

# **Tracking Market Shares of High Efficiency Measures in California's Residential Sector**

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## **ABSTRACT**

California's ratepayer-funded energy efficiency programs are dedicated to transforming markets to a higher, sustainable level of energy efficiency. The evaluation of market transformation initiatives requires knowledge of baseline market conditions and changes relative to that baseline over time. While most market behaviors (and behavioral changes) cannot be quantitatively observed, the market share trend of high efficiency measures over time is one truly measurable indicator. Reliable data will be required to 1) develop baseline efficiency market shares, 2) estimate efficiency market shares over time, and 3) ascertain the extent to which changes in market shares are sustainable beyond the life of market intervention.

This paper discusses the development and results to date of efficiency market share tracking efforts in California's residential sector, as well as lessons learned from this effort. The project entailed the development of five extensive data collection initiatives: on-site inspections of residential new construction, installation form collection from building departments and HVAC and plumbing contractors, sales data collection from space conditioning and water heating equipment distributors and appliance retailers, and lighting data through point-of-sales data obtained from commercial firms. These methods were designed to gather the data necessary to derive efficiency parameters of key existing and emerging measures, covering HVAC equipment, windows, duct sealing practices, lighting equipment, and appliances. Among other things, the crucial part of this effort is close coordination with the planning and evaluation efforts of individual energy efficiency programs administered in California, as well as research efforts in other regions. The result of this ongoing effort is a comprehensive efficiency market share database updated regularly (quarterly).

## **Introduction/Background**

Since the passage of California's electric power industry restructuring legislation (AB 1890), the California Public Utilities Commission (CPUC) has established a uniform funding mechanism for ratepayer-funded energy efficiency programs. The CPUC also redirected the focus of such programs toward transforming markets to a higher, sustainable level of energy efficiency. The ultimate objective of market transformation programs is to increase energy efficiency to a sustainable level that is maintained beyond the life of the intervention. In general, market transformation programs are designed to operate within the natural functions of a specific marketplace and to mitigate any existing barriers preventing the adoption of more energy efficient equipment, services, and standard business operation.

To assess the success of market transformation strategies, it is necessary to develop a reasonably comprehensive system for tracking various indicators of market changes attributable to these efforts (market effects) and to monitor these indicators after programs are discontinued or substantially altered. Tracking systems (including those specifically tracking market shares) are needed for program

development, program redesign, and for broader policymaking decisions: to assess the effectiveness of specific intervention strategies, and to assess the success of the overall market transformation process and determine the need for continued publicly funded market intervention.

More specifically, market share data are needed to develop baseline efficiency market shares, estimate and monitor efficiency market shares over time, and ascertain the extent to which changes in market shares of high efficiency measures are sustainable beyond the life of market intervention.

In 1998, a scoping study was conducted to investigate the feasibility of market share tracking in California's residential and nonresidential sectors (RER 1999). This study identified high priority measures that should be tracked over time and provided some methodological and budgetary recommendations for doing so. These recommendations were based upon four criteria. First, data must represent unit sales (or installations) so both levels and percentages of shipments of energy efficiency measures could be assessed. Second, data must be segmented by efficiency type, so shares of efficient products could be monitored continuously, even in the face of shifts in the overall distribution of efficiency. Third, data must be available at the state level to support policy decision making and, if possible, at finer levels of geographic resolution to support the evaluation of individual programs administered by each IOU. Fourth, data should distinguish the market event or "decision type" (new construction, net acquisition, retrofit, or replacement-on-burnout sales or installations). This distinction is particularly relevant in California because many of the state's individual programs are based upon such market events. Market share data could then contribute to the assessment of individual programs that are designed to influence choices under specific market events.

Efficiency market share tracking activities in California's residential sector began in the fall of 1999 after the scoping study's completion. One characteristic of market share tracking emphasized in the scoping study and adopted for developing the data collection efforts summarized here is that, by definition, *market share tracking is an ongoing, long-term commitment*. First, many data collection components take considerable time and effort to develop fully. Second, market share tracking must continue at least until a reasonable trend can be developed to provide feedback for program redesign and to justify policy decisions regarding the future of market transformation efforts.

The rest of this paper presents the actions undertaken and results to date of market share tracking in California's residential sector, including a discussion of appropriately defining an efficiency market share, a summary of data collection efforts underway, results to date, and various lessons learned so far.

## **Defining a "Market Share"**

In the context of energy efficiency, a market share is defined as the proportion of a particular measure in the marketplace that is "energy efficient." The numerator of the equation represents the number of units sold or installed in the relevant market that exceed a particular energy efficiency threshold—the federal standard, or the ENERGY STAR<sup>®</sup> qualifying level, for example. The denominator of the market share equation represents the total population of units sold or installed, including the high efficiency units and all standard efficiency substitutes.

While this definition is straightforward, applying it to specific measures could be problematic. For example, the above definition lends itself well to energy using equipment that is available in a range of efficiency levels, such as space conditioning equipment. However, a slightly different rationale is necessary to define the efficiency market share of energy saving equipment (controls) and other products that do not have energy efficiency ratings. In particular, lighting products pose a unique challenge in terms of logically defining the market share of high efficiency products, as well as the data required to calculate the percentage. The market share of medium screw-based compact fluorescent lamps, for example, could be the percentage of CFLs of all medium screw-based light bulbs, or the percentage of CFLs of all fluorescent lamps. Neither is theoretically wrong, but the most appropriate formula should be determined before commencing data collection efforts. In addition, the data required to compute the

market share of energy efficient lighting products can be very large, depending on the definition adopted. The denominator of the market share equation is the sum of all high efficiency units *and all substitute products*. This is not a small task. In general, the appropriate market share for all measures represents the number of “high efficiency” applications or installations of the measure as a percentage of all *feasible* applications or the stock of all eligible equipment it serves.

Defining what constitutes “energy efficient” also deserves careful attention. What was considered energy efficient in the past might be considered “standard” today and what is energy efficient today will likely become standard in the near future. This moving efficiency threshold is the result of periodic increases in federal standards and the influx of new technologies in the marketplace. The time trend of efficiency market shares must account for changes in efficiency standards.

## Summary of Data Collection Efforts

California’s residential efficiency market share tracking is comprised of four major components that have been ongoing since the fall of 1999: new construction on-site surveys and installation forms, sales data collection from HVAC and water heating equipment distributors, sales data collection from appliance retailers and point-of-sales data on lighting products. Taken together, these initiatives represent an integrated system capable of tracking a variety of commercialized measures and emerging technologies by market event. Table 1 summarizes the measures covered by each component.

**Table 1: Measure Coverage and Corresponding Data Collection Efforts**

Measure	New Construction	Distributor Sales Data	Retail Sales Data	Point-of-Sales Data
Central AC	✓	✓		
Room AC	✓	✓		
Heat Pumps	✓	✓		
Forced-Air Furnaces	✓	✓		
Water Heaters	✓	✓		
Heat Pump Water Heaters	✓	✓		
Duct Sealing and Insulation	✓			
Windows	✓			
Dishwashers	✓		✓	
Clothes Washers			✓	
Refrigerators			✓	
CFL Lamps and Fixtures	✓			✓
High Efficiency Torchiere Lamps	✓			

## New Construction On-Site Surveys and Compliance Documentation Forms

Tracking the efficiencies of shell measures, space conditioning and water heating equipment, appliances, and lighting products in the residential new construction sector is supported by annual on-site surveys conducted throughout California. In particular, the new construction tracking component consists of 1,600 on-site surveys of single family and multifamily buildings. In addition, duct blaster tests were conducted in 200 of the surveyed sites to measure duct leakage rates and assess other duct system related characteristics, such as system design and installation practices.

The sample frame for the new construction surveys was developed from utility billing frame data provided by California’s four investor-owned utilities: Pacific Gas & Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), and Southern California Gas Company

(the Gas Company). To date, the sample frame for the results includes homes first occupied between July 1, 1998 and June 31, 2000, as well as residence type and climate zone indicators for sample stratification. The sample for the new construction on-site surveys was stratified according to residence type, climate zone, and six-month construction periods to allow for representation in the sample throughout the entire sample year. Proportional sampling, with some oversampling of sites from SDG&E's service area, was applied to develop the completed sample design of 800 sites per year. The residential new construction on-site surveys were conducted by Volt VIEWtech, Inc. between November 1999 and May 2000. The duct blaster tests were administered by the California Home Energy Rating System (CHEERS) organization.<sup>1</sup>

Related to the new construction on-site survey effort is the collection of installation documentation submitted to California building departments upon a building's completion (CEC 1998).<sup>2</sup> The installation certificate, or CF-6R form, is completed by various installation and building contractors throughout the construction process. Among other things, the CF-6R form provides a record of installed equipment types and efficiency parameters for HVAC systems, water heating systems, fenestration and glazing, and building envelope characteristics. To augment the on-site survey data, 2,876 CF-6R forms were obtained from 18 building departments and HVAC and plumbing contractors throughout California. Furthermore, sample CF-6R data were used to test the accuracy of the CF-6R forms by comparing CF-6R data with on-site inspection data of identical sites. The installation data recorded on the CF-6R forms were combined with on-site survey data, allowing for more precise efficiency estimates.

### **HVAC and Water Heater Distributor Data Collection**

The distributor-based data collection component involves obtaining HVAC and water heater equipment sales data from distributors and wholesalers serving California. Starting in the spring of 1999, a panel of distributors was recruited to provide equipment sales data on a quarterly basis to support efficiency tracking. Of the 15 entities in the HVAC market, five distributors currently share sales data. Three of these distributors have large shares of the California market. Three of the five carry product from the manufacturer with the largest national market share. The other two carry product from the manufacturer with the second largest national market share. The project team also recently improved the geographical coverage of the data, especially in the major population centers. Efforts to increase the panel size will continue, especially with regard to central California. Also, some HVAC distributors sell water heaters. In these cases, both types of sales data are being shared for the study.

Water heating equipment has a more diffuse market than HVAC equipment. Accordingly, the approach for recruitment has been different from that for HVAC. With the exception of a few national distributing warehouses, the water heating market consists of dozens of small plumbing supply houses. Each of the small supply houses services a relatively small geographic area. In order to ease their ability to share data, a form was developed with the assistance of water heater distributors. This form is filled out and reports the applicable sales data. This has simplified the process for all parties. Currently, there are 12 plumbing supply houses sharing data. They are concentrated in the Greater Los Angeles area. However, the project team did obtain coverage in the Bay area, Sacramento and San Diego and plans to increase the panel size as the study continues.

Recruiting protocol continues to center on flexibility and understanding of each distributor's position. Meeting decision makers in person helped facilitate participation on both a new and continuing basis. Along these lines, a need has developed to contact HVAC manufacturers directly in order to secure approval for a California distributor to share data. Efforts to recruit water heater supply

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<sup>1</sup> Incentive payments of \$25 per site were paid to each on-site survey participant. Those who agreed to the duct testing component were paid an additional \$50, for a total payment of \$75.

<sup>2</sup> All low-rise residential buildings in California must comply with Title 24, Part 6 of the California Code of Regulations. Compliance documentation is required to obtain a building permit, as well as throughout the construction process.

houses also expanded to include contact with manufacturer representatives located in California. The confidentiality agreement continues to be a crucial element. Building ongoing relationships has been a long but fruitful process.

### **Appliance Retail Data Collection**

In June 2001, the report analyzing the 2000 appliance sales data was released. As with the First Year Interim Report, national chain data as well as independent store and regional chain data were both obtained to achieve an overall market perspective. Again, D&R International (D&R) supplied the aggregated national appliance sales data from two national chain retailers for efficiency market share tracking efforts in California. The volume of national data was significantly reduced from 1999, due to the closing of Circuit City (from the appliance product line) and Montgomery Ward. Again, the project team utilized the ENERGY STAR appliance program to provide the framework for data analysis. Since the national chains account for a significant percentage of total appliance sales, the contribution of this data continues to be important (D&R 1999; D&R 2000).

The project team discovered a similarity between the national stores closing and those of independents. Twenty-six independent appliance stores also closed in California during the last half of 2000. To improve the sample of independents for the second report, the project team aggressively recruited both independent stores and regional chains for the 2000 report. Consequently, sample size increased significantly. There are now 45 storefronts submitting data. They represent 11% of the total independent storefronts in California. Of these, eight are individual storefronts, commonly called “Mom and Pop” stores. The other storefronts are locations of regional, independent chains. In particular, the chains improved the geographical coverage of submitted data, especially with regard to the major population centers in the state. Recruiting efforts are scheduled to continue for the third year of the project.

In California, the overall market share of ENERGY STAR qualified appliances continued to rise slightly throughout 2000. National data showed that room air conditioners, in particular, had a higher percentage of qualified units sold in 2000. The average market share of ENERGY STAR qualified room air conditioners sold in 2000 was almost 18%. ENERGY STAR refrigerators also appear to have increased their market share. The independent retailers indicated that 2000 was a good sales year. They benefited from a strong California economy and a rapidly growing housing market. However, it is important to note that, nationally, the last quarter of 2000 brought significant sales decreases for appliances (TWICE 2001).<sup>3</sup> The project team continues to work toward a successful third year and looks forward to comparing the 2000 and 2001 sales data in order to observe whether the earlier trends altered due to the economic slowdown or energy crisis.

### **Point-of-Sales Data**

Collecting lighting data requires a significantly different approach than collecting data for other measures. Lighting manufacturers are very guarded about sales data. Likewise, retailers selling lighting are competitively sensitive about sales data. Understanding that the new construction on-site surveys would only account for a small percentage of the lighting market, efforts turned to purchasing point-of-sale (POS) data.

The project team identified data vendors that provided light bulb POS data for the most popular sales channels—food, drug, mass merchandiser, home improvement, and hardware stores. The data are available on a national and sub-state level and include information on efficiency, lamp type, and region

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<sup>3</sup> Note that the new construction HVAC and water heating results are preliminary and that the retrofit/replacement results do not include the last six months of 2000 or the first six months of 2001 as the distributor data for these measures has not yet been analyzed.

sold, among other details. As with the HVAC equipment data, confidentiality agreements were required by data vendors to ensure that company-specific information remained confidential.

Purchasing these data required substantial capital, relative to other measures. Having unsuccessfully recruited retailers and manufacturers for this effort, the data purchase was the best option. Despite the cost, POS data give the best approximation of quantity and type of lighting sold in the marketplace. The sheer volume of lighting sales and the frequency at which these measures are replaced render any other data collection efforts obsolete. An agreement was signed to purchase data for two years to track long-term trends in lighting sales.

## Review of Tracking Efforts to Date

The first efficiency tracking report (RER 2000) includes the results for each measure listed in Table 1. In an effort to produce reports in a timely and targeted manner, RER is creating multiple equipment-specific reports for the second year of the tracking project instead of one all-inclusive report. The main advantage of having four individual reports is that each can be published based on the timing of the data collection. Table 2 lists each of the second year reports, along with details about each report.

**Table 2: Second Year Reports**

Report	Data	Measures	Next Report Due Date
Lighting*	Point-of-Sales Data	Light Bulbs Torchieres	April 2001 August 2001
Appliances	Distributor Data	Refrigerators Dish Washers Clothes Washers/Dryers	June 2001
New Construction	New Construction Data	Gas Furnaces Central Air Conditioning Gas Water Heaters Ducts Lighting Windows	June 2001
HVAC and Water Heating	New Construction & Distributor Data	Gas Furnaces Central Air Conditioning Gas Water Heaters	July 2001

\* Semiannual report

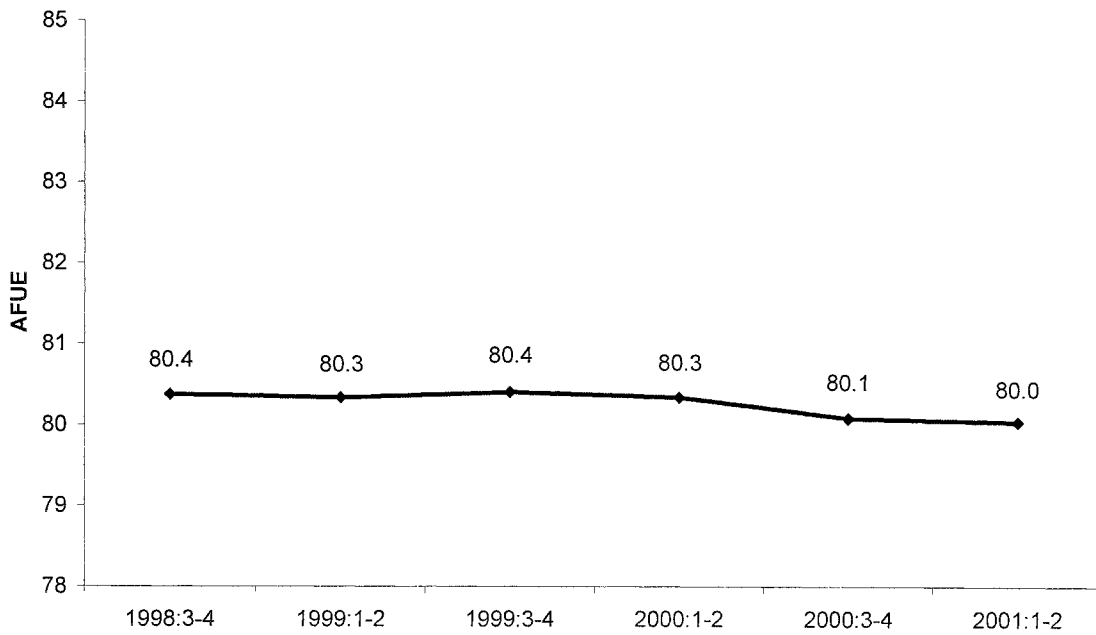
The results presented below represent market share tracking activities through June 2001. The results presented are for only a subset of measures covered by the efficiency tracking project, including space heating and cooling equipment, gas water heaters, and light bulbs.<sup>3</sup>

## Space Heating Equipment

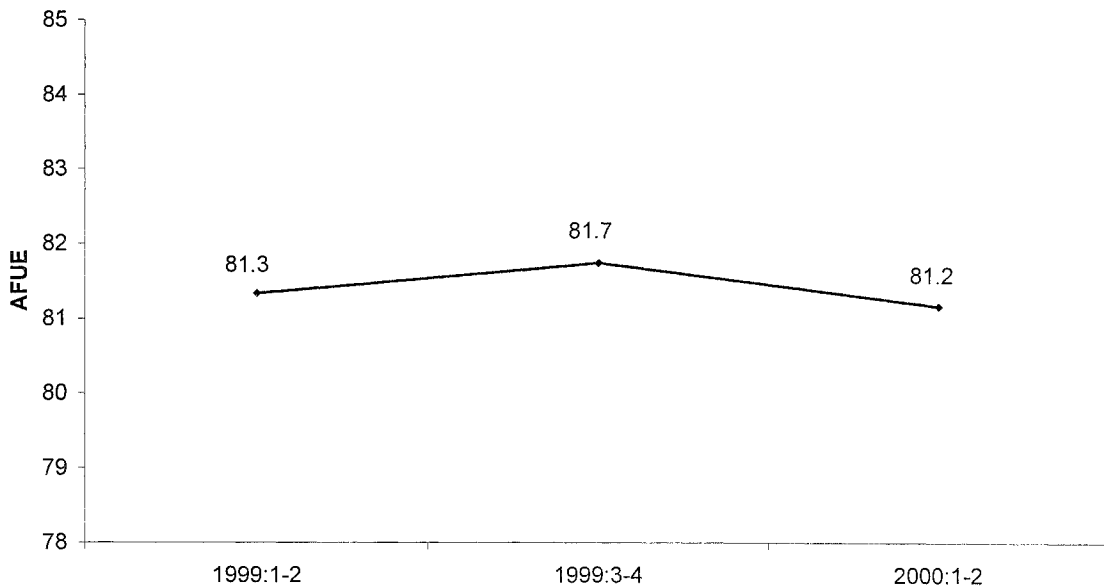
Figure 1 and Figure 2 present the average efficiency ratings (AFUE) of gas furnaces installed in the new construction and retrofit, replacement, and net acquisition sectors, respectively.<sup>4</sup> The results indicate that there has been no significant change in the average efficiency of gas furnaces during the past year or so.<sup>5</sup> AFUEs of gas furnaces installed in new construction have wavered between 80.0 and 80.4, while AFUEs of retrofit/replacement units have vacillated between 81.2 and 81.7.

<sup>4</sup> The federally mandated minimum Annual Fuel Utilization Efficiency rating for gas furnaces is 78.0.

<sup>5</sup> Two estimates (1999:3 and 2000:2) are significantly lower than the other averages have relatively small sample sizes.



**Figure 1: Central Gas Furnace Average AFUE – New Construction**

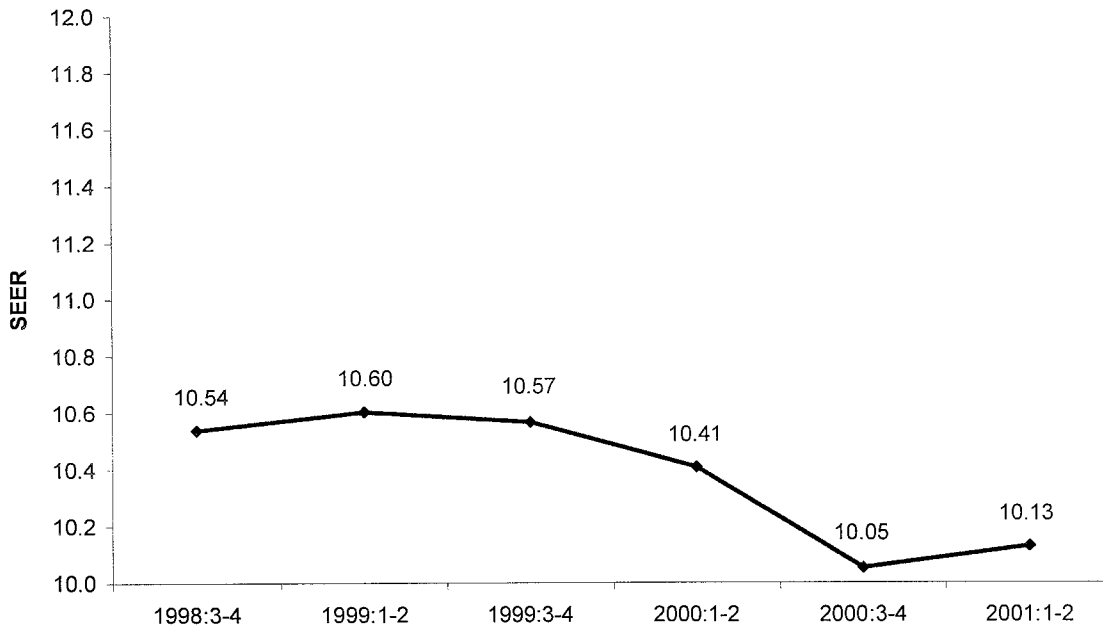


**Figure 2: Central Gas Furnace Average AFUE – Retrofit, Replacement, and Net Acquisition**

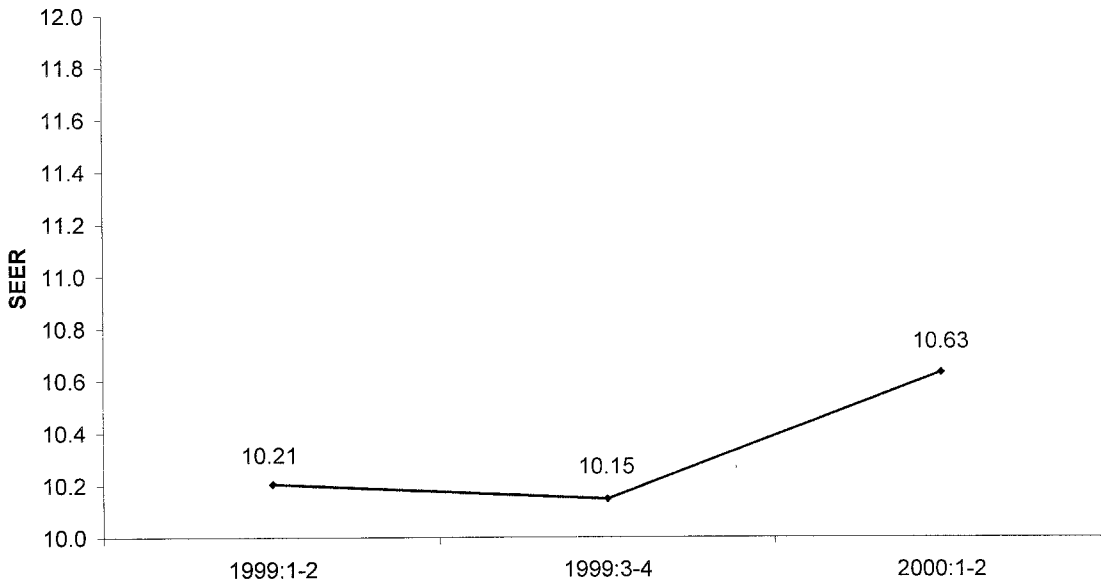
**Space Cooling Equipment**

Figure 3 presents the average efficiency ratings (SEER) of central air conditioners in California’s residential new construction sector.<sup>6</sup> As shown, there has been a slight decrease in average efficiencies over the last three years. Figure 4 depicts the average SEER of retrofit, replacement, and/or net acquisition sales. The average efficiency varies from 10.21 in the first half of 1999 to 10.63 in the first half of 2000.

<sup>6</sup> The federally mandated minimum Seasonal Energy Efficiency Rating (SEER) for central air conditioners is 10.0.



**Figure 3: Central Air Conditioner Average SEER – New Construction**



**Figure 4: Central Air Conditioner Average SEER – Retrofit, Replacement, and Acquisition**

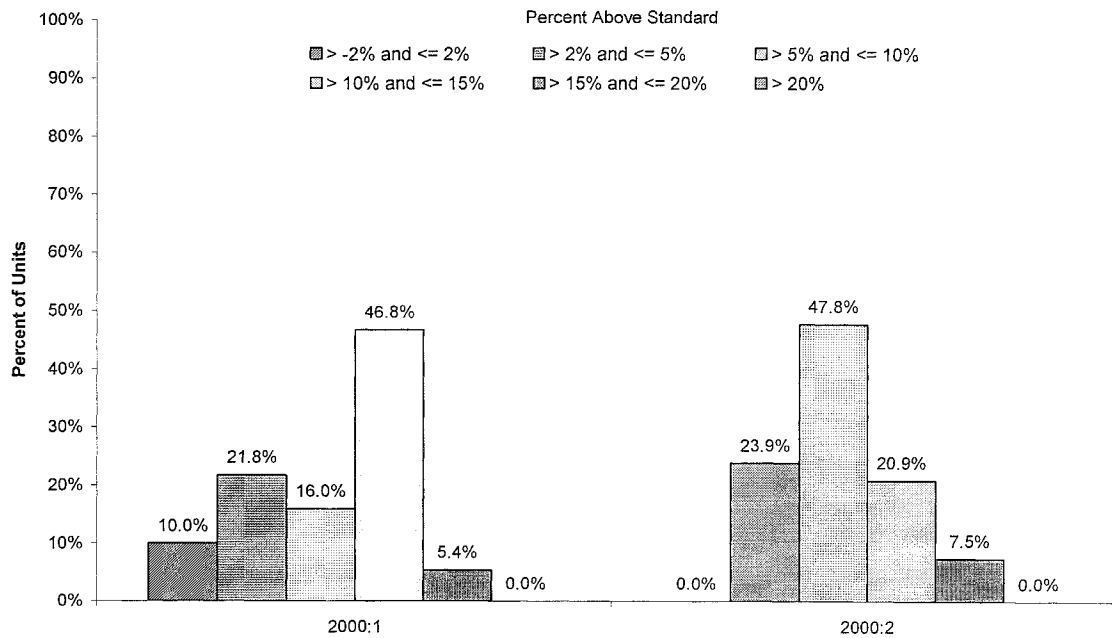
### Gas Water Heaters

Figure 5 illustrates the percentage of units sold according to percent above standard. Nearly half the units sold in early 2000 exceeded the standard by 10% to 15%. In the second quarter, only 21% of units exceeded the standard by 10% to 15%. This decrease seems to be offset by an increase in the percentage of units with energy ratings between 5% and 10% above standard.

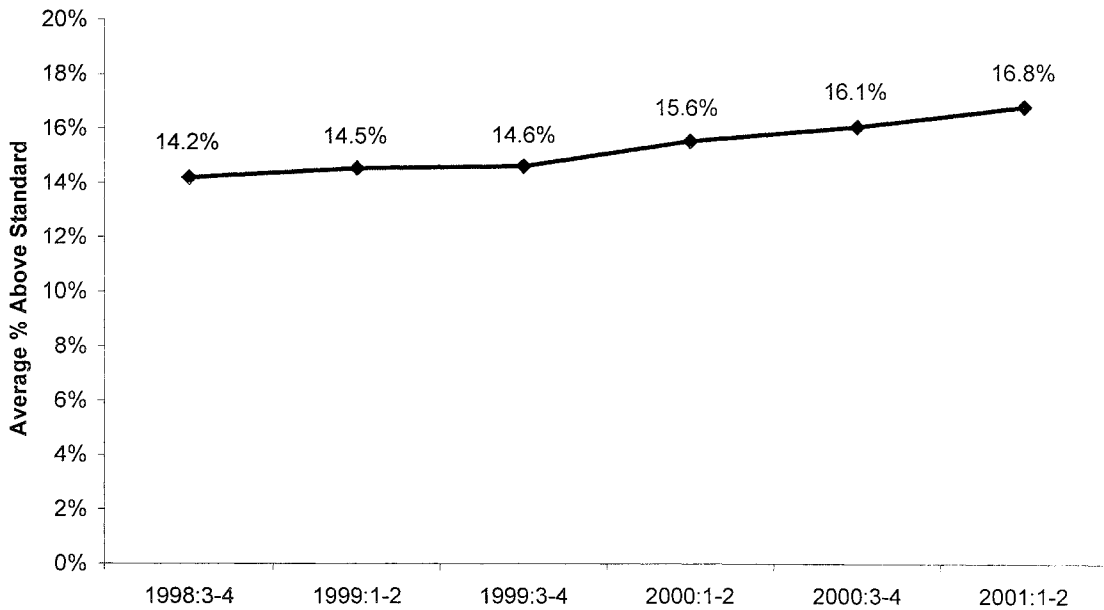
Figure 6 illustrates the average percent above standard of gas water heaters installed in California new homes over the past three years. As shown, the percentage remained relatively constant in late



1998/early 1999, and then has continued to increase since late 1999. The average percent above standard in early 2001 is approximately 17% percent above standard.



**Figure 5: Gas Water Heater Sales, by Percent-Above-Standard – All Units**

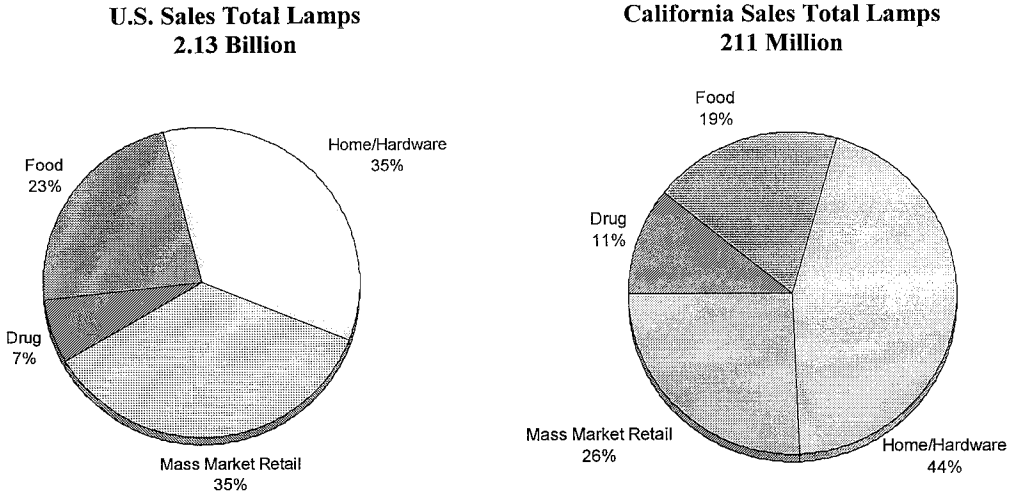


**Figure 6: Gas Water Heaters, Percent Above Standard – New Construction**

## Lighting

The tracking of the market shares of lamps has been a fruitful if not trying exercise. To date the team has produced two reports that cover the market shares of lamps from January of 1998 through January of 2000. Semiannual reports and four-page summaries are being published in January and July of each year (RER 2000, 2001). The following gives some flavor to the results contained in these

reports. In particular, Figure 7 presents a breakout of total lamp sales by market channel. Comparing lamps by market channel reveals a shift in purchasing preferences for U.S. and California consumers. Figure 7 shows that hardware, home improvement centers, and drug stores account for a larger percentage of lamp sales in California than in the overall U.S. Correspondingly, mass market retailers contribute to a smaller percentage of lamp sales than they do nationally.

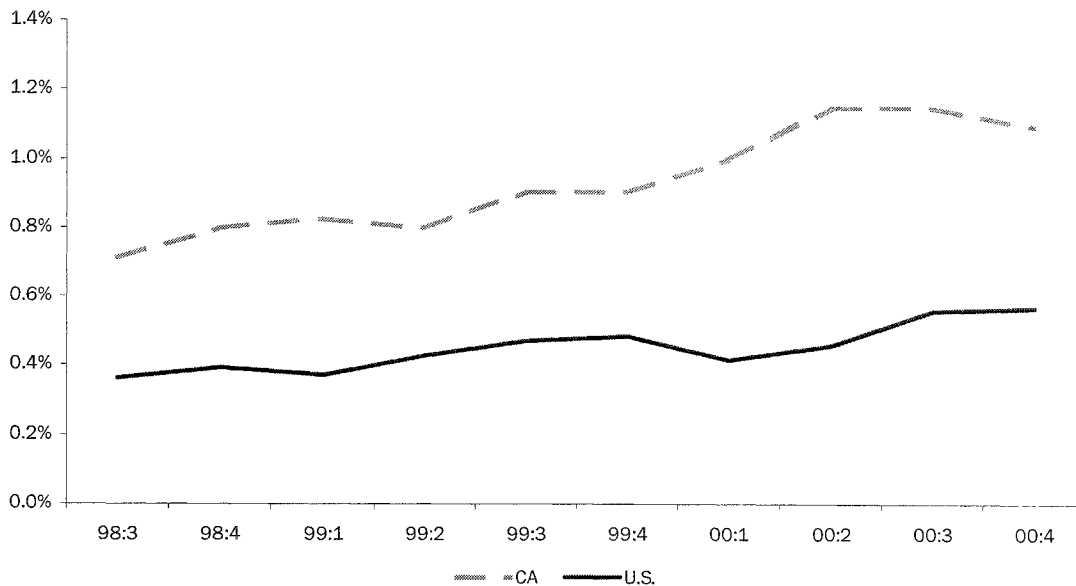


**Figure 7: Residential Lamp Sales by Market Channel – California and U.S. – 2000**

California’s Statewide Lighting and Appliance Program focuses on medium screw-based lamps. Analysis of lamp efficiencies was based on the unit sales of energy efficient medium screw-based lamps as a percent of unit sales of standard efficiency medium screw-based lamps (halogen and incandescent). Table 3 provides some perspective on the number of light bulbs sold annually across the U.S. and the respective shares of California and the IOU service areas. The general trends in lamp unit sales are increasing, regardless of lamp type. CFL sales increased by 27% in California vs. 11% in the U.S. The largest increase occurred for halogen lamps, where sales rose 44% in the U.S. and 45% in California. These increases reflect meaningful shifts in product share within the lighting market, since overall lamp sales increased by only 2.0% in California and 3.0% in the U.S. over the same period. Figure 8 shows the share of medium screw-based CFLs as a percentage of total medium screw-based lamps sold by quarter for California and the rest of the U.S. Although shares of CFLs in the overall market are relatively low, the CFL market share increases over time in both markets.

**Table 3: Total Sales, Medium Screw-Based Lamps**

Region	CFL		Halogen		Incandescent	
	1999	2000	1999	2000	1999	2000
U.S.	6,211,525	6,917,392	5,033,134	7,225,005	1,293,681,759	1,301,378,813
CA	1,003,690	1,278,037	523,587	778,182	115,328,066	115,288,430
SCE	249,061	342,351	158,205	233,277	35,455,574	35,669,419
SDGE	111,866	161,094	56,662	71,574	9,087,726	8,907,261
PG&E	403,717	438,586	177,038	276,758	48,270,196	47,308,662
Other	239,046	336,007	131,683	196,574	22,486,853	23,368,574



**Figure 8: CFL Share of Medium Screw-Based Lamps – California and the U.S. (non-California)**

## Lessons Learned

An important aspect of developing a market share tracking system is to recognize that it is a hands-on, practical, data collection exercise. Understanding and adapting to the business practices of all entities that distribute and market energy using measures is critical to the success of market share tracking. As a guide to those preparing to embark on this formidable yet necessary journey, we offer the following lessons learned in developing a tracking system identified in the course of this research.

### Coordinate with Utility Program Planners, Implementers, and Evaluators

The data collection efforts described here have involved close coordination between the project team and other professionals in the energy efficiency community—mainly utility program planners and other market assessment and evaluation (MA&E) project managers and consultants. Doing so has proved beneficial for numerous reasons. First, the transparency of data collection efforts across the many MA&E activities helps to avoid wasteful duplication of effort. Second, program implementers often have a greater understanding of the marketplace and can provide valuable insights into developing more effective recruiting tools. Third, program staff can also help compile samples and other valuable assistance. A prime example is the coordination and leveraging of lighting program staff experience with lighting product retailers and manufactures. Other examples include coordination with California statewide appliance program implementers, the building codes and standards assessment project team, and the residential new construction evaluation project team.

Such coordination can and should be a two-way street. Although the project team continuously sought leveraging opportunities, it is important that market share tracking be open to assist other efforts. For example, the California statewide residential new construction program is utilizing data obtained through the on-site surveys. This, in turn, freed funds for other purposes.

## **Coordinate with and Leverage Off Other Programs and Data Collection Efforts Already in Place**

Significant advantages exist in identifying and leveraging off other projects and data collection efforts already in place. For example, sales data collected from national retailers to assess the ENERGY STAR program are invaluable to tracking the market shares of residential appliances in California. It is unlikely that such companies would be willing to surrender data to a new, unfamiliar entity. Other opportunities are likely to exist through other state and federal agencies or research organizations.

## **Identify and Understand Issues Unique to Each Market**

All components of this market share tracking system involve fostering and maintaining positive relationships with both market participants and members of the energy efficiency community. First, most of these efforts—the distributor and retail tracking components, in particular—require developing long-term working relationships with key market participants or “data providers.” Identifying and understanding issues unique to each market is an integral part of this process.

For example, California’s HVAC wholesale market is very concentrated with relatively few companies serving both the new construction and replacement markets. The presence of large national firms and resulting consolidation in the wholesale market has resulted in a very competitive distribution industry. As such, confidentiality is their most significant concern. Likewise, lighting manufacturers and retailers are also very concerned about confidentiality.

Other issues encountered in both the distributor- and retailer-based components are resource and time constraints. It became apparent very early in the project that providing data for the market share tracking project is the absolute lowest priority for most that agree to participate. Project deadlines, and in some cases even monetary incentives, would not elevate the project’s importance over the normal business operations of those in the private sector.

## **Realize and Accept Reluctance to Provide Data**

Most data obtained to support residential market share tracking are competitively sensitive. Although considerable effort is expended to develop and maintain trusting relationships with data providers, they tend to be very reluctant to provide data to third parties. Three main approaches were adopted to mitigate this problem. First, confidentiality agreements are signed with all data providers to ensure that company-specific data will remain proprietary. Second, it is important to stress that any data released would be sufficiently aggregated so that no one data provider’s information would be transparent. Third, it is very important to recognize the value of the information provided to support market share tracking and to offer participants some value added in return for providing data. For example, participating HVAC distributors will be provided with market summaries, including each distributor’s number of total units sold and sales by efficiency level, and other segmentation variables. Each distributor will receive a report only on their company relative to the rest of the market, honoring all confidentiality agreements.

Consider purchasing data if it cannot be had any other way. Attempts to secure lighting data from manufacturers and retailers were unsuccessful. Despite trying the approaches used for HVAC data, lighting manufacturers and retailers were unwilling to provide data. Although purchasing data is not always an option, it should be considered when other efforts are exhausted and the data are available.

## **Be Flexible, Open-minded, and Patient**

The project team spent considerable time developing well planned data collection approaches for each major tracking element. However, once implemented, it was evident that some approaches were inadequate to accomplish the tasks. This forced the team to be flexible in the approach taken and to adjust the expectations for the resulting data. Data collected from building departments provide a typical example. In particular, the original approach was to collect historical data and set up an annual data collection system with each building department. A feasibility investigation for this approach, however, revealed that building departments staff are over-committed and unable to provide sufficient historical data. The more successful approach was to negotiate a system whereby building department staff copy and send documents to the project team as they receive them from builders. Although this does not provide historical data, the team was able to establish a system that will provide a foundation for future tracking efforts.

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