OPTIMIZING RESIDENTIAL HVAC EFFICIENCY PROGRAMS

An Energy Efficiency Programs Study Conducted by Vermont Energy Investment Corporation (VEIC)

Study commissioned by the HARDI Foundation Center for Energy Efficiency Optimization

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Foreword

HARDI and our distributor members have been studying and engaging energy efficiency programs and initiatives intensely for the last four years. We’ve watched incentive funding skyrocket over that time while the volume of HVAC equipment sales has steadily declined until only leveling off in 2010. We saw the share of this shrinking pie grow significantly for high-efficiency units during the two years of robust $1,500 federal tax credits, only to plunge right back to historic levels in 2011. In short, the vast majority of utility energy efficiency programs are simply not working. In those instances of program success, it has been the engaged and active efforts of HVAC distributors that have made the difference. We needed to study this further to see whether there really was a pattern here, and is there a model that makes economic sense for HARDI distributors to spend considerable time and resources supporting these programs. Fortunately the HARDI Education and Research Foundation stepped up to make this research a reality.

Along the way we began to learn about distributors in other lines of trade also having significant impacts on energy efficiency. This led our Foundation to think bigger and form the Center for Energy Efficiency Optimization where the role of all distributors— not just HVACR— in making real energy-saving impacts could be defined and collected. This report strikes us now as just one small step in a long journey towards perhaps a new definition of “Market Transformation” in which greater energy savings is better achieved by shifts in the way the energy efficiency community does its business rather than that of the businesses who have entered their offices every day for decades always with the same goal of selling more high-efficiency products.

We hope this report provides a new insights and new perspectives on the keys to attaining real energy savings in residential HVAC. We are grateful to our valuable partners and friends in the energy efficiency community who contributed to this report and our incredible colleagues at VEIC for being so willing to deal with our often outside-the-box mentality. And finally, none of this would have been possible without our HARDI Foundation, the support of so many members and contributions over the years, and last but not least, our volunteer leadership who despite having very real and complicated businesses to run, always find time to help make our distributors and our industry that much better every day.

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Executive Summary

Background
This study was intended to: 1) describe the state of the residential HVAC energy efficiency programs, 2) explain HVAC market trends and dynamics related to efficiency, and 3) quantify the opportunity to address the challenges efficiency programs face by working in partnership with HVAC distributors.

The findings of this study establish that leading distributors are already playing valuable roles that can improve the outcomes of residential HVAC energy efficiency programs. This report describes those roles in detail and provides examples for other distributors and efficiency programs to follow. The research also identified a series of specific recommendations for efficiency programs and distributors.

Key Findings
Energy efficiency program administrators face difficult challenges in achieving their goals of advancing the sale and proper installation of efficient residential HVAC equipment:

- Even though residential program budgets in the U.S. have grown by 129 percent since 2007 (from $752 million in 2007 to $1.72 billion in 2010), sales of HVAC equipment have stagnated. Data from the Air Conditioning, Heating, and Refrigeration Institute (AHRI) indicate that shipments of residential central air conditioners and heat pumps dropped by nearly 20 percent and shipments of residential furnaces dropped by 12 percent over the same 2007-2010 time period.

- Awareness of efficiency programs and rebate offerings is difficult to develop and maintain over time. A survey of HARDI-member distributors found that 15 percent of respondents did not know whether there was an active efficiency program in their territory.

- Efficiency programs to date have not been major drivers of high efficiency product sales, especially when compared with the $1,500 federal tax incentive that was in place during 2009 and 2010. The J.P. Morgan/HARDI 2011 HVAC Review and Outlook asked distributors, “Have you seen any benefits to your business this year from utility incentive programs?” Only 30 percent of respondents said yes.

- Given upcoming changes to federal minimum energy performance scheduled to take effect in 2013 for furnaces and 2015 for central air conditioners and heat pumps, efficiency programs have a limited time period to garner energy savings from today’s technologies. After those standards take effect, programs will need to look to emerging technologies to capture additional savings.

A sampling of the recommendations for efficiency programs that are included in this report is below.

- **Leverage the distributor’s training events**
  Most efficiency program training is focused on contractors, and distributors can play a big role in getting the right training to contractors at the right time. This research found that the vast majority of HVAC distributors (92 percent) offer training to contractors, including sales, technical, and business basics courses. Further, 58 percent of distributors who responded to the survey stated that their contractor customers first learn about energy efficiency incentive programs through their training sessions. Comments by two of the distributors interviewed indicated that training is needed to help contractors overcome price objections and move toward features/benefits/value
based selling. When approaching distributors about working together on training events, efficiency programs should pitch sales training events focused on upselling to efficiency and competing successfully against low-price bids, because it would address this barrier while benefiting both the program and the distributor.

- **Seek to attend distributor sales and territory meetings**
  Distributors host sales and territory meeting frequently, which present a good opportunity to explain efficiency programs to contractors who attend. One of the efficiency programs interviewed has had success in getting invited to speak at these events, in part because distributors know that rebates are good for business and share a goal of promoting higher efficiency-higher margin product lines.

A subset of the recommendations provided in this report for HVAC distributors includes the following:

- **Provide constructive input at the right time**
  Distributors should ask about program planning cycles to determine the best time to provide input. Efficiency programs are typically constrained as to the number of changes they can make outside of that formal planning cycle, so providing input as program planning is occurring is most effective. If there is critical input to provide, however, distributors should do that as soon as possible and should be ready to brainstorm with efficiency programs about how to address the problem. Even outside of a planning cycle, smaller operational changes may be able to be made, while large-scale changes in program design would require modifications to formal plans and approval by the entity overseeing the program.

- **Help efficiency programs understand emerging technologies**
  Technical analysis presented in this report demonstrate that there is remaining technical potential in the near term that would help offset scheduled increases in federal minimum standards, thus helping to justify additional efficiency program support. Efficiency programs will require help from the HVAC industry to understand those technical opportunities and develop programs to promote them. Examples were provided by two distributors that provide models for other distributors to use when approaching efficiency programs about promoting new technologies, underscoring the importance of showing that the savings are proven and reliable and that the new technology is a good fit with a customer type.

**Research Objectives**

The purpose of this research project was to explore the opportunities for increasing the market acceptance of high efficiency residential HVAC equipment through improved collaboration between trade distributor networks and energy efficiency program implementers. The four primary goals of this research project were to:

- Identify the degree of influence that HARDI member distributors have on their contractor customers’ purchasing decisions and sales strategies

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1 Throughout this document, “energy efficient” refers generally to cooling and heating equipment meeting at least the minimum ENERGY STAR specifications.
• Identify the specific supply chain barriers—especially those that can be impacted at the distributor level—that to date have kept residential HVAC energy efficiency programs from achieving greater success
• Present possible scenarios for efficiency programs to address those barriers on a regional basis
• Quantify the potential benefits to efficiency programs if they address those barriers

To achieve these goals, VEIC undertook the three research tasks described below:

1. Task One: Research and provide a high level summary of the current state of residential HVAC programs. Understand the existing landscape of HVAC programs in order to understand opportunities. Determine whether efficiency programs are meeting their goals at acceptable costs or not. Research areas included:
   • Goals and cost parameters
   • Typical program approaches

2. Task Two: Develop a survey instrument that HARDI can deploy to its membership on a regionalized basis to gather information on distributor perceptions and desires relative to residential HVAC efficiency programs. Understand distributors’ past experiences with efficiency programs, their role in influencing the sales of high efficiency equipment, and their perceptions of the conditions in which greater trade participation in efficiency programs could occur. Questions focused on:
   • What works/does not work with existing efficiency programs?
   • What are the down-, mid-, and up-stream opportunities?
   • What would it take to get significantly increased participation from distributors?

3. Task Three: Evaluate and provide a high level summary of technical residential HVAC efficiency opportunities to assure ongoing viable role for residential HVAC efficiency programs. Review available white papers from efficiency industry, interview key technical experts, review ENERGY STAR® future direction. Questions included:
   • What product types offer viable improvement opportunities?
   • What product categories meet utility cost-effectiveness test criteria?
   • What are pending codes/standards changes that will impact opportunities?

Research Methods

Task 1: Energy Efficiency Program Research
To complete Task 1, VEIC used a combination of secondary research and phone interviews. A description of the specific methods used is provided below.

Secondary Research
Sources used in the secondary research included energy efficiency program web sites, public utility commission web sites, papers and information presented at efficiency industry conferences such as the ACEEE Summer Study and the CEE Industry Partner Meeting, and staff at other research organizations such as Lawrence Berkeley National Laboratory.
**Interviews**
VEIC conducted five phone interviews with managers of HVAC energy efficiency programs. The interviews were conducted between October 12-27, 2011. They ranged in duration from approximately 30-60 minutes. Each interview was conducted by Rebecca Foster, who used the interview questions in Appendix A to guide discussion.

In identifying a group of potential interviewees, HARDI and VEIC sought the following characteristics: variation in region of the U.S., variation in type of organization (e.g., investor owned utilities, non-utility program administrators, etc.), variation in budget and size of HVAC programs, and variation in length of time the program had been in existence. In addition, given that a key research objective was to understand the successes and challenges of working with HVAC distributors, HARDI and VEIC attempted to identify programs that had a greater level of engagement with distributors than is typical across the efficiency program industry.

Four of the five companies interviewed (Resource Solutions Group, Conservation Services Group, Southern California Edison, and Xcel Energy) were identified by HARDI. The fifth company interviewed (Efficiency Vermont) was identified by VEIC. All of the efficiency program managers contacted about interviews consented to participate and were interviewed for this report.

**Task 2: Distributor Research**
Several research methods were used to complete Task 2. They included secondary research, a web-based survey of HARDI distributor members, and a series of phone interviews. A more detailed description of these methods is provided below.

**Secondary Research**
The secondary research drew upon reports and resources provided by HARDI, including the J.P. Morgan/HARDI 2011 HVAC Review and Outlook from November 2011 and a HARDI brief entitled, “Quantifying 2009’s and 2010’s 4th Quarter Unitary HVAC Anomalies.”

**Web-based Survey**
In the summer of 2011, HARDI distributed a survey questionnaire via email to 454 HARDI member HVAC distributors, utilizing the survey software of a leading research provider (MarketTools, Inc.). Over a three-week period, 70 usable returns were obtained, yielding a response rate of 15.4 percent. While this is somewhat low, it is estimated that approximately 30 percent of HARDI members who received the survey did not qualify to take it. This reduced the base of potential respondents to 318 and yielded a realistic response rate of 22 percent.

The questionnaire (shown in Appendix B) was broken into five primary sections. These sections, along with the measures in them, were developed through an iterative process involving meetings and communications between HARDI, VEIC and the consultant who led this research task. A description of each section is given as follows:

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2 VEIC interviewed the Resources Solutions Group staff person who manages the residential HVAC program for Nicor Gas in Illinois.
3 VEIC interviewed the Conservation Services Group staff person who manages the residential HVAC program for an Ohio investor owned utility.
1) A section that measured HVAC residential product lines carried by the distributor and an estimate of the percentage of sales of high efficiency equipment
2) A section that measured characteristics of distributors’ inventory/sales systems
3) A section that measured distributors’ programs for training of contractor customers
4) A section that measured distributors’ experiences with and desire to participate in efficiency programs
5) A section that measured demographic information of distributors

HARDI Conference Survey
To obtain additional input from HARDI members, a survey was also fielded during the HARDI Annual Conference (held in Maui, Hawaii from October 23-26, 2011). The survey was fielded through a mobile-phone based application that HARDI developed to make providing input easier for conference attendees. This method yielded 17 responses to the survey questions. The survey questions—which are a subset of those used during phone interviews—are presented in Appendix C.

Interviews
VEIC conducted ten phone interviews with senior-level management at HARDI member HVAC distributors between October 13-31, 2011. They ranged in duration from approximately 30-60 minutes. Each interview was conducted by Rebecca Foster, who used the interview questions in Appendix A to guide discussion.

In identifying a group of potential interviewees, HARDI and VEIC sought distributors who carry unitary HVAC product lines from across the U.S. and who have some degree of knowledge of energy efficiency programs. The last criterion was included given the fact that the research sought to uncover the value, successes, and challenges associated with distributor-efficiency program interactions. Thus, it was important to focus on those distributors who had some experiences and lessons to share with their peers. HARDI identified 17 of its member companies that met these criteria. HARDI and VEIC contacted all 17 distributors via email regarding the research project, and VEIC ultimately conducted phone interviews with ten of them.

Task 3: Technical Research

Secondary Research
Secondary research was the only research method used to conduct Task 3. The sources referenced included papers and presentations from energy efficiency conferences, such as the ACEEE Summer Study and the CEE Industry Partner Meeting, technical reports from utilities including Southern California Edison and Sacramento Municipal Utility District, and technical reports from trade publications such as the Electricity Journal. Reports and documents from the Department of Energy and the Environmental Protection Agency were also consulted.
Research Findings
Task 1: Energy Efficiency Program Research

Introduction
The objective of the energy efficiency research task was to understand how large the energy efficiency program industry is, how prevalent residential HVAC programs are, what the most common program components are, and how successful residential HVAC programs are. In addition, the research aimed to identify how leading efficiency programs have worked with HVAC distributors to date, and what the successes and challenges of that work have been. The findings presented below are intended to arm HARDI members with background information that they can use when approaching their local efficiency programs to discuss the potential for greater collaboration.

Background on Energy Efficiency Programs
Overview
In 2010, energy efficiency program administrators across the U.S. and Canada spent $7.5 billion on electric and natural gas efficiency programs, which offer a variety of services and rebates to promote more efficient equipment and behaviors. While the bulk of this spending was directed at electric efficiency opportunities, of the $7.5 billion, $1.2 billion was spent on natural gas efficiency programs. This is an increase of 21 percent over 2009 spending.\(^4\)

Characteristics of Residential HVAC Efficiency Programs
According to the Energy Information Administration, heating and cooling accounts for 53% of residential energy consumption in 2010. This share is expected to increase through 2030 to a total of 59% (see Figure 1). This makes addressing heating and cooling loads a high priority for efficiency program administrators, many of whom do this through HVAC focused programs.\(^5\)

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\(^5\) Other approaches to address heating and cooling include building shell programs (e.g., air sealing and insulation), or whole house efficiency programs.
VEIC researched 23 efficiency programs from across the U.S. and gathered information to define the typical characteristics of residential HVAC programs. These included type of fuels and products covered, equipment rebates offered, prevalence of contractor training, use of a contractor pre-approved list, and whether quality installation and quality maintenance were promoted. An overview of the efficiency programs researched is presented in Appendix D. Based on that research, the following summary is provided.

**Barriers to the Sale and Installation of Efficient Residential HVAC Equipment**

Since HVAC equipment is more complex than other household devices and products, such equipment is usually introduced to the customer as a product available through the contractor, who advises the customer on purchasing decisions. Thus it is effectively “sold” by the contractor, rather than “bought” by a homeowner as if it were an appliance in a retail store; the customer does not typically visit a retail location to select HVAC equipment but rather discusses options with a contractor/ installer. This dynamic can create a more difficult sales environment for contractors who are trying to close the deal, win the job, and complete it with some margin for profit.

Other barriers to the purchase and installation of efficient HVAC equipment that efficiency programs attempt to overcome are:

- High upfront cost of new efficient systems compared to repair of older equipment and new less efficient systems
- Consumers’ inability to differentiate, and therefore value, the difference between good and poor quality HVAC installation

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6 Source: Environmental Leader analysis of Energy Information Administration Data
- Consumers’ lack of information on the benefits (both energy and non-energy) of efficient equipment and quality installations, particularly during renovation and remodeling
- HVAC contractor perception of low value and/or sense of difficulty about program participation
- On-going training needs for HVAC contractors on key installation issues and approaches to “selling” energy efficiency

**Equipment Rebates**

The first energy efficiency program component is equipment rebates, which are nearly universal among residential HVAC programs. The rebate is used to help the customer offset the higher incremental cost for the more efficient equipment. Programs often use the ENERGY STAR specification and Consortium for Energy Efficiency (CEE) tiers, both of which identify equipment that is more efficient than federal minimum efficiency standards.

The technologies promoted can often span all fuel types to include oil, natural gas, propane, fuel oil, wood, and electricity. Technologies promoted can also include high-efficiency space heating, domestic hot water (DHW), and high-efficiency cooling equipment. Table 1 presents a snapshot of how common HVAC rebates are among efficiency programs promoting both electric and natural gas efficiency, based on CEE data from 2010.

**Table 1: Prevalence of HVAC Efficiency Programs**

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Percent of All Electric Programs Offering Rebates</th>
<th>Percent of All Gas Programs Offering Rebates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas and oil furnaces with efficient furnace fan</td>
<td>-</td>
<td>81%</td>
</tr>
<tr>
<td>Boilers</td>
<td>-</td>
<td>73%</td>
</tr>
<tr>
<td>Central air conditioning and ductless mini-splits</td>
<td>64%</td>
<td>-</td>
</tr>
<tr>
<td>Room AC</td>
<td>38%</td>
<td>-</td>
</tr>
<tr>
<td>Air source heat pumps</td>
<td>76%</td>
<td>-</td>
</tr>
<tr>
<td>Domestic hot water</td>
<td>29%</td>
<td>73%</td>
</tr>
</tbody>
</table>

Consumer rebates often come in the form of instant rebate from the efficiency program that is given to the customer through the manufacturer, distributor, or contractor. In these situations, the consumer is provided information noting that the price of the equipment reflects the discount. The other type of rebate is a mail-in rebate that the consumer has to fill out and submit to the efficiency program before receiving payment.

**Market Development Activities**

The second residential HVAC program component focuses on market development. These activities are used to address the market barriers unrelated to the higher price of the equipment. Common market development activities are presented below.

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Contractor Recruitment and Collaborative Marketing Efforts
For programs that include this component, contractors typically join and become program partners. As a requirement, contractors participate in variety of technical and sales trainings. Program partners are listed on the efficiency program web page, which helps direct consumers looking at high efficiency equipment to contractors who can sell and install the equipment. Some programs may make available co-operative marketing funds for participating contractors who want to promote their participation in the program.

Contractor Technical and Sales Training Support
Programs provide training for two reasons. First, they want to ensure that contractors have enough information to sell the benefits of high-efficiency HVAC equipment to consumers. This includes being able to cover concepts such as return on investment and simple pay back for high efficiency units compared to baseline equipment. Second, they want to ensure that the equipment will be installed properly so that the customer—and the program—will achieve the expected energy savings. As a result, programs may offer technical training as well.

Quality Installation and Quality Maintenance
Many efficiency programs have embraced quality installation and quality maintenance in an effort to generate additional energy savings. This includes proper sizing, charge, and airflow. Quality installation and quality maintenance help support consumer confidence and ensure energy savings are realized and lasting throughout the equipment life.

Quality installation (QI) specifications used by efficiency programs can be the complete Air Conditioning Contractors of America's (ACCA) quality installation standard or can be based on that standard with modifications deemed necessary by the program. While some variation exists, the term QI implies that the program requires:

- Equipment properly sized for a home
- Sufficient airflow in the system
- Proper amount of refrigerant
- A well-sealed duct system

Quality maintenance (QM) is a standard also developed by ACCA that establishes minimum annual maintenance tasks that should be performed on HVAC systems. The ACCA QM standard requires:

- Following checklists for inspecting, testing and measuring functionality of equipment
- Identifying recommended corrective action for issues uncovered

Upstream Collaboration
As noted below in the discussion of the interviews held with efficiency program managers, efficiency programs can provide incentives to distributors (or manufacturers) for stocking or selling high efficiency HVAC equipment. The goals of this program component are typically to encourage increased sales at a lower cost to the program. These incentives can be negotiated at the regional level for multiple jurisdictions or can be offered just by one efficiency program to one or more distributors. When using this program component, efficiency programs use circuit riders (field staff) to visit the network of distributors to ensure smooth program implementation.
Based on the research presented in Appendix D, the frequency of each of these program components is given in Figure 2. The red bars represent the types of rebates typically offered, and the blue bars represent the different market development components described above.

**Figure 2: Frequency of Residential HVAC Program Components**

Success of Residential HVAC Programs
The question of whether residential HVAC efficiency programs are successful is a difficult one to answer. One approach would be to ask whether they are meeting the goals established for them by their state public utility commissions. This approach is the most common and most critical for energy efficiency programs and their regulators, to whom meeting goals is of paramount importance given that failure to meet them can result in financial penalties. However, the downside of using this approach is that efficiency program goals are often set with limited market intelligence and do not reflect the true market potential.

Another approach, taken by VEIC for the purposes of this report, is to examine the market penetration of high efficiency products both nationally and in areas with efficiency programs. In this analysis, assuming appropriate specification levels are promoted, high market penetration (e.g., over 50 percent) would indicate that programs have made significant inroads. In areas where free ridership is an issue, efficiency programs with market penetration of over 50 percent would likely need to ramp down or increase specification levels. Moderate market penetration (e.g., between 25-50 percent) would indicate that the programs are indeed successful in influencing the sale of high efficiency equipment. Low market penetration (e.g., less than 25 percent) would mean that there is still significant potential for efficiency programs to garner additional savings through more effective program design and implementation. It should be noted that the downside associated with this approach is that it is difficult to tease out the impacts of other factors that influence market penetration, such as federal tax incentives, from the impacts of the efficiency programs themselves.

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8 Market penetration is defined as the percent of high efficiency products sold as compared to the total number of products sold in a given time period and geography.
9 Free ridership rates measure the percentage of people who participate in a program even though they would have purchased the more efficient equipment anyway.
10 Sales data from HARDI members indicates that the impacts of the $1,500 federal tax incentive were significant. Leading up to the phase out of the tax incentive, sales were up 24 percent and 17 percent in November 2010 and December 2010, respectively, as compared to the previous year.
Table 2 below shows the national market penetration of various types of ENERGY STAR qualified HVAC equipment. The data shown, from 2010, are the most recent available, though they do include sales made due to the influence of the $1,500 federal tax incentive, which expired at the end of 2010. Even with the tax credit, these data indicate that there is still significant opportunity to promote ENERGY STAR central air conditioners and water heaters. The higher market penetration of ENERGY STAR heating equipment is not surprising given upcoming changes to the specification levels that EPA has announced (see Task 3 findings below for more information on those changes). Once those specification changes take effect, it is expected that market penetration for heating products will fall.

**Table 2: ENERGY STAR Unit Shipment and Market Penetration Report 2010 Summary**

<table>
<thead>
<tr>
<th>Product Category</th>
<th>2010 Estimated Market Penetration Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Oil Boilers</td>
<td>61%</td>
</tr>
<tr>
<td>Residential Gas Furnaces</td>
<td>61%</td>
</tr>
<tr>
<td>Residential Gas Boilers</td>
<td>52%</td>
</tr>
<tr>
<td>Geothermal Heat Pumps</td>
<td>47%</td>
</tr>
<tr>
<td>Air-Source Heat Pumps</td>
<td>46%</td>
</tr>
<tr>
<td>Residential Oil Furnaces</td>
<td>36%</td>
</tr>
<tr>
<td>Central Air Conditioners</td>
<td>27%</td>
</tr>
<tr>
<td>Gas Storage Water Heaters</td>
<td>12%</td>
</tr>
<tr>
<td>Light Commercial Central Air Conditioning and Heat Pump</td>
<td>9%</td>
</tr>
<tr>
<td>Heat Pump Water Heaters (% of electric water heater market)</td>
<td>2%</td>
</tr>
</tbody>
</table>

In addition to looking at national level market penetration, VEIC also estimated the market penetration in a subset of the country with energy efficiency programs. Figure 3 below shows the estimated market penetration rates in several New England states’ energy efficiency programs for 2008. The analysis drew upon program activity data, utility account population data, and central air conditioning saturation and housing information from the Residential Energy Consumption Survey. This result required an estimate of annual market opportunities based upon the average lifetime of central air conditioning equipment and the total population of equipment in the region. Given the uncertainty of this estimate of annual sales in each efficiency program’s jurisdiction, this benchmarking result is best used as a way to compare programs to each other.

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11 It will be interesting to compare ENERGY STAR market penetration data for 2011, which will include the impacts of only a $500 federal tax incentive, to these 2010 numbers.
13 Given these data were drawn from 2008—the year before the $1,500 federal tax incentive was established—they may offer a more accurate portrayal of efficiency program success than the ENERGY STAR market penetration numbers from 2010 above.
It is also noteworthy that all of the above metrics of program success focus on sales of efficient equipment. Another metric of success, about which very little information appears to be available, would be the extent to which contractors who participate in efficiency program and distributor sponsored training events modify their sales and equipment installation techniques. This is a potential area for additional research.

Findings from Interviews with Efficiency Program Managers

Overview of Efficiency Programs Interviewed
Each of the efficiency programs selected for phone interviews started in 2009, although Efficiency Vermont’s was piloted in 2008. With one exception (Efficiency Vermont), all of the program managers interviewed were responsible primarily for residential HVAC programs. The manager of Efficiency Vermont’s commercial HVAC program was included in the sample given that program design trends can migrate from commercial to residential customers and given that they have done a significant amount of work with distributors. For the residential programs, three of the four focused on equipment rebates and one focused primarily on quality installation. All programs included contractor outreach and training in their programs.

14 VEIC analysis of efficiency program results from 2008. These results provide a snapshot of the situation in the Northeast U.S. and a nationwide analysis would also be beneficial. Greater availability of state level market penetration data for efficient HVAC equipment would provide a valuable tool for program planning.

Figure 3: Efficiency Program Market Penetration

Efficiency Program Penetration Rates:
Central Air Conditioning - % Total 2008 Sales

CT: 10.4%
LIPA: 5.3%
MA: 2.5%
NJ: 8.0%
RI: 2.8%
VT: 0.5%
Program Success
Three of the programs interviewed commented on the success of their programs. Two noted that they were not currently meeting goals. Efficiency Vermont said that they almost always come in under goal. The program manager stated that if the program did a better job engaging upstream players, program results would improve. She recognized that actors in the supply chain are busy every day doing design and installation of HVAC systems and that energy efficiency does not always rise to the top of their to do lists. Xcel Energy commented that within their HVAC program, central air conditioning is the hardest goal to achieve. The reason given was that there are more requirements for contractor participation and that there is a big gap between where the industry is now and the potential in equipment selection, sizing, and installation.

Southern California Edison stated that its program had exceeded its goal, but noted that the goal was not based on good intelligence but was instead based on what had been accomplished during the pilot phase of the program. Since changes were made from the pilot, the program had been more successful than anticipated.

Value of Working with Distributors
The efficiency program managers each stated that they got significant value out of working with distributors:

- Xcel Energy noted that the relationship between the utility, OEMs/distributors, and contractors is a triangle that requires connection on all sides. Though they reach out to all contractors, Xcel understands that top tier contractors have relationships with OEMs and distributors, through which they get discounts, training, etc. As a result, the program needs to have relationships with OEMs/distributors also so that they can leverage that.

- Resource Solutions Group stated that each distributor relationship has been essential to the program it administers in Illinois. The reasons are that each company represents different product lines and helps the program understand different technologies and different products and that the connections to contractors they provide are invaluable to program success. In particular, when working in a large service territory, like Nicor’s which covers the northern 1/3 of Illinois, the program would not have the geographic reach or penetration with contractors if it was not involved with distributors.

- Conservation Services Group agreed, stating that distributors are a great place to get to a number of contractors at once. Because distributors are already doing what they can to make their contractors competitive, the efficiency programs are appealing to them. Working with distributors has allowed the program to access contractors in a time effective way and resulted in access to higher level information about forecasts to match against contractor estimates of sales.

- Southern California Edison cited that influence on contractors is a significant benefit of working with distributors. They said that distributors have a huge influence on contractors regarding what products to buy, including efficiency level.

- Efficiency Vermont commented that it looks to distributors to provide technical expertise to contractors and end customers in its commercial HVAC program. Before working directly with distributors, the program was challenged by the facts that end users do not have the technical expertise to understand paperwork and program requirements and contractors are reluctant to spend their time filling out paperwork. Distributors helped address those issues.
Distributor-Efficiency Program Interactions
The efficiency program interviews also showed that these program managers have established effective working relationships with HVAC distributors. Their work most commonly fell into the following categories: encouraging contractors to participate in the program, training contractors on efficiency issues, promoting the program, stocking efficient equipment, providing data on sales trends, and providing input to the program on how it could improve.

Incentive Levels
Due to HARDI members’ interest in understanding better how incentive levels are set, this topic was touched on during the phone interviews. Program managers were asked what percent of incremental cost a rebate needed to cover in order to impact decision making. Each of the respondents commented that setting incentive levels was both an art and a science. Several factors are typically considered, including the goals of the program, the budget available, the incremental cost between efficient and baseline equipment, the energy savings delivered by the product, the market penetration of the product, the local economy, and the demographics of the customer population being targeted. In addition, incentive levels can vary over time as these conditions change.

Both Xcel Energy and Southern California Edison commented on the need to do research that includes outreach to the HVAC industry to understand what incentive amount would influence the customer’s decision. During the phone interviews, three specific answers to the question of how large the incentive needs to be were given. These responses were: 50 percent of incremental cost (Conservation Services Group), 10 percent of the total customer bill (Southern California Edison), and 25-33 percent of incremental cost (Efficiency Vermont).

Program Success Factors: Higher Rebates vs. Greater Engagement
Due to time constraints in one interview, four of the five efficiency program managers interviewed were then presented with two scenarios and asked which one would result in greater program activity (see Appendix A for the scenarios). The purpose of the scenarios was to test the comparative benefit of generous rebate amounts versus greater industry engagement.

Half of the efficiency program managers said that up-front engagement with distributors and contractors would be more valuable than higher rebate amounts. Their comments included the following:

- Southern California Edison noted that they had increased engagement in a commercial HVAC program and found that when the distribution channel is engaged, they come up with creative ways to motivate sales staff rather than just lowering the price of the equipment. They had success in giving more leeway to the distributor in terms of how to use the incentive and letting them be the expert about how to increase sales.
- Efficiency Vermont found that engagement worked better with their upstream HVAC program. In addition, Efficiency Vermont developed an early replacement program, talking to distributors and contractors to get input all along the way and modifying the program based on their feedback. While the program was not ultimately approved due to lower than desirable savings, the program manager felt that if it had been rolled it out, they would have had distributors and contractors on board right away.
The other half of the efficiency program managers said that a combination of the right rebate amount and greater engagement with distributors was necessary:

- Resource Solutions Group noted that engagement is always going to result in better program activity because success depends on awareness, but at same time it depends on the product lines carried by each distributor. If a program covers only a small percentage of incremental cost and there is another product in a line that is more cost-effective for the consumer, the distributor/contractor will sell that instead. If the incentive amount is not enough to get the customer engaged, the program will not be effective.
- Xcel Energy commented that a program needs to set a high enough rebate to get the industry’s attention and then to use engagement to maximize impact.

**Task 2: Distributor Research**

**Introduction**

VEIC’s research with HARDI member distributors was intended to describe the role that distributors are playing in supporting residential HVAC programs across the U.S. and to identify the successes and challenges that have arisen from distributor-efficiency program interactions to date. Further, this research attempted to uncover distributors’ opinions and preferences with regard to energy efficiency program design and implementation and identify any untapped value that distributors could potentially bring to efficiency programs as part of future collaboration.

**Background on Distributors (From Web-based Survey)**

**Respondents**

As noted above, the web-based survey resulted in 70 usable returns, with a realistic response rate of 22 percent. Based on demographic information collected, the respondent companies were well established, geographically dispersed, and show a good degree of variability in size and age. The respondents themselves had a high degree of industry experience and represented upper-level positions in their companies.

**Product Lines Carried**

The diffusion of product lines carried by respondents varied widely. The top three most distributed product line categories among survey respondents were:

- York/Coleman/Luxaire
- Rheem/Ruud
- Nordyne Brands

Distribution of multiple product line categories is not common. For example only 30 percent of respondents handled more than one product line category. The pattern of product lines carried by respondents varies somewhat by region of the U.S. For example, distributors who carry York/Coleman/Luxaire are more concentrated in the Midwest while those who carry Trane/American Standard appear to be concentrated in the Northeast.

**Experience with Efficient Products**

Respondents were actively involved in the sale of high efficiency products. However, there was a wide variance in the percent of sales that they attribute to high efficiency residential HVAC equipment, ranging
from very little (4.7 percent of respondents reported 5 percent or less of such sales) to very high (6.3 percent of respondents reported 86 to 95 percent or less of such sales). When respondents were asked for the approximate percentage of residential HVAC sales that represented high efficiency equipment, the most frequent response was 26 to 35 percent.

When sales of high efficiency products were examined regionally, they were found to vary somewhat. In the Midwest, for example, just over 40% of distributors surveyed indicated that high efficiency residential HVAC equipment accounted for over 2/3 of all equipment sales.¹⁵

Training
Respondents indicated that they are actively engaged in training programs for their contractor customers. Approximately 92 percent of respondents offered training programs. Some regional differences appear to exist, with 100 percent of distributors offering training programs in the Northeast and less doing so in other regions.

Regarding frequency of training, for distributors across the U.S., the average number of training programs offered by a distributor was 21.4 per year. Variance exists regionally, however, with 32.1 average training sessions held in the Northeast and 14.2 in the Midwest. The average number of attendees per training event for the U.S. as a whole was 18.9 people, with less variance by region.

Training appears to be customized by each distributor. Approximately 60 percent of distributors developed their own training curriculum for their contractor customers, while 40 percent used training provided by OEMs and other suppliers. Approximately 56 percent of distributors offered training in person, with 44.2 percent offering training in person and over the web. No distributors indicated that they offer training exclusively over the web.

Training on efficiency programs appears to be needed, with 58 percent of distributors who responded to the survey stating that their contractor customers first learn about energy efficiency incentive programs through their training sessions. Regional differences exist in contractor knowledge of incentive programs, with Northeast scoring lowest on pre-existing knowledge of energy efficiency incentive programs.

In terms of training on quality installation in accordance with the ACCA standard, less than half (48 percent) of distributors offered that training. Of those that do, 24 percent did so with support from local energy efficiency programs.¹⁶ Regional differences surfaced in availability of quality installation training programs, with distributors in the Midwest citing the lowest offerings of such programs. Frequency of and attendance at quality installation trainings was lower than general training sessions. For those distributors who offer quality installation training, the average number of sessions was 13.9 per year, with 17.4 contractor customers in attendance.

¹⁵ These high numbers may be in part due to the prevalence of efficient furnaces in Wisconsin. An Energy Center of Wisconsin study based on a statewide tracking system found that the statewide market share for 90% efficient furnaces has been consistently over 90% of furnace sales through 2009.
¹⁶ Based on information solicited during the phone interviews, it appears that the 76 percent of distributors who offer QI training without efficiency program support do so to reduce warranty claims on the equipment that they sell.
Experience with Efficiency Programs
Respondents noted that efficiency programs are prevalent in their territories, with approximately 77 percent of respondents reporting that there is an active efficiency program in their territory. Variance does exist by region, with the Midwest and South reporting lower incidence of efficiency programs. Rebates for residential HVAC equipment were also prevalent. In cases where an active efficiency program exists, 100 percent offer rebates for residential HVAC equipment, and this percentage did not vary by region of the U.S.

It was surprising, for example, how many distributors did not know (15.4 percent) if there was an efficiency program in their territory. There were regional differences in efficiency program knowledge levels, with distributors from the Northeast fully aware (0 percent “don’t know”) and the Midwest least aware (33.3 percent “don’t know”).

Rebates for training on quality installation were not found to be prevalent. Approximately 13 percent of respondents reported that their efficiency program offers rebates for training on quality installation. The region of the U.S. where such rebates were most typical (37.5 percent) is the Northeast. The region of the U.S. where such rebates were least typical (0 percent) is the South.

A sizeable portion (64 percent) of distributor respondents had worked with the administrator(s) of their local energy efficiency program. The region of the U.S. where such involvement was most typical (75 percent) was the Midwest. Their work included, but was not limited to:

- Coordinating promotions and training
- Developing programs
- Sponsoring programs for interested contractors
- Providing rebate education
- Providing information about efficiency thresholds and price premiums

A sizeable portion of respondents was interested in playing a larger role in promoting high efficiency residential HVAC equipment. Approximately 88 percent of respondents reported that they were interested in having a larger role with such promotions, and the region of the U.S. where such interest was highest (100 percent) was the South. The roles respondents were most interested in playing were:

- Being eligible for marketing co-op dollars to help promote programs
- Hosting training about EE programs
- Assisting in the design of efficiency incentive programs

In response to the question “What would you prefer energy efficiency programs focus their incentive dollars on?” seventy-four percent of respondents indicated a preference for rebates to homeowners, with the next strongest response (co-op marketing dollars given to distributors) a far second at 25.5 percent. Ten percent of respondents indicated other preferences including: financing programs for customers, a mix of all of the stated options, and stopping all rebates. While some regional preferences can be gleaned from the table, it appears that distributors in the Northeast are more favorably disposed to all of the suggested incentive options.

Findings from HARDI Conference Survey
Of the 17 distributors who responded to the survey fielded at the HARDI Annual Conference, 14 indicated that there was an active rebate program in their areas. Several respondents stated that the
program has resulted in changes to their normal business practice. For example, three respondents changed their inventory, five changed their marketing to contractor customers, and five changed their sales strategy. One respondent wrote, “We have not been successful making these part of our sales efforts. This has been our failure not the utility programs.”

Just over half of the respondents had been asked to provide input to efficiency programs. The most common types of input asked for included input about efficiency levels (five responses), input about rebate levels (four responses) and input about rebate levels (four responses). One respondent wrote that they had been asked to help “design the entire program.”

Conference attendees were asked how large a rebate needs to be to warrant their effort and change their behavior. They were given five responses from which to choose, all presented in terms of the price difference between the standard unit and efficient unit. Two respondents said that 75 percent of the price difference needed to be covered by the rebate, five respondents chose 50 percent, and seven respondents chose 25 percent. Interestingly, no respondents selected the option where the rebate covered 100 percent of the price difference.

When asked about training events, there was a wide range of responses, from a low of four per year to a high of 100 or more. Twelve respondents provided a number of events (as opposed to other responses such as, “Too many to count”), and the average for those responses was 38 events annually. The number of attendees at those events also ranged, from 10-50, with an average of 25.5 attendees per event.

Eighty percent of respondents said that they do include information about utility and other rebate programs in their training events. Of those, just over half have included representatives from the rebate program.

Conference attendees were also asked how much influence they have on their contractor customers’ purchasing decisions. As shown in Figure 4 below, 62 percent of respondents indicated that they have a somewhat large influence, while another 31 percent indicated that they have a small influence.
Findings from Interviews with HVAC Distributors

Efficiency Program Impact
Six distributors commented on the question of whether the efficiency programs operating in their territory were having an impact on their business-as-usual practices. Four of the six distributors commented that the programs were not having a large impact. For example:

- Mingledorff’s stated that their local programs are not driving many big impacts since the expiration of the 2010 federal tax incentive, in part because businesses are working to maintain a steady work flow to keep their doors open, but also in part due to the burden of paperwork. The efficiency program has introduced a new streamlined online paperwork system in the past year, but it has been slow to catch on with the majority of contractors. The other reason the program has not greatly increased the number of high efficiency sales above what is happening already in the market is the low incentive amount, averaging approximately $150.

- U.S. Air Conditioning also indicated that the efficiency program is not a huge driver now. When federal HVAC tax credits were available, the distributor would pair them with a manufacturer rebate and an efficiency program rebate and could make an impact. Now that federal incentives are no longer as robust and that the economy is poor, efficiency programs alone are not moving the needle in sales.

The other two distributors felt that efficiency program incentives were important, particularly given the expiration of the $1500 federal tax credit at the end of 2010:

- Duncan Supply stated that in the last couple of years, the entire HVAC industry was fixated on federal tax credits since they dwarfed the local utility incentives, but now local utility credits are the only thing left. If a distributor wants to stay away from entry level products and avoid fighting others on lower cost, they need to push the utility incentives more than they ever have. While there are some distributors that are happy to sell SEER 13, that is not where they make money in
distribution. Distributors are better off when they work with higher price point and higher margin products, typically those associated with efficiency programs.

- Carrier Enterprise indicated that where there are programs throughout their territory, they do factor them into their business model and sales/marketing efforts. Operationally, this requires coordination and use of technology (Word and Excel) to be able to educate and customize sales and marketing and inventory planning by region and then by utility program within that region. By doing that, the distributor makes sure they have inventory to meet levels, are educating contractors, and they are selling the right products.

Distributors gave some examples about the success of promotions around a particular technology. For instance, Geary Pacific said that the Pacific Northwest program for ductless mini splits had been a tremendous success due in part to an attractive rebate amount. The product class has grown 50 percent year over year in the Northwest, and that would not have happened without the program. Hercules Industries noted that a local efficiency program for evaporative cooling was driving a significant number of sales, also in part due to the robust incentive levels.

Riley Sales noted that efficiency programs who understand the supply chain and present many vehicles for contractors to use in becoming aware of the program are most successful. For example, Riley Sales estimated that as many as 40 percent of their contractor customers are not on the internet yet, so when program marketing advises contractors to “go to the web site” to sign up, the program is missing a large percentage of the contractor base.

These interview responses are consistent with the findings of the J.P. Morgan/HARDI 2011 HVAC Review and Outlook, which asked, “Have you seen any benefits to your business this year from utility incentive programs?” 70 percent of the respondents said no, a similar number to the 66 percent of interviewees who stated that they are not seeing large impacts from incentive programs. One of the reasons for this posited in the J.P. Morgan/HARDI report was that, compared to the federal tax incentives in 2009 and 2010, energy efficiency programs have tended to be less successful because the size of the incentive is smaller and because they are more fragmented regionally, making awareness harder to achieve.  

In addition, the distributor comments on efficiency program success underscore industry trends in terms of decreasing equipment sales over time. One example those trends is provided in Figure 5, which shows declining residential air conditioner and heat pump shipment data from California from 2007-2010—on the order of 15-25% year over year decreases—at the same time that budgets for residential efficiency programs in California rose from $232 million in 2007 to $319 million in 2010—an increase of 37.5%.  

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Distributor Influence on Contractors

Distributors were asked whether they are 100 percent responsive to their contractor customers or if they influence them at all. All of the distributors who were interviewed said that they do try to influence their customers, though some commented that the extent to which they are successful varies. For example:

- Geary Pacific said that they do influence their contractor customers, but the portion of the market that they can influence is only about 20 percent, which are the contractors that have learned to sell efficiency and other benefits like lower noise and increased comfort and health. The other 80 percent continue to sell on price and are not as easy to influence.

- Munch Supply stated that they do try to influence their customers and, with regard to efficiency, that they try to get the contractor to understand that they can be more profitable by selling efficiency. Munch Supply works to make sure that the contractor understands the benefits to the consumer and knows how to overcome price objections.

- Riley Sales commented that they absolutely work to influence their customers. All of their counter people are sales people, and Riley Sales expects them to know everything about current promotions. They also team their counter people up with outside sales people, staple promotional information to invoices, and generally work to educate contractors on how they could benefit from selling more efficient products.

Distributor-Efficiency Program Interactions

The distributors who were interviewed gave several examples of how they are working together with efficiency programs. A sample is presented below:

- Munch Supply worked with local energy efficiency programs (Commonwealth Edison, Peoples Gas, North Shore Gas, and Nicor) to host meetings for contractors and give utilities an audience to present on programs. Munch Supply had 70 contractors at a meeting, which helped the energy efficiency program enroll contractors. Duncan Supply also hosted meetings for its contractors and the local efficiency programs, making use of its spring marketing meeting to bring a program.
implementer in to present. Riley Sales has invited efficiency program staff to “Lunch and Learn” sessions to present to contractors and then to go to the counter and give out paperwork and sign up contractors for the program.

- U.S. Air Conditioning receives information on efficiency programs and then publicizes the rebates to contractors. They use emails, faxes, and letters to do so. Gorman Industries has also done this, sending email bulletins, posting information on programs on the front door, and instructing its counter employees to mention them. Gorman stressed that contractors rely on distributors for information, so this is a natural role for the distributor to be playing.

- Geary Pacific played a large role in the ductless mini split program in the Northwest. They determined what products meet the specifications, have product knowledge meetings with contractors to teach them about the products and the fact that they meet program requirements, as well as how to install and service the units.

Some distributors have gone further than simply promoting current program offerings. They have helped the efficiency program design new programs. For example, Duncan Supply helped a program in eastern Illinois to develop an air-source heat pump program. The utility already promoted ground source heat pumps and wanted to expand, so they asked Duncan Supply for help in learning about the technology and market barriers. Geary Pacific worked with Southern California Edison to develop a program for school classrooms. Geary Pacific went to the utility on behalf of the local school district to ask for the program change, which while ultimately successful, took significant effort over three years. Riley Sales also said that they have worked with some efficiency programs to request that new products be covered, but that those requests have not yet resulted in changes.

Incentive Levels
To add to the information collected from efficiency programs, distributors were also asked how large incentives need to be to influence decision making. They responded to this question in two ways. Some responded in terms of the percent of incremental cost that needed to be covered, and these responses ranged from 25-75 percent of incremental cost. Others responded with a specific dollar amount, stating that incentives need to be at least $300 (Riley Sales) or between $500-$750 (Gorman Industries).

U.S. Air Conditioning commented that since the economy has gone into recession, higher rebate amounts are needed to change consumer decision making. Before the recession, they found that they could switch contractors and consumers up to energy efficient equipment with the energy savings story alone. Now, consumers do not want to invest in their homes because capital is tight and their houses are not worth as much.

Specification Levels
Gorman Industries also noted that most incentives they see are in the range of $200 for 14 SEER equipment, which is not enough to get a consumer’s attention. They recommended that efficiency programs increase the incentive amounts, promoting higher efficiency equipment if needed to offset incentive costs. Munch Supply picked up on this point as well, noting that a lower incentive at a lower specification level has less of an impact on decision making than a higher incentive at a higher specification level.
Incentive Targets: Upstream, Midstream, or Downstream

The question of whether efficiency programs should provide incentives downstream (to consumers), midstream (to contractors), or upstream (to distributors or manufacturers) elicited varied responses from the distributors interviewed for this report.

- While Carrier Enterprise did not have experience with upstream concepts, they said that they liked the idea of providing an incentive to the distributor to reflect the fact that stocking efficient equipment ties up more working capital than standard efficiency equipment. Carrier Enterprise added that to be successful, consumer demand is needed, so efficiency programs should not get away from consumer incentives entirely.

- Both Munch Supply and Gorman Industries indicated a preference for downstream rebates. They did not want to be left without payment if a sale fell through, and did not want to have to deal with paperwork. In addition, they noted that using the rebate as a tool to motivate the consumer—the ultimate decision maker—was important.

- Geary Pacific stated that the upstream programs that they have been exposed to to date have been ineffective. The program’s aim is to encourage stocking of efficient equipment, without realizing that distributors stock what sells and that they can only be marginally successful pushing products that customers are not interested in purchasing. Geary Pacific added that efficiency programs should not take their focus off the end customer. While programs do need to work with the distributor and contractor, the program should be marketed toward the consumer.

Program Success Factors: Higher Rebates vs. Greater Engagement

Five of the distributors interviewed were presented with two scenarios and asked which one would result in greater program activity (see Appendix A for the scenarios). The purpose of the scenarios was to test the comparative benefit of generous rebate amounts versus greater industry engagement.

Although the same scenarios were used with the distributors as were used with the efficiency programs, the responses differed between groups. While the efficiency programs were split in terms of ranking higher rebates or greater engagement as more important, all five distributors said that the larger rebate amount would be more important in driving program activity.

U.S. Air Conditioning said that the higher rebate amount would be better because the distributor can take care of marketing and publicity to give their contractors the advantage in the market. They just want news of the program and then they can help their contractors promote the offer with templates for marketing, newspapers, flyers, etc. Hercules Industries noted that if they were involved from conception to implementation, they would have more invested in the program and its success. However, they concluded at that as long as they know about the program, they can work with it and that the higher rebate would be more effective at the end of the day. Gorman Industries stated that they would rather see the bigger incentive because most marketing of incentive programs is done by a contractor who is trying to sell across a kitchen table. Further, given the state of the economy, Gorman Industries did not believe that smaller incentives would be as effective in motivating system replacements as larger incentives.

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19 For examples of U.S. Air Conditioning’s marketing templates, see www.Californiahvac.com.
Contractor Training
All of the distributors interviewed were heavily involved in contractor training activities. Training topics that they offer include business courses, sales courses, and technical courses. They viewed training as an essential service that they offer to their customers, one that differentiates them from other distributors, decreases warranty claims (in the case of technical training), and increases on-time payment of invoices by contractors (in the case of business basics training).

There are several methods for delivering training, ranging from webinars, “Lunch and Learn” trainings, in-depth trainings that take place over several days, and one-on-one informal trainings. Some distributors have mandatory trainings for their employees (e.g., Mingledorff’s employees have specific requirements annually with most managers obtaining 40-50 hours of continuing education per year) or for their authorized dealers. Some distributors have training classes across the year (multiple events per week or per month), while others arrange training so that it is focused off-peak, outside of the busiest heating and cooling seasons. When asked how many attendees are typical for a training session, responses ranged between 8-60 people, with the most common response being between 30-40 attendees per session.

In terms of training about energy efficiency, the majority of the distributors interviewed did include this information in both sales and technical trainings. Providing training on general energy efficiency concepts was not prevalent, however. Rather, distributors included energy efficiency aspects of equipment in technical trainings and stressed how to upsell a customer to a more efficient product in sales trainings.

Trainings specific to energy efficiency programs was common among the distributors interviewed, though not universal. For example, U.S. Air Conditioning indicated that they include available rebate programs in both sales and technical trainings, and has invited representatives from efficiency programs to those events with good results. Gorman Industries also invited efficiency program personnel to training events, which have focused on the programs that are available for the upcoming six months. Carrier Enterprises also stated that they have had efficiency program managers come in and present to contractors, and that the contractors have enjoyed the ability to provide input directly to the program. On the other hand, Geary Pacific has not done formal trainings on efficiency program rebates. The reason is that distributing information on rebates is part of their Territory Sales Manager job responsibilities. Geary Pacific prepares 3-ring binders for the Territory Managers with material about rebates all in one place, and then the Territory Managers use that with their local contractor customers, so the training is more one-on-one.

Emerging Technologies
Even working outside of efficiency programs, distributors have provided a link between manufacturers working on new technologies and customers who could benefit from them. In one example, Mingledorff’s described their work with a large commercial customer (a research laboratory) to evaluate their air distribution and venting system over work stations. The lab was venting a significant amount of conditioned air to the outside from the exhaust hoods over work stations and Mingledorff’s identified that as a significant savings opportunity. They found a manufacturer who was able to modulate the flue and reduce the venting, saving the customer money on cooling.

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20 Dealers are a subset of contractor customers who meet certain requirements and receive special pricing, training, and other benefits.
Task 3: Technical Research

Introduction
The goal of this task was to understand whether opportunities for HVAC distributors and efficiency programs to work together are likely to continue exist over the next ten years. A technical perspective was taken due to the fact that the prevalence, size, and focus of HVAC efficiency programs are intrinsically linked to the pace of technological advancements in the industry. For example, if this research concluded that the cost-effective technical potential available in residential HVAC was high, distributors could feel confident that efficiency programs would likely focus on capturing that potential and could pursue partnerships with them. If, on the other hand, the research found that remaining technical potential was low, distributors would be more cautious about partnering with efficiency programs. The findings from VEIC’s technical research are presented below.

As noted above, traditionally the number and size of electricity-based efficiency programs (e.g., central cooling) have dwarfed natural gas programs (e.g., central space heating). Though there is a growing trend in the direction of integrated electrical and thermal efficiency programs, the focus of this section reflects the historical biases towards cooling technologies.

Potential Efficiency Improvements – Equipment

Detailed Research Findings

Near Term Potential Efficiency Improvements (< 5 years)

- Inverter/variable speed technology shows significant opportunity (~30 percent) for cost effective technical improvement in the capability of central air conditioning and heat pump units to deliver greater performance (comfort, energy and to some degree, and demand savings). Most notably, improvements in proper sizing, SEER and HSPF ratings are feasible. Although EER ratings are largely unaffected by inverter technology, the additional modulation control it facilitates can support greater interaction with utility demand response programs. Technology included in this general category includes:
  - Brushless permanent magnet (ECM) motors
  - “Ductless” mini or multi-splits
  - Variable refrigerant flow
  - Liquid pump assist

- Climate-specific technology approaches such as low-temperature heat pumps with intelligent defrost cycles in heating-dominated climates, and evaporative or hybrid cooling units for hot-dry climates, reveal a class of opportunities which are meaningful despite the requisite market segmentation. Given the highly variable relationship between climate, technology performance, and economic value of energy consumption, the improvement potential, from an efficiency perspective, ranges from 20-80 percent. Technology included in this general category includes:

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21 90% of total ratepayer-funded energy efficiency program spending in the U.S. is targeted to electric end-uses.
22 Nearly all heating and cooling systems satisfy the thermal needs of the space through a system of ducts and or piping distributed throughout the house in a manner that normally would not be cost-effective to modify. This section looks at opportunities for efficiency that do not depend upon upgrades to the distribution system.
- Multi-stage heat pumps and/or northern heat pumps with intelligent defrost cycles and controls
- Outside air economizers and controls
- Evaporative and hybrid cooling
- Liquid desiccant

- Controls and advanced diagnostics are ripe for improvement and subsequent recognition by energy savings advocates. Incorporating insulated compressor covers and more sophisticated control electronics can result in overall economic performance of efficient units. Given the increasing saturation rate of air conditioning in buildings even in colder climates and the relatively low cost of improvements, savings in standby modes are particularly promising. Technology included in this general category includes:
  - Advanced diagnostics
  - Standby power modes and consumption

**Mid Term Potential Efficiency Improvements (5-10 years)**

- Coil/heat exchanger improvements could bring up to 30 percent improvements in EER and SEER scores, but will require significant transition costs. Present conditions do not appear to support the level of industry investment required to tool-up and prove-out the engineering and design changes to deliver improved heat transfer through design changes to unit heat exchangers. Further delaying broader adoption of the technology are the impacts on maintenance and operation under various environmental conditions. Technology included in this general category includes:
  - Micro-channel heat exchangers
  - Flat-tube heat exchangers

- Alternative refrigerant opportunities are varied and largely obscured by uncertainties in the broader topic of global warming potential economics. Different operating temperatures *can* improve EER/SEER and HSPF, but *can also* result in poorer performance overall depending upon the climate and application. The realization of cost-effective improvements will be highly dependent upon the market impacts associated with any new carbon regulation and implementation. The near term likelihood of carbon accounting impacts on this market is diminished by the current economic and political conditions. Technology included in this general category includes:
  - Carbon dioxide (CO2)
  - Hydrocarbons (HC)
  - Ammonia (NH3)
  - Fluorinated gases (HFOs)

**Conclusion**

Moderate technical opportunities exist for significant improvements, over 15+ percent relative to today’s top tier, in the near term (< 5 years). Longer-term (5-10 years) opportunities are limited by market fragmentation and higher realization costs.

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23 The Consortium for Energy Efficiency has specified three tiers of efficiency levels (http://www.cee1.org/resid/rs-ac/res-ac_specs.pdf) with Tier 3 indicated by a minimum SEER 16 and 13 EER. All savings increments discussed are relative to current typical performance at this rating.
Potential Efficiency Improvements – System

Detailed Research Findings

- **Distribution** factors have a combined impact on total energy consumption and peak demand upwards of 40 percent, and are all but unaccounted for by most utility efficiency programs. Distribution opportunities are largely dictated by existing or constrained site conditions such as duct placement and accessibility. Alternatives to conventional distribution systems (such as ductless mini/multi-splits) are often limited by customer and contractor perception of occupant comfort and control uncertainty. Technology included in this general category includes:
  - Air-flow rates and associated pressure losses, energy and comfort impacts
  - Duct Locations, Integrity, Sealing and Insulation
  - Thermostat placement, programming and operation

- **Sizing** factors have a combined impact on total energy consumption that depends significantly on system type and is often diminished by advanced unit technologies. Reductions of 25-50 percent are common, but as is found with distribution opportunities, opportunities are held back by customer and contractor perception of comfort impacts. The largest benefit of system sizing improvements is through cost-effectiveness advantages stemming from capital cost reductions in smaller capacity equipment and distribution system sizes. Technology included in this general category includes:
  - Enhanced load modeling (manuals J, S, and extra enhancements)
  - Electrical loads, air infiltration, building shell, and orientation and distribution impacts on sensible/latent cooling needs

- **Integrated Design** factors have the most potential (30-90+ percent) for energy savings but require the most coordination between site and system design. Sophisticated analysis that incorporates HVAC system economics into building shell design depends upon designer access to and facility with market and performance data to iterate and optimize life-cycle costs. Critical factors to realizing these opportunities are the inefficiency and high costs of design optimization due to lack of data, priority, and confidence in model results. Technology and approaches included in this general category includes:
  - Whole house retrofit (Home Performance with ENERGY STAR)
  - New construction (ENERGY STAR, Passive House)

Conclusion

System efficiency opportunities are significant (20-90 percent) but can be difficult and problematic to cost-effectively realize due to the increased scope and complexity.

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24 Nearly all heating and cooling systems satisfy the thermal needs of the space through a system of ducts and or piping distributed throughout the house in a manner that normally would not be cost-effective to modify. This section looks at opportunities for efficiency through upgrades to the distribution system.

25 There are significant innovations that focus on opportunities for improved set-backs and temperature regulation using “smart” networked thermostats to manage energy usage. Incorporation of house-specific thermal history, weather forecasting and occupant behavior algorithms, these opportunities individually may save 15% to 30%

26 This issue persists despite the poor humidity control of over-sized systems.

27 Savings relative to “typical” construction and top-tier equipment ratings.
Likely Efficiency Program Action on these Opportunities

Detailed Research Findings

- **Product Attributes**: Efficiency programs most often determine product support in accordance with a performance specification. Administrators typically rely upon independent sources to verify and maintain lists of products that adhere to program standards. This includes National initiatives such as ENERGY STAR qualified products lists, as well as industry collaborations such as the CEE/AHRI database. Tying incentive payments to the data available from these sources allows programs to minimize program overhead and simplify communication of requirements to customers and contractors.
  - Successes include:
    - Universally-recognized AFUE, SEER, EER, HSPF, COP, EF and other equipment ratings
    - Technology Types: Brushless Permanent Magnet motors (ECM), Thermal Expansion Valves (TXV)
  - Struggles include:
    - Non-standard or Proprietary elements: e.g. Diagnostics.
    - Controls-based features with impacts not captured by testing standards:
      - Demand Management (Comfort and Temperature-based setbacks)
      - Climate-Specific Adjustments (Hot-Dry, Hot-Humid, Cold-Humid, etc.)

- **System Attributes**: Programs have succeeded with system-level opportunities only to the level that participating contractors have shown sufficient and sustained interest in the additional verification and administrative overhead. These conditions are, to date, largely limited to situations in which this burden was either pre-existing, or minimal.
  - Success stories include:
    - Basic Sizing and Selection: best practice program design leverages existing quality assurance activities at the contractor level, such as the work of sizing and selecting equipment in accordance with the Air Conditioning Contractors of America Manuals J and S.
    - New Construction: Location of ductwork within conditioned spaces, and advanced and integrated load modeling is encouraged by programs that offer incentives in accordance with prescriptive and performance based criteria.
  - Struggles often occur in areas where problems are previously unrecognized or hard to quantify in given situations. Customers, contractors, and programs alike are accustomed to visible or tangible issues and correspondingly clear resolutions. In situations where costs and or benefits are hidden, highly variable and or uncertain, market traction has been lacking.
    - **Quality Installation and/or Verification (QI/QIV)**: Despite significant attention nationwide, the full-realization of cost-effective savings through program-sponsored incentives for duct-sealing, proper charging and air-flow has come up short of expectations. The challenges associated with contractor scope limitations, customer value, and the costs of fixing identified systemic problems can take more resources to overcome than programs or contractors have available.
    - **Robust Sizing and Selection**: Incorporation and iteration of whole-house load and comfort impacts is technically-demanding and, highly site-specific. Even in situations where contractor and customer interest and capabilities align, program
mechanisms for assessing savings are limited. Resources and methodologies for savings based upon site-specific details are, when deployed, often restricted to projects where tens or hundreds of units are done in bulk, where the additional costs can be absorbed by additional savings.

Conclusion
Energy efficiency programs have excelled at realizing opportunities afforded by performance-based qualifying criteria tied to discrete product specifications and technologies, but struggle to capture the potential of opportunities that rely upon system design, integration and commissioning.  

Pending Codes and Standards that Could Impact Residential HVAC Programs
Detailed Research Findings

Federal Minimum Appliance Standards and ENERGY STAR Criteria
- Regional Standards
  - The impact of climate on efficiency results, for the first time, in minimum standards that are not nationally uniform. Dividing the states according to the number of Heating Degree Days (HDD), new federal minimum standards identify corresponding performance criteria for furnaces, air conditioners and heat pumps.
    - North: HDD>5000
    - South: HDD<5000
    - Southwest: “Hot-Dry”
      - AZ, CA, NM, NV
    - Southeast: “Hot-Humid”
      - AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA
- Minimum Standards Timeline
  - May 2013: Furnace standards (non-weatherized, gas) take effect:
    - North: AFUE equal or greater than 90 percent
    - South: AFUE equal or greater than 80 percent
  - Jan 2015: Air conditioner, heat pump, and weatherized furnace standards take effect (see Table 3)

Key barriers include quantifying annual and lifetime savings for measures requiring special training, equipment, and dependence upon a number of site-specific, and difficult to verify factors through program resources.

On October 24, 2011, DOE confirmed the efficiency levels and timeline presented here. A notice describing comments received on the direct final rule and outlining DOE’s intention to proceed can be found here:
### Table 3: Minimum Federal Standards for Air Conditioner, Heat Pump, and Weatherized Furnace Standards

<table>
<thead>
<tr>
<th>System Type</th>
<th>≥ 5000 HDD</th>
<th>&lt; 5000 HDD</th>
<th>CA/AZ/NM/NV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Split AC</td>
<td>13 SEER</td>
<td>14 SEER</td>
<td>14 SEER/12.2 EER (&lt;45,0000 Btu/h) 14 SEER/11.7 EER (≥ 45,0000 Btu/h)</td>
</tr>
<tr>
<td>Split HP</td>
<td>14 SEER/8.2 HSPF</td>
<td>14 SEER/8.2 HSPF</td>
<td>14 SEER/8.2 HSPF</td>
</tr>
<tr>
<td>Package AC</td>
<td>14 SEER</td>
<td>14 SEER</td>
<td>14 SEER/11.0 EER</td>
</tr>
<tr>
<td>Package HP</td>
<td>14 SEER/8.0 HSPF</td>
<td>14 SEER/8.0 HSPF</td>
<td>14 SEER/8.0 HSPF</td>
</tr>
<tr>
<td>Gas-Pack (weatherized)</td>
<td>14 SEER/81% AFUE</td>
<td>14 SEER/81% AFUE</td>
<td>14 SEER/81% AFUE</td>
</tr>
<tr>
<td>Gas Furnaces (non-weatherized)</td>
<td>90% AFUE</td>
<td>80% AFUE</td>
<td>80% AFUE</td>
</tr>
<tr>
<td>Oil Furnaces (non-weatherized)</td>
<td>83% AFUE</td>
<td>83% AFUE</td>
<td>83% AFUE</td>
</tr>
</tbody>
</table>

Notes: SEER = seasonal energy efficiency ratio; EER = energy efficiency ratio; HSPF = heating seasonal performance factor; AFUE = annual fuel utilization efficiency

### Prior Impacts of increases to Federal Minimum Standards and ENERGY STAR Criteria

In 2006, the federal minimum SEER rating was changed from 10 to 13 for air conditioners and heat pumps. In response to the increased baseline rating, ENERGY STAR criteria were advanced as well. Efficiency programs pegged to ENERGY STAR would see a decrease in “savings” of 77 percent—impacting whether their programs would pass cost-effectiveness tests—and many announced reductions in incentives along with higher qualifying standards.

Typically, efficiency programs must show that their programs are cost effective by passing one or more cost effectiveness tests. There are several tests currently in use, including the Participant Cost Test, Rate Impact Measure Test, Total Resource Cost Test, Program Administrator Cost Test, and Societal Cost Test. There have been recent calls within the efficiency program industry to reconsider which tests are used and how they are applied. With regard to HVAC programs, this has been, in part, due to a growing recognition that when a system fails, a consumer can not only replace it with a standard efficiency version or with an energy efficient version, but also to repair it. Research from J.P. Morgan and HARDI quantifies the magnitude of consumer repair decisions. Between 2005-2010, cooling shipments (replacements) were down 20 percent, despite a 25 percent increase in the eligible replacement base. J.P. Morgan calls this phenomenon an unprecedented change in consumer behavior opting for repair over replacement.

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Table 4: Criteria for ENERGY STAR Qualified Residential ASHPS and CAC

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Product Type</th>
<th>SEER</th>
<th>EER</th>
<th>HSPF*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 (Version 2)</td>
<td>Split Systems</td>
<td>≥ 13</td>
<td>≥ 11</td>
<td>≥ 8.0</td>
</tr>
<tr>
<td></td>
<td>Single Package Equipment (including gas/electric package units)</td>
<td>≥ 12</td>
<td>≥ 10.5</td>
<td>≥ 7.6</td>
</tr>
<tr>
<td>2008 Tier 1 (Version 3)</td>
<td>Split Systems</td>
<td>≥ 14</td>
<td>≥ 11.5</td>
<td>≥ 8.2</td>
</tr>
<tr>
<td></td>
<td>Single Package Equipment (including gas/electric package units)</td>
<td>≥ 14</td>
<td>≥ 11</td>
<td>≥ 8.0</td>
</tr>
<tr>
<td>2009 Tier 2 (Version 4)</td>
<td>Split Systems</td>
<td>≥ 14.5</td>
<td>≥ 12</td>
<td>≥ 8.2</td>
</tr>
<tr>
<td></td>
<td>Single Package Equipment (including gas/electric package units)</td>
<td>≥ 14</td>
<td>≥ 11</td>
<td>≥ 8.0</td>
</tr>
</tbody>
</table>

* For heat pumps only

The minimum standards change in 2006 led to an increase in energy efficiency program participation numbers leading up to the change. It also led to a sharp drop off in subsequent years. As shown in Figure 6, this decline was seen in the HVAC industry as a whole as well, with a 40 percent reduction in shipment volume for cooling equipment since the standard took effect in 2006.

Figure 6: Shipments of Central Air and Heat Pumps: 2005-Present

Despite the maturation of efficiency programs in general, and the impacts of the 2009 American Recovery and Reinvestment Act, efficiency programs still struggle to regain the success and cost-effectiveness that preceded the elevation of the minimum standard.

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32 The range varies, but according to efficiency program managers in NJ, CT, and MA, the increase was on the order of 15-30 percent.
33 Results again varied by region, but reductions of 20-40% were seen in the subsequent years.
35 Institute for Trend Research.
It should be noted that the upcoming change in baseline AFUE for furnaces sold in the Northern region is of a similar magnitude to the 2006 SEER change for air conditioners. Absent reductions in changes in equipment incremental costs or fuel prices, similar program impacts are anticipated.

**Conclusion**

New federal minimum appliance standards will impact energy savings baselines. The revisions will significantly impact the economic justification for utility program support of efficiency opportunities. Importantly, this results in a narrow window of opportunity for energy savings opportunities.

On the heating side, the increasing penetration of high-efficiency condensing furnaces and boilers is drawing attention to safety concerns around existing naturally-drafted water heaters that relied upon the older heating equipment for safe evacuation of combustion products. Rising awareness of the “orphaned” water heater problem may increase the linkage of space and water heating equipment upgrades.

**Potential Changes to ENERGY STAR Specifications**

**Detailed Research Findings**

ENERGY STAR has plans to revise qualifying criteria for gas furnaces, but has not publicly announced any plans for cooling equipment. Following the regional framework of the federal standards, ENERGY STAR has stratified AFUE levels according to Northern and Southern States, as shown in Table 5.

**Table 5: ENERGY STAR Gas Furnace Versions**

<table>
<thead>
<tr>
<th>ENERGY STAR Version</th>
<th>Region</th>
<th>Min. AFUE</th>
<th>Fan (F_{Eff})</th>
<th>Leakage (Q_{Leak})</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 (Oct 2006)</td>
<td>North America</td>
<td>90%</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>3.0 (Feb 2012)</td>
<td>US North/Canada</td>
<td>95%</td>
<td>≤2.0%</td>
<td>No Req.’s</td>
</tr>
<tr>
<td></td>
<td>US South</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0 (Feb 2013)</td>
<td>US North/Canada</td>
<td>95%</td>
<td>≤2.0%</td>
<td>≤2.0%</td>
</tr>
<tr>
<td></td>
<td>US South</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion**

Efficiency programs will need to adapt to new ENERGY STAR specifications in the coming years.

**Technologies Likely to Meet Cost-Effectiveness Criteria**

**Detailed Research Findings**

Efficiency programs use cost-effectiveness tests to evaluate how efficiency can compete with the broad range of other resource options available to a utility and to ensure that public benefit dollars are spent prudently. In its simplest form, energy efficiency cost-effectiveness is measured by comparing the benefits of an investment with the costs. Five key cost-effectiveness tests have, with minor updates, been

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36 The exception is the previously announced phased-in improvement to the GSHP criteria effective in 2012. See http://www.energystar.gov/index.cfm?c=geo_heat.pr_crit_geo_heat_pumps for more information.
used for over 20 years as the principal approaches for energy efficiency program evaluation. These five cost-effectiveness tests are the following:\footnote{These tests are examined in depth in the National Action Plan for Energy Efficiency report, “Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers.” http://www.epa.gov/cleanenergy/documents/suca/cost-effectiveness.pdf}

- Participant cost test (PCT)
- Utility/program administrator cost test (PACT)
- Ratepayer impact measure test (RIM)
- Total resource cost test (TRC)
- Societal cost test (SCT)

Typically, proposed programs are “screened” for cost-effectiveness using one or more of these tests, as determined by the local PUC or energy efficiency program enabling legislation. Of these five, the most commonly used is the TRC. The choice of where to apply each cost-effectiveness test has a significant impact on the ultimate set of recommended energy efficiency upgrades (also called “measures”) offered to customers. In general, there are three places to evaluate the cost-effectiveness test: at the “measure” level, the “program” level, and the “portfolio” level. Applying cost-effectiveness tests at the program or portfolio levels allows some non-cost-effective measures or programs to be offered as long as their shortfall is more than offset by more cost-effective measures and programs. For many programs, during the planning process individual programs are screened and then the entire portfolio of programs needs to demonstrate cost-effectiveness. In some instances (typically for non-residential programs), individual measures are screened on a case-by-case basis before determining eligibility for a program.

Conclusion
Given the variation in which cost-effectiveness tests are used and how they are applied, answering the question of which particular HVAC technologies will be cost-effective for programs to promote is difficult. However, the technologies that offer the greatest energy savings at the lowest incremental cost compared to baseline will continue to be attractive targets for efficiency programs.

Future Value of Energy Saved through Efficiency Programs
Detailed Research Findings
Growth Factors
- Energy efficiency program spending is concentrated, but diversifying: 10 states represented 80 percent of spending in 2008 and 70 percent in 2010.
- Spending rises with savings goals and achievements. In 2010, electrical savings represented one half of one percent (0.5 percent) of utility retail sales. Some efficiency program actors have achieved almost 2 percent. The reference (base) case from the Energy Information Administration (EIA) estimates the aggregate cumulative retail energy savings from 2011 to 2020 at 6.5 percent for the entire U.S.
- Existing policies that maintain and/or accelerate savings goals:\footnote{For more information on policies requiring energy efficiency in each state, see the American Council for an Energy Efficient Economy State Policy Database at http://www.aceee.org/sector/state-policy.}
  - Several states have adopted a policy of acquiring “all cost-effective energy efficiency”: CA, CT, MA, RI, WA


38For more information on policies requiring energy efficiency in each state, see the American Council for an Energy Efficient Economy State Policy Database at http://www.aceee.org/sector/state-policy.
Others have established mandatory, non-trivial Energy Efficiency Resource Standards: CA, MN, NY, IL, OH
Major parts of the U.S. have set aggressive infrastructure and integrated resource planning goals: Pacific NW, Midwest, Southwest

Challenges to the Growth of Efficiency Programs

- The Economy
  - Programs generally rely upon customer-driven transactions to realize savings. Diminished transactional activity, facilitated-lending, and future uncertainty all inhibit this core performance path for programs.
  - Avoided costs may erode if economic decline shutters a significant fraction of the utility base loads of commercial and industrial customers.
  - Political support for increased program funding through rate-payer charges wanes at times when administrations and budgets are scrutinized on all non-essential expenditures.
  - The significant expenditures of the American Recovery and Reinvestment Act and federal tax credits through the end of 2010 had a harvesting effect which could lead to significant drops in “natural replacement rates” in the subsequent years. HARDI research indicates that sales of equipment above 13 SEER in September 2011 were approximately 20% less than the prior year.
  - Widely available, attractive financing options could be listed under all of these headings, but it is placed here because of the double-edged sword that weak economic conditions wield on lending capital, terms and conditions, and the risks and costs of defaults.

- Institutional Infrastructure
  - Mature programs require increasing amounts of data and administrative processes to realize deeper savings in existing markets. Further savings growth must come from establishing relationships with harder-to-reach markets and their particular needs.
  - New or underdeveloped program areas—many of whom have politically leapfrogged the incremental development period of older EE programs with aggressive and expansive goals—critically require:
    - More sophisticated savings verification systems
    - Retail and supply chain relationships. The requisite need for experienced and skilled staff to deliver the programs has been, and may continue to be a bottle-neck to program growth.

- Customer Reach and Influence
  - Innovative program design and implementation are essential to support higher savings targets on a per-customer basis and increase program penetration rates.

39 Integrated resource planning sets demand side resources on the same plane as supply side resources, enabling efficiency savings be factored into long term forecasting.
40 Note: these factors are, in part, codependent: the value of success and failure in one is amplified by real or perceived associations and impacts on the others. Though one obvious example is the dampening effect of weak consumer demand, it is also true that robust customer reach and influence can buoy local infrastructure and sector-specific markets.
41 The conventional expectation of an efficiency-based payback period sets a timeline of expectation around employment, housing, or other operations that is destabilized in downturns.
42 The associated data acquisition, analysis, and reporting mechanisms ultimately dictate the scope of program reach.
Connecting to the right customers at the right times with the right information and service requires a robust array of program/customer interactions that must be established and maintained. Implementing the network of relationships to accomplish these aims can be difficult and expensive, particularly given the fact that the natural cycle of equipment replacement was sped up due to tax credits and ARRA spending.

Conclusion
Ratepayer-funded efficiency program spending, despite the emergence of some negative indicators, is still projected to grow at a brisk pace over the next decade. Three key issues challenge growth, largely dictating the value of energy and demand savings to efficiency programs. Though macroeconomic and political issues could conceivably strengthen (e.g., carbon policies) or weaken (e.g., collapse in consumer demand), the underlying fundamental value of efficiency will continue as a least-cost energy resource.

Recommendations
Recommendations for Efficiency Programs
As noted above, each of the energy efficiency program managers and distributors interviewed noted several recommendations about working together. Based on their responses and the rest of the research conducted for this report, suggestions for efficiency program managers on how to improve program results are provided below. The most basic recommendations about working with trade allies are presented first, followed by recommendations regarding program design and lastly recommendations on partnering with distributors.

General
⇒ Build HVAC Industry Knowledge and Relationships
Knowledge of the players in a local HVAC market can help an efficiency program establish trust and credibility. Southern California Edison, Conservation Services Group, and Efficiency Vermont all stressed the importance of HVAC industry knowledge and relationships. Getting out into industry and building up trust and credibility over time was noted as essential.

⇒ Communicate in Terms that are Meaningful for Distributors
Efficiency Vermont recommended that programs communicate in terms that are meaningful for distributors. The program

Key Recommendations for Efficiency Programs
- Build HVAC industry knowledge and relationships
- Communicate in terms that are meaningful for distributors
- Work with distributors early in the program design process
- Commit to the program for at least one year
- Be open and frank about program successes and challenges
- Get an external perspective on program changes from trade allies
- Streamline operations and reporting
- Consider financing
- Evaluate size of rebates
- Increase marketing
- Ask distributors to stock efficient equipment
- Ask for sales and market trend insights
- Get distributor help with program promotion
- Seek to attend distributor sales and territory meetings
- Schedule contractor outreach effectively
- Leverage the distributor’s training events

43 A bottom-up analysis of federal projection of spending through 2020 found results that equate to a range from low (4.6%) to high (12.2%) annually on average. For context, the annual average growth in spending from 2006 to 2008 was 18% per year. These projections did not include the expenditures from the American Recovery and Reinvestment Act of 2009. Accordingly the high case scenario should be considered more likely than the low case.
cannot show up “preaching efficiency” and expect all distributors to respond. Instead, knowing what is valuable to distributors (e.g., increased sales of higher margin products, increased contractor loyalty, fewer warranty issues) and stressing those benefits is more likely to result in success.

⇒ Work with Distributors Early in the Program Design Process
Southern California Edison recommended working with distributors as early as possible in the program design process instead of coming to them after all of the program details have been set. It is important to get input and feedback up front, incorporate it to the extent possible, and then share the program design again. This makes distributors more supportive of the program at the launch.

Process Issues
⇒ Commit to the Program for at Least One Year
Xcel Energy recommended, whenever possible, not to change a program mid-year given how difficult it is for trust to be developed between a contractor, distributor, and efficiency program. Trade allies need to be able to count on the program for the entire year and no matter how hard a program tries to communicate a change, some contractors will still miss it.

Carrier Enterprise agreed, suggesting that there is a minimum time period needed for a program in order to justify action by distributors. Given the industry sales cycles and the time needed for word of mouth to develop, Carrier Enterprise concluded that nothing less than a year makes sense. While distributors can mobilize around quarterly promotions and are flexible enough to be able to support promotions for a few months at a time, from a market development perspective, longer timeframes are needed.

⇒ Be Open and Frank about Program Successes and Challenges
Resource Solutions Group suggested that an open and frank approach works best with distributors. Being open about program success and identifying where activity is slower than desired brings distributors in as partners to help the program identify the barriers and troubleshoot solutions.

⇒ Get an External Perspective on Program Changes from Trade Allies
Xcel Energy recommended getting external perspective and asking how program changes look from a trade ally perspective. Since trade allies are the main contact to customers, it behooves the program to understand how they perceive the program and whether any tweaks are needed. Xcel Energy has found that this interaction results in helpful feedback and enables distributors to provide value to their contractor customers by positioning them as an efficiency program expert that can answer questions once changes are announced. In another example, Efficiency Vermont gathered input on the ease of submitting program paperwork and as a result of feedback, moved to an online system to ease the burden on participants.

Efficiency programs should pay special attention to trade ally perspectives when they are contemplating program elements that could be considered duplicative or competitive to a role already played by the industry. For example, given that contractor training is a nearly universal offering among distributors, efficiency programs would be well served to talk with distributors before setting up their own training efforts to make sure that they are leveraging resources already in place rather than competing with them.
Program Components

⇒ Streamline Operations and Reporting
U.S. Air Conditioning recommended that efficiency programs make their paperwork as easy for the contractor as possible, because they are the ones who fill out model numbers, efficiency ratings, etc. In addition, to offset any cash flow problems associated with participating in the program, the quicker programs can turn around rebate checks, the better.

⇒ Consider Financing
Due to the emergency replacement nature of many HVAC purchases, Lennox estimates that approximately 70% of HVAC systems are financed. In phone interviews, several distributors commented that in the present economic climate, efficiency programs that offer low-cost, long-term, easy-to-access financing for their customers will drive more participation. Two distributors pointed to on-bill financing as an ideal solution from a customer perspective, although that may pose operational challenges for some efficiency programs. Geary Pacific underscored that financing is an absolutely necessary tool for contractors to have in their toolkits today given the continued tightness in credit markets. The HVAC financing options for consumers tend not to be that effective given acceptance rates are low and interest rates are high.

⇒ Evaluate Size of Rebates
Distributors recommend that efficiency programs reevaluate the size of the incentive they offer. One noted that, at the end of the day these are discount programs, so the larger the discount, the more effective it will be. Carrier Enterprise stated that the dollars are larger in some of their markets than others and that they have seen those higher rebate amounts translate into more sales.

Additional research is needed to determine whether it is the percent of incremental cost covered or the amount of the rebate that is more persuasive. For example, a program could offer a $150 rebate to offset a $300 incremental cost, thereby covering 50% of the incremental cost. On the other hand, a program could offer a $500 rebate to offset a $1,500 incremental cost, covering only 33% of the incremental cost. Based on the distributor input, it appears that the amount of the larger rebate amount would be most influential, but the sample size of the interviews was too small to allow for broad conclusions to be drawn on this point. Efficiency programs are encouraged to test this concept with trade allies and customers locally before finalizing rebate amounts.

In addition to testing the above concept, efficiency programs should also evaluate whether they can garner enough additional savings by promoting higher tiers of HVAC equipment to justify a larger incentive level. As noted by both Gorman Industries and Munch Supply, larger rebate amounts are more impactful than smaller ones.

⇒ Increase Marketing
Four of the distributors interviewed for this research report stressed the importance of effective marketing of efficiency programs.

Carrier Enterprise suggested programs increase their marketing efforts directed at distributors and contractors. They felt that rebate dollars should be focused at the customer level, but the distributor and contractor are the ones who need to sell the program to the consumer. General efficiency program marketing to the public is not effective given HVAC is not thought of until a system breaks and needs replacement.

Gorman Industries said that the utilities in their territory rely too much on bill inserts to market their programs and that billboard, radio, and television marketing are needed also.

Riley Sales suggested that programs create a portal on the web where contractors can go to find out about program status and changes. In addition, mailing postcards to a contractor mailing list would inform those that are not web savvy.

Hercules Industries noted that efficiency programs could help educate customers about better understanding their utility bills so they know what they are using now and what they could save. Connecting the dots when the bill comes in is sometimes hard for consumers to do; contractors try to do this during the sales process but have limited success.

Work with Distributors
⇒ Ask Distributors to Stock Efficient Equipment
A simple recommendation that came up in several interviews was to talk with distributors about maximizing the amount of rebate they can access by bringing in equipment that qualifies for different tiers. Encouraging them to go to higher tiers of product can be effective.

⇒ Ask for Sales and Market Trend Insights
Resource Solutions Group stated that they have found value in attending distributors’ sales meetings or territory meetings to learn about products and sales trends that could impact its programs in Illinois and about specific barriers that exist for different products that are promoted. Xcel Energy also gained insight into what products would be introduced in the short term and which product classes would grow in popularity. For example, when their program started in 2009, 2-stage equipment was not widely installed. It is now very common in their service territory, with the implication that Xcel needs to more closely examine the AHRI product certificate to determine qualification. Distributors helped Xcel prepare for that change.

VEIC notes that this recommendation is particularly important given this report’s finding that efficiency programs have a limited time to achieve savings in residential HVAC market with current technologies before increases in minimum standards take effect in May 2013 for heating equipment and January 2015 for cooling equipment.

⇒ Get Distributor Help with Program Promotion
Because distributors are viewed as “trusted sources” of information by contractors and influence their ordering decisions (at least to a degree), distributors can be very helpful in securing contractor participation in efficiency programs. Several efficiency programs recommended that other programs simply ask for help with program promotion.
Xcel Energy routinely asks distributors to put program related events on their calendars, put signs at their counters, send email blasts out to their customers, etc., and has achieved good results through this approach.

Conservation Services Group recommended that efficiency programs ask to attend the distributor’s “counter days.” Most distributors have counter days, where they provide contractors with the option of coming in and placing orders. An efficiency program in the Midwest has attended counter days (often with donuts and coffee) to provide contractors with information about the program. This has been very time efficient, allowing program staff to access upwards of 50 contractors in one day.

Resource Solutions Group stated that at the end of the day, contact with contractors is critical to program success. Because work with distributors helps to bring contractors into the program, it’s an essential part of what the program does.

⇒ **Seek to Attend Distributor Sales and Territory Meetings**
Distributors host sales and territory meeting frequently, which present a good opportunity to explain efficiency programs to contractors who attend. Resource Solutions Group has had success in getting invited to speak at these events, in part because distributors know that rebates are good for business and share a goal of promoting higher efficiency-higher margin product lines.

⇒ **Schedule Contractor Outreach Effectively**
Both Riley Sales and Resource Solutions Group recommended that efficiency programs and distributors work together to host contractor events that are scheduled either early or late in the day. Asking contractors to give up time in the middle of day does not work as well. Another important element of effective contractor events was having food available, whether that is bagels or donuts and coffee or sandwiches for a light dinner.

⇒ **Leverage the Distributor’s Training Events**
Most efficiency program training is focused on contractors, and distributors can play a big role in getting the right training to contractors at the right time. This research found that the vast majority of HVAC distributors (92 percent) offer training to contractors, including sales, technical, and business basics courses. Further, 58 percent of distributors who responded to the survey stated that their contractor customers first learn about energy efficiency incentive programs through their training sessions.

Comments by Geary Pacific and Munch Supply indicated that training is needed to help contractors overcome price objections and move toward features/benefits/value based selling. When approaching distributors about working together on training events, efficiency programs should pitch sales training events focused on upselling to efficiency and competing successfully against low-price bids, because it would address this barrier while benefiting both the program and the distributor.

**Recommendations for HVAC Distributors**
Based on all of the research tasks completed for this report, VEIC has compiled the following set of recommendations for HVAC distributors. The most straightforward recommendations that are easiest to
undertake are presented first and are followed by recommendations that would be more complex to complete.

⇒ **Become Aware of Local Efficiency Programs**
The web-based survey of distributors found that 15 percent of respondents did not know whether there was an efficiency program in their area. The first step to leveraging efficiency program activity is becoming aware of it. Distributors can use several sources to understand what programs are available, including the Database of State Incentives for Renewables and Efficiency\(^\text{45}\) and the CEE Directory of Energy Efficient HVAC Equipment.\(^\text{46}\) A useful follow up to searching these sources is to contact local utilities and any non-utility efficiency program providers.

⇒ **Offer to Connect Efficiency Programs with Contractor Customers**
In order to open a dialogue with an efficiency program, offer to help them connect with contractors. Contractors are essential parts of HVAC efficiency programs and nearly all programs would benefit from a more robust and informed contractor base. Offering to host events where the program representative presents and conducts outreach, placing program materials and posters at distributor counters, and stapling program information to invoices are all good activities to undertake.

⇒ **Inform Efficiency Programs about Training Offerings**
Both the web-based survey of distributors and the phone interviews found that training of contractors is a core service that HVAC distributors provide. Because an informed and trained contractor base is essential to efficiency programs, this represents an untapped area of opportunity for most distributors and efficiency programs. Integrating information about efficiency program rebates into technical and sales trainings, offering stand-alone trainings on rebates and promotions, and incorporating them into one-on-one trainings are all a good ways to get started. Depending on the jurisdiction and the program, some efficiency programs may be able to offer either financial or in-kind support to distributors that take those steps.

⇒ **Provide Constructive Input at the Right Time**
Once a relationship is established with the efficiency program, distributors should ask about program planning cycles to determine the best time to provide input. Efficiency programs are typically constrained as to the number of changes they can make outside of that formal planning cycle, so providing input as program planning is occurring is most effective. If there is critical input to provide, however, distributors should do that as soon as possible and should be ready to brainstorm with efficiency programs about how to address the problem. Even outside of a planning cycle, smaller operational changes may be able to be made, while large-scale changes in program design would require modifications to formal plans and

---

\(^{45}\) This database includes a broad range of efficiency and renewable energy programs and is available online at http://www.dsireusa.org/.

\(^{46}\) This directory is specific to residential HVAC programs and is available at http://www.ceedirectory.org/Content/FindaRebateorIncentiveProgram_4.aspx.
approval by the entity overseeing the program. Distributors should also be aware of how their input will be received. For example, phrasing feedback in terms of how the program could be improved is more likely to result in changes than simply saying that the program is not working.

⇒ Help Efficiency Programs Understand Emerging Technologies
As shown in the technical analysis, there is remaining technical potential in the near term that would help offset increases in federal minimum standards, thus helping to justify additional efficiency program support. Efficiency programs will require help from the HVAC industry to understand those technical opportunities and develop programs to promote them. The examples provided by Geary Pacific and Duncan Supply demonstrate that efficiency programs can be open to promoting new technologies if the savings are clearly established and if it is a good fit with a customer.

Conclusion
This study has established that HVAC distributors play valuable yet generally under recognized roles that can improve the outcomes of residential HVAC energy efficiency programs. Specific areas ripe for partnership between efficiency programs and distributors include: program promotion, stocking efficient equipment, contractor outreach, contractor training, understanding sales trends, and providing program input. The report presents a series of specific recommendations for efficiency programs, distributors, and HARDI on how to best leverage those partnership opportunities and achieve their shared objective of increasing the sale and installation of efficient residential HVAC equipment.
Selected References


Appendix A: Distributor and Energy Efficiency Program Interview Questions

Distributor Questions
1. Can you tell me a little bit about your distributorship?
   a. Territory served:
   b. Employees:
   c. Annual revenues:
   d. Percentage of sales that are high efficiency:
   e. Residential vs. commercial split:
2. Is there an active EE program in your area for residential HVAC equipment?
3. Can you describe it to me?
4. How did you become aware of the program?
5. Has the program changed your normal business practice at all, e.g., have you modified your sales, marketing, inventory strategy as a result?
6. Have you ever been asked to provide input or help the program meet its goals?
7. How successful do you think the program is?
8. How much does a rebate need to be to warrant your effort and change your behavior?
9. Can you tell me which scenario you think would result in greater sales of efficient residential HVAC equipment:
   a. An efficiency program offers a $XXX consumer rebate. Just before the rebate rolls out, the program manager informs contractors and distributors about it via an email distribution list.
   b. An efficiency program offers a $XXX/2 consumer rebate. Months prior to the rebate rolling out, the program manager informs contractors and distributors about it via an email distribution list, hosts a meeting to get input from contractors and distributors on how and when the rebate should be marketed, and asks for feedback on how to make the program easier to participate in.
10. Which of those two scenarios best reflects your experience with efficiency programs to date?
11. Why do you think that is?
12. Do you offer sales and other training to your contractor customers?
   a. If so, what kind and how many/how often?
   b. How many customers generally take advantage of these programs per event?
   c. What benefits have you seen from these training programs?
   d. Do you incorporate information about utility and other incentive programs in these sessions?
      i. If so, do you involve representatives from the utilities in these programs?
13. With regard to the efficiency of products that you sell to contractors, are you 100 percent responsive to what your contractors tell you they would like to order or do you purchase, inventory, and sell with the intention of influencing their ordering decisions at all?
14. What’s your best example of influencing contractors’ purchasing and sales strategies?
15. What recommendations would you have for efficiency programs – if you were in their shoes what would you do to promote the sale of efficient equipment?
16. Do you feel that you have an effective working relationship with the efficiency programs that operate in your territory?
17. Would you be interested in learning more about efficiency programs?
18. What would be the right venue for that? A conference, a webinar, etc.?
19. Is there anything else you’d like to offer on the topic of residential HVAC efficiency programs?

Efficiency Program Questions
1. Can you give me an overview of your residential HVAC program?
2. How long has it been in operation?
3. What’s the program’s budget?
4. How many rebates did you do last year? Did you meet your goals?
5. Describe your work with trade allies (manufacturers, distributors, and contractors), if any.
6. Do you ever have contact with distributors?
7. What kind of interactions do you have?
8. How valuable have those interactions been? (not at all to extremely – and ask for examples)
9. Thinking about what you’ve done with trade allies, where have you seen the biggest impact to your program success? Working with manufacturers, distributors, or contractors?
10. Do you have any recommendations for other efficiency programs about working with trade allies?
11. What rebate amounts have you seen be effective at influencing purchasing and installation behaviors?
12. Can you tell me which scenario you think would result in greater sales of efficient residential HVAC equipment:
   a. An efficiency program offers a $XXX consumer rebate. Just before the rebate rolls out, the program manager informs contractors and distributors about it via an email distribution list.
   b. An efficiency program offers a $XXX/2 consumer rebate. Months prior to the rebate rolling out, the program manager informs contractors and distributors about it via an email distribution list, hosts a meeting to get input from contractors and distributors on how and when the rebate should be marketed, and asks for feedback on how to make the program easier to participate in.
13. Which of those two scenarios best reflects your experience running an efficiency program to date?
14. Why do you think that is?
15. How important are the following to your program: (scale of 1-5, with 5 being most important)
   a. Matching or in-kind funding
   b. Training of contractors re: QI or efficiency or sales
   c. Influence with contractors on what to buy
   d. Market data on pricing, market share, etc.
   e. Information to the program on emerging technologies
16. Have you achieved any of these benefits by working with distributors?
   a. Matching or in-kind funding
   b. Training of contractors re: QI or efficiency or sales
   c. Influence with contractors on what to buy
   d. Market data on pricing, market share, etc.
e. Information to the program on emerging technologies

17. Can you tell me a little about those benefits, and how they came about?
18. Do you have any data comparing your program’s success before and after working with distributors?
19. Do you feel that you have an effective working relationship with the distributors in your territory?
20. Would you be interested in learning more about the HVAC supply chain and the roles distributors play related to efficiency?
21. What would be the right venue for that? A conference, a webinar, etc.?
22. Is there anything else you’d like to offer on the topic of residential HVAC efficiency programs and distributors?
Appendix B: Report on Web-Based Survey of Distributors

Technical Completion Report
August 25, 2011

THE HARDI RESIDENTIAL HVAC EFFICIENCY SURVEY:
KEYS TO OPTIMIZING RESIDENTIAL HVAC EFFICIENCY PROGRAMS

by

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THE HARDI RESIDENTIAL HVAC EFFICIENCY SURVEY

Executive Summary

BACKGROUND

This study presents the results of the HARDI Residential HVAC Efficiency Survey. The goal of the study is to describe distributor perceptions and desires relative to residential HVAC energy efficiency programs as well as their past experiences with such programs. In addition, an understanding of distributors’ role in influencing sales of high efficiency equipment via inventory management systems and training of contractors is a cornerstone of the study. Analysis of the presence of efficiency programs and distributor involvement in such programs is also included in the research. Finally, the study focuses on distributors’ perceptions of the conditions in which greater trade participation in EE programs could occur. While the results provided here offer meaningful insight on the questions noted above, the residential HVAC market is a dynamic one and a repeat of the study in the future might show interesting changes. A description of the method used in the study follows.

In the summer of 2011, a survey questionnaire was sent by internet to 454 HARDI member HVAC distributors utilizing the survey software of a leading research provider (MarketTools, Inc.). Over a three-week period 70 usable returns were obtained, yielding a response rate of 15.4 percent. While this is somewhat low, it is estimated that approximately 30 percent of HARDI members did not qualify to take the survey. This reduces the base of potential respondents to 318 and a realistic response rate of 22 percent.

The questionnaire (shown below) was broken into five primary sections. These sections, along with the measures in them, were developed through an iterative process involving meetings and communication between key individuals at Vermont Energy Investment Corporation, HARDI and the consultant. A description of each section, along with its related measures, is given as follows:

1) A section that measured HVAC residential product lines carried by the distributor and an estimate of the percentage of sales of high efficiency equipment.

2) A section that measured characteristics of distributors’ inventory/sales systems.

3) A section that measured distributors’ programs for training of contractor customers.

4) A section that measured distributors’ experiences with and desire to participate in efficiency programs.

5) A section that measured demographic information of distributors.
Data were collected on-line and a preliminary analysis was conducted utilizing software provided by MarketTools, Inc. In addition the data were downloaded, cleaned, coded and analyzed utilizing the SPSS\textsuperscript{47} statistical software. The output of this software program provides, in detail, the results of the survey. The major results and conclusions are provided here with, first, a look at the sample profile. Next, some general conclusions about product lines carried and energy efficient product sales will be put forth. After that, a look at distributor inventory and sales management systems will be detailed. This will be followed by an examination of distributor training patterns. Then, distributor experiences with efficiency programs will be profiled. Finally, some geographic (regional) comparisons will be provided.

SAMPLE PROFILE

As stated earlier, 70 distributors responded, at least in part, to the questionnaire. Respondents were asked questions about company size, age, location, market coverage in addition to their experience and position within the company. Based on the responses to these items, a profile of the respondents is provided below.

1) Company size: The bulk (over 80 percent) of companies have sales of $100 million or less.

<table>
<thead>
<tr>
<th>In dollars, what was your approximate sales volume in 2010?</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than $15 million</td>
<td>12</td>
<td>25.0%</td>
</tr>
<tr>
<td>$15 to $30 million</td>
<td>7</td>
<td>14.6%</td>
</tr>
<tr>
<td>$31 to $50 million</td>
<td>9</td>
<td>18.8%</td>
</tr>
<tr>
<td>$51 to $100 million</td>
<td>11</td>
<td>22.9%</td>
</tr>
<tr>
<td>$101 to $200 million</td>
<td>6</td>
<td>12.5%</td>
</tr>
<tr>
<td>more than $200 million</td>
<td>3</td>
<td>6.3%</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100%</td>
</tr>
</tbody>
</table>

2) Company size: The bulk (approximately 80 percent) of companies employ 200 or fewer people.

<table>
<thead>
<tr>
<th>Approximately how many people does your company employ full time?</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 20</td>
<td>8</td>
<td>16.3%</td>
</tr>
<tr>
<td>20 to 50</td>
<td>9</td>
<td>18.4%</td>
</tr>
<tr>
<td>51 to 75</td>
<td>7</td>
<td>14.3%</td>
</tr>
<tr>
<td>76 to 100</td>
<td>3</td>
<td>6.1%</td>
</tr>
<tr>
<td>101 to 200</td>
<td>12</td>
<td>24.5%</td>
</tr>
<tr>
<td>more than 20</td>
<td>10</td>
<td>20.4%</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>100%</td>
</tr>
</tbody>
</table>

\textsuperscript{47} Statistical Package for the Social Sciences.
3) Market area: Geographic representation is spread across the nation, though weak in the West.

<table>
<thead>
<tr>
<th>In what state is your company headquartered?</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>8</td>
<td>16.7%</td>
</tr>
<tr>
<td>Midwest</td>
<td>12</td>
<td>25.0%</td>
</tr>
<tr>
<td>South</td>
<td>22</td>
<td>45.8%</td>
</tr>
<tr>
<td>West</td>
<td>4</td>
<td>8.3%</td>
</tr>
<tr>
<td>Other (Canada)</td>
<td>2</td>
<td>4.2%</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100%</td>
</tr>
</tbody>
</table>

4) Company age: Companies are well established, with a median age of 56 years.

<table>
<thead>
<tr>
<th>Company age</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>54.39</td>
</tr>
<tr>
<td>Median</td>
<td>56.00</td>
</tr>
<tr>
<td>Range</td>
<td>4 to 145</td>
</tr>
<tr>
<td>S.D</td>
<td>30.24</td>
</tr>
<tr>
<td>Quartile 1</td>
<td>Less than 29 years</td>
</tr>
<tr>
<td>Quartile 2</td>
<td>29 to 55 years</td>
</tr>
<tr>
<td>Quartile 3</td>
<td>56 to 66 years</td>
</tr>
<tr>
<td>Quartile 4</td>
<td>67 plus years</td>
</tr>
</tbody>
</table>

---

48 States were categorized according to the following regional divisions used by the United States Census Bureau.

**Northeast**
- New England
  - Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut
- Mid-Atlantic
  - New York, Pennsylvania, New Jersey

**Midwest**
- East North Central
  - Wisconsin, Michigan, Illinois, Indiana, Ohio
- West North Central
  - Missouri, North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa

**South**
- South Atlantic
  - Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida
- East South Central
  - Kentucky, Tennessee, Mississippi, Alabama
- West South Central
  - Oklahoma, Texas, Arkansas, Louisiana

**West**
- Mountain
  - Idaho, Montana, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico
- Pacific
  - Alaska, Washington, Oregon, California, Hawaii

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54 3455 Mill Run Drive, Suite 820, Columbus, OH 43026
T: (614) 345-4328  (888) 253-2128  F: (614) 345-9161  www.TheCEE0.org
5) Market coverage: Companies have broad market coverage, with a median number of 8 branch locations.

<table>
<thead>
<tr>
<th>How many branch locations does your company have?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean = 11.63</td>
</tr>
<tr>
<td>Median = 8.0</td>
</tr>
<tr>
<td>Range = 0 to 78</td>
</tr>
<tr>
<td>S.D = 12.82 years</td>
</tr>
<tr>
<td>Quartile 1</td>
</tr>
<tr>
<td>Quartile 2</td>
</tr>
<tr>
<td>Quartile 3</td>
</tr>
<tr>
<td>Quartile 4</td>
</tr>
<tr>
<td>Less than 4</td>
</tr>
<tr>
<td>4 to 7</td>
</tr>
<tr>
<td>8 to 15</td>
</tr>
<tr>
<td>16 plus</td>
</tr>
</tbody>
</table>

6) Market coverage: Companies have broad market coverage, with a median number of 3 states.

<table>
<thead>
<tr>
<th>How many states do you serve?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean = 3.2</td>
</tr>
<tr>
<td>Median = 3.0</td>
</tr>
<tr>
<td>Range = 1 to 9</td>
</tr>
<tr>
<td>S.D = 1.99</td>
</tr>
<tr>
<td>Quartile 1</td>
</tr>
<tr>
<td>Quartile 2</td>
</tr>
<tr>
<td>Quartile 3</td>
</tr>
<tr>
<td>Quartile 4</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

7) Respondent experience: Respondents have a wealth of experience, with a median number of 30 years in the industry.

<table>
<thead>
<tr>
<th>How many years have you been in the industry?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean = 29.43</td>
</tr>
<tr>
<td>Median = 30.00</td>
</tr>
<tr>
<td>Range = 7 to 47</td>
</tr>
<tr>
<td>S.D = 9.78</td>
</tr>
<tr>
<td>Quartile 1</td>
</tr>
<tr>
<td>Quartile 2</td>
</tr>
<tr>
<td>Quartile 3</td>
</tr>
<tr>
<td>Quartile 4</td>
</tr>
<tr>
<td>Less than 23 years</td>
</tr>
<tr>
<td>23 to 29 years</td>
</tr>
<tr>
<td>30 to 39 years</td>
</tr>
<tr>
<td>40 plus years</td>
</tr>
</tbody>
</table>
8) Respondent title: Respondents have higher level positions in their respective companies.

<table>
<thead>
<tr>
<th>What is your title?</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>President</td>
<td>4</td>
<td>16%</td>
</tr>
<tr>
<td>CEO</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>President and CEO</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>President and COO</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>Director</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>COO</td>
<td>1</td>
<td>4%</td>
</tr>
<tr>
<td>General Manager</td>
<td>2</td>
<td>8%</td>
</tr>
<tr>
<td>Vice President</td>
<td>7</td>
<td>28%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>25</td>
<td>100%</td>
</tr>
</tbody>
</table>

The previous geo-demographic description of the sample reveals that the respondent profile is well established, geographically dispersed, and shows a good degree of variability in size and age. In addition, the respondents have a high degree of industry experience and represent upper-level positions in their companies.
STUDY FINDINGS

Product Lines Carried
1) The diffusion of product lines carried by respondents varies widely. (See Table 1 for more details).
   - For the U.S., market penetration of HVAC product lines varies from 10.0 to 25.7 percent based on distribution.
   - For the U.S., the top three most distributed product line categories are:
     - York/Coleman/Luxaire
     - Rheem/Ruud
     - Nordyne Brands
   - Distribution of multiple product line categories is not common. For example only 30.0 percent of respondents handle more than one product line category.
   - The pattern of product lines carried by respondents varies somewhat by region of the U.S. For example, distributors who carry York/Coleman/Luxaire are more concentrated in the Midwest while those who carry Trane/American Standard appear to be concentrated in the Northeast.

2) Respondents are actively involved in the sale of high efficiency products. However, there is a wide variance in the percent of sales that they attribute to high efficiency residential HVAC equipment. (See Table 2 for more details).
   - For the U.S., when respondents were asked for the approximate percentage of residential HVAC sales that represented high efficiency equipment, the most frequent response was 26 to 35 percent.
   - For the U.S., the range of sales that comes from high efficiency equipment varies from little (4.7 percent of respondents who report 5 percent or less of such sales) to very high (6.3 percent of respondents who report 86 to 95 percent or less of such sales).
   - High efficiency sales vary, somewhat, by region of the U.S., with the Northeast and Midwest revealing greater percentages of high efficiency equipment sales in the 66 percent and over categories.

---

49 The reader is cautioned that the West is under-represented in the sample.
Table 1
HVAC Lines Carried - Rank Ordered

<table>
<thead>
<tr>
<th></th>
<th>US** (n=70)</th>
<th>Northeast (n=8)</th>
<th>Midwest (n=12)</th>
<th>South (n=22)</th>
<th>West (n=4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>York/Coleman/Luxaire</td>
<td>25.7%</td>
<td>12.5%</td>
<td>41.7%</td>
<td>27.3%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Rheem/Ruud</td>
<td>20.0%</td>
<td>12.5%</td>
<td>8.3%</td>
<td>18.2%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Nordyne Brands</td>
<td>15.7%</td>
<td>12.5%</td>
<td>8.3%</td>
<td>22.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>ICP</td>
<td>14.3%</td>
<td>12.5%</td>
<td>8.3%</td>
<td>22.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Goodman/Amana</td>
<td>12.9%</td>
<td>12.5%</td>
<td>16.7%</td>
<td>13.6%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Carrier/Bryant/Payne</td>
<td>12.9%</td>
<td>12.5%</td>
<td>16.7%</td>
<td>18.2%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Trane/American Standard</td>
<td>12.9%</td>
<td>37.4%</td>
<td>8.3%</td>
<td>13.6%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Allied Air Enterprises</td>
<td>10.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.5%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Other</td>
<td>4.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.5%</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

*Percentage of respondents who indicated they carried the line.
*Percentages will not sum to 100 because respondent was allowed to check more than one category.
** Regions do not sum to US (70) because not all respondents indicated the state in which they are headquartered.

As is apparent in the table above, distribution of product line categories varies by region of the U.S. While York/Coleman/Luxaire, Rheem/Ruud and Nordyne Brands represent the top brand groups nationwide, others such as Trane/American Standard have a strong presence in the Northeast. In the South, Nordyne Brands and ICP have a stronger presence than in other regions of the country. It is difficult to comment on distribution patterns in the West since the sample there is under-represented.
Table 2
Sales of High Efficiency Equipment

<table>
<thead>
<tr>
<th>What percent of your residential HVAC sales were high efficiency equipment?*</th>
<th>US** (n=64)</th>
<th>Northeast (n=8)</th>
<th>Midwest (n=12)</th>
<th>South (n=22)</th>
<th>West (n=4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 percent or less</td>
<td>4.7%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>6 to 15 percent</td>
<td>6.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>9.1%</td>
<td>25.0%</td>
</tr>
<tr>
<td>16 to 25 percent</td>
<td>15.6%</td>
<td>8.3%</td>
<td>8.3%</td>
<td>22.7%</td>
<td>25.0%</td>
</tr>
<tr>
<td>26 to 35 percent</td>
<td>28.1%</td>
<td>33.3%</td>
<td>33.3%</td>
<td>27.3%</td>
<td>0.0%</td>
</tr>
<tr>
<td>36 to 45 percent</td>
<td>4.7%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>9.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td>46 to 55 percent</td>
<td>18.8%</td>
<td>16.7%</td>
<td>16.7%</td>
<td>22.7%</td>
<td>25.0%</td>
</tr>
<tr>
<td>56 to 65 percent</td>
<td>3.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td>66 to 75 percent</td>
<td>9.4%</td>
<td>16.7%</td>
<td>16.7%</td>
<td>4.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td>76 to 85 percent</td>
<td>3.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>4.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td>86 to 95 percent</td>
<td>6.3%</td>
<td>0.0%</td>
<td>25.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>96 percent or more</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

* Percent who responded to the category.
** Regions do not sum to US (64) because not all respondents indicated the state in which they are headquartered.

Perhaps most interesting in the table above are data that suggest that distributors from the Northeast and Midwest are more involved in high efficiency equipment. For example, the 66 to 75 percent and 86 to 95 percent categories in the table above are more populated by distributors from the Northeast and Midwest. Likewise, the 6 to 15 percent and 16 to 25 percent categories are more populated by distributors from the South and West. However, the reader is, again, cautioned that the sample for all regions is somewhat small and may not be projectable to all HARDI members.
Inventory and Sales Systems

1) Respondents actively utilize computerized software systems to track inventory and sales.

   ➢ Approximately 95 percent of respondents indicated that they use a software system to manage their inventory.

   ➢ The top systems used are:
      • Profit
      • Eclipse
      • FACTS
      • SHIMS
      • Infor
      • NxTrends

2) The use of software systems to manage inventory does not vary by region of the country. For the subset of the sample that indicated their location, virtually all utilize software systems to manage inventory.

3) Capabilities of inventory management systems vary somewhat by region of the country. For example, some regional differences are evident when:

   ➢ Accounting for rebates offered by utility companies.

   ➢ Accounting for where a particular piece of equipment was installed.

Table 3 below offers greater detail on respondents’ inventory management systems’ capabilities. It is notable that most systems (89.7 percent) allow managers to discount prices for certain equipment and to track which contractors are buying high efficiency equipment (86 percent). Fewer systems (22.8 percent) enable distributors to easily capture information on the home address where a particular piece of equipment was installed or to account for rebates offered by utility companies (39.7 percent). Not surprisingly, there are some regional differences in inventory system capabilities, as is the case for accounting for rebates offered by utility companies. Here, distributors in the South (40.9 percent) appear to have an edge in accounting for such rebates.
### Table 3
Inventory Management Systems

<table>
<thead>
<tr>
<th>Question</th>
<th>Percent ‘Yes’</th>
<th>US</th>
<th>Northeast</th>
<th>Midwest</th>
<th>South</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you use a software system to manage your inventory?</td>
<td></td>
<td>95.2%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Does your inventory/sales system enable you to discount prices for certain equipment easily?</td>
<td></td>
<td>89.7%</td>
<td>87.5%</td>
<td>100.0%</td>
<td>86.4%</td>
<td>75.0%</td>
</tr>
<tr>
<td>Can you use your inventory/sales system to account for rebates offered by utility companies?</td>
<td></td>
<td>39.7%</td>
<td>25.0%</td>
<td>33.3%</td>
<td>40.9%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Does your inventory/sales system enable you to easily track which contractors are buying high efficiency equipment?</td>
<td></td>
<td>86.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>72.7%</td>
<td>75.0%</td>
</tr>
<tr>
<td>Does your inventory/sales system enable you to easily capture information on the home address where a particular piece of equipment is installed?</td>
<td></td>
<td>22.8%</td>
<td>12.5%</td>
<td>25.0%</td>
<td>18.2%</td>
<td>75.0%</td>
</tr>
<tr>
<td>Do your contractor customers currently report the home addresses where they install high efficiency equipment?</td>
<td></td>
<td>25.0%</td>
<td>25.0%</td>
<td>8.3%</td>
<td>27.3%</td>
<td>50.0%</td>
</tr>
</tbody>
</table>
Training

1) Respondents are actively engaged in training programs for their contractor customers.
   - Approximately 92 percent of respondents offer training programs.
   - Regional differences appear to exist, with 100 percent of distributors offering training programs in the Northeast and less in other regions.

2) Training appears to be needed.
   - Approximately 58 percent of contractor customers first learn about energy efficiency incentive programs through training sessions.
   - Regional differences exist in contractor knowledge of incentive programs, with Northeast scoring lowest on pre-existing knowledge of energy efficiency incentive programs.

3) Training appears to be personalized.
   - Approximately 60 percent of distributors develop their own training curriculum for their contractor customers.
   - Approximately 56 percent of distributors offer training in person, with 44.2 percent offering training in person and over the web. No distributors offer training exclusively over the web.
   - Regional differences exist in training program delivery.

4) Fewer respondents offer training on quality installation in accordance with the ACCA standard.
   - Approximately 48 percent of distributors offer training on quality installation in accordance with the ACCA standard.
   - Approximately 24 percent of distributors received EE support for offering such training programs.
   - Regional differences exist in availability of quality installation training programs, with distributors in the Midwest citing the lowest offerings of such programs.

Table 4.1 below provides a more detailed look at training program characteristics. For the entire sample, the average number of training programs offered by a distributor is 21.4 per year. Variance exists across the country, with 32.1 in the Northeast and 14.2 in the Midwest. The average number of attendees for the full sample is 18.9, with less variance by region. Training for quality installation, as stated earlier, is less prevalent. For those distributors who offer such training, the average number of sessions is 13.9 with 17.4 contractor customers in attendance. Again, as Table 4 indicates, there is variance in these numbers by region of the country.
### Table 4.1
**Training Programs**

<table>
<thead>
<tr>
<th>Do you currently offer training for your contractor customers?</th>
<th>US</th>
<th>Northeast</th>
<th>Midwest</th>
<th>South</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>91.7%</td>
<td>100.0%</td>
<td>91.7%</td>
<td>95.5%</td>
<td>75.0%</td>
</tr>
<tr>
<td>No</td>
<td>8.3%</td>
<td>0.0%</td>
<td>8.3%</td>
<td>4.5%</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

Most of our contractor customers:
- come to us with a solid, pre-existing knowledge of energy efficiency incentive programs. 41.8% 25.0% 36.4% 47.6% 66.7%
- first learn about energy efficiency incentive programs from us. 58.2% 75.0% 63.6% 52.4% 33.3%

Over the past year, about how many training sessions did you offer to your contractor customers? 21.4 32.1 14.2 24.7 15.5

On average, about how many contractor customers attended a typical training session? 18.9 17.9 20.6 18.4 27.5

Do you primarily:
- develop your own training curriculum. 59.6% 100.0% 36.4% 66.7% 66.7%
- use one developed by others. 40.4% 0.0% 63.6% 33.3% 33.3%

Do you offer training?
- in person 55.8% 37.5% 54.5% 57.1% 66.7%
- over the web 0.0% 0.0% 0.0% 0.0% 0.0%
- both 44.2% 62.5% 45.5% 42.9% 33.3%

### Table 4.2
**Training Programs**

<table>
<thead>
<tr>
<th>Do you offer training on quality installation in accordance with the ACCA QI standard?</th>
<th>US</th>
<th>Northeast</th>
<th>Midwest</th>
<th>South</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>48.1%</td>
<td>50.0%</td>
<td>18.2%</td>
<td>57.1%</td>
<td>66.7%</td>
</tr>
<tr>
<td>No</td>
<td>51.9%</td>
<td>50.0%</td>
<td>81.8%</td>
<td>42.9%</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

Did you get any EE support for offering training on quality installation in accordance with the ACCA QI standard?
- Yes 23.8% 50.0% 50.0% 16.7% 0.0%
- No 76.2% 50.0% 50.0% 83.3% 100.0%

Over the past year, about how many training sessions on quality installation in accordance with the ACCA QI standard did you offer to your contractor customers? 13.9 20.7 5.00 16.0 1.5

On average, about how many contractor customers attended a typical training session? 17.4 17.3 20.0 18.1 12.5
Experience with Efficiency Programs

1) Efficiency programs are prevalent.
   - Approximately 77 percent of respondents report that there is an active efficiency program in their territory.
   - Variance exists by region, with the Midwest and South reporting less incidence of efficiency programs.

2) Rebates for residential HVAC equipment are prevalent.
   - In those cases where an active efficiency program exists, 100 percent offer rebates for residential HVAC equipment.
   - This percentage does not vary by region of the U.S.

3) Rebates for training on quality installation are not prevalent.
   - Approximately 13 percent of respondents report that their efficiency program offers rebates for training on quality installation.
   - The region of the U.S. where such rebates are most typical (37.5 percent) is the Northeast.
   - The region of the U.S. where such rebates are least typical (0 percent) is the South.

4) A sizeable portion of respondents have worked with the administrator(s) of their energy efficiency program.
   - Approximately 64 percent of respondents report that they have worked with their energy efficiency program. Their work included, but was not limited to:
     ▪ Coordinating promotions and training
     ▪ Developing programs
     ▪ Sponsoring programs for interested contractors
     ▪ Providing rebate education
     ▪ Providing information about efficiency thresholds and price premiums
   - The region of the U.S. where such involvement is most typical (75 percent) is the Midwest.

5) A sizeable portion of respondents are interested in playing a larger role in promoting high efficiency residential HVAC equipment.
   - Approximately 88 percent of respondents report that they are interested in having a larger role with such promotions.
   - The region of the U.S. where such interest is highest (100 percent) is the South.
   - The roles respondents are most interested in playing are:
     ▪ Be eligible for marketing co-op dollars to help promote programs
     ▪ Host training about EE programs
Tables 5.1 and 5.2, below, provide further information on efficiency programs. It is surprising, for example, how many distributors don’t know (15.4 percent) if there is an efficiency program in their territory. Table 5.1 reveals that there are regional differences in efficiency program knowledge levels, with distributors from the Northeast fully aware (0 percent ‘don’t know’) and the Midwest least aware (33.3 percent ‘don’t know’). Table 5.2 illustrates responses to the question, ‘What would you prefer energy efficiency programs focus their incentive dollars on?’ Seventy-four percent of respondents indicated a preference for rebates to homeowners, with the next strongest response (co-op marketing dollars given to distributors) a far second at 25.5 percent. Ten percent of respondents indicated other preferences including: financing programs for customers, a mix of all of the stated options, and stopping all rebates. While some regional preferences can be gleaned from the table, it appears that distributors in the Northeast are more favorably disposed to all of the suggested incentive options.

<table>
<thead>
<tr>
<th>Table 5.1</th>
<th>Experience with Efficiency Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Is there an active efficiency program in your territory?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>76.9%</td>
</tr>
<tr>
<td>No</td>
<td>7.7%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>15.4%</td>
</tr>
<tr>
<td>Do they offer rebates for residential HVAC equipment?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>100.0%</td>
</tr>
<tr>
<td>No</td>
<td>0.0%</td>
</tr>
<tr>
<td>Do they offer rebates for training on quality installation?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12.8%</td>
</tr>
<tr>
<td>No</td>
<td>87.2%</td>
</tr>
<tr>
<td>Have you worked with them in any way?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>64.1%</td>
</tr>
<tr>
<td>No</td>
<td>35.9%</td>
</tr>
</tbody>
</table>
Table 5.2
Experience with Efficiency Programs

<table>
<thead>
<tr>
<th>What would you prefer energy efficiency programs focus their incentive dollars on?*</th>
<th>US</th>
<th>Northeast</th>
<th>Midwest</th>
<th>South</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebates given to homeowners</td>
<td>74.0%</td>
<td>75.0%</td>
<td>75.0%</td>
<td>72.2%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Rebates given to installing contractors</td>
<td>20.4%</td>
<td>25.0%</td>
<td>9.1%</td>
<td>31.8%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Rebates given to wholesalers</td>
<td>12.2%</td>
<td>12.5%</td>
<td>9.1%</td>
<td>18.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Co-op marketing dollars given to contractors</td>
<td>12.2%</td>
<td>25.0%</td>
<td>9.1%</td>
<td>9.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Co-op marketing dollars given to distributors</td>
<td>24.5%</td>
<td>37.5%</td>
<td>0.0%</td>
<td>36.4%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other</td>
<td>10.0%</td>
<td>0.0%</td>
<td>18.2%</td>
<td>9.1%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Are you interested in having a larger role promoting high efficiency residential HVAC equipment?

| Yes | 88.0% | 87.5% | 91.7% | 100.0% | 50.0% |
| No  | 12.0% | 12.5% | 8.3%  | 0.0%   | 50.0% |

What role would you like to play?*

| Assist in the design of efficiency incentive programs | 56.8% | 71.4% | 54.5% | 59.1% | 0.0% |
| Be able to process rebates for contractors            | 27.9% | 14.3% | 30.0% | 31.8% | 0.0% |
| Host training about EE programs                       | 84.1% | 100.0%| 90.9% | 77.3% | 50.0% |
| Be eligible for marketing co-op dollars to help promote programs | 86.4% | 87.5% | 72.7% | 95.5% | 50.0% |
| Other                                                   | 9.3%  | 0.0%  | 9.1%  | 9.5%  | 0.0%  |

*Percentages will not sum to 100 because respondent was allowed to check more than one category.

SUMMARY

This study of residential HVAC efficiency reveals some interesting and meaningful results that could prove useful to managerial decision-making at HARDI. A profile of the diffusion (distribution) of HVAC equipment has been established along with a breakdown of the percent of sales that represent high efficiency equipment. Inventory systems capabilities among the distributor sample have been outlined, illustrating that while distributors have strong inventory management skills, there are areas that could be improved upon (e.g., accounting for rebates offered by utility companies). Training programs are prevalent among respondents to the survey. A profile of the nature, frequency and size of these programs is outlined in this research. Finally, the description of what distributors know about energy efficiency programs in their region, what their involvement is, and how they would like to be involved might serve as a basis for educational efforts sponsored by HARDI.

While the information presented in this study is useful, the market for energy efficient HVAC products is a dynamic one. Therefore, managers at HARDI should consider a follow-up study to explore changes in the results found here. If managers are considering new marketing strategies to encourage change (say an increase in distributor involvement) a follow-up study could help to assess the effectiveness of such strategies.
This survey seeks input from HARDI distributor members that carry unitary HVAC product lines. If you fit that description, thank you for agreeing to respond to the survey! (If not, feel free to cancel out of the survey now.) The survey should take no more than 10 minutes. Your input is very important, so please give us your honest answers to the questions. Please be assured that your responses will be held in the strictest confidence. Again, thank you for your help!

---

First we'd like to ask you some questions about the product lines that you carry.

Please indicate the RESIDENTIAL HVAC lines that you carry (check all that apply)

- York/Coleman/Luxaire
- Goodman/Amana
- ICP
- Rheem/Ruud
- Allied Air Enterprises
- Carrier/Bryant/Payne
- Trane/American Standard
- Nordyne Brands
- I don't carry any unitary product lines [Skip to End]
- Other, please specify
We’re also interested in the volume of energy efficient products that you sell.

When you answer the following question, please answer in terms of UNITS sold, not dollars.

In 2010, approximately what percent of your RESIDENTIAL HVAC equipment sales were high efficiency equipment (i.e., Energy Star or greater)?

- 5 percent or less
- 6 to 15 percent
- 16 to 25 percent
- 26 to 35 percent
- 36 to 45 percent
- 46 to 55 percent
- 56 to 65 percent
- 66 to 75 percent
- 76 to 85 percent
- 86 to 95 percent
- 96 percent or more

The next set of questions pertain to your inventory/sales systems. Please continue.

Do you use a software system to manage your inventory?

- Yes
- No [Skip to 8]
  - If you answered 'yes' what is the name of the system?

Does your inventory/sales system enable you to discount prices for certain equipment easily (e.g., to account for a manufacturer's discount)?

- Yes
- No
Page 6 - Question 5 - Yes or No

Can you use your inventory/sales system to account for rebates offered by utility companies?

○ Yes
○ No
○ If you answered 'no', what easy and straightforward upgrade(s) to your system would allow you to do so?

Page 7 - Question 6 - Yes or No

Does your inventory/sales system enable you to easily track which contractors are buying high efficiency equipment?

○ Yes
○ No

Page 7 - Question 7 - Yes or No

Does your inventory/sales system enable you to capture information on the home addresses where a particular piece of equipment is installed?

○ Yes
○ No
○ If you answered 'no', what easy and straightforward upgrade(s) to your system would allow you to do so?

Page 8 - Question 8 - Yes or No

Do your contractor customers currently report the home addresses where they install high efficiency equipment?

○ Yes
○ No
○ If not why not?

Page 9 - Heading

Now we'd like to ask you a few questions about if and how you train your contractor customers. Please continue.

Page 10 - Question 9 - Yes or No

Do you currently offer training for your contractor customers?

○ Yes
○ No [Skip to 16]
Page 11 - Question 10 - Choice - One Answer (Bullets)

Most of our contractor customers:

- come to us with a solid, pre-existing knowledge of energy efficiency incentive programs.
- first learn about energy efficiency incentive programs from us.

Page 12 - Question 11 - Open Ended - One Line

Please reflect upon the past year.

Over the past year, about how many training sessions did you offer to your contractor customers? (please enter a positive number)

Page 12 - Question 12 - Open Ended - One Line

Please reflect upon a typical training session.

On average, about how many contractor customers attended a typical training session? (please enter a positive number)

Page 13 - Question 13 - Choice - One Answer (Bullets)

Do you primarily:

- develop your own training curriculum
- use one developed by others

Page 13 - Question 14 - Choice - One Answer (Bullets)

Do you offer training:

- in person
- over the web
- both

Page 13 - Question 15 - Yes or No

Do you offer training on quality installation in accordance with the ACCA QI standard?

- Yes
- No [Skip to 16]
- If you answered 'no' please explain why not
Did you get any energy efficiency program support for offering training on quality installation in accordance with the ACCA QI standard?

- yes
- no

Please reflect upon the past year.

Over the past year, about how many training sessions on quality installation in accordance with the ACCA QI standard did you offer to your contractor customers? (please enter a positive number)

Please reflect upon a typical quality installation training session.

On average, about how many contractor customers attended a typical training session? (please enter a positive number)

What prompted you to offer training on quality installation?

Now we'd like to ask you a few questions about your experience with efficiency programs. By efficiency programs, we mean programs that offer rebates, marketing, training or other support for energy efficient HVAC systems. Energy efficiency programs can be offered by utilities, state energy offices, non-profit organizations, municipalities, or other entities. Please continue.

Is there an active efficiency program(s) in your territory?

- Yes
- No [Skip to 20]
- Don't Know [Skip to 20]
Page 18 - Question 21 - Open Ended - Comments Box

Who administers the program?

________________________________________________________________________________________________

________________________________________________________________________________________________

________________________________________________________________________________________________

Page 18 - Question 22 - Yes or No

Do they offer rebates for residential HVAC equipment?

- Yes
- No

Page 18 - Question 23 - Yes or No

Do they offer rebates for training on quality installation?

- Yes
- No

Page 18 - Question 24 - Yes or No

Have you worked with them in any way?

- Yes
- No [Skip to 20]

Page 19 - Question 25 - Open Ended - One or More Lines with Prompt

You’ve indicated that you have worked with the administrator of an efficiency program.

What specifically have you done?  
What has worked well?  
What have the problems been?

________________________________________________________________________________________________

________________________________________________________________________________________________

Page 20 - Question 26 - Open Ended - Comments Box

Knowing what you know about the market for high efficiency residential HVAC equipment, how could efficiency programs best increase sales at the lowest cost?

________________________________________________________________________________________________

________________________________________________________________________________________________

________________________________________________________________________________________________
What would you prefer energy efficiency programs focus their incentive dollars on?

- Rebates given to homeowners
- Rebates given to installing contractors
- Rebates given to wholesalers
- Co-op marketing dollars given to contractors
- Co-op marketing dollars given to distributors
- Other, please specify

Are you interested in having a larger role in promoting high efficiency residential HVAC equipment?

- Yes
- No [Skip to 23]
- If you answered 'no' can you please explain why?

You indicated that you are interested in having a larger role in promoting high efficiency residential HVAC equipment. What role would you like to play? (check all that apply)

- Assist in the design of efficiency incentive programs
- Be able to process rebates for contractors
- Host training about EE programs
- Be eligible for marketing co-op dollars to help promote programs
- Other, please specify

Finally, we'd like to ask you a few questions about you and your firm. These questions are for classification and cross-tabulation purposes only. None of the information will be associated with your company or you personally. As stated in our cover letter, those who respond to the survey will remain completely anonymous. Please continue.

Company location.

- In what city is your company headquartered?
- In what state is your company headquartered?
- Zip code for company headquarters?
Your experience.

How many years have you been in the industry?  
What is your title? (e.g., CEO, Vice-president of Operations, etc.)

Company age.

In what year was your company founded?

Market coverage.

How many branch locations do you have?  
How many states do you serve?

Approximately how many people does your company employ full time?

- less than 20
- 20 to 50
- 51 to 75
- 76 to 100
- 101 to 200
- more than 200

In dollars, what was your approximate sales volume in 2010?

- less than $15 million
- $15 to $30 million
- $31 to $50 million
- $51 to $100 million
- $101 to $200 million
- more than $200 million

The last set of questions are optional and should be completed only if you wish to waive anonymity. Please continue.
If you are willing, please provide the following information.

Name
Company
Address 1
Address 2
City/Town
State/Province
Zip/Postal Code
Country
Email Address

THAT COMPLETES THE SURVEY. Thank you for your time and input - it is much appreciated! Stay tuned to the HARDI newsletters for findings from this survey and more information about this research project. If you would like to talk more about energy efficiency programs for residential HVAC, please contact Rebecca Foster, Senior Consultant with VEIC, at 802-658-6060 x1382.
Appendix C: Questions Included in HARDI Conference Survey

1. Is there an active rebate program in your area for residential HVAC equipment, sponsored by a utility or other entity? (yes/no)
   a. If yes…
      i. Has the program changed your normal business practice at all, e.g., have you modified your sales, marketing, inventory strategy as a result? (yes/no)
         1. If yes…
            a. Please indicate which of these you have done: (select all that apply)
               i. I have changed my inventory practices.
               ii. I have changed the marketing I do to my contractor customers.
               iii. I have changed my sales strategy.
               iv. Other: ________________________________
      ii. Have you ever been asked to provide input or help the rebate program meet its goals? (yes/no)
         1. If yes…
            a. What types of input have you given? (select all that apply)
               i. Input about rebate levels
               ii. Input about who gets the rebate, e.g., customer or contractor
               iii. Input about efficiency levels
               iv. Input about paperwork
               v. Input about getting contractors to participate
               vi. Other: ________________________________
            b. Have changes been made to the program as a result? (yes/no)

2. How much does a rebate need to be to warrant your effort and change your behavior? (select one answer)
   a. 100% of the price difference between the standard unit and efficient unit
   b. 75% of the price difference between the standard unit and efficient unit
   c. 50% of the price difference between the standard unit and efficient unit
   d. 25% of the price difference between the standard unit and efficient unit
   e. Other: ________________________________

3. Over the past year, how many training events did you hold for your contractor customers? (enter a number)

4. On average, how many contractors attended each training event? (enter a number)

5. Do you incorporate information about utility and other rebate programs in your training events? (yes/no)
   a. If yes…
      i. Do you involve representatives from the rebate program in these events? (yes/no)
## Appendix D: Overview of Residential HVAC Efficiency Programs

<table>
<thead>
<tr>
<th>Program Overview</th>
<th>Residential Equipment Promotions</th>
<th>Market Initiatives</th>
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</thead>
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<tr>
<td><strong>Program Sponsor</strong></td>
<td><strong>State</strong></td>
<td><strong>Fuel Types Served</strong></td>
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<tr>
<td>APS</td>
<td>AZ</td>
<td>Electric</td>
</tr>
<tr>
<td>Southern California Edison</td>
<td>CA</td>
<td>Electric</td>
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<td>San Diego Gas and Electric</td>
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<td>Sacramento Municipal Utility District</td>
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<tr>
<td>Southern California Gas</td>
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<td>Gas</td>
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<tr>
<td>Pacific Gas &amp; Electric</td>
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<td>Florida Power &amp; Light</td>
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<td>Electric</td>
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<td>Progress</td>
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<td>Electric</td>
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<tr>
<td>Commonwealth Edison</td>
<td>IL</td>
<td>Electric</td>
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<td>MA</td>
<td>Electric, Gas, Oil, Propane</td>
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<td>MI</td>
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</tr>
<tr>
<td>NJ Clean Energy Program</td>
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<td>Long Island Power Authority</td>
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<td>Energy Trust of Oregon</td>
<td>OR</td>
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<td>Seattle City &amp; Light</td>
<td>WA</td>
<td>Electric</td>
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<tr>
<td>Puget Sound Energy</td>
<td>WA</td>
<td>Electric, Gas</td>
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</table>
A subsidiary of the HARDI Foundation, the Center for Energy Efficiency Optimization is dedicated to researching wholesale distribution’s contribution, impact, and opportunities to advance the adoption of energy-saving technologies and practices in residential, commercial, institutional, and industrial applications, including renewable energy technologies. It is CEEO’s mission to serve as a central hub and vehicle for all trades to explore, quantify and grow the role of wholesale distribution in driving energy efficiency in their respective industry.

Founded in 2003, the HARDI Foundation exists to launch and support educational and research programs within the HVACR industry designed to reinforce and strengthen the role, value, and effectiveness of wholesale distribution and define opportunities for future industry growth.

The Vermont Energy Investment Corporation is a mission-driven nonprofit organization, founded in 1986, dedicated to reducing the economic, social, and environmental costs of energy consumption through cost-effective energy efficiency and renewable energy technologies. VEIC has consulted in 28 states, 6 Canadian Provinces and 7 countries outside North America to design programs that reduce energy use through energy efficiency and renewable energy. In addition, VEIC operates Efficiency Vermont – the nation's first statewide energy efficiency utility – as well as other implementation services across the country.