Critical Differences Between Residential HVAC Customers' and Contractors' Perceptions

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ABSTRACT

To inform the design of market transformation programs, Pacific Gas and Electricity Company employed extensive market research to characterize the existing market for residential heating, ventilating and air conditioning equipment across the areas PG&E serves in Northern and Central California. Among the key findings are critical differences between customers' and contractors' perceptions of the time available when a customer needs to replace HVAC equipment at time of failure. In this, the most common purchase situation, contractors report they have one-half the time available to replace a customer's furnace or air conditioner that customers report they are willing to allow a contractor. Distributors and manufacturers report that they see very few contractors taking the time to "up sell" to higher efficiency equipment and other features or services. We also found that energy-efficient furnaces and air conditioners have higher penetration rates in climate zones with higher annual heating and cooling loads. Customers' self-reports indicate that energy efficiency and reducing operating costs are of concern to approximately one-third of customers replacing equipment and one-fourth of customers adding equipment. Customers who recently purchased HVAC equipment are least satisfied with the energy costs. Few customers in PG&E territory are aware of or interested in heating and cooling equipment or energy costs. The difference between contractors' and customers' perceptions of purchases of replacement HVAC equipment and the lack of consumer interest in their heating and cooling equipment are barriers to improving the overall efficiency with which energy is used to provide thermal comfort.

Background and Objectives

Pacific Gas and Electric Company (PG&E) has pursued detailed market research regarding the California residential heating, ventilating, and air conditioning (HVAC) market. This exploration of the residential HVAC market is part of an effort to understand the markets for all types of energy-related retrofit and renovation measures that together comprise the "Whole System" and "Whole House" approaches.

The primary objective of this multi-faceted research effort was to characterize the residential heating, ventilating, and air conditioning (HVAC) market in Northern and Central California to inform the design of a comprehensive market transformation strategy in the single-family, owner-occupied housing market. This characterization included establishing a baseline of consumer, contractor, distributor, and manufacturer opinions, attitudes, and practices relative to energy efficient residential HVAC products and services.

The specific objectives of the research were to: (1) identify barriers to the purchase and installation of energy efficient HVAC equipment among all of the key market players; (2) baseline HVAC contractor sales and services practices; (3) identify distributors and

manufacturers' marketing activities related to energy efficient products; (4) explore the residential customers' decision making process when purchasing HVAC equipment; and (5) identify ways in which PG&E may influence the residential HVAC market.

Methods

To address PG&E's research objectives, Opinion Dynamics Corporation (ODC) surveyed 227 HVAC contractors who provided sales and services to residential customers and 803 residential customers who had purchased HVAC equipment in the previous five years. In addition, ODC conducted in-depth telephone interviews with four of the eight major manufacturers of residential HVAC equipment, 20 HVAC distributors, and 20 residential HVAC contractors (located within PG&E's service territory).

Findings

In this paper, the authors present selected findings from the overall "Residential HVAC Market Characterization and Baseline Study" (Pacific Gas and Electric Company 1999) that identify several critical differences between customers' and contractors' perceptions and other findings characterizing the market for energy-efficient products. Key findings relate to equipment installation timing and customers' contractor and equipment selection process, customers' concerns with HVAC projects, and customers' satisfaction with various aspects of their 'recent' HVAC projects.

Because distributors and manufacturers have a 'broader view' of the HVAC industry than contractors or customers and provided important insights, we include their key comments on the nature of HVAC markets.

Equipment Installation Timing

We investigated whether the time customers and contractors allocate for equipment replacements and additions is a barrier to purchasing energy-efficient HVAC equipment. We asked customers the reason for their HVAC equipment purchase (breakdown or planned replacement of existing equipment or addition of new equipment). We asked both contractors and customers about the time available to replace HVAC equipment. And, we asked distributors and manufacturers for their perspectives. Where appropriate, contractor survey responses in this sub-section are weighted by their residential HVAC equipment unit sales volume.[1] (Weighted responses are indicated in footnotes when used in the findings.)

- **Customers who replace HVAC equipment have a more urgent need for their equipment than customers who add HVAC equipment.** Table 1 compares the customer-reported timing for HVAC "replacements" and "additions" As illustrated in the table, 25% of customers report they need replacements within three days, while only 9% of customers need additions in that time frame. (Note: cumulative percentages are shown to indicate the proportion of customers who need equipment by each time.)

[1] "Residential HVAC equipment unit sales volume" includes furnace, central air conditioner, heat pump, and evaporative cooler installations in both new and existing homes.

Timeframe for replacement or addition	Cumulative percent of customer survey respondents	
	Replacement	Addition
Within three days	25%	9%
Within one week	38%	17%
Within two weeks	45%	23%
Within one month	54%	30%
	(n = 506)	*(n = 383)*

Table 1: Comparison of customer timeframe for replacing or adding equipment

- **"End-of-life" reasons dominate customer *replacement* of residential HVAC equipment.** According to 506 customer survey respondents who replaced HVAC equipment, 85% of all replacements are made for "end-of-life" reasons. These include "breakdown," "unit getting old," "unit needing repairs," "inspector recommendation," "contractor convinced purchaser," "afraid unit would breakdown," and "utility red-tag."

- **The primary reason that customers *add* either a furnace or an air conditioner is "because they do not have one."** According to 383 customer survey respondents who added HVAC equipment, 24% did so because they did not have an air conditioner, 20% for "comfort," and 14% because they did not have a furnace.[2] Distributors noted that in areas where air conditioning had not historically been employed in homes (such as the San Francisco Bay Area), higher income consumers were now adding air conditioners. In addition, in many areas customers are replacing wall furnaces with central heating systems.

- **Contractors report they are under pressure to install equipment quickly when a customer's HVAC equipment "breaks down."** Replacements made because of "breakdown" of existing equipment are more urgent than replacements made for other reasons. As illustrated in Table 2, contractor survey respondents indicate that 86% of breakdown replacements are needed in four days or less, [3] compared with only 14% of planned replacements needed in that time frame.[4]

- **Contractors also reported (during in-depth interviews) that more than one-half of customers with broken down equipment want it replaced within 3 days.** In addition, in the in-depth interviews, contractors report that customers want an immediate response to their call, a quick proposal, and next day service. Further, contractors feel they do not have as much opportunity to discuss options — including energy efficiency — when equipment breaks down during the middle of the cooling or heating season.

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[2] In California's mild climate many homes were built without central furnaces or air conditioners. All of these answers indicate a desire for improved comfort.

[3] Cumulative percentages show the total of all respondents indicating a need by the time shown.

[4] Of course, old equipment tends to fail under extreme weather conditions when customers want comfort restored as quickly as possible.

- **Information collected from distributors and manufacturers supports the contractor and customer findings—they view the residential HVAC market as "full of procrastinating customers."** Distributors estimated that 77% of equipment replacements are due to breakdown. A typical description they gave of customer behavior was, "Nobody thinks ahead . . . [even if they have some idea that] when dealers are busy it will be more expensive." The distributors' estimates of replacements due to breakdown are generally consistent with, although slightly higher than, the contractor estimates (60%).

- **Contractors generally indicate a greater urgency for replacements due to breakdowns than do customers.** As illustrated in Table 2 and Figure 1, 31% of contractor survey respondents[5], contrasted with 18% of customer survey respondents, indicate equipment replacements due to breakdowns are needed the same day as the breakdown occurs. A total of 98% of contractors, contrasted with 55% of customers, indicate replacements due to breakdowns are needed within one week.

Timeframe for breakdown or planned replacement	**Breakdown Replacement**			
	Need for time shown **(Customers)**	Market need for time shown [1] **(Contractors)**	Cumulative % need by time shown **(Customers)**	Cumulative % market activity by time shown [1] **(Contractors)**
Same day	18%	31%	18%	31%
Next day	6%	16%	24%	47%
2 days	10%	20%	34%	67%
3 to 4 days	4%	19%	38%	86%
1 week	17%	12%	55%	98%
2 weeks	8%	2%	63%	100%
3 to 4 weeks	9%		72%	
More than 4 weeks	21%		93%	
Don't know	7%		100%	

[1] Weighted by contractors' residential HVAC equipment *breakdown replacement* unit sales volume.

Table 2: Customer and contractor reported urgency of breakdown replacement

- **Contractors' sense of urgency appears to be a key barrier to greater efforts to sell energy-efficient equipment and services. However, a manufacturer cautioned that, "Many [contractors] think that customers buy real fast, but they [customers] take more time than many [contractors] think."** The manufacturer continued, *"The contractor is in a hurry*—they want a quick sell. They don't offer more. If the salesperson will take the time, features will sell."

[5] Weighted by contractor survey respondents' residential HVAC equipment *breakdown replacement* unit sales volume.

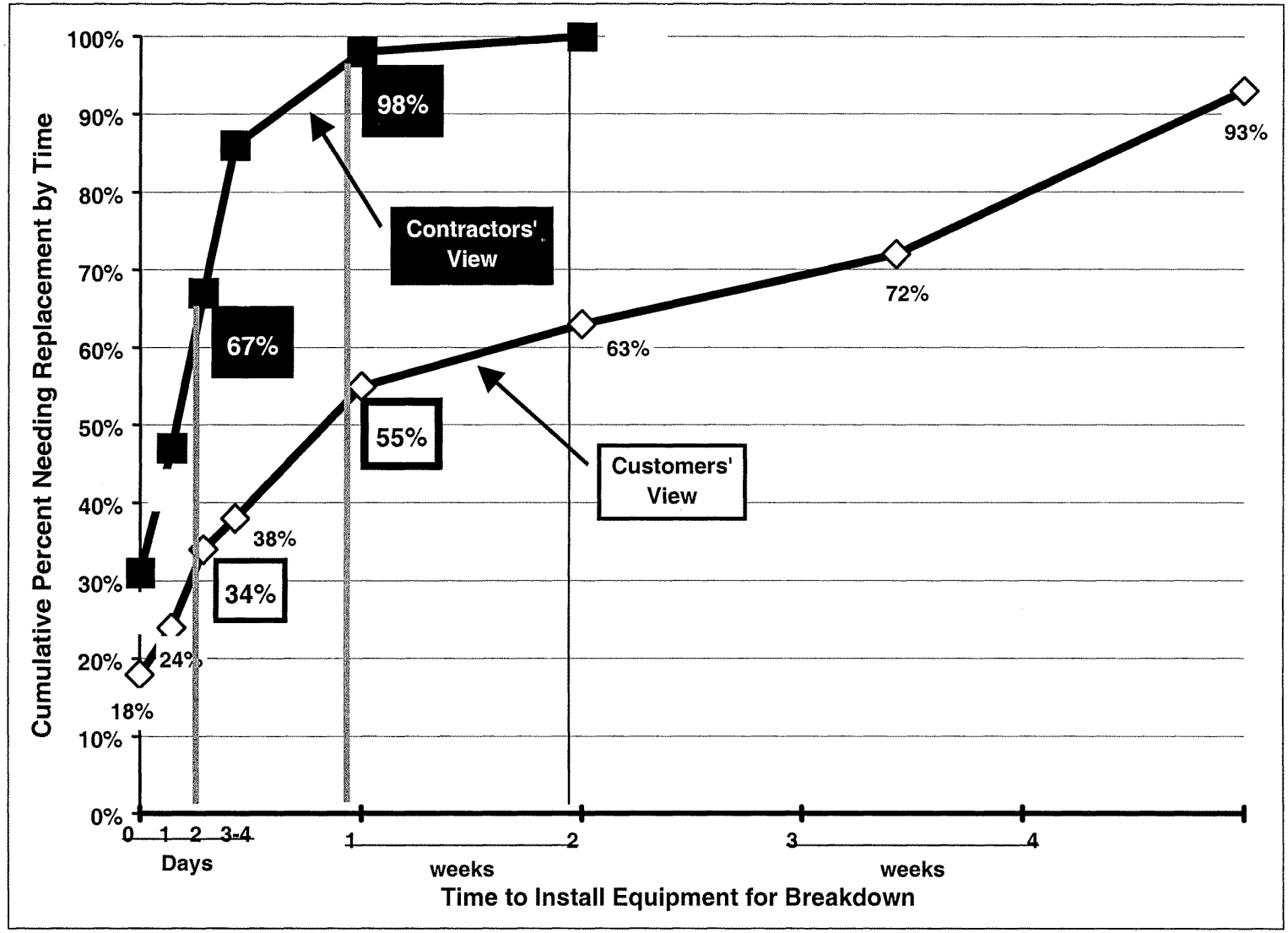

Figure 1: Cumulative percent of customers needing replacement equipment installed by time shown

- **Few contractors or customers indicate a need for replacement equipment within 3-4 days when they have a *planned replacement.*** As illustrated in Table 3, only 14% of customers and 14%[6] of contractors indicate a replacement is needed within four days for a *planned replacement.* However, contractors' sense of urgency reappears for longer timeframes, starting with one week. [7]

Timeframe for breakdown or planned replacement	**Planned Replacement**			
	Need for time shown **(Customers)**	Market need for time shown [1] **(Contractors)**	Cumulative % need to time shown **(Customers)**	Cumulative % market activity to time shown [1] **(Contractors)**
Same day	8%	2%	8%	2%
Next day	9%	5%	9%	5%
2 days	12%	6%	12%	6%
3 to 4 days	14%	14%	14%	14%
1 week	22%	58%	22%	58%
2 weeks	29%	79%	29%	79%
3 to 4 weeks	38%	98%	38%	98%
More than 4 weeks	85%	100%	85%	100%
Don't know	100%		100%	

[1] Weighted by contractors' residential HVAC equipment *planned replacement* unit sales volume.

Table 3: Customer and contractor reported urgency of planned replacement

Contractor and Equipment Selection Process

We asked both contractors and customers to discuss the HVAC purchasing process. This portion of the research explored how customers select an HVAC contractor and what they learn from their conversations with HVAC sales staff. We found that the contractor selection directly affects the equipment that is installed. Because there is close agreement in their responses and, in order to simplify the presentation, we only report the customers' responses.

- **The choice of a contractor is the most important element of the customer's decision-making process when adding or replacing HVAC equipment.** Thirty-two percent of customer survey respondents said the contractor is the most important aspect of the decision making process, 24% said it is price and terms, 18% said it is the make or brand, and 16% said it is specific model features.

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[6] Weighted by contractor survey respondents' residential HVAC equipment *planned replacement* unit sales volume.

[7] During the in-depth interviews contractors report that customers who are remodeling will often wait to call them until the project is well underway. Then they only have an average of two weeks to do the job.

- **When selecting an HVAC contractor, customers most frequently (61% of the time) rely on their own past experience or word-of-mouth referrals from friends, relatives, or neighbors.** Few customers rely solely on contractor advertising when making the selection decision. For example, only 20% of those replacing or adding equipment look to the yellow pages or phone book to help them identify contractors. A contractor's reputation and the trust they are able to build up with residential customers are central to both retaining and expanding their business.

- **Over one-half of customers simply call a single HVAC contractor and have them do the work, obtaining no bids or only one bid (Figure 2).** The average HVAC purchaser obtains 1.8 bids as part of the contractor and equipment selection process.

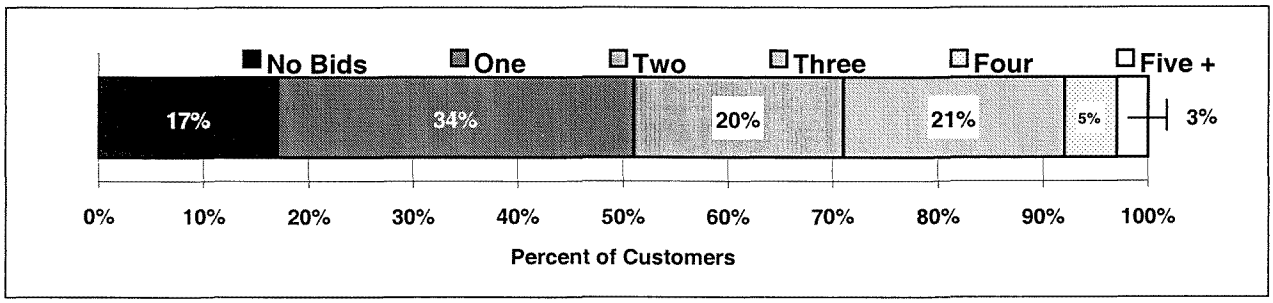


Figure 2: Number of bids obtained when replacing or adding equipment

- **Contractor responses from the depth interviews indicate many contractors feel they face significant competition.** (We did not ask contractors—in the contractor survey—for estimates of the number of competitors they feel are bidding against them.)

- **Manufacturers and distributors characterize contractors as generally feeling that they have to sell with low bids and are wary of trying to "up sell."** "Selling better value is too much of a challenge, especially when they are busy. Thus, high efficiency sales drop off during the peak seasons when they are busy [and when most units are replaced]."

Sales by Efficiency Level

Sales of both forced air furnaces and air conditioners show that a greater proportion of energy efficient units are sold in the climate zones with greater heating and cooling loads.[8]

- **Approximately 80 percent of 1998 forced air furnace sales within PG&E's service territory have efficiency or A.F.U.E. ratings of 80-89%.** As illustrated in Table 4,

[8] Sales data were obtained from 227 residential HVAC contractors across PG&E's territory.

79% of new construction unit sales, and 83% of existing home unit sales across PG&E's service territory have efficiency or A.F.U.E. ratings of 80-89%. [9]

- **The market share of high efficiency forced air furnaces is highest among survey respondents located in the Desert/Mountain climate zone.** Table 4 also shows that 46% of new construction unit sales and 32% of existing home units sales in the Desert/Mountain climate zone have A.F.U.E. ratings of 90% or higher. These market shares are approximately twice as high as those in the Valley, Coastal, and Hill climate zones (where heating loads are significantly less). [10]

	Percent of 1998 Forced Air Furnace Unit Sales [1]				
	Desert/ Mountain	**Valley**	**Coastal**	**Hill**	**PG&E Territory**
New Construction					
80-89% A.F.U.E.	54%	79%	84%	86%	**79%**
90% A.F.U.E. or higher	46%	21%	16%	14%	**21%**
	100%	*100%*	*100%*	*100%*	***100%***
(Contractor Units Sales)	*(874)*	*(3,785)*	*(1,169)*	*(2,454)*	*(8,282)*
Existing Homes					
80-89% A.F.U.E.	68%	83%	87%	83%	**83%**
90% A.F.U.E. or higher	32%	17%	13%	17%	**17%**
	100%	*100%*	*100%*	*100%*	*100%*
(Contractor Unit Sales)	*(797)*	*(4,985)*	*(2,324)*	*(4,403)*	*(12,509)*

[1] Weighted by HVAC contractor survey respondents' new construction and existing home forced air furnace unit sales volumes, respectively.

Table 4: 1998 forced air furnace sales by efficiency level and climate zone

- **Approximately 50 percent of 1998 central air conditioning sales in PG&E's service territory just meet the minimum federal standard for energy efficiency—they have SEER ratings of 10.** As illustrated in Table 5, 56% of unit sales in the new construction market and 50% of unit sales in the existing homes market have SEER ratings of 10. [11]

[9] These percentages are weighted by HVAC contractor survey respondents' new construction and existing home forced air furnace unit sales volumes, respectively.

[10] These percentages are weighted by HVAC contractor survey respondents' new construction and existing home forced air furnace unit sales volumes, respectively

[11] These percentages are weighted by HVAC contractor survey respondents' new construction and existing home central air conditioning unit sales volumes, respectively.

- **Over 40% of both overall new construction and overall existing home central air conditioning sales have SEER ratings of 12 or higher.** As illustrated in Table 5, 41% of new construction sales and 44% of existing home sales have SEER ratings of 12 or higher. The table also illustrates that the percentage of units with SEER ratings of 12 or higher is greatest in the Desert/Mountain and Valley climate zones, moderate in the Hill zone and lowest in the Coastal climate zone for both new construction, and to a higher degree, existing homes. [12] This pattern appears consistent with the magnitude of cooling loads across these climate zones.

	Percent of 1998 Central Air Conditioning Unit Sales [1]				
	Desert/ Mountain	**Valley**	**Coastal**	**Hill**	**PG&E Territory**
New Construction					
10 SEER	55%	55%	69%	55%	**56%**
11 SEER	3%	2%	11%	3%	**3%**
12 SEER or higher	42%	43%	20%	42%	**41%**
	100%	*100%*	*100%*	*100%*	***100%***
(Contractor Unit Sales)	*(1,136)*	*(4,005)*	*(375)*	*(1,860)*	*(7,376)*
Existing Homes					
10 SEER	47%	44%	67%	59%	**50%**
11 SEER	4%	4%	15%	8%	**6%**
12 SEER or higher	49%	52%	18%	33%	**44%**
	100%	*100%*	*100%*	*100%*	***100%***
(Contractor Unit Sales)	*(1,194)*	*(5,584)*	*(581)*	*(2,950)*	*(10,309)*

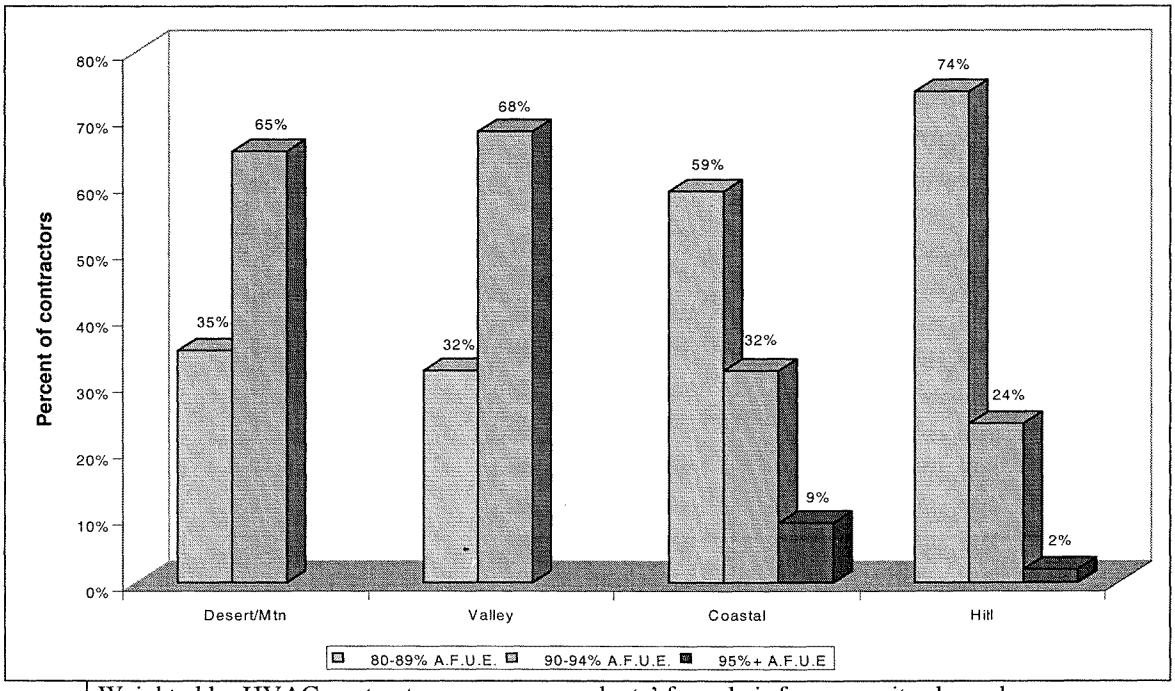
[1] Weighted by HVAC contractor survey respondents' new construction and existing home forced central air conditioning unit sales volumes, respectively.

Table 5: 1998 central air conditioning sales by efficiency level and climate zone

For both new construction forced air furnace and central air conditioning equipment sales, we also asked HVAC contractors who participated in the quantitative telephone survey what efficiency level (i.e., A.F.U.E. rating for furnaces and SEER rating for central air conditioning equipment) they "consider" to be energy efficient. Key findings across climate zones are outlined below.

[12] These percentages are weighted by HVAC contractor survey respondents' new construction and existing home central air conditioning unit sales volumes, respectively.

- **Approximately two-thirds of HVAC contractors located in the Desert/Mountain and Valley climate zones consider furnaces with 90-94% A.F.U.E. ratings to be energy efficient.** However, as Figure 3 shows, only one-third of survey respondents located in the Coastal and Hill climate zones that consider 90-95% A.F.U.E. furnaces to be energy efficient. [13]



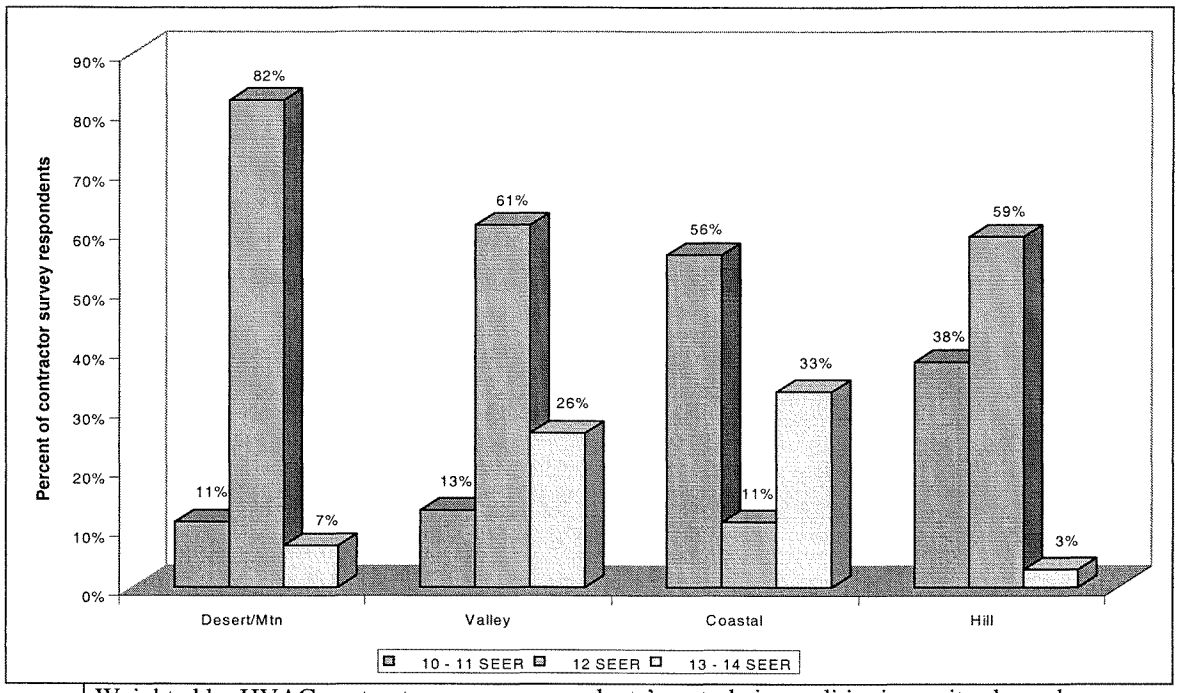
[1] Weighted by HVAC contractor survey respondents' forced air furnace unit sales volume.

Figure 3: Forced air furnace efficiency level considered to be efficient[1]

- **Only one in eight contractors located in the Desert/Mountain and Valley climate zones consider central air conditioners with a 10-11 SEER rating to be energy efficient.** Figure 4 shows that more respondents in the Coastal (56%) and Hill (38%) climate zones consider 10-11 SEER air conditioners to be energy efficient. [14]

[13] Percentages are weighted by HVAC contractor survey respondent's furnace sales volume.

[14] Percentages are weighted by HVAC contractor survey respondents' central air conditioning unit sales volume.



[1] Weighted by HVAC contractor survey respondents' central air conditioning unit sales volume.

Figure 4: Central air conditioning efficiency level considered to be efficient [1]

Customer Concerns with HVAC Projects

In order to gain a better understanding of the consumer perspective on the HVAC purchasing process, we specifically asked customer survey respondents about concerns that arose during their purchasing process.[15] We found that customer survey respondent concerns vary somewhat by the reason they purchased HVAC equipment—*breakdown of existing equipment* versus *planned replacement of existing equipment* versus *adding equipment* they did not previously have.

- **Equipment Replacements: "Energy efficiency" (or a desire to reduce energy costs) is the most frequently mentioned concern residential consumers have when replacing heating and cooling equipment.** As illustrated in Table 6, "reliability" and "comfort" are other major concerns that consumers have when replacing heating and cooling equipment.

[15] Each customer survey respondent had made an HVAC purchase in the previous five years.

Main Concerns When Replacing [1]	Percent of Respondents [2]
Energy efficiency/lower energy costs	35%
Reliability/durability	18%
Comfort	16%
Need quickly/timing	8%
Proper size for home	8%
Safety	7%
Cost of unit	7%
Total respondents	*(n = 511)*

[1] Respondents may have given more than one *unaided* response. Only response categories given by 5% or more of respondents are listed.
[2] Includes three categories of equipment (furnace, heat pump, central air).

Table 6: Customer survey respondent concerns when *replacing* HVAC equipment

- **Replacements Due to Breakdown: Customer survey respondents replacing heating and cooling equipment due to breakdown are more concerned with getting a replacement unit installed quickly and at an affordable price (it is an unexpected expenditure their energy costs as compared to respondents replacing for other reasons).** Table 7 illustrates that "breakdown" purchasers are generally less concerned about energy efficiency and reducing operating costs than those replacing for other reasons.

Main Concerns When Replacing Breakdown vs. Other[1]	Percent of respondents with concern	
	Breakdown	Other
Save energy / energy efficiency / reduce operating costs	28%	41%
Need quickly / timing	13%	4%
Cost of unit	10%	4%
Total respondents	*(n = 243)*	*(n = 268)*

[1] Respondents may have given more than one response. Only those response categories where substantial differences exist are listed.

Table 7: Customer survey respondent concerns *breakdown* vs. *other* replacement

- **<u>Adding HVAC Equipment:</u> "Comfort" and "energy efficiency" (or a desire to reduce energy costs) are the most frequently mentioned concerns customer survey respondents have when adding heating or cooling equipment.** As illustrated in Table 8, consumers who are adding central air conditioning only are keenly aware of and concerned about "comfort." Forty-six percent of consumers who added central air conditioning only said their main concern was "comfort." This compares to only 19% of consumers who purchased a forced air furnace only.

Main Concerns When Adding [1]	Percent of respondents with concern			
	All Additions [2]	Furnace and AC	Furnace Only	AC Only
Comfort	31%	29%	19%	46%
Energy efficiency/lower energy costs	23%	24%	24%	23%
Proper size for home	12%	20%	17%	10%
Reliability/durability	11%	11%	8%	13%
Cost of unit	11%	11%	6%	18%
Total respondents	*(n = 329)*	*(n = 66)*	*(n = 79)*	*(n = 125)*

[1] Some respondents gave more than one response. Only response categories mentioned by 5 % or more of respondents are listed.

[2] Includes three categories of equipment (furnace, heat pump, central air) and combinations of additions, not just those categories listed in the final three columns on the right.

Table 8: Main concerns when *<u>adding</u>* heating and/or cooling equipment

We also asked customers what topics they recall the HVAC salesperson mentioning when discussing a combination of replacement and additional equipment, replacement equipment, or additional equipment.

- **According to customer survey respondents, "energy efficiency" is the topic mentioned most frequently by contractor sales staff.** Table 9 shows other topics mentioned. These other topics included (in decreasing order) reliability, the reputation of contractor and/ or brand, and total cost of installation. Warranty terms, improved comfort, sizing equipment properly for their home and speed of installation were also mentioned. [16]

[16] Note that "sized properly for home" does not mean sized to just meet calculated loads in order to reduce operating costs. Responses in the contractor qualitative research and the contractor survey indicate that most contractor / salespeople are reassuring potential customers that the equipment would be sized large enough to ensure their comfort.

Topics emphasized [1]	Percent of respondents		
	Replacements and additions	Replacements	Additions
Energy efficiency	27%	26%	29%
Reliability	15%	16%	16%
Reputation of contractor/brand	13%	15%	12%
Total cost of installation	11%	12%	9%
Warranty	8%	9%	7%
Improved comfort	8%	7%	9%
Sized properly for home	6%	6%	7%
Speed of installation	5%	7%	2%
Total Respondents	*(n = 709)*	*(n = 488)*	*(n = 310)*

[1] Respondents may have given more than one response. Only those responses mentioned by 5% or more of respondents are listed.

Table 9: Salesperson emphasis in equipment replacements and additions

Customer Satisfaction with HVAC Projects

In addition to asking customer survey respondents about their concerns, we also asked them how satisfied they are with the results of the HVAC project. In addition, manufacturers and distributors were asked for their perspectives on what "drives" customer satisfaction.

- **Customer survey respondents who have replaced or added HVAC equipment are highly satisfied with the comfort provided, the quality of the installation work, and the reliability of the equipment installed**. Overall, 74% of customer survey respondents said they were satisfied with the comfort provided, 74% said they were satisfied with the installation work, and 80% said they were satisfied with equipment reliability.

- **Customer survey respondents are *least satisfied* (46%) with the energy costs of running their replacement or additional equipment.** However, it is difficult to tell if this lack of satisfaction is primarily driven by what some might see as relatively high perceived costs or by failure to achieve the savings they led to expect.

- **Distributors and manufacturers recognize that the industry needs to move beyond selling efficient 'boxes' to using a 'systems approach' including proper installation and maintenance.** Several distributors stressed the need to raise contractors' and customers' awareness of the need for proper equipment and duct sizing and sealing and repairing leaky ducts when installing a new air conditioner or furnace.

- **Both contractors and distributors list "greater customer satisfaction" as one of the major benefits they gain from selling energy-efficient equipment.** Many contractors rely on word-of-mouth referrals. Dealers want customers satisfied with the brand of equipment they installed to help them build the brand's image for efficiency, quality, and reliability.

Low Consumer Awareness

Manufacturers and distributors described several aspects of the low consumer awareness of HVAC products.

- **California's low energy costs and mild climate limit consumer interest in the energy costs of heating and cooling their homes.**

- **Many consumers have low expectations for comfort in their homes.** Most have little experience with the comfort that can be created by properly designed and maintained HVAC systems. Thus, they do not know what they are missing.

- **Furnaces and air conditioners in most California homes are literally "out of sight and out of mind."** Because of their low importance and out of the way location, few homeowners maintain their equipment.

- **HVAC is an "intangible product" and "not a necessity" [in most of California]. In addition it is not a "fun purchase."**

- **Although "consumers *say* they are interested in energy efficiency, they do not buy energy-efficient products."**

Conclusions and Implications

From the findings presented in this paper PG&E and ODC staff developed several conclusions:

Contractors believe they face fierce competition for every job, but customers disagree. Contractors' view of the customer purchase decision-making process is not consistent with customer-reported purchase behaviors. Most contractors believe that they must compete on cost and on how quickly they can respond and install replacement units. On the other hand, one-half of all customers report that they get no bids or only one bid.

In addition, customers report they give contractors a reasonable amount of time—*faster may not necessarily be better;* customers report they are willing to discuss other issues such as improving comfort, reducing noise, and improving indoor air quality—*customers personal environment is important*; and customers report relying on contractors'

recommendations regarding the value of energy-efficient products and services—*they want contractor's advice.*
Conclusion: *residential HVAC sales may not be as competitive as contractors believe.*
Implication: working with manufacturers and distributors to stress the importance of taking more time to explore each customer's needs and to sell more efficient equipment and whole system / whole house improvements are likely to improve system efficiency.

Market shares of energy-efficient equipment appear to reflect regional markets' assessment of cost-effective efficiency in each climate zone. The market shares of "high" efficiency furnaces and air conditioners across the four PG&E climate zones reflect the relative annual heating and cooling loads in each zone. In climates with higher annual loads, higher efficiency equipment has a greater market share.
Conclusion: *customers in climate zones where higher annual loads make payback more acceptable are investing in more efficient capital equipment to reduce operating costs.*
Implication: "just" selling higher efficiency "boxes" will be difficult and may not achieve the desired results in areas with mild climates.

Most consumers have minimal awareness and little understanding of HAVC equipment. Further, manufacturers and distributors emphasize that few consumers are interested in this purchase and most prefer to rely on a contractor's guidance.
Conclusion: *purchasing HVAC equipment is an infrequent task, possibly a once-in-a-lifetime experience for many consumers. In addition to being a novel event, the most salient feature for most consumers is that it is an unexpected major expense.*
Implication: Getting anyone to attend to information is difficult. It is difficult to educate consumers about infrequent events whose importance very few consumers recognize. Further, mass marketing is very wasteful, with an expected purchase incidence of less than three percent of households per year.

Customer satisfaction can be improved by pursuing broader "system improvement" goals. This research has shown that while they are highly satisfied with most aspects of HVAC equipment installations, a less than one-half of recent HVAC purchasers are satisfied with their energy costs. Distributors and manufacturers agree that greater satisfaction could be achieved through a systems approach.
Conclusion: *a narrow focus on replacing a failed unit with a more efficient 'box' achieves only a small portion of the overall potential energy savings.*
Implication: market transformation should support "whole system" and "whole house" approaches that support the installation of energy-efficient units with system and whole house diagnostic testing and remediation. Ensuring that efficient boxes are not installed on leaky duct systems or in homes with leaky, inefficient envelopes will provide customers with the savings they should expect.

References

Pacific Gas and Electric Company. 1999. "Residential HVAC Market Transformation–Market Characterization and Baseline Study."