

# California Residential Efficiency Market Share Tracking

## HVAC 2003

Prepared for:

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# 1

## Introduction

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This report summarizes the analysis and results of the heating, ventilation, and air conditioning (HVAC) equipment component of the California Residential Market Share Tracking (RMST) project. This project tracks the average efficiencies and shares of highly energy efficient HVAC equipment, appliances, and lamps sold for use in California's residential sector.<sup>1</sup> Itron Inc. conducts the California RMST for the state's three investor-owned electric utilities (IOUs). This project is managed by Southern California Edison.<sup>2</sup>

This report presents the total estimated unit sales, average efficiencies, and percent of ENERGY STAR qualified units sold in the state for three types of HVAC equipment: central air conditioners (CACs), air-source heat pumps, and central gas furnaces. Results are also presented by IOU service area or aggregated service areas if the data can support such segmentation. This report also contains general market information and efficiency standards for each equipment type, including federal energy use standards, national ENERGY STAR<sup>®</sup> program standards, and California's appliance efficiency standards.<sup>3</sup>

Of particular interest regarding this study is the consistency of input data over time. Since the inception of the study, Itron has obtained sales data from a panel of HVAC equipment distributors serving the residential new construction and contracting markets throughout California. The consistent, ongoing nature of the data collection process has produced a valuable and meaningful trend of HVAC equipment characteristics.

The remainder of this report is organized as follows.

- Section 2 details the data collection methodology for developing the market share and average efficiency estimates.

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<sup>1</sup> All RMST reports can be downloaded from <http://www.calmac.org/>.

See, for example: RER, Inc. July 2001. *California Residential Efficiency Market Share Tracking: New Construction 2000*. Prepared for Southern California Edison.

RER, Inc. October 2001. *California Residential Efficiency Market Share Tracking: Lamps 2001*. Prepared for Southern California Edison.

<sup>2</sup> RER was acquired by Itron in 2003.

<sup>3</sup> Although past reports also incorporated detailed estimates and analysis of HVAC equipment installed in newly constructed homes throughout California, this report focuses on overall equipment sales.

- Section 3 presents the RMST results for CACs.
- Section 4 presents the RMST results for heat pumps.
- Section 5 presents the RMST results for central gas furnaces.
- Section 6 previews work in progress.

# 2

## Data Collection and Methodology

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The data collection methodology adopted for the HVAC component of the RMST is based upon recommendations of the Efficiency Market Share Tracking Needs Assessment and Scoping Study (Scoping Study).<sup>4</sup> The Scoping Study found that obtaining HVAC equipment sales data at the distribution level was appropriate and cost-effective relative to other alternatives.<sup>5</sup> Despite its advantages, however, the Scoping Study found that distributor-level data can be limiting due to the inability to distinguish the market event (e.g., new construction versus replacement installations), since both builders and contractors purchase equipment from HVAC distributors. It is also not possible to discern new construction versus retrofit/replacement sales.

The project team recruited a panel of equipment distributors to provide sales data for the HVAC equipment analysis. The data collected from distributors are used to estimate average energy efficiency ratings and shares of energy efficient equipment in the overall market.

The remainder of this subsection describes the development of the distributor sample frame and sampling plan, the protocol for recruiting the distributor panel, and construction of the HVAC sales database.

### 2.1. Distributor Sample Frame

Iron developed the frame of equipment distributors from a variety of resources, including contacts developed from past residential sector research, HVAC equipment manufacturer web sites, the North American Heating, Refrigeration & Air Conditioning Wholesalers Association's (NRHAW) on-line membership directory, and referrals from other distributors. As shown below in Table 2-1, the RMST distributor sample frame consists of 16 companies whose primary business is the wholesale of residential space heating and cooling equipment.<sup>6</sup> As shown, the frame is further segmented by geographic region and distributor type

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<sup>4</sup> RER, Inc. May 1999. *Efficiency Market Share Needs Assessment and Feasibility Scoping Study*. Prepared for the California Board for Energy Efficiency and Pacific Gas and Electric.

<sup>5</sup> *Ibid.*

<sup>6</sup> The HVAC equipment wholesale market is in the midst of a great deal of consolidation, thus some companies in the sample frame are owned by the same corporation.

(independent or manufacturer dealer). The frame consists of distributors that represent all major residential equipment manufacturers and brands, including Bryant, Carrier, Goodman, Lennox, Payne, Trane, and York. The frame includes independent equipment wholesalers, independently owned manufacturer dealerships, and manufacturer-owned dealers, representing well over 200 branch/warehouse locations throughout California.<sup>7</sup>

**Table 2-1: HVAC Distributor Sample Frame**

	Distributors
<b>Total in Frame</b>	<b>16</b>
with Statewide Service Areas	5
with Primarily Southern California Service Area	6
with Primarily Northern California Service Area	5
Manufacturer Dealers	4
Independent Dealers	12

## 2.2. Distributor Panel Recruiting Protocol

Recruiting HVAC distributors to provide sales data can be challenging for many reasons. First, nearly all companies consider their sales data to be competitively sensitive information and most are reluctant to consider sharing it, even with assurances of confidentiality. Second, most companies are reluctant to commit the resources (i.e., staff time) to pull the required data from their inventory and sales records. Understandably, pulling data for the RMST is the absolute lowest priority for the distributors. Third, all direct manufacturers’ distributors’ participation must be approved through the corporate office. Historically, it has been more difficult to develop relationships with manufacturers, and manufacturers are even more reluctant to share sales data. Fourth, the HVAC equipment market in California has consolidated considerably throughout the past five to ten years. The resulting larger companies maintain more centralized inventory and sales systems and have more centralized decision-making authority within the parent companies. These parent companies may have multiple subsidiaries, each of which has many warehouses located throughout California. Yet all these potential points-of-sale likely report to a single contact. Each contact may control a significant portion of the California market depending on the number and size of the subsidiaries involved.

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<sup>7</sup> In general, HVAC distributors have experienced some consolidation since the publication of the First-Year Interim Report. For consistency, the project team considers these subsidiaries as separate entities for all subsequent HVAC reports, even though they are owned by the same parent company.

Itron's efforts to overcome these challenges have been ongoing since the inception of the RMST. The recruiting strategy follows the following principles.

- **Develop and Maintain Long-Term Relationships.** The distributor data collection efforts must be considered a long-term, ongoing process. Most distributors are only willing to participate if there is a long-term commitment. Due to the sensitive nature of the data provided, trust and a positive working relationship between project staff and the distributors have proven to be paramount.
- **Guarantee Confidentiality.** Itron guarantees the confidentiality of all information and sales data provided by distributors. To ensure this, the team agreed to report efficiency market shares and any other information only at an aggregated level (statewide and by utility service area if possible).
- **Minimize Burden and Be Flexible.** Participation in the panel has been tailored to accommodate the requirements of each distributor. For example, because distributors have different inventory and sales systems, Itron accepts data in a variety of formats to minimize the time and effort required by the participants to provide the data.
- **Provide Value.** It is important that the participating distributors are provided something of value in return for the valuable data they contribute to the project. Itron prepares a confidential vendor level sales summary report for each participating distributor. These custom reports have received positive feedback not only from the distributors themselves, but also from the manufacturers with whom they do business.

Itron contacts all distributors in the sample frame for each RMST reporting period. The sampling objectives for recruiting HVAC distributors are to recruit distributors that have a relatively large share of the residential HVAC market and to have adequate representation of sales for all utility service areas in the state. Recruiting continues to be an on-going effort. Distributors in the existing panel are asked to continue their participation. Those not in the panel are asked to begin sharing data in an effort to continue to improve the sample. Itron's long-term goal continues to be increasing participation and market coverage of the wholesale market.

The 2003 distributor panel includes five companies representing 71 warehouse locations throughout the state. Sales from the 2003 distributor panel approximate 20% of the statewide central air conditioner, heat pump, and gas furnace markets.

### 2.3. Distributor Sales Database Construction

Since the inception of the HVAC component of the RMST, HVAC equipment distributors have provided sales data covering the first quarter of 1999 through the fourth quarter of 2003. Distributors have provided Itron with data in two different basic formats, each having varying levels of detail. Some provided quarterly summary reports of sales segmented by predetermined efficiency ranges. Others provided line-item quarterly sales reports that included manufacturer model number, quantity, and date sold.

After converting all data files into a common format, Itron linked efficiency parameters to each observation in the database using one of two methods. In cases where the distributor provided the manufacturer's model number, Itron merged efficiency characteristics from the California Energy Commission's (CEC's) appliance efficiency database to each observation in the sales data.<sup>8</sup> When the team could not match efficiency parameters electronically to the provided model number, further investigation took place through the manufacturers' websites and/or by contacting the manufacturer directly. In cases where distributor data were already grouped by equipment type and efficiency level, the project team used a table to attach the appropriate efficiencies to these units for analysis.

After all observations in the HVAC database are assigned corresponding efficiency characteristics, Itron weights each observation to expand the sample data to represent the population of HVAC sales in California.<sup>9</sup> This process resulted in a database of quarterly HVAC equipment sales from 1999 through 2003.

### 2.4. Unit Sales Analysis

The team analyzed HVAC equipment in two ways. The project team estimated the market share of CACs, air-source heat pumps, and central gas furnaces sold that met or exceeded the ENERGY STAR qualification threshold from 2000 through 2003. Additionally, the project team analyzed the average efficiencies of CAC, HP and FUR units over time.

The ENERGY STAR qualified CACs and central gas furnaces are examined on a statewide level as well as by utility service area or region. The tables provide more detailed information than the graphs. Therefore, it was necessary to combine results for the Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E) areas in order to protect the confidentiality of participating HVAC distributors. Also, please note that Section 4 (heat

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<sup>8</sup> California Energy Commission. March 2000-November 2001. *Database of Energy Efficient Appliances*. <http://www.energy.ca.gov/appliances/appliance/>

<sup>9</sup> Expansion weights are developed at the IOU service area level and are based upon number of households, equipment saturations, equipment useful life estimates, and new housing starts.



pumps) does not contain the more detailed utility or regional ENERGY STAR analysis because of insufficient information regarding the overall installations or sales of heat pumps. As a result, Itron could not develop accurate weights for that type of analysis.

The project team also examined the percentage of statewide sales by average efficiency level and by efficiency categories. The project team did this in order to analyze trends over time in SEER levels for CACs and heat pumps and AFUE levels for gas furnaces. As with ENERGY STAR analysis, the utility-level detail is shown in the graphs for CACs and central gas furnaces only.

# 3

## Central Air Conditioners

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### 3.1. Overview

This section presents the efficiency market shares and average efficiencies of central air conditioners (CACs) purchased in California’s residential sector. Subsection 3.2 summarizes energy efficiency standards for CACs, Subsection 3.3 includes estimates of total CAC sales in California by decision type. Estimates of the share ENERGY STAR qualified units sold are presented in Subsections 3.4. Subsections 3.5 and 3.6 present the average efficiency and distribution of CAC sales by efficiency category, respectively.

### 3.2. Central Air Conditioner Efficiency Standards

The cooling efficiency rating used to rate CACs is the Seasonal Energy Efficiency Ratio (SEER) level. This rating represents a unit’s efficiency over the length of the cooling season by comparing total cooling to total energy input—the higher the SEER rating, the more efficient the cooling equipment. SEER ratings range from 9.7 to over 16.

A summary of federal, state, and ENERGY STAR minimum efficiency standards for CACs is provided in Table 3-1. The current federal efficiency standards for CACs are 10 SEER (for split system units) and 9.7 SEER (for packaged units).<sup>10,11</sup> The current federal standard has been in place since 1992. A new standard, effective January 23, 2006, will increase the minimum allowable efficiency to 12 SEER for both split systems and packaged units. This increase would cause split system air conditioners to be 20% more efficient and packaged units 24% more efficient than the current models.<sup>12</sup>

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<sup>10</sup> Required efficiency for residential central air conditioners less than 65 kBtu/hr.

<sup>11</sup> Department of Energy, Office of Energy Efficiency and Renewable Energy. 2000. *Federal Register. Energy Conservation Program for Consumer Products: Central Air Conditioners and Heat Pumps Energy Conservation Standards; Proposed Rule*. Title 10, Chapter II, Subpart C, Part 430, Section 430.32.

<sup>12</sup> DOE. *Federal Register. Central Air Conditioners and Heat Pumps*. 10 CFR Part 430.

In addition to the federal standard, the California Appliance Efficiency Regulations specify energy use standards for CACs.<sup>13</sup> The current California energy use standard for air-cooled CACs with less than 65,000 Btu has been in place since January 1, 1995. These efficiency standards currently match the current federal energy use standards. The CEC has also published increases to the standards for CAC units that will increase the minimum SEER level for CAC units sold statewide.<sup>14</sup> Note that these revisions match the changes to the federal standard in SEER and will take effect on January 23, 2006.

To qualify for the ENERGY STAR label, CACs must be at least 13 SEER for a split system and 12 for a packaged unit. The ENERGY STAR specification for residential CACs was increased on October 1, 2002. The ENERGY STAR program is also changing to a combined SEER and Energy Efficiency Ratio (EER) rating system. EER computes the instantaneous efficiency of any cooling unit. It is considered to be the “steady-state rate of heat energy removal (e.g., cooling capacity) by the equipment in Btuh divided by the steady-state rate of energy input to the equipment in watts.”<sup>15</sup> The ENERGY STAR program included EER as part of the new specification to address peak load energy performance issues, which are not included in SEER ratings.

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<sup>13</sup> California Energy Commission. *California Code of Regulations, Title 20: Division 2, Chapter 4: Energy Conservation, Article 4: Appliance Efficiency Regulations, Section 1601-1608*. January 22, 2002.

<sup>14</sup> This action occurred to comply with Assembly Bill 970- California Energy Security and Reliability Act of 2000, which was signed into law on September 6, 2000. Section 399.15 of this legislation required evaluation and improvement of energy efficiency and DSM programs throughout the State. In response, the Commission decided to increase the standards for a multitude of appliances.

<sup>15</sup> [http://yosemite1.epa.gov/estar/consumers.nsf/attachments/HVACSpec2.pdf/\\$File/HVACSpec2.pdf?OpenElement](http://yosemite1.epa.gov/estar/consumers.nsf/attachments/HVACSpec2.pdf/$File/HVACSpec2.pdf?OpenElement), pp 4.

**Table 3-1: Comparison of Federal, ENERGY STAR, and Commission Energy Standards for Residential Central Air Conditioners**

	Split Systems (SEER)	Split Systems (EER)	Single Package Equipment (SEER)	Single Package Equipment (EER)
<b>Federal</b>				
Current/ 1992 Standard	10	n/a	9.7	n/a
January 23, 2006 Standard	12	n/a	12	n/a
Percent Improved	20%	n/a	24%	n/a
<b>ENERGY STAR</b>				
Former Standard	12	n/a	12	n/a
October 1, 2002 Standard	13	11	12	10.5
<b>California Standards</b>				
Current/1995 Standard	10	n/a	9.7	n/a
January 23, 2006 Standard	12	n/a	12	n/a

### 3.3. Total Unit Sales, New Construction Installations, and Retrofit, Replacement, and Net Acquisition Estimates

Table 3-2 presents estimates of total unit sales for CACs from 1999 through 2003. Itron developed the 1999 figure for California sales by examining national shipment data from Appliance Magazine, shipments estimates from the Air Conditioning and Refrigeration Institute (ARI), and subsequently cross-referencing that information from the CEC.<sup>16</sup> The 2000 through 2003 figures were developed through a process that examined the total number of households in California and the quantity of homes newly constructed.<sup>17</sup> Both the statewide and new construction data were scaled to estimate California’s annual sales based on the number of households and updated measure type saturations. Currently, there is no publicly available definitive source of annual unit sales, nor is there information that indicates whether units sold or shipped would be installed as retrofit/replacement units or in new construction. As such, estimates of new construction were developed from new construction on-site survey data and estimates of new housing starts. Retrofit/replacement

<sup>16</sup> See: [http://www.appliancemagazine.com/mm/stats/html/december\\_1999.html](http://www.appliancemagazine.com/mm/stats/html/december_1999.html), <http://www.ari.org/sr/1999/sr9912.pdf>, and

California Energy Commission. July 1995. *Staff Report California Energy Demand: 1995-2015*.

<sup>17</sup> Number of households from the U.S. Census. For estimates of new construction see:

RER, Inc. September 2002. *Residential New Construction Study – Year #2*. Prepared for Pacific Gas & Electric Company.

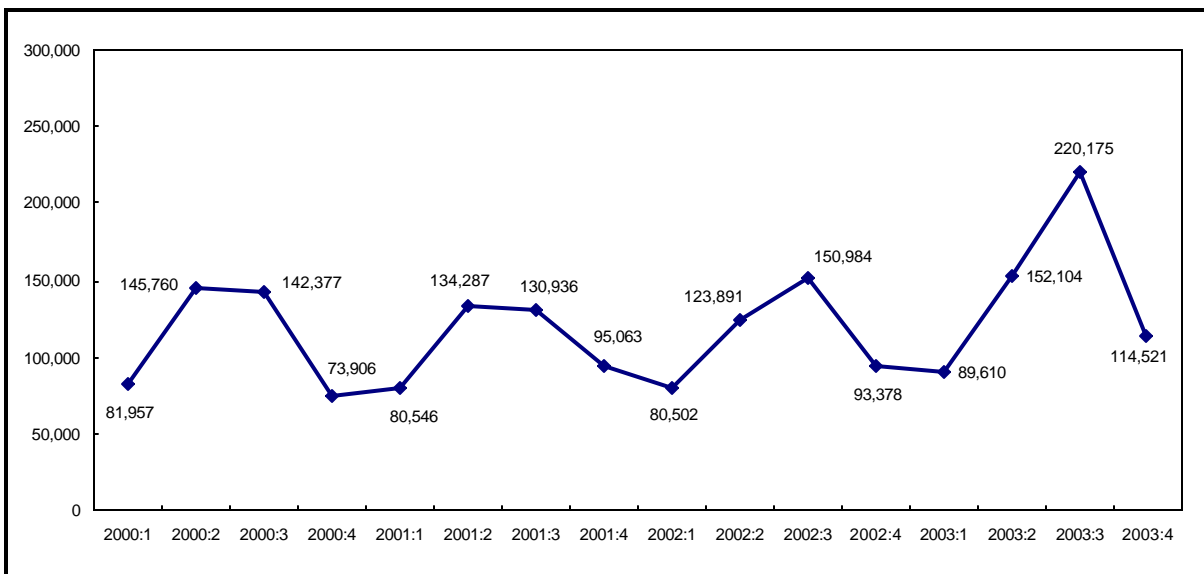
units are then estimated as the difference between total units sold and units for new construction.

**Table 3-2: Estimates of California’s Annual Central Air Conditioner Sales by Decision Type**

Year	Total Unit Sales	New Construction <sup>1</sup>	Retrofit/ Replacement
1999	441,000	80,936	360,064
2000	444,000	99,126	344,874
2001	440,831	95,881	344,950
2002	448,755	115,660	333,095
2003	576,409	149,673	367,721

Cooling equipment sales typically exhibit seasonal trends or cycles, that typically increases with warmer weather and decreases as the weather cools. Figure 3-1 illustrates these trends in sales from 2000 through 2003.

**Figure 3-1: California Central Air Conditioner Quarterly Sales**



Error bands for 90% confidence interval.

### 3.4. Market Share of ENERGY STAR Central Air Conditioners

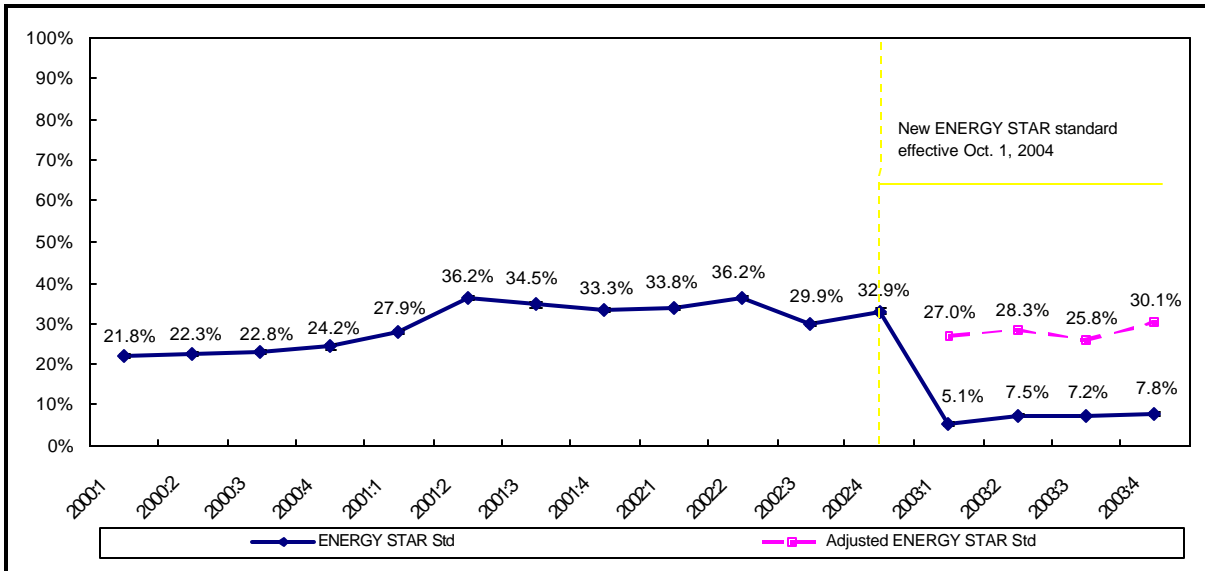
Figure 3-2 and Figure 3-3 present the percentage of ENERGY STAR qualified CACs sold from 2000 through 2003 in California and by IOU service area, respectively. As shown, the statewide share increased by roughly 50% (from 21.8% to 32.9%) between the first quarter of 2000 and the fourth quarter of 2002. The market share of ENERGY STAR qualified units decreased during 2003 because the ENERGY STAR specification increased from 12 to 13 SEER in October 2002. In this analysis, all 2002 CAC sales were based on the 12 SEER threshold for both split system and packaged units. Sales in 2003, however, were compared to the increased standard that took effect in October 2002. Thus, units sold after 2002 have been specified as split systems or packaged units. Because most of the CACs sold statewide are split systems, the change in specification greatly affected the ENERGY STAR share of CAC units.

The dashed line in Figure 3-2 illustrates the shares of ENERGY STAR qualified CAC units had the minimum standard not increased. Using the 2002 standard as a baseline still reveals a slight decrease in the share of ENERGY STAR units sold during 2003. Possible reasons include the following:

- There was an overall decrease in retrofit/replacement CAC sales in 2002. Many low-end CAC purchasers did not buy during the economic downturn.
- CAC purchasers in 2002 experienced lingering effects of California energy crisis in 2001.
- There was an increase in sales during 2003, many of which were lower efficiency units.

ENERGY STAR qualified CAC units had an average percentage of 33.18% during 2002 but only 6.89% throughout 2003. Please realize that the decrease in share most likely occurred in the market during the fourth quarter of 2002. However, during 2002 analysis, the project team did not have the appropriate designations in order to calculate the specification change for that quarter alone.

**Figure 3-2: Central Air Conditioner Sales, Percent of ENERGY STAR Qualified Units**



Error bands for 90% confidence interval.  
Dashed line denoted sales based upon old standard.

**Figure 3-3: CAC Sales, Percent of ENERGY STAR Qualified Units by Utility**

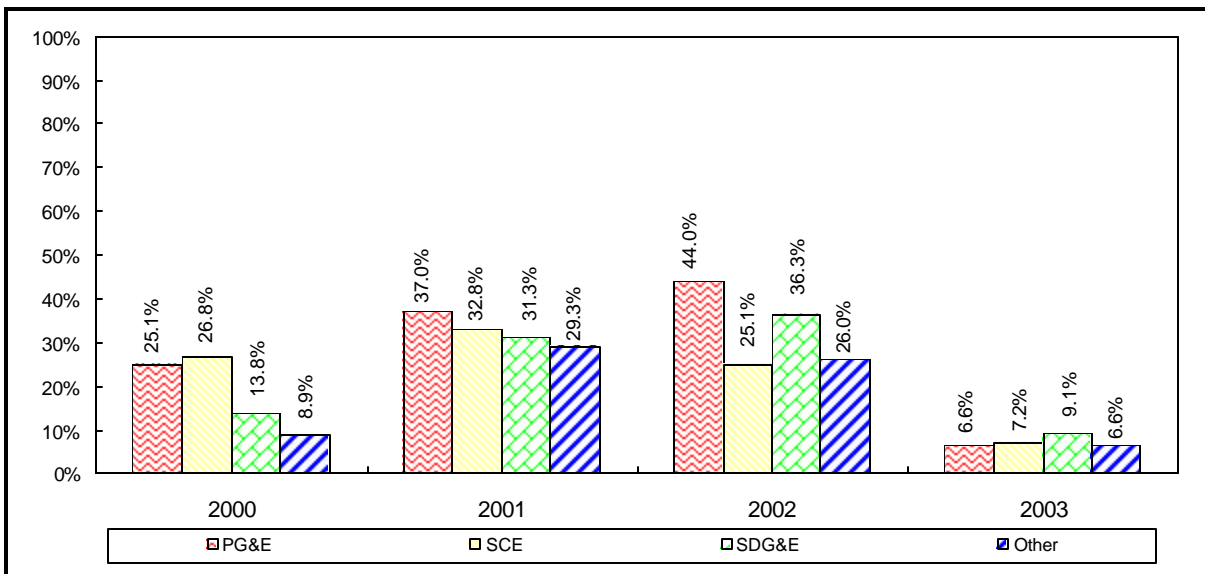


Table 3-3 illustrates state-level data for the market share of ENERGY STAR qualified CAC units both annually and by quarter. Additionally, Table 3-4 shows the same data broken out by utility/region.

**Table 3-3: CAC Sales, Percent of ENERGY STAR Qualified Units (Statewide)**

Year	Percent of ENERGY STAR Qualified CACs				
	Annual	Q1	Q2	Q3	Q4
2000	<b>22.71%</b> (.0014) n=90,369	<b>21.8%</b> (.0032) n=16,297	<b>22.34%</b> (.0024) n=30,078	<b>22.82%</b> (.0025) n=28,339	<b>24.25%</b> (.0034) n=15,655
2001	<b>33.56%</b> (.0016) n=89,150	<b>27.95%</b> (.0035) n=16,518	<b>36.22%</b> (.0029) n=27,245	<b>34.51%</b> (.0029) n=25,477	<b>33.3%</b> (.0033) n=19,910
2002	<b>32.60%</b> (.0016) n=87,209	<b>33.76%</b> (.0038) n=15,374	<b>35.08%</b> (.0030) n=24,844	<b>29.88%</b> (.0027) n=29,752	<b>32.87%</b> (.0036) n=17,239
2003	<b>7.06%</b> (.0008) n=100,284	<b>5.09%</b> (.0018) n=15,768	<b>7.52%</b> (.0016) n=26,962	<b>7.16%</b> (.0013) n=37,710	<b>7.79%</b> (.0019) n=19,844

Standard errors in parentheses.



**Table 3-4: CAC Sales, Percent of ENERGY STAR Qualified Units by Utility Service Area/Region**

Utility	Year	Percent of ENERGY STAR Qualified CACs <sup>1,2</sup>				
		Annual	Q1	Q2	Q3	Q4
PG&E	2000	<b>25.13%</b> (.0021) n=42,366	<b>22.79%</b> (.0051) n=6,807	<b>23.76%</b> (.0034) n=15,257	<b>26.63%</b> (.0039) n=12,770	<b>27.48%</b> (.0051) n=7,532
Southern California <sup>3</sup>	2000	<b>25.0%</b> (.0021) n=42,362	<b>24.64%</b> (.0047) n=8,370	<b>25.3%</b> (.0038) n=12,901	<b>25.5%</b> (.0037) n=13,536	<b>24.1%</b> (.0049) n=7,555
Other	2000	<b>8.92%</b> (.0038) n=5,641	<b>9.91%</b> (.0089) n=1,120	<b>9.48%</b> (.0067) n=1,920	<b>6.89%</b> (.0056) n=2,033	<b>12.32%</b> (.0138) n=568
PG&E	2001	<b>36.98%</b> (.0024) n=39,837	<b>29.12%</b> (.0050) n=8,142	<b>36.45%</b> (.0042) n=13,024	<b>41.09%</b> (.0047) n=10,849	<b>40.34%</b> (.0055) n=7,822
Southern California <sup>3</sup>	2001	<b>32.61%</b> (.0031) n=22,976	<b>27.86%</b> (.0071) n=3,956	<b>37.32%</b> (.0058) n=6,961	<b>32.45%</b> (.0056) n=7,102	<b>30.15%</b> (.0065) n=4,957
Other	2001	<b>29.29%</b> (.0028) n=26,337	<b>25.07%</b> (.0065) n=4,420	<b>31.38%</b> (.0054) n=7,260	<b>28.47%</b> (.0052) n=7,526	<b>30.63%</b> (.0055) n=7,131
PG&E	2002	<b>44.00%</b> (.0024) n=41,449	<b>41.16%</b> (.0059) n=7,034	<b>47.24%</b> (.0045) n=12,105	<b>41.32%</b> (.0041) n=14,152	<b>46.26%</b> (.0055) n=8,158
Southern California <sup>3</sup>	2002	<b>27.01%</b> (.0029) n=22,714	<b>30.76%</b> (.0074) n=3,892	<b>28.92%</b> (.0058) n=6,182	<b>24.52%</b> (.0049) n=7,852	<b>25.83%</b> (.0063) n=4,788
Other	2002	<b>26.03%</b> (.0029) n=23,046	<b>27.95%</b> (.0067) n=4,448	<b>26.92%</b> (.0055) n=6,557	<b>23.01%</b> (.0048) n=7,748	<b>28.12%</b> (.0069) n=4,293
PG&E	2003	<b>6.56%</b> (.0014) n=30,654	<b>5.15%</b> (.0031) n=5,219	<b>6.59%</b> (.0026) n=8,974	<b>6.94%</b> (.0025) n=10,536	<b>7.07%</b> (.0033) n=5,925
Southern California <sup>3</sup>	2003	<b>7.62%</b> (.0015) n=31,244	<b>5.00%</b> (.0033) n=4,433	<b>8.88%</b> (.0033) n=7,467	<b>7.35%</b> (.0023) n=13,032	<b>8.54%</b> (.0035) n=6,312
Other	2003	<b>6.61%</b> (.0013) n=38,386	<b>5.15%</b> (.0028) n=6,116	<b>6.47%</b> (.0024) n=10,521	<b>7.01%</b> (.0021) n=14,142	<b>7.23%</b> (.0030) n=7,607

1 Standard errors in parentheses.

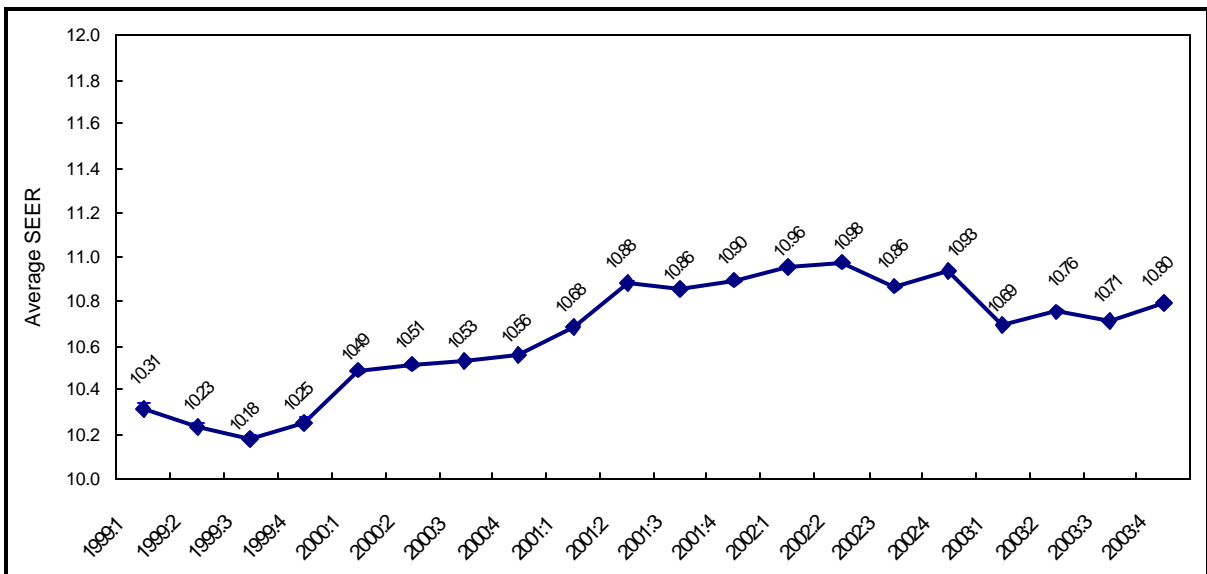
2 "Other" includes municipal utilities such as Los Angeles Department of Water and Power, Sacramento Municipal Utility District, and others.

3 Southern California is a combination of Southern California Edison and San Diego Gas & Electric.

### 3.5. Average Efficiency of Central Air Conditioners in California

Figure 3-4 and Table 3-5 present the average SEER of CAC units sold in California from 1999 through 2003 by quarter. As shown, the average SEER ranged from a low of 10.18 during the third quarter of 1999 to a high of 10.98 in the second quarter of 2002. As previously mentioned, many of the CAC units sold during 2003 were lower efficiency (10 SEER), which led to a reduction in the overall average SEER levels throughout 2003. Additionally, the high SEER averages during 2001 and 2002 may be partially due to the energy crisis.

**Figure 3-4: Central Air Conditioners, Average SEER by Quarter**



Error bands for the 90% confidence interval.

**Table 3-5: Central Air Conditioners, Average SEER by Quarter**

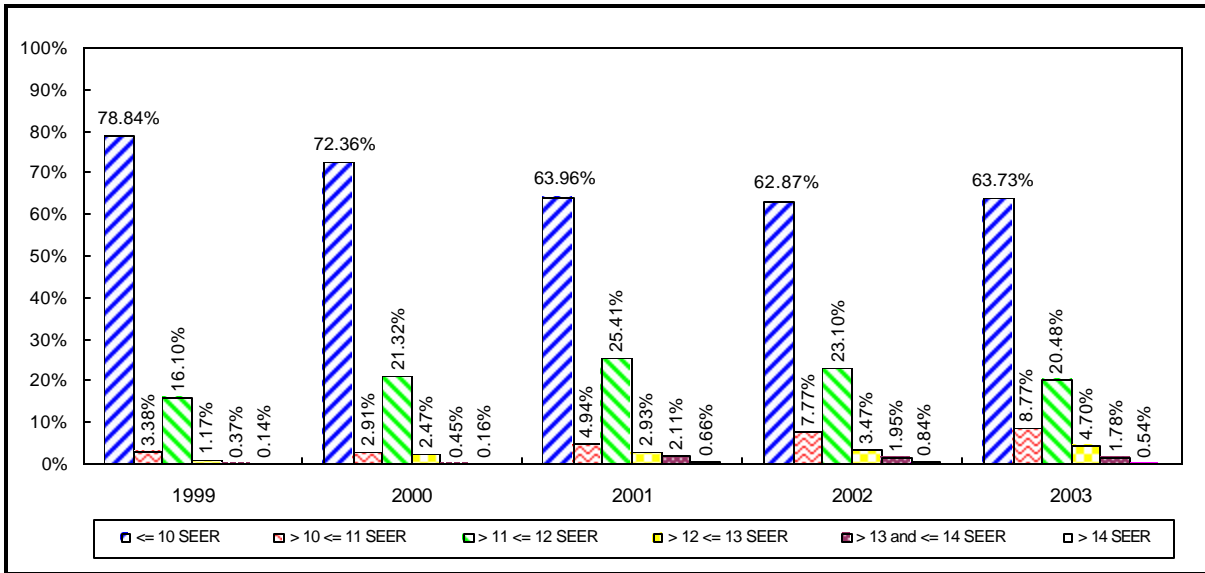
Year	Average SEER			
	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
1999	<b>10.31</b> (0.0196) n = 1,358	<b>10.23</b> (0.0126) n = 2,589	<b>10.18</b> (0.0105) n = 2,956	<b>10.25</b> (0.0179) n = 1,360
2000	<b>10.51</b> (0.0078) n = 16,231	<b>10.54</b> (0.0056) n = 30,000	<b>10.57</b> (0.0058) n = 28,243	<b>10.59</b> (0.0080) n = 15,599
2001	<b>10.73</b> (0.0039) n = 16,524	<b>10.98</b> (0.0034) n = 27,259	<b>10.92</b> (0.0034) n = 25,502	<b>10.90</b> (0.0041) n = 19,949
2002	<b>10.96</b> (0.0047) n=15,385	<b>10.98</b> (0.0037) n=24,872	<b>10.86</b> (0.0031) n=29,780	<b>10.93</b> (0.0042) n=17,244
2003	<b>10.69</b> (0.0036) n=15,771	<b>10.76</b> (0.0029) n=26,963	<b>10.71</b> (0.0023) n=37,710	<b>10.80</b> (0.0034) n=19,848

Standard errors in parentheses.

***Distribution of Central Air Conditioner Sales by Efficiency Category***

Figure 3-5 illustrates the distribution of CACs sold by SEER efficiency categories. These efficiency categories combine general efficiency groups. As shown, nearly 79% of units sold throughout 1999 were 10.0 SEER or less. In 2000, these percentages began to decline—fewer than three-fourths of all units sold were less than or equal to 10 SEER. This downward trend continued through 2002. Coincident with the decrease in lower efficiency units was a noticeable increase in the percentage of CAC sales between 11.0 and 12.0 SEER. These trends continued from 2001 through 2003 with generally decreasing percentages of 10 SEER units and increasing percentages of higher efficiency unit sales.

**Figure 3-5: Central Air Conditioners, Percent of Sales by SEER Level**



# 4

## Heat Pumps

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### 4.1. Overview

This section presents the efficiency market shares and average efficiencies of heat pumps installed/purchased in California's residential sector. Subsection 4.2 summarizes energy efficiency standards for heat pumps and Subsection 4.3 summarizes the availability of models by efficiency level. Subsection 4.4 presents estimates of average efficiencies in the overall California market; estimates of heat pumps installed in new construction were not feasible because of extremely low saturations.

### 4.2. Heat Pump Efficiency Standards

Air-source heat pumps have both cooling and heating efficiency ratings. Similar to CACs, cooling efficiency is expressed as SEER value. Heat pump heating efficiency ratings are expressed as Heating Seasonal Performance Factor (HSPF). As with SEER, the higher the HSPF, the more efficiently the heat pump will perform.

Table 4-1 provides a summary of federal, state, and ENERGY STAR minimum efficiency standards for heat pumps. The current minimum federal standard efficiency for heat pumps is 10 SEER/6.8 HSPF for split systems and 9.7 SEER/6.6 HSPF for single package systems. The current federal standard has been in place since 1992. On May 23, 2002, the DOE published new standards that will become effective January 23, 2006. The revised standards will require heat pumps to be 12 SEER/7.4 HSPF, resulting in a 20% increase in minimum cooling efficiency and a 9% increase in heating efficiency of split system heat pumps. Packaged systems will become 24% more efficient in cooling and 12% more efficient in heating.<sup>18</sup>

The CEC has also published increases to the appliance energy efficiency standards for air-source heat pump units. This action is part of the continual evaluation of state appliance standards, which occurs to comply with the California Energy Security and Reliability Act of 2000. The current energy use standard for air-source heat pumps with less than 65,000 Btu

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<sup>18</sup> DOE. *Federal Register. Central Air Conditioners and Heat Pumps.* 10 CFR Part 430.

has been in place since January 1, 1995. The new standards, which will take effect on January 23, 2006, will match the new federal standards.

Units must be 13 SEER/11 EER/8.0 HSPF for split systems and 12 SEER/10.5 EER/7.6 HSPF for single package systems to qualify for the ENERGY STAR label. This standard, which became effective on October 1, 2002, added the EER specification as a new criterion. EER computes the instantaneous efficiency of any cooling unit. It is considered to be the “steady-state rate of heat energy removal (e.g., cooling capacity) by the equipment in Btuh divided by the steady-state rate of energy input to the equipment in watts.”<sup>19</sup> The ENERGY STAR program included EER as part of the new specification because it addresses peak load energy performance issues, which are not included in SEER ratings.

**Table 4-1: Comparison of Federal and ENERGY STAR Air Source Heat Pump Energy Standards**

	Split Systems (SEER)	Split Systems (EER)	Split Systems (HSPF)	Single Package Equipment (SEER)	Single Package Equipment (EER)	Single Package Equipment (HSPF)
<b>Federal</b>						
Current/1992 Standard	10	n/a	6.8	9.7	n/a	6.6
January 23, 2006 Standard	12	n/a	7.4	12	n/a	7.4
Percent Improved	20%	n/a	9%	24%	n/a	12%
<b>ENERGY STAR</b>						
Former Standard	12	n/a	7.6	12	n/a	7.6
October 1, 2002 Standard	13	11	8.0	12	10.5	7.6
<b>California Standard</b>						
Current 1995 Standard	10	n/a	6.8	9.7	n/a	6.6
January 23, 2006 Standard	12	n/a	7.4	12	n/a	7.4

<sup>19</sup> [http://yosemite1.epa.gov/estar/consumers.nsf/attachments/HVACSpec2.pdf/\\$File/HVACSpec2.pdf?OpenElement](http://yosemite1.epa.gov/estar/consumers.nsf/attachments/HVACSpec2.pdf/$File/HVACSpec2.pdf?OpenElement), pp 4.

### 4.3. Total Unit Sales

Table 4-2 presents estimates of total unit sales for residential heat pumps. As with CACs, there is no publicly available definitive source for data regarding annual unit sales, nor information about sales by decision type for heat pumps. These figures were developed through a process that examined the total number of households in California and the quantity of homes newly constructed.<sup>20</sup> Both the statewide and new construction data were scaled to estimate California’s annual sales based on number of households and updated measure type saturations. The life expectancy of heat pumps was also taken into consideration when developing unit sales for California.<sup>21</sup>

**Table 4-2: Estimates of California’s Annual Heat Pump Sales**

Year	Total Unit Sales
2000	82,500
2001	88,084
2002	90,318
2003	109,104

Total unit sales data developed from information provided by ARI, Appliance Magazine, EPRI 1998, and compared with information on life expectancies and saturations.

### 4.4. Market Share of ENERGY STAR Heat Pumps

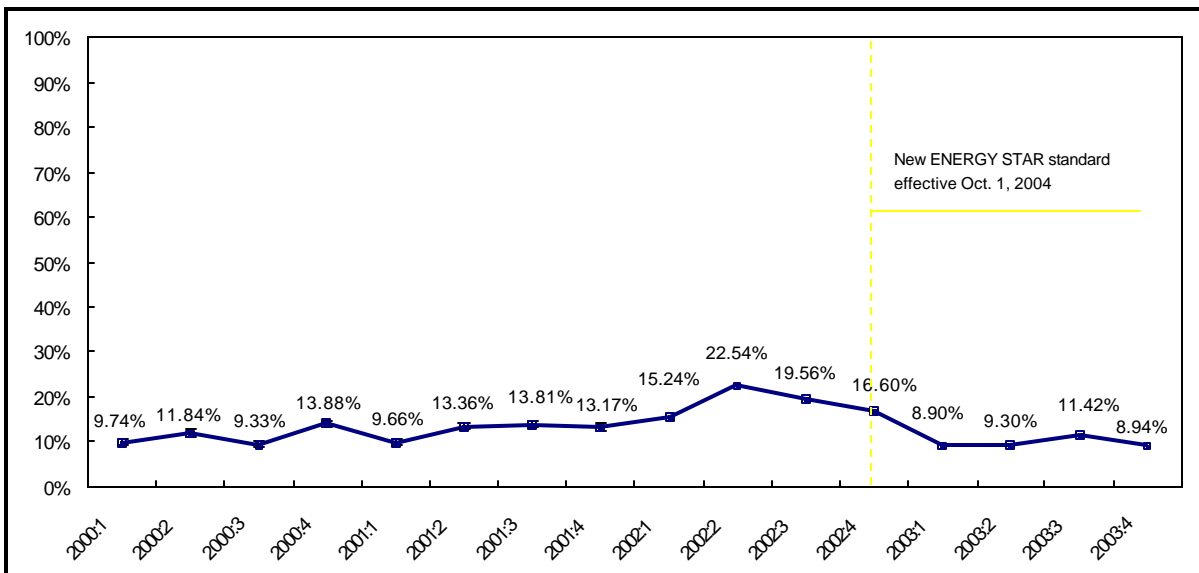
Figure 4-1 and Table 4-3 present the quarterly percentages of ENERGY STAR qualified heat pumps sold in California from 2000 through 2003. Before 2003, the statewide market share of ENERGY STAR qualified heat pumps ranged from a low of 9.33% in the third quarter of 2000 to high of 22.54% in the second quarter of 2002. As with CACs, the ENERGY STAR specification for heat pumps changed during the fourth quarter of 2002. Heat pumps sold throughout 2003 have been compared to the new ENERGY STAR threshold level. The first quarter of 2003 showed a decline to 8.9%, the lowest seen during the period examined. However, the share began to recover quickly. In general, heat pump ENERGY STAR shares in 2003 are similar to those seen in 2000. However, it is important to understand that the

<sup>20</sup> Number of households from the U.S. Census. For estimates of new construction see: RER, Inc. September 2002. *Residential New Construction Study – Year #2*. Prepared for Pacific Gas & Electric Company.

<sup>21</sup> Appliance Magazine. “A Portrait of the U.S. Appliance Industry: The Saturation Picture; The Share-of-Market Picture; The Life Expectancy/Replacement Picture; Who’s Who in the Appliance Industry.” September 1998. pp. 68-90.

average efficiency of units sold under the 2003 specification is higher than those sold during 2000.

**Figure 4-1: Heat Pump Sales, Percent of ENERGY STAR Qualified Units**



Error bands for the 90% confidence interval.

**Table 4-3: Heat Pump Sales, Percent of ENERGY STAR Qualified Units (Statewide)**

Year	Percent of ENERGY STAR Qualified Heat Pumps				
	Annual	Q1	Q2	Q3	Q4
2000	<b>11.13%</b> (.0025) n=16,154	<b>9.74%</b> (.0051) n=3,356	<b>11.84%</b> (.0047) n=4,789	<b>9.33%</b> (.0043) n=4,566	<b>13.88%</b> (.0059) n=3,443
2001	<b>12.55%</b> (.0024) n=19,136	<b>9.66%</b> (.0044) n=4,565	<b>13.36%</b> (.0049) n=4,864	<b>13.81%</b> (.0048) n=5,077	<b>13.17%</b> (.0050) n=4,630
2002	<b>18.66%</b> (.0029) n=18,515	<b>15.24%</b> (.0055) n=4,273	<b>22.54%</b> (.0062) n=4,566	<b>19.56%</b> (.0053) n=5,664	<b>16.60%</b> (.0059) n=4,012
2003	<b>9.74%</b> (.0022) n=18,413	<b>8.90%</b> (.0044) n=4,114	<b>9.30%</b> (.0041) n=4,990	<b>11.42%</b> (.0044) n=5,317	<b>8.94%</b> (.0045) n=3,992

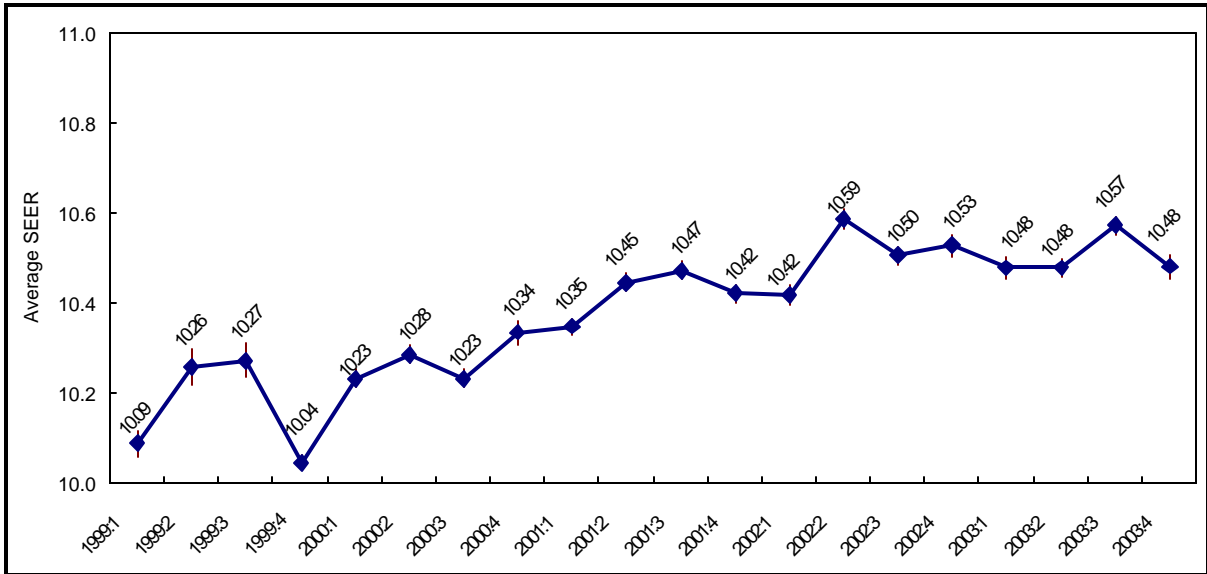
Standard errors in parentheses.



### 4.5. Average Cooling Efficiency of Heat Pumps in California

Figure 4-2 and Table 4-4 present the average cooling efficiency ratings (SEER) of heat pumps sold in California from 1999 through 2003, by quarter. As shown, the average SEER ranged from a low of 10.04 in the fourth quarter of 1999 to a high of 10.59 during the second quarter of 2002. This high average was almost met again during the third quarter of 2003, when the average SEER for heat pumps in California was 10.57.

**Figure 4-2: Heat Pumps, Average Cooling Efficiency (SEER)**



Error bands for the 90% confidence interval.

**Table 4-4: Heat Pumps, Average Cooling Efficiency (SEER)**

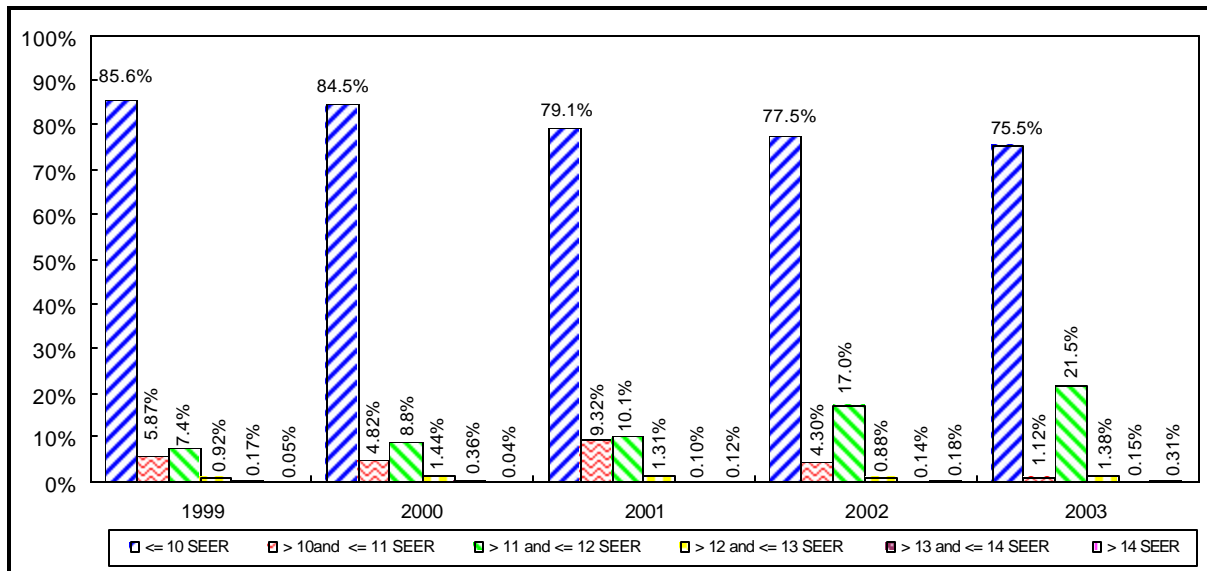
Year	Average SEER			
	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
1999	<b>10.0860</b> (0.0176) n = 535	<b>10.2573</b> (0.0249) n = 723	<b>10.2723</b> (0.0229) n = 896	<b>10.0447</b> (0.0099) n = 894
2000	<b>10.2323</b> (0.0141) n = 3,268	<b>10.2843</b> (0.0116) n = 4,721	<b>10.2318</b> (0.0115) n = 4,487	<b>10.3359</b> (0.0162) n = 3,385
2001	<b>10.3476</b> (0.0112) n = 4,569	<b>10.4456</b> (0.0125) n = 4,873	<b>10.4716</b> (0.0125) n = 5,094	<b>10.4207</b> (0.0127) n = 4,634
2002	<b>10.4167</b> (0.0132) n = 4,279	<b>10.5860</b> (0.0145) n = 4,584	<b>10.5041</b> (0.0123) n = 5,720	<b>10.5272</b> (0.0149) n = 4,032
2003	<b>10.4774</b> (0.0140) n = 4,120	<b>10.4784</b> (0.0130) n = 4,990	<b>10.5710</b> (0.0130) n = 5,319	<b>10.4800</b> (0.0145) n = 3,992

Standard errors in parentheses.

***Distribution of Heat Pump Sales by Cooling Efficiency Category***

Figure 4-3 illustrates the distribution of heat pumps sold by SEER level. As shown, the percentage of units 10 SEER or less has decreased slightly from 85.6% in 1999 to 75.5% in 2003. This decrease appears to have been offset by an increase in the percent of 11 to 12 SEER units. Sales of units with SEER greater than 12 have been minimal.

**Figure 4-3: Heat Pumps, Percent of Sales by SEER Level**



# 5

## Central Gas Furnaces

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### 5.1. Overview

This section presents the efficiency market shares and average efficiencies of central gas furnaces purchased for use in California's residential sector. Subsection 5.2 summarizes energy efficiency standards for gas furnaces. Subsection 5.3 includes estimates of total gas furnace sales in California by decision type; estimates of average efficiencies and ENERGY STAR market share are presented in Subsections 5.4 and 5.5, and the distribution of furnace sales by efficiency category are provided in Subsection 5.6.

### 5.2. Furnace Efficiency Standards

The energy efficiency of furnaces is expressed as a percentage of Annual Fuel Utilization Efficiency (AFUE). Equipment AFUE levels increase as energy efficiency increases. The federal minimum AFUE standard for furnaces is 78%.<sup>22,23</sup> California's standards for furnaces set by the CEC currently match the federal standard. Currently, there are no anticipated changes to the federal or state standards.

Units must have at least a 90% AFUE to qualify for the ENERGY STAR label. The ENERGY STAR program is currently evaluating its current standard for furnaces, though no changes have been proposed to date. Any developments with regard to a potential change to the ENERGY STAR specification will be reported in future RMST HVAC reports.

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<sup>22</sup> DOE. *Federal Register*. *Central Air Conditioners and Heat Pumps*. Title 10, Chapter II, Subpart C, Part 430, Section 430.32.

<sup>23</sup> Required efficiency for residential central gas furnaces that are less than 225 kBtu/hr.

### 5.3. Total Unit Sales, New Construction Installations, and Retrofit, Replacement, and Net Acquisition Estimates

Table 5-1 presents estimates of total unit sales for gas furnaces from 1999 through 2003. There is no definitive public source for data regarding annual sales of gas furnaces in California. Itron developed the 1999 figure for California sales by examining national shipment data from Appliance Magazine, shipments estimates from the Air Conditioning and Refrigeration Institute (ARI), and subsequently cross-referencing that information from the CEC.<sup>24</sup> The 2000 through 2003 figures were developed through a process that examined the total number of households in California and the quantity of homes newly constructed.<sup>25</sup> Estimates for new construction sales were based upon data obtained through residential new construction on-site surveys and new housing starts. Both the statewide and new construction data were scaled to estimate California’s annual sales based on number of households and updated measure type saturations. Retrofit/replacement sales were then derived as the difference between the estimated total unit sales and sales for new construction.

**Table 5-1: Estimates of Annual Central Gas Furnaces Sales by Decision Type**

Year	Total Units Sales	New Construction <sup>1</sup>	Retrofit/ Replacement
1999	413,387	102,785	310,602
2000	408,578	115,415	293,162
2001	415,000	113,000	308,077
2002	418,769	116,769	302,000
2003	562,476	160,094	402,382

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<sup>24</sup> See: [http://www.appliancemagazine.com/mm/stats/html/december\\_1999.html](http://www.appliancemagazine.com/mm/stats/html/december_1999.html), <http://www.ari.org/sr/1999/sr9912.pdf>, and

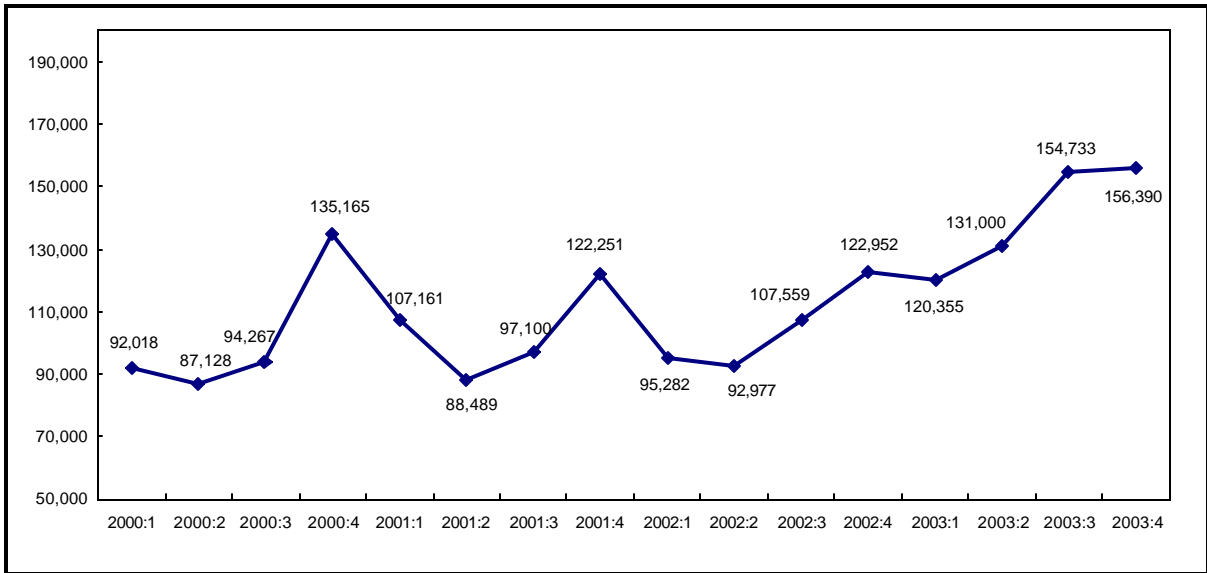
California Energy Commission. July 1995. *Staff Report California Energy Demand: 1995-2015*.

<sup>25</sup> Number of households from the U.S. Census. For estimates of new construction see:

RER, Inc. September 2002. *Residential New Construction Study – Year #2*. Prepared for Pacific Gas & Electric Company.

Figure 5-1 illustrates the statewide sales trend for central gas furnaces since the first quarter of 2000. Sales in California reflect some seasonality, with increases in sales during the fourth quarter and decreases in second quarter of each year.

**Figure 5-1: California Gas Furnace Quarterly Sales**

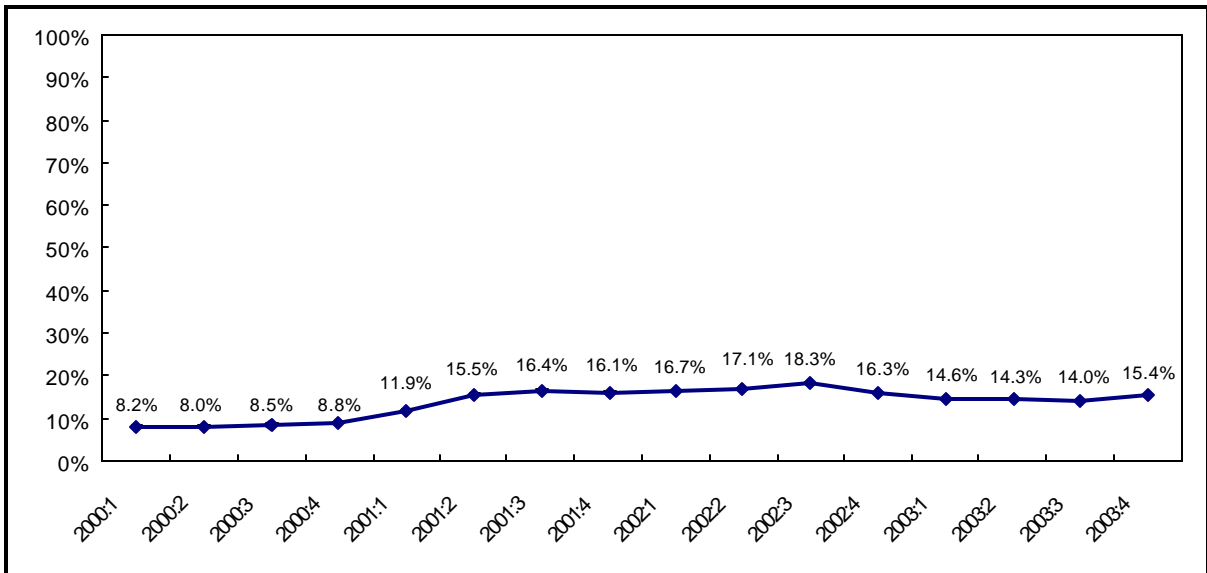


Error bands for 90% confidence interval.

### 5.4. Market Share of ENERGY STAR Gas Furnaces

Figure 5-2 and Table 5-2 present the statewide percentage of ENERGY STAR qualified gas furnaces sold by quarter from 2000 through 2003. Figure 5-3 and Table 5-3 provide utility-level estimates. As shown, the statewide market share of ENERGY STAR qualified gas furnace units ranges from a low of 8.0% in the first quarter of 2000 to a high of 18.3% in the third quarter of 2002. Overall shares declined slightly throughout 2003.

**Figure 5-2: Central Gas Furnace Sales, Percent of ENERGY STAR Qualified Units**



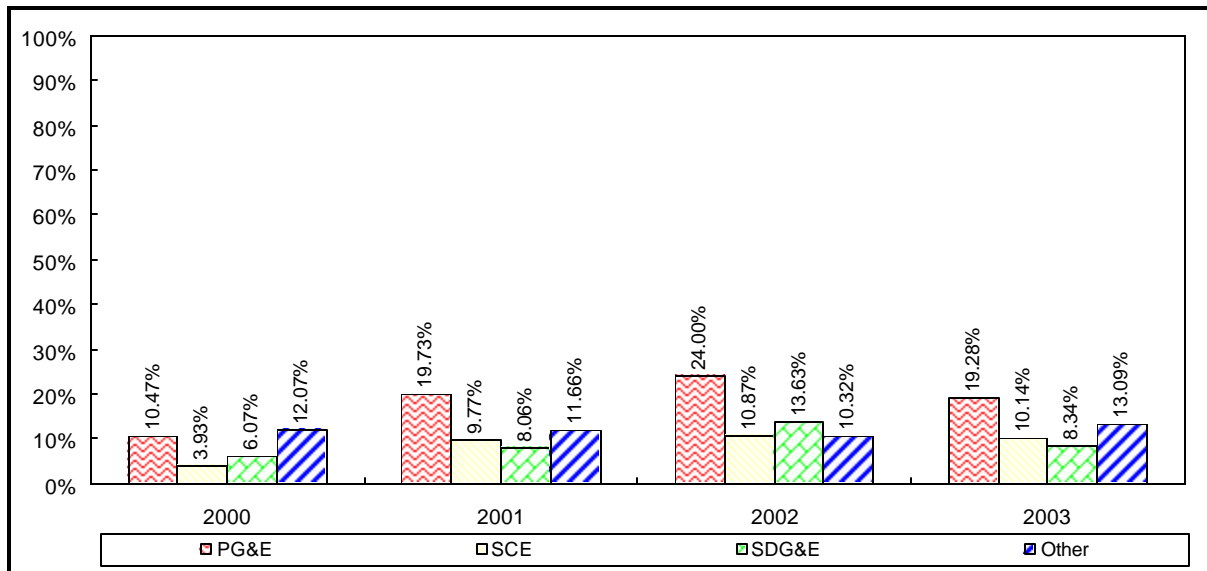
Error bands for 90% confidence interval.

**Table 5-2: Gas Furnace Sales, Percent of ENERGY STAR Qualified Units (Statewide)**

Year	Percent of ENERGYSTAR Qualified Gas Furnaces				
	Annual	Q1	Q2	Q3	Q4
2000	<b>8.45%</b> (.0009) n=88,309	<b>8.24%</b> (.0020) n=19,854	<b>8.02%</b> (.0020) n=19,207	<b>8.54%</b> (.0019) n=21,052	<b>8.81%</b> (.0017) n=28,196
2001	<b>14.96%</b> (.0010) n=117,053	<b>11.87%</b> (.0018) n=29,978	<b>15.52%</b> (.0023) n=25,145	<b>16.41%</b> (.0022) n=27,291	<b>16.09%</b> (.0020) n=34,639
2002	<b>17.09%</b> (.0011) n=127,572	<b>16.72%</b> (.0022) n=30,007	<b>17.06%</b> (.0022) n=29,302	<b>18.32%</b> (.0021) n=32,508	<b>16.31%</b> (.0020) n=35,755
2003	<b>14.59%</b> (.0010) n=129,462	<b>14.59%</b> (.0021) n=27,686	<b>14.31%</b> (.0020) n=30,400	<b>14.04%</b> (.0018) n=35,741	<b>15.37%</b> (.0019) n=35,635

Standard errors in parentheses.

**Figure 5-3: Central Gas Furnace Sales, Percent of ENERGY STAR Qualified Units by Utility**



**Table 5-3: Gas Furnace Sales, Percent of ENERGY STAR Qualified Units by Utility Service Area**

Utility	Year	Percent of ENERGYSTAR Qualified Furnaces <sup>1,2</sup>				
		Annual	Q1	Q2	Q3	Q4
PG&E	2000	<b>10.47%</b> (.0012) n=59,874	<b>9.43%</b> (.0025) n=13,598	<b>9.29%</b> (.0025) n=13,589	<b>10.78%</b> (.0025) n=14,865	<b>11.91%</b> (.0024) n=17,822
Southern California <sup>3</sup>	2000	<b>4.54%</b> (.0013) n=23,639	<b>4.70%</b> (.0029) n=5,196	<b>4.15%</b> (.0029) n=4,668	<b>4.37%</b> (.0028) n=5,228	<b>4.75%</b> (.0023) n=8,547
Other	2000	<b>12.07%</b> (.0047) n=4,796	<b>14.25%</b> (.0107) n=1,060	<b>14.00%</b> (.0113) n=950	<b>10.85%</b> (.0100) n=959	<b>10.45%</b> (.0072) n=1,827
PG&E	2001	<b>19.73%</b> (.0016) n=61,409	<b>16.76%</b> (.0030) n=15,807	<b>19.96%</b> (.0035) n=13,254	<b>21.94%</b> (.0035) n=14,316	<b>20.40%</b> (.0030) n=18,032
Southern California <sup>3</sup>	2001	<b>9.29%</b> (.0016) n=31,247	<b>5.88%</b> (.0026) n=8,150	<b>10.43%</b> (.0038) n=6,614	<b>9.79%</b> (.0035) n=7,041	<b>11.03%</b> (.0032) n=9,442
Other	2001	<b>11.66%</b> (.0021) n=24,397	<b>9.07%</b> (.0037) n=6,021	<b>11.60%</b> (.0044) n=5,277	<b>12.18%</b> (.0042) n=5,934	<b>13.44%</b> (.0040) n=7,165
PG&E	2002	<b>24.00%</b> (.0016) n=68,037	<b>21.28%</b> (.0033) n=15,800	<b>22.86%</b> (.0034) n=15,664	<b>27.24%</b> (.0034) n=17,124	<b>24.27%</b> (.0031) n=19,449
Southern California <sup>3</sup>	2002	<b>11.61%</b> (.0018) n=33,215	<b>13.83%</b> (.0039) n=7,683	<b>12.42%</b> (.0037) n=7,817	<b>11.17%</b> (.0034) n=8,401	<b>9.53%</b> (.0030) n=9,314
Other	2002	<b>10.32%</b> (.0019) n=26,320	<b>10.34%</b> (.0038) n=6,524	<b>11.30%</b> (.0042) n=5,821	<b>10.57%</b> (.0037) n=6,983	<b>9.22%</b> (.0035) n=6,992
PG&E	2003	<b>19.28%</b> (.0017) n=51,345	<b>18.08%</b> (.0035) n=12,082	<b>18.95%</b> (.0037) n=11,364	<b>18.29%</b> (.0033) n=13,376	<b>21.44%</b> (.0034) n=14,523
Southern California <sup>3</sup>	2003	<b>9.54%</b> (.0015) n=38,459	<b>9.85%</b> (.0035) n=7,154	<b>10.28%</b> (.0032) n=8,822	<b>9.39%</b> (.0028) n=11,132	<b>8.92%</b> (.0027) n=11,351
Other	2003	<b>13.09%</b> (.0017) n=39,658	<b>13.38%</b> (.0037) n=8,450	<b>12.03%</b> (.0032) n=10,214	<b>13.55%</b> (.0032) n=11,233	<b>13.43%</b> (.0035) n=9,761

1. Standard errors in parentheses.

2. "Other" includes municipal utilities such as LA DWP, LMUD, PP&L, SMUD, and others.

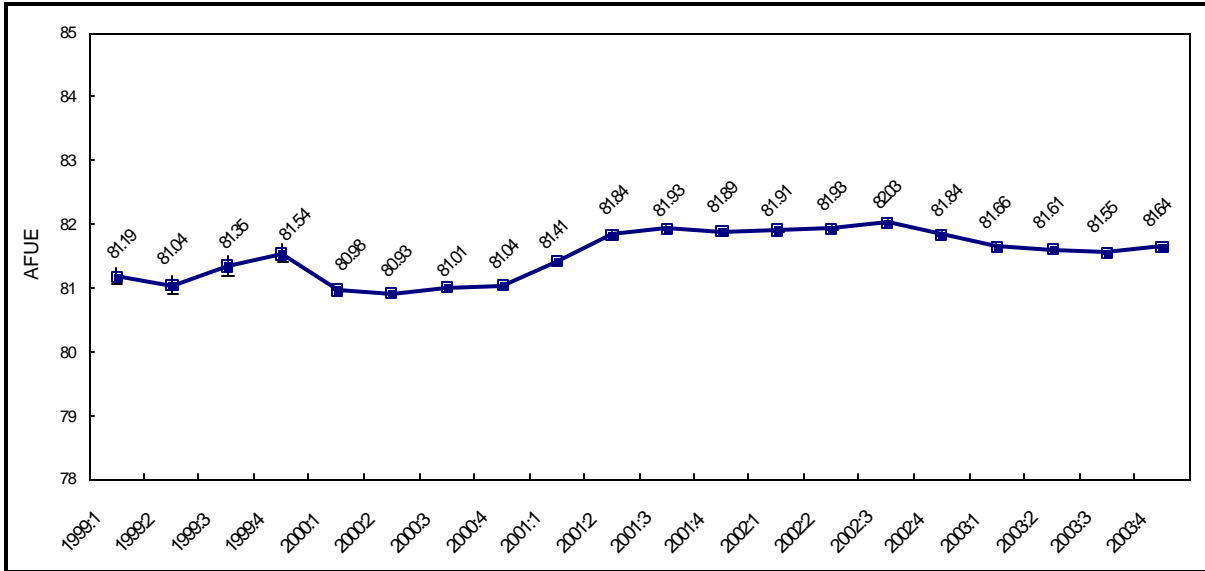
3. Southern California is a combination of SCE and SDG&E.



### 5.5. Average Efficiencies of Gas Furnaces in California

Figure 5-4 and Table 5-4 present the average AFUE of central gas furnaces sold in California by quarter from 1999 through 2003. The trend has remained fairly steady over the past few years. As shown, the average AFUE ranged from a low of 81.0 in the third quarter of 2000 to a high of 82.03 during the third quarter of 2002.

**Figure 5-4: Central Gas Furnaces, Average AFUE**



Error bands for the 90% confidence interval.

**Table 5-4: Central Gas Furnaces, Average AFUE**

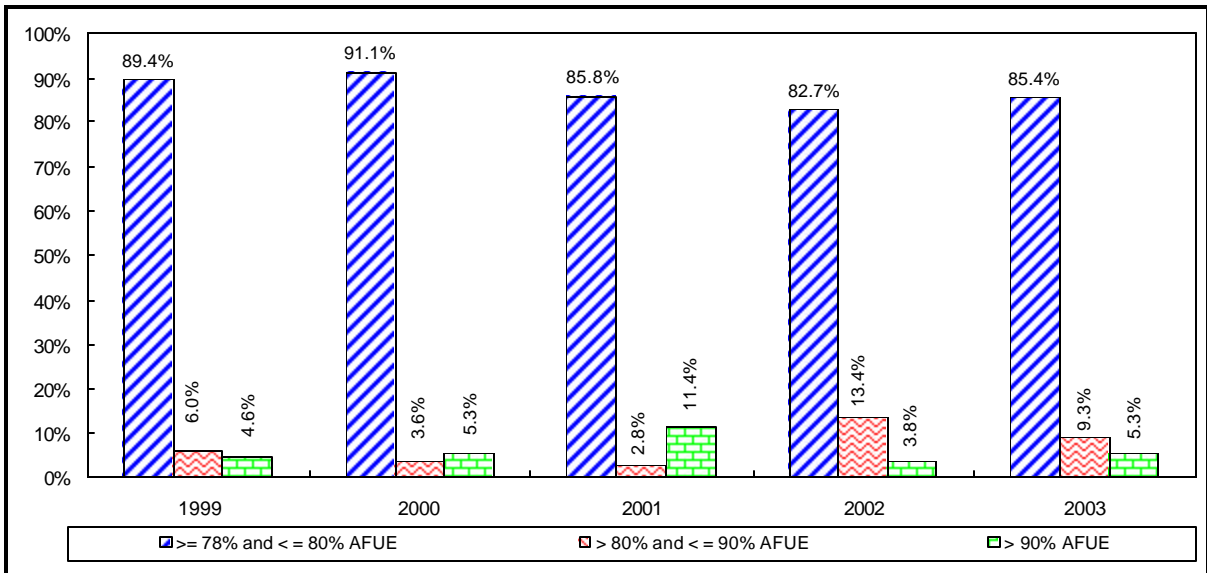
Year	Average AFUE			
	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
1999	<b>81.19</b> (0.0821) n = 1,556	<b>81.04</b> (0.0846) n = 1,300	<b>81.35</b> (0.0909) n = 1,414	<b>81.54</b> (0.0780) n = 2,147
2000	<b>81.02</b> (0.0240) n = 19,755	<b>80.97</b> (0.0235) n = 19,207	<b>81.10</b> (0.0241) n = 21,049	<b>81.14</b> (0.0211) n = 28,195
2001	<b>81.41</b> (0.0119) n = 30,014	<b>81.84</b> (0.0145) n = 25,181	<b>81.93</b> (0.0142) n = 27,317	<b>81.89</b> (0.0124) n = 34,676
2002	<b>81.91</b> (0.0118) n = 30,013	<b>81.93</b> (0.0119) n = 29,313	<b>82.03</b> (0.0114) n = 32,511	<b>81.84</b> (0.0105) n = 35,759
2003	<b>81.66</b> (0.0117) n = 27,686	<b>81.61</b> (0.0110) n = 30,400	<b>81.55</b> (0.0099) n = 35,741	<b>81.64</b> (0.0098) n = 35,635

Standard errors in parentheses.

**Distribution of Gas Furnace Sales by Efficiency Category**

Figure 5-5 illustrates the distribution of gas furnaces sold by AFUE category. As shown, the majority of units sold throughout the past three years had AFUE ratings between 78 and 80. As expected, the percent of higher efficiency (above 80 through to 90 AFUE) units sold has increased slightly over time. The exception to this is the decrease in furnaces with an AFUE above 90 seen in 2002 from the 2001 level. Note that the sales above 90 AFUE increased in 2003.

**Figure 5-5: Gas Furnaces, Percent of Sales by AFUE Level**



# 6

## Summary

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This report described the data development and results of the 2003 HVAC component of California's ongoing RMST project. The results presented herein do not reveal significant deviations in the expected trends of HVAC equipment efficiencies. The average SEER of CACs increased steadily from 1999 through 2002, but decreased slightly in 2003. The average cooling efficiency rating for air-source heat pumps follows a similar pattern. The average AFUE of central gas furnaces has remained relatively steady since 1999, vacillating between 81.0 and 82.0 throughout the study period.

In addition to tracking the average equipment efficiency ratings, this study estimates the share of ENERGY STAR qualified units sold. While such estimates are valuable, the results with respect to central air conditioners illustrate how changes in the ENERGY STAR qualifying criteria impact the trend. In particular, the share of ENERGY STAR qualified CACs dropped from 32.9% in the last quarter of 2002 to 5.1% in early 2003. This statistic could be misleading without prior knowledge regarding changes to the ENERGY STAR specification. Examining both the average efficiency and the share of ENERGY STAR qualified units *together* is far more meaningful.

The HVAC component to the RMST will continue through the end of California's 2005 energy efficiency program funding cycle. Itron will continue the distributor panel recruitment efforts to not only maintain the current panel, but to increase the sample size and improve the precision of the analysis. Within this overall effort to increase the sample, Itron will pay special attention to obtaining more sales data for the less-represented utility areas, such as SDG&E.