California Residential Efficiency Market Share Tracking

HVAC 2004

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1

Introduction

The California HVAC Report 2004 presents the analysis of HVAC equipment sales for residential use in California and the U.S. from 1998 through 2004.[1] This research is one component of the California Residential Market Share Tracking (RMST) project, which has monitored the market penetration of energy efficient measures in California since 1999.[2] The RMST supports California's investor-owned utilities (IOUs) in their program planning and efforts to measure statewide and IOU-specific program milestones for promoting short-term adoption of measures and longer-term market acceptance of energy efficient technologies. In addition to residential gas furnaces, central air conditioners, and heat pumps, the RMST estimates the average efficiency rating and market penetration of high efficiency refrigerators, clothes washers, dishwashers, and room air conditioners.[3] The RMST also examines the market penetration of compact fluorescent other medium screw-based lamps. In addition to the California IOUs, beneficiaries of this research includes federal and state agencies, regional and state energy efficiency organizations, trade organizations, and equipment manufacturers, distributors, and retailers.

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 utility service area or aggregated service areas if the data cannot 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 program standards, and California's appliance efficiency standards.[4]

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

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1 A four-page companion report titled *California HVAC Trends 2004* summarizes the findings in this report.

2 This project is managed by Southern California Edison.

3 Annual RMST reports detailing CFL sales, residential appliance sales, and HVAC sales in California since 2000 can be downloaded from http://www.calmac.org/.

4 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.

California. The consistent and ongoing nature of the data collection process has produced valuable and meaningful trends of HVAC equipment sales.

The remainder of this report is organized as follows.

- Section 2 details the data collection and analysis methodologies for developing the market share and average efficiency estimates.
- 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 summarizes key results and previews work in progress for the 2005 RMST.

2

Data Collection and Methodology

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).[5] The Scoping Study found that obtaining HVAC equipment sales data at the distribution level was appropriate and cost-effective relative to other alternatives.[6] The disadvantage, however, is that distributor-level data can be limiting due to the inability to distinguish the market event (i.e., new construction versus replacement installations), since both builders and contractors purchase equipment from HVAC distributors.

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 STAR qualified equipment in the overall residential 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

Itron 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.[7] As shown, the frame is further segmented by geographic region and distributor type

[5] RER, Inc. *Efficiency Market Share Needs Assessment and Feasibility Scoping Study.* Prepared for the California Board for Energy Efficiency and Pacific Gas and Electric. May 1999.

[6] *Ibid.*

[7] The HVAC equipment wholesale market has undergone 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.[8]

Table 2-1: HVAC Distributor Sample Frame

	Distributors
Total in Frame	**16**
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 Recruiting Protocol and 2004 Panel

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 difficult to develop relationships with manufacturers because manufacturers are very reluctant to share sales data, despite assurances of confidentiality. 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.

[8] In general, HVAC distributors have experienced some consolidation since the publication of the First-Year Interim Report. For consistency, the project team considers 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 be 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 ongoing 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 2004 distributor panel includes four companies representing 69 warehouse locations throughout the state. Sales from the 2004 distributor panel approximate 25% 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 2004. 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 key efficiency parameters (i.e., SEER, EER, and AFUE) 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) Database of Energy Efficient Appliances to each observation in the sales data.[9] In cases where the efficiency parameters could not be matched electronically to the provided model number (usually because of differences in model number formats and characters), Itron obtained the required data from manufacturers' websites 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.[10] This process resulted in a database of quarterly HVAC equipment sales from 1999 through 2004.

2.4. Unit Sales Analysis

HVAC equipment sales data are analyzed and reported in three ways:

- 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 2004.
- The average efficiency ratings of units over time.
- The percentage of statewide sales by efficiency categories.

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9 California Energy Commission *Database of Energy Efficient Appliances.* (See: http://www.energy.ca.gov/appliances/appliance/)

10 Expansion weights are developed at the utility service area level and are based upon number of households, equipment saturations, equipment useful life estimates, and new housing starts.

The share of ENERGY STAR qualified CACs and central gas furnaces are examined at the statewide and utility service area levels. Results for heat pumps are presented only at the statewide level because of insufficient data at the utility region and because of insufficient information regarding the overall installations or sales of heat pumps. As a result, Itron could not develop accurate weights for the statewide level analysis.

3

Central Air Conditioners

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 (new construction, retrofit, or replacement). Estimates of the share ENERGY STAR qualified units sold are presented in Subsections 3.4, 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). 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).[11,12] The current federal standard has been in place since 1992. A new standard, effective January 23, 2006, will increase the minimum allowable efficiency to 13 SEER for both split systems and packaged units. This would result in a 30% improvement of energy efficiency of split systems.[13]

[11] Required efficiency for residential central air conditioners less than 65 kBtu/hr.

[12] 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.

[13] 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.[14] 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 to 13 SEER.[15] These revisions will become effective 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. ENERGY STAR program requirements for CACs, however, are currently being revised and new standards will become effective on April 1, 2006. Under the 2006 standards, CACs must have an efficiency rating of at least 14 SEER/11.5 EER for split systems and 14 SEER/11 EER for single systems.[16] A second phase, effective on January 1, 2009, will further increase the qualifying requirements to 14.5 SEER/12 EER for split systems. 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."[17] The ENERGY STAR program included EER as part of the new specification to addresses peak load energy performance issues, which are not included in SEER ratings.

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14 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.

15 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.

16 Energy Star Program Requirements for Air Source Heat Pumps (ASHP) and Central Air Conditioner Equipment. Eligibility Criteria. Version 4.0. (See http://www.energystar.gov/index.cfm?c=revisions.revisions_specs.)

17 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 California Energy Commission Energy Standards for Residential Central Air Conditioners

	Split Systems (SEER)	Split Systems (EER)	Single Package Equipment (SEER)	Single Package Equipment (EER)
Federal				
Current/1992 Standard	10	n/a	9.7	n/a
January 23, 2006 Standard	13	n/a	13	n/a
Percent Improved	30%	n/a	34%	n/a
ENERGY STAR				
Former Standard	12	n/a	12	n/a
October 1, 2002 Standard	13	11	12	10.5
April 1, 2006 Standard (Tier 1)	14	11.5	14	11
January 1, 2009 Standard (Tier 2)	14.5	12	14	11
California Standards				
Current/1995 Standard	10	n/a	9.7	n/a
January 23, 2006 Standard	13	n/a	13	n/a

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

Table 3-2 presents estimated CAC unit sales from 1999 through 2004. Itron developed the 1999 data by examining national shipment data from Appliance Magazine, shipments estimates from the Air Conditioning and Refrigeration Institute (ARI), and subsequently cross-referencing that information with the CEC.[18] The 2000 through 2004 data were developed through a process that examined the total number of households, new housing starts in California, and residential new construction on-site survey data.[19] Both the statewide and new construction data were scaled to estimate California's annual sales based on the number of households and updated measure saturations. Retrofit/replacement units

[18] See: 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.*

[19] 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.

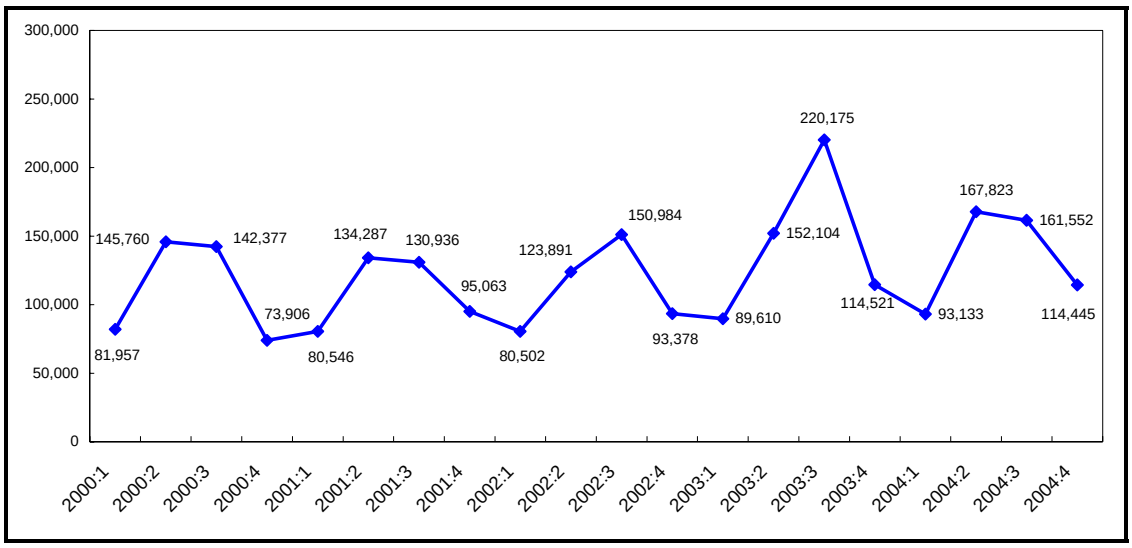
are then estimated as the difference between total units sold and units for new construction. Currently, there is no publicly available definitive source of annual unit sales at the state level, nor is there information that indicates whether units sold or shipped would be installed as retrofit/replacement units or in new construction.

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

Year	Total Unit Sales	New Construction	Retrofit/ Replacement
1999	441,000	80,900	360,100
2000	444,000	99,100	344,900
2001	440,800	95,900	344,900
2002	448,800	115,700	333,100
2003	517,400	149,700	367,700
2004	546,400	150,200	396,200

Figure 3-1 illustrates estimated quarterly CAC sales from 2000 through 2004.[20] Itron developed these data from utility service area weighted sales data obtained from the RMST HVAC distributor panel. Cooling equipment sales typically exhibit seasonal trends or cycles, that typically increase with warmer weather and decrease as the weather cools.

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



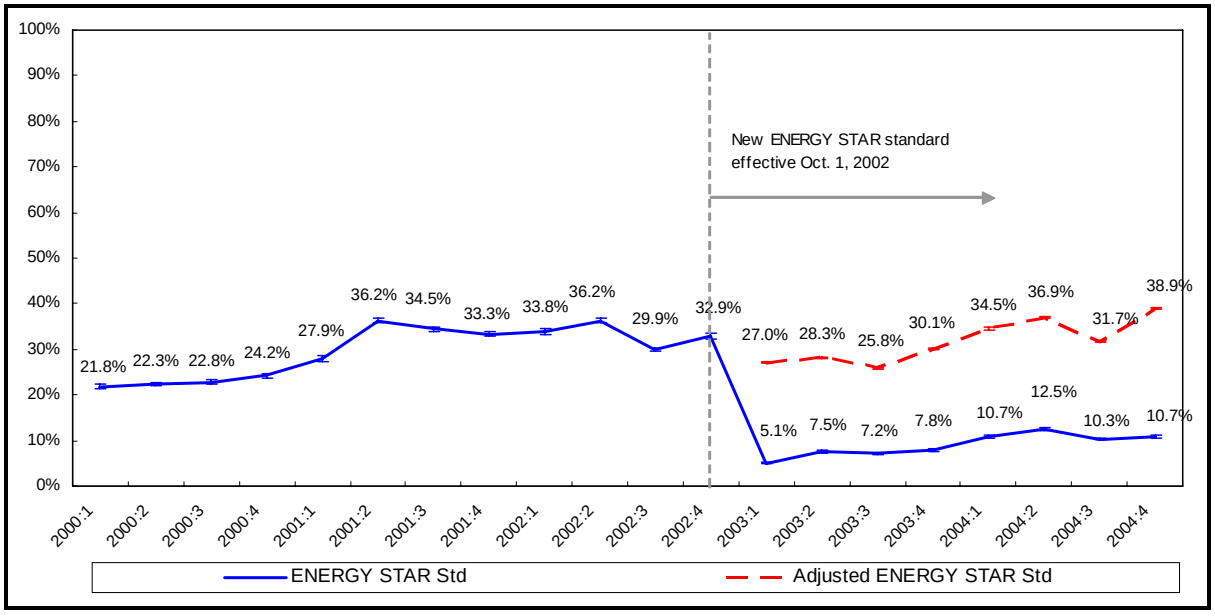
20 Figure 3-1 does not correspond to Table 3-1 because the supporting data were developed from different sources representing different points in the equipment distribution channel (publicly available shipment data versus the distributor panel sales data).

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 2004 in California and by utility 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 share of ENERGY STAR qualified CACs sold in 2004 increased from 7.8% in the fourth quarter of 2003 to 10.7% in fourth quarter of 2004.

Figure 3-2 also illustrates the shares of ENERGY STAR qualified CAC units, had the minimum standard not increased. Using the 2002 standard as a baseline reveals a slight decrease in the share of ENERGY STAR units sold during 2003, and an increase again in 2004.

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 2002 standard.

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

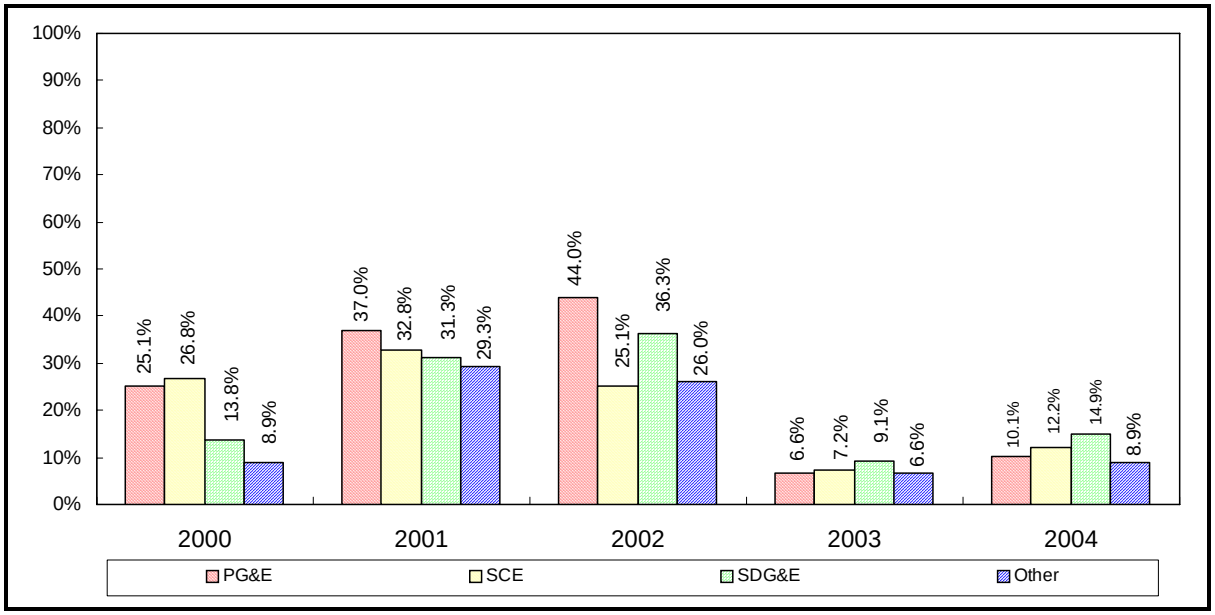


Table 3-3 illustrates state-level data for the market share of ENERGY STAR qualified CAC units both annually and by quarter. ENERGY STAR qualified CAC units had an average market share of 32.6% during 2002 but only 7.0% throughout 2003. Shares increased to 11.2% in 2004. The increase in 2004 is at least partly attributable to a new distributor added to the 2004 panel that sells a larger proportion of higher efficiency units than the others. 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	**22.7%** (.0014) n=90,369	**21.8%** (.0032) n=16,297	**22.3%** (.0024) n=30,078	**22.8%** (.0025) n=28,339	**24.3%** (.0034) n=15,655
2001	**33.6%** (.0016) n=89,150	**28.0%** (.0035) n=16,518	**36.2%** (.0029) n=27,245	**34.5%** (.0029) n=25,477	**33.3%** (.0033) n=19,910
2002	**32.6%** (.0016) n=87,209	**33.8%** (.0038) n=15,374	**35.1%** (.0030) n=24,844	**29.9%** (.0027) n=29,752	**32.9%** (.0036) n=17,239
2003	**7.1%** (.0008) n=100,284	**5.1%** (.0018) n=15,768	**7.5%** (.0016) n=26,962	**7.2%** (.0013) n=37,710	**7.8%** (.0019) n=19,844
2004	**11.2%** (.0008) n=138,681	**10.7%** (.002) n=24,265	**12.5%** (.002) n=43,084	**10.3%** (.002) n=41,967	**10.8%** (.002) n=29,365

Standard errors in parentheses.

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

Utility	Year	Percent of ENERGY STAR Qualified CACs [1, 2]				
		Annual	Q1	Q2	Q3	Q4
PG&E	2000	**25.1%** (.0021) n=42,366	**22.8%** (.0051) n=6,807	**23.8%** (.0034) n=15,257	**26.6%** (.0039) n=12,770	**27.5%** (.0051) n=7,532
Southern California[3]	2000	**25.0%** (.0021) n=42,362	**24.6%** (.0047) n=8,370	**25.3%** (.0038) n=12,901	**25.5%** (.0037) n=13,536	**24.1%** (.0049) n=7,555
Other	2000	**8.9%** (.0038) n=5,641	**9.9%** (.0089) n=1,120	**9.5%** (.0067) n=1,920	**6.9%** (.0056) n=2,033	**12.3%** (.0138) n=568
PG&E	2001	**37.0%** (.0024) n=39,837	**29.1%** (.0050) n=8,142	**36.5%** (.0042) n=13,024	**41.1%** (.0047) n=10,849	**40.3%** (.0055) n=7,822
Southern California[3]	2001	**32.6%** (.0031) n=22,976	**27.9%** (.0071) n=3,956	**37.3%** (.0058) n=6,961	**32.5%** (.0056) n=7,102	**30.2%** (.0065) n=4,957)
Other	2001	**29.3%** (.0028) n=26,337	**25.1%** (.0065) n=4,420	**31.4%** (.0054) n=7,260	**28.5%** (.0052) n=7,526	**30.6%** (.0055) n=7,131
PG&E	2002	**44.0%** (.0024) n=41,449	**41.2%** (.0059) n=7,034	**47.2%** (.0045) n=12,105	**41.3%** (.0041) n=14,152	**46.3%** (.0055) n=8,158
Southern California[3]	2002	**27.0%** (.0029) n=22,714	**30.8%** (.0074) n=3,892	**28.9%** (.0058) n=6,182	**24.5%** (.0049) n=7,852	**25.8%** (.0063) n=4,788
Other	2002	**26.0%** (.0029) n=23,046	**28.0%** (.0067) n=4,448	**26.9%** (.0055) n=6,557	**23.0%** (.0048) n=7,748	**28.1%** (.0069) n=4,293
PG&E	2003	**6.6%** (.0014) n=30,654	**5.2%** (.0031) n=5,219	**6.6%** (.0026) n=8,974	**6.9%** (.0025) n=10,536	**7.1%** (.0033) n=5,925
Southern California[3]	2003	**7.6%** (.0015) n=31,244	**5.0%** (.0033) n=4,433	**8.9%** (.0033) n=7,467	**7.4%** (.0023) n=13,032	**8.5%** (.0035) n=6,312
Other	2003	**6.6%** (.0013) n=38,386	**5.2%** (.0028) n=6,116	**6.5%** (.0024) n=10,521	**7.0%** (.0021) n=14,142	**7.2%** (.0030) n=7,607
PG&E	2004	**10.1%** (.0014) n=45,107	**8.6%** (.0031) n=8,018	**11.5%** (.0026) n=14,641	**9.8%** (.0027) n=12,016	**9.7%** (.0029) n=10,432
Southern California[3]	2004	**12.7%** (.0015) n=48,242	**13.1%** (.0038) n=8,069	**13.9%** (.0028) n=14,955	**11.5%** (.0026) n=15,416	**12.4%** (.0033) n=9,802
Other	2004	**8.9%** (.0013) n=45,332	**8.5%** (.0031) n=8,178	**10.7%** (.0027) n=13,488	**7.9%** (.0022) n=14,535	**8.2%** (.0029) n=9,131

1 Standard errors in parentheses.

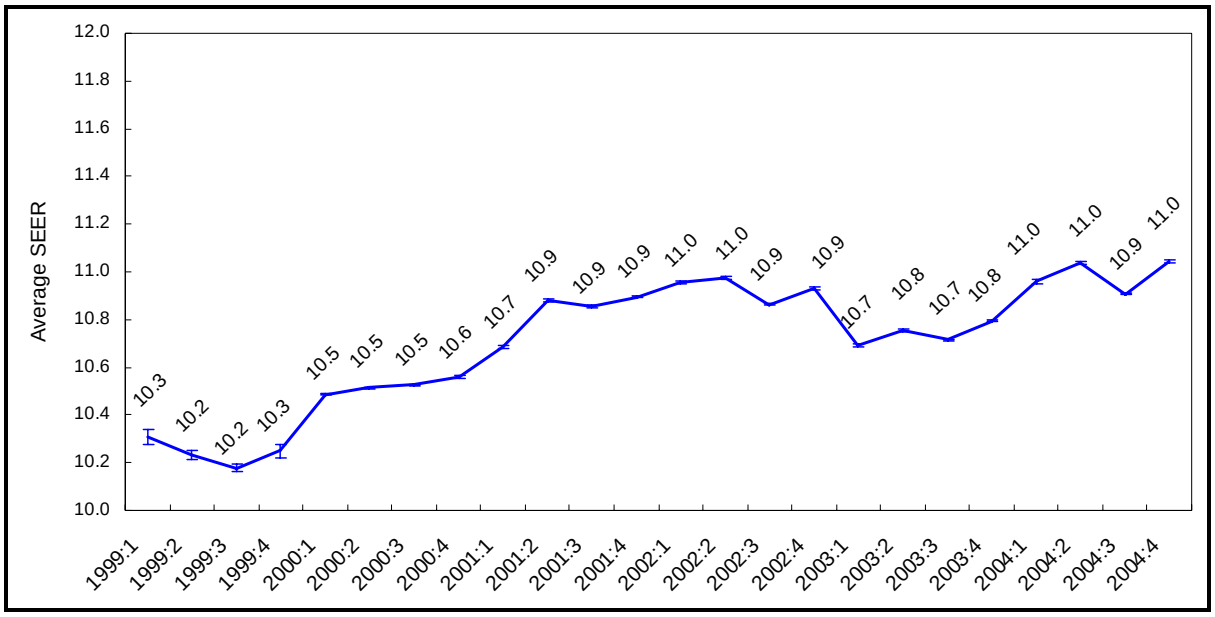
2 "Other" includes municipal utilities such as Los Angeles Department of Water and Power, Sacramento Municipal Utility District, and others.

3 Southern California is a combination of Southern California Edison, The Gas Company, 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 2004 by quarter. As shown, the average SEER ranged from a low of 10.2 during the third quarter of 1999 to a high of 11.0 in the second and fourth quarters of 2004. Many CAC units sold in 2003 were standard efficiency (10 SEER), which led to a reduction in the overall average SEER levels during that year. Additionally, the high SEER averages during 2001 and 2002 may be partially due to the energy crisis. The increase in average SEER in 2004 is at least partly attributable to the addition of a new distributor that sells a larger share of higher efficiency units than the rest of the panel.

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

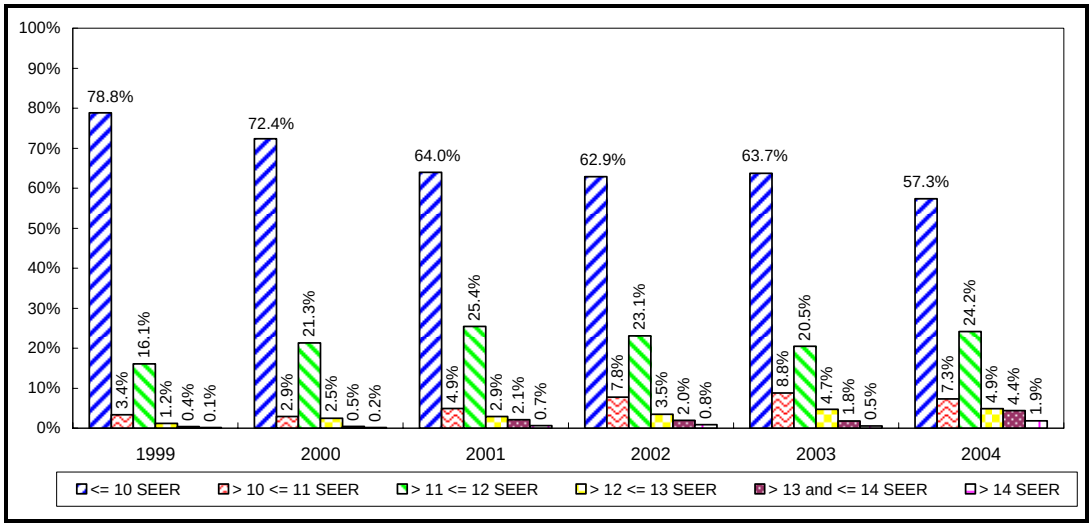
Year	Average SEER			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1999	**10.3** (0.0196) n = 1,358	**10.2** (0.0126) n = 2,589	**10.2** (0.0105) n = 2,956	**10.3** (0.0179) n = 1,360
2000	**10.5** (0.0078) n = 16,231	**10.5** (0.0056) n = 30,000	**10.6** (0.0058) n = 28,243	**10.6** (0.0080) n = 15,599
2001	**10.7** (0.0039) n = 16,524	**11.0** (0.0034) n = 27,259	**10.9** (0.0034) n = 25,502	**10.9** (0.0041) n = 19,949
2002	**11.0** (0.0047) n=15,385	**11.0** (0.0037) n=24,872	**10.9** (0.0031) n=29,780	**10.9** (0.0042) n=17,244
2003	**10.7** (0.0036) n=15,771	**10.8** (0.0029) n=26,963	**10.7** (0.0023) n=37,710	**10.8** (0.0034) n=19,848
2004	**11.0** (0.0044) n=24,265	**11.0** (0.0034) n=43,084	**10.9** (0.0032) n=41,967	**11.0** (0.0040) n=29,365

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 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 and 12 SEER. These trends continued from 2001 through 2004 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

4.1. Overview

This section presents the efficiency market shares and average efficiencies of air-source heat pumps 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 13 SEER/7.7 HSPF, resulting in a 30% increase in minimum cooling efficiency and a 13% increase in heating efficiency of split system heat pumps. Packaged systems will become 34% more efficient in cooling and 17% more efficient in heating.[21]

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

[21] DOE. *Federal Register. Central Air Conditioners and Heat Pumps.* 10 CFR Part 430.

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

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."[22] 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.

ENERGY STAR program requirements for air-source heat pumps are currently being revised and new standards will become effective on April 1, 2006. Under the new standards, heat pumps must have an efficiency rating of at least 14 SEER/11.5 EER/8.2 HSPF for split systems and 14 SEER/11 EER/8 HSPF/ for single systems.[23] A second phase, effective on January 1, 2009, will further increase the qualifying requirements to 14.5 SEER/12 EER/8.2 HSPF for split systems.

Table 4-1: Comparison of Federal and ENERGY STAR Heat Pump Standards

	Split Systems (SEER)	Split Systems (EER)	Split Systems (HSPF)	Single Package Equipment (SEER)	Single Package Equipment (EER)	Single Package Equipment (HSPF)
Federal						
Current/1992 Standard	10	n/a	6.8	9.7	n/a	6.6
January 23, 2006 Standard	13	n/a	7.7	13	n/a	7.7
Percent Improved	30%	n/a	9%	34%	n/a	12%
ENERGY STAR						
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
April 1, 2006 Standard (Tier 1)	14	11.5	8.2	14	11	8
January 1, 2009 Standard (Tier 2)	14.5	12	8.2	14	11	8
California Standard						
Current 1995 Standard	10	n/a	6.8	9.7	n/a	6.6
January 23, 2006 Standard	13	n/a	7.7	13	n/a	7.7

[22] http://yosemite1.epa.gov/estar/consumers.nsf/attachments/HVACSpec2.pdf/$File/HVACSpec2.pdf?OpenElement, pp 4.

[23] Energy Star Program Requirements for Air Source Heat Pumps (ASHP) and Central Air Conditioner Equipment. Eligibility Criteria. Version 4.0. (See http://www.energystar.gov/index.cfm?c=revisions.revisions_specs.).

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.[24] 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.[25]

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

Year	Total Unit Sales
2000	82,500
2001	88,000
2002	90,000
2003	102,000
2004	115,000

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

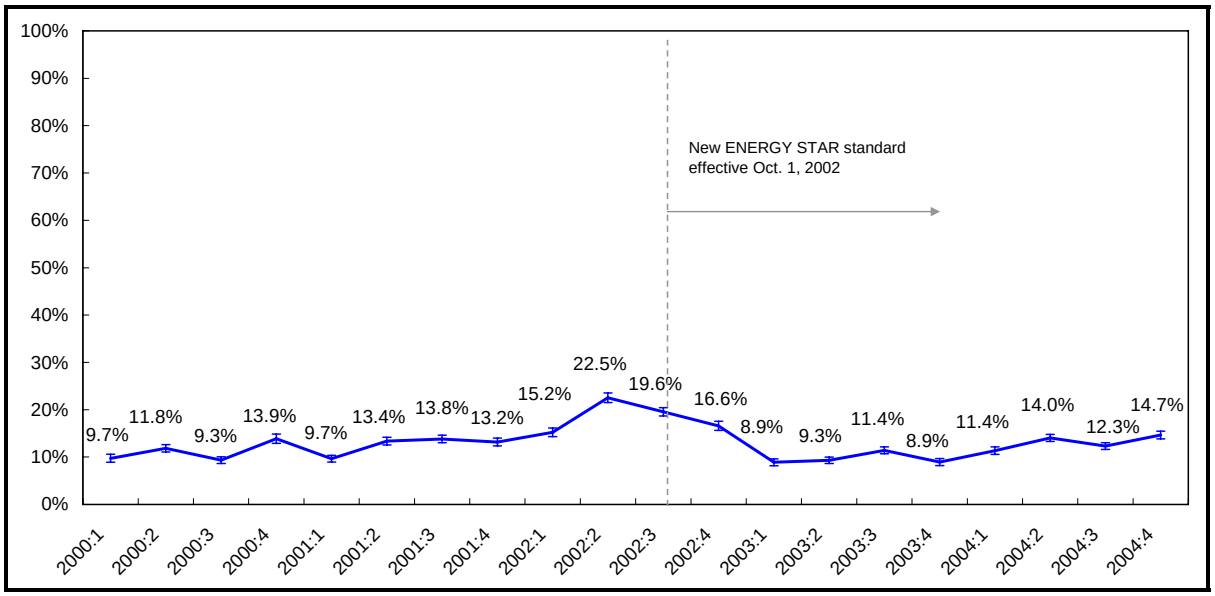
Figure 4-1 and Table 4-3 present the quarterly percentages of ENERGY STAR qualified heat pumps sold in California from 2000 through 2004. Before 2003, the statewide market share of ENERGY STAR qualified heat pumps ranged from a low of 9.3% in the third quarter of 2000 to high of 22.5% in the second quarter 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 and, in general, heat pump ENERGY STAR shares in 2003 were similar to those seen in 2000. It is important to understand that the average efficiency of units sold under the 2003 specification is higher than those sold during

[24] 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.

[25] 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.

2000. By the fourth quarter of 2004, the market share of ENERGY STAR qualified heat pumps increased to 14.7%.

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)

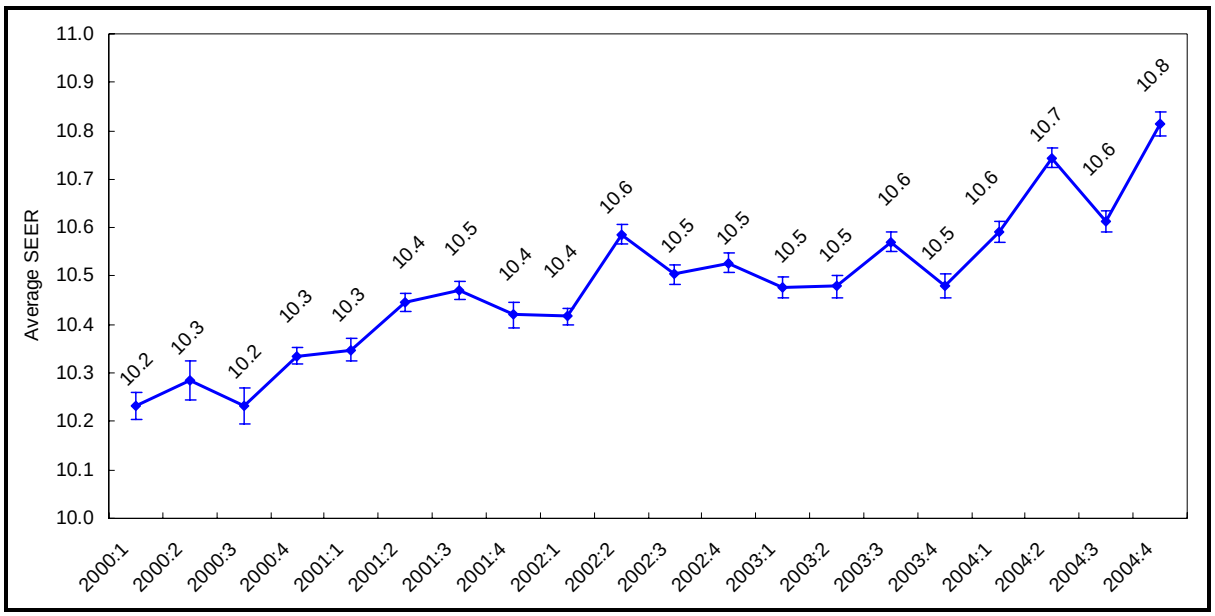
Year	Percent of ENERGY STAR Qualified Heat Pumps				
	Annual	**Q1**	**Q2**	**Q3**	**Q4**
2000	**11.1%** (.0025) n=16,154	**9.7%** (.0051) n=3,356	**11.8%** (.0047) n=4,789	**9.3%** (.0043) n=4,566	**13.9%** (.0059) n=3,443
2001	**12.6%** (.0024) n=19,136	**9.7%** (.0044) n=4,565	**13.4%** (.0049) n=4,864	**13.8%** (.0048) n=5,077	**13.2%** (.0050) n=4,630
2002	**18.7%** (.0029) n=18,515	**15.2%** (.0055) n=4,273	**22.5%** (.0062) n=4,566	**19.6%** (.0053) n=5,664	**16.6%** (.0059) n=4,012
2003	**9.7%** (.0022) n=18,413	**8.9%** (.0044) n=4,114	**9.3%** (.0041) n=4,990	**11.4%** (.0044) n=5,317	**8.9%** (.0045) n=3,992
2004	**13.2%** (.0023) n=21,427	**11.4%** (.0048) n=4,401	**14.0%** (.0046) n=5,815	**12.3%** (.0042) n=6,030	**14.7%** (.0049) n=5,241

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 2000 through 2004, by quarter. As shown, the average SEER ranged from a low of 10.2 in the first and third quarters of 2000 to a high of 10.8 during in the fourth quarter of 2004.

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)

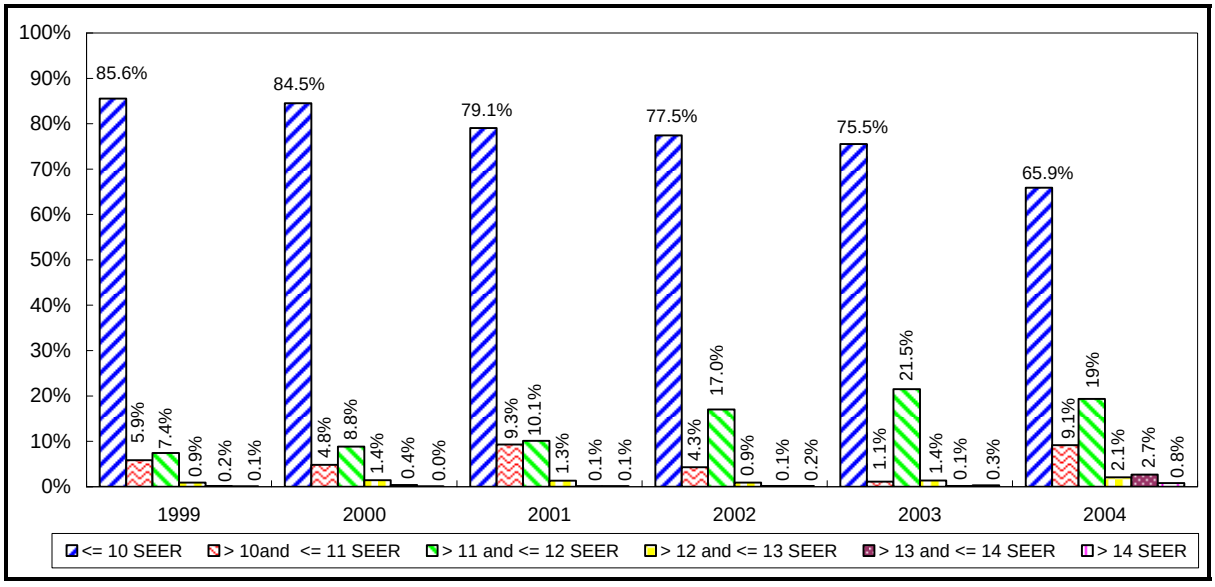
Year	Average SEER			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1999	**10.1** (0.0176) n = 535	**10.3** (0.0249) n = 723	**10.3** (0.0229) n = 896	**10.0** (0.0099) n = 894
2000	**10.2** (0.0141) n = 3,268	**10.3** (0.0116) n = 4,721	**10.2** (0.0115) n = 4,487	**10.3** (0.0162) n = 3,385
2001	**10.4** (0.0112) n = 4,569	**10.5** (0.0125) n = 4,873	**10.5** (0.0125) n = 5,094	**10.4** (0.0127) n = 4,634
2002	**10.4** (0.0132) n = 4,279	**10.6** (0.0145) n = 4,584	**10.5** (0.0123) n = 5,720	**10.5** (0.0149) n = 4,032
2003	**10.5** (0.0140) n = 4,120	**10.5** (0.0130) n = 4,990	**10.6** (0.0130) n = 5,319	**10.5** (0.0145) n = 3,992
2004	**10.6** (0.0172) n = 4,401	**10.7** (0.0144) n = 5,815	**10.6** (0.0136) n = 6,030	**10.8** (0.0163) n = 5,241

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 65.9% in 2004. 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

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%.[26,27] California's standards for furnaces set by the CEC 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.

[26] DOE. *Federal Register. Central Air Conditioners and Heat Pumps.* Title 10, Chapter II, Subpart C, Part 430, Section 430.32.

[27] 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 estimated central gas furnace unit sales from 1999 through 2004. Itron developed the 1999 data by examining national shipment data from Appliance Magazine and subsequently cross-referencing that information with the CEC.[28] The 2000 through 2004 data were developed through a process that examined the total number of households, new housing starts in California, and residential new construction on-site survey data.[29] Both the statewide and new construction data were scaled to estimate California's annual sales based on the number of households and updated measure saturations. Retrofit/replacement units are then estimated as the difference between total units sold and units for new construction. Currently, there is no publicly available definitive source of annual unit sales at the state level, nor is there information that indicates whether units sold or shipped would be installed as retrofit/replacement units or in new construction.

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

Year	Total Units Sales	New Construction	Retrofit/ Replacement
1999	413,400	102,800	310,600
2000	408,600	115,400	293,200
2001	415,000	113,000	302,000
2002	418,800	116,800	302,000
2003	562,500	160,100	402,400
2004	564,000	161,800	402,200

Figure 5-1 illustrates estimated quarterly sales for gas furnaces since the first quarter of 2000. Itron developed these data from utility service area weighted sales data obtained from the RMST furnace distributor panel. Sales in California reflect some seasonality, with increases during the fourth quarter and decreases in second quarter of each year.[30]

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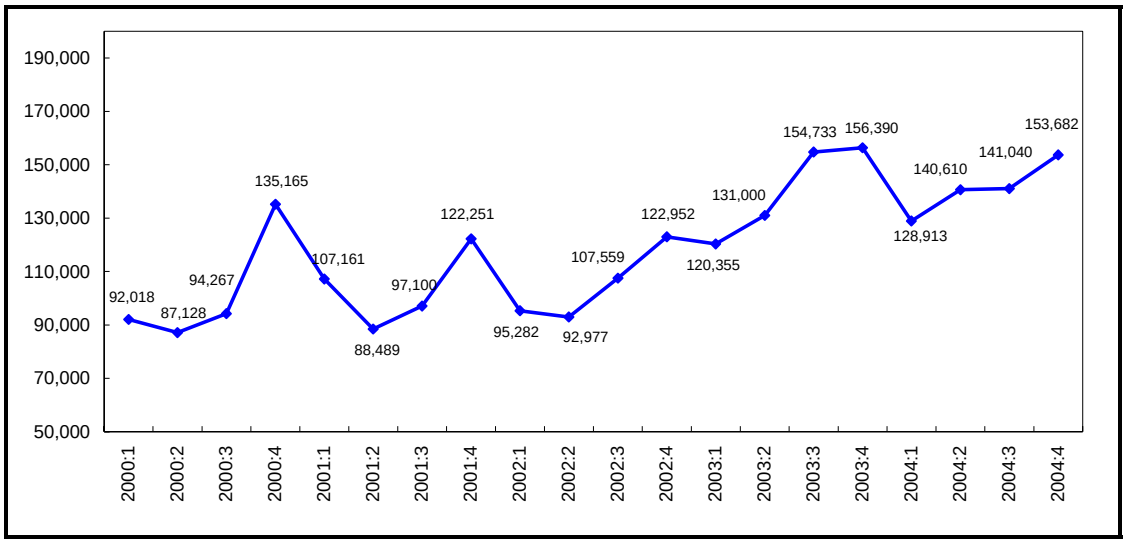
[28] See: http://www.appliancemagazine.com/mm/stats/html/december_1999.html, http://www.ari.org/sr/1999/sr9912.pdf, and California Energy Commission. July 1995. *Staff Report California Energy Demand: 1995-2015.*

[29] 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.

[30] Figure 5-1 does not correspond to Table 5-1 because they were developed using different sales data (publicly available shipment data versus the distributor panel sales data).

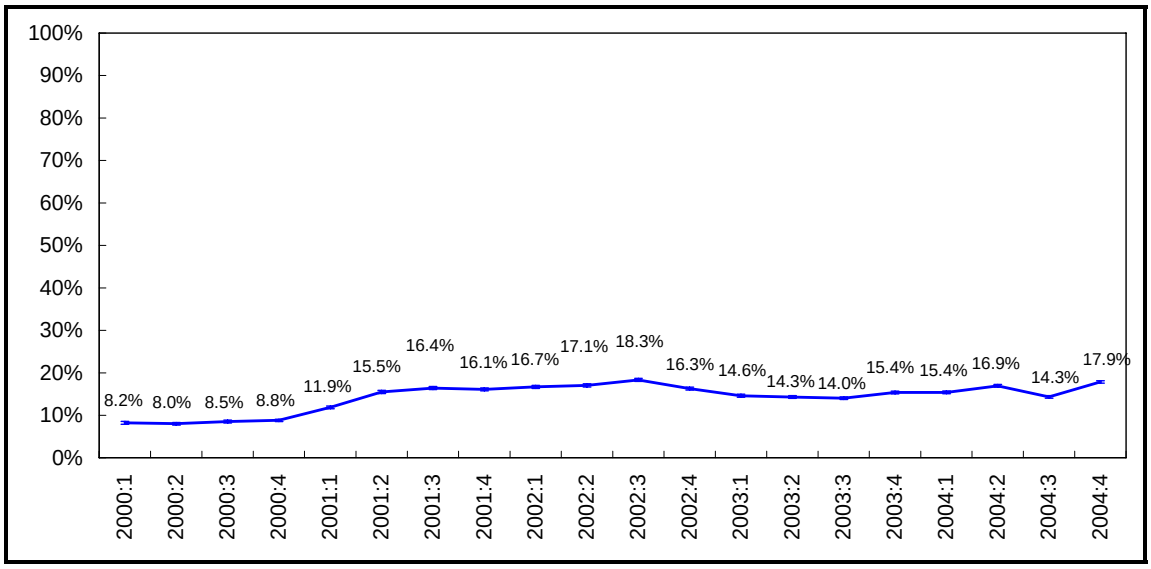
Figure 5-1: Estimated California Gas Furnace Quarterly Sales



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 2004. 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 second quarter of 2000 to a high of 18.3% in the third quarter of 2002. Overall shares declined slightly throughout 2003, then increased to nearly 18% by the end of 2004.

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 ENERGY STAR Qualified Gas Furnaces				
	Annual	Q1	Q2	Q3	Q4
2000	**8.5%** (.0009) n=88,309	**8.2%** (.0020) n=19,854	**8.0%** (.0020) n=19,207	**8.5%** (.0019) n=21,052	**8.8%** (.0017) n=28,196
2001	**15.0%** (.0010) n=117,053	**11.9%** (.0018) n=29,978	**15.5%** (.0023) n=25,145	**16.4%** (.0022) n=27,291	**16.1%** (.0020) n=34,639
2002	**17.1%** (.0011) n=127,572	**16.7%** (.0022) n=30,007	**17.1%** (.0022) n=29,302	**18.3%** (.0021) n=32,508	**16.3%** (.0020) n=35,755
2003	**14.6%** (.0010) n=129,462	**14.6%** (.0021) n=27,686	**14.3%** (.0020) n=30,400	**14.0%** (.0018) n=35,741	**15.4%** (.0019) n=35,635
2004	**16.2%** (.0009) n=157,878	**15.4%** (.0019) n=35,678	**17.0%** (.0019) n=39,819	**14.3%** (.0018) n=40,102	**17.9%** (.0019) n=42,189

Standard errors in parentheses.

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

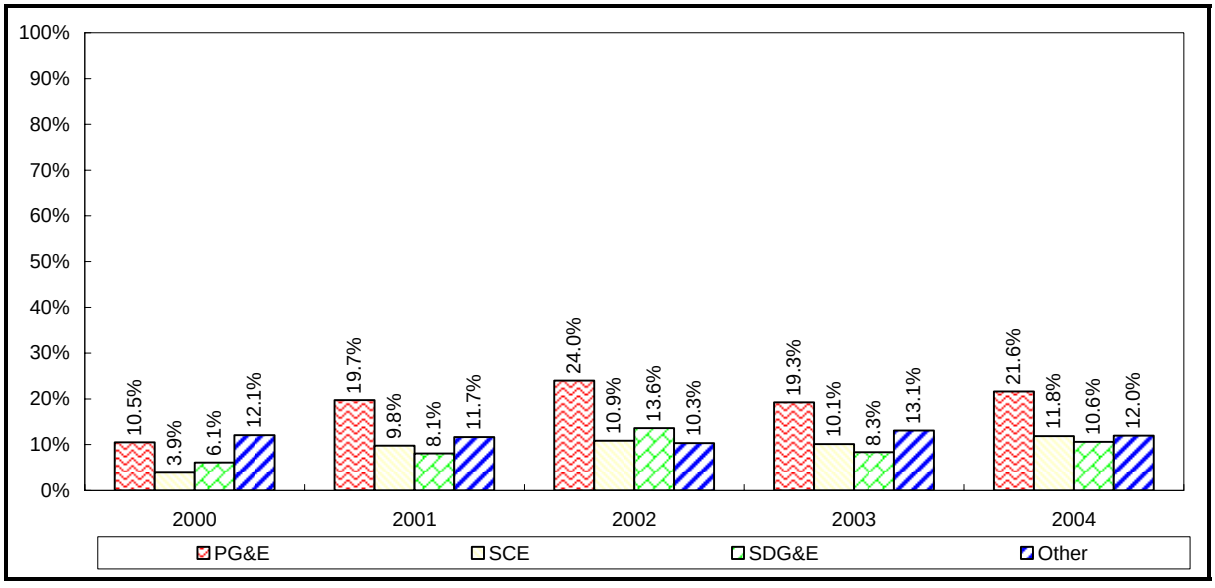


Table 5-3: Gas Furnace Sales, Percent of ENERGY STAR Qualified Units by Utility Service Area

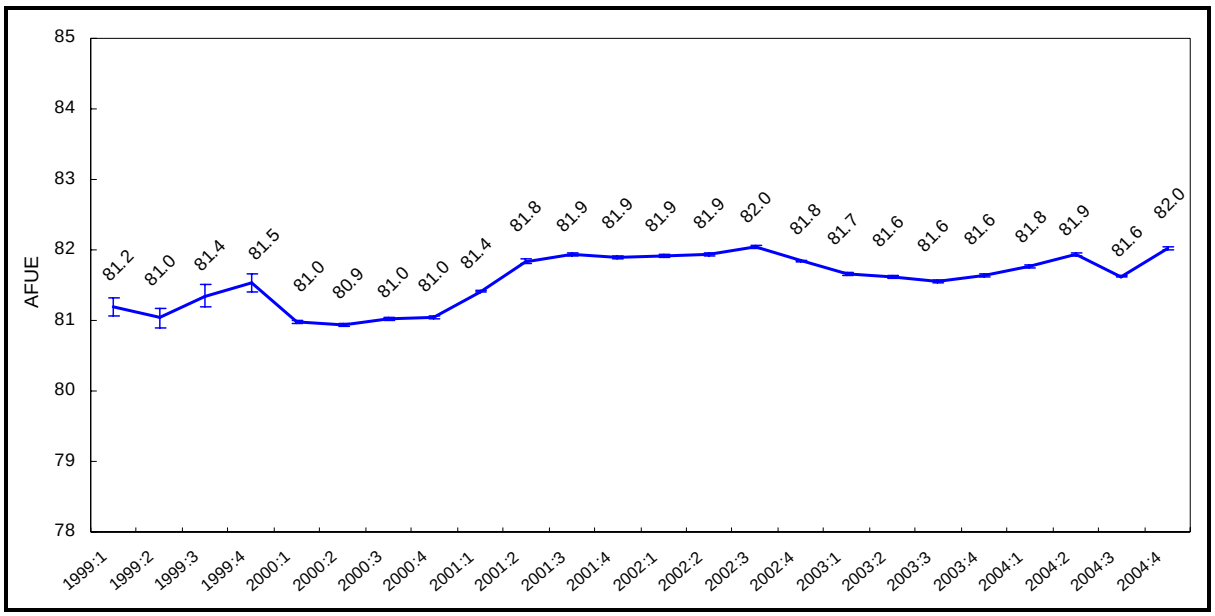
Utility	Year	Percent of ENERGY STAR Qualified Furnaces [1, 2]				
		Annual	Q1	Q2	Q3	Q4
PG&E	2000	**10.5%** (.0012) n=59,874	**9.4%** (.0025) n=13,598	**9.3%** (.0025) n=13,589	**10.8%** (.0025) n=14,865	**11.91%** (.0024) n=17,822
Southern California[3]	2000	**4.5%** (.0013) n=23,639	**4.7%** (.0029) n=5,196	**4.2%** (.0029) n=4,668	**4.4%** (.0028) n=5,228	**4.8%** (.0023) n=8,547
Other	2000	**12.1%** (.0047) n=4,796	**14.3%** (.0107) n=1,060	**14.0%** (.0113) n=950	**10.9%** (.0100) n=959	**10.5%** (.0072) n=1,827
PG&E	2001	**19.7%** (.0016) n=61,409	**16.8%** (.0030) n=15,807	**20.0%** (.0035) n=13,254	**21.9%** (.0035) n=14,316	**20.4%** (.0030) n=18,032
Southern California[3]	2001	**9.3%** (.0016) n=31,247	**5.9%** (.0026) n=8,150	**10.4%** (.0038) n=6,614	**9.8%** (.0035) n=7,041	**11.0%** (.0032) n=9,442
Other	2001	**11.7%** (.0021) n=24,397	**9.1%** (.0037) n=6,021	**11.6%** (.0044) n=5,277	**12.2%** (.0042) n=5,934	**13.4%** (.0040) n=7,165
PG&E	2002	**24.0%** (.0016) n=68,037	**21.3%** (.0033) n=15,800	**22.9%** (.0034) n=15,664	**27.2%** (.0034) n=17,124	**24.3%** (.0031) n=19,449
Southern California[3]	2002	**11.6%** (.0018) n=33,215	**13.8%** (.0039) n=7,683	**12.4%** (.0037) n=7,817	**11.2%** (.0034) n=8,401	**9.5%** (.0030) n=9,314
Other	2002	**10.3%** (.0019) n=26,320	**10.3%** (.0038) n=6,524	**11.3%** (.0042) n=5,821	**10.6%** (.0037) n=6,983	**9.2%** (.0035) n=6,992
PG&E	2003	**19.3%** (.0017) n=51,345	**18.1%** (.0035) n=12,082	**19.0%** (.0037) n=11,364	**18.3%** (.0033) n=13,376	**21.4%** (.0034) n=14,523
Southern California[3]	2003	**9.5%** (.0015) n=38,459	**9.9%** (.0035) n=7,154	**10.3%** (.0032) n=8,822	**9.4%** (.0028) n=11,132	**8.9%** (.0027) n=11,351
Other	2003	**13.1%** (.0017) n=39,658	**13.4%** (.0037) n=8,450	**12.0%** (.0032) n=10,214	**13.6%** (.0032) n=11,233	**13.4%** (.0035) n=9,761
PG&E	2004	**21.63%** (.0017) n=55,736	**19.24%** (.0034) n=13,371	**23.79%** (.0037) n=13,138	**20.14%** (.0035) n=12,927	**23.04%** (.0033) n=16,300
Southern California3	2004	**11.42%** (.0013) n=56,615	**11.62%** (.0029) n=11,965	**11.84%** (.0027) n=14,777	**9.56%** (.0024) n=14,855	**12.68%** (.0027) n=15,018
Other	2004	**12.0%** (.0015) n=45,527	**12.2%** (.0032) n=10,432	**11.7%** (.0029) n=11,904	**10.9%** (.0028) n=12,320	**13.3%** (.0033) n=10,871

1. Standard errors in parentheses.
2. "Other" includes municipal utilities such as LADWP, LMUD, PP&L, SMUD, and others.
3. Southern California is a combination of SCE, The Gas Company, 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 2004. The trend has remained steady over the past few years. As shown, the average AFUE ranged from a low of 80.9 in the second quarter of 2000 to a high of 82.0 during the third quarter of 2002 and again in the fourth quarter of 2004.

Figure 5-4: Central Gas Furnaces, Average AFUE



Error bands for the 90% confidence interval.

Table 5-4: Central Gas Furnaces, Average AFUE

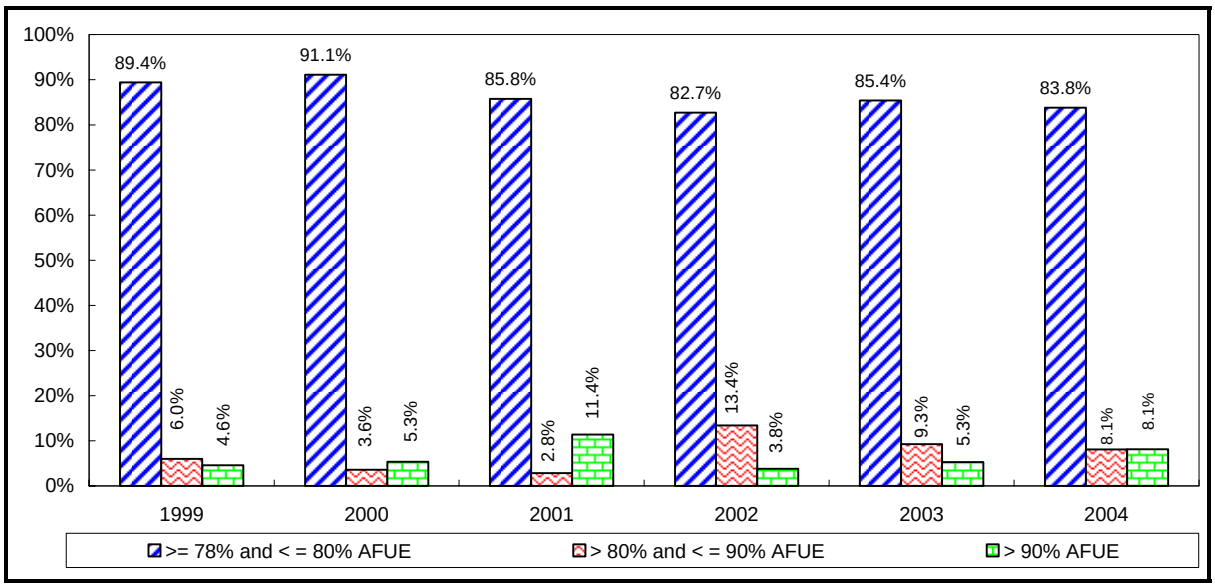
Year	Average AFUE			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1999	**81.2** (0.0821) n = 1,556	**81.0** (0.0846) n = 1,300	**81.4** (0.0909) n = 1,414	**81.5** (0.0780) n = 2,147
2000	**81.0** (0.0240) n = 19,755	**81.0** (0.0235) n = 19,207	**81.1** (0.0241) n = 21,049	**81.1** (0.0211) n = 28,195
2001	**81.4** (0.0119) n = 30,014	**81.8** (0.0145) n = 25,181	**81.9** (0.0142) n = 27,317	**81.9** (0.0124) n = 34,676
2002	**81.9** (0.0118) n = 30,013	**81.9** (0.0119) n = 29,313	**82.0** (0.0114) n = 32,511	**81.8** (0.0105) n = 35,759
2003	**81.7** (0.0117) n = 27,686	**81.6** (0.0110) n = 30,400	**81.6** (0.0099) n = 35,741	**81.6** (0.0098) n = 35,635
2004	**81.8** (0.0117) n = 35,768	**81.9** (0.0116) n = 39,819	**81.6** (0.0107) n = 40,102	**82.0** (0.0112) n = 42,189

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, most units sold throughout the past three years had AFUE ratings between 78 and 80. As expected, the percent of higher efficiency (above 80 and above 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. Sales above 90 AFUE have increased, however, to 8% in 2004.

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



6

Summary

This report described the data development and results of the 2004 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, decreased slightly in 2003, then increased again in 2004. 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 ENERGY STAR market share of CACs, heat pumps, and furnaces increased in 2004, compared to the average 2003 shares. Increases in average efficiencies and the share of ENERGY STAR qualified units observed in 2004 for all measures covered by this study are at least partly attributed to the addition of a new distributor to the panel that sells a higher proportion of higher efficiency units than the rest of the panel.

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.