Report
143-1

Tracking the HVAC Market for Energy Efficiency Services

August 1996
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Acknowledgments

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As restructuring of the Wisconsin utility industry goes forward, many organizations are rethinking how energy efficiency should be promoted. To design new programs, these organizations need information about how HVAC contractors view energy-related products and services. We established a baseline of energy efficiency attitudes and practices among Wisconsin's HVAC contractors by conducting 95 in-depth interviews in five, broadly-defined areas of Wisconsin: Madison, Milwaukee, Janesville/Beloit, Green Bay, and Eau Claire/La Crosse. We found that the HVAC market is served mostly by small, established, local contractors. Few of the contractors we interviewed offer energy efficiency services like energy audits and blower-door tests. Most HVAC contractors focus their work on equipment installation, repair, and service. However, most contractors support energy efficiency, as long as they feel it benefits the customer. This is shown by the large majority of interviewed contractors who recommend high-efficiency forced-air furnaces, but do not recommend high-efficiency central air conditioning, which they believe is not financially worthwhile in Wisconsin's climate. Contractors are also concerned about comfort, frequently saying that indoor air quality is suffering because today's houses are built too "tight." HVAC contractors recommend other energy-efficiency measures, such as setback thermostats and air-to-air heat exchangers, selectively, depending on the customer's wishes and the contractor's opinion and knowledge of the product or service. Contractors support utility rebates and utility promotion of energy efficiency, but do not want utilities to sell, install, or service HVAC equipment.
To help design and evaluate future energy-efficiency programs, we interviewed 95 contractors in five areas of Wisconsin to establish a baseline of energy-efficiency services in the residential and small commercial HVAC market. We explored market structure; services, products, and practices; utility influence; and training.

**Market Structure**

The average interviewed HVAC contractor is a small (6-person), established (25-year), local company that depends on referrals for business. Over 80 percent of contractor sales are residential. Contractors have more influence over equipment type and efficiency in the new residential market and the repair and replacement market, and less in the new small commercial market.

**Services, Products, and Practices**

Interviewed contractors generally recommend high-efficiency forced-air furnaces; statewide, 85 percent of units sold meet or exceed 90 percent efficiency. Most contractors do not recommend high-efficiency central air conditioning, especially in northern Wisconsin; statewide, 27 percent of units sold meet or exceed 11.0 Seasonal Energy Efficiency Ratio. Most contractors said the energy savings of high-efficiency central air conditioning or geothermal heat pumps don’t justify their additional cost.

Most interviewed contractors do not offer energy audits, blower-door tests, advice on insulation and weatherization, or customized estimates of energy savings. Contractors have mixed opinions of setback thermostats, whole-house fans, and electronic air filters; those that recommend them do so selectively. They tend to use rules of thumb to size equipment, rather than computerized heat loss calculations.

Many contractors said that modern buildings are too air-tight, but few contractors install air-to-air heat exchangers, saying that other methods are more economical.
Utility Influence

Most HVAC contractors approve of utility education and rebate programs, although they want utilities to stop recommending high-efficiency central air conditioning and to avoid selling, installing, or servicing HVAC equipment.

Training

Technicians learn on the job and are not licensed. Most contractors said they learn about new technologies through distributors and manufacturer representatives.

Based on our results, we make the following recommendations:

Research

- Research basic products and practices and disseminate cost and benefit information to HVAC contractors, especially the costs and benefits of air-to-air heat exchangers.
- Investigate whether sealed-combustion furnaces have a reduced risk of emitting carbon monoxide.
- To increase participation and reduce scheduling difficulties, conduct HVAC market tracking studies in the winter.
- Work closely with contractors to understand their perspective on products, services, and practices.
- Because the HVAC market changes slowly, wait until there is a reason, such as an education program, to do further market research.

Education

- To foster cooperation with contractors, utilities should consider staying out of the HVAC installation, repair, and replacement business.
- Continue to educate residential and small commercial customers on the benefits of energy efficiency.
- In education programs for HVAC contractors, use the same techniques and materials throughout the state.
Wisconsin utilities have promoted energy-efficiency programs since the early 1980's. Utilities designed their first efforts to increase customer awareness and provide education about energy efficiency. This typically involved television and radio advertisements, brochures, bill stuffers, and other promotional efforts emphasizing the benefits of energy conservation. Utilities also offered free energy audits for residential and small commercial customers. Many utilities gradually expanded their efforts to include rebates, financing, shared savings, and other incentives. However, in the past few years many utilities have scaled back most of these programs, favoring instead information programs or demand-side management bidding programs to promote energy efficiency.

In this changing climate, the Public Service Commission of Wisconsin, the Energy Center of Wisconsin, Wisconsin's gas and electric utilities, and other organizations concerned with energy conservation are investigating alternative ways to encourage energy-efficiency. To design new programs and measure their impact, it is essential to establish a baseline of products, attitudes, behaviors, and practices among Wisconsin's HVAC contractors. This was the objective of our study. To collect this information, we conducted in-depth interviews with HVAC contractors across the state.

In-depth interviews are a qualitative research method designed to explore a research issue and to identify and explore the range of attitudes, opinions, and preferences on a particular topic. In-depth interviews can not confirm hypotheses or predict the percentage of contractors that hold a certain opinion or attitude. Based on the consistency of their responses, and the fact that contractors frequently reported similar practices and products among their competitors, we believe our results are representative of most other contractors. But the reader should evaluate the results of this study in light of the qualitative nature of the research.
Method

We interviewed 95 HVAC contractors in five areas of Wisconsin between August 22, 1995, and January 18, 1996. The five areas, or city-regions, were Madison, Milwaukee, Janesville/Beloit, Green Bay, and Eau Claire/La Crosse. We completed 20 interviews in each city-region except Janesville/Beloit, where we completed 15 interviews. The city-regions included both the cities themselves and surrounding communities.

We interviewed a mix of HVAC contractors in each city-region, ranging from small one-person shops that concentrate on service and repair to large contractors with more than 30 employees that serve the residential, small commercial, and large commercial and industrial sectors. Although we did not interview a large proportion of HVAC contractors in most city-regions, we did interview a mix of contractors who provide many overlapping and complementary services. Appendix A describes the sampling methodology.

Except where noted, the descriptions of opinions, attitudes, behaviors, and practices apply to all five city-regions. Appendices B through F report findings for individual city-regions.

The in-depth interviews, lasting up to one and one-half hours, included both open-ended and close-ended (yes/no, multiple choice) questions designed to identify and explore the products and services HVAC contractors provide to the residential and small commercial sectors. Appendix G contains the instrument used to conduct the interviews. The interview questions covered the following topics:

- Market Structure

  We asked HVAC contractors to describe the residential and small commercial (defined as buildings that use heating and cooling equipment similar to residential equipment) new construction and repair and replacement markets and the interactions they have with other contractors, customers, and suppliers. We also asked them to describe their marketing, the service delivery process, and the services they provide in three market areas: new construction, service, and replacement.
• **Services, Products, and Practices**
  
  We asked HVAC contractors about the services and products they offer that address energy efficiency, safety, and comfort and the practices they use when they deliver services and install heating and cooling equipment. At the end of the interviews, we asked contractors about general policies and practices their company uses when recommending products and services. We asked them to read a series of statements and rate each statement on a scale of one to six, where one means "strongly disagree" and six means "strongly agree."

• **Utility Influence**
  
  We asked HVAC contractors about the influence that gas and electric utilities have had on their business and the impact that utility programs have had on their products, practices, and services.

• **Training**
  
  We asked HVAC contractors about staff training, sources of training information, and future training needs.
Results

Market Structure

Market Characteristics
When asked about the new construction market, HVAC contractors mainly discussed their interactions with builders and general contractors. When asked about the repair and replacement market, they mainly discussed the relationships they have with residential and small commercial customers. Many contractors work in both markets and provide repair and related maintenance services.

- For interviewed contractors, the residential market is substantially larger than the small commercial market.

Interviewed contractors install over 80 percent of their heating and cooling units in the residential sector. These contractors install over 20,000 residential units per year compared to just under 4000 small commercial units.

Table 1: Annual heating and cooling unit sales—all contractors

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Small Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forced-air furnaces</td>
<td>11,267</td>
<td>1914</td>
</tr>
<tr>
<td>Boilers</td>
<td>1247</td>
<td>248</td>
</tr>
<tr>
<td>Central air conditioners</td>
<td>7809</td>
<td>1812</td>
</tr>
<tr>
<td>Total</td>
<td>20,323</td>
<td>3974</td>
</tr>
</tbody>
</table>

- Most HVAC contractors are small—the average number of employees is six.

Over two-thirds of the HVAC contractors interviewed have 12 or fewer employees, although the number of employees ranges from one to 120. A few contractors in each city-region said they have reduced the size of their firm because being bigger did not necessarily mean increased profits.

- Many interviewees have over two decades of experience in the HVAC industry.

Across the state, respondents averaged 21 years of experience in the HVAC industry; their company averaged 25 years. Many contractors learned the HVAC trade from their fathers or grandfathers.
Most contractors prefer certain HVAC manufacturers and carry one or two brands.

Most contractors said that they change manufacturers very infrequently. They gave three reasons for this: 1) contractors are trained on a particular manufacturer's product; 2) they believe in the quality of the products they know; and 3) they have established relationships with suppliers who carry a limited number of brands.

Most residential and small commercial HVAC contractors serve customers within a 40-50 mile radius of their office.

Contractors working in the large commercial sector cover a broader geographic area but usually limit service to counties surrounding their location.

Employees of both large and small contractors sometimes start their own HVAC business.

Employees build relationships with customers and building contractors and some decide to start their own company and compete with their old employer.

Marketing and Service Delivery

Referrals from satisfied customers are the primary method of building a customer base.

Contractors say that they have long standing relationships with many of their residential and small commercial customers—resulting in repeat business and referrals.

Many HVAC contractors do not aggressively advertise their services.

Many contractors said they “do not need to advertise.” They generally limit advertising to Yellow Pages display ads and signs painted on trucks. A few of the larger contractors in each city-region do some television, radio, or direct-mail advertising. Although many manufacturers do some cooperative advertising with contractors, most contractors do not see this as a particularly effective way of adding to their customer base.

Timeliness is very important in the service delivery process.

HVAC contractors who consistently demonstrate their ability to meet deadlines and respond to service emergencies benefit from word-of-mouth endorsements from builders, general contractors, and customers.
• HVAC contractors usually limit their services to equipment installation, repair, and replacement.

Only a few contractors said they routinely discuss other safety and comfort issues. Many said they are trained to work on heating and cooling equipment and that is what they concentrate on.

Decision Making—New Construction

The primary decisions in the new construction market are which HVAC contractor to select and which brand and efficiency level to install.

• Builders and general contractors select the HVAC contractor.

HVAC contractors working in the new construction market rarely have contact with residential and small commercial customers. Builders and general contractors, especially small commercial general contractors, solicit bids and select sub-contractors. Residential home builders are more likely to work exclusively with a single HVAC contractor.

• Quality, workmanship, and price are the most important factors in the new construction market.

HVAC contractors said that pricing within an acceptable range of other bidders is important. However, many contractors also said their reputation for quality and workmanship will overcome at least a moderate price advantage that other HVAC contractors have.

• In the small commercial new construction market, builders and architects specify both the type and efficiency level of heating and cooling equipment.

HVAC contractors bid small commercial projects according to specifications and are rarely permitted to provide other options. Contractors said they have some opportunity to influence the brand installed because they can bid equipment of "like kind and quality."

• In the residential new construction market, HVAC contractors select the brand of equipment and have input into the efficiency level.

Most builders in the residential sector let the HVAC contractor install the brand of heating and cooling equipment that they prefer—recognizing that the HVAC contractor is responsible for service. Most HVAC contractors said that builders typically specify the efficiency level based on the HVAC contractor's recommendation and the customer's preference.
Decision Making—Repair and Replacement

In the repair and replacement market, HVAC contractors play a more significant role in customer decisions about brand, efficiency level, and when to replace rather than repair equipment.

- **Customers select HVAC contractors based on the contractor’s reputation for quality, integrity, and workmanship.**

  Contractors that consistently provide high quality equipment and responsive service benefit from word-of-mouth referrals. Many contractors said that sound advice about whether to repair or replace equipment is important to their long-term relationships with customers.

- **Contractors said that customers are aware of brands but do not have strong brand preferences.**

  Many contractors said that customers choose a contractor and then accept the contractor’s advice about what brand to install. Most contractors said that their reputation for quality and integrity will generally overcome any brand preference a customer may have.

- **Most residential and small commercial customers request a high-efficiency furnace when replacing an existing furnace.**

  According to HVAC contractors, many residential and small commercial customers prefer high-efficiency heating equipment. HVAC contractors have input into this decision, but the customer makes the final decision.

- **Most residential and small commercial customers do not request high-efficiency central air conditioning equipment when replacing existing equipment.**

  According to HVAC contractors, many residential and small commercial customers ask about central air conditioning efficiency but rely on the contractor’s advice regarding the cost/benefit tradeoff.

- **Most residential and small commercial customers rely on the HVAC contractor to select heating and cooling equipment that will provide comfort and reliability.**

  Most HVAC contractors said that warranties, comfort, and reliability are important to customers but taken for granted. In other words, customers assume that the contractor will select equipment that meets their expectations.
• HVAC contractors have varying opinions of the importance of financing in the replacement market.

Many contractors said that customers either pay for new equipment out-of-pocket or arrange for financing through their lending institution. A few contractors in each area said they accept major credit cards.

Some HVAC contractors in each city-region said that homeowners and small business owners are beginning to show more interest in contractor financing packages. Contractor-provided programs consist of 90 to 180 days free financing followed by relatively high interest rates. Manufacturers usually offer these programs, and, like most lending institutions, they limit financing to new equipment.

Contractors in Madison, Milwaukee and Green Bay were more likely to say that offering a financing package is becoming more important. Contractors in Janesville/Beloit and Eau Claire/La Crosse were more likely to say that financing is not important.

Services, Products, and Practices

Services
Few HVAC contractors offer services that do not directly relate to the installation, repair, or replacement of heating and cooling equipment. Few HVAC contractors offer residential and small commercial customers formal service and maintenance agreements, energy audits, carbon monoxide detection, smoke detection, or blower-door services. Most contractors said that these services are either 1) unnecessary, 2) the responsibility of other types of contractors, such as insulation contractors, 3) not popular with most residential and small commercial customers, or 4) already, or more appropriately, provided by gas and electric utilities.

• Because of the close relationships between HVAC contractors and customers, many contractors feel it is better for customers to contact them when they want their HVAC equipment serviced.

HVAC contractors build relationships with customers on the contractor's historical ability to solve problems and provide reliable advice. Because of these relationships, contractors often feel that formal service and maintenance agreements are not necessary.

Contractors who offer agreements said that they are not a significant fraction of their total revenue. Most contractors said that residential and small commercial equipment is reliable and requires limited servicing.
• Few HVAC contractors offer comprehensive energy audits, although some offer walk-through audits.

Only a few HVAC contractors offer services that approach the comprehensiveness of an energy audit. Most contractors said that the typical residential and small commercial customer is not interested in an energy audit. Many said they have no interest or expertise in energy audits and that is more appropriate for gas and electric utilities to offer this service. A few contractors in each area question the validity of the energy savings estimates that many audits provide.

A few contractors perform “walk-through” audits to assess insulation levels, weatherization, window quality, and other relevant characteristics of the home. They make heat loss and heat gain calculations to properly size equipment and point out opportunities for insulation and weatherization improvements.

• Few HVAC contractors sell or install carbon monoxide detection devices, although many approve of them.

Most contractors said that customers can buy carbon monoxide detectors from local retailers and install them themselves. The few contractors that sell detectors, or tried to sell them in the past, said that sales are weak.

Generally, HVAC contractors approve of carbon monoxide detectors. A few contractors said they lack confidence in carbon monoxide detectors because they are unreliable. A few others said that carbon monoxide “is not a problem with sealed-combustion furnaces”—implying that the furnace will shut down before carbon monoxide enters the home. Other contractors vehemently disagree.

• Many HVAC contractors carry carbon monoxide detection equipment in their trucks but do not use them routinely.

Across the state, HVAC contractors fall into four groups of about equal size based on their opinion of carbon monoxide detection services. The first group refers customers to the gas utility when they suspect carbon monoxide problems. Some of these contractors said they do not want the liability problems associated with offering this service. The second group routinely tests for carbon monoxide on service and maintenance calls and believes this is a valuable service. A third group provides the service if the customer requests it or if the heat exchanger is cracked—a potential source of carbon monoxide. The fourth group does said carbon monoxide detection hasn’t been perfected, and they lack confidence in detection equipment.
• **HVAC contractors support the use of smoke detectors but do not recommend or install them.**

Residential and commercial building codes require the installation of smoke detectors and, as a result, most HVAC contractors said that homes and small commercial buildings already have them. Similar to carbon monoxide detectors, contractors said that customers can buy smoke detectors at local retailers and install them themselves. A few contractors in each area said they do not install them because they want to avoid liability issues associated with faulty smoke detection equipment.

• **Many HVAC contractors have never heard of blower-door tests or are too unfamiliar with them to have an opinion.**

Most contractors familiar with blower-door tests said it is more appropriate for gas and electric utilities or insulation and weatherization contractors to offer this service. Many of these contractors associate blower-door tests with utility personnel and programs and have no interest in becoming involved in this type of service.

A few contractors in the Janesville/Beloit and Madison area offer blower-door services. Most of these contractors just started offering the service and said that Wisconsin Power & Light got them involved. One said that despite his best efforts there has been little demand. Two contractors in Brown County and one in Milwaukee County offer blower-door tests on a very limited basis, but they also said there has been little demand.

• **HVAC contractors do not actively promote weatherization services.**

Most interviewed HVAC contractors said that weatherization services are beyond their expertise. They also said that customers are aware of the importance of insulation and weatherization and coordinate projects themselves. Some HVAC contractors in each city-region said they routinely advise customers about proper insulation levels and point out opportunities for weatherization improvements.

Many HVAC contractors are cautious about recommending insulation and weatherization contractors because of a perception that some cut corners by installing weatherization materials improperly or by installing less insulation than needed to obtain agreed upon R-values.

• **The number of HVAC contractors participating in low-income programs varies by city-region.**

A few contractors in the Madison and Milwaukee areas, roughly one-third of the contractors in the Green Bay area, about one-half of the contractors in the Eau Claire/La Crosse area and most contractors in the Janesville/Beloit area work with low-income customers through utility weatherization programs or weatherization agencies.
• The services HVAC contractors provide to low-income agencies are very similar to the services they offer other residential and small commercial customers.

Most HVAC contractors said they install what the weatherization agency or utility specifies—typically a furnace with an A.F.U.E. rating of 90 percent or higher. Contractors usually bid on contracts or agree to hourly rates and basic service or replacement charges with the weatherization agency or utility prior to participating in the program.

Products

Few HVAC contractors sell or install products that do not directly relate to the installation, repair, or replacement of heating and cooling equipment. Contractors have a variety of opinions on many heating and cooling products.

• The majority of HVAC contractors across the state recommend high-efficiency furnaces.

Contractors consistently said that high-efficiency furnaces are a good investment for most residential and small commercial customers. Many said that both residential and small commercial customers are aware of high-efficiency furnaces and routinely ask for them.

• Eighty-five percent of the forced-air furnaces sold by interviewed contractors have efficiency ratings of 90 percent or higher.

Contractors who sell a substantial number of lower efficiency units (that is, 79-84 percent A.F.U.E. rating) gave three reasons. First, they are more affordable. Second, because they are more affordable, they appeal to rental property owners when the owner will not be paying the utility bill. Third, they require fewer repairs than high-efficiency units.
### Table 2: Furnace sales by efficiency level and city-region

<table>
<thead>
<tr>
<th>Efficiency rating (A.F.U.E.)</th>
<th>Green Bay</th>
<th>Eau Claire and La Crosse</th>
<th>Madison</th>
<th>Janesville/ Beloit</th>
<th>Milwaukee</th>
<th>All City-Regions</th>
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<td>90-100</td>
<td>92</td>
<td>81</td>
<td>84</td>
<td>86</td>
<td>78</td>
<td>85</td>
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<tr>
<td>85-89&lt;sup&gt;2&lt;/sup&gt;</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>79-84</td>
<td>6</td>
<td>18</td>
<td>11</td>
<td>12</td>
<td>21</td>
<td>13</td>
</tr>
</tbody>
</table>

<sup>1</sup> Weighted by contractor reported unit sales; contractors that sold the most units contributed the most to the percentages.

<sup>2</sup> Most manufacturers do not have units within this efficiency category.

- **Between city-regions there is some variation in the percentage of high-efficiency furnaces sold.**

  Green Bay contractors reported the highest percentage (92 percent of all units sold are 90-percent+ efficiency) while Milwaukee area contractors reported the lowest percentage (78 percent of all units sold are 90-percent+ efficiency).

- **Many HVAC contractors do not recommend the purchase of high-efficiency central air conditioners.**

  Contractors gave a number of reasons for this. First, and most importantly, many contractors believe that units with SEER ratings of 12.0 or higher are a poor investment. Contractors said that low operating hours and the additional cost of high-efficiency units results in paybacks that exceed five years and can exceed 10 years. Many contractors ask customers how they will use central air conditioning and recommend lower efficiency units for people operating them for relatively few hours. Second, contractors said that manufacturers do not aggressively promote the highest efficiency central air conditioners in Wisconsin. Third, people on limited budgets can not afford the additional cost of higher efficiency units.

  Contractors in Green Bay and Eau Claire/La Crosse were the most vocal in their opposition to high-efficiency central air conditioning—citing very low operating hours for the northern areas of Wisconsin.
• Seventy-three percent of central air conditioners sold by interviewed contractors just meet, or slightly exceed, the minimum federal efficiency standard of 10.0 SEER.

This is consistent with contractors' opinions of high-efficiency units.

Table 3: Central air conditioning sales by efficiency level and city-region

<table>
<thead>
<tr>
<th>Efficiency rating (SEER)</th>
<th>Percent of units sold</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Green Bay</td>
</tr>
<tr>
<td>13.0+</td>
<td>0</td>
</tr>
<tr>
<td>12.0-12.99</td>
<td>1</td>
</tr>
<tr>
<td>11.0-11.99</td>
<td>5</td>
</tr>
<tr>
<td>10.0-10.99</td>
<td>94</td>
</tr>
</tbody>
</table>

1 Weighted by contractor reported unit sales; contractors that sold the most units contributed the most to the percentages

• Contractors in the northern areas of the state—Green Bay and Eau Claire/La Crosse—install a very low percentage of high-efficiency central air conditioners compared to other city-regions.

Over 90 percent of all central air conditioning units sold in these areas just meet, or slightly exceed, the minimum federal efficiency standard of 10.0 SEER.

• HVAC contractors expressed a diversity of opinion on the usefulness of setback thermostats.

We can divide the contractors we spoke to into four groups of approximately equal size. The first group firmly supports the use of setback thermostats and promotes them on every job. This group said that setback thermostats work well and save customers money. However, some of these contractors do not always install them because people are not always interested.

The second group recommends setback thermostats to customers if they have set schedules and are young or interested in electronics. The feeling among this group is that many people, including most elderly individuals, have difficulty understanding how to program the units.
The third group only recommends setback thermostats for older furnaces. This group said that new high-efficiency furnaces and air conditioners are so energy-efficient that it does not pay to change the temperature setting when occupants are sleeping or away from home. Others said that high-efficiency furnaces have trouble recovering from the setback temperature on very cold days.

The fourth group strongly opposes setback thermostats in any situation. This group said setback thermostats are not worthwhile because the units are often defective, and because people do not operate them properly, do not change batteries often enough, and frequently call the contractor with service and maintenance problems.

- **Most contractors have concerns about electronic air filters.**

  Contractors raised four concerns about electronic air filters: 1) they are maintenance intensive in an era when people want maintenance-free equipment; 2) they often fail; 3) they are bad for the environment because they produce ozone; and 4) they are expensive. Contractors most frequently market electronic air filters to people who have allergies or other related health problems.

  Many contractors across the state said they routinely install Space Gard media filters as alternatives to electronic filters. Many contractors said that these new filtration systems do a good job and are very affordable ($200). The systems consist of an easily installed filter housing and $25 throw-away filters.

- **Many contractors have limited knowledge of whole-house fans and expressed no opinion about them.**

  A small group of contractors has installed whole-house fans but does so very selectively. Some of these contractors said that installation of whole-house fans is usually the building contractor's responsibility. A few contractors have installed whole-house fans in two story homes where adequately cooling the upstairs has been difficult. In some cases, they use the whole-house fan to remove warm air from the second floor and replace it with conditioned air from the first floor. A few other contractors have installed whole-house fans when the occupant strongly opposes central air conditioning.

  A small group of contractors strongly opposed whole-house fans. These contractors said that whole-house fans simply draw in pollen and humidity from the outside, reducing occupant comfort.
Awareness of air-to-air heat exchangers is high but the number of installations is low.

Across all city-regions, few contractors are installing air-to-air heat exchangers. Even contractors who are strong advocates of air-to-air heat exchangers said they have not gained widespread acceptance.

Awareness and installation of air-to-air heat exchangers are highest in the Eau Claire/La Crosse area. Contractors said that Northern States Power Company’s Star Home Program, which offered rebates for air-to-air heat exchangers in new homes, was highly effective. Most Eau Claire and La Crosse area contractors continue to recommend them but noted that installation rates have declined dramatically since NSP stopped offering rebates.

HVAC contractors have mixed opinions of air-to-air heat exchangers.

Two opinions are most common. One group of contractors said that air-to-air heat exchangers are too expensive ($1000 to $1400). Some members of this group said that piping outside air directly into the ductwork’s cold air return is a better way to ventilate a home. Others said that air-to-air heat exchangers do not transfer heat as well as manufacturers claim—making them expensive relative to their effectiveness. A second group of contractors offers air-to-air heat exchangers selectively, based on the customer’s ability to pay and the “tightness” of the home.

Most HVAC contractors say that geothermal heat pumps are not an economical heating or cooling technology for the Wisconsin climate.

Most contractors said that geothermal heat pumps are too expensive compared to other high-efficiency heating and cooling equipment. Some expressed concern about the level of comfort that geothermal heat pumps deliver without supplemental heat. One Milwaukee area contractor said that ten years ago he was the second largest heat pump dealer in the state. He went on to say that since then high-efficiency forced-air furnaces and central air conditioners have made geothermal heat pumps uneconomical, so he no longer installs them.

Some contractors said that geothermal heat pumps are too sophisticated for the average HVAC contractor. A few contractors in the Eau Claire/La Crosse area install a large number of geothermal heat pumps. One of these contractors installs over 50 units per year. This contractor credited a number of rural electric cooperatives in the area for helping to make customers aware of this technology.

Practices

Contractors mentioned few differences between small commercial and residential heating and cooling practices. Most contractors said they provide the
same basic products and services to both the residential and small commercial sectors. Most contractors said that installation practices and basic services are fairly standard and change very slowly. Many said they will continue to learn about high-efficiency furnaces and central air conditioners but that equipment efficiency does not have a dramatic impact on basic installation procedures and practices.

- **HVAC contractors are concerned that homes and small commercial buildings are being built “too tight.”**

  Most HVAC contractors express some concern about the “tightness” of homes and buildings because of possible indoor air quality problems, such as stale air or excessive moisture. Contractors frequently singled out two causes: 1) in new homes, inadequate use of bathroom and kitchen fans, and 2) in existing homes, excessive weatherization and sealing.

- **Most HVAC contractors size replacement furnaces and central air conditioners using rules of thumb.**

  This usually involves an educated guess based on window quality, wall and ceiling insulation levels, square footage of the home, and the size of the existing furnace. Contractors who perform detailed heat loss and heat gain calculations are the exception rather than the rule. Many do not believe the calculations are necessary and said their experience working in a variety of homes and small businesses is more relevant. Several contractors said that when they compared their estimates to computerized size determinations, they were usually the same.

  A few contractors in Madison, Milwaukee and Janesville/Beloit said they slightly oversize the furnace or central air conditioner so that the customer will always have ample heating or cooling. HVAC contractors in the Eau Claire/La Crosse area were most likely to perform heat loss and heat gain calculations. A few contractors in each area said they have computer software that helps them size furnaces and central air conditioning.

- **In the new construction market, furnace and central air conditioner sizing is more likely to include heat loss and heat gain calculations.**

  Most distributors have personnel with access to software programs who will size the system for the contractor as an inducement to buy from them. However, some contractors said they do not take advantage of this service and use rules of thumb instead.
• HVAC contractors do not give residential or small commercial customers customized estimates of energy savings for forced-air furnaces, although many give "rough estimates."

Most contractors prefer to either: 1) tell customers to call the gas or electric utility for this information, 2) give the customer the manufacturer's literature, which typically provides a range of savings estimates, or 3) give rough guidelines based on experience. Many said they simply do not want to get involved with estimates because of "hard feelings" that might develop if the estimates are not accurate. Others said that many customers have already decided to purchase a 90-percent+ efficiency furnace and, as a result, they do not request savings estimates.

The relatively few contractors who do give savings estimates base them on previous fuel bills and the difference in efficiency between the existing and proposed furnace. A few contractors in Milwaukee, Madison, and Green Bay mentioned software programs that allow them to calculate savings by looking at old fuel bills, the structural characteristics of the home, and the old versus new furnace efficiency. However, they said that they only provide this service if it will assist in a sale or if the customer requests it.

Policy and Practice Ratings

Table 4 gives information about the general policies and practices that contractors in each city-region use when recommending products and services. Interviewed contractors read the statements and rated each on a scale of one to six, where one means "strongly disagree" and six means "strongly agree."

The reader should use the following numbers cautiously for three reasons. First, and most importantly, we believe that the qualitative interview results provide a more comprehensive assessment of current attitudes, opinions, and practices because we were able to ask detailed follow-up questions. Second, there are only 20 respondents in each city-region (15 in Janesville/Beloit). Therefore, the average ratings apply to the respondents, but not necessarily all contractors. Third, the principal reason we collected the information was to track changes in individual contractors' attitudes, opinions, and practices over time.
### Table 4: Policy and practices ratings

<table>
<thead>
<tr>
<th>Statement</th>
<th>Madison</th>
<th>Janesville/Beloit</th>
<th>Milwaukee</th>
<th>Green Bay</th>
<th>Eau Claire/La Crosse</th>
</tr>
</thead>
<tbody>
<tr>
<td>We focus primarily on the short-term needs of our customers (such as purchase price and availability) when recommending equipment, rather than longer-term issues (such as operating cost).</td>
<td>2.1</td>
<td>2.0</td>
<td>2.8</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>It is becoming increasingly important for us to be responsive to customer concerns about the environment (e.g., clean fuels, greenhouse impacts, CFCs).</td>
<td>4.7</td>
<td>4.1</td>
<td>4.7</td>
<td>4.5</td>
<td>5.2</td>
</tr>
<tr>
<td>Except on rare occasions, we will only recommend energy-related equipment that is quickly available in the local market.</td>
<td>3.3</td>
<td>3.5</td>
<td>3.3</td>
<td>3.0</td>
<td>3.3</td>
</tr>
<tr>
<td>We almost always recommend energy-efficient equipment, even if it costs the customer a bit more up-front</td>
<td>5.0</td>
<td>5.2</td>
<td>4.7</td>
<td>5.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use electric end use equipment and appliances.</td>
<td>2.1</td>
<td>2.2</td>
<td>2.2</td>
<td>2.1</td>
<td>2.2</td>
</tr>
<tr>
<td>The services we offer are substantially the same as the services we offered 4 years ago.</td>
<td>4.3</td>
<td>3.5</td>
<td>4.0</td>
<td>3.8</td>
<td>4.5</td>
</tr>
<tr>
<td>We offer services that are not typical of other businesses in our industry.</td>
<td>3.2</td>
<td>3.7</td>
<td>3.5</td>
<td>3.7</td>
<td>3.8</td>
</tr>
<tr>
<td>Rather than making equipment recommendations, our role is primarily that of providing or installing whatever equipment customers request.</td>
<td>2.5</td>
<td>3.0</td>
<td>2.7</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>We encourage customers to consider the long-term savings of the products and services we offer.</td>
<td>5.2</td>
<td>5.1</td>
<td>4.9</td>
<td>5.4</td>
<td>5.3</td>
</tr>
</tbody>
</table>

1Contractors rated each statement on a scale of one to six, where one means “strongly disagree” and six means “strongly agree.”
<table>
<thead>
<tr>
<th>Statement</th>
<th>Madison</th>
<th>Janesville/Beloit</th>
<th>Milwaukee</th>
<th>Green Bay</th>
<th>Eau Claire/La Crosse</th>
</tr>
</thead>
<tbody>
<tr>
<td>We view customer concern about health and safety as an opportunity to offer new services.</td>
<td>4.7</td>
<td>4.9</td>
<td>4.7</td>
<td>5.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use gas-fueled equipment and appliances.</td>
<td>5.3</td>
<td>5.3</td>
<td>5.7</td>
<td>5.4</td>
<td>4.5</td>
</tr>
<tr>
<td>We almost always recommend the equipment with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.1</td>
<td>2.3</td>
<td>2.6</td>
<td>1.7</td>
<td>1.9</td>
</tr>
<tr>
<td>Rather than marketing specific services to our customers, our role is primarily that of providing the services our customers request.</td>
<td>3.7</td>
<td>4.2</td>
<td>3.7</td>
<td>4.1</td>
<td>3.6</td>
</tr>
<tr>
<td>We almost always recommend the repair alternative with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.4</td>
<td>2.8</td>
<td>3.2</td>
<td>2.7</td>
<td>2.5</td>
</tr>
<tr>
<td>We have made a substantial effort over the last 4 years to provide our customers with new services.</td>
<td>4.2</td>
<td>4.2</td>
<td>3.9</td>
<td>4.7</td>
<td>4.5</td>
</tr>
<tr>
<td>We provide information to customers about the environmental benefits of our products and services.</td>
<td>3.7</td>
<td>4.3</td>
<td>4.1</td>
<td>4.6</td>
<td>4.2</td>
</tr>
<tr>
<td>Heating and cooling contractors in my area are offering a number of services that generally were not available 4 years ago.</td>
<td>3.2</td>
<td>3.9</td>
<td>3.9</td>
<td>4.2</td>
<td>3.5</td>
</tr>
<tr>
<td>We try to persuade our customers to buy very energy-efficient equipment</td>
<td>4.7</td>
<td>4.9</td>
<td>4.3</td>
<td>5.4</td>
<td>4.7</td>
</tr>
</tbody>
</table>

1 Contractors rated each statement on a scale of one to six, where one means “strongly disagree” and six means “strongly agree.”

Utility Influence

When asked about the influence that utilities have had on their business, most contractors discussed utility sponsored high-efficiency forced-air
furnace and central air conditioning rebate programs. Contractors frequently mentioned that gas and electric utilities have largely eliminated these programs and that interactions with utility personnel have dramatically declined.

Program Impacts

- **Most HVAC contractors said that utility programs have substantially increased customer awareness and demand for energy-efficient forced-air furnaces.**

  Contractors said that utility advertising and promotion has brought energy efficiency to the forefront of consumer awareness, making it easier to sell these products. Many contractors said that residential and small commercial customers have decided to purchase high-efficiency equipment before they speak with a contractor.

- **The majority of contractors across the state believe that the market for forced-air furnaces has been permanently transformed toward the sale of high-efficiency equipment (that is, 90 percent+ A.F.U.E. rating).**

  Most contractors said they have not seen, nor do they expect to see, a decline in heating equipment efficiency levels as utilities scale back or eliminate their rebate programs. Contractors credit utility conservation programs and manufacturer research and development for this transformation.

- **Despite the transformation toward high-efficiency forced-air furnaces, contractors report that lower efficiency equipment (that is, 79-84 percent A.F.U.E. ratings) continues to be available.**

  A few contractors in each city-region said they have seen some decline in efficiency levels as utilities eliminate their programs. One Milwaukee area contractor said that there are a few general contractors from Illinois who are becoming significant players in the Milwaukee apartment and condominium market that have "brought along the 80-percent efficiency mentality."

- **Contractors install lower efficiency forced-air furnaces most frequently in apartment buildings, rental properties, and lower income households.**

  Contractors said that they get requests for lower efficiency forced-air furnaces most frequently when the building owner will not be paying the utility bill. They also install less efficient units in lower income households.
The majority of contractors say that utilities have not had a dramatic or sustainable impact on central air conditioning efficiency.

Most contractors said that central air conditioning rebate programs moved some customers up to higher efficiency central air conditioners. However, many said that without rebate programs the central air conditioning market has moved back to units that meet, or just exceed, the minimum federal efficiency standard (that is, 10 SEER).

Contractors said that utilities have had little impact on their basic services and installation practices.

Most contractors said that the only impact utility programs have is increasing the efficiency of the equipment they sell. Some contractors also said that past utility rebate programs that targeted operations and maintenance have significantly increased the number of "clean and checks" they do. But few contractors give utilities any credit for changing their installation techniques or maintenance practices.

**Future Role of Utilities**

Contractors generally agree that it is appropriate and desirable for gas and electric utilities to continue to offer energy audits and programs, and to educate residential and small commercial customers on the benefits of energy efficiency.

Residential and small commercial customers trust the advice they receive from electric and gas utilities.

Contractors generally agree that electric and gas utilities give energy-efficient products and services additional credibility. Many contractors said that customers pay attention to the advice they receive from utilities—viewing them as an unbiased source of information.

Most contractors would like gas utilities to continue offering carbon monoxide detection services.

Many contractors feel that this is an appropriate role for gas utilities. Others would like utilities to stay involved because they do not want the liability problems that can result from faulty testing equipment.

Many HVAC contractors would like to see utility rebate programs continue.

Many contractors said that utility rebate programs stimulate the market for energy efficiency equipment. This saves customers money and increases business.
• Contractors in northern areas of the state—Eau Claire/La Crosse and Green Bay—want utilities to stop promoting high-efficiency central air conditioners.

Many contractors believe that units with SEER ratings or 12.0 or higher are a poor investment. Many contractors in Eau Claire/La Crosse and Green Bay said that when utilities promote high-efficiency central air conditioning they are misleading customers by encouraging them to make uneconomical decisions.

• Most HVAC contractors feel that utilities should not encroach on their business by selling, installing, or servicing HVAC equipment.

Many contractors feel that ratepayers subsidize utility HVAC services, which gives utilities an unfair competitive advantage. Many contractors across the state contribute to a distributor-coordinated alliance to fight what they see as unfair competition by electric and gas utilities. Some distributors collect a $5 to $10 contribution from contractors for each furnace or central air conditioner sold and give the money to the alliance.

Training

• There are no state licensing requirements for HVAC contractors or their employees.

Approximately 15-20 municipalities require a local license to install, service, adjust, or modify HVAC equipment, according to a bulletin issued by the Wisconsin Department of Industry, Labor and Human Relations (HVAC Program, Safety and Building Division- SBDB10165-P(N0295)). According to a Wisconsin Department of Industry, Labor and Human Relations representative, some municipalities require that one individual within a contractor's organization pass a competency test.

• HVAC technicians mainly receive on-the-job training.

The typical new employee works with an experienced technician during the early years of his or her career. This is the major way that new technicians learn various systems, installation practices, and troubleshooting techniques.

• HVAC technicians use a variety of sources for training and education.

Even within a single firm, individual technicians develop their skills in a variety of ways, such as: 1) on-the-job training with experienced technicians, 2) technical schools, 3) union apprenticeship programs, which are often offered through technical schools, 4) manufacturer- and distributor-sponsored training seminars, 5) manufacturer training videos, and 6) local trade association seminars and conferences.
• Few contractors identified any future training needs.

Most contractors said they will continue to keep abreast of new technologies through distributors and manufacturer representatives. A few contractors said they needed training on large commercial equipment and computerized control systems. Contractors also mentioned air purification systems, refrigerant handling procedures, duct-cleaning equipment, energy-management systems, heat-recovery ventilation systems, and heat pumps.

Summary

Market Structure

HVAC contractors install, repair, or replace heating and cooling equipment. Few contractors offer comprehensive services that address household energy efficiency, safety, or comfort.

HVAC contractors depend on referrals from satisfied customers for sustaining and building their business. Few aggressively advertise their services. HVAC contractors consistently said that contractors who can meet deadlines and respond to service emergencies get repeat business and word-of-mouth endorsements from builders, general contractors, and customers.

Services, Products, and Practices

Across the state, few HVAC contractors offer residential and small commercial customers service and maintenance agreements, energy audits, blower-door tests, or carbon monoxide detection services. Most contractors said that these services are either 1) unnecessary, 2) the responsibility of other types of contractors, 3) not popular with customers, or 4) already, or more appropriately, provided by gas and electric utilities.

The majority of contractors across the state recommend high-efficiency furnaces. Eighty-five percent of the forced-air furnaces sold by interviewed contractors have efficiency ratings of 90 percent or higher.

HVAC contractors feel quite differently about energy-efficient central air conditioning. Many do not believe that the energy savings justify the additional cost. Contractors in northern Wisconsin—Eau Claire/La Crosse and Green Bay—strongly oppose high-efficiency central air conditioning equipment, saying that it is not economical for their customers. While many contractors in southern Wisconsin share this view, they are less vocal in their opposition.

HVAC contractors consistently referred to the “tightness” of new homes and small commercial buildings. However, few contractors mentioned new prod-
ucts or services that address the problem. Awareness of air-to-air heat ex-
changers is high, but installation rates are low. Eau Claire and La Crosse in-
stall the most air-to-air heat exchangers. Most attribute this to NSP’s Star
Home Program that provided rebates for air-to-air heat exchangers in new
homes.

Utility Influence

Most HVAC contractors said that utility programs have had a substantial
impact on increasing customer awareness and demand for energy-efficient
forced-air furnaces. The majority of contractors statewide believe that the
market for forced-air furnaces has been permanently transformed toward the
sale of high-efficiency equipment (that is, 90 percent+ A.F.U.E. rating). The
majority of contractors say that utility impacts on central air conditioning
efficiency levels have not been dramatic or sustainable. Many contractors—
especially those in northern Wisconsin—said they did not think utilities
should encourage customers to purchase them.

Most contractors would like utilities to continue to educate residential and
small commercial customer about energy efficiency. They would also like
utilities to continue their rebate programs. HVAC contractors feel strongly
that utilities should not encroach on their business by selling, installing, or
servicing HVAC equipment.

Training

For the most part, HVAC contractor personnel are trained on the job. Most
contractors said they keep abreast of new technologies through distributors
and manufacturer representatives.
Recommendations

Based on the interview results, we suggest the following actions to further promote energy efficiency in the HVAC market.

Technical Research

• *Research basic products and practices and disseminate cost and benefit information.*

Most product and practice information available to contractors comes from product manufacturers. Third party information on products like setback thermostats, high-efficiency central air conditioning, and geothermal heat pumps would help contractors assess the information they receive from manufacturers and suppliers. Third party information, which is seen as more objective than manufacturer's information, may be more successful in convincing contractors of the benefits of energy-efficiency products.

• *Research the costs and benefits of air-to-air heat exchangers.*

Most HVAC contractors are not installing air-to-air heat exchangers. Some claim that simply piping outside air directly into the ductwork's cold air return is a cost-effective ventilation method. Many said that air-to-air heat exchangers don't provide the heat transfer and savings that manufacturers claim. To increase sales of air-to-air heat exchangers, contractors must be convinced that it is cost-effective, and customers must be convinced that indoor air quality is problematic enough to warrant more ventilation. Information from an independent, knowledgeable third party may help resolve this issue.

• *Research the carbon monoxide risk of sealed-combustion furnaces.*

Some contractors believe that carbon monoxide "is not a problem with sealed-combustion furnaces"—implying that the furnace will shut down before carbon monoxide enters the home. Other contractors vehemently disagree, saying that carbon monoxide is a risk with any forced-air furnace.
• Work closely with HVAC contractors to understand their perspectives on products, services, and practices.

HVAC contractors will only respect advice and information from someone who has established credibility within the industry. People can build credibility by working closely with contractors and listening to their views. A number of contractors said that researchers must have a better understanding of the environment in which they operate.

Market Research

• Conduct HVAC market tracking studies in the winter (approximately December 1 through March 1).

This is the slowest season for most HVAC contractors. Contacting them during winter should maximize response rates and minimize scheduling logistics.

• Do not undertake further general tracking studies until there is a reason to believe that basic products, practices, or services have changed, such as a market transformation program.

Because products, practices, and services change slowly there is little need to track the HVAC market in the near future. However, because most utilities have ended their rebate programs, it may be useful to continue tracking forced-air furnace sales by efficiency level, although a focused telephone interview could accomplish this goal.

Education

• Continue to educate residential and small commercial customers on the benefits of energy efficiency.

Contractors agree that utilities have significantly increased customer awareness of energy efficiency. Most believe that it is appropriate for utilities to continue their education campaigns.

• To foster cooperative relationships with HVAC contractors, utilities should consider staying out of the HVAC installation, repair, and replacement business.

HVAC contractors across the state are currently contributing to an alliance to fight what they perceive as unfair competition in the HVAC industry by electric and gas utilities. Many interviewed contractors are suspicious of why utilities are working in the HVAC industry.
• Use the same education techniques and materials throughout the state.

HVAC contractors across the state have similar attitudes about many heating and cooling products and services. They also report that most basic practices are similar statewide. Consequently, educational information does not need to be specific to each area.
Appendix A: Sampling Methodology

The objective of our study was to establish a baseline of products, services, attitudes, behaviors, and practices among Wisconsin’s HVAC contractors. To meet this objective, we defined the geographic boundaries of five city-regions: Milwaukee, Madison, Janesville/Beloit, Green Bay, and Eau Claire/La Crosse. We then created a list of HVAC contractors in each city-region that work in the residential or small commercial sectors. Finally, we sampled from the list to recruit participants for the study.

Sampling Plan

City-Region Boundaries

To include all contractors who might work in a given metropolitan area, we defined the boundaries of each city-region broadly to include contractors located in major cities and surrounding communities. The city-regions are defined in Table A-1.

<table>
<thead>
<tr>
<th>City-Region</th>
<th>Geographic Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milwaukee area</td>
<td>Milwaukee, Waukesha, Racine, Ozaukee, and Washington Counties</td>
</tr>
<tr>
<td>Madison area</td>
<td>Dane County</td>
</tr>
<tr>
<td>Janesville/Beloit area</td>
<td>Rock County</td>
</tr>
<tr>
<td>Green Bay area</td>
<td>Brown County</td>
</tr>
<tr>
<td>Eau Claire/La Crosse area</td>
<td>Eau Claire, Chippewa, &amp; La Crosse Counties</td>
</tr>
</tbody>
</table>

1 Other communities in west-central Wisconsin such as Ashland, Washburn, Bayfield, Hudson, Neillsville, Menomonie, and Sparta were also included.

Identification of Contractors

We used the following Standard Industrial Classification (SIC) codes to identify HVAC contractors who work in the residential or small commercial sectors.
Table A-2: SIC codes for HVAC contractors

<table>
<thead>
<tr>
<th>Code</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1711-0100</td>
<td>Boiler &amp; furnace</td>
</tr>
<tr>
<td>1711-0101</td>
<td>Boiler maintenance</td>
</tr>
<tr>
<td>1711-0102</td>
<td>Boiler setting</td>
</tr>
<tr>
<td>1711-0103</td>
<td>Heating systems repair &amp; maintenance</td>
</tr>
<tr>
<td>1711-0104</td>
<td>Hydronics heating contractor</td>
</tr>
<tr>
<td>1711-0400</td>
<td>Heating and ac contractors</td>
</tr>
<tr>
<td>1711-0401</td>
<td>Mechanical contractor</td>
</tr>
<tr>
<td>1711-0404</td>
<td>Ventilation and duct work contractor</td>
</tr>
<tr>
<td>1711-0405</td>
<td>Warm air heating and ac contractor</td>
</tr>
<tr>
<td>1711-9902</td>
<td>Plumbing, heating</td>
</tr>
<tr>
<td>7623-9901</td>
<td>Chillers, refrigeration, ac repair</td>
</tr>
</tbody>
</table>

Sample Source

We evaluated three potential sources for lists of HVAC contractors: utilities, Dun & Bradstreet (a research service), and the Yellow Pages. To ensure a representative sample, we wanted to include both participants and nonparticipants in utility programs. We eliminated utility lists because some of them reportedly only include contractors who have participated in utility programs. This left Dun & Bradstreet and the Yellow Pages as possible sample sources, both of which include HVAC contractors irrespective of participation in utility programs.

To determine which source was more complete, we compared a Dun & Bradstreet database search (Market Place™ database, search using SIC division "Heating and Cooling" and zip code) to a Yellow Pages search (Survey Sampling Inc., Multifaceted Yellow Pages Service, search using category "Heating and Cooling Contractors"). The comparison showed that the Dun & Bradstreet listing was more complete, and for this reason, we chose the Dun & Bradstreet service as our sample source.

Sampling Procedure

Table A-3 gives the population of HVAC contractors identified in each city-region.
Table A-3: Population statistics

<table>
<thead>
<tr>
<th>City-Region</th>
<th>Number of HVAC Contractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milwaukee area</td>
<td>470</td>
</tr>
<tr>
<td>Madison area</td>
<td>100</td>
</tr>
<tr>
<td>Janesville/Beloit area</td>
<td>41</td>
</tr>
<tr>
<td>Green Bay area</td>
<td>66</td>
</tr>
<tr>
<td>Eau Claire/La Crosse area</td>
<td>125</td>
</tr>
</tbody>
</table>

1 There were a total of 86 contractors in La Crosse, Eau Claire, Altoona, and Chippewa Falls, and 39 contractors in Ashland, Washburn, Bayfield, Hudson, Neillsville, Menomonie, and Sparta.

For each city-region, we randomly selected 40 HVAC contractors from the population, with the objective of completing 20 interviews. To address potential shortcomings in the sampling process, we asked utility personnel to review the list established for their service territory. We also asked them to identify the largest contractors within their service territory. We did this in order to 1) identify HVAC contractors not on the list, 2) obtain contact names, and 3) ensure a mix of large and small contractors.

Recruitment

From the reviewed lists, we recruited a mix of contractors for the study. Recruitment consisted of calling contractors to introduce the study and ensure that they worked in the residential or small commercial sector. We then asked for their participation and set up an in-person interview. To increase the response rate and demonstrate that we recognized the value of their time, we offered contractors a $50 incentive to participate in the study. We also told them that the research was on-going and that they may be contacted periodically to track changes in the HVAC market.

We completed a total of 95 interviews—15 in the Janesville/Beloit area and 20 in the other city-regions. Table A-4 gives a breakdown of the interviews completed in the La Crosse/Eau Claire city-region.
<table>
<thead>
<tr>
<th>City</th>
<th>Number of Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>La Crosse</td>
<td>5</td>
</tr>
<tr>
<td>Eau Claire</td>
<td>5</td>
</tr>
<tr>
<td>Altoona</td>
<td>0</td>
</tr>
<tr>
<td>Chippewa Falls</td>
<td>1</td>
</tr>
<tr>
<td>Ashland</td>
<td>0</td>
</tr>
<tr>
<td>Washburn</td>
<td>0</td>
</tr>
<tr>
<td>Bayfield</td>
<td>0</td>
</tr>
<tr>
<td>Hudson</td>
<td>2</td>
</tr>
<tr>
<td>Neillsville</td>
<td>0</td>
</tr>
<tr>
<td>Menomonie</td>
<td>4</td>
</tr>
<tr>
<td>Sparta</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>
Appendix B: Janesville/Beloit

This section summarizes the results of 15 in-depth interviews with heating, ventilation and air conditioning (HVAC) contractors in the Janesville and Beloit Area, consisting of contractors located primarily in Rock County. The interviews were conducted between August 22, 1995 and December 1, 1995.

The purposes of the interviews were to: 1) discuss contractors’ opinions of and attitudes toward energy-efficient heating and cooling equipment, 2) understand the products, practices, and services of HVAC contractors who work in both the residential and small commercial sectors, 3) discuss the role of financing in residential and small commercial customer decision making, 4) understand the present level of training among HVAC technicians, and 5) explore both the past and potential future role of utilities in the residential and small commercial HVAC market.

General Business Characteristics

The typical contractor interviewed has about six employees, although the number varies from one person to 35 employees. Average annual gross revenue among these contractors is just over $800,000. The median is $350,000.

Interviewees have been working in the HVAC business for an average of 18 years (median is 17 years) and their company has been operating for an average of almost 24 years (median of 12 years). Almost two-thirds of the contractors interviewed work almost exclusively in the residential heating and cooling market. For the remaining contractors, the residential sector accounts for between 20 and 30 percent of their annual gross revenue.

The contractors interviewed generally serve customers within a 40 mile radius of their office—many limit their travel to Rock County. Larger contractors and contractors serving the large commercial sector cover a broader geographical area but usually limit service to the counties surrounding where their business is located.

Heating and Cooling Products

Forced-Air Furnaces

Collectively, the contractors we interviewed install just under 3900 residential and small commercial heating and cooling systems per year. Most contractors believe in the benefits of high-efficiency furnaces and recommend
them. Over 85 percent of the residential and small commercial forced-air furnaces sold by these contractors have A.F.U.E. ratings of 90 percent or higher (see Table B-1). Contractors who sell a substantial number of lower efficiency units (that is, 79-84 percent A.F.U.E. ratings) gave two reasons. First, they are more affordable. Second, they appeal to rental property owners when the owner will not be paying the utility bill.

Table B-1: Forced-air furnace sales by efficiency level

<table>
<thead>
<tr>
<th>Efficiency Rating (A.F.U.E.)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 percent or higher</td>
<td>86</td>
</tr>
<tr>
<td>85-89 percent</td>
<td>2</td>
</tr>
<tr>
<td>79-84 percent</td>
<td>12</td>
</tr>
</tbody>
</table>

1 Weighted by contractor reported unit sales
2 Most manufacturers do not have units within this efficiency category

Central Air Conditioners

Over one-half of the central air conditioning systems installed just meet, or slightly exceed, the minimum federal standards of 10.0 SEER (See Table B-2). Contractors give a number of reasons for this. First, and perhaps most importantly, many contractors believe that units with SEER ratings of 12 or higher are a poor investment. Contractors said that the low number of operating hours combined with the increased cost of high-efficiency units results in paybacks that easily exceed five years and can exceed 10 years. Many contractors ask customers how they use or intend to use their central air conditioning and recommend lower efficiency units for people operating the unit for relatively few hours. Second, manufacturers are not aggressive in promoting the very highest efficiency central air conditioners in Wisconsin. Third, people on limited budgets can not afford the additional cost associated with higher efficiency units.
Table B-2: Central air conditioning sales by efficiency level

<table>
<thead>
<tr>
<th>Efficiency Rating (SEER)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0 or higher</td>
<td>3</td>
</tr>
<tr>
<td>12.0 to 12.99</td>
<td>20</td>
</tr>
<tr>
<td>11.0 to 11.99</td>
<td>16</td>
</tr>
<tr>
<td>10.0 to 10.99</td>
<td>61</td>
</tr>
</tbody>
</table>

1Weighted by contractor reported unit sales

Other Heating and Cooling Products

We asked contractors about a number of other heating and cooling products such as setback thermostats, electronic air filters, whole-house fans, air-to-air heat exchangers, and geothermal heat pumps. The attitudes and opinions expressed about these products were mixed. Some contractors were very supportive of certain products while others were often strongly opposed to them. The products discussed as well as the opinions expressed are outlined below.

Setback Thermostats

Contractors expressed a diversity of opinion regarding the usefulness of setback thermostats. The contractors we spoke to can be divided into two groups of about equal size. The first group firmly supports the use of setback thermostats and promotes them on every job. This group said that setback thermostats work well and save customers money. A few of these contractors said they advise customers to only set the temperature back five degrees because they feel the furnace will not be able to catch up otherwise.

The second group of contractors do not recommend the installation of setback thermostats. These contractors either said that customers do not understand how to operate them correctly or that they (contractors) do not like to spend their time programming them for the customer.

Electronic Air Filters

Only a small group of contractors routinely markets electronic air filters to all of their customers. Many contractors said that they are reluctant to market them because of the cost ($500-$600) and because people do not maintain them properly.

By far the most popular filtration systems are the new Media Filters and Space Guard Filters. Many contractors said that these new filtration systems do a very good job and are very affordable ($200). These systems consist of a filter
housing that can be easily added to a new or existing furnace and $25 filters that can be thrown away.

Whole-House Fans

Many contractors have limited knowledge of whole-house fans and expressed no opinion about them. Some of these contractors said that the installation of whole-house fans would be part of an electrician's or building contractor's business. A small group of contractors have installed whole-house fans but do so very selectively. One contractor has installed whole-house fans in a few two-story homes where adequately cooling the upstairs has been difficult. In these cases, the whole-house fan is used to remove warm air and replace it with cooler outside air or conditioned air from the first floor. A few other contractors have installed whole-house fans in situations where the occupant is strongly opposed to central air conditioning.

Air-to-Air Heat Exchangers

Few contractors in the Janesville and Beloit area are strong advocates of air-to-air heat exchangers. About one-half of the contractors interviewed said that the price of air-to-air heat exchangers is too high ($1000 to $1400) to be cost-effective. According to these contractors, few customers are interested in air-to-air heat exchangers because of the cost. Some members of this group said it is better to introduce outside air to the home by piping it directly into the ductwork's cold air return. Others said that air-to-air heat exchangers do not transfer heat as well as manufacturers claim—making them expensive relative to their effectiveness.

A second group of contractors offer air-to-air heat exchangers selectively, based on the customer's ability to pay and the "tightness" of the home. This group is most likely to advocate their use in new construction projects, although many said that they do not push them with customers who have limited construction budgets.

Geothermal Heat Pumps

Contractors generally agree that geothermal heat pumps are not a cost-effective heating or cooling technology for the Wisconsin climate. Most said that they are too expensive relative to more conventional heating and cooling options. Some expressed concern about the level of comfort that geothermal heat pumps deliver without supplemental heat. A few contractors said that geothermal heat pumps are too sophisticated for the average HVAC contractor. A few other contractors said they don't know much about geothermal heat pumps.
Practices

All of the contractors interviewed said that word-of-mouth and referrals from satisfied customers are their primary methods of building a customer base. Many said that they simply "do not need to advertise." Approximately one-half of the contractors interviewed advertise their services. Advertising is generally limited to the Yellow Pages and local newspapers. A few of the larger contractors do some television, radio, or direct-mail advertising.

Decision Making Factors

According to contractors, their reputation for quality and workmanship, cost, and energy efficiency are the most important factors in residential and small commercial customer decision making. While contractors said that customers are concerned about cost and energy-efficiency they also said that customers make tradeoffs based on the information they receive from the contractor. In fact, many contractors said that customers choose a contractor and then listen to and act on the contractor's advice. Other less important decision making factors include reliability, warranty, comfort, and brand name.

Brand loyalty among residential and small commercial customers is identifiable but fragile. Most contractors said that their reputation for quality and integrity generally will overcome any concern a customer has regarding the brand of equipment.

The majority of contractors limit their discussions with customers to the various efficiency options available and warranty information. Only a few said that they routinely discuss air quality, electronic air filters, and thermostat controls.

Sizing of Heating and Cooling Equipment

Most contractors size replacement furnaces and central air conditioners based on rules of thumb. Usually this involves an educated guess based on window quality, wall and ceiling insulation levels, and square footage of the home. A few contractors slightly oversize the furnace or central air conditioner so that the customer will always have ample heat or cooling.

Contractors who perform detailed heat loss or heat gain calculations are the exception rather than the rule. Many do not believe the calculations are necessary and say their experience working in a variety of homes and small businesses is more relevant when sizing equipment.

Furnace and central air conditioner sizing is quite different in new construction. Distributor personnel with access to software programs will size the system for the contractor as an inducement to buy from them. However,
some contractors said they do not take advantage of this service and use
general rules of thumb.

**Energy Savings Estimates**

Most of the contractors in the Janesville and Beloit area provide customers
with a "rough estimate" of the savings they will realize by installing a 90-
percent+ efficiency furnace versus an 80-percent efficiency unit. Many of
these contractors also give "rough estimates" of the savings that will be real-
ized by replacing an older furnace (for example, one with a 60-65-percent
efficiency rating).

Contractors generally estimate the percentage savings to be roughly equiva-
 lent to the increase in efficiency ratio. For example, moving from a 60-percent
efficient furnace to a 80-percent efficient unit will result in a 20-percent en-
ergy savings, while moving from a 60-percent efficient unit to a 90-percent
efficient unit will result in a 30-percent energy savings. Approximately one-
third of the contractors interviewed do not give savings estimates because
they insist on the installation of units with efficiency ratings of 90 percent or
higher.

**Services**

We asked HVAC contractors about service and maintenance agreements, en-
ergy audits, carbon monoxide detection, smoke detection, blower-door tests,
and weatherization services. Many of the contractors we interviewed do not
see a need to proactively market new products and services because
"customers will call us when they have a problem." Contractors opinions and
attitudes about a number of services are outlined below.

**Service and Maintenance Agreements**

Few contractors offer formal service and maintenance agreements to their res-
didential or small commercial customers. Those who offer them said that it is
an insignificant portion of their overall revenue. Most contractors said that
residential and small commercial equipment is highly reliable and requires
limited servicing. As a result, many said it is better to advise customers to call
them when there is a problem. These contractors said that manufacturers'
warranties are enough and that anything else is unnecessary.

For a central air conditioner, the typical manufacturer's warranty consists of a
one-year parts warranty and a five-year compressor warranty. Some manufac-
turers also offer a one-year warranty on labor, while others extend the
compressor warranty to 10 years.
Energy Audits

None of the interviewed HVAC contractors offers energy audits. Most said that either they do not have the expertise or that customers are not interested in this type of service. A few of the contractors said that Wisconsin Power & Light Company offered this service (some are not sure if WP&L still does) and they refer interested customers to WP&L.

Carbon Monoxide Detection

Few HVAC contractors sell or install carbon monoxide detection devices because they are readily available at local retailers. Those who do sell them said that sales are weak.

Contractor opinions of carbon monoxide detection services are mixed and fall into four groups. The first and largest group of contractors refers customers to the gas utility when they suspect carbon monoxide problems. Some of these contractors said they do not want the liability problems associated with offering this service. The second group consists of contractors who routinely test for carbon monoxide on service and maintenance calls. A third group consists of contractors who provide the service if the customer requests it or they see a crack in a heat exchanger (an indicator of a possible carbon monoxide leak). The fourth group said carbon monoxide detection hasn’t been perfected and, as a result, they lack confidence in detection equipment.

A few of the interviewed contractors said that new forced-air furnaces will shut down before carbon monoxide enters the home. One of these contractors said that this was because of the “negative pressure system,” meaning that the furnace electronics would sense the difference in intake and exhaust pressure and shut the furnace off.

Smoke Detection

None of the HVAC contractors sell or install smoke detection devices because they are readily available at local retailers. Similar to carbon monoxide services, some contractors are concerned with being held liable for faulty smoke detection equipment. HVAC contractors unanimously agree that smoke detectors are valuable, but said it is something that most customers take care of themselves.

Blower-door tests

The majority of HVAC contractors have never heard of blower-door tests or are too unfamiliar with them to have an opinion. A few of the contractors interviewed offer blower-door tests but have done very few of them. Two contractors said they were just getting started with blower-door tests while another said that despite their best efforts there has been little demand for
this service. These contractors said that it was WP&L who talked to them about getting involved in blower-door testing. Most HVAC contractors have absolutely no interest in getting involved in this type of service.

**Weatherization Services**

Every HVAC contractor we interviewed said that weatherization services are generally beyond their expertise and they have little interest in getting involved in this area. Contractors are also cautious about recommending insulation and weatherization contractors because of a perception that some cut corners (for example, they do not install weatherization material properly, do not put in the amount of insulation they said they would, and so on). Many contractors said that customers are aware of the importance of insulation and weatherization and coordinate weatherization projects themselves. Many routinely ask customers about insulation levels and refer customers to the Yellow Pages if insulation is inadequate.

**Participation in Low-Income Programs**

Most of the contractors interviewed work with low-income customers through utility weatherization programs or through arrangements with weatherization agencies. In these situations the contractor installs what the weatherization agency or utility specifies—typically a furnace with an A.F.U.E. rating of 90 percent or higher. Contractors usually agree on hourly rates and a basic replacement charge with the weatherization agency or utility prior to participating in the program.

**Financing**

Most contractors interviewed said that financing is not an important service to offer residential and small commercial customers. These contractors said the most homeowners and small business owners take care of financing issues themselves. Others said that getting more highly involved in financing would give them little competitive advantage.

Only about one of every four contractors interviewed offer financing programs. These contractors said that few residential and small commercial customers participate. All of these programs were offered through local distributors and equipment manufacturers. Manufacturer programs typically consist of 90 to 180 days free financing followed by relatively high interest rates (for example, 16 percent and up). Manufacturers, like most lending institutions, limit financing to the installation of new equipment.
Training

Licensing

There are no state licensing requirements for either HVAC contractors or their employees. Approximately 15-20 municipalities require a local license in order to install, service, adjust, or modify HVAC equipment within the municipality (according to bulletin SBDB10165-P(N0295) issued by the Wisconsin Department of Industry, Labor and Human Relations (DILHR) HVAC Program, Safety and Building Division). According to a DILHR representative, some of these municipalities require that one individual within a contractor's organization pass a competency test. Testing is not required of every technician within the contractor's organization.

On August 1, 1994, it became mandatory that HVAC contractors register with DILHR. Registration consists of minimal standards of accountability and evidence of compliance with workers compensation and unemployment compensation.

While some HVAC technicians have gone through union certification programs, others have obtained most of their training on the job. Some contractors pay for union apprenticeship programs and classes at local technical schools while others leave training up to the individual employee. Even within a single firm, individual technicians have developed their skills in a variety of ways.

Training Providers

HVAC technicians look to a variety of sources for training and education on HVAC systems. These are: 1) on-the-job training working with journeyman or master technicians within their own companies, 2) technical schools, 3) union apprenticeship programs (often offered through technical schools), 4) manufacturer and distributor sponsored training seminars, 5) training videos provided by manufacturers, and 6) local trade association seminars and conferences. Most HVAC technicians appear to have taken advantage of a number of these offerings when initially learning the business. However, on-the-job training appears to be the predominate education method for most technicians. This is especially true for smaller non-union HVAC businesses.

Future Training Needs

Most contractors do not see any specific training needs developing in the future. Most said they will continue to keep abreast of new technologies and changes in building codes through informal channels, including their distributors and manufacturer representatives.
The few contractors who identified training needs most frequently mentioned a need for training on computerized control systems. Other needs identified by a few contractors include training on air quality issues, refrigerant handling procedures, duct-cleaning equipment, and heat pumps. One contractor said there is a need for training on blower-door tests.

Utility Programs and Relationships

All but one of the contractors interviewed has been involved with gas and electric utility rebate programs. Although many could not remember specific program names, they knew the programs were offered by Wisconsin Power & Light Company or one of the area gas companies.

Program Impacts

Most contractors said that gas and electric utility programs have had a substantial impact on the energy-efficiency level of equipment sold in the Janesville and Beloit area. Utility advertising and promotion has brought energy-efficiency to the forefront of consumer awareness, making it easier to sell these products. However, many said that the sustainability of these effects differs for furnaces and central air conditioning.

The majority of contractors said that the Janesville and Beloit market for forced-air furnaces has been permanently transformed toward the installation and sale of energy-efficient heating equipment, although lower efficiency equipment continues to be available. These contractors have not seen, nor do they expect to see, a decline in the efficiency level of heating equipment sold as utility rebate programs are eliminated or scaled back.

Contractors say utility impacts on central air conditioning efficiency levels are less dramatic and less sustainable. Most contractors said that central air conditioning rebate programs was effective in moving customers up to higher efficiency central air conditioners. However, many said that the move toward higher efficiency units was not as dramatic as past forced-air furnace rebate programs. These contractors said that, in absence of rebate programs, the central air conditioning market has moved back to units that meet, or just exceed, the minimum federal standard (that is, 10 SEER).

Most contractors said that utility programs that promote maintenance of HVAC equipment increase the number of "clean and checks" they do. Contractors have mixed opinions about the sustainability of this type of work. Most said that utility promotions dramatically increased the number of clean and checks they do. Some of these contractors continue to see a moderate level of activity in this area—despite the elimination of programs—while
others say the activity level has declined dramatically. All agree that activity
peaks during utility promotional campaigns.

**Future Role of Utilities**

Many contractors said that it is appropriate for gas and electric utilities to
promote routine maintenance checks and the installation of energy-efficient
equipment. Many also said that gas and electric utilities should continue to
administer and promote rebate programs and provide energy audits to inter-
ested residential and small commercial customers. Others said that gas utili-
ties should continue to take a lead role in providing carbon monoxide
detection services.

Contractors are consistent in their belief that utilities should stay out of the
HVAC service business and refrain from selling HVAC or related equipment.
Many contractors said that gas and electric utilities use rates to subsidize their
HVAC services, giving them an unfair competitive advantage. Many contrac-
tors contribute to distributor coordinated efforts to fight what they perceive
to be unfair competition by electric and gas utilities.

**General Policies and Practices**

At the end of the in-depth interviews, contractors were asked to read a num-
ber of statements related to general policies and practices their company uses
when recommending products and services to customers. They were asked to
rate each statement on a scale of one to six, where one means “strongly
disagree” and six means “strongly agree.” The results of this exercise are
illustrated in Table B-3.

The reader should review the following numbers with caution, two reasons.
First, and most importantly, we believe that the qualitative interview results
provide a more comprehensive assessment of current attitudes, opinions, and
practices. This is because we were able to ask detailed follow-up questions for
each area of interest. Second, the emphasis in our recruitment was to include
contractors of various sizes from a wide geographical area. As a result, the

group of contractors we spoke to are not representative of all HVAC
contractors in the Janesville and Beloit area.

The principal value in collecting the information presented in Table B-3 is
that it will provide a quantitative baseline from which to track changes in
individual contractors attitudes, opinions, and practices over time.
Table B-3: Policy and practices ratings

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>We focus primarily on the short-term needs of our customers (such as purchase price and availability) when recommending equipment, rather than longer-term issues (such as operating cost).</td>
<td>2.00</td>
</tr>
<tr>
<td>It is becoming increasingly important for us to be responsive to customer concerns about the environment (for example, clean fuels, greenhouse impacts, CFCs).</td>
<td>4.07</td>
</tr>
<tr>
<td>Except on rare occasions, we will only recommend energy-related equipment that is quickly available in the local market.</td>
<td>3.47</td>
</tr>
<tr>
<td>We almost always recommend energy-efficient equipment, even if it costs the customer a bit more up-front</td>
<td>5.20</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use electric end use equipment and appliances.</td>
<td>2.20</td>
</tr>
<tr>
<td>The services we offer are substantially the same as the services we offered 4 years ago.</td>
<td>3.47</td>
</tr>
<tr>
<td>We offer services that are not typical of other businesses in our industry.</td>
<td>3.67</td>
</tr>
<tr>
<td>Rather than making equipment recommendations, our role is primarily that of providing or installing whatever equipment customers request.</td>
<td>3.00</td>
</tr>
<tr>
<td>We encourage customers to consider the long-term savings of the products and services we offer.</td>
<td>5.07</td>
</tr>
<tr>
<td>We view customer concern about health and safety as an opportunity to offer new services.</td>
<td>4.86</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use gas-fueled equipment and appliances.</td>
<td>5.33</td>
</tr>
<tr>
<td>We almost always recommend the equipment with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.27</td>
</tr>
<tr>
<td>Rather than marketing specific services to our customers, our role is primarily that of providing the services our customers request.</td>
<td>4.20</td>
</tr>
<tr>
<td>We almost always recommend the repair alternative with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.80</td>
</tr>
<tr>
<td>We have made a substantial effort over the last 4 years to provide our customers with new services.</td>
<td>4.21</td>
</tr>
<tr>
<td>We provide information to customers about the environmental benefits of our products and services.</td>
<td>4.29</td>
</tr>
<tr>
<td>Heating and cooling contractors in my area are offering a number of services that generally were not available 4 years ago.</td>
<td>3.93</td>
</tr>
<tr>
<td>We try to persuade our customers to buy very energy-efficient equipment</td>
<td>4.87</td>
</tr>
</tbody>
</table>

1 Contractors were asked to rate each statement on a scale of one to six, where one means "strongly disagree" and six means "strongly agree."
Appendix C: Madison

This section summarizes the results of 20 in-depth interviews with heating, ventilation and air conditioning (HVAC) contractors in Dane County, including the cities of Cambridge, Cottage Grove, De Forest, Madison, Middleton, Mt. Horeb, Stoughton, Sun Prairie, Verona, and Waunakee. The interviews were conducted between December 27, 1995 and January 18, 1996.

The purposes of the interviews were to: 1) discuss contractors’ opinions of and attitude toward energy-efficient heating and cooling equipment, 2) understand the products, practices, and services of HVAC contractors who work in both the residential and small commercial sectors, 3) discuss the role of financing in residential and small commercial customer decision making, 4) understand the present level of training among HVAC technicians, and 5) explore both the past and potential future role of utilities in the residential and small commercial HVAC market.

General Business Characteristics

The contractors interviewed include a group of 10 contractors all with five or fewer employees, a group of five contractors each with 8-15 employees, and a group of five contractors all with 26 or more employees. These contractors range in size from a one-person shop to a firm employing 120 individuals. Gross revenue among these contractors averages nearly $1.8 million—ranging from $25,000 to $12 million, with a median of $700,000.

Interviewees have been working in the HVAC business for an average of nearly 22 years (median of 24 years) and their company has been operating for an average of almost 20 years (median of 18 years). Most contractors work in both the residential and small commercial sector. Most of the work conducted by these contractors is for replacement, service, and repair of HVAC equipment, but most also do some new construction work. Some focus primarily on the new construction market.

Most of the contractors interviewed serve customers within a 40-50 mile radius of their office, with many saying they serve primarily Dane County, and a few focusing primarily on Madison. Larger contractors and contractors serving the large commercial sector cover a broader area but usually limit service to Dane County and surrounding counties. A small number said they provide services statewide.
Heating and Cooling Products

Forced-Air Furnaces

Collectively, the contractors we interviewed install approximately 5600 residential and small commercial heating and cooling systems per year. Most contractors believe in the benefits of high-efficiency furnaces and recommend their installation. Just over 84 percent of the residential and small commercial forced-air furnaces sold by these contractors have A.F.U.E. ratings of 90 percent or higher (see Table C-1).

Contractors who sell a substantial number of lower efficiency units (that is, 79-84 percent A.F.U.E. ratings) gave three reasons. First, they say that 79-84 percent efficiency units do not have the mechanical and maintenance problems associated with high-efficiency units. Many of these contractors say that because of the reduced repair costs associated with lower efficiency units, these units are more cost-effective in the long run. Second, they are more affordable to people who can not or do not want to pay the higher up-front price associated with high-efficiency equipment. Third, they appeal to rental property owners when the owner will not be paying the utility bill.

<table>
<thead>
<tr>
<th>Efficiency Rating (A.F.U.E.)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 percent or higher</td>
<td>84</td>
</tr>
<tr>
<td>85-89 percent</td>
<td>5</td>
</tr>
<tr>
<td>79-84 percent</td>
<td>11</td>
</tr>
</tbody>
</table>

1 Weighted by contractor reported unit sales  
2 Most manufacturers do not have units within this efficiency category

Central Air Conditioners

Almost 70 percent of the central air conditioning systems installed just meet, or slightly exceed, the minimum federal standards of 10.0 SEER (See Table C-2). Many contractors interviewed believe that units with SEER ratings of 12 or higher are a poor investment. Contractors said that the low number of operating hours combined with the increased cost of high-efficiency units results in paybacks that easily exceed five years and can exceed 10 years.
Table C-2: Central air conditioning sales by efficiency level\(^1\)

<table>
<thead>
<tr>
<th>Efficiency Rating (SEER)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0 or higher</td>
<td>3</td>
</tr>
<tr>
<td>12.0 to 12.99</td>
<td>16</td>
</tr>
<tr>
<td>11.0 to 11.99</td>
<td>12</td>
</tr>
<tr>
<td>10.0 to 10.99</td>
<td>69</td>
</tr>
</tbody>
</table>

\(^1\)Weighted by contractor reported unit sales

Other Heating and Cooling Products

We asked contractors about a number of other heating and cooling products, such as setback thermostats, electronic air filters, whole-house fans, air-to-air heat exchangers, and geothermal heat pumps. The attitudes and opinions expressed about these products were mixed. Some contractors were very supportive of certain products while others were often strongly opposed to them. Some contractors who are opposed to certain products will not sell them, while some others will install such products when customers request them. Contractors view several of these additional products favorably, noting that they like to provide customers with options. Contractor opinions about these products are outlined below.

Setback Thermostats

Contractors expressed a diversity of opinion regarding the usefulness of setback or programmable thermostats and can be divided roughly into two groups based on their recommendations. The first group highly recommends setbacks, though with some caveats. They say that setbacks can be very useful for people with set schedules and for commercial customers. However, many stated that educating people on the use of the thermostats is essential to proper usage. Contractors in this group also said that the thermostats should not be set back too far or else the furnace will not catch up on very cold days. Many commented that the cheaper setbacks do not work as well nor are they as user friendly as the more expensive units.

The second group of contractors also installs setback thermostats, but either does not recommend them at all, or does not strongly recommend them. This group offered a number of reasons for their discomfort with setbacks. The most common reasons stated were that people do not understand how to use setbacks, and so contractors get many service calls for broken furnaces when the problem is the programmable thermostat. Contractors also stated that
setback thermostats are complicated, only work for households with fixed schedules, and can cause problems in extreme temperatures.

Electronic Air Filters

A few contractors actively promote electronic air filters. Other contractors feel that these filters are good for people with allergies or for people who want to pay for them. The majority of contractors interviewed said they prefer other filtration methods for a number of reasons. They say that electronic air filters are more expensive, require more maintenance (once a month washing) and break down more often than other filters. They also comment that they are noisy, hard to install, and emit ozone.

Most of the contractors interviewed said that air filtration was a growing concern among customers and that other filters worked as well as or almost as well as electronic air filters. Space Gard media filters were the most common alternative raised, with several contractors saying they automatically install Space Gard filters as part of their package.

Whole-House Fans

Very few contractors install whole-house fans. Those that do have only installed a few, saying that people really are not interested in them because of the perceived nuisance and because they want to keep their homes closed. Approximately one fourth of the contractors interviewed do not like whole-house fans because they are noisy and draw dirt and humidity into the home. Others feel that installation of whole-house fans is the job of electricians or builders.

One contractor said that he is a heating and cooling contractor—he wants to sell air conditioning equipment, not fans. The remaining contractors interviewed offered no opinion of whole-house fans, or felt that they might be useful in difficult-to-cool two-story homes.

Air-to-Air Heat Exchangers

Most contractors interviewed said that the cost of air-to-air heat exchangers was extremely high ($1000 to $1500) compared to the benefit provided. However, many contractors said that they were installing more every year. Only a few contractors install air-to-air heat exchangers with any regularity, and these are installed in new homes or homes with excessive humidity problems. Several contractors feel that air-to-air heat exchangers are a gimmick or a joke and are not worth the expense.

The majority of contractors feel that because homes are built so tightly, some form of air exchange is needed to reduce moisture build-up. However, most said there are other less expensive methods of introducing outside air that
work almost, or just as, well. Alternatives include using fresh air intakes with dampers, and installing higher-capacity fans in bathrooms and kitchens.

**Geothermal Heat Pumps**

Contractors generally agree that geothermal heat pumps are not a cost-effective heating or cooling technology for the Wisconsin climate. Most said that they are too expensive relative to more conventional heating and cooling options.

Almost a fourth of the contractors interviewed have installed geothermal heat pumps in the past. Although they say the systems work well and are highly efficient, they can be extremely expensive to maintain, and they are difficult to install now because of Department of Natural Resources water disposal requirements. A few of these contractors have replaced the systems they installed with more conventional systems.

**Practices**

All of the contractors interviewed said that word-of-mouth and referrals from satisfied customers are their primary methods of building a customer base. Many said that they simply "do not need to advertise." Approximately three fourths of the contractors interviewed advertise their services. In addition to advertising on their trucks, and in the Yellow Pages and local newspapers, contractors advertise through seasonal television and radio spots, and a few use direct mailings.

**Decision Making Factors**

According to contractors, their reputation for quality and workmanship, service abilities, cost, and energy efficiency are the most important factors in residential and small commercial customer decision making. While contractors said that customers are concerned about cost and energy-efficiency, they also said that customers make tradeoffs based on the information they receive from the contractor. In fact, many contractors said that customers choose a contractor and then listen to and act on the contractor's advice.

Other less important heating and air conditioning decision making factors include reliability, warranty and brand name. Most contractors said that their reputation for quality and integrity generally will overcome any concern a customer has regarding the brand. Several contractors, however, said that the most important factor influencing their customers is price.

Most of the interviewed contractors said that commercial customers tend to be even more price sensitive than residential customers, especially in new
construction. For new construction, contractors generally are not able to speak directly with the customer. Instead, they must submit bids based on blueprints. Many contractors said that the lowest bidder often gets these jobs.

When speaking with residential customers, the majority of contractors discuss various efficiency options and some brand options. Many contractors also discuss air quality controls. Contractors say that air quality is becoming a growing issue for customers. Some suggest that this might be due to the fact that new homes are so tight.

Contractors said they do not discuss many options with commercial customers, for two primary reasons. First, they are often in bid situations where they cannot discuss options. Second, many contractors say there just are not that many options in the commercial market. However, when they have the opportunity to talk with commercial customers, several contractors actively promote residential-type high-efficiency units, as opposed to rooftop units. These contractors say that residential-type units are not only more efficient but also require far less maintenance.

**Sizing of Heating and Cooling Equipment**

Most contractors size replacement furnaces and central air conditioners based on rules of thumb. Usually this involves an educated guess based on window quality, wall and ceiling insulation levels, and square footage of the home. A few contractors slightly oversize the furnace or central air conditioner so that the customer will always have ample heat or cooling. Contractors who perform detailed heat loss or heat gain calculations are the exception rather than the rule. Many do not believe the calculations are necessary and say their experience working in a variety of homes and small businesses is more applicable to sizing equipment. These contractors say that because there are only a few size ranges available anyway, it is not hard to estimate based on experience.

Furnace and central air conditioner sizing is quite different in new construction. Distributor personnel with access to software programs will size the system for the contractor as an inducement to buy from them. Many contractors also perform their own heat load calculations.

**Energy Savings Estimates**

Almost all the contractors interviewed provide customers with savings estimates, usually in the form of general paybacks. Some contractors provide customers with the estimates based on manufacturer literature or information provided by utilities. A few contractors said that they only talk about estimates in very general terms. These contractors said that the information in manufacturer and utility literature is often not pertinent to actual use in Wisconsin.
Only a few contractors said they do not offer estimates, the primary reason being that people just do not ask about savings. Many contractors pointed out that Dane county customers “do their research” and already know what they want and the benefits of energy efficiency.

Services

We asked HVAC contractors about service and maintenance agreements, energy audits, carbon monoxide detection, smoke detection, blower-door tests, and weatherization services. Many of the contractors we interviewed do not see a need to proactively market new products and services because they believe customers should call them when they have a problem. Contractors’ opinions and attitudes about a number of services are outlined below.

Service and Maintenance Agreements

Few contractors offer formal service and maintenance agreements to their residential or small commercial customers. Most contractors, however, said that they offer five-year parts and labor warranties. These contractors also said that people really don’t ask about them. Many contractors do not offer agreements because agreements are complex and contractors don’t want to get involved with them. Others said that agreements are a waste of customers’ money and that some contractors have taken advantage of customers with maintenance agreements in the past. Most of the contractors not offering agreements said that, rather than offering formalized agreements, they encourage customers to call them “as needed.”

The few contractors offering service agreements said they work well because they reduce unnecessary service calls due to poor maintenance. Two contractors said that it was hard to compete with the price of Wisconsin Power & Light’s Security Blanket Program.

Energy Audits

Only a few HVAC contractors offer energy audits. Most contractors said they do not have the expertise to offer this service. Contractors who do offer audits generally limit them to a walk-through and discussion with customers about system size. Written energy savings recommendations with estimated project costs and paybacks are not included. Over half the contractors interviewed said that energy audits could be worthwhile if the auditor is knowledgeable, well-equipped, and does not need to justify his job by coming up with at least a few recommendations. Almost half the contractors refer customers to utilities for energy audits, saying they generally do a good job.
Carbon Monoxide Detection

Few HVAC contractors sell or install carbon monoxide detection devices because they are readily available at local retailers at prices lower than the contractors could sell them. Many do not like these detectors because they are often "too sensitive," and depending on the brand, easily set off. Contractors say that they get too many service calls from people whose detectors went off, but who do not have a carbon monoxide leak. Other contractors like carbon monoxide detectors and recommend them, both for existing and new furnaces.

Contractor opinions of carbon monoxide detection services are mixed and fall into three groups. The first (small) group of contractors refers customers to the gas utility when they suspect carbon monoxide problems because they do not want to "mess" with it. The second group consists of contractors who routinely test for carbon monoxide on service and maintenance calls. The third group consists of contractors who provide the service if the customer requests it or if they see a crack in a heat exchanger (an indicator of a possible carbon monoxide leak).

Smoke Detection

Few HVAC contractors sell or install smoke detection devices because they are readily available at local retailers at prices lower than contractors could sell them. A few are concerned with being held liable for faulty smoke detection equipment. Those who do sell and install smoke detectors said that most people already have them and, as a result, they sell very few. HVAC contractors unanimously agree that smoke detectors are valuable, but said it is something that most customers take care of themselves.

Blower-Door Tests

HVAC contractors' opinions about blower-door tests are mixed. Contractors can be divided roughly into three groups based on their opinions. The first group either has no opinion or are not familiar with blower-door testing. The second group, approximately half the contractors interviewed, said they or not interested in it, don't have the time for it, or that "the utilities do it." These contractors are mixed in their opinions of testing. Some question the value of it while others feel that it is a beneficial service for homeowners. A few contractors said that blower-door testing is something that siding, window, or weatherization contractors would do. The third group of contractors are either exploring or are beginning to participate in Wisconsin Power & Light's Total Home Tune-up Program, which combines blower-door testing with some weatherization.
Weatherization Services

Almost all the HVAC contractors interviewed said that weatherization services do not fit the scope of what they do. Approximately one fourth of the contractors said that they caulk anything associated with their work, and some said they will caulk other things nearby if they see a problem, but these contractors are the exception.

More than half of the contractors interviewed said that they identify insulation needs or refer customers to insulation contractors. Some of these contractors emphasize the importance of insulation, saying that their equipment is only as good as the buildings they put them in.

Participation in Low-Income Programs

A few of the contractors interviewed work with low-income customers through utility weatherization programs or through arrangements with weatherization agencies. In these situations the contractor installs what the weatherization agency or utility specifies—typically a forced-air furnace with an A.F.U.E. rating of 90 percent or higher. Contractors usually bid to participate in a program. Participating contractors said that, for the most part, the services they provide through the programs are the same as the services they provide other residential customers. Many non-participating contractors said that in order to be selected contractors have to bid extremely low.

Financing

Several interviewed contractors said that financing is becoming an increasingly important service to offer residential and small commercial customers. However, only about one-half of the contractors interviewed offer financing. This group offers financing through equipment manufacturers, utilities, low-income organizations, or credit cards. Manufacturer programs typically consist of 90 to 180 days free financing followed by relatively high interest rates (for example, 16 percent and up). Manufacturers, like most lending institutions, limit financing to the installation of new equipment. Some of these contractors use their financing in their promotions.

Contractors not offering financing state several reasons. First, many say that payment is becoming a growing problem, and so they require COD payment, especially with first time customers. Some contractors do not offer financing because they want to keep business simple, others because they feel that manufacturer interest rates are too high and that people are better off going through banks. Many of these contractors will extend the payment period for loyal customers.
Contractors are mixed in their opinions of the competitive advantage of offering financing. Many say that customers already have adequate access to financing through banks and other finance companies. Other contractors say it is something they have to offer in order to close some sales, although several of them offer financing reluctantly.

Training

Licensing

There are no state licensing requirements for either HVAC contractors or their employees. Approximately 15-20 municipalities require a local license in order to install, service, adjust, or modify HVAC equipment within the municipality (according to bulletin SBDB10165-P(N0295) issued by the Wisconsin Department of Industry, Labor and Human Relations (DILHR) HVAC Program, Safety and Building Division). According to a DILHR representative, some of these municipalities require that one individual within a contractor's organization pass a competency test. Testing is not required of every technician within the contractor's organization.

On August 1, 1994, it became mandatory that HVAC contractors register with DILHR. Registration consists of minimal standards of accountability and evidence of compliance with workers compensation and unemployment compensation.

While some HVAC technicians have gone through union certification programs, others have obtained most of their training on the job. Some contractors pay for union apprenticeship programs and classes at local technical schools while others leave training up to the individual employee. Even within a single firm, individual technicians have developed their skills in a variety of ways.

Training Providers

HVAC technicians look to a variety of sources for training and education on HVAC systems. These are: 1) on-the-job training working with journeymen or master technicians within their own companies, 2) technical schools, 3) union or individual apprenticeship programs (often offered through technical schools), 4) manufacturer and distributor sponsored training seminars, 5) training videos provided by manufacturers, and 6) local trade association seminars and conferences. Most HVAC technicians appear to have taken advantage of a number of these offerings when initially learning the business. However, on-the-job training appears to be the predominant education method for most technicians. This is especially true for smaller non-union HVAC businesses.
Future Training Needs

Most contractors do not see any specific training needs developing in the future. Most said they will continue to keep abreast of new technologies and changes in building codes through informal channels, including their distributors and manufacturer representatives.

The few contractors who identified training needs most frequently mentioned a need for training on computerized control systems. Other needs identified by a few contractors include training on air purification systems, air quality, refrigerant handling procedures, energy management systems, and heat recovery ventilation systems. A few contractors said that the state should impose contractor licensing.

Utility Programs and Relationships

Every contractor interviewed has been involved with gas and electric utility rebate programs. Although many could not remember specific program names, they knew the programs were offered by Madison Gas & Electric Company or Wisconsin Power & Light Company.

Program Impacts

Most contractors said that rebate programs increased the efficiency level of furnaces sold in the area when the programs first began, and a few contractors said that rebates increased their sales. Contractors said that customers are now generally aware of energy-efficient furnaces and purchase them without rebates. Contractors attribute this awareness to manufacturer and utility promotion and other media sources.

Many contractors said that high-efficiency air conditioning has not caught on like efficient furnaces, primarily because of longer paybacks. Some contractors said that paybacks for energy-efficient central air conditioning are long even when rebates are offered.

Future Role of Utilities

Many contractors said that utilities have done a good job promoting energy efficiency. Contractors said that rebate programs, financing, education, and utility seminars are beneficial. Some contractors are frustrated that utilities push energy efficiency as an end and don’t always recognize that energy efficient products are not always the best products for some applications. Contractors also said that utilities need to make sure that the information they provide is accurate, because the public sees them as an unbiased source of information.
Many contractors believe that utilities should not get involved in the HVAC service and replacement business. Contractors said that utilities use rates to subsidize their HVAC services, giving them an unfair competitive advantage.

General Policies and Practices

At the end of the in-depth interviews, contractors were asked to read a number of statements related to general policies and practices their company uses when recommending products and services to customers. They were asked to rate each statement on a scale of one to six, where one means "strongly disagree" and six means "strongly agree." The results of this exercise are illustrated in Table C-3.

The reader should review the following numbers with caution, for two reasons. First, and most importantly, we believe that the qualitative interview results provide a more comprehensive assessment of current attitudes, opinions, and practices. This is because we were able to ask detailed follow-up questions for each area of interest. Second, the emphasis in our recruitment was to include contractors of various sizes from a wide geographical area. As a result, the group of contractors we spoke to are not necessarily representative of all HVAC contractors in Dane County.

The principal value in collecting the information presented in Table C-3 is that it will provide a quantitative baseline from which to track changes in individual contractors’ attitudes, opinions, and practices over time.
## Table C-3: Policy and practices ratings

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>We focus primarily on the short-term needs of our customers (such as purchase price and availability) when recommending equipment, rather than longer-term issues (such as operating cost).</td>
<td>2.11</td>
</tr>
<tr>
<td>It is becoming increasingly important for us to be responsive to customer concerns about the environment (for example, clean fuels, greenhouse impacts, CFCs).</td>
<td>4.74</td>
</tr>
<tr>
<td>Except on rare occasions, we will only recommend energy-related equipment that is quickly available in the local market.</td>
<td>3.26</td>
</tr>
<tr>
<td>We almost always recommend energy-efficient equipment, even if it costs the customer a bit more up-front</td>
<td>4.95</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use electric end use equipment and appliances.</td>
<td>2.11</td>
</tr>
<tr>
<td>The services we offer are substantially the same as the services we offered 4 years ago.</td>
<td>4.32</td>
</tr>
<tr>
<td>We offer services that are not typical of other businesses in our industry.</td>
<td>3.16</td>
</tr>
<tr>
<td>Rather than making equipment recommendations, our role is primarily that of providing or installing whatever equipment customers request.</td>
<td>2.47</td>
</tr>
<tr>
<td>We encourage customers to consider the long-term savings of the products and services we offer.</td>
<td>5.16</td>
</tr>
<tr>
<td>We view customer concern about health and safety as an opportunity to offer new services.</td>
<td>4.74</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use gas-fueled equipment and appliances.</td>
<td>5.26</td>
</tr>
<tr>
<td>We almost always recommend the equipment with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.05</td>
</tr>
<tr>
<td>Rather than marketing specific services to our customers, our role is primarily that of providing the services our customers request.</td>
<td>3.74</td>
</tr>
<tr>
<td>We almost always recommend the repair alternative with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.42</td>
</tr>
<tr>
<td>We have made a substantial effort over the last 4 years to provide our customers with new services.</td>
<td>4.16</td>
</tr>
<tr>
<td>We provide information to customers about the environmental benefits of our products and services.</td>
<td>3.74</td>
</tr>
<tr>
<td>Heating and cooling contractors in my area are offering a number of services that generally were not available 4 years ago.</td>
<td>3.21</td>
</tr>
<tr>
<td>We try to persuade our customers to buy very energy-efficient equipment.</td>
<td>4.68</td>
</tr>
</tbody>
</table>

---

1 Contractors were asked to rate each statement on a scale of one to six, where one means “strongly disagree” and six means “strongly agree.”
Appendix D: Milwaukee

This section summarizes the results of 20 in-depth interviews with heating, ventilation and air conditioning (HVAC) contractors in the Milwaukee Area, consisting of Milwaukee, Waukesha, Racine, Ozaukee, and Washington counties. The interviews were conducted between August 23, 1995 and October 11, 1995.

The purposes of the interviews were to: 1) discuss contractors' opinions of and attitudes toward energy-efficient heating and cooling equipment, 2) understand the products, practices, and services of HVAC contractors who work in both the residential and small commercial sectors, 3) discuss the role of financing in residential and small commercial customer decision making, 4) understand the present level of training among HVAC technicians, and 5) explore both the past and potential future role of utilities in the residential and small commercial HVAC market.

General Business Characteristics

The typical contractor interviewed has between five and ten employees, although employment varies from one person to over 75 employees. Average annual gross revenue among these contractors is just under $1 million. The median is $500,000.

Interviewees have been working in the HVAC business for an average of 23 years (median is 22 years) and their company has been operating for an average of almost 30 years (median is 26 years). Most contractors work in both the residential and small commercial sector. Only a few are dedicated to one sector. Most of the work conducted by these contractors is for replacement, service, and repair of HVAC equipment, but most also do some new construction work.

The contractors interviewed generally serve customers within a 30-40 mile radius of their office. Larger contractors and contractors serving the large commercial sector cover a broader geographical area but usually limit service to the counties in which their business is located.

Heating and Cooling Products

Forced-Air Furnaces

Collectively, the contractors we interviewed install approximately 5000 residential and small commercial heating and cooling systems per year. Most
contractors believe in the benefits of high-efficiency furnaces and recommend them. Almost 80 percent of the residential and small commercial forced-air furnaces sold by these contractors have A.F.U.E. ratings of 90 percent or higher (see Table D-1). Contractors who sell a substantial number of lower efficiency units (that is, 79-84 percent A.F.U.E. ratings) gave two reasons. First, they are more affordable to “working class” people who can not pay the higher price associated with high-efficiency equipment. Second, they appeal to rental property owners when the owner will not be paying the utility bill.

Table D-1: Forced-air furnace sales by efficiency level

<table>
<thead>
<tr>
<th>Efficiency Rating (A.F.U.E.)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 percent or higher</td>
<td>78</td>
</tr>
<tr>
<td>85-89 percent</td>
<td>1</td>
</tr>
<tr>
<td>79-84 percent</td>
<td>21</td>
</tr>
</tbody>
</table>

1 Weighted by contractor reported unit sales
2 Most manufacturers do not have units within this efficiency category

Central Air Conditioners

Over one-half of the central air conditioning systems installed just meet, or slightly exceed, the minimum federal standards of 10.0 SEER (See Table D-2). Contractors give a number of reasons for this. First, and perhaps most importantly, many contractors believe that units with SEER ratings of 12 or higher are a poor investment. Contractors said that the low number of operating hours combined with the increased cost of high-efficiency units results in paybacks that easily exceed five years and can exceed 10 years. Additionally, many contractors ask customers how they use or intend to use their central air conditioning and recommend lower efficiency units for people operating the unit for relatively few hours. Second, manufacturers are not aggressive in promoting the very highest efficiency central air conditioners in Wisconsin. Third, people on limited budgets can not afford the additional cost associated with higher efficiency units. This is a significant issue for contractors who work in the working class neighborhoods in Milwaukee.
Table D-2: Central air conditioning sales by efficiency level

<table>
<thead>
<tr>
<th>Efficiency Rating (SEER)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0 or higher</td>
<td>2</td>
</tr>
<tr>
<td>12.0 to 12.99</td>
<td>10</td>
</tr>
<tr>
<td>11.0 to 11.99</td>
<td>32</td>
</tr>
<tr>
<td>10.0 to 10.99</td>
<td>56</td>
</tr>
</tbody>
</table>

1 Weighted by contractor reported unit sales

Other Heating and Cooling Products

We asked contractors about a number of other heating and cooling products such as setback thermostats, electronic air filters, whole-house fans, air-to-air heat exchangers, and geothermal heat pumps. The attitudes and opinions expressed about these products were mixed. Some contractors were very supportive of certain products while others were often strongly opposed to them.

Most large contractors (that is, those with over 15 employees) view many of these additional products favorably, noting that they can provide both a competitive advantage and increased profitability. Small contractors, with a few exceptions, are more likely to express concern with either the quality or usefulness of some products. The products discussed and the opinions expressed are outlined below.

Setback Thermostats

Contractors expressed a diversity of opinion regarding the usefulness of setback thermostats. The contractors we spoke to can be divided into four groups of about equal size. The first group firmly supports the use of setback thermostats and promotes them on every job.

The second group recommends setback thermostats only to young people or individuals with an interest in electronics. The feeling among this group is that many people, including most elderly individuals, have difficulty understanding how to program the units.

The third group consists of contractors who only recommend setback thermostats for older furnaces. This group said that new high-efficiency furnaces and air conditioners are so energy-efficient that it does not pay to change the temperature setting when occupants are not home or sleeping.

The final group of contractors is strongly opposed to the use of setback thermostats in any situation. This group said setbacks are not worthwhile because
the units are often defective and people do not operate them properly, do not
change batteries often enough, and frequently call the contractor with service
and maintenance problems.

Electronic Air Filters

Contractors generally agree that electronic air filters are worthwhile for peo-
ple who have allergies or other related health problems. As a result, most
contractors only market electronic air filters to people with health problems
and to "people who have the ability to pay." Only a small group of contractors
routinely market electronic air filters to all of their customers. Many contrac-
tors said that they are reluctant to market them because of the cost ($500-
$600) and because people do not maintain them properly.

By far the most popular filtration systems are the new Media Filters and Space
Guard Filters. Many contractors said that these new filtration systems do a
very good job and are very affordable ($200). These systems consist of a filter
housing that can be easily added to a new or existing furnace and $25 filters
that can be thrown away.

Whole-House Fans

Many contractors have limited knowledge of whole-house fans and expressed
no opinion about them. A small group of contractors have installed whole-
house fans but do so very selectively. One contractor has installed whole-
house fans in a few two-story homes where adequately cooling the upstairs
has been difficult. In these cases, the whole-house fan is used to remove warm
air and replace it with cooler outside air or conditioned air from the first
floor. A few other contractors have installed whole-house fans in situations
where the occupant is strongly opposed to central air conditioning.

One group of contractors is strongly opposed to the use of whole-house fans.
These contractors said that whole-house fans simply draw in pollen and
moisture from the outside, decreasing occupant comfort.

Air-to-Air Heat Exchangers

Contractor opinions of air-to-air heat exchangers are mixed and fall into three
groups. The first group consists of contractors who said that the price of air-
to-air heat exchangers is too high ($1000 to $1400) to be cost-effective. Some
members of this group said it is better to introduce outside air to the home by
piping it directly into the ductwork's cold air return. Others said that air-to-
air heat exchangers do not transfer heat as well as manufacturers claim—
making them expensive relative to their effectiveness.

A second group of contractors offer air-to-air heat exchangers selectively,
based on the customer's ability to pay and the "tightness" of the home. This
group is most likely to advocate their use in new construction projects, although many said that they do not push them with customers who have limited construction budgets.

The final group of contractors has never heard of air-to-air heat exchangers and appeared to be genuinely confused regarding their operation and usefulness.

Contractors who are strong advocates of air-to-air heat exchangers said the exchangers have not gained widespread acceptance—mostly because of the high price and long payback period. Some contractors said that air-to-air heat exchangers are primarily designed to address moisture problems. Most of these contractors said that there are more cost-effective methods of controlling moisture, such as installing fans in bathrooms and kitchens.

Geothermal Heat Pumps

Contractors generally agree that geothermal heat pumps are not a cost-effective heating or cooling technology for the Wisconsin climate. Most said that they are too expensive relative to more conventional heating and cooling options. Some expressed concern about the level of comfort that geothermal heat pumps deliver without supplemental heat. A few contractors said that geothermal heat pumps are too sophisticated for the average HVAC contractor.

One interviewee said that he was the second largest heat pump dealer in the state. He went on to say that the introduction of high-efficiency forced-air furnaces and central air conditioners has made geothermal heat pumps uneconomical compared to conventional equipment and, as a consequence, he no longer installs them.

Practices

All of the contractors interviewed said that word-of-mouth and referrals from satisfied customers are their primary methods of building a customer base. Many said that they simply “do not need to advertise.” Approximately one-half of the contractors interviewed advertise their services. Advertising is generally limited to the Yellow Pages and local newspapers. A few of the larger contractors do some television, radio, or direct-mail advertising.

Decision Making Factors

According to contractors, their reputation for quality and workmanship, cost, and energy efficiency are the most important factors in residential and small commercial customer decision making. While contractors said that customers
are concerned about cost and energy efficiency, they also said that customers make tradeoffs based on the information they receive from the contractor. In fact, many contractors said that customers choose a contractor and then listen to and act on the contractor's advice.

Other less important heating and air conditioning decision making factors include reliability, warranty, comfort, and brand name. Brand loyalty among residential and small commercial customers is identifiable but fragile. Most contractors said that their reputation for quality and integrity generally will overcome any concern a customer has regarding the equipment brand.

The majority of contractors limit their discussions with customers to warranty information and the various efficiency options available. Only a few said that they routinely discuss air quality, electronic air filters, and thermostat controls.

**Sizing of Heating and Cooling Equipment**

Most contractors size replacement furnaces and central air conditioners based on rules of thumb. Usually this involves an educated guess based on window quality, wall and ceiling insulation levels, and square footage of the home. A few contractors slightly oversized the furnace or central air conditioner so that the customer will always have ample heat or cooling.

Contractors who perform detailed heat loss or heat gain calculations are the exception rather than the rule. Many do not believe the calculations are necessary and say their experience working in a variety of homes and small businesses is more relevant and applicable when sizing equipment.

Furnace and central air conditioner sizing is quite different in new construction. Distributor personnel with access to software programs will size the system for the contractor as an inducement to buy from them. However, some contractors said they do not take advantage of this service and use general rules of thumb instead.

**Energy Savings Estimates**

Most contractors do not give residential or small commercial customers customized estimates of energy savings under any condition (new or replacement). They prefer to either: 1) tell customers to call the gas or electric utility for this information, or 2) give the customer the manufacturer's literature, which typically provides the customer a range of savings estimates. Many said they simply do not want to get involved in giving estimates because of "hard feelings" that might develop if the estimates are not accurate.

The relatively few contractors who do give savings estimates base the estimates on previous fuel bills and the difference in efficiency between the exist-
ing and proposed furnace. Two of the contractors we interviewed have software programs which allow them to calculate savings by looking at old fuel bills, the structural characteristics of the home, and the difference in furnace efficiency. However, this service is only provided when it will assist in the sale or is specifically requested by the customer.

Services

We asked HVAC contractors about service and maintenance agreements, energy audits, carbon monoxide detection, smoke detection, blower-door tests, and weatherization services. Many of the contractors we interviewed do not see a need to proactively market new products and services because “customers will call us when they have a problem.” Contractors opinions and attitudes about a number of services are outlined below.

Service and Maintenance Agreements

Few contractors offer formal service and maintenance agreements to their residential or small commercial customers. Contractors said this is because the residential and small commercial market has traditionally been built on long-term relationships between HVAC contractors and customers. These relationships are strengthened over time by interactions individual customers have with their contractor. Contractors that are successful in managing these relationships benefit from repeat business and word-of-mouth advertising.

Key ingredients to managing relationships include timely service, sound advice with the customer’s best interest at heart, and quality workmanship. The relationship between HVAC contractors and their customers is similar to the relationship that many people have with a particular auto mechanic or auto shop—when they find one they are comfortable with they stay with them and tell others.

Most contractors said that residential and small commercial equipment is highly reliable and requires limited servicing. As a result, many said it is better to advise customers to call them when there is a problem. These contractors said that manufacturer’s warranties are enough and that anything else is unnecessary.

For central air conditioning, the typical manufacturer’s warranty consists of a one-year parts warranty and a five-year compressor warranty. Some manufacturers also offer a one-year warranty on labor, while others extend the compressor warranty to 10 years.

A few contractors said they offer a one-year warranty on labor (if labor is not offered by the manufacturer) as an additional sales inducement. This exten-
sion of the manufacturer's warranty constitutes a service and maintenance agreement from the perspective of these contractors.

**Energy Audits**

Only a few HVAC contractors offer energy audits. Most said they do not have the expertise to offer audits. Contractors who do offer audits limit them to a quick walk-through with heat loss and heat gain calculations. Written energy savings recommendations with estimated project costs and paybacks are not included. A few contractors are skeptical about the validity of utility and contractor audits, saying that savings estimates are often inaccurate. Others said that offering this type of service is "the gas and electric utility's job."

**Carbon Monoxide Detection**

Few HVAC contractors sell or install carbon monoxide detection devices because they are readily available at local retailers. Those who do said that sales are weak.

Contractor opinions of carbon monoxide detection services are mixed and fall into four groups. The first group of contractors refers customers to the gas utility when they suspect carbon monoxide problems. Some of these contractors said they do not want the liability problems associated with offering this service. The second group consists of contractors who routinely test for carbon monoxide on service and maintenance calls. A third group consists of contractors who provide the service if the customer requests it or they see a crack in a heat exchanger (an indicator of a possible carbon monoxide leak). The fourth group says carbon monoxide detection hasn't been perfected and, as a result, they lack confidence in detection equipment.

A few contractors said that customers are more concerned about carbon monoxide than they should be. They gave two reasons why customers should not be concerned. First, carbon monoxide problems are rare. Second, they said that new forced-air furnaces will shut down before any significant amount of carbon monoxide can enter a home. Many other contractors vehemently disagree with this position. They believe that carbon monoxide is a potential problem with both new and older furnaces.

**Smoke Detection**

Few HVAC contractors sell or install smoke detection devices because they are readily available at local retailers. Similar to carbon monoxide services, some contractors are concerned with being held liable for faulty smoke detection equipment. Those who do sell and install smoke detectors said that most people already have them and, as a result, they sell very few units. HVAC contractors unanimously agree that smoke detectors are valuable, but it is something that most customers take care of themselves.
Blower-Door Tests

The majority of HVAC contractors have never heard of blower-door tests or are too unfamiliar with them to have an opinion. Only one of the contractors interviewed offers blower-door tests and they do this on a very limited basis. This contractor, as well as most others, said that this service is more appropriately offered by insulation and weatherization contractors. Most have absolutely no interest in getting involved in this type of service. Some said that they are concerned that blower-door tests will lead to weatherization contractors making the home so tight that indoor air quality problems develop.

Weatherization Services

Every HVAC contractor we interviewed said that weatherization services are generally beyond their expertise and they have little interest in getting involved in this area. Contractors are also cautious about recommending insulation and weatherization contractors because of a perception that some cut corners (for example, they do not install weatherization material properly, do not put in the amount of insulation they said they would, and so on). Many contractors said that customers are aware of the importance of insulation and weatherization and coordinate weatherization projects themselves. Many contractors routinely ask customers about insulation levels and refer customers to the Yellow Pages if insulation is inadequate.

Participation in Low-Income Programs

A few of the contractors interviewed work with low-income customers through utility weatherization programs or through arrangements with weatherization agencies. In these situations the contractor installs what the weatherization agency or utility specifies—typically a unit with an A.F.U.E. rating of 90 percent or higher. Contractors usually agree on hourly rates and a basic replacement charge with the weatherization agency or utility prior to participating in the program.

Financing

Most contractors interviewed said that financing is becoming an increasingly important service to offer residential and small commercial customers. However, about one-half of the contractors interviewed limit their involvement to referring customers to specific banks or finance companies.

The remaining contractors are split into two groups. One group offers financing through equipment manufacturers. Manufacturer programs typically consist of 90 to 180 days free financing followed by relatively high interest rates (for example, 16 percent and up). Manufacturers, like most lending institutions, limit financing to the installation of new equipment.
The second group consists of contractors who refuse to get involved with financing under any condition. In other words, if the customer can not pay within 10-30 days they do not work for them. A few contractors mentioned that they accept Visa or Mastercard. Others will extend the payment period for loyal customers.

Contractors are mixed in their opinions of the competitive advantage of offering financing. Many say that customers already have adequate access to financing through banks and other finance companies. Others say it is something they have to offer in order to close some sales, although they offer financing reluctantly.

Training

Licensing

There are no state licensing requirements for either HVAC contractors or their employees. Approximately 15-20 municipalities require a local license in order to install, service, adjust, or modify HVAC equipment within the municipality (according to bulletin SBDB10165-P(N0295) issued by the Wisconsin Department of Industry, Labor and Human Relations (DILHR) HVAC Program, Safety and Building Division). According to a DILHR representative, some of these municipalities require that one individual within a contractor's organization pass a competency test. Testing is not required of every technician within the contractor's organization.

On August 1, 1994, it became mandatory that HVAC contractors register with DILHR. Registration consists of minimal standards of accountability and evidence of compliance with workers compensation and unemployment compensation.

While some HVAC technicians have gone through union certification programs, others have obtained most of their training on the job. Some contractors pay for union apprenticeship programs and classes at local technical schools while others leave training up to the individual employee. Even within a single firm, individual technicians have developed their skills in a variety of ways.

Training Providers

HVAC technicians look to a variety of sources for training and education on HVAC systems. These are: 1) on-the-job training working with journeymen or master technicians within their own companies, 2) technical schools, 3) union apprenticeship programs (often offered through technical schools), 4) manufacturer and distributor sponsored training seminars, 5) training videos
provided by manufacturers, and 6) local trade association seminars and conferences. Most HVAC technicians appear to have taken advantage of a number of these offerings when initially learning the business. However, on-the-job training appears to be the predominate education method for most technicians. This is especially true for smaller nonunion HVAC businesses.

**Future Training Needs**

Most contractors do not see any specific training needs developing in the future. Most said they will continue to keep abreast of new technologies and changes in building codes through informal channels, including their distributors and manufacturer representatives.

The few contractors who identified training needs most frequently mentioned a need for training on computerized control systems. Other needs identified by a few contractors include training on air purification systems, indoor air quality, refrigerant handling procedures, energy-management systems, and heat-recovery ventilation systems. One contractor said there is a need for training on radon mitigation and blower-door tests.

A few contractors said that the biggest need within the industry is to recruit and train new HVAC technicians to replace the large number who are reaching retirement age. These contractors said that younger people are not going into the trades, creating a shortage of qualified HVAC technicians.

**Utility Programs and Relationships**

Every contractor interviewed has been involved with gas and electric utility rebate programs. Although many could not remember specific program names, they knew the programs were offered by Wisconsin Electric Power Company, Wisconsin Gas Company, Wisconsin Natural Gas Company, or Wisconsin Southern Gas Company.

**Program Impacts**

Most contractors said that gas and electric utility programs have had a substantial impact on the efficiency level of equipment sold in the Milwaukee area. Utility advertising and promotion has brought energy-efficiency to the forefront of consumer awareness, making it easier to sell these products. However, many said that the sustainability of these effects differs for furnaces and central air conditioning.

The majority of contractors said that the Milwaukee market for forced-air furnaces has been permanently transformed toward energy-efficient heating equipment, although lower efficiency equipment continues to be available.
These contractors have not seen, nor do they expect to see, a decline in the efficiency level of heating equipment sold as utility rebate programs are eliminated or scaled back. A few contractors contradict this, saying they have seen a decline in efficiency levels as programs are eliminated. One contractor mentioned that there are a few general contractors from Illinois who are becoming significant players in the Milwaukee-area apartment and condominium market who have “brought along the 80-percent efficiency mentality.”

Contractors say utility impacts on central air conditioning efficiency levels are less dramatic and less sustainable. Most contractors said that Wisconsin Electric Power Company’s central air conditioning rebate program was effective in moving customers up to higher efficiency central air conditioners. However, many said that the move toward higher efficiency units was not as dramatic as past forced-air furnace rebate programs. These contractors said that in absence of rebate programs the central air conditioning market has moved back to units that meet, or just exceed, the minimum federal standard (that is, 10 SEER).

Most contractors said that utility programs that promote maintenance of HVAC equipment increase the number of “clean and checks” they do. Contractors have mixed opinions about the sustainability of this type of work. Most said that utility promotions dramatically increased the number of clean and checks they do. Some of these contractors continue to see a moderate level of activity in this area—despite the elimination of programs—while others say the activity level has declined dramatically. All agree that activity peaks during utility promotional campaigns.

**Future Role of Utilities**

Many contractors said that it is appropriate for gas and electric utilities to promote routine maintenance checks and the installation of energy-efficient equipment. Many also said that gas and electric utilities should continue to administer and promote rebate programs and provide energy audits to interested residential and small commercial customers. Others said that gas utilities should continue to take a lead role in providing carbon monoxide detection services.

Contractors are consistent in their belief that utilities should stay out of the HVAC service business and refrain from selling HVAC or related equipment. Many contractors said that gas and electric utilities use rates to subsidize their HVAC services, giving them an unfair competitive advantage. Many contractors contribute to distributor-coordinated efforts to fight what they perceive to be unfair competition by electric and gas utilities. One such effort in the Milwaukee area is the Alliance Against Unfair Competition. Distributors collect a $5 voluntary fee from contractors for each furnace or central air conditioner sold and contribute this money to the alliance.
General Policies and Practices

At the end of the in-depth interviews, contractors were asked to read a number of statements related to general policies and practices their company uses when recommending products and services to customers. They were asked to rate each statement on a scale of one to six, where one means "strongly disagree" and six means "strongly agree." The results of this exercise are illustrated in Table D-3.

The reader should review the following numbers with caution for two reasons. First, and most importantly, we believe that the qualitative interview results provide a more comprehensive assessment of current attitudes, opinions, and practices. This is because we were able to ask detailed follow-up questions for each area of interest. Second, the emphasis in our recruitment was to include contractors of various sizes from a wide geographical area. As a result, the group of contractors we spoke to are not representative of all HVAC contractors in the Milwaukee area.

The principal value in collecting the information presented in Table D-3 is that it will provide a quantitative baseline from which to track changes in individual contractors attitudes, opinions, and practices over time.
<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>We focus primarily on the short-term needs of our customers (such as purchase price and availability) when recommending equipment, rather than longer-term issues (such as operating cost).</td>
<td>2.79</td>
</tr>
<tr>
<td>It is becoming increasingly important for us to be responsive to customer concerns about the environment (for example, clean fuels, greenhouse impacts, CFCs).</td>
<td>4.74</td>
</tr>
<tr>
<td>Except on rare occasions, we will only recommend energy-related equipment that is quickly available in the local market.</td>
<td>3.32</td>
</tr>
<tr>
<td>We almost always recommend energy-efficient equipment, even if it costs the customer a bit more up-front.</td>
<td>4.68</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use electric and use equipment and appliances.</td>
<td>2.21</td>
</tr>
<tr>
<td>The services we offer are substantially the same as the services we offered 4 years ago.</td>
<td>4.00</td>
</tr>
<tr>
<td>We offer services that are not typical of other businesses in our industry.</td>
<td>3.53</td>
</tr>
<tr>
<td>Rather than making equipment recommendations, our role is primarily that of providing or installing whatever equipment customers request.</td>
<td>2.72</td>
</tr>
<tr>
<td>We encourage customers to consider the long-term savings of the products and services we offer.</td>
<td>4.94</td>
</tr>
<tr>
<td>We view customer concern about health and safety as an opportunity to offer new services.</td>
<td>4.67</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use gas-fueled equipment and appliances.</td>
<td>5.67</td>
</tr>
<tr>
<td>We almost always recommend the equipment with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.56</td>
</tr>
<tr>
<td>Rather than marketing specific services to our customers, our role is primarily that of providing the services our customers request.</td>
<td>3.72</td>
</tr>
<tr>
<td>We almost always recommend the repair alternative with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>3.17</td>
</tr>
<tr>
<td>We have made a substantial effort over the last 4 years to provide our customers with new services.</td>
<td>3.89</td>
</tr>
<tr>
<td>We provide information to customers about the environmental benefits of our products and services.</td>
<td>4.06</td>
</tr>
<tr>
<td>Heating and cooling contractors in my area are offering a number of services that generally were not available 4 years ago.</td>
<td>3.89</td>
</tr>
<tr>
<td>We try to persuade our customers to buy very energy-efficient equipment</td>
<td>4.33</td>
</tr>
</tbody>
</table>

1 Contractors were asked to rate each statement on a scale of one to six, where one means "strongly disagree" and six means "strongly agree."
Appendix E: Green Bay

This section summarizes the results of 20 in-depth interviews with heating, ventilation and air conditioning (HVAC) contractors in the Green Bay area, consisting of contractors located in Brown County. The interviews were conducted between November 10, 1995 and December 18, 1995.

The purposes of the interviews were to: 1) discuss contractors' opinions of and attitude toward energy-efficient heating and cooling equipment, 2) understand the products, practices, and services of HVAC contractors who work in both the residential and small commercial sectors, 3) discuss the role of financing in residential and small commercial customer decision making, 4) understand the present level of training among HVAC technicians, and 5) explore both the past and potential future role of utilities in the residential and small commercial HVAC market.

General Business Characteristics

The typical contractor interviewed has between five and ten employees, although the number ranges from one person to 37 employees. Average annual gross revenue among these contractors is just over $1,200,000. The median is $875,000.

Interviewees have been working in the HVAC business for an average of just over 21 years (median is 18 years) and their company has been operating for an average of almost 19 years (median of 15 years). The residential sector accounts for over 70 percent of most interviewed contractors' gross revenue. Only a few of the contractors interviewed complete more work in the commercial sector than the residential sector.

The contractors interviewed generally serve customers within a 50 mile radius of their office. Larger contractors and contractors serving the mobile home market cover a broader geographical area.

Heating and Cooling Products

Forced-Air Furnaces

Collectively, the contractors we interviewed install just under 5000 residential and small commercial heating and cooling systems per year. Most contractors believe in the benefits of high-efficiency furnaces and recommend them. Over 90 percent of the residential and small commercial forced-air furnaces sold by these contractors have A.F.U.E. ratings of 90 percent or higher.
(see Table E-1). Contractors who sell a substantial number of lower-efficiency units (that is, 79-84 percent A.F.U.E. ratings) gave two reasons. First, they are more affordable. Second, they appeal to rental property owners when the owner will not be paying the utility bill.

Table E-1: Forced-air furnace sales by efficiency level

<table>
<thead>
<tr>
<th>Efficiency Rating (A.F.U.E.)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 percent or higher</td>
<td>92</td>
</tr>
<tr>
<td>85-89 percent(^2)</td>
<td>2</td>
</tr>
<tr>
<td>79-84 percent</td>
<td>6</td>
</tr>
</tbody>
</table>

\(^1\)Weighted by contractor reported unit sales  
\(^2\)Most manufacturers do not have units within this efficiency category

Central Air Conditioners

Over 90 percent of the central air conditioning systems installed just meet, or slightly exceed, the minimum federal standards of 10.0 SEER (See Table E-2). Many of the contractors interviewed strongly believe that units with SEER ratings of 11.0 or higher are a poor investment. Contractors said that the low number of operating hours combined with the increased cost of high-efficiency units results in paybacks that easily exceed five years and can exceed 10 years. Additionally, many contractors ask customers how they use or intend to use their central air conditioning and recommend lower efficiency units for people operating the unit for relatively few hours.

Table E-2: Central air conditioning sales by efficiency level

<table>
<thead>
<tr>
<th>Efficiency Rating (SEER)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0 or higher</td>
<td>0</td>
</tr>
<tr>
<td>12.0 to 12.99</td>
<td>1</td>
</tr>
<tr>
<td>11.0 to 11.99</td>
<td>5</td>
</tr>
<tr>
<td>10.0 to 10.99</td>
<td>94</td>
</tr>
</tbody>
</table>

\(^1\)Weighted by contractor reported unit sales
Other Heating and Cooling Products

We asked contractors whether they offered anything else that added to the overall efficiency, safety, or comfort of a home or small commercial building. Approximately one-half said ventilation was part of their business, specifically mentioning exhaust systems, quiet vents, and air-to-air heat exchangers. One fourth said they recommend setback thermostats. Another 20 percent said quality duct work and quality installation overall added to the efficiency, safety, or comfort level of a building. Other contractors mentioned zoning, humidification, air-cleaning, in-floor heating systems, educating people about their systems, and carbon monoxide detection.

We also asked contractors about specific heating and cooling products. These include setback thermostats, electronic air filters, whole-house fans, air-to-air heat exchangers, and geothermal heat pumps. Contractors' opinions about these were mixed, depending on the product. They are discussed in more detail below.

Setback Thermostats

All of the interviewed contractors install setback thermostats, although some do so with considerably more regularity than others. About one-fourth of these contractors say they always recommend setback thermostats. However, only a few contractors said that they regularly install them. Other contractors said that, although they recommend them, people are not typically interested.

Many contractors said that setbacks are useful only when households have a set schedule. Other contractors said that customers feel that setting their thermostat back by hand, or buying a setback thermostat from a local retailer, are cheaper alternatives. Finally, several contractors said that many people who have setbacks either do not use them, or have problems with them that result in many service calls.

Electronic Air Filters

Regardless of their opinions of them, contractors raised four concerns with electronic air filters: 1) they are maintenance intensive in an era when people want maintenance-free equipment; 2) the electronics often fail; 3) they are unhealthy because they produce ozone; and 4) they are expensive.

Almost half the contractors interviewed said that the filters they use most are Space Gard media filters. None of the contractors interviewed said that they regularly install electronic filters; rather, they offer the filters as an option. Media type filters, and sometimes electrostatic filters, are more commonly installed.
Approximately half of the contractors interviewed do not like or do not actively market electrostatic filters. The other half offers the filters as an option; only three of these contractors spoke highly of them.

**Whole-House Fans**

Almost none of the contractors interviewed said they install whole-house fans. Most said that they do not work well in this climate, though a few thought they were beneficial. Only a small number have installed whole-house fans, but did so selectively, and often many years ago. A few contractors said that installing whole-house fans is not a part of the heating and cooling business.

**Air-to-Air Heat Exchangers**

Contractors do not install many air-to-air heat exchangers. Most of those installed are in new construction, because new homes are built “tight.” Approximately 20 percent of the contractors interviewed do not recommend or install air-to-air heat exchangers, saying they are too expensive and that there are other less expensive options, including fabricating their own systems. Of those who do install them, only one said that he recommends them for all new homes. Many of these contractors offer air-to-air heat exchangers as an option along with other ventilation strategies. Some said that they have begun to install more units in the last few years, and one said that he installed more units when Wisconsin Public Service Corporation offered rebates on them.

**Geothermal Heat Pumps**

Most of the contractors interviewed have never installed a geothermal heat pump. One contractor said he was aware of another contractor in the area who installs geothermal heat pumps. Several said that the climate was not suitable for geothermal heat pumps, and several others said that one of the big problems associated with them is disposing of the waste water. A few contractors hadn’t had much experience with geothermal heat pumps. The few contractors who have installed them did so at least 15 years ago, with mixed feelings about the results.

**Practices**

Many of the contractors interviewed said that word-of-mouth, referrals, and quality service was important for building and maintaining their customer base. Some contractors said they do not need to advertise while others advertise through the phone book, television, radio, newspapers, magazines, and signs painted on their trucks.
Decision Making Factors

Many of the interviewed contractors said that price was the “bottom line” for customers’ heating and cooling decisions. This is particularly true in new construction and the small commercial sector. Almost half of the contractors, however, said that the reputation of the installer can outweigh the importance of price. Over half the contractors interviewed also said that people are interested in energy-efficient systems. Other factors that contractors mentioned included brand name recognition and warranties. A few contractors also mentioned air quality, comfort, and low maintenance.

Most of the contractors interviewed discuss a number of different options with customers. About 40 percent of contractors discuss various equipment options with customers. These include air filters, humidification, zoning, setback thermostats—and for small commercial customers—economizers, zoning, and variable speed drives. Approximately 15 percent of contractors offer several different brand names with various efficiency levels.

Almost all of the contractors interviewed said that many people call them asking for energy-efficient furnaces. Several contractors actively promote high-efficiency furnaces. Some provide standard and high-efficiency options, and a few talk with customers to determine which system is best for their needs.

Some contractors working with small commercial customers discuss high-efficiency furnaces versus rooftop systems, which are the standard. These contractors said that more small commercial customers are installing high-efficiency systems, though many are more concerned about up-front price and the indoor space requirements of high-efficiency systems.

Sizing of Heating and Cooling Equipment

Most contractors size residential replacement systems by heat loss and heat gain calculations and rules of thumb. This generally incorporates insulation values, the size of the home, windows, and sometimes lifestyles. Almost half of the contractors interviewed said that they could size systems based on informal assessments, rules of thumb, and experience. A few of these contractors said that when they compared their estimates to computerized heat loss calculations they were the same.

Most of the remaining contractors rely on computerized heat loss calculations. A few of them said that without the calculations sizing may be wrong. Several interviewed contractors rely on their distributor for the calculations. Sizing for small commercial new construction is generally done by the engineer or architect drawing up the plans.
Energy Savings Estimates

About one fourth of the contractors interviewed discuss the savings benefits of high-efficiency furnaces either in terms of paybacks, percent savings, or actual dollar savings. Among other sources, contractors acquire this information from manufacturers and utilities. Approximately half of the contractors talk with customers about savings and paybacks in general, without providing actual figures. This group says that because every situation is different (due to lifestyles, building type, and so on) they can not stand behind any precise estimates. The rest do not offer savings estimates. Several of these contractors said people already know about savings and paybacks, so it is not necessary to discuss this with them. Others in this group work with contractors or install small commercial systems according to design specifications.

Services

We asked HVAC contractors about several services having to do with energy efficiency, safety, and comfort. These services included service and maintenance agreements, energy audits, carbon monoxide detection, smoke detection, blower-door tests, and weatherization services. Contractors' opinions and attitudes about these services are discussed below.

Service and Maintenance Agreements

Just over half of the contractors interviewed offer some form of service agreement. Of this group, one fourth said that few customers are interested in service agreements. They said that many people don't recognize the need for regular maintenance until they have problems with their systems. The other fourth said that agreements are extremely popular with their customers. A few contractors said that agreements are nice because they can schedule service calls during slow periods.

The contractors who do not offer agreements gave several reasons. The two most common reasons were 1) warranties, such as the five-year parts and labor warranty, are so good that service and maintenance agreements are not necessary; and 2) contractors tell their customers that they should call if there is a problem or if regular maintenance is needed, and pay for the service as they get it. Other reasons contractors gave for not offering service and maintenance agreements were that their business was too small, that the agreements are nothing more than money makers, and that they are not necessary because very little will go wrong with today's systems.

Energy Audits

Most of the interviewed contractors do not offer energy audits, saying that the gas and power companies offer audits for free. Many contractors tell their
customers to contact their utilities if they want an audit. Several other interviewed contractors said that they did not offer audits because they could not do it for free. A few contractors said that energy audits do not fit into their business, and one contractor wondered if there would be a conflict of interest if he performed the audit.

About one fifth of the contractors interviewed said they offer some form of energy audit. One contractor performs audits through a utility program in the Fox valley. Another does free in-depth audits only on occasion because they are time consuming and costly. The others in this group do walk through audits when they are in customers’ homes.

**Carbon Monoxide Detection**

Few contractors install carbon monoxide detectors. Most contractors say that detectors are available at low cost from local retailers. They also say that most detectors have not been perfected—making them unreliable. Of the contractors who do install detectors, some say that they only install high quality detectors. Others install carbon monoxide detectors in all new construction projects.

Almost all of the contractors interviewed said that utilities offer carbon monoxide testing for free. A little less than one fourth of the contractors refer customers to the utilities for testing because they don’t want to deal with the liability issues or because they don’t want to invest in expensive testing equipment.

The other three fourths of the contractors interviewed offer carbon monoxide detection services. Most of these contractors test only on request, or when they notice problems. Only one said that he tested on every service call.

**Smoke Detection**

Almost none of the HVAC contractors install smoke detectors. One changes batteries on request, and another installs detectors for rental properties. A few others mentioned that they might become more involved with smoke detection as control systems develop.

Contractors raised a number of reasons for not offering smoke detectors: 1) they are available at low cost from local retailers; 2) contractors feel that detectors are not a part of their business; 3) there are liability issues associated with detectors; and 4) builders are required to install them on all new construction projects.
Blower-Door Tests

Two contractors interviewed offer blower-door testing. The remaining contractors interviewed may be divided into two groups. The first group is not familiar with blower-door testing. The second group has had experience with them and offers mixed opinions. A few of these contractors said that blower-door tests are worthwhile, but that no one ever asks about them. Others who have observed blower-door testing by the utilities said that the results aren't useful because the people performing the tests do not use common sense. A few contractors refer people to the utilities if asked about blower-door testing. One contractor suggested that contractors should consider offering testing, and that the utilities should help contractors get set up.

Weatherization Services

Most of the HVAC contractors interviewed said that weatherization is not part of their business. Many said that weatherization was more appropriate for builders, insulators, or windows and siding people. However, one fourth of the contractors said that they will make recommendations to people when they notice areas in need of insulation. Two contractors said that they do some weatherization, although they would rather not, and one installs some insulation as a part of his energy audits.

Participation in Low-Income Programs

Approximately one third of the HVAC contractors interviewed participate in low-income programs. These include the Brown County Housing Allowance, several Indian tribes, Wisconsin Public Service Corporation programs, and individual calls. In these cases, the contractors submit bids and install what the organizations specify.

Many contractors, whether participating or not, are frustrated with low-income programs for a number of reasons. Contractors said that, although the organizations specify high-efficiency furnaces, they always go with the lowest bidders. Several contractors feel that the low bid precludes quality systems, installation, and service. Contractors also said that programs are now working with only two or three contractors for all their installations, and that competition for low-income programs has increased.

Referrals

We asked HVAC contractors whether they refer customers to other contractors who provide services that they do not provide. The majority of contractors interviewed said they either tell people if something is needed, such as insulation, or refer customers to other contractors. A few contractors said that since the amount of insulation in a home will affect the furnace size talking to customers about insulation is important.
Changing Technologies and Services

We asked HVAC contractors whether the technologies and services they offer are substantially different than those offered several years ago. Just over one fourth of the contractors interviewed said that, other than keeping abreast of changes in the industry and fine tuning their services, they are not offering services and technologies that are substantially different than those they have offered in the past. Changes that other contractors mentioned include carbon monoxide detection, using CAD programs to design duct systems, bidding April AIs—a humidification device—in all systems, and offering radiant floor heating, blower-door testing, energy audits, and service contracts.

Financing

Almost half of the contractors interviewed offer some form of financing, usually in the form of manufacturer or credit card financing. Of those, approximately half said that people don’t use financing very often, with several saying that usage increases in the fall as people “get surprises” when they turn on their furnaces.

Only a few contractors said that a lot of people take advantage of financing; one contractor said that financing had generated a significant amount of business. One contractor offering financing said that people like it because it is in a familiar format, similar to financing offered through appliance stores.

Training

Licensing

There are no state licensing requirements for either HVAC contractors or their employees. Approximately 15-20 municipalities require a local license in order to install, service, adjust, or modify HVAC equipment within the municipality (according to bulletin SBDB10165-P(N0295) issued by the Wisconsin Department of Industry, Labor and Human Relations (DILHR) HVAC Program, Safety and Building Division). According to a DILHR representative, some of these municipalities require that one individual within a contractor’s organization pass a competency test. Testing is not required of every technician within the contractor’s organization.

On August 1, 1994, it became mandatory that HVAC contractors register with DILHR. Registration consists of minimal standards of accountability and evidence of compliance with workers compensation and unemployment compensation.
Training Providers

While some HVAC contractors and technicians have gone through technical school programs, others have obtained most of their training on the job. Some contractors pay all or part of the tuition for technical school courses while others leave schooling up to the individual employee. Most employers send their employees to training seminars and courses offered by manufacturers. Many contractors believe that some of the best training is done on the job. Several shops, including union and some non-union shops, require apprenticeships. A new HVAC and refrigeration program at the Northeast Wisconsin Technical College (NWTC) is generating excitement among several contractors because it offers training for individuals entering the HVAC industry. In addition to seminars and courses, contractors stay informed about changes in the industry through suppliers, trade organizations, trade magazines, manufacturers, utilities, and other contractors.

Future Training Needs

Most contractors do not see any training needs developing in the near future, though they stress the ongoing importance of keeping abreast of models and technologies as they change. Several contractors who mentioned future needs discussed the growing role of computer and electronics in the industry. Other contractors mentioned the increasing difficulty of keeping up with regulations. A few contractors said that technical education is becoming more important, and that the new NWTC HVAC and refrigeration program is a step towards meeting that need.

Utility Programs and Relationships

Almost all of the contractors interviewed have participated in or are familiar with several utility efficiency programs. Contractors mentioned furnace and air conditioning rebate programs, a trade ally program that authorized the contractor to offer rebates, and energy audits, blower-door testing, and financing.

Program Impacts

Most contractors said that gas and electric utility programs have influenced the energy-efficiency level of equipment sold in their area. Utility advertising and promotion has brought energy-efficiency to the forefront of consumer awareness, making it easier to sell these products. Most of the contractors interviewed said that the sustainability of these effects differs for furnaces and central air conditioning.

All of the contractors interviewed said that the installation and sale of energy-efficient furnaces has become the norm, although standard-efficiency equip-
ment is still installed in some new construction, especially rental properties. These contractors did not see a decline in the efficiency level of furnaces sold as utility rebate programs were eliminated. Rather, several contractors said that customers are merely waiting longer before replacing their furnaces. But when they do replace furnaces, it is often with high-efficiency systems. Two contractors mentioned rebates for DC drive furnaces. Although the efficiency level of these furnaces is very high, people aren't interested in them because the payback is too long.

Contractors say utility impacts on central air conditioning efficiency levels are less dramatic and sustainable. Most contractors said that central air conditioning rebate programs were effective while rebates lasted. But once rebates stopped, the efficiency levels of air conditioning systems sold went down from 11 or 12 SEER to 10 SEER. Many contractors say that because the cooling season is so short, customers will not see a reasonable payback with high-SEER air conditioning.

Future Role of Utilities

Interviewed contractors can be divided into two groups based on their views of the role of utilities in promoting energy efficiency. The first group feels that the utilities should not play any role. These contractors either believe there is no need to promote efficiency or they are concerned that utilities are encroaching on their industry.

The second group believes that utilities should be involved in promoting efficiency, suggesting that education and developing awareness among customers is important. Several of these contractors strongly believe that the utilities should promote efficiency without encroaching on their business. They feel that utilities should not get involved with service or installation, but rather work with contractors on this. The second group also thought rebates are useful. A few contractors suggested that if utilities offer rebates, the utilities should be responsible for the paperwork. One contractor suggested that utilities work with manufacturers in developing efficient technologies.

General Policies and Practices

At the end of the in-depth interviews, contractors were asked to read a number of statements related to general policies and practices their company uses when recommending products and services to customers. They were asked to rate each statement on a scale of one to six, where one means "strongly disagree" and six means "strongly agree." The results of this exercise are illustrated in Table E-3.
The reader should review the following numbers with caution, for two reasons. First, and most importantly, we believe that the qualitative interview results provide a more comprehensive assessment of current attitudes, opinions, and practices. This is because we were able to ask detailed follow-up questions for each area of interest. Second, the emphasis in our recruitment was to include contractors of various sizes from a wide geographical area. As a result, the group of contractors we spoke to are not necessarily representative of all HVAC contractors in the Green Bay area.

The principal value in collecting the information presented in Table E-3 is that it will provide a quantitative baseline from which to track changes in individual contractors' attitudes, opinions, and practices over time.
Table E-3: Policy and practices ratings

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>We focus primarily on the short-term needs of our customers (such as purchase price and availability) when recommending equipment, rather than longer-term issues (such as operating cost).</td>
<td>2.00</td>
</tr>
<tr>
<td>It is becoming increasingly important for us to be responsive to customer concerns about the environment (for example, clean fuels, greenhouse impacts, CFCs).</td>
<td>4.47</td>
</tr>
<tr>
<td>Except on rare occasions, we will only recommend energy-related equipment that is quickly available in the local market.</td>
<td>3.00</td>
</tr>
<tr>
<td>We almost always recommend energy-efficient equipment, even if it costs the customer a bit more up-front</td>
<td>5.26</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use electric end use equipment and appliances.</td>
<td>2.05</td>
</tr>
<tr>
<td>The services we offer are substantially the same as the services we offered 4 years ago.</td>
<td>3.79</td>
</tr>
<tr>
<td>We offer services that are not typical of other businesses in our industry.</td>
<td>3.68</td>
</tr>
<tr>
<td>Rather than making equipment recommendations, our role is primarily that of providing or installing whatever equipment customers request.</td>
<td>2.47</td>
</tr>
<tr>
<td>We encourage customers to consider the long-term savings of the products and services we offer.</td>
<td>5.37</td>
</tr>
<tr>
<td>We view customer concern about health and safety as an opportunity to offer new services.</td>
<td>5.37</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use gas-fueled equipment and appliances.</td>
<td>5.42</td>
</tr>
<tr>
<td>We almost always recommend the equipment with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>1.68</td>
</tr>
<tr>
<td>Rather than marketing specific services to our customers, our role is primarily that of providing the services our customers request.</td>
<td>4.05</td>
</tr>
<tr>
<td>We almost always recommend the repair alternative with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.67</td>
</tr>
<tr>
<td>We have made a substantial effort over the last 4 years to provide our customers with new services.</td>
<td>4.74</td>
</tr>
<tr>
<td>We provide information to customers about the environmental benefits of our products and services.</td>
<td>4.58</td>
</tr>
<tr>
<td>Heating and cooling contractors in my area are offering a number of services that generally were not available 4 years ago.</td>
<td>4.16</td>
</tr>
<tr>
<td>We try to persuade our customers to buy very energy-efficient equipment</td>
<td>5.37</td>
</tr>
</tbody>
</table>

1 Contractors were asked to rate each statement on a scale of one to six, where one means "strongly disagree" and six means "strongly agree."
Appendix F: Eau Claire/La Crosse

This section summarizes the results of 20 in-depth interviews with heating, ventilation and air conditioning (HVAC) contractors in the Eau Claire and La Crosse Area, consisting primarily of contractors located in La Crosse, Eau Claire, and Chippewa County. Other communities in West Central Wisconsin such as Hudson, Sparta, and Menomonie were also included.

The interviews were conducted between October 10, 1995 and November 1, 1995. The purposes of the interviews were to: 1) discuss contractors' opinions of and attitudes toward energy-efficient heating and cooling equipment, 2) understand the products, practices, and services of HVAC contractors who work in both the residential and small commercial sectors, 3) discuss the role of financing in residential and small commercial customer decision making, 4) understand the present level of training among HVAC technicians, and 5) explore both the past and potential future role of utilities in the residential and small commercial HVAC market.

General Business Characteristics

The typical interviewed contractor has between six and 11 employees, although the number varies from one to 42 employees. Average annual gross revenue among these contractors is just over $800,000. The median is $525,000.

Interviewees have been working in the HVAC business for an average of just over 20 years (median is 20 years) and their company has been operating for an average of just over 33 years (median is 25 years). The residential sector accounts for over 70 percent of most interviewed contractors' gross revenue. Only a few of the contractors interviewed complete more work in the commercial sector than the residential sector.

The contractors interviewed generally serve customers within a 50 mile radius of their office. Larger contractors and contractors serving the mobile home market cover a broader geographical area.

Heating and Cooling Products

Forced-Air Furnaces

Collectively, the contractors we interviewed install approximately 3700 residential and small commercial heating and cooling systems per year. Most contractors believe in the benefits of high-efficiency furnaces and recommend
them. Just over 80 percent of the residential and small commercial forced-air furnaces sold by interviewed contractors have A.F.U.E. ratings of 90 percent or higher (see Table F-1). Contractors who sell a substantial number of lower efficiency units (that is, 79-84 percent A.F.U.E. ratings) gave two reasons. First, they are more affordable. Second, they appeal to rental property owners when the owner will not be paying the utility bill.

Table F-1: Forced-air furnace sales by efficiency level

<table>
<thead>
<tr>
<th>Efficiency Rating (A.F.U.E.)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 percent or higher</td>
<td>81</td>
</tr>
<tr>
<td>85-89 percent²</td>
<td>1</td>
</tr>
<tr>
<td>79-84 percent</td>
<td>18</td>
</tr>
</tbody>
</table>

¹Weighted by contractor reported unit sales
²Most manufacturers do not have units within this efficiency category

Central Air Conditioners

Over 90 percent of the central air conditioning systems installed just meet, or slightly exceed, the minimum federal standards of 10.0 SEER (See Table F-2). Many of the contractors interviewed strongly believe that units with SEER ratings of 11.0 or higher are a poor investment. Contractors said that the low number of operating hours combined with the increased cost of high-efficiency units results in paybacks that easily exceed five years and can exceed 10 years. Additionally, many contractors ask customers how they use or intend to use their central air conditioning and recommend lower efficiency units for people operating the unit for relatively few hours.

Table F-2: Central air conditioning sales by efficiency level

<table>
<thead>
<tr>
<th>Efficiency Rating (SEER)</th>
<th>Percent of Units Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0 or higher</td>
<td>0</td>
</tr>
<tr>
<td>12.0 to 12.99</td>
<td>5</td>
</tr>
<tr>
<td>11.0 to 11.99</td>
<td>4</td>
</tr>
<tr>
<td>10.0 to 10.99</td>
<td>91</td>
</tr>
</tbody>
</table>

¹Weighted by contractor reported unit sales
Other Heating and Cooling Products

We asked contractors about a number of other heating and cooling products, such as setback thermostats, electronic air filters, whole-house fans, air-to-air heat exchangers, and geothermal heat pumps. The attitudes and opinions expressed about these products were mixed. Only a few of the contractors interviewed said that offering these products gives them a competitive advantage. The products discussed as well as the opinions expressed are outlined below.

Setback Thermostats

Based on their opinion of setback thermostats, the contractors we spoke to can be divided into two groups. The largest group, representing about two-thirds of the contractors interviewed, either do not install setback thermostats or expressed a number of concerns about them. About one-half of these contractors said that setbacks are not worthwhile because the units are often defective, people do not operate them properly, do not change batteries often enough, and frequently call the contractor with service and maintenance problems. The other half said that setback thermostats are not appropriate for new high-efficiency furnaces because the new furnaces have trouble catching up from the setback temperature on very cold days. One contractor provided a publication provided by his furnace manufacturer advising contractors against using setback thermostats with high-efficiency furnaces for this reason. A few also said that little energy savings are realized through the use of setback thermostats.

The second group, representing about one-third of the contractors interviewed, recommend and install setback thermostats. Few of these contractors recommend and install setback thermostats for elderly people. A few contractors also said that they tell residential customers to only set back the thermostat five to eight degrees because the furnace will not be able to catch up otherwise.

Electronic Air Filters

About one-half of the contractors interviewed give residential customers the option of purchasing electronic air filters. Most of these contractors said that electronic air filters are not installed frequently. The other group of contractors said that they are reluctant to market electronic air filters because of the cost ($500-$600) and because people do not maintain them properly.

By far the most popular filtration systems are the new media filters such as Space Gard Filters. Many contractors said that these new filtration systems do a very good job and are very affordable ($200). These systems consist of a filter housing that can be easily added to a new or existing furnace and $25 filters that can be thrown away.
Whole-House Fans

Many contractors have limited knowledge of whole-house fans and expressed no opinion about them. A small group of contractors have installed whole-house fans but do so very selectively. Most of these contractors said that the installation of whole-house fans is usually the building contractor's responsibility.

Air-to-Air Heat Exchangers

Contractors in the Eau Claire and La Crosse area are highly aware of air-to-air heat exchangers. Many mention Northern States Power Company's Star Home Program when discussing air-to-air heat exchangers. Roughly two-thirds of the contractors interviewed said that they recommend air-to-air heat exchangers for all new homes. Most of these contractors said that installation rates have declined dramatically since NSP stopped offering rebates. Despite this decline, many of these contractors said they will continue to promote air-to-air heat exchangers and believe they will slowly gain acceptance.

Approximately one-third of the contractors interviewed do not recommend air-to-air heat exchangers. This group said that the price of air-to-air heat exchangers is too high ($1000 to $1400) to be cost-effective. Some members of this group said it is better to introduce outside air to the home by piping it directly into the ductwork's cold air return. Others said that air-to-air heat exchangers do not transfer heat as well as manufacturers claim—making them expensive relative to their effectiveness.

Geothermal Heat Pumps

Most of the contractors interviewed said that geothermal heat pumps are not a cost-effective heating or cooling technology for the Wisconsin climate. Most said that they are too expensive relative to more conventional heating and cooling options. Some expressed concern about the level of comfort that geothermal heat pumps deliver without supplemental heat. A few contractors said that geothermal heat pumps are too sophisticated for the average HVAC contractor.

Three interviewees said that geothermal heat pumps are a cost-effective heating and cooling option. One interviewee installs over 50 geothermal heat pumps per year and strongly advocates them. This contractor credited a number of the rural electric cooperatives in the area for helping to make customers aware of this technology.
Practices

All of the contractors interviewed said that word-of-mouth and referrals from satisfied customers are their primary methods of building a customer base. Many said that they simply "do not need to advertise." Approximately one-half of the contractors interviewed advertise their services. Advertising is generally limited to Yellow Pages ads, local newspapers, and advertisements on their trucks. A few of the larger contractors do some television, radio, or direct-mail advertising.

Decision Making Factors

According to contractors, their reputation for quality and workmanship, cost, and energy efficiency are the most important factors in residential and small commercial customer decision making. While contractors said that customers are concerned about cost and energy efficiency they also said that customers make tradeoffs based on the information they receive from the contractor. In fact, many contractors said that customers choose a contractor and then listen to and act on the contractor's advice. Other less important factors include equipment reliability, warranty, comfort, and brand name.

Brand loyalty among residential and small commercial customers is identifiable but fragile. Most contractors said that their reputation for quality and integrity will often overcome any concern a customer has regarding the equipment brand.

The majority of contractors limit their discussions with customer to warranty information and the various efficiency options available. Only a few contractors said that they routinely discuss indoor air quality, electronic air filters, and thermostat controls.

Sizing of Heating and Cooling Equipment

Most contractors size replacement furnaces and central air conditioners through heat loss and heat gain calculations and general rules of thumb. Usually this involves an assessment of window quality, wall and ceiling insulation levels, and square footage of the home. A few of these contractors said they have computer software that assists them with furnace and air conditioner sizing. One group, representing about one-fourth of the contractors interviewed, said that calculations are not necessary and that their experience working in a variety of homes and small businesses is more relevant when sizing equipment.

Furnace and central air conditioner sizing is quite different in new construction. Distributor personnel with access to software programs will size the system for the contractor as an inducement to buy from them. However, some
contractors said they do not take advantage of this service and use general rules of thumb.

**Energy Savings Estimates**

Most contractors do not give residential or small commercial customers customized energy savings estimates under any condition (new or replacement). They prefer to either: 1) tell customers to call the gas or electric utility for this information, 2) give the customer the manufacturer's literature, which typically provides the customer a range of savings estimates, or 3) give rough estimates of the savings realized by installing a 90-percent versus 80-percent efficiency furnace. Many contractors said they simply do not want to get involved in giving estimates because of "hard feelings" that might develop if the estimates are not accurate. Others said that many customers have already decided to purchase a 90-percent+ efficiency furnace and, as a result, they do not request savings estimates.

Contractors who do give savings estimates tell customers to look at the efficiency rating as the percentage of each dollar spent on natural gas that will actually be used to heat the home. For example, with a 60-percent efficient furnace they tell customers that 60 cents of every dollar is actually being used to heat the home and the remaining 40 cents is going "up the chimney." With a 90-percent efficiency furnace 90 cents of every dollar is used to heat the home. Few contractors give savings estimates for high-efficiency central air conditioners because of the large variability in the number of hours that customers actually operate them.

**Services**

We asked HVAC contractors about service and maintenance agreements, energy audits, carbon monoxide detection, smoke detection, blower-door tests, and weatherization services. About one-fourth of the contractors interviewed offer duct-cleaning services. Many of the contractors we interviewed do not see a need to proactively market new products and services because "customers will call us when they have a problem." Contractors' opinions and attitudes about a number of services are outlined below.

**Service and Maintenance Agreements**

Few contractors offer formal service and maintenance agreements to their residential or small commercial customers. Those who offer them said that it is not a significant portion of their overall revenue. Most contractors said that residential and small commercial equipment is highly reliable and requires limited servicing. As a result, many said it is better to advise customers to call
them when there is a problem. These contractors said that manufacturers' warranties are enough and that anything else is unnecessary.

For central air conditioners, the typical manufacturer's warranty consists of a one-year parts warranty and a five-year compressor warranty. Some manufacturers also offer a one-year warranty on labor, while others extend the compressor warranty to 10 years.

There are at least two reasons why HVAC contractors do not offer service and maintenance agreements to their residential and small commercial customers. First, many contractors feel customers should contact them when they want their HVAC equipment serviced. Second, many customers form close business relationships with their HVAC contractors. This relationship is built on the contractor's historical ability to solve problems and give the customer sound advice. Because of this relationship, both customers and contractors often feel that formal service and maintenance agreements are not necessary. Contractors said that customers will call their preferred contractor when they need them.

**Energy Audits**

Most contractors do not offer services that approach the comprehensiveness of energy audits. These contractors said that few customers are interested in energy audit and they refer those that are to Northern States Power Company. A few contractors said they have seen the results of energy audits and don't always agree with the recommendations. They both felt that too many recommendations with long payback periods are being made.

Only a few HVAC contractors offer services that approach the comprehensiveness of an energy audit. These contractors perform "walk through audits" in order to assess insulation levels, weatherization, window quality, and other relevant characteristics of the home. Heat loss and heat gain calculations are made to properly size equipment and insulation, and weatherization improvements are noted and explained.

**Carbon Monoxide Detection**

Few HVAC contractors sell or install carbon monoxide detection devices because they are readily available at local retailers. Those who do said that sales are weak. Two contractors said that carbon monoxide is "not a problem with the new sealed combustion furnaces." A few other contractors said that carbon monoxide detectors have not been perfected and that they lack confidence in them.

Contractor opinions of carbon monoxide detection services are mixed and fall into three groups. The first group of contractors refers customers to the gas utility when they suspect carbon monoxide problems. Some of these contrac-
tors said they do not want the liability problems associated with offering this service. The second group consists of contractors who routinely test for carbon monoxide on service and maintenance calls. A third group consists of contractors who provide the service if the customer requests it or they see a crack in a heat exchanger (an indicator of a possible carbon monoxide leak).

Smoke Detection

None of the interviewed HVAC contractors sell or install smoke detection devices. Many contractors said that, in the new construction market, smoke detection equipment is the building contractor’s responsibility. They also said that most owners of existing homes and small commercial buildings already have smoke detectors. HVAC contractors unanimously agree that smoke detectors are valuable, but it is something that most customers take care of themselves.

Blower-door tests

The majority of HVAC contractors have little experience with or knowledge of blower-door tests. The few contractors who were aware of blower-door tests associated them with NSP’s Star Home program. These contractors, as well as most others, said that it is appropriate for NSP to offer this service. Most have no interest in getting involved in this type of service.

Weatherization Services

About one-half of the HVAC contractor we interviewed said that weatherization services are generally beyond their focus and they have little interest in getting involved in this area. These contractors are also cautious about recommending insulation and weatherization contractors because of a perception that some cut corners (for example, they do not install weatherization material properly, do not put in the amount of insulation they said they would, and so on). Many contractors said that customers are aware of the importance of insulation and weatherization and coordinate weatherization projects themselves.

Another group of contractors, representing about one-half of those interviewed, said they routinely advise customers about proper insulation levels. Some of these contractors also point out where weatherization improvements could be made. A number of contractors said if a customer takes their advice on increasing insulation levels they will factor this information into their equipment sizing decision.

Participation in Low-Income Programs

Over one-half of the contractors interviewed work with low-income customers through utility weatherization programs or through arrangements
with weatherization agencies. Agencies and organizations mentioned include Western Dairyland, Northern States Power Company, WestCAP, Eau Claire Housing Authority, Monroe County, Vernon County, La Crosse County, and La Crosse Rehab. In these situations the contractor installs what the weatherization agency or utility specifies—typically a furnace with an A.F.U.E. rating of 90 percent or higher. Contractors usually agree on hourly rates and a basic replacement charge with the weatherization agency or utility prior to participating in the program.

Financing

Most contractors interviewed said that financing is not an important service to offer residential and small commercial customers. These contractors said the most home and small business owners take care of financing themselves. Others said that getting more highly involved in financing would give them little competitive advantage.

Only about one out of every four contractors interviewed offers financing programs. All of these programs were offered through local distributors and equipment manufacturers. Manufacturer programs typically consist of 90 to 180 days interest-free financing followed by relatively high interest rates (for example, 16 percent and up). Manufacturers, like most lending institutions, limit financing to the installation of new equipment. The contractors that offer financing said that few residential and small commercial customers participate.

Training

Licensing

There are no state licensing requirements for either HVAC contractors or their employees. Approximately 15-20 municipalities require a local license in order to install, service, adjust, or modify HVAC equipment within the municipality (according to bulletin SBDB10165-P(N0295) issued by the Wisconsin Department of Industry, Labor and Human Relations (DILHR) HVAC Program, Safety and Building Division). According to a DILHR representative, some of these municipalities require that one individual within a contractor's organization pass a competency test. Testing is not required of every technician within the contractor's organization.

On August 1, 1994, it became mandatory that HVAC contractors register with DILHR. Registration consists of minimal standards of accountability and evidence of compliance with workers compensation and unemployment compensation.
While some HVAC technicians have gone through technical school program, others have obtained most of their training on the job. Some contractors pay for classes at local technical schools while others leave training up to the individual employee. Even within a single firm, individual technicians have developed their skills in a variety of ways.

**Training Providers**

HVAC technicians look to a variety of sources for training and education on HVAC systems. These are: 1) on-the-job training, 2) technical schools, 3) manufacturer and distributor sponsored training seminars, and 4) training videos provided by manufacturers. Most HVAC technicians appear to have taken advantage of a number of these offerings when initially learning the business. However, on-the-job training appears to be the predominate education method for most technicians. This is especially true for smaller HVAC businesses.

**Future Training Needs**

Most contractors do not see any specific training needs developing in the future. Most said they will continue to keep abreast of new technologies and changes in building codes through informal channels, including their distributors and manufacturer representatives.

The few contractors who identified training needs most frequently mentioned a need for training on computerized control systems. Other needs identified by a few contractors include training on air purification systems, indoor air quality, refrigerant handling procedures, combined water heating and space heating systems, and duct cleaning.

**Utility Programs and Relationships**

All but two of the HVAC contractors interviewed have been involved with gas and electric utility rebate programs. Although many could not remember specific program names, they knew the programs were offered by Northern States Power Company or surrounding electric cooperatives. Programs mentioned included central air conditioning rebates, water heater rebates, time-of-use rates, low-interest financing programs, gas fireplace promotions, furnace rebates, and NSP's Star Home program.

**Program Impacts**

Most contractors said that gas and electric utility programs have had a substantial impact on the energy-efficiency level of equipment sold in their area. Utility advertising and promotion has brought energy-efficiency to the fore-
front of consumer awareness, making it easier to sell these products. Many said that the sustainability of these effects differs for furnaces and central air conditioning.

The majority of contractors said that the La Crosse and Eau Claire markets for forced-air furnaces has been permanently transformed toward the sale of energy-efficient heating equipment, although lower efficiency equipment continues to be available. These contractors have not seen, nor do they expect to see, a decline in the efficiency level of heating equipment sold as utility rebate programs are eliminated or scaled back.

Contractors say utility impacts on central air conditioning efficiency levels are less dramatic and less sustainable. Most contractors said that NSP's central air conditioning rebate program was not very effective in moving customers up to higher efficiency central air conditioners. Many believe that it is not in a residential customer's best interest to purchase high-efficiency central air conditioners. These contractors said that in the absence of rebate programs the central air conditioning market has moved back to units that meet, or just exceed, the minimum federal standard (that is, 10 SEER).

**Future Role of Utilities**

Most contractors interviewed are highly satisfied with the role that NSP has traditionally played in the HVAC market. These contractors said that it is appropriate for gas and electric utilities to promote the installation of energy-efficient heating equipment and routine maintenance checks. Many also said that gas and electric utilities should continue to administer and promote rebate programs and provide energy audits to interested residential and small commercial customers. Others said that gas utilities should continue to take a lead role in providing carbon monoxide detection services.

Contractors are consistent in their belief that utilities should stay out of the HVAC service business and refrain from selling HVAC or related equipment. Many also said that, although education and promotion of energy-efficient equipment is an important utility role, utilities need to give responsible advice. Many contractors said that NSP's central air conditioning rebate program was an example of a utility giving "poor" advice.
General Policies and Practices

At the end of the in-depth interviews, contractors were asked to read a number of statements related to general policies and practices their company uses when recommending products and services to customers. They were asked to rate each statement on a scale of one to six, where one means "strongly disagree" and six means "strongly agree." The results of this exercise are illustrated in Table F-3.

The reader should review the following numbers with caution, for two reasons. First, and most importantly, we believe that the qualitative interview results provide a more comprehensive assessment of current attitudes, opinions, and practices. This is because we were able to ask detailed follow-up questions for each area of interest. Second, the emphasis in our recruitment was to include contractors of various sizes from a wide geographical area. As a result, the group of contractors we spoke to are not representative of all HVAC contractors in the La Crosse and Eau Claire area.

The principal value in collecting the information presented in Table F-3 is that it will provide a quantitative baseline from which to track changes in individual contractors' attitudes, opinions, and practices over time.
Table F-3: Policy and practices ratings

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>We focus primarily on the short-term needs of our customers (such as purchase price and availability) when recommending equipment, rather than longer-term issues (such as operating cost).</td>
<td>2.00</td>
</tr>
<tr>
<td>It is becoming increasingly important for us to be responsive to customer concerns about the environment (for example, clean fuels, greenhouse impacts, CFCs).</td>
<td>5.16</td>
</tr>
<tr>
<td>Except on rare occasions, we will only recommend energy-related equipment that is quickly available in the local market.</td>
<td>3.25</td>
</tr>
<tr>
<td>We almost always recommend energy-efficient equipment, even if it costs the customer a bit more up-front.</td>
<td>4.85</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use electric end use equipment and appliances.</td>
<td>2.16</td>
</tr>
<tr>
<td>The services we offer are substantially the same as the services we offered 4 years ago.</td>
<td>4.50</td>
</tr>
<tr>
<td>We offer services that are not typical of other businesses in our industry.</td>
<td>3.75</td>
</tr>
<tr>
<td>Rather than making equipment recommendations, our role is primarily that of providing or installing whatever equipment customers request.</td>
<td>2.40</td>
</tr>
<tr>
<td>We encourage customers to consider the long-term savings of the products and services we offer.</td>
<td>5.25</td>
</tr>
<tr>
<td>We view customer concern about health and safety as an opportunity to offer new services.</td>
<td>5.10</td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use gas-fueled equipment and appliances.</td>
<td>4.45</td>
</tr>
<tr>
<td>We almost always recommend the equipment with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>1.90</td>
</tr>
<tr>
<td>Rather than marketing specific services to our customers, our role is primarily that of providing the services our customers request.</td>
<td>3.55</td>
</tr>
<tr>
<td>We almost always recommend the repair alternative with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>2.50</td>
</tr>
<tr>
<td>We have made a substantial effort over the last 4 years to provide our customers with new services.</td>
<td>4.50</td>
</tr>
<tr>
<td>We provide information to customers about the environmental benefits of our products and services.</td>
<td>4.15</td>
</tr>
<tr>
<td>Heating and cooling contractors in my area are offering a number of services that generally were not available 4 years ago.</td>
<td>3.53</td>
</tr>
<tr>
<td>We try to persuade our customers to buy very energy-efficient equipment</td>
<td>4.74</td>
</tr>
</tbody>
</table>

1Contractors were asked to rate each statement on a scale of one to six, where one means “strongly disagree” and six means “strongly agree.”
Appendix G: In-Depth Interview Instrument

Tracking the Market for Energy-Efficiency Services
HVAC Contractor Survey

Contact Name: ____________________________________________
Title: ____________________________________________
Business Name: ____________________________________________
Address: ____________________________________________
Interview Date: ____________________________________________

Introduction
Thank you for agreeing to meet with me. The purpose of this interview is to help the Wisconsin Center for Demand-Side Research\(^1\) better understand the products, services, and practices of heating and cooling contractors. As I mentioned on the phone, we are interested in talking with contractors from time to time in order to understand how products, services, and practices change over time.

General Business Characteristics
1. I would like to begin by learning a little more about your business. Could you tell me about your main business activities? [PROBE: What lines of business? Are you an independent business/subsidiary? How are you organized?]

2. How many employees do you have? [Probe: Number of HVAC installers/service people]

3. How many years has your company been in the heating and cooling business?
   __________  Years in Heating and Cooling Business

4. How long have you been working in the heating and cooling business?
   __________  Years Worked in Heating & Cooling Business

\(^1\)Former name of the Energy Center of Wisconsin
5. What geographical area(s) does your company serve? [PROBE: Where are the majority of your customers located? What is the typical travel time to a job site?]

Note: You may want to return to questions 6-13 later

6. What is your overall gross sales volume in a typical year?

   __________ Gross Sales Volume

7. What percent of your heating and cooling work, measured by gross sales volume, is residential, what percent is small commercial, and what percent is large commercial and industrial?
   [Note: By small commercial I am referring to small commercial buildings that utilize heating and cooling equipment which is similar to residential equipment.]


9. Approximately how many residential heating and cooling systems does your company install in a typical year? [PROBE: This should include new construction, replacements, and installations in existing homes]

   ______ Number of Furnaces
   ______ Number of Boilers
   ______ Number of Central Air Conditioners


11. Approximately how many small commercial heating and cooling systems does your company install in a typical year? [PROBE: This should include new construction, replacements, and installations in existing buildings]

   ______ Number of Furnaces
   ______ Number of Boilers
   ______ Number of Central Air Conditioners
12. Approximately what percentage of the residential and small commercial furnaces you install have efficiency ratings of... [READ EACH CATEGORY, FILL IN BLANK FOR EACH]

<table>
<thead>
<tr>
<th>Percent</th>
<th>AFUE (Efficiency) Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90 percent and up</td>
</tr>
<tr>
<td></td>
<td>85 to 89 percent</td>
</tr>
<tr>
<td></td>
<td>79 to 84 percent</td>
</tr>
<tr>
<td></td>
<td>100 percent</td>
</tr>
</tbody>
</table>

13. Approximately what percent of the residential and small commercial central air conditioners you install have SEER (efficiency) ratings of... [READ EACH CATEGORY, FILL IN BLANK FOR EACH]

<table>
<thead>
<tr>
<th>Percent</th>
<th>SEER (Efficiency) Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13.0 and up</td>
</tr>
<tr>
<td></td>
<td>12 to 12.99</td>
</tr>
<tr>
<td></td>
<td>11 to 11.99</td>
</tr>
<tr>
<td></td>
<td>10 to 10.99</td>
</tr>
<tr>
<td></td>
<td>100 percent</td>
</tr>
</tbody>
</table>

Residential Products, Services, Practices

INTERVIEWER READ: Next, I'd like to talk to you about your residential heating and cooling work. After these questions, I'll be asking you similar questions about your small commercial work.

14. Do you advertise your residential products and services? [PROBE: How do you advertise? Where do you advertise? What does you advertising emphasize?]

[PROBE:] Leads for new construction? Replacement?


16. Which factors are most important? [PROBE: Why?]

17. What options do you typically discuss with a residential customer? [PROBE: Different brands? Different efficiencies? Packaged product/service offerings?]
18. How do you determine the size and efficiency level of the heating or cooling system that ultimately gets installed? [PROBE: Rule of thumb? Load calculation? Software?]

Existing Homes?
New Construction?

19. Do you provide residential customers with various efficiency options [PROBE: How often? How is the information presented? Is it important? Why do/don't you provide this information?] [FILL IN BLANKS]


21. Do you offer service/maintenance agreements to your residential customers? [PROBE: How do these agreements work? What are the terms? How popular are they? How important are they to have from a competitive standpoint?]

[PROBE]: Sell these services up-front or after installation? How aggressive/proactive are they?

22. Do you provide services to low-income customers through utility programs or through arrangements with weatherization agencies?

Yes  No

23. [IF YES] Do these services differ from those you offer to residential customers in general? [PROBE: Services offered? How do they differ? Opinion of arrangement?]

Small Commercial Products, Services, Practices

INTERVIEWER READ: I would also like to talk to you about your small commercial heating and cooling work. If any of your commercial practices are similar to those you use on the residential side, please say so.

By small commercial I am referring to small commercial buildings that use equipment similar to residential equipment. This includes apartment buildings (typically of 4 units or less) but does not include commercial buildings that have packaged units, variable air handling units, etc.

24. Do you advertise the products and services you provide to small commercial customers? [PROBE: How do you advertise? Where do you advertise? What does you advertising emphasize?]

[PROBE: Leads for new construction? Replacement?]

26. Which factors are most important? [PROBE: Why?]

27. What options do you typically discuss with small commercial customers? [PROBE: Different brands? Different efficiencies? Packaged product/service offerings?]

28. How do you determine the size and efficiency level of the heating or cooling system that ultimately gets installed? [PROBE: Rule of thumb? Load calculation? Software?]

Existing Homes?
New Construction?

29. Do you provide small commercial customers with various efficiency options [PROBE: How often? How is the information presented? Is it important? Why do/don't you provide this information?] [FILL IN BLANKS]


31. Do you offer service/maintenance agreements to your small commercial customers? [PROBE: How do these agreements work? What are the terms? How popular are they? How important are they to have from a competitive standpoint?]

[PROBE]: Sell these services up-front or after installation? How aggressive/proactive are they?

32. Do you provide services to low-income commercial customers through utility programs or through arrangements with weatherization agencies? [NOTE: small commercial includes multifamily housing]

Yes
No

33. [IF YES] Do these services differ from those you offer to other commercial customers? [PROBE: Services offered? How do they differ? Opinion of arrangement?]

Other Products, Services, Practices

INTERVIEWER READ: Now I would like to switch gears and talk about other products and services you might offer to either residential or small commercial customers.
34. Do you provide other services to improve the efficiency, comfort, or safety of a home or small business? [Describe and explain]

[PROBE:] Recommend or install setback thermostats?

[PROBE:] Recommend or install electronic air filters to improve indoor air quality or address concerns about allergies?

[PROBE:] Recommend or install whole-house fans?

[PROBE:] Recommend or install air-to-air heat exchangers?

[PROBE:] Recommend or install geothermal heat pumps?

35. Do you see any of these services as valuable? [PROBE: Competitive advantage? Help retain customers? Increase profitability?]

36. I would like to ask you about a few other services I have heard of that some contractors offer residential and small commercial customers. I would like to know whether you offer any of these services, and your opinions of them. [PROBE: If offered, why did they start to offer it in the first place]


Yes  No

Opinion

Why offered

Carbon monoxide detection services? [PROBE: For furnaces? Household levels? Do you sell/install carbon monoxide detection equipment?]

Yes  No

Opinion

Why offered

Blower-door tests to check for air leaks? [PROBE: How is this done? Do you fix problem areas? Refer customer to other contractors?]

Yes  No

Opinion

Why offered
Sell or install smoke detectors? [PROBE: Do you recommend where/how they should be installed? How many the customer should have?]

Yes    No

Opinion

Why offered

Install weatherization products such as insulation, caulking and weather-stripping? [PROBE: How are problem areas identified? How often is this done?]

Yes    No

Opinion

Why offered

Refer customers to insulation or weatherization contractors when insulation values are low? [PROBE: How often is this done?]

Yes    No

Opinion

Why offered

Refer customers to contractors who perform any of the above services? [PROBE: How often is this done?]

Yes    No

Opinion

Why offered

37. Are you aware of other businesses who offer any of the services we have been talking about? [PROBE: Which businesses? What services? What do you think about these offerings?]
Financing

38. Do you offer financing? [PROBE: Why/Why not? What types? Is it through manufacturers, distributors, local banks/finance companies? What are the terms, rates, etc.]

39. How important is financing from a competitive standpoint? [PROBE: Do competitors offer financing? Do customers frequently ask about it?]

40. Are the financing packages only for the installation of new equipment or do you also provide financing for major repair or service work that you provide? [FILL IN BLANKS]

Training

41. How many of your staff members are licensed to install residential and small commercial heating and cooling systems?

42. Where do they go to get the training they need? [PROBE: What classes? What schools or technical schools? Utilities? Does this training lead to certification or licensing?]

43. What is the skill make up of your staff? [How many engineers? Apprentices? Journeyman? Truck drivers? etc.]

44. What other types of training do you offer your staff? [Probe: Manufacturer training, tuition paid for technical or vocational school classes, on the job]

45. Are there any technologies or services that your company has started to offer over the past few years? [Probe: Have they required any additional training? What was the specific training need? What was the new service or product you decided to offer?]

46. What type of training needs do you foresee in the future?

47. Are there other ways you stay informed about products and services? [PROBE: Trade magazines? Trade shows/meetings? Local contractor associations?]
Utility Programs and Relationships

INTERVIEWER READ: Next, I want to talk to you about electric and gas utilities in your service area.

48. Have you or your customers participated in any gas or electric utility energy-efficiency programs over the past 5 to 10 years? [CIRCLE ONE NUMBER]

1   Yes  ----------> Which ones? [FILL IN BLANKS]

2   No  ----------> Why not? [FILL IN BLANKS]
    (skip to question 52)

3   Don't Know/Don't Remember ---> (Skip to question 52)

49. Did these programs have an impact on your business? [PROBE: In what way?]
    [PROBE: Efficiency level of equipment sold?]
    [PROBE: Type of products offered?]
    [PROBE: Services offered?]
    [PROBE: Any other impact?]

50. Did any changes you made because of a utility program last beyond the life of the program?

51. (If still involved with utility program) Do you think you will continue to offer these products and services after the program(s) end?

52. What role could utilities play in helping develop products and services? [PROBE: Ex. training, advertising, promotional literature, etc.]

Practices, Opinions, Attitudes

INTERVIEWER READ: I have one additional exercise I would like you to complete. I would like to have you read a number of statements that have to do with the general policies and practices that your company tends to use when recommending or suggesting products and services to your customers. Please indicate how well each statement on the list describes your practices by circling a number from one to six, where one means "strongly disagree" and six means "strongly agree." You should disagree with an item if it is not true of your company.
<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>We focus primarily on the short-term needs of our customers (such as purchase price and availability) when recommending equipment, rather than longer-term issues (such as operating cost).</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>It is becoming increasingly important for us to be responsive to customer concerns about the environment (e.g., clean fuels, greenhouse impacts, CFCs).</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>Except on rare occasions, we will only recommend energy-related equipment that is quickly available in the local market.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We almost always recommend energy-efficient equipment, even if it costs the customer a bit more up-front</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use electric and use equipment and appliances.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>The services we offer are substantially the same as the services we offered 4 years ago.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We offer services that are not typical of other businesses in our industry.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>Rather than making equipment recommendations, our role is primarily that of providing or installing whatever equipment customers request.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We encourage customers to consider the long-term savings of the products and services we offer.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We view customer concern about health and safety as an opportunity to offer new services.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>Whenever possible, we try to recommend, and/or use gas-fueled equipment and appliances.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We almost always recommend the equipment with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>Rather than marketing specific services to our customers, our role is primarily that of providing the services our customers request.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We almost always recommend the repair alternative with the lowest up-front cost, because our customers tend to be price sensitive.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We have made a substantial effort over the last 4 years to provide our customers with new services.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We provide information to customers about the environmental benefits of our products and services.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>Heating and cooling contractors in my area are offering a number of services that generally were not available 4 years ago.</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
<tr>
<td>We try to persuade our customers to buy very energy-efficient equipment</td>
<td>1 2 3 4 5 6</td>
<td></td>
</tr>
</tbody>
</table>