your company sold through the



California Upstream Lighting Program. However, they are also very interested in learning about prices and sales volumes for CFL products that were not sold through the Upstream Lighting Program. If we provided assurances to protect the confidentiality of these sales data, would you be willing to share these data?

a) [IF YES] What would be the next step for getting these data?

**C. Specialty CFL Bulbs** [IF THEY SOLD SPECIALTY CFL BULBS ELSE SKIP TO III. D]. Next I'm going to ask you some similar questions but this time about your sales of specialty CFL bulbs. By "specialty" CFL bulbs I mean bulbs that have special functions or features such as reflectors, dimmability, three-way light levels, or flood lighting. [REPEAT QUESTIONS B1. – B10 EXCEPT SUBSTITUTE WORD "Specialty" for "Non-Specialty"]

**D. CFL Fixtures** [IF THEY SOLD CFL FIXTURES ELSE SKIP TO III. E.] Next I'm going to ask you some similar questions but this time about your sales of Energy Star-qualified CFL fixtures. [REPEAT QUESTIONS B1. – B10 EXCEPT SUBSTITUTE WORDS "CFL fixtures" for "Non-Specialty CFL bulbs"]

**E. Recent trends, policies for the California Upstream Lighting Program**

1. Are there certain types of CFL or LED bulbs or fixtures that the California Upstream Lighting Program has been encouraging your company to sell more than others?
  - a) [IF YES] Which products are these?
  - b) Have there been differences between the California investor-owned utilities involved in this program in terms of which lighting products they have been encouraging?
    - a. [IF YES] What are these differences?
  - c) [IF YES] Do you agree with an emphasis on these products?
    - a. Why do you say this?
  - d) Are there certain types of the energy-efficient lighting products that you think the California Upstream Lighting Program should be promoting that they are not currently promoting?
2. Are there certain types of retailers that the California Upstream Lighting Program has been encouraging lighting manufacturers to partner with more than other retailer types?

- a) [IF YES] Which types of retailers?
  - b) [IF YES] Do you agree with an emphasis on these retailer types?
    - a. Why do you say this?
  - c) Are there certain types of retailers that you think the California Upstream Lighting Program should be focusing on more to encourage their sales of energy-efficient lighting products?
    - a. Why do you say this?
3. Before now were you aware that the California Upstream Lighting Program currently has a bulk purchase limit on how many CFLs, CFL fixtures, LED night lights or holiday lights can be included in a single customer purchase?
- a) What is your opinion on these bulk purchase limits?
  - b) [IF WERE AWARE OF BULK LIMITS] What, if anything, is your company doing to try to enforce these bulk limits?
    - a. [IF INVOLVED IN POLICING OF BULK LIMITS] The main purpose of the bulk purchase limits is to reduce the chance of CFL products discounted by the Upstream Lighting Program being sold outside of California. Have you discovered any of your CFL products being sold outside of California?
      - i. [IF YES] How do you think this happened?

**IV. Free Ridership and In-State Spillover for 2006-2008 Upstream Lighting Program**

- A. My next questions are about the impact that the 2006-2008 California Upstream Lighting Program may have had on your California CFL products sales. Are there any retailers or retailer categories that you worked with through the 2006-2008 Upstream Lighting Program that you think would not have been selling any CFL products during this 2006-2008 time period if the discounts of \$0.50-\$2.75 per bulb from this program had not been available?
- 1. [IF YES] Which retailers or retailer categories?

2. Are there any retailers or retailer categories that you worked with through the 2006-2008 Upstream Lighting Program that you think would have been selling a different assortment of CFL bulbs or fixtures than they are now if the discounts of \$0.50-\$2.75 per bulb from this program had not been available?
  - a. [IF YES] Which retailers/retailer categories and which products?
  
- B. [SURVEYORS: PLEASE FOLLOW THE FOLLOWING INSTRUCTIONS CAREFULLY FOR THE FREE RIDERSHIP PORTION OF THIS SURVEY].
  1. FIRST ASK THE MANUFACTURER THE FREE RIDERSHIP AND SPILLOVER QUESTION SEQUENCE FOR THE RETAILER CATEGORY THROUGH WHICH THEY SOLD THE **MOST** CFLS THROUGH THE PROGRAM (SEE MATRIX). **HOWEVER, EXCLUDE ANY RETAILER CATEGORIES THAT THEY IDENTIFIED AS NOT SELLING ANY CFL PRODUCTS AT ALL WITHOUT THE BUYDOWNS]**
  2. SECOND ASK THE MANUFACTURER **THE FREE RIDERSHIP QUESTION SEQUENCES ONLY** FOR THE RETAILER CATEGORY THROUGH WHICH THEY SOLD THE **SECOND MOST** CFLS THROUGH THE PROGRAM (SEE MATRIX). **HOWEVER, AS BEFORE, EXCLUDE ANY RETAILER CATEGORIES THAT THEY IDENTIFIED IN V. A AS NOT SELLING ANY CFL PRODUCTS AT ALL WITHOUT THE BUYDOWNS]**
  3. [IF THEY SOLD DISCOUNTED CFLS THROUGH MORE THAN TWO RETAILER CATEGORIES] THEN SAY: “You also sold CFL products through [LIST OTHER RETAILER CATEGORIES, IF ANY, BESIDES THE TWO ALREADY IDENTIFIED].”
    - a) “Would your responses regarding the effect of the manufacturer buydowns on CFL product sales in these types of retailers be different, in a non-trivial way than for the retailer categories we already discussed?
      - a. [IF YES, OR THEY RESPOND IN A WAY THAT WOULD INDICATE SOME NON-TRIVIAL DIFFERENCE (THIS IS A JUDGEMENT CALL)] For which types of retailers would your responses be different?
        - i. ASK A NEW FREE RIDERSHIP QUESTION SEQUENCE FOR EACH ADDITIONAL RETAILER CATEGORY THAT THEY IDENTIFY ABOVE.

**C. Free Ridership**

**1. Non-Specialty CFL bulbs** [ASK ONLY IF SOLD NON-SPECIALTY CFL BULBS – OTHERWISE SKIP TO IV.C.2.]

According to our records in the 2006-2008 period you received California Upstream Lighting Program manufacturer buydown discounts of \$0.50-\$2.75 per bulb for the sale of the following types of non-specialty CFL bulbs [NAME TYPES] through [RETAILER CATEGORY] such as [NAME RETAILER EXAMPLE]. The program also provided promotional materials such as signage. If these manufacturer buydown discounts and program promotional materials had not been available during this 2006-2008 period, do you think your sales of these types of non-specialty Energy Star CFL bulbs through [RETAILER CATEGORY] stores would have been about the same, lower, or higher?

- a) [IF HIGHER] Why do you say this? [RECORD RESPONSE AND THEN SKIP TO NEXT RETAILER CATEGORY]
  
- b) [IF LOWER] By what percentage do you estimate your sales of non-specialty Energy Star CFL bulbs through [RETAILER CATEGORY] stores would be lower during this 2006-2008 period if these manufacturer buydowns and program promotional materials for non-specialty CFLs had not been available? [RECORD % DECREASE]
  - a. I want to make sure I understand you correctly. You estimate that your sales would have been [PERCENTAGE FROM QUESTION IV.C.1. b.] % lower without the manufacturer buydowns. So if you actually sold 100 non-specialty CFLs in a given week, you think you'd have sold only about [100 – (PERCENTAGE FROM QUESTION IV.C.1. b. \* 100)] in that period if the manufacturer buydowns hadn't been available? [IF RESPONSE IS ≠ YES THEN CLARIFY ESTIMATED SALES DECREASE]
  
- c) **Manufacturer add-on discounts:** When the California Upstream Lighting Program was providing manufacturer buydown discounts for non-specialty bulbs sold through the [RETAIL CATEGORY] retail channel, did your company ever provide any of its own price discounts in addition to those provided by the Upstream Lighting Program?
  - a. [IF NO] Why not?

- b. [IF YES] What were your reasons for providing these additional price discounts?
- c. [IF YES] What was the typical range of these additional discounts on a \$ per bulb basis?
- d. [IF YES] Were there particular types of bulbs that you offered these additional discounts on?
  - i. [IF YES] What types of bulbs were these?
- e. Using a scale of 0 to 10 where 10 equals “very likely” and 0 equals “not likely at all,” how likely were you to offer these additional price discounts if the manufacturer buydowns had not also been available?

[REPEAT QUESTIONS IV. C. 1. a) – d). FOR THE NEXT RETAILER CATEGORY]

- 2. **Specialty CFL bulbs** [ASK ONLY IF SOLD SPECIALTY CFL BULBS THROUGH THIS RETAILER CATEGORY OTHERWISE SKIP TO IV.C.3.] [REPEAT QUESTIONS IV. C. 1. a) – d) BUT SUBSTITUTE APPROPRIATE PRODUCT NAME AND DISCOUNT LEVELS. REPEAT SEQUENCE FOR EACH RETAILER CATEGORY]
- 3. **CFL fixtures** [ASK ONLY IF SOLD SPECIALTY CFL BULBS THROUGH THIS RETAILER CATEGORY OTHERWISE SKIP TO NEXT QUESTION] [REPEAT QUESTIONS IV. C. 1. a) – d) BUT SUBSTITUTE APPROPRIATE PRODUCT NAME AND DISCOUNT LEVELS. REPEAT SEQUENCE FOR EACH RETAILER CATEGORY]
- 4. **Effects of other California IOU programs/efforts**
  - a) Besides the discounts and the promotional materials, do you think the California Upstream Lighting Program does anything else to help you sell non-specialty Energy Star CFL bulbs?
    - a. [IF YES] What else does the program do?
  - b) California also has a program called Flex Your Power that does mass advertising for CFL products and other energy efficient measures. Please indicate how significant you think this program is as a driver of increased CFL product sales in California in the 2006-2008 period. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant. [RECORD RATING]

- a. Why do you give this rating?
  
- c) In addition to the Upstream Lighting Program and the Flex Your Power Program some California utilities have also been involved in other campaigns to promote sales of CFL products such as the Energy Star Change-a-Light promotion. Please indicate how significant you think these promotions have been as a driver of increased CFL product sales in the 2006-2008 period. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant. [RECORD RATING]

a. Why do you give this rating?

**D. Program Effects on Non-discounted CFLs Sold in California in 2006-2008** [IF THEY SOLD NON-SPECIALTY CFLS IN CALIFORNIA IN 2006-2008 THAT DID NOT RECEIVE CALIFORNIA UPSTREAM LIGHTING PROGRAM DISCOUNTS ELSE SKIP TO SECTION V.]

- 1. You said earlier that you also sold CFL bulbs or fixtures in California in the 2006-2008 that did not receive discounts from the California Upstream Lighting Program. What effects, if any, do the program-discounted CFL bulbs or fixtures have on your sales levels of these non-program-discounted CFL bulbs or fixtures? [IF MECHANISM FOR THESE EFFECTS IS NOT EXPLAINED, PROBE FOR MECHANISM]
  - a) Would these effects vary depending on the type of CFL product?
    - a. [IF YES] How so?
  - b) Have these effects changed at all over this 2006-2008 period?
    - a. [IF YES] How so and about what time period did these effects change?
- 2. Do the retailers that you supply ever sell program-discounted CFL bulbs or fixtures and non-program-discounted CFL bulbs or fixtures at the same time?
  - a) [IF YES] Would you say this happens always, very often, sometimes, or not very often?
  - b) [IF YES] Do you promote these non-program-discounted CFL bulbs or fixtures differently than you do the program-discounted CFL bulbs or fixtures?

- a. [IF YES] How are your promotional efforts different?
- c) [IF YES] Do you think increased shopper foot traffic due to program-discounted CFL bulbs and fixtures has any impact on the sales of non-program discounted CFL bulbs or fixtures that are being sold at the same time?
  - a. [IF YES] Why do you say this?
- 3. What effects do you think program-discounted CFL bulbs or fixtures have on consumer expectations regarding prices of non-discounted CFL bulbs or fixtures?
- 4. You indicated that you sold the following types of non-specialty CFL bulbs in California during the 2006-2008 period that you did not sell through the ULP Program:[READ PRODUCT TYPES AND RETAIL CHANNELS (IF AVAILABLE). IF THEY FILLED OUT THE TABLE, DIRECT THEM TO SPECIFIC ROW]. Do you think your sales of these types of non-specialty non-program-discounted CFL bulbs would be about the same, lower, or higher if the California Upstream Lighting program – with its manufacturing buydowns and promotional materials – did not exist during this time period?
  - a) [IF HIGHER] Why do you say this?
  - b) [IF HIGHER] By what percentage do you estimate your sales of these non-specialty non-program-discounted CFL bulbs through [RETAILER CATEGORY] stores would be higher during this period if the California Upstream Lighting Program did not exist during this 2006-2008 time period? [RECORD % DECREASE]
    - a. I want to make sure I understand you correctly. You estimate that your sales of non-program-discounted bulbs would have been [PERCENTAGE FROM QUESTION IV. D. 4. b.] % higher without the manufacturer buydowns. So if you actually sold 100 of these non-specialty CFLs in a given week, you think you'd have sold about [100 + (PERCENTAGE FROM QUESTION IV. D. 4. b. \* 100)] in that period if the California Upstream manufacturer buydowns hadn't been available? [IF RESPONSE IS ≠ YES THEN CLARIFY ESTIMATED SALES INCREASE]
  - c) [IF LOWER] Why do you say this?

- d) [IF LOWER] By what percentage do you estimate your sales of these non-specialty CFL bulbs through [RETAILER CATEGORY] stores would be lower during this period if the California Upstream Lighting Program did not exist during this time period? [RECORD % DECREASE]
  - a. I want to make sure I understand you correctly. You estimate that your sales of non-program-discounted bulbs would have been [PERCENTAGE FROM QUESTION IV. D. 4. d.] % lower without the manufacturer buydowns. So if you actually sold 100 of these non-specialty CFLs in a given week, you think you'd have sold about [100 - (PERCENTAGE FROM QUESTION IV. D. 4. d. \* 100)] in that period if the California Upstream Lighting Program did not exist during this time period? [IF RESPONSE IS ≠ YES THEN CLARIFY ESTIMATED SALES DECREASE]
- e) [IF SAME] Why do you say this?
- f) [IF THEY INDICATED IN IV B. 1. THAT EFFECTS OF PROGRAM ON NON-PROGRAM NON\_SPECIALTY CFLS HAS CHANGED OVER 2006-2008 PERIOD, PROBE FOR HOW THESE SALES EFFECTS WOULD VARY OVER THE 2006-2008 PERIOD]

- 5. [REPEAT SEQUENCE IV. D. 4 FOR SPECIALTY CFLS OR CFL FIXTURES IF RELEVANT, MAKING SURE TO CHANGE PRODUCT DESCRIPTION IN QUESTIONS.]
- 6. [IF THEY SOLD BOTH SPECIALTY AND NON-SPECIALTY CFLS] You said earlier that during the 2006-2008 period, you sold both non-specialty and specialty CFL bulbs through the California Upstream Lighting Program. What effects, if any, do the program-discounted non-specialty CFL bulbs have on your sales levels of program-discounted specialty CFL bulbs, such as dimmable bulbs, bulbs with reflectors, 3-way bulbs, and flood lights? [IF MECHANISM FOR THESE EFFECTS IS NOT EXPLAINED, PROBE FOR MECHANISM]

**V. Early, Cumulative Effects of California Lighting Rebate Programs –** Up until now we have been talking about the effect of the California Upstream Lighting Program on CFL bulbs and products that you sold in California during the 2006-2008 period. Now I want you to think about the earlier and



cumulative effects that the years of California lighting rebate and discount programs might have had on your company's sales of CFL products.

- A. Have the years of California lighting rebate and discount programs had any effects on the types of CFL products you sell or the way that you sell them?
1. [IF YES] How so?
- B. [IF THEY SAID THAT THEY HADN'T BEEN SELLING CFL PRODUCTS IN CALIFORNIA BEFORE BECOMING INVOLVED IN CA LIGHTING REBATE PROGRAMS – E.G. II. E = “NO”] Earlier you said that your company was not selling CFL products in California before getting involved with any California lighting rebate or discount programs. How significant was the existence of the California lighting rebate or discount programs in your company's decision to enter the California lighting market? Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.
- C. [IF THEY SAID THAT THEY HAD BEEN SELLING CFL PRODUCTS IN CALIFORNIA BEFORE BECOMING INVOLVED IN CA LIGHTING REBATE PROGRAMS – E.G. II. E = “YES”] Earlier you said that your company sold CFL products in California before getting involved with any of these California lighting rebate or discount programs. Are you familiar with your company's CFL product sales activities during this period?
1. [IF YES] Currently you sell CFL products in the following retail channels in California [IDENTIFY RETAIL CHANNELS]. Were you selling in these same retail channels before you became involved with the California lighting rebate or discount programs?
    - a) [IF NO] Which retail channels did you enter only after becoming involved with the California lighting rebate or discount programs?
      - a. How significant was your involvement in the California lighting rebate or discount programs in your decision to enter the [X] retail channel. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant. [REPEAT QUESTIONS FOR ALL NEW RETAIL CHANNELS]?
      - b. Why do you say this?
  2. [IF NO, OR NO LONGER RECALL] Is there anyone else in your company that might recall your CFL sales trends during this period?

[IF SO, RECORD NAME AND CONTACT INFORMATION AND CONTINUE TO NEXT QUESTION]

3. Do you have California CFL product sales data for this period before you became involved with the California lighting rebate or discount programs?

a) [IF YES] If we provided assurances to protect the confidentiality of these sales data, would you be willing to share these data?

a. [IF YES] What would be the next step for getting these data?

- D. Does your company sell CFL bulbs or fixtures in any states that **do not** have utilities or state energy efficiency programs that offer manufacturer buydowns or point of sale rebates for these kind of lighting products?

1. [IF YES] Are you familiar with your company's CFL bulb or fixture sales activities in these states?

a) [IF YES] Currently you sell CFL bulbs or fixtures in [IDENTIFY RETAIL CHANNELS] channels in California. Do you sell CFL products in the same retail channels in these states that **do not have** utilities or state energy efficiency programs offering CFL product rebates or discounts?

a. [IF NO] Which retail channels do you use to sell CFL products in these other states?

b. [IF RETAIL CHANNELS ARE USED IN CALIFORNIA THAT ARE NOT USED IN THESE OTHER STATES] You sell CFL products through the [INCREMENTAL CA CHANNELS] retail channels in California but not in other states. How significant is the 2006-2008 California Upstream Lighting program in explaining why you sell CFL products through these retail channels in California and not these other states? Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.

b) [IF NO] Who would be another person at your company who is familiar with the sales of these CFL products in states that do not have utilities or state energy efficiency programs offering CFL product rebates or discounts? [RECORD NAME AND CONTINUE TO NEXT QUESTION]

- E. [IF YES] If we provided assurances to protect the confidentiality of your data, would you be willing to share recent CFL product sales data for states other than California?
1. [IF YES] What would be the next step for getting these data?
- F. California energy efficiency programs have been offering rebates and discounts on CFL bulbs for many years. Do you think these California programs have influenced the level of sales of CFLs in other states?
1. Why do you say this?
    - a) [IF NOT EXPLAINED IN THEIR ANSWER TO E1] How do the California lighting rebate programs influence the level of sales of CFLs in other states?
    2. [IF YES] How significant has been the influence of these years of California rebate programs on the price of CFLs in these states? Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.
- G. Has your firm experienced any reductions in manufacturing production costs for non-specialty CFLs over the last ten years?
1. [IF YES] By how much do you think these reductions in production costs have reduced the average per-bulb prices during this ten-year period?
  2. [IF YES] What factors have led to these reductions in manufacturing production costs?
    - a) [IF STATE/UTILITY REBATE PROGRAMS ARE MENTIONED] How did these rebate programs influence these reductions in your manufacturing costs?
    - b) [IF STATE/UTILITY REBATE PROGRAMS ARE MENTIONED] In what time period did these rebate programs influence these reductions in your manufacturing costs?
    - c) [IF STATE/UTILITY REBATE PROGRAMS ARE MENTIONED] Do you think that the California lighting rebate and discount programs in particular have been an important factor in influencing these reductions in your manufacturing costs?

- a. [IF YES] How important a factor were the California lighting rebate programs, in particular, in influencing these reductions in your manufacturing costs? Please use a scale of 0 to 10 where 10 equals “very important” and 0 equals “not important at all.”
  - i. Why do you give this rating?
    1. [IF INCREASED MANUFACTURING CAPACITY CAUSED BY CALIFORNIA REBATE PROGRAMS MENTIONED] By approximately what % did you increase your manufacturing capacity in response to the California rebate programs?
    2. [IF INCREASED MANUFACTURING CAPACITY CAUSED BY CALIFORNIA REBATE PROGRAMS MENTIONED] About when did these increases in manufacturing capacity caused by the California rebate programs occur?
    3. [IF INCREASED MANUFACTURING CAPACITY CAUSED BY CALIFORNIA REBATE PROGRAMS MENTIONED] By approximately what % did this increase in CFL manufacturing capacity reduce your average CFL production cost?
- d) [IF GENERAL INCREASES IN WORLD CFL DEMAND MENTIONED] How important a factor were the California lighting rebate programs, in particular, in increasing demand for these CFL products? Please use a scale of 0 to 10 where 10 equals “very important” and 0 equals “not important at all.”
  - a. Why do you give that rating?
- e) [IF TECHNOLOGICAL IMPROVEMENTS AT THE FACTORY MENTIONED] How important a factor were the

California lighting rebate programs, in particular, in driving these technological improvements in the factory? Please use a scale of 0 to 10 where 10 equals “very important” and 0 equals “not important at all.”

a. Why do you give that rating?

f) If the California rebate and discount programs went away after 2008 do you think your average production costs for non-specialty CFLs would go up, would go down, or stay about the same?

a. Why do you say that?

H. For years California lighting rebate and discount programs have been working to improve the performance of CFLs as well as their acceptability as substitutes for incandescent bulbs. For example, these programs have long required Energy Star compliance and offered larger rebates for higher lumen levels at a given wattage level. What influences, if any, have these program requirements had on the performance of the CFLs that you manufacture?

I. If the California lighting rebate and discount programs had not existed, do you think the performance improvements you have made to your CFLs would have happened sooner, later, or about the same time as they actually did?

1. [IF LATER] How much later would you have made these performance improvements?

J. Have the California lighting rebate and discount programs influenced the way that you market your CFLs in other states?

1. [IF YES] How so?

K. State or utility rebate and discount programs are only some of the factors that may be encouraging sales of CFL bulbs and fixtures. I’m going to name a number of possible drivers of increased CFL bulbs and fixtures. For each one I identify, please indicate how significant you think it is as a driver of increased CFL product sales during the 2006-2008 period. Please use a 0 to 10 scale, where 0 is not at all significant and 10 is extremely significant.

1. State or utility rebate and discount programs? [RECORD RATING]

a) Why do you give this rating?

2. The Energy Star program including its Change-a-Light campaign? [RECORD RATING]
    - a) Why do you give this rating?
  3. CFL promotion campaigns by some large retailers such as Wal-Mart, Home Depot, and Lowe's that are being done independently of any state or utility energy efficiency programs? [RECORD RATING]
    - a) Why do you give this rating?
  4. Media stories promoting the use of CFLs? [RECORD RATING]
    - a) Why do you give this rating?
  5. Reductions in CFL production costs and price points due to lower-cost overseas manufacturing and increases in CFL production capacity? [RECORD RATING]
    - a) Why do you give this rating?
  6. Growing consumer awareness about global warming? [RECORD RATING]
    - a) Why do you give this rating?
  7. Higher energy costs? [RECORD RATING]
    - a) Why do you give this rating?
- L. Have you seen any evidence that that some lighting products receiving discounts from the California Upstream Lighting Program are being sold out-of-state or through out-of-state buyers through the Internet?
1. [IF YES]. What evidence have you seen?
- M. What do you think should be done to minimize the occurrence of out-of-state sales of lighting products receiving discounts from the California Upstream Lighting Program?

**VI. Supply Chain Characterization**

- A. Now I would like to ask you some questions about your supply chain. Of the CFL products that you sell in California, where are most of them manufactured?

1. Are your CFL products that are discounted through the ULP-program manufactured in different places than those that are not discounted through the program? [IF YES, IDENTIFY DIFFERENT SOURCES]
  
- B. How long does it typically take from the time that you notify your production facilities that you have received a new order for CFL products and the time that order is delivered to the California retailer or distributor who ordered it?
  1. Approximately how much of this time is for manufacture?
  2. Approximately how much of this time is for shipment?
  3. Approximately how much of this is for temporary warehousing and storage that occurs before the retailer or distributor receives the product?
  
- C. Are there any types of CFL products for which it takes significantly longer than this to receive after your order them?
  1. [IF YES] Which products?
  
- D. What other factors could cause variations in these delivery times?
  
- E. Are your delivery times for CFL products that you sell through the Upstream Lighting Program different than those for other CFL products that you manufacture?
  1. [IF YES] How so?
  
- F. At what point in the supply chain are the stickers and packages for the California Upstream Lighting Program applied?
  1. What safeguards do you have in place to insure that CFLs which receive the program stickers and packaging are not sent to retailers that are not participating in the program?
  
- G. If a retailer has program-discounted CFLs that remain unsold after a long period of time do you ever regain possession of these unsold bulbs through retailer returns, buybacks, or other means?
  1. [IF YES] Do you track these returned or repossessed CFLs?
  2. [IF YES] About what percentage of the program-discounted CFLs that you sell do these account for?

3. [IF YES] In such case, what do you typically do with these unsold bulbs?
- H. As noted earlier, there is evidence that some lighting products receiving discounts from the California Upstream Lighting Program are being sold out-of-state or through out-of-state buyers through the Internet. At what point in the supply and distribution chain do you think this might be happening?
- I. Do you track CFL products that you sell through the California Upstream Lighting Program that are lost due to breakage and other damage?
  1. [IF YES] Do you just track damage/breakage to CFL products before they reach the retailer or also after?
  2. [IF YES] If we gave your company assurances of confidentiality, would you be willing to share information about your loss and breakage rates?

## **VII. Pricing**

- A. The California Upstream Lighting Program requires manufacturers to estimate the price for which their CFL products would have been selling for if the program's buydown discounts had not been available. How are these estimates derived?
  1. [IF SOLD PROGRAM-DISCOUNTED CFLs THROUGH MULTIPLE RETAIL CHANNELS] Did they way that you estimate these retail prices vary by retailer type?
    - a) [IF YES] How so?
- B. You sold the most program-discounted CFL products through the [RETAILER CATEGORY] retail channel. How much influence do the retailers in this channel have over the price of the CFL products that you supply them? Would you say that they are very influential, somewhat influential, or not very influential?
- C. [IF SOLD PROGRAM-DISCOUNTED CFLs THROUGH MULTIPLE RETAIL CHANNELS] You sold the second-most program-discounted CFL products through the [RETAILER CATEGORY] retail channel. How much influence do the retailers in this channel have over the price of the CFL products that you supply them? Would you say that they are very influential, somewhat influential, or not very influential?



- D. Some claim that retailers often use something called “keystone pricing” where they double the wholesale price to determine the retail price. In your experience, how frequently is this keystone pricing used for setting retail prices for CFL products. Would you say it is done always, most of the time, some of the time, or never?
1. [IF KEYSTONE PRICING NOT USED ALWAYS] What other rules or strategies do retailers use to mark up wholesale prices?
  2. [ASK OF ALL] Are the retail pricing strategies for the products with California Upstream Lighting Program buydowns handled differently than non-program products?
    - a) [IF YES] How are these different?
    - b) [IF YES] Why do you think the retail pricing of these program discounted products is set in this way?
- E. For CFL types that have very low costs of production, sometimes the buydown discounts from the California Upstream Lighting Program can reduce the wholesale prices to almost nothing. Do you provide any advice to retailers on how to price these free or nearly free CFL products?
1. [IF YES] What advice do you give them?
- F. California CFL product prices have been declining in the last 10 years. Do you think this trend will continue, or will prices level off or even increase?
1. What factors are causing you to make this prediction?
- G. [IF THEY SELL NON-PROGRAM-DISCOUNTED CFLS ALSO] You said earlier that you also sell CFL products in California that do not receive buydown discounts from the California Upstream Lighting Program. Are the program-discounted CFL products typically sold at a lower retail price, a higher retail price, or at the same retail prices as the non-program-discounted bulbs?
1. On a per-bulb basis, on average, how much [LOWER/HIGHER] are the prices of the program-discounted CFL bulbs than the other CFL bulbs that you sell?
  2. On a per-fixture basis, on average, how much [LOWER/HIGHER] is the price on the program-discounted CFL fixtures than the other CFL fixtures that you sell?

3. Are your pricing strategies for the products with California Upstream Lighting Program buydowns handled differently than non-program products?
  - a) [IF YES] How are these different?

**VIII. Market Characterization**

- A. How would you characterize the current market for CFL products in California in terms of manufacturer market share? For example, are there a few major manufacturers responsible for the major share of product sales? Or are there a large number of major players?
- B. Where would you characterize your firm in terms of market share for the California CFL market?
- C. Are there factors inherent in the manufacturing, importing or distributing processes that have restricted the production and supply of CFL products in the past year or so? Please describe: [IF RESPONDENT CAN'T THINK OF ANYTHING, PROMPT WITH EXAMPLES SUCH AS SHORTAGES OF INPUTS USED IN MANUFACTURING PROCESSES (LABOR, CAPITAL, RAW MATERIALS), INADEQUATE INFRASTRUCTURE TO PRODUCE OR IMPORT PRODUCTS, OR BRING THEM TO MARKET, ETC.]
  1. To what degree have these production and supply restrictions varied with the type of CFL product?
  2. How do these supply-side barriers compare to those for non-CFL products?
  3. [IF SUPPLY BARRIERS IDENTIFIED] Has there been any progress recently to reduce these barriers?
    - a) [IF YES] What factors led to the reduced barriers?
    - b) [IF NOT ALREADY MENTIONED] Did the 2006-2008 California Upstream Lighting Program play a role in reducing these barriers?
      - a. [IF YES] What role did it play?
    - c) Are there any supply-side barriers that have been increased due to the structure or timing of the California lighting rebate programs?
      - a. [IF YES] What are these?

- b. [IF YES] How did/does the California programs create or increase these barriers?
  - 4. [IF SUPPLY BARRIERS IDENTIFIED] What, if anything, needs to happen to overcome the remaining supply-side restrictions?
- D. What are the most important factors that are limiting customer demand for CFL products? Please explain. [IF RESPONDENT CAN'T THINK OF ANYTHING, PROMPT WITH EXAMPLES SUCH AS LACK OF AWARENESS, PRODUCT PRICING, AND PERCEPTIONS REGARDING PRODUCT PERFORMANCE, BULB FIT, APPEARANCE, EARLY BURN-OUT, ETC. RECORD WHETHER ONE HAD TO PROMPT AND RANDOMLY ROTATE THE EXAMPLES USED IN THE PROMPT.]
- 1. To what degree do these demand barriers vary with the type of CFL product?
  - 2. [IF DEMAND BARRIERS IDENTIFIED] Has there been any progress recently to reduce these barriers?
    - a) [IF YES] What factors lead to the reduced barriers?
    - b) [IF NOT ALREADY MENTIONED] Did the 2006-2008 California Upstream Lighting Program play a role in reducing these barriers?
      - a. [IF YES] What role did it play?
    - c) Are there any demand-side barriers that have been increased due to the structure or timing of the California lighting rebate programs?
      - a. [IF YES] What are these?
      - b. [IF YES] How did/does the California programs create or increase these barriers?
  - 3. [IF DEMAND BARRIERS IDENTIFIED] What needs to happen to overcome these demand-side barriers?
- E. Are you aware that in 2007 a federal Energy Bill was passed that requires new efficiency standards for light bulbs?
- 1. [IF YES] What do you think will be the impact of this 2007 Energy Bill on CFL sales and prices?

- F. What are your expectations for U.S. CFL product sales in 2008 and beyond?
  - 1. Why do you say that?
- G. If California eliminated its CFL rebate and discount programs starting in 2009 what effects would this have on the sales levels of CFL products in California?
- H. Will manufacturers continue to develop and market CFLs without support from rebate and discount programs?
- I. What effects do you think the California Upstream Lighting Program has on the capability and willingness of lighting manufacturers to produce innovative CFL products?
- J. What has a greater impact on the level of sales of CFL products: 1) having a lower level of price or 2) having a higher awareness of CFL benefits and options?
- K. Do you sell CFL products in other countries besides the United States?
  - 1. [IF YES] Are you familiar with your company's international sales trends?
    - a) [IF NO] Who would be another person at your company who is familiar with your company's international sales of CFL products? [RECORD NAME AND CONTACT INFORMATION AND SKIP TO SECTION IX]
    - b) [IF YES] How do your international sales trends for CFL products compare to those in the United States?
    - c) [IF YES] What do you think are driving these international sales trends?

**IX. Product Quality, Recycling**

- A. Do you think the quality of CFL products in recent years has been increasing, decreasing, or staying about the same?
  - 1. [IF THEY THINK QUALITY IS DECREASING] What factors do you think might be leading to the production of lower quality CFL products?

- B. What do you think should be done to improve the quality of CFL products?
- C. Do you think that CFL product discount programs like the California Upstream Lighting Program, have affected consumer attitudes towards the quality of CFL products in any way?
  - 1. [IF YES] In what way?
- D. Energy Star's "CFL Criteria Version 4.0" was released in February 2008 and will become effective in November 2008. What do you think will be the impact of new Energy Star standards on CFL products and prices?
- E. CFL disposal has become a major issue in recent years. What policies do you advocate for dealing with CFL disposal?
- F. What actions has your own company taken to encourage environmentally-safe recycling and disposal of CFL products?

**X. Program Satisfaction**

Finally I would like to find out your level of satisfaction with the California Upstream Lighting Program

**A. Rebate Reservation, Program Verification Process**

- 1. Using a scale of 0 to 10 where 10 = very satisfied and 0 = very dissatisfied, how satisfied have you been with the incentive fund reservation process – that is, the process used by the utility to allocate a set amount of incentive dollars to participating stores?
  - a) [IF SATISFACTION RATING IS 0-5] Why do you say that?
- 2. Again using a scale of 0 to 10 where 10 = very satisfied and 0 = very dissatisfied, how satisfied have you been with the program tracking and verification process – that is, the process used by the utility to insure that the CFL products that they are providing discounts for are being sold by retailers and are properly labeled and promoted?
  - a) [IF SATISFACTION RATING IS 0-5] Why do you say that?

**B. Incentive Levels and Coverage**

- 1. CFL bulbs [ASK ONLY IF THEY SELL CFL BULBS THROUGH THE PROGRAM]
  - a) Using this same satisfaction scale, how satisfied have you been with the level of manufacturer buydown incentives for CFL *bulbs*?

- a. [IF SATISFACTION RATING IS 0-5] Why do you say that? For which bulb types are you unsatisfied with the incentive levels?
    - b) If the program, due to fund constraints, had to eliminate a manufacturer buydown incentive for one type of CFL bulb, which one should they choose? Why do say that?
- 2. CFL fixtures [ASK ONLY IF THEY SELL CFL FIXTURES THROUGH THE PROGRAM]
  - a) Using this same satisfaction scale, how satisfied have you been with the levels of manufacturer buydown incentives for CFL *fixtures*?
    - a. [IF SATISFACTION RATING IS 0-5] Why do you say that? For which fixture types are you unsatisfied with the incentive levels?
- 3. Are there CFL products that you think that the program should be offering manufacturer buydown incentives for, that it's not currently offering?
  - a) [IF YES] For what CFL products?

**C. Marketing and Coordination with Retailers**

- 1. Using the same scale of 0 to 10, how satisfied have you been with the California Upstream Lighting Program's efforts to mass-market CFL products?
  - a) [ASK ONLY IF SATISFACTION RATING IS 0-5] Why do you say that?
- 2. Using the same satisfaction scale, how satisfied have you been with the program's efforts to coordinate with retailers on in-store product placement and promotions?
  - a) [ASK ONLY IF SATISFACTION RATING IS 0-5] Why do you say that?
- 3. What effects, if any, does the inclusion of the utility logos have on the sales of your CFL products?

**D. Satisfaction with Program Staff and Program As a Whole**

1. Using the same satisfaction scale, how satisfied have you been with the program managers and other staff involved in the California Upstream Lighting Program?
  - a) [ASK ONLY IF SATISFACTION RATING IS 0-5] Why do you say that?
2. Using the same scale, how would you rate your level of satisfaction with the program in general?
  - a) [ASK ONLY IF SATISFACTION RATING IS 0-5] Why do you say that?
3. In what way could the program be improved?
4. Are you planning to participate in the program going forward?
  - a) [IF YES] Why do you say that?
5. Can you estimate what percentage of the CFL products you sold through the California Upstream Lighting Program during the 2006-2008 time period were installed in residential vs. nonresidential fixtures?
  - a) [IF YES] What is your estimate of this breakdown?
6. “Many discount, grocery stores, and drug stores are participating in the California Upstream Lighting Program that did not sell Energy Star CFLs before joining this program. To what degree do you think these grocery, drug, and discount stores are creating new Energy Star CFL product sales as opposed to taking away Energy Star CFL sales that otherwise would have gone to national chain retailers such as Wal-Mart, Home Depot, or Lowe's?
  - a) [IF RESPONDENT INDICATES THESE GROCERY, DRUG, OR DISCOUNT STORES MAY BE TAKING SALES FROM OTHER RETAILERS] Which retailers do you think these grocery, drug, or discount stores are taking Energy Star CFL product sales away from?

## **Appendix E**

### **In-Home Survey Instrument**



## CFL Market Effects In-Home Verification

### Section 1

<b>Customer Name</b> <i>(Map to Recruit)</i>	<b>In-Home Contact</b>		
<b>Customer ID</b> <i>(Map to Recruit)</i>	<b>Site Address</b>	<i>(Map to Recruit)</i>	
<b>Main Phone</b> <i>(Map to Recruit)</i>			
<b>Alternate Phone</b> <i>(Map to Recruit)</i>		<b>Date</b>	<b>Time</b>
<b>Field Representative</b>		<b>Scheduled Appointment</b>	
		<b>Actual Arrival</b>	
		<b>Actual Departure</b>	

### Section 2

Survey Question		Results		
		Phone Survey	Onsite (from Audit)	Notes
1	Do you currently have any Compact Fluorescent Lightbulbs (CFLs) installed inside or outside your home? (Y/N)	(Q 2)		
2	How many CFLs are currently installed?	(Q2a)		
3	How many CFLs have you bought in the last three months?	(Q6)		
3 a	Of the CFL's bought in the last three months, how many are currently installed?	(Q8)		
3 b	Where are the CFLs installed that were purchased in the last three months?	NA		
		Room:		Quantity:
		Room:		Quantity:
		Room:		Quantity:
		Room:		Quantity:
		Room:		Quantity:
		Room:		Quantity:
3 c	How many CFLs have you bought in the last three weeks?	NA		
4	Do you have any CFLs installed in dimmable fixtures? (Y/N)	(SAT20)		
4 a	Are they dimmable CFLs, or standard?	(SAT21)		
5	Do you have any CFLs installed in 3-way Fixtures? (Y/N)	(SAT20)		
5 a	Are they 3-way CFLs, or standard?	(SAT24)		
6	How many CFLs are you storing?	(Q3a)		

Additional Notes:





## **Appendix F**

# **In-Home Survey Procedures Guide**



User Manual

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# CFL Market Effects: In-Home Site Visit Manual

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Prepared for:  
California Public Utilities Commission

November 22, 2008





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# CFL Market Effects Project Background

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California's investor-owned utility (IOU) energy-efficiency programs are some of the longest-running and largest efforts in the country, particularly for compact fluorescent lamps (CFLs). The programs' maturity, size, and use of varying implementation strategies may lead to substantial impacts, measured not just in terms of direct energy savings and peak demand reduction, but in terms of other progress indicators, including changes in awareness, attitudes, behaviors, product offerings, and incremental costs. These other impacts create short-term and potential long-term market structural and operational changes that may result in energy and demand savings. To the extent that these market changes are program-induced, indirect savings (savings not derived from program participation) are the programs' market effects that are additional to the direct program impact savings.

While market effects for California IOU programs may exist, they are difficult to quantify and largely impact non-participants. The California Public Utilities Commission (CPUC) is interested in exploring the California programs' possible effects on the CFL market and has directed its staff to investigate whether "non-participant spillover" market effects can be credibly quantified and credited.

The CPUC retained The Cadmus Group to investigate these potential market effects. In addition to investigating the CFL market in California, this evaluation includes an investigation of the CFL market in specific "baseline" states where there has been very little or no utility- or government-sponsored CFL program activity.

## Cadmus Methodology

A key part of assessing the market effects of California's CFL programs is to establish a dynamic baseline: what would have happened in the absence of the programs. While not perfect, the CFL markets in states without utility- or government-sponsored programs can provide an approximation of such a baseline (albeit without consideration of the effects of the California programs on those other states' markets). The comparison states that we are using for this effort are Pennsylvania, Kansas, and Georgia.

This CFL Market Effects evaluation includes a wide range of tasks including (among others):

- Telephone surveys with CFL users
- In-home verifications.

These are discussed, in turn, below.

## CFL User Survey

One approach we are employing to assess the CFL markets in Pennsylvania, Kansas, and Georgia in comparison to California is conducting telephone surveys of residents. The CFL User Survey includes questions about the lighting products respondents have purchased (both over the past 3 months and over the past 3 years), their familiarity with CFLs, and the number of CFLs

purchased, installed and stored in the home, among others. At the end of the CFL User Survey, respondents are asked whether they would be interested in participating in a follow-up in-home survey. Those that express an interest in the follow-up survey are included on our list of In-Home Survey recruits.

## In-Home Verifications

Residents of comparison states, as well as some residents of California, may not be sufficiently familiar with CFLs to reliably report how many they have and how many they have purchased. To validate purchases reported during the CFL User Survey, we are conducting 70 follow-up in-home surveys in each of the four states (CA, PA, KS, and GA).

During each in-home visit you will be verifying:

- The total number of CFLs currently installed in the home and the locations of these installations
- The total number of CFLs that are currently in storage in the home
- The total number of CFLs purchased within the past 3 months and, of these, the number that are currently installed and locations of these installations
- The total number of medium screw-based light sockets in the home

Based on your observed counts, we will be calibrating estimates of recent CFL purchases, CFLs currently installed, and CFLs in storage from the CFL User Survey. We will also use results from the on-site visits to estimate the saturation of CFLs relative to all eligible sockets in the home. The results from Pennsylvania, Kansas, and Georgia will all be compared with the results from California.

## Preparation for Site Visits

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### Scheduling

- Schedule all in-home visits at least two to three weeks before the visit.
- Schedule the in-home visits between 8 a.m. and 8 p.m., in accordance with participant preference.
- Make a reminder phone call two or three days before the visit to confirm the appointment date, time, and inspector.
- To minimize travel time and cost, make an effort to schedule in-home visits in the same geographic vicinity each day.

## Site Visit Etiquette

Dress appropriately for all in-home verifications or surveys. Specifically, wear close-toed shoes, Cadmus/KEMA polo shirt (if possible), slacks or skirts (no shorts or cut-offs), or other casual office attire.

Do not make or receive cell phone calls while on site.

Be on time for all site visit appointments. If you will be more than 15 minutes late for an appointment, call the site visit contact and confirm that you may still perform the verification.

Leave a copy of the CPUC Validation Letter and a supervisor's business card at each verification site.

When entering a home, be aware of your surroundings and touch as little as possible.

Try to not interrupt the people in the house.

Wipe your feet before entering.

Answer all participant questions.

### ***What To Bring***

Bring the following to each site visit:

- Customer incentive (\$50 Visa Card or other)
- Participant signature sheet
- Appropriate site visit collection tool
- Handwriting format sheet
- CPUC verification letter
- Contact business cards

## In-Home Verification Data Collection Tool

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The in-home verification data collection tool includes a two-sided main page plus an additional optional page. Complete all sections on the main page (1, 2, & 3) during the site visit. Use the optional page (Section 4) only when the information about all of the rooms will not fit on the main page.

Make sure your handwriting is consistent with the Handwriting Format Sheet.

Enter the data in the Web Data Collection Tool within one (1) week of collection to ensure timely analysis. Note that many of the fields in Sections 1 & 2 will be populated with survey responses before the site visit.

## Section 1

Section 1 consists of the basic scheduling and contact information for the verification. Pre-populated data are responses that we received during the CFL User Survey (conducted several weeks earlier via telephone) and will be available for the Field Staff to review and verify onsite.

In Section 1, note on the form and in the Web Collection Tool any discrepancies found between the pre-populated and actual in-home information.

### Pre-Populated Field Descriptions

**Customer Name:** This pre-populated field contains the contact name provided during the phone survey and recruitment.

**Customer ID:** This pre-populated field contains a unique numerical identifier for a particular respondent. Field staff must not alter the data in this field.

**Main Phone:** This pre-populated field contains the main contact phone number from the phone survey.

**Alternate Phone:** This pre-populated field contains the alternate phone number provided by the respondent during the phone survey.

**Site Address:** This pre-populated field contains the site address provided during the phone survey and recruitment.

### In-home Field Descriptions

**Field Representative:** Name of the field representative performing the site visit.

**In-home Contact:** Name of the person at the home who responded to the telephone survey questions and assisted with the verification. This will often be the home owner or head of the household.

**Scheduled Appointment Date & Time:** Scheduled time and date of the site visit.

- Use a mm/dd/yy format.
- Use a 12-hour format (hh:mm) and include the a.m. or p.m. designation.

**Actual Arrival:** Time and date when the field representative arrived in the home for the verification visit.

- Use a mm/dd/yy format.
- Use a 12-hour format (hh:mm) and include the a.m. or p.m. designation.

**Actual Departure:** Time and date when the field representative completed the verification and left the site.

- Use a mm/dd/yy format.
- Use a 12-hour format (hh:mm) and include the a.m. or p.m. designation.

## Section 2

This consists of the survey questions you will ask and/or verify while in the home.

Survey questions 1, 2, and 6 are based on your observations, so you will not ask the respondent these questions.

The Onsite Results column will be populated with the answers verified onsite, while the Phone Survey Results column will be pre-populated with the responses from the phone survey.

Enter all “Don’t Know” responses as “-99”.

Survey questions Q1, Q2, and Q6 will not be verbally asked of the respondent. The results of these questions will be obtained during Section 3, In-Home Observations, and the answers will be entered into the appropriate columns.

## Survey Questions

**Q1 “Do you currently have any Compact Fluorescent Lightbulbs (CFLs) installed inside or outside your home?”**

*Answer this question as either “yes” or “no,” based on your observation/inspection of the site, rather than asking the respondent.*

A “yes” response indicates that one or more results in Section 3, Column A, B, or C and/or Section 4, Column A, B, or C, are greater than zero. A “no” response indicates that the results of Section 3, Column A, B, and C and Section 4, Column A, B, and C are all equal to zero.

**Q2 “How many CFLs are currently installed?”**

*Answer this question by observing or inspecting the site, rather than by asking the respondent.* (The Onsite Results column is populated by a numerical answer that is the cumulative result of Section 3, Column A, B, & C and Section 4, Column A, B, and C.)

If there are no CFLs installed, record a zero in this column.

**Q3 “How many CFLs have you bought in the last three months?”**

When you ask this question, do not provide the respondent with the pre-populated survey response.

Record the response in numerical form. If the respondent has not purchased CFLs in the last three months, record a zero in this column and skip questions 3a and 3b.

**Q3a “Of the CFLs bought in the last three months, how many are currently installed?”**

When you ask this question, do not provide the respondent with the pre-populated survey response.

Record the response in numerical form. If the respondent has not purchased CFLs in the last three months, skip this question and do not record anything in the Onsite Results column.

**Q3b “Where are the CFLs installed that were purchased in the last three months?”**

Record the respondent’s answer to “quantity” as a number.

Make sure the Room Type responses correspond to the room types found in Section 3 or 4. For example, if the respondent states that one of the CFLs was installed in the master bedroom and that bedroom data is recorded as Bedroom 1 in the Section 3 responses, the Room Type recorded here should be Bedroom 1.

If the respondent has not purchased CFLs in the last three months, skip this question and do not record anything in the Onsite Results column.

**Q3c “How many CFLs have you bought in the last three weeks?”**

Record the response in numerical form. If the respondent has not purchased CFLs in the last three weeks, record a zero in this column.

**Q4 “Do you have any CFLs installed in dimmable fixtures?”**

Record the respondent’s answer as either “yes” or “no.” (For the purpose of this study, a dimmable fixture is defined as an electrical component that creates adjustable light levels ranging from nearly dark to fully lit by turning a knob or sliding a lever.)

**Note:** A “yes” answer can mean that the respondent has either standard or dimmable CFLs installed in dimmable fixtures. If the answer is “no,” skip to Question 5.

**Q4a “Are they dimmable CFLs, or standard?”**

When asking the respondent this question, you may also phrase it as, “Of the CFLs that are installed in dimmable fixtures, are they dimmable CFLs or standard ones?”

Record “dimmable” or “standard,” as appropriate, in the Onsite Results column. A “dimmable” response indicates that one or more of the results in Section 3 or 4, Column B, are greater than zero. A “standard” response indicates that the results in Section 3 or 4, Column B, are all equal to zero. (For the purpose of this study, a dimmable CFL is defined as compact fluorescent light bulb that creates adjustable light levels ranging from nearly dark to fully lit by turning a knob or sliding a lever.)

**Q5 “Do you have any CFLs installed in 3-way fixtures?”**

When you ask this question, do not provide the respondent with the pre-populated survey response. Record the respondent’s answer as either a “yes” or “no” answer.

**Note:** A “yes” answer can mean that the respondent has either standard or 3-way CFLs installed in 3-way fixtures. (For the purpose of this study, a 3-way fixture is defined as an electrical component that creates three light levels from dimly to fully lit by turning a knob or sliding a lever.) If the answer is “no,” skip to question 6.

**Q5a “Are they 3-way CFLs, or standard?”**

When asking the respondent this question, you may also phrase it as, “Of the CFLs that are installed in 3-way fixtures, are they 3-way CFLs or standard ones?” In the Onsite Results column, record the response as either “3-way” or “Standard.”

A “3-way” response indicates that one or more of the results of Section 3 or 4, Column C, are greater than zero. A “Standard” response indicates that the results of Section 3 or 4, Column C, are all equal to zero. (For the purpose of this study, a 3-way CFL is defined as compact fluorescent light bulb that creates three light levels from nearly dark to fully lit by turning a knob or sliding a lever.)

**Q6 “How many CFLs are you storing:**

*Answer this question through your observation/inspection of the site, rather than asking the respondent.* In the Onsite Results column, record a numerical answer. (This will be the cumulative results of Section 3, Columns A, B, & C, Row “In Storage”). If there are no CFLs in storage, record a zero in this column.

## Sections 3 and 4

Sections 3 and 4 are the observation sections of the verification. Here, you will tally and total all medium screw-based light bulbs found inside and outside the home, even if the bulb is not currently working.

**Note:** Do not include pin-based, small socket, or tube-style light bulbs as part of this effort.

### Column Descriptions

#### **Standard CFL Tally**

Tally all standard (medium, screw-based) CFLs found within the specified room type.

**Note:** Do not include dimmable or 3-way CFLs in this column.

Although this column is optional, you may use it to help keep count of bulbs. The tally marks must be consistent with the Handwriting Format Sheet.

#### **Total (A)**

Use this column to record the sum of the Standard CFL Tally. This column should contain a numerical answer.

#### **Dimmable CFL Tally**

Tally all dimmable (medium, screw-based) CFLs found within the specified room type. (For the purpose of this study, a dimmable CFL is defined as compact fluorescent light bulb that creates adjustable light levels ranging from nearly dark to fully lit by turning a knob or sliding a lever.)

Although this column is optional, you may use it to help keep count of bulbs. The tally marks must be consistent with the Handwriting Format Sheet.

#### **Total (B)**

Use this column to record the sum of the dimmable CFL Tally. This column should contain a numerical answer.

#### **3-Way CFL Tally**

Tally all 3-way (medium, screw-based) CFLs found within the specified room type. (For the purpose of this study, a 3-way CFL is defined as compact fluorescent light bulb that creates three light levels ranging from nearly dark to fully lit by turning a knob or sliding a lever.)

Although this column is optional, you may use it to help keep count of bulbs. The tally marks must be consistent with the Handwriting Format Sheet.

#### **Total (C)**

Use this column to record the sum of the 3-way CFL Tally. This column should contain a numerical answer.

#### **Other Medium Screw-Based Bulbs (non-CFLs) Tally**

Tally all medium, screw-based light bulbs found within the specified room type. (This section



includes all incandescent and halogen bulbs that have a medium screw base, but excludes all types of CFLs, Light Emitting Diodes (LEDs), as well as bug and solar lights)

Although this column is optional, you may use it to help keep count of bulbs. The tally marks must be consistent with the Handwriting Format Sheet.

#### **Total (D)**

Use this column to record the sum of the bulbs in the in the Other Medium Screw-Based Bulbs (non-CFLs) Tally. This column should contain a numerical answer.

#### **Empty Medium Screw-Based Sockets Tally**

Tally all empty medium screw-based sockets within the specified room type.

Although this column is optional, you may use it to help keep count of bulbs. The tally marks must be consistent with the Handwriting Format Sheet.

#### **Total (E)**

Use this column to record the sum of the sockets in the in the Empty Medium Screw-Based Sockets Tally. This column should contain a numerical answer.

#### **Total Sockets (A+B+C+D+E)**

Record the summation of columns A, B, C, D and E here, which should be the total medium screw-base sockets within a specified room type. This column should contain a numerical answer.

### **Row Descriptions, Section 3**

The rows in this section are common types of rooms found in homes. You will not need to fill every row for every home as many do not have all room types described. If there are additional rooms not included on this sheet you will need to populate Section 4 with the additional data.

For the purpose of this study we are looking for the primary usage of the light. Often times, a home will have a Great Room or a single room with several purposes. In those instances, look at the particular usage of the light and tally the bulbs accordingly.

In all room types, only count bulbs that are physically installed. All bulbs in storage, and all bulbs that are uninstalled, will be captured in the “In Storage” row.

#### **Bathroom 1-3**

The Bathrooms included in this row can be full baths, half baths, or three quarter baths. If a particular bathroom has two rooms (like a separate shower and sink area), input the lights in both rooms in one bathroom row.

#### **Bedroom 1-4**

Bedrooms are all labeled with a number. Count the master bedroom first (Bedroom 1), then other inhabited bedrooms, followed by guest rooms and rooms of children who are no longer living in the home. If the bedroom is being used as an office, it should be coded as such.

### **Closet 1-4**

Closets are all storage spaces, including pantries and linen closets.

**Note:** This section is only for installed bulbs. Uninstalled bulbs will be captured in the “In Storage” row.

### **Formal/Separate Dining Room**

Any room where the primary purpose is dining. When a dining area is attached to the kitchen, like a dining nook, those observations should be included in the “Kitchen” row. Formal dining rooms would fit into this category.

### **Garage**

The primary purpose of a garage is to store or work on cars. A carport also fits into this category. Do not include the bulb on the garage door opener in your calculations.

### **Hallway/Entry 1-3**

This category includes all entries, even those called “Mudrooms.” It also includes all hallways and stairways that have lights in them.

### **Kitchen/Dining Area**

Any light where the primary use is in the kitchen. Include the lights that are associated with a dining area inside the kitchen such as a counter with bar stools or a small kitchen table. Do not include the light under the range hood.

### **Laundry/Utility Room**

The main purpose of this room is washing clothes.

### **Office/Den**

A recent study found that there are a large number of home offices in residential homes. This row should be used for light bulbs in computer rooms, home offices, and parts of a Great Room that have office functions.

### **Other/Secondary Living Space**

Use this room for spaces that are used less than the Primary Living Space, but for similar activities. Examples of rooms of this type are recreation rooms, formal living rooms, and additional family rooms.

### **Outside Lamps**

Include bulbs in this row that are attached to the home, and those that are owned by the homeowner. Common area bulbs should *not* be included.

### **Primary Living Area**

This room is the most commonly used area for family activities such as watching TV.

### **In Storage (not installed)**

This row should tally all bulbs that are present *but not installed* in the home.

## Row Descriptions, Section 4

Section 4 should only be used when there are additional rooms not included in Section 3. If you use this page, you must complete the Customer ID field in the lower right hand corner of the page prior to completing the site visit. The Customer ID field should match the Customer ID in Section 1. As with Section 3, include only medium screw-based bulbs in your calculations.

### **Other**

When you use this field, you must specify the type of room. For example, if a home has five bedrooms (there are only enough rows for four bedrooms in Section 3) you must write Bedroom 5 in the title of the row. Examples of additional rooms that may be included in this type are pool houses, second garages, play rooms, and basements.

## **Upon Leaving the Home**

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As you are preparing to leave the home:

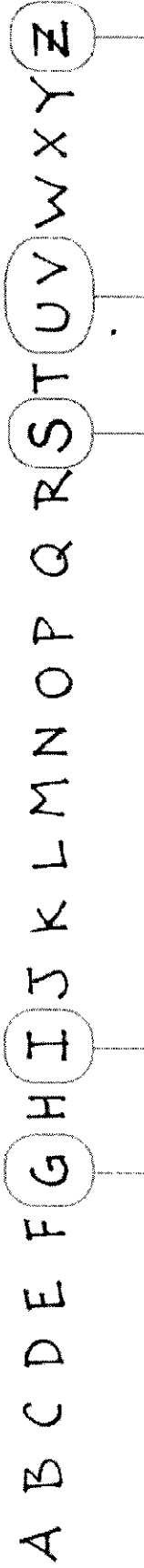
- Complete, and ask the participant sign, the Market Effects Signature Log.
- Leave with the participant:
  - One copy of the CPUC Validation Letter
  - A contact business card—in case the participant has any questions after you have left his/her home.



# Attachment A: Handwriting Format Sheet

# Handwriting Format Sheet

## ALPHABET - WRITE IN ALL CAPITAL LETTERS



Include top and bottom to "I"

Make sure to emphasize the tail of the "G" so it does not look like a "6"

Make sure the "S" is rounded so not to be confused with a "5"

When writing a "V", make sure there is a point at the bottom and when writing a "U", make sure to round the bottom

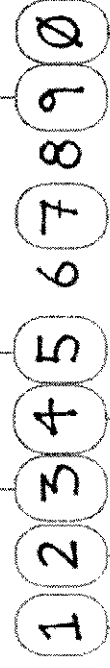
When writing a "Z" make sharp corners and place a slash through the "Z" so not to be confused with a "2"

## NUMBERS

Make sure the "5" has a right angle at the top so not to be confused with an "S"

Make sure "3" is open so not to look like an "8"

Make sure "9" does not look like a lower case "G"



Include top and bottom to "1"

Make sure "4" has sharp angles so not to be confused with a nine

Place a slash through all zeros so not to be confused with the letter "O"

Place a line through "7"

Make sure the "2" is rounded on the top so not to be confused with a "Z"

## TALLY



Make sure to make lines clearly vertical with a diagonal slash

# Attachment B: CPUC Validation Letter

PUBLIC UTILITIES COMMISSION  
505 VAN NESS AVENUE  
SAN FRANCISCO, CA 94102-3298



DATE: July 16, 2008

SUBJECT: California Residential Lighting Research Project

FROM: Mikhail Haramati / California Public Utilities Commission

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Dear Utility Customer:

The California Public Utilities Commission's Energy Division is currently employing independent program evaluators to measure achievements of electric and gas utility sponsored energy efficiency programs. As part of these evaluations you are participating in a statewide residential lighting study. The study includes a full inventory of all the lighting in your home to collect information about how your home lighting is used.

This research is critical for the verification and evaluation efforts of the 2006-2008 energy-efficiency programs sponsored by the state's investor-owned utilities (PG&E, SCE, and SDG&E).

The Cadmus Group (formerly Quantec, LLC) is the primary contractor retained for this evaluation work. The Cadmus Group staff will be performing the in-home lighting inventory and survey. This letter serves to authenticate their request for information.

For additional confirmation and a list of the subcontractors used by all of the primary evaluation contractors please visit the CPUC website at the link below:

<http://www.cpuc.ca.gov/eevalidation>

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Should you have further questions regarding the evaluation process, please contact me using the information provided below.

Thank you for your participation.

Sincerely,

/S/MIKHAIL HARAMATI

Mikhail Haramati  
Residential Retrofit Contract Manager  
415-703-1458  
[mkh@cpuc.ca.gov](mailto:mkh@cpuc.ca.gov)



# Attachment C: Data Collection Form

## CFL Market Effects In-Home Verification

### Section 1

<b>Customer Name</b>	<i>(Map to Recruit)</i>	<b>In-Home Contact</b>	
<b>Customer ID</b>	<i>(Map to Recruit)</i>	<b>Site Address</b>	<i>(Map to Recruit)</i>
<b>Main Phone</b>	<i>(Map to Recruit)</i>		
<b>Alternate Phone</b>	<i>(Map to Recruit)</i>		
<b>Field Representative</b>			
		<b>Date</b>	<b>Time</b>
		<b>Scheduled Appointment</b>	
		<b>Actual Arrival</b>	
		<b>Actual Departure</b>	

### Section 2

Survey Question		Results		
		Phone Survey	Onsite (from Audit)	Notes
1	Do you currently have any Compact Fluorescent Lightbulbs (CFLs) installed inside or outside your home? (Y/N)	(Q_2)		
2	How many CFLs are currently installed?	(Q2a)		
3	How many CFLs have you bought in the last three months?	(Q6)		
3	a	Of the CFL's bought in the last three months, how many are currently installed?		
		(Q8)		
3	b	Where are the CFLs installed that were purchased in the last three months?		
		NA		
		<i>Room:</i>		<i>Quantity:</i>
		<i>Room:</i>		<i>Quantity:</i>
		<i>Room:</i>		<i>Quantity:</i>
		<i>Room:</i>		<i>Quantity:</i>
		<i>Room:</i>		<i>Quantity:</i>
		<i>Room:</i>		<i>Quantity:</i>
		<i>Room:</i>		<i>Quantity:</i>
3	c	How many CFLs have you bought in the last three weeks?		
		NA		
4	Do you have any CFLs installed in dimmable fixtures? (Y/N)	(SAT20)		
4	a	Are they dimmable CFLs, or standard?		
		(SAT21)		
5	Do you have any CFLs installed in 3-way Fixtures? (Y/N)	(SAT20)		
5	a	Are they 3-way CFLs, or standard?		
		(SAT24)		
6	How many CFLs are you storing?	(Q3a)		

Additional Notes:



