

***Report of the Residential Contractor Program Evaluation***

***Volume 2***

**California Residential Retrofit and Repair  
Baseline Contractor Survey Summary Report**

***Prepared for:***

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# Work Completed as Part of the Report of the Residential Contractor Program Evaluation

<b>Report 1: PY98 Residential Standard Performance Contract Program</b>	
<b>Interim Evaluation.....</b>	<b>10/4/98</b>
<b>Report 2: Additional Research into Certification and Contractors' Attitudes .....</b>	<b>12/1/98</b>
<b>Volume 1: Phase I Residential Contractor Program Market Assessment.....</b>	<b>3/12/00</b>
<b>Volume 2: California Residential Retrofit and Repair Baseline Contractor</b>	
<b>Survey Summary Report.....</b>	<b>3/12/00</b>
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<b>Volume 4: Appendix B: Contractor Baseline Survey Banners.....</b>	<b>3/12/00</b>

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## **EXECUTIVE SUMMARY**

### **Background**

This report presents findings from a statewide survey of selected residential contractors operating in the state of California.<sup>1</sup> The purpose of this Baseline Contractor Survey was to establish a quantifiable assessment of the baseline practices and attitudes, related to energy efficiency, on the part of contractors who are providing services to the existing residential housing market. The results of this survey provide essential information against which the future performance of the Residential Contractor Program (RCP) and future programs may be measured.

The telephone survey instrument used in this research was designed by the Wirtshafter Associates team and fielded by International Communications Research (ICR) in November 1999. A copy of the survey instrument is found in Volume 3: Contractor Baseline Survey and Data Dictionary and the detailed cross-tabulated banners are bounded separately in Volume 4: Contractor Baseline Survey Banners. A stratified random sample of 1757 contractors was selected from the 1999 California Contractor State Licensing Board database using five license categories considered most relevant to the Residential Contractor Program: HVAC, glazing, insulation, electrical, and general contracting. A total of 444 contractors met the study's eligibility requirements and completed the survey.

A brief synopsis of key findings is summarized here.

### **Over-arching Factors Affecting Energy Efficiency Installations**

To better understand the barriers to increased usage and/or sales of energy efficient products across the various specialties, respondents were asked to estimate the proportion of their consumers who request high efficiency options and to identify the major factors preventing higher adoption rates. Residential contractors from all trades feel that the "lack of consumer demand" and "the higher cost or unfavorable economics" of the high efficiency options are the most important factors preventing contractors from providing more energy efficient equipment and services. The contractors generally feel that the high cost to purchase and install the equipment is the most important factor preventing consumers from installing the equipment. While many of these respondents likely see the first-cost barrier as being important, some of these respondents also feel that the cost is high relative to annual savings. Most contractors either do not know the paybacks for major items, or see the paybacks as being greater than 5 years for major energy efficiency measures.

Table E-1 summarizes the results for this question by each contractor specialty addressed in this survey.

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<sup>1</sup> This research was conducted for CBEE as part of a project, which evaluated the 1998 Residential Standard Performance Contractor program and developed baseline market intelligence relevant to the 1999 Residential Contractor Program (RCP).

**Table E-1: Factors Preventing Contractors from Installing More Energy Efficient Equipment and Services**

(Percentage of Contractors Mentioning Factor)

Barrier	HVAC	Ducts	Windows	Insulation	Weatherization	Lighting
Lack of consumer demand	14%	42%	12%	35%	35%	47%
Cost of the system or unfavorable economics	45%	14%	32%	26%	13%	21%
Equipment availability	5%	1%	4%	0%	13%	7%
Equipment reliability and performance problems	3%	1%	1%	0%	6%	4%
My firm is not in a position to provide these services	3%	19%	5%	26%	30%	1%
Something else	1%	3%	1%	4%	0%	2%
There are no factors	0%	0%	45%	8%	6%	20%

It is interesting that cost factors are the largest perceived barrier for HVAC and windows, and lack of consumer demand is the primary barrier for all other service types. It is also noteworthy that a large proportion of window contractors feels there are no significant barriers impeding sales of energy efficient windows.

Low consumer demand appears to be a prevalent condition facing contractors who are in a position to promote energy efficiency in the residential retrofit market. For example, seven out of ten HVAC contractors reported that fewer than ten percent of their customers request SEER of 12 or better. Similarly, one-half of the contractors providing duct services indicated that consumer demand for these services is almost non-existent; nearly one out of five indicated that they had seen no consumer demand at all. Likewise, lighting contractors reported very limited consumer demand for higher efficiency lighting alternatives. For many contractors then, the key issue impeding greater sales of energy efficient measures is a pervasive lack of market demand for these products and services.

In marked contrast to the above, it is reported that approximately half of retrofit window consumers express an interest in energy efficient products. This information suggests that these product categories are in different phases of diffusion in the residential marketplace. Interestingly though, only one-third of the contractors indicated an awareness of Energy Star windows and certain efficiency features are not widespread in the market. Regardless, there appears to be greater market support for higher efficiency products in the windows markets as compared to other end-uses, both in terms of levels of consumer demand and in contractor support for the products.

## Notable Industry-Specific Findings

### HVAC

Furnaces with lower energy efficiency ratings are predominant in the retrofit market. The large majority of furnaces (82%) have AFUE ratings at or below 84%. Air conditioning system efficiency levels similarly trend toward the lowest allowable levels. The lowest SEER rating (10) is installed in nearly two-thirds of retrofits. Consumer demand for high efficiency systems is

low; over 70% of respondents indicated that fewer than one in ten of their retrofit consumers requests air conditioning systems with SEER ratings of 12 or better.

Most HVAC equipment is purchased through wholesalers/distributors. For the most part, higher efficiency equipment is readily available and equipment availability is not a primary barrier to increased market adoption. The greatest barrier as reported by our respondents is the higher cost of energy efficient systems (or, conversely, the poor economics of the efficiency investment).

### ***Duct Services***

Diagnostic equipment is not currently being used by most of the contractors offering duct services to the residential retrofit market. Fewer than half owns any diagnostic equipment and, among those owning such equipment, utilization tends to be low. Visual inspection is the most prevalent method of identifying duct service needs. Among respondents who offer duct repair and/or sealing, 80% complete a visual inspection to determine if services are needed. Only 22% report that they use diagnostic testing equipment at all. Fewer than one in five of those who do own diagnostic equipment report that they routinely use it on all their jobs.

Flex duct is by far the most common duct type used in both single family and multi-family homes. This material was reportedly used in 81% of jobs completed by respondents in 1998. Duct tape is by far the most commonly used material in sealing ducts.

Lack of consumer demand is the critical market barrier to increased penetration of duct sealing and related services. The baseline data indicate that more than half of the contractors who offer duct diagnostics and sealing see little or no consumer-initiated demand for these services.

### ***Windows***

Double-paned windows seem to be the overwhelming choice for contractors, as they are installed by over 95% of the contractors surveyed and account for 77% of the windows installed. Triple paned windows are virtually unused in the retrofit market. Over 80% of those surveyed indicate installing both vinyl and aluminum window frames, with vinyl accounting for 49% of the windows installed and aluminum accounting for 29%. Untreated glass is preferred to treated glass, being installed about 60% of the time as contrasted to the less used low-e glass (33%) and double low-e glass (5%).

As compared to the other contractor trades we interviewed, this group of contractors is most likely to feel that there are no significant barriers preventing them from selling energy efficient products. A significant number of window contractors (55%) feel that energy efficient windows are superior products to their lower efficiency counterparts for non-efficiency as well as efficiency reasons.

Even though windows make up a large part of EPA's Energy Star program, only 30% of the respondents installing windows indicate that they are aware of this EPA program. While those who were aware of the program indicate that over 60% of their window sales are certified, the lack of greater Energy Star awareness is an obvious concern. Nearly all windows are purchased directly through manufacturers; this suggests that manufacturers are not promoting qualifying products as Energy Star windows.

### ***Insulation***

There are few insulation contractors who are doing work in the residential retrofit market. The small number of providers of this service is no doubt reflective of significant market barriers either limiting the potential market size or depressing the profitability of business operations. Data collected in this baseline survey indicate that contractors feel that the most significant barrier to

insulation retrofits is cost rather than limited technical potential. Respondents indicate that they thought half of the existing homes still need insulation upgrades. Among those homes where the contractors had recommended additional insulation but the homeowner had elected not to have the work done, the key impediment was cost.

Most of the retrofit work addresses attic or ceiling insulation; approximately 60% of the insulation retrofitted in 1998 was of this type.

The average R-value of insulation added to single family attics is 20, while the average for basements (where applicable) is 18. The average R-value of insulation added to multifamily attics is 21, while the average for basements is 19. Title 24 does influence retrofit jobs and respondents report that 40% of consumers request that their homes be upgraded to Title 24 levels without any marketing push from the contractor.

### ***Weatherization***

More research needs be conducted in this area, as only three of the 17 respondents providing weatherization services reported providing air-infiltration reduction services and only one of these three respondents actually responded to the questions probing on this topic. For the record, that contractor lists weatherstripping and adding extra insulation as standard weatherization practices.

### ***Lighting***

Over 30% of the surveyed contractors who install lighting indicate that more than half of the 4- or 8-foot fluorescent fixtures they installed were T-8's with electronic ballasts. Almost 50% say that less than half of their installations involved these technologies, while 20% say they didn't know. Only 6% of the contractors say that over half the indoor fixtures they installed were compact fluorescents, 67% say less than half, and 27% do not know. Nearly 20% of the contractors indicate that over half of the outdoor security fixtures they installed were fluorescent, low-pressure sodium, or metal halide, 56% say less than half, and 25% do not know.

Low consumer demand appears to be a major barrier to greater contractor sales of higher efficiency lighting options. Two thirds of lighting contractors interviewed in the Contractor Baseline Survey report very low consumer demand among their customers; this includes 40% who have never had customers request energy efficient lighting. As is typical for other end uses, cost is perceived as a primary factor contributing to the lack of demand.

Information barriers seem to be significant for lighting technologies. Not only do contractors see this as a key barrier to consumer demand (second only to price), but the contractors themselves are also relatively uninformed as a whole with respect to the benefits of higher efficiency products. In all, 42% of lighting contractors report that they do not know what is the likely payback of energy efficient lighting. This low level of knowledge among potential product specifiers must certainly reduce baseline levels of marketing and promotion of energy efficient options.

## **Awareness of, and Interest in, Residential Contractor Program**

Only 19% of the firms surveyed say they are either very familiar or somewhat familiar with the residential contractor program. Of the firms that are familiar with the program, only 25% (28) say they are involved in RCP. Of the 28 who say they are in the program, only eight are actually on the qualification list and two more have taken a training course but are not yet approved. In summary, five percent of the contractors report being in the RCP program and only two percent

are actually signed up. Only two firms familiar with the RCP say that they planned to begin participating in the program in the future.

However, contractors indicate some willingness to learn more about the RCP. Nearly 70% say they would be interested in receiving more information about the program. Specifically, 65% want to see some literature, and 5% are comfortable receiving a phone call from someone associated with the program.

## **Implications for Future Research**

This research was conducted to provide a baseline measure of residential contractors' energy efficiency attitudes and behavior in the existing home market. The baseline study and the broader research conducted by this team depict a very complex marketplace. This situation suggests that some caution is needed in interpreting the research results. Generalized results may not always be appropriate given the level of diversity within the marketplace. To this end, the study team is undertaking additional research using these data to try to build more formal market segments among the different contractor types. Used with the above caveat, the survey does provide information that will be useful for program planning.

The most important of these products is a foundation for tracking the level of energy efficiency in the marketplace. Each of the four major measure types, HVAC, ducts, windows, and insulation have a viable set of questions to track the number and energy efficiency level of contractor activity. These questions along with contractor motivational questions will form the basis of future tracking efforts. To a lesser degree, questions for lighting and weatherization have also been developed, but program activity is so low, it is difficult to know for certain if the battery is appropriate.

Finally, this baseline study has provided direct support for current program planning. The results have given program managers an indication of the current marketplace. The baseline study has also shown the importance of program diversity in addressing the broad concerns of this market. The market segmentation will provide additional support to this end.

## CHAPTER ONE: OVERVIEW

### 1.1 Report Background and Organization

This survey was conducted as part of the evaluation of the 1998 Residential Standard Performance Contractor program. The purpose of this survey is to establish a quantifiable assessment of the baseline practices and attitudes, related to energy efficiency, on the part of contractors who are providing services to the existing residential housing market. The telephone survey was designed by the Wirtshafter Associates team and fielded by International Communications Research (ICR) in November 1999. A copy of the survey instrument can be viewed in the separately bounded Volume III: Appendices

This report is designed to be a concise summary of the important findings of the report. More detailed and complete reporting of the results is available in Volume III: Appendices and in an electronic Word document "Contractor Baseline Survey Banners.doc". This is a 400-page document containing an analysis of each question in the survey cross-tabulated by key descriptive factors. Responses that show statistically significant differences within grouped factors are noted. The descriptive factors include:

- **Sampled License Type**
  - General contractor
  - Electrical contractor
  - Glazing contractor
  - HVAC contractor
  - Insulation Contractor
  
- **Survey Section Completed**
  - HVAC section only
  - Duct section only
  - HVAC and Duct sections
  - Insulation section
  - Windows section
  - Weatherization section
  - Lighting section
  
- **Total Contacted**
  - Completes
  - Terminates

In addition, further analysis of the baseline data is being carried out as part of the Residential Contractor Program evaluation. Those results will be reported at a later date.

### 1.2 Survey and Sampling Methodology

Contractors were drawn at random to fill quotas for each building service type, such as insulation, HVAC, etc. The initial sample frame of eligible contractors was taken from the California Contractor State Licensing Board (CSLB) database. Initially 1757 contractors were contacted via telephone, and after screening out those contractors who did not work in existing residential households or did not do contracting on a full-time basis, 444 completed surveys were obtained. Table 1.1 shows the breakdown of contractors by type and housing sector.

**Table 1.1: Record of Contractors Contacted**

	Number	Net remaining
Initial Number of Contractors Contacted	1757	
Do not do residential work	1110	642
Do not work full time	23	619
Do not do retrofit jobs	79	540
Do not provide services in HVAC, ducts, windows, insulation, weatherization, or lighting	96	444

Development of an a priori sampling scheme was complicated by two factors: multiple licensing and variable qualification rates within contractor sub-populations. To address these complexities, a quota sampling approach was used in lieu of a proportional sampling strategy. Quotas of 100 each were preliminarily established for each of five contractor types: general, electrical, HVAC, glazing, and insulation. These quotas were adjusted to reflect the fact general contractors and insulation contractors were difficult to fill. Additional HVAC contractors were included, since these contractors were also the most qualified to be able to answer duct-related questions.

Each contractor with an insulation license had an equal chance of being selected in the insulation pool. Those contractors with multiple licenses had a better chance of being selected overall. This fact introduces a small amount of bias into the selection process. However, the bias is quite small because the vast majority of CSLB contractors have only one of the five license types. In fact, for our survey only 12 of the 444 completes held multiple licenses.

Table 1.2 shows the actual sample sizes for the survey. For those twelve contractors with multiple licenses, fractional counts are split among each license type. For example, a respondent who had both a glazing and an insulation license is counted as one-half glazing response and one-half insulation response. Similarly, an interview with a contractor with three licenses is credited with 1/3 for each license type. In most cases, the quotas were achieved or exceeded, with the obvious exception of the insulation type. There are not as many insulation contractors as there are of the other types, and most of these were not in the retrofit business. Oversampling HVAC contractors made up some of the difference. This was done because some HVAC contractors were being divided between answering HVAC and duct questions, so that extra HVAC would ensure enough sample for each product type branch.

### **1.2.1 Population Weighting**

The sample was selected to fill quotas of equal sizes for each of the five license types. These quotas and the actual distribution of respondents by license type are not proportional to the whole population of contractors in the State of California. It is therefore necessary to apply weights to responses to extrapolate survey results to the full population of California contractors. These sample weights for the analysis are presented in Table 1.2.

**Table 1.2: Actual Sample Sizes and Weighting Calculation**

		Electric	General	Glazing	HVAC	Insulation	Total
UNIVERSE	Number of Contractors	17,426	90,889	2493	7206	1180	119,194
	% of Universe	15	76	2	6	1	
SURVEY	Completes	98.5	81	102	139.5	23	444
	Terminates	439.17	397.00	109.50	241.67	125.67	1313
	Total Screens	537.67	478.00	211.50	381.17	148.67	1757
	Incidence	18%	17%	48%	37%	15%	25%
ADJUSTED	Estimated Universe	3097.68	15508.31	1063.21	2570.21	204.45	22, 444
	% of Total Adjusted Universe	13.80%	69.10%	4.74%	11.45%	0.91%	100.00%
	% of Total Completes	22.19%	18.24%	22.97%	31.42%	5.18%	100.00%
	Weight	0.62214	3.787607	0.206208	0.364485	0.175849	1

Table 1.2 firsts determines an incidence rate -- the percentage of total calls that found a contractor who provided service to existing residential homes in one of the relevant service areas. These incidence rates are used to adjust the number of licensed contractors in the CSLB database to an estimated universe of eligible contractors. Weights are then applied to square the number of completes with the proportional share of each license type to the total number of eligible contractors. These population weights are applied whenever a question is applied for the entire list of completes. For questions within a measure category, there is no need to weight the results.

### 1.3 General Characteristics of Sample

When asked what specific services their firm offered, contractors listed the following services as shown in table 1.3.

**Table 1.3: Percent of Respondents Offering Services**

Type of Service	Raw Percentages	Population-Weighted Percentages
HVAC	40 %	42 %
Window reflection and shading techniques	37 %	57 %
Lighting	33 %	56 %
Duct installation, repair, diagnostics	30 %	33 %
Insulation	21 %	42 %
Water heating	19 %	37 %
Weatherization	14 %	39 %
Remodeling	4 %	9 %
Decks	3 %	9 %
Pools and Spas	2 %	3 %
Electrical installation and repairs	2 %	1 %
Irrigation	1 %	4 %

On average, respondents report that they worked as subcontractors on 18% of their jobs. In those instances where respondents are sub-contractors, they specify the equipment 65% of the time, See Table 1.4. Specialty contractors with the greatest influence on measure specification are the HVAC contractors. Glazing contractors have the least influence but still specify more than half of the windows installed on such jobs.

**Table 1.4 Comparison of Specification Rates across Specialties  
(Proportion of Jobs as Subcontractor in Which Firms Specifies Measures)**

Specialty	(n)	None	1-25%	26-50%	51-75%	76-100%	Mean
Electric	73	18%	21%	15%	7%	40%	65%
General	24	17%	12%	8%	4%	58%	65%
Glazing	58	17%	19%	17%	3%	43%	54%
HVAC	86	12%	14%	6%	6%	64%	72%
Insulation	15	20%	13%	7%	0%	60%	65%
Total	256	16%	14%	14%	5%	52%	65%

Because time constraints prevented asking contractors to answer every question on every type of service they perform, respondents were asked to identify the primary service offered by their firm. The contractor was then given a battery of questions on the primary service. For HVAC contractors who also did ductwork, contractors were paid \$50 to complete both batteries. As shown in Table 1.5, contractors completed the following number of segment interviews.

**Table 1.5 Number of Responses within Measure Types**

Measure Type	Number of Completes *
HVAC	143
Duct installation, repair, diagnostics, balancing, sealing, or cleaning	97
Insulation	29
Windows	120
Weatherization/infiltration reduction, whole house assessment, house doctoring	17
Lighting	122

Completed measure sections exceed 444, because some HVAC contractors also answered duct questions

Please note that the numbers of respondents in Table 1.5 do not match the numbers in Table 1.2. For example, Table 1.2 has 23 insulation licensees, while Table 1.4 has 29 completed surveys. This is due to two factors. Contractors who supplied weatherization services were directed to that category regardless of the other services they supply. Other contractors who supplied more than one service were asked to specify the most important service and were placed in that category. In the case of insulation, some of the general contractors selected insulation as the service they provide most often. There are a few cases also where the contractor does not supply eligible service in the service type that s/he was licensed, but does in another service area.

The eligible contractors were asked if they performed work on existing single family, multi family (defined as 5 or more units), or mobile homes. Table 1.6 shows the number of contractors answering that at least 10 percent of their work is in that housing type. In some important cases, separate questions are asked for each housing type.

**Table 1.6: Breakdown of Services by Housing Type**

Housing Type	Unweighted Number of Contractors	Unweighted Percent of Total	Population Weighted Percent of Total
Do at least 10% Single Family	417	94%	92.6%
Do at least 10% Multi Family	184	41%	28.1%
Do at least 10% Mobile	51	11%	7.7 %

Contractors were asked, “*What is the maximum number of miles from your offices that you will accept work*”. Three answers predominate, 30 miles (47 responses), 50 miles (63 responses), and 100 miles (60 responses). The average number of miles that contractors will travel to accept work is 95; however, this includes 21 answers greater than 200 miles, and 62 greater than 100 miles. It is likely that contractors are including the possibility of a very lucrative opportunity well beyond their currently typical job. It will be more useful in the future to add “*similar in scope and profitability to your typical job*”. If we convert all of the estimates greater

than 100 miles to 100 miles, we find that the average distance drops to 60 miles. Additional analysis by county location does not reveal a consistent urban/rural differentiation.

Other factors that describe the types of contractors include:

- Most (95%) have only one office in California
- The average number of employees is 7.
- The average number of years in the business is 17.
- Annual revenues averaged \$197,000, with 25% of the sample not responding.

## CHAPTER TWO: BASELINE RESULTS FOR ALL CONTRACTOR TRADES

While much of this baseline survey focuses on installation practices and market penetration of energy efficient technologies, data which will serve as benchmarks for measuring impacts attributable to RCP in the future, the research also incorporates information intended as inputs to a market characterization analysis. At the time of this study, the fund of data available on residential contractors providing retrofit services was somewhat limited; leaving unanswered key questions on standard business practices among the target audience of contractors. Consequently, this research addresses some broader issues that were felt to be useful for developing a characterization of the target contractor market. This section of the report summarizes data on contractor business development, marketing strategy and perspectives on market demand and customer preferences. These data provide an indication of the contractors' opinions on the relative importance of energy efficiency to the success of their business operations.

### 2.1 Market Issues

#### 2.1.1 Business Generation and Barriers to Energy Efficient Sales

In order to better understand the contractor's process for getting business and closing a sale with prospective customers, a number of questions were asked addressing business generation and the relative importance of energy efficiency-related services to business development. These findings are summarized below.

**Job Leads.** Table 2.1 shows the response to a question on how contacts with prospective customers are initiated. Customer referrals and word of mouth are far and away the most common methods of generating new business, with 77% of respondents indicating that they receive jobs in that fashion. The only other common medium is the yellow pages, which is mentioned by 25% of the sample.

**Table 2.1: Sources of Leads**

Sources of Leads	Percent Mentioned
Referrals from customers/word of mouth	77 %
Yellow pages	25 %
Leads from other businesses	9%
Newspaper ads	5%
Customer inquiries,	5 %
Mailers, flyers, and door hangers	4 %
Pennysaver ads	3 %
General contractors	2 %
Telemarketing	1 %
Radio and television	1 %

**Consumers' Selection Criteria.** Contractors were asked to postulate on which factors are most important in consumers' decisions when selecting a contractor for a job. Table 2.2 shows the summary results regarding contractor perspectives on the key reasons their firm is selected

for retrofit jobs. It is clear that the reputation and service provided by a firm in the past is seen as the most important reason firms get jobs. Price and speed of installation are sometimes important factors. Energy efficiency is reported to be an important reason for duct services only.

**Table 2.2 Why Firm Was Selected**

Specialty	(n)	The speed with which you could replace the equipment	The price you bid	The past services provided / reputation of your firm	The brand or quality of equipment you offer	The energy efficiency options you provide	Something else/ Don't know
HVAC	41	2%	7%	56%	20%	2%	12%
Ducts	45	4%	11%	44%	0%	38%	2%
Windows	89	10%	18%	54%	0%	1%	6%
Insulation	22	0%	5%	77%	0%	0%	18%
Weatherization	17	6%	6%	82%	0%	6%	0%
Lighting	122	5%	4%	77%	9%	0%	5%

**Information Barriers.** It may be that contractors are not aggressively marketing the benefits of high efficiency options due to information barriers. Table 2.3 indicates that a large percentage of contractors remain unclear on how to calculate the payback period for energy efficient products. In several trades, nearly half of the respondents report that they did not know what the expected paybacks are. Those that do supply payback estimates often appear to be underestimating the payback lengths.

**Table 2.3: Contractor Knowledge of Payback Periods for Energy Efficient Options**

Measure	(n)	Under 2 years	2 - 5 years	5 - 10 years.	Over 10 years	Never a payback	Don't know
+90 furnace	70	3%	24%	16%	11%	3%	43%
SEER 12 air conditioner	65	2%	31%	15%	6%	0%	46%
Duct repair services	60	10%	32%	7%	2%	2%	47%
Energy efficient windows	89	16%	38%	9%	1%	1%	35%
Typical insulation job	22	5%	45%	41%	0%	0%	14%
Air infiltration reduction measures	8	50%	0%	0%	0%	0%	50%
Lighting services	122	17%	34%	8%	2%	4%	35%

In a separate series of questions addressing consumer behavior, lack of information is also mentioned as an important factor determining why consumers are not electing to purchase more of the high efficiency products. While lack of consumer awareness or knowledgeability is perceived to be a key barrier, there often is evidence that the contractors are not attempting to change this situation. Surprisingly, a large number of contractors do not know the energy efficiency ratings of the products they install. Clearly, this group is not educating consumers if they themselves are not aware of this information. General contractors are far less likely to be

knowledgeable on the energy efficiency information described above than specialty contractors doing the same types of installations.

**Perceived Barriers to Efficient Technologies.** Table 2.4 shows the summary results of a question on factors preventing firms from installing more energy efficient products and services. In all cases, either low consumer demand or cost/payback issues (or both) are mentioned as the principal barriers to energy efficiency. The majority of contractors interviewed do not view equipment availability and reliability as major factors.

**Table 2.4 Factors Preventing Firm From Selling More Energy Efficiency Products and Services**

Specialty	(n)	Lack of consumer demand	Cost of the system or unfavorable economics	Equipment availability	Equipment reliability and performance problems	Firm is not in a position to provide these services	There are no factors preventing sales	Something else/ Don't know
HVAC	96	20%	65%	7%	5%	5%	11%	1%
Ducts	97	41%	13%	2%	1%	19%	23%	4%
Windows	120	18%	27%	2%	1%	4%	45%	7%
Insulation	29	31%	24%	0%	0%	28%	10%	10%
Weatherization	17	35%	12%	12%	6%	30%	6%	24%
Lighting	122	47%	21%	4%	7%	1%	20%	5%

Respondents who indicated that their firm was not in a position to provide energy efficient services were asked to give one (unaided) reason explaining their response. Table 2.5 on the following page provides the raw score responses for why firms are not in a position to offer energy efficiency services. While many of the responses are unspecified, it appears that a lack of technical expertise or a need for training is an important impediment. (More than 22% gave one of these responses.)

**Table 2.5 Reasons Firms Are Not in a Position to Offer Additional Energy Efficiency Services**

Specialty	Too much competition	We lack the technical expertise	Employees do not have the training	Requires changing business practices	We do not have the equipment	My firm is too busy	Other	Don't know
HVAC							1	3
Ducts	1	1	2		1	5	3	5
Windows		1		1	1			2
Insulation	2		3					3
Weatherization		2		2			1	
Lighting								1

**Perceived Consumer Barriers.** To further probe on perceptions of low consumer demand for high efficiency options, contractors were asked to identify the key factors preventing greater adoption of energy efficient alternatives. Table 2.6 summarizes the respondents' perceptions as to why residential consumers are not adopting more energy efficiency technologies. Costs and lack of information are seen as the predominant issues.

**Table 2.6 Factors Preventing Customers From Selecting More Energy Efficiency Products and Services**

Specialty	(n)	Cost to purchase and install	Small annual energy savings or system not cost effective	Reliability concerns	O&M costs	Consumers prefer other features over efficiency	Consumers lack information	There are no factors	Something else/ Don't know
HVAC	85	68%	11%	4%	4%	4%	18%	4%	4%
Ducts	97	30%	10%	0%	1%	2%	37%	14%	9%
Windows	120	60%	3%	2%	0%	6%	17%	17%	8%
Insulation	29	48%	7%	3%	0%	3%	34%	7%	7%
Weatherization	17	18%	6%	6%	0%	0%	47%	6%	12%
Lighting	122	34%	5%	4%	3%	29%	31%	10%	12%

**Distribution Channels.** The distribution channel plays an important part not only in setting prices, but also in determining what products are readily available and the information provided on their performance characteristics. Opportunities to partner with members of the distribution channel to improve price, availability, and education level should not be overlooked. As Table 2.7 indicates, HVAC and lighting contractors are most likely to purchase products through wholesalers, distributors or dealers. Windows are generally purchased directly from the manufacturers, and insulation is purchased half directly and half from distributors. Few contractors report buying from local hardware stores, national home centers, lumberyards, or from sub or lead contractors.

**Table 2.7 Comparison of Supply Patterns by Contractor Trade**

Contractor Type	(n)	Directly from manufacturer	Wholesalers / distributors/ dealers	Local hardware stores	Large national home centers	Lumber yards	Partnering sub or lead contractor	Other sources
HVAC	139	28%	71%	0%	0%	0%	1%	0%
Windows	114	85%	13%	0%	0%	0%	0%	1%
Insulation	28	49%	43%	0%	2%	3%	4%	0%
Lighting	122	11%	76%	3%	4%	6%	0%	1%

\*each response given same weight regardless of number of units sold

**2.1.2 Knowledge and Interest in the Residential Contractor Program**

Only 19% of the respondents say they are either very familiar or somewhat familiar with residential contractor program. Only 5% of the contractors are very familiar with the program, 15% are somewhat familiar, 20% are not too familiar, and 60% are not at all familiar.

Of the contractors that are either very familiar or somewhat familiar, 25% (28) say they are involved in the program, while nearly 75% say they are not. We independently verified whether contractors who say they are in RCP are in fact enrolled. From the data supplied by the RCP Program Managers, we find that of the 28 who say they are in the program, only eight are actually on the qualification list, and two more have taken a training course but are not yet approved. Only 2 of the 75 contractors familiar with RCP, but not yet participating, expect to participate.

Nearly 70% of all the contractors surveyed say they are interested in receiving more information about the program. Specifically, 65% want literature sent to them, while 5% are interested in receiving a phone call. The remaining 30% are not interested in learning more about the program.

## 2.2 Firm Segmentation Questions

A battery of questions was included in the survey to attempt to profile the business approaches and attitudes prevalent among contractors. These questions address such issues as perceptions about market demand and strategies needed for success, attempts to differentiate themselves from their competition, support for marketing and training investments, and proclivity toward making significant changes to their business. The findings from this early analysis indicate that the bulk of the contractors are approaching business in what might be referred to as a status quo mode: they have been running their business more or less the same way for years and are not planning any major changes to their business operations at present. There is a recognition that markets are always changing, but contracting practices and available products are generally not viewed as changing dramatically in a way that requires them to change their business practices substantially. Instead, price competition appears to be a major driver of any strategic decisions for most contractors.

In contrast to the majority views outlined above, there is a smaller pool of contractors taking a more innovative view of their market opportunities. This tendency may manifest itself as a greater willingness to promote newer products, greater efforts to differentiate their firm from the competition, or a greater willingness to make changes and incorporate newer installation practices. Contractors pursuing service niches emphasizing higher quality or higher efficiency do not view their customers as being predominantly driven by first-cost.

A complete segmentation analysis is being conducted as part of the 1999 Residential Contractor Program evaluation. The raw results from the firm segmentation questions from this baseline study are listed below.

Our customers are usually looking for the best price up-front, not necessarily the least cost over the life of the product.

- 75% of respondents either strongly or somewhat agree with this statement
- 50% strongly agree, 25% somewhat agree, 15% somewhat disagree, and 10% strongly disagree.

Customers generally know what they want and need without our input so we don't usually try to give them a lot of new information

- 25% of respondents either strongly or somewhat agree with this statement
- 10% strongly agree, 15% somewhat agree, 35% somewhat disagree, and 40% strongly disagree.

Our customers are looking for premium quality and are willing to pay more to get it.

- 55% of respondents either strongly or somewhat agree with this statement
- 30% strongly agree, 25% somewhat agree, 35% somewhat disagree, and 10% strongly disagree.

Our firm doesn't need to do much advertising because we usually have enough business.

- 75% of respondents either strongly or somewhat agree with this statement
- 50% strongly agree, 25% somewhat agree, 15% somewhat disagree, and 10% strongly disagree.

We try to attract new customers by offering something different from our competitors

- 60% of respondents either strongly or somewhat agree with this statement
- 35% strongly agree, 20% somewhat agree, 15% somewhat disagree, and 30% strongly disagree.

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We've run our business more or less the same way for a number of years and we are not planning any major changes or additions to our services.

- 70% of respondents either strongly or somewhat agree with this statement
- 45% strongly agree, 25% somewhat agree, 20% somewhat disagree, and 10% strongly disagree.

Equipment and installation approaches change frequently in our industry.

- 55% of respondents either strongly or somewhat agree with this statement
- 25% strongly agree, 30% somewhat agree, 25% somewhat disagree, and 15% strongly disagree.

We think it is a good investment for our company to send employees to outside training programs.

- 50% of respondents either strongly or somewhat agree with this statement
- 30% strongly agree, 20% somewhat agree, 20% somewhat disagree, and 30% strongly disagree.

We do not generally use the new innovative products, we prefer to sell products that have been on the market for a while and that have a proven track record.

- 70% of respondents either strongly or somewhat agree with this statement
- 35% strongly agree, 35% somewhat agree, 20% somewhat disagree, and 10% strongly disagree.

The market is always changing and we have to change in order to continue be successful.

- 80% of respondents either strongly or somewhat agree with this statement
- 50% strongly agree, 30% somewhat agree, 15% somewhat disagree, and 5% strongly disagree.

## CHAPTER THREE: TRADE-SPECIFIC ISSUES

### 3.1 HVAC

#### 3.1.1 Annual Activity Levels

Table 3.1 shows the number of units installed in 1998 by the HVAC respondents.

**Table 3.1: Number of HVAC Units Installed in 1998**

Type of Equipment	Average per Contractor	Total Installed
Furnaces	105	12,484
Air Conditioners	97	11,583
Heat Pumps	22	2,684
Evaporative Coolers	23	2,943

**Business Development.** Firm reputation or previous service is perceived by contractors to be the primary reason they are selected for furnace and air conditioning jobs. Sixty-two percent feel that this was the case. Next is the brand of equipment offered at 14% and the bid price at 9%.

**Equipment Supply.** Large majorities (79%) of contractors purchase their HVAC equipment through wholesalers/distributors/dealers, with 57% saying they purchase all of their equipment this way. Only 18% say they never purchase through this channel. Most contractors (62%) do not purchase their HVAC equipment directly from the manufacturer. Just over one third (36%) purchase at least a portion of their HVAC equipment directly from manufacturers. Of this group, 18% make all of their purchases through this channel. Other channels are even less frequently used. Only 4% go to local hardware stores, 1% use large national home centers, and 2% purchase through a sub or lead contractor.

Sixty-two percent of contractors report that they never have trouble getting plus 90% efficiency heating equipment. Thirty-five percent occasionally have trouble.

Seventy-seven percent of contractors never have trouble getting energy efficient air conditioning equipment. Seventeen percent say they occasionally have trouble getting this equipment.

#### 3.1.1 Barriers

**Barriers for Contractors.** “Cost of the system or unfavorable economics” are the reasons that 45% of respondents feel prevent them from installing more energy efficient units. Fourteen percent feel that it is lack of consumer demand. Only 5% feel that unavailability is a significant factor.

**Barriers for Consumers.** When asked what factors they felt kept consumers from selecting energy efficient furnaces, cost is once again the primary factor. Forty-nine percent of contractors feel that cost to purchase is the issue, while another 7% feel that the annual energy savings are too small. Whether this is a measure of a first-cost bias is not clear from these results. It is probable that some of the respondents who find purchase cost an issue are seeing the high cost relative to expected savings, some are seeing sticker shock, and some are seeing

a lack of consumer access to financing. Therefore, no clear policy finding should be assumed based on this set of findings. Thirteen percent feel that a lack of information kept consumers from choosing energy efficient products.

**3.1.2 Furnaces**

**Product Types.** The 124 contractors report installing 10,580 furnaces in 1998. Table 3.2 shows the distribution of those furnaces by efficiency.

**Table 3.2: Number of Furnaces Installed in 1998**

System Efficiency Ratings	Unweighted percentages	Total number by Contractors	Weighted percentages
79-84% Efficiency	78 %	8806	82 %
85-90% Efficiency	18 %	1464	14 %
91-96% Efficiency	4 %	310	3 %

Contractors were asked what percentage of the furnaces they had installed in 1998 had an AFUE rating of 80%. Seventy-two percent report that at least half of the furnaces installed had this rating. Among these are 33% that say that all of their installations had an 80% rating. Furnaces with a 90% AFUE rating were installed much less frequently. Only 10% say that more than half of their installations were rated 90%, while 37% say that they did not installed any furnaces with this rating.

Fewer contractors still report installations of furnaces with a 95% AFUE rating. Sixty-six percent of contractors did not install a furnace with this rating during 1998. Seventeen percent had installed at least one, but state that these units made up less than 10% of their business.

**Payback.** Contractors seem to be lacking clear information on the payback time for furnaces with greater energy efficiency. When asked how long it takes for energy savings to make up for the incremental cost of a 90% vs. an 80% AFUE furnace, there is a broad range of answers. 25% say 2-5 years, 26% say 5-10 years and 18% say greater than 10 years. Twenty percent say that they do not know.

To examine the linkage between perceived payback and field activity; a statistic was formulated to compare those respondents who had installed +90 or better furnaces at least 40% of the time from those using efficient furnaces less often. Table 3.3 shows the perceived payback period for the two categories.

**Table 3.3: Comparison of Contractor Payback Perceptions by Sales Rates for Higher Efficiency Furnaces**

Payback period for +90 as compared to +80.	Use +90 furnaces less than 40% of the time	Use +90 furnaces more than 40% t of the time	Total
Less than 2 years	1	5	6
Between 2 and 5 years.	19	10	29
Between 5 and 10 years	27	3	30
More than 10 years.	21	0	21
There is never a payback	5	0	5
Don't know/Refused	22	2	24
Total	95	20	115

**Consumer Demand.** Contractors were asked what percent of their customers specifically requested furnaces with an efficiency rating of 90%. Eighteen percent say none of their customers, 35% say 10% or less, 13% say between 11 and 20%, and another 13% say 41-50%. Only 5% of contractors say that more than half of their customers request this type of equipment.

### 3.1.3 Air Conditioning

**Product Types.** When asked what percentage of the air conditioners they had installed in 1998 had a SEER rating of 10, 64.5% of respondents say more than half. Nearly half (48%) of the respondents had not installed any air conditioners with a SEER rating of 11. Of those who had, 22% say these units made up less than 10% of their installations.

Air conditioners with a SEER rating of 12 are installed a bit more frequently than are those with SEER 11. Installations of air conditioners with a SEER rating of 13 and 14 are fairly rare. Only 14% of respondents had installed a unit with a SEER 13 rating and only 11% had installed units with a rating of 14.

The 111 contractors who install air-conditioners installed 11,200 units in 1998. Table 3.4 summarizes the distribution of 1998 sales across efficiency ratings categories.

**Table 3.4: Number of Air Conditioners Installed in 1998**

System Efficiency Rating (SEER)	Unweighted percentages	Total number by Contractors	Weighted percentages
10 SEER	66	7268	65
11 SEER	10	1581	14
12 SEER	20	1894	17
13 SEER	2	266	2
+14 SEER	2	191	2

**Consumer Demand.** Most contractors encounter very limited consumer demand for energy efficient air conditioning. When asked what percentage of their customers specifically request 12 SEER air conditioning, 70% say less than 10% of their customers.

**Payback.** Contractors also seem to be unclear on the payback time for air conditioners with greater energy efficiency. Responses varied widely when asked how long it would take for the energy savings to payback the incremental costs between a SEER 10 as compared to a SEER 12. Forty one percent say 2-5 years, 25% say 5-10 years and 11% say more than 10 years. Twenty percent say that they did not know. Those who installed higher efficiency systems more frequently are more likely to believe the systems offered a payback of less than five years.

Table 3.5 shows the perception of HVAC contractors toward the payback of higher efficiency air conditioning systems.

**Table 3.5: Perceptions on Payback of High Efficiency Air Conditioner Systems**

Perceived Payback period for SEER 10 as compared to SEER 12.	Use 12 SEER less than 25 percent of the time	Use 12 SEER more than 25 percent of the time	Total n
Less than 2 years	3%	2%	3
2 to 5 years.	24%	67%	46
5 to 10 years	28%	20%	28
More than 10 years	16%	2%	12
There is never a payback	1%	0%	1
Don't know/Refused	28%	9%	23
Total n	68	45	113

**Servicing.** With respect to servicing of air conditioning equipment, a large majority of HVAC respondents (94%) report that they provide servicing on a regular basis to the residential retrofit market. In addition, a majority of these respondents, (60%) indicate that the approach they use in checking refrigerant charge is to refer to the manufacturer's information and to check pressures and temperatures of the systems they are servicing.

## 3.2 Duct Services

### 3.2.1 Annual Market Activity Levels

Table 3.6 summarizes the number of duct services provided by the respondents during the baseline year of 1998.

**Table 3.6: Number of Duct Services Jobs Performed in 1998**

Residential Market Segment	Number of Contractors Serving	Number of Jobs Completed	Average Number of Jobs per Contractor	Median Number of Jobs per Contractor
Single Family	85	6,756	79	28
Multi-family	40	2,188	55	2
Mobile homes	23	383	17	1.5

### 3.2.2 Products and Services Offered

Contractors were asked to detail their duct services. Breakouts are as follows:

- 95% Duct installation/retrofit
- 90% Duct repair
- 77% Duct insulation
- 75% Duct sealing
- 69% Testing for and repair of duct leakage
- 68% Safety checks
- 63% Duct balancing
- 42% Duct pressure diagnostics
- 20% Duct cleaning

Flex duct is by far the most common duct type used in both single family and multi-family homes. Eighty-seven percent of the responding contractors most often use flex duct. The others used aluminum ductwork, custom ductwork, or insulated ductboard.

**Diagnostic Services.** Of respondents who offer duct repair and/or sealing, 80% do a visual inspection to determine if such services are needed. Thirty-six percent rely on a customer description of problems and 22% use diagnostic testing equipment.

Thirty-eight percent of respondents claim to own diagnostic equipment. Of these, 29% own a flow hood, 23% a duct leakage tester, 17% a micromanometer, 14% a duct blaster and 14% a blower door. Nearly a quarter of the respondents, 23%, do not know what type of equipment they own. Forty percent of this group uses diagnostic equipment in 10-20% of their jobs. Nineteen percent use it on all jobs.

**Duct Sealing.** Duct tape is by far the most commonly used method of sealing ducts, being used by approximately half of the contractors providing duct sealing services. Mastic is the next most common sealing material, and banding is third. Only a few firms use aerosol sealant (6%).

The relative importance of duct servicing to the overall business of an HVAC contractor varies quite a bit. While duct repair and sealing services are frequently provided as part of a larger set of services, there is a segment of contractors - roughly one-fifth of this market - who tend to provide duct repair/sealing as a stand-alone service. Nearly twelve percent of this contractor population indicates that they never bundle duct sealing with other services and an additional nine percent indicate that they rarely bundle such services. At the other end of the spectrum,

27% indicate that these services are provided as a larger bundle of services at least 80% of the time.

Installing duct insulation is a fairly common outcome: 81% of respondents who test for and repair duct leakage insulate ducts in at least a portion of their jobs; 52% install duct insulation on every job. The R-value used in insulating ducts varies significantly. Twenty-one percent of respondents use R-1-5, 21% use R-6-10, 12% use R-11-20 and 6% use R-20 or higher. Thirty-nine percent could not say what R-value they are using.

### **3.2.3 Consumer Awareness and Demand**

Seventy-three percent of respondents state that customers request duct servicing at least a portion of the time. However, the level of demand experienced by many contractors is negligible. For 36% of these, the percentage of customers requesting service is less than 10%. Furthermore, 19% of contractors say that customers never ask for these services. Thus more than half of the contractors who provide duct services find little or no level of consumer demand for these services.

Past service to consumers is cited by 54% of respondents as the most important reason they were selected for a job. Twenty-one percent felt that bid price is the most important. Few contractors feel that consumers because of differentiation in terms of the types of efficiency services provided selected them.

### **3.2.4 Cost of Services**

Table 3.7 summarizes data on the average contractor costs for four common types of duct services.

**Table 3.7: Availability and Cost of Duct Services**

Type of Duct Service	Number of Contractors Providing	Average Charges for Services
Duct Sealing	20	\$356
Duct Balancing	38	\$234
Duct Pressure Diagnostics	22	\$181
Duct Cleaning	9	\$175

**3.2.5 Payback**

Contractor opinion on the amount of time it takes for duct repair work to pay back in energy savings varies greatly. Eighteen percent believe that it is less than 2 years, 36% say 2-5 years, 13% say 5-10 years and 23% do not know. This variability may be linked to the variations in installed R-values reported by these respondents.

**3.2.6 Barriers**

Lack of consumer demand is the main factor preventing 42% of respondents from doing more duct servicing. Nineteen percent attribute it to other factors such as being too busy. Contractors believe that customers do not have more duct servicing performed because they lack information (37%) and because the cost is too great (30%).

**3.3 Windows****3.3.1 Annual Activity Levels**

Table 3.8 shows the number of windows installation jobs completed by the interviewed firms in 1998.

**Table 3.8: Window Retrofit Activity in 1998**

Residential Market Segment	Number of Contractors	Number of Jobs	Average Number of Jobs per Contractor	Median Number of Jobs per Contractor
Single Family	68	4509	66	29
Multi-family	31	1872	60	12
Mobile	17	514	30	6

**3.3.2 Product Types**

Each contractor was asked about their use of vinyl, aluminum and wood windows. Eighty-four percent of the contractors report that they installed vinyl windows, 80% report installing aluminum windows, and 28% say they installed wood windows in 1998. On average, vinyl windows account for over 50% of the windows installed in 1998. Aluminum windows follow with 40%, and wood windows make up about 6% of the total windows installed. Table 3.9 gives the average number of windows by the type of windows.

**Table 3.9: Types of Windows Frames Used**

Frame material	Number of Contractors Using	Total Number of Windows	Percentage of All Windows	Average Number of Windows per Contractor
Vinyl	63	54,859	49 %	871
Aluminum	57	32,645	29 %	572
Wood	21	8,871	8 %	422
Other	4	16,666	15 %	4167

The use of single, double, and triple-paned windows was also queried. Fifty-five percent of the contractors report installing single-paned windows, 95% report installing double-paned windows, and only 3% of the contractors surveyed install triple-paned windows. As shown in Table 3.10, single-paned windows account for 23% of the total windows installed in 1998. Double-paned windows make up 77% of the installations. Triple-windows are almost non-existent in the retrofit market; they make up less than one percent of the total windows installed in 1998.

**Table 3.10 Glazing Characteristics of Baseline Window Market**

Window Type	Number of Contractors Using	Total Number of Windows of this Frame Type	Percentage of All Windows Installed	Average Number of Windows per Contractor
Single Pane	37	22,653	23 %	612
Double Pane	68	74,982	77 %	1103
Triple Pane	2	350	0 %	175

Finally, contractors were asked about their use of treated glass. Eighty-seven percent report installing untreated glass, 77% install low-e glass, 16% install double low-e glass, and 7% of the contractors surveyed report installing “something else”. On average, 60% of the windows installed in 1998 had untreated glass, 33% had low e glass, 5 % were double low e glass, and the remaining 2% were ‘something else’.

**3.3.3 Energy Star Awareness**

Only 30% of the contractors surveyed were aware of EPA’s Energy Star program, which, among other things, rates energy efficient windows. Of those respondents who were aware of Energy Star, 73% state that Energy Star products are available in their area. Again, those who indicate awareness of Energy Star, report that on average over 60% of their window sales are Energy Star certified.

**3.3.4 Barriers**

When asked to list factors preventing the contractor from selling more energy efficient windows, 32% list cost or unfavorable economics, 12% list lack of consumer demand, 5% say their firm was in no position to provide those services, 4% list equipment availability, 1% list reliability problems, and 42% say there are no factors impeding sales of higher efficiency windows.

When asked to list factors preventing customers from buying more energy efficient windows, 60% list cost, 17% list lack of awareness, 6% say customers prefer other features over efficiency, 3% list small annual energy savings, 3% list reliability concerns, and 17% say there are no factors.

### **3.3.5 Consumer Demand**

As far as consumer awareness, contractors state that just about half of their customers ask about energy efficient windows without prompting. Interestingly, this large market interest in more efficient windows is not seen as creating increased business for these contractors. When asked their perceptions about why customers selected their firms for retrofit jobs, few feel that offering efficient products is key to customer calls.

The most important reason for firm selection is the past services provided to customers, mentioned by 48% of the respondents. Next in importance is the price of the service with 22%, followed by firm reputation, 11%, speed of replacement 9%, efficiency options provided 5%, and "something else" or "don't know" 6%.

### **3.3.6 Performance**

Energy efficient windows seem to have a favorable service reputation as 55% of the contractors state that energy efficient windows are more reliable than standard efficiency units, 32% say they are just as reliable, and 7% believe them to be less reliable than standard windows. The remainder does not know what the reliability of energy efficient windows is.

### **3.3.7 Payback**

There was a little more disparity among contractors about the estimated payback of energy efficient windows. Twelve percent say it takes less than 2 years, 36% say the payback is between 2 and 5 years, 18% say the payback is between 5 and 10 years, 4% say it is more than 10 years, and 4 % say there is no payback. Twenty-six percent say they do not know how long payback takes.

### **3.3.8 Product Supply**

Windows most often are purchased directly from the manufacturer, rather than through intermediary sources. Eight-five percent of the contractors surveyed report buying a portion of their windows direct from the manufacturer, 20% report purchasing some windows from a distributor or dealer, and less than 1% purchase windows from lumberyards, local hardware stores, and sub-contractors.

On average, 83% of the windows installed in 1998 are purchased direct from the manufacturer, 13% are purchased from a distributor or dealer, 1% from sub-contractors, less than 1% from local hardware stores, and less than 1% are purchased from lumberyards.

Over three-quarters of the contractors reported having no problems obtaining energy efficient windows and the remainder report that they occasionally have trouble.

### **3.3.9 Installation Practices**

Contractors were asked to detail their specific installation practices. Listed below are the breakdowns.

- 55% of the contractors caulk during the installation of windows.
- 27% fill the cavity with insulation.
- 26% leave the old window frame in place

- 23% remove the old window frame.
- 23% use tape during installation.
- 16% apply Tyvek or an infiltration barrier.
- 13% extend and attach a vapor barrier to the frame.
- 6% go strictly by the manufacturer or industry standards.
- Less than 1% of the contractors screw the windows in place.

### 3.4 Insulation

#### 3.4.1 Annual Activity Levels

Insulation contractors working in the residential existing home market are very difficult to find. Most licensed insulation contractors report that they do not work in the residential retrofit market. Table 3.11 summarizes the activity levels as described by the respondents.

**Table 3.11: Number of Insulation Jobs Completed in the Residential Retrofit Market in 1998**

Type of Housing	Number of Contractors	Number of Jobs in 1998	Average Number of Jobs per Contractor	Median Number of Jobs per Contractor
Single Family	22	3986	181	50
Multi-family	12	266	22	20
Mobile	4	24	6	4

#### 3.4.2 Single Family Applications

Over three-quarters of the contractors report installing insulation in existing single family homes, over half install insulation in multi family homes, and less than one-fifth report installing insulation in mobile homes.

**Ceiling and Attic Insulation.** Over 90% of the contractors indicate installing insulation to the ceiling or attic of a single family home in 1998. Ceiling and attic insulation accounts for nearly 60% of the insulation installed in single family homes.

- For contractors who installed insulation in single family homes, the typical R-value already in place in the ceiling or attic averaged 14. Contractors report that the insulation that was added had an average R-value of 20.
- An average of 10% of the homes serviced by contractors are reported to have had a need for attic and ceiling insulation, but the homeowner elected not to go ahead with the installation. Of those homes that did not have attic or ceiling insulation installed, 23% of the contractors say it was because the homeowners could not afford the price of the service, nearly 23 % feel it was because other house repairs were a priority, 23% say it was because the homeowner did not want to pay the price, 15% feel it was because more insulation was not required by code, and the remaining say either the homeowner wanted to do the job, the home owner did not think there would be enough savings, or it was too expensive.

**Outside Wall Insulation.** Eighty percent of the contractors interviewed added insulation to the outside walls of single family homes in 1998. Installation of insulation in outside walls accounts for 18% of the insulation installed in single family homes in 1998.

- An average of 20% of the homes serviced by contractors are reported to have had a need for wall insulation, but the homeowner elected not to go ahead with the installation.
- Of those homes that did not have wall insulation installed, 33% of the contractors say it was because the homeowners could not afford the price of the service, 17 % feel it was because other house repairs were a priority, 8% say it was because the homeowner did not want to pay the price, 25% say the homeowner did not think there would be enough savings, 8% say it was too expensive, and 8% of contractors say they do not install wall insulation.

**Floor and Crawl Space Insulation.** Sixty percent of the contractors interviewed added insulation to the floor or crawl space of single family homes in 1998. Installation of insulation to the floor or crawl space accounts for 13% of the insulation installed in single family homes in 1998.

- For contractors who installed insulation in single-family homes floor or crawl space, the typical R-value insulation that was added had an average R-value of 18.
- An average of 33% of the homes serviced by contractors are reported to have had a need for floor or crawl space insulation, but the homeowner elected not to go ahead with the installation.
- Of those homes that did not go ahead, 66% of the contractors say it was because the homeowners could not afford the price of the service, 25% say the home owner did not think there would be enough savings, 8 % say that other house repairs were a priority, and 8% say the homeowner felt it was too expensive.

### **3.4.3 Multifamily**

**Ceiling and Attic Insulation.** All of the contractors that worked in the multifamily sector indicate installing insulation to the ceiling or attic of a multifamily home in 1998. Ceiling and attic insulation account for nearly 60% of the insulation installed in multifamily homes.

- For contractors that installed insulation in multifamily homes, the typical R-value already in place in the ceiling or attic averaged 12. Contractors report that the insulation that was added had an average R-value of 21.
- An average of 60% of the buildings serviced by contractors are reported to have had a need for attic and ceiling insulation, but the owner elected not to go ahead with the service.
- Of those buildings that did not have attic or ceiling insulation installed, all of the contractors say it was because the owners could not afford the price of the service. In addition one contractor also says it was too expensive and the owner wanted to do the job on his/her own.

**Outside Wall Insulation.** All of the contractors that worked in the multifamily sector in 1998 added insulation to the outside walls of at least one multifamily building. Insulation added to outside walls accounts for 32% of the insulation installed in multifamily homes in 1998.

- An average of 30% of the buildings serviced by contractors are reported to have had a need for wall insulation, but the owner elected not to go ahead with the installation.

- Of those buildings that did not have wall insulation installed, two-thirds of the contractors say it was because the homeowners could not afford the price of the service, and the remainder indicates 'other reasons'.

**Floor and Crawl Space Insulation.** Sixty percent of the contractors that worked in the multifamily sector added insulation to the floor or crawl space of multifamily homes in 1998. Installation of insulation to the floor or crawl space was done in approximately 30% of the multifamily homes that contractors reported working on in 1998.

- For contractors that installed insulation in multifamily homes floor or crawl space, the typical R-value insulation that was added has an average R-value of 19.
- An average of 60% of the homes serviced by contractors are reported to have had a need for floor or crawl space insulation, but the owner elected not to go ahead with the installation. Of those homes that did not go ahead, 66% of the contractors say it was because the homeowners could not afford the price of the service, and the remainder state 'other reasons'.

#### **3.4.4 Mobile Homes**

None of the contractors that indicated working on mobile homes installed insulation to the ceiling or attic, outside walls, or floor or crawl space of mobile homes in 1998.

- An average of 50% of the homes serviced by contractors are reported to have had a need for wall insulation, but the owner elected not to go ahead with installation.
- Of those homes that did not have wall insulation installed, all of the contractors say it was because the homeowners could not afford the price of the service.

#### **3.4.5 Potential Market**

When asked to estimate what percent of homes in their area still had the potential for attic insulation installation,<sup>2</sup> contractors report that about 50% of the homes still have the opportunity to install attic insulation.<sup>2</sup>

#### **3.4.6 Title 24 Issues**

Eight-six percent of the insulation contractors state that they are aware of Title 24 standards for insulation in new construction. Those contractors report that they bid or specified insulation to meet Title 24 standards in 75% of their jobs in 1998 and exceed Title 24 standards in 20% of the jobs in 1998. Contractors report that they bid or specified insulation to be below Title 24 standards in 5% of the jobs in 1998.

A fair number of consumers are aware of Title 24 standards as contractors report that 40% of their customers request that they meet or exceed Title 24 standards without prompting.

#### **3.4.7 Payback**

Ten percent of the contractors surveyed believe that it takes less than 2 years for customers to pay back in energy savings the cost of a typical insulation job. Forty-five percent say it takes between 2 and 5 years, 25% say it takes between 5 and 10 years, and 20% either do not know or refuse to answer.

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<sup>2</sup> Contractors were supposed to be asked the potential question for each of the three insulation placements: attics, walls, and crawl spaces. Unfortunately, a coding error meant that values for walls and crawl space were lost. This same error even raises an issue as to the validity of the attic responses.

### **3.4.8 Barriers**

When asked to list factors preventing the contractor from selling more insulation, 35% list cost of service or unfavorable economics, 26% list lack of consumer demand, 26% say their firm is in no position to provide those services, 8% say there are no factors, and 7% say something else, refuse or do not know. Of the firms that say they are not in a position to sell more, 40% say their employees did not have enough training, 25% say too much competition, and 40% do not elaborate.

When asked to list factors preventing customers from buying more insulation, 50% list cost, 35% list lack of awareness, 3% say customers prefer other features over efficiency, 7% list small annual energy savings, 3% list reliability concerns, 7% say there are no factors, and 10% do not know or refuse to answer.

### **3.4.9 Product Supply**

Manufacturers and their distributors are the major supply sources for insulation contractors as measured in terms of volume of sales or types of sources used. Fifty percent of the respondents report buying a portion of their insulation direct from the manufacturer, 50% report purchasing some insulation from a distributor or dealer, 10% purchase insulation from a national home center, 3% purchase product from lumberyards, 3% from local hardware stores, and 3% from sub-contractors.

In terms of sales volume, 50% of the insulation product installed in 1998 was purchased direct from the manufacturer, 40% was purchased from a distributor or dealer, 4% was purchased from sub-contractors, 3% from local hardware stores, 3% from lumberyards, and 2% from national home centers.

## **3.5 Weatherization**

### **3.5.1 Types of Services**

Out of all the contractors contacted, only 17 respondents say they provide weatherization services. Each of these customers was questioned on their weatherization activities even if they listed another service as being primary. The following is a list of weatherization activities and the number of contractors who say they perform these services.

- Air infiltration diagnostics and testing (0)
- Infiltration reduction (3)
- Whole house or house doctor inspections (6)
- Lighting analysis (4)
- Major appliance efficiency assessment (1)
- Combustion safety check (0)
- Furnace/boiler combustion efficiency testing (1)
- Indoor air quality assessment (1)
- Other (4)

### **3.5.2 Firm Selection**

When asked most the important reason for being selected for the job, over 80% say it was due to past services they had provided to customers. Six percent say it was the speed of service, 6% say it was the price that was bid, and 6% say it was the efficiency options they provided.

### 3.5.3 Sectors

Table 3.12 shows the breakdown by housing type. Nearly two-thirds of the surveyed contractors installed weatherization services in single-family homes in 1998. The average number of single family homes each contractor installed weatherization services was 64. One-third of the surveyed contractors installed weatherization services in multifamily homes with each contractor averaging 2 buildings per year. And two-thirds of the surveyed contractors installed weatherization services in mobile homes with each contractor averaging 27 mobile homes per year.

**Table 3.12: Weatherization Activity in 1998**

Residential Market Segment	Number of Contractors Serving	Number of Jobs Completed	Average Number of Jobs per Contractor	Median Number of Jobs per Contractor
Single Family	11	830	75	11
Multi-family	2	7	3.5	3.5
Mobile	2	54	27	27

### 3.5.4 Standard Practices

Only 3 firms provide air infiltration reduction services. Of those 1 lists weather stripping as a standard practice, and 1 lists adding other insulation. The other firm did not respond. One contractor says they made their determinations through visual inspection and another through the customer description. Of these three, one contractor reports using a blower door or other diagnostic equipment and that it was provided through a sub-contractor. This contractor went on to say that none of their jobs involve the use of diagnostic equipment.

### 3.5.5 Payback

Only one of the contractors estimated the payback for air infiltration measures, and he feels it is less than 2 years. The others report that they do not know how long the payback is. None of the contractors provide cost estimates.

### 3.5.6 Consumer Demand for Air Infiltration Measures

The three contractors that provide air infiltration measures were asked how often customers specifically request weatherization services. One says about 25% of the time and the other two do not provide estimates of how often customers request the service.

### 3.5.7 Barriers

When asked what factors prevent their firm from providing more weatherization services, 35% of the 17 contractors surveyed reply lack of consumer demand. Thirty percent say their firm is not in a position to provide more service, 12% respond that unfavorable economics is the reason, 12% say equipment availability is to blame, 6% say equipment reliability is to blame, 6% reported 'something else', 6% do not know, and 12% say there are no factors.

Of those contractors who say they are not in a position to offer more weatherization services, 40% say it would require a change in business practices and 40% say it is due to lack of technical expertise. Twenty percent respond with 'other reasons'.

When asked what factors prevent customers from purchasing more weatherization services, nearly 50% of the surveyed contractors say it was due to lack of consumer awareness. Eighteen percent report cost as the main factor, 6% cite small energy savings, 6% cite reliability concerns and the remainder do not know or refuse to answer the question.

## 3.6 Lighting

### 3.6.1 Annual Activity Levels

Table 3.14 shows the lighting activity by housing type.

**Table 3.14: Lighting Retrofit Activity in 1998**

Residential Market Segment	Number of Contractors Serving	Number of Jobs Completed	Average Number of Jobs per Contractor	Median Number of Jobs per Contractor
Single Family	81	7124	88	40
Multi-family	44	2824	64	20
Mobile home	13	177	14	5

### 3.6.2 Product Type

Contractors were asked to detail the types of lighting they most commonly install. Breakouts are as follows:

- 84% Indoor hardwired standard incandescent, halogen or compact fluorescent fixtures
- 82% Four or eight foot fluorescent fixtures
- 80% Motion detector lighting controls
- 74% Photosensitive lighting controls
- 73% Outdoor hardwired security fixtures

Contractors were asked what percentage of the 4 or 8 foot fluorescent fixtures they installed were T-8's with electronic ballasts. Thirty-three percent say more than half, 47% say less than half and 20% say they do not know.

When asked what percentage of indoor fixtures they installed are compact fluorescent, 67% say less than half, 6% say more than half and 27% do not know.

When asked what percentage of outdoor security fixtures is fluorescent, low-pressure sodium, or metal halide, 56% say less than half, 19% say more than half and 25% do not know.

### 3.6.3 Payback

Contractors are not at all clear on the payback of energy efficient lamps and lighting fixtures. Forty-two percent state that they do not know what the payback is likely to be, 16% say less than 2 years, 29% say 2-5 years, 9% say 5-10 years, 3% say more than 10 years, and 3% say there is never a payback.

### 3.6.4 Customer Demand

A large percentage (40%) of lighting contractors state that customers never request energy efficient lighting. Twenty-seven percent say that less than 10% of their customers request it. Thus, two-thirds of these contractors are finding little or no consumer demand for high efficiency options.

Seventy-seven percent of respondents feel that the reputation of the firm and services provided in the past are the most important reasons they are selected for lighting jobs. Availability of energy efficiency services is not felt to be an important consideration for their consumers.

### **3.6.5 Barriers**

Consistent with the finding reported above, when asked what prevents them from installing more energy-efficient lighting, 47% of lighting contractors cite lack of consumer demand. Twenty-one percent feel it is the cost of service, and 20% say there are no factors impeding sales of high efficiency lighting alternatives.

When asked what prevents customers from purchasing more energy-efficient lighting, the three top reasons are: the cost to purchase and install, a lack of information, and a preference for other features such as style or aesthetics over efficiency.

### **3.6.6 Product Supply**

Most contractors purchase their lighting from wholesalers/distributors/dealers (93%) or manufacturers (57%). Sixty-four percent of respondents never have trouble getting energy-efficient lighting equipment. Thirty percent occasionally have trouble.

## **CHAPTER FOUR: SUMMARY**

### **4.1 Statewide Baseline Overview**

The baseline data indicate that a large proportion of the residential retrofit market is not utilizing higher efficiency options available in the present market. In HVAC and lighting areas, this is manifested in consumers selecting lower efficiency alternatives in a majority of cases. In contrast, insulation retrofit activity often attains, or at least targets, Title 24 levels. However, overall retrofit activity for insulation appears to be very low. The windows market differs from the other specialties examined in that it is the sole market showing evidence of strong consumer interest in higher efficiency products.

The data collected in this baseline survey show that from the perspective of the contractors, the major barriers to higher efficiency products and practices are a lack of consumer demand and/or cost factors. Equipment supply and performance are not particularly important barriers for the types of measures examined in this research.

Awareness of RCP is found to be quite low (19%), a finding, which is not all that surprising given that the program is in its start-up year and that marketing of the program has been both targeted and deliberately limited in scope. However, this survey also documents low awareness of the Energy Star program, even among window contractors who characterize their consumer base as more interested in efficient products.

Unique findings for the individual specialties are summarized below.

### **4.2 Industry-Specific Baselines**

#### **4.2.1 HVAC**

Furnaces with lower energy efficiency ratings are predominant in the retrofit market. The large majority of furnaces (82%) have AFUE ratings at or below 84%. Air conditioning system efficiency levels similarly trend toward the lowest allowable levels. The lowest SEER rating (10) is installed in nearly two-thirds of retrofits. Consumer demand for high efficiency systems is low; over 70% of respondents indicate that fewer than one in ten of their retrofit consumers requests air conditioning systems with SEER ratings of 12 or better.

Most HVAC equipment is purchased through wholesalers/distributors. For the most part, higher efficiency equipment is readily available and is not a primary barrier to increased market adoption. The greatest barrier as reported by our respondents is the higher cost of energy efficient systems (or, conversely, the poor economics of the efficiency investment).

#### **4.2.2 Duct Services**

Most contractors offering duct services are not currently using diagnostic equipment. Fewer than half of the duct contractors own any diagnostic equipment and, among those owning such equipment, utilization tends to be low. Of respondents who offer duct repair and/or sealing, 80% simply rely upon a visual inspection to determine if services are needed. Thirty-six percent rely on a customer description of problems and only 22% report that they use diagnostic-testing equipment at all. Fewer than one in five who do own diagnostic equipment report that they routinely use it on all their jobs.

Flex duct is by far the most common duct type used in both single family and multi-family homes. This material was reportedly used in 81% of jobs completed by respondents in 1998. Duct tape is by far the most commonly used material in sealing ducts.

Lack of consumer demand is the critical market barrier to increased penetration of duct sealing and related services. The baseline data indicate that more than half of the contractors who offer duct diagnostics and sealing see little or no consumer-initiated demand for these services.

#### **4.2.3 Windows**

Double-paned windows seem to be the overwhelming choice for contractors, they are used by 95% of the contractors surveyed and accounted for 77% of the windows installed. Triple paned windows are virtually unused in the retrofit market. Over 80% of those surveyed indicated installing both vinyl and aluminum window frames, with vinyl accounting for 49% and aluminum accounting for 29% of the windows installed. Untreated glass is slightly preferred to treated glass, as it was installed about 60% of the time.

Installation practices vary greatly across the sample of contractors. Only the application of caulk during installation is practiced by over 50% of the sample. Interestingly, 26% say they leave the old window frame in place, while 23% indicate that they remove the frame, suggesting that there is no industry wide standard, as far as the old frame is concerned. Regarding the use of infiltration barriers, 16% apply Tyvek, and 13% extend and attach a vapor barrier to the frame. Another 23% report using tape during installation.

As compared to the other contractor trades we interviewed, this group of contractors is most likely to feel that there are no significant barriers preventing them from selling energy efficient products. A significant number of window contractors feel that energy efficient windows are superior products to their lower efficiency counterparts for non-efficiency as well as efficiency reasons.

Even though windows make up a large part of EPA's Energy Star program, only 30% of the respondents installing windows indicate that they are aware of this EPA program. While those who are aware of the program indicate that over 60% of their window sales are certified, the lack of greater Energy Star awareness is an obvious concern, and particularly interesting in light of the stronger consumer interest in efficient products in this category. Nearly all windows are purchased directly through manufacturers; this suggests that manufacturers are not promoting qualifying products as Energy Star windows.

#### **4.2.4 Insulation**

There are few insulation contractors who are doing work in the residential retrofit market. Most of the retrofit work addresses attic or ceiling insulation; approximately 60% of the insulation retrofitted in 1998 was of this type.

The average R-value of insulation added to single family attics was 20, while the average for basements (where applicable) was 18. The average R-value of insulation added to multifamily attics was 21, while the average for basements was 19. Title 24 does influence retrofit jobs and respondents report that 40% of consumers request that their homes be upgraded to Title 24 levels without any prompting from the contractor.

#### **4.2.5 Weatherization**

More research needs be conducted in this area, as only 3 of the 17 respondents providing weatherization services report providing air-infiltration reduction services and only 1 of these 3 respondents actually responded to the questions probing on this topic. For the record, that

contractor listed weatherstripping and adding extra insulation as standard weatherization practices.

#### **4.2.6 Lighting**

Over 30% of the surveyed contractors who install lighting indicate that more than half of the 4 or 8 foot fluorescent fixtures they install are T-8's with electronic ballasts. Almost 50% say less than half of their installations involve these technologies, while 20% say they do not know. Only 6% of the contractors say that over half the indoor fixtures they install are compact fluorescents, 67% say less than half, and 27% do not know. Nearly 20% of the contractors indicate that over half of the outdoor security fixtures they installed were fluorescent, low-pressure sodium, or metal halide, 56% say less than half, and 25% do not know.

A large percentage (40%) of lighting contractors state that customers never request energy efficient lighting. Twenty-seven percent say that less than 10% of their customers request it. Thus, two-thirds of these contractors are finding little or no consumer demand for high efficiency options.

### **4.3 Implications for Future Research**

This research was conducted to provide a baseline measure of residential contractors' energy efficiency attitudes and behavior in the existing home market. The baseline study and the broader research conducted by this team depict a very complex marketplace. This situation suggests that some caution is needed in interpreting the research results. Generalized results may not always be appropriate given the level of diversity within the marketplace. To this end, the study team is undertaking additional research using these data to try to build more formal market segments among the different contractor types. Used with the above caveat, the survey does provide information that will be useful for program planning.

The most important of these products is a foundation for tracking the level of energy efficiency in the marketplace. Each of the four major measure types, HVAC, ducts, windows, and insulation have a viable set of questions to track the number and energy efficiency level of contractor activity. These questions along with contractor motivational questions will form the basis of future tracking efforts. To a lesser degree, questions for lighting and weatherization have also been developed, but program activity is so low, it is difficult to know for certain if the battery is appropriate.

Finally, this baseline study has provided direct support for current program planning. The results have given program managers an indication of the current marketplace. The baseline study has also shown the importance of program diversity in addressing the broad concerns of this market. The market segmentation will provide additional support to this end.