

# CALIFORNIA COMMUNITY COLLEGES

ATTRACTING STUDENTS TO THE SKILLED HVACR TRADES

## BARRIERS AND OPPORTUNITIES: FINAL REPORT

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# EXECUTIVE SUMMARY

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## ■ Background

The skilled HVACR technician trade is an excellent career: jobs are numerous, the work is uniquely well-suited to a large fraction of the populace, jobs are relatively stable, it pays well upon entry, and the path to advancement is clearly laid out and encouraged. In addition, these skilled workers are key to efforts to achieve environmental goals through improving the performance of HVACR systems. Unfortunately, there is a growing shortage of such workers. The skilled trades are currently seen as “dirty,” low-status, physically difficult, boring, low-paying, and unskilled. While some acknowledge that HVACR technicians are critical to addressing important issues facing our society, they are generally not highly valued, and new workers are not attracted to the career. An extensive outreach and communication campaign to attract workers could address these issues, but it is not likely to be effective without an insightful understanding of some of the current gaps in HVACR programs.

## ■ Objectives

The goal of this project was to gather information from a cross section of stakeholders concerned about issues facing the HVACR technician trade, with the hope that the findings would support the efforts of California Community Colleges (CCCs) and partner institutions in attracting, retaining, and successfully graduating students in HVACR programs.

## ■ Methods

The project used a “bootstrap” method of qualitative research design to identify broad issues and then drill down to gather more specific information. Researchers conducted 39 phone and in-person interviews, with a range of different stakeholder groups, to identify the primary issues that could then guide a set of more extensive focus groups. The goal of these interviews was to identify the benefits of the career and the existing barriers and obstacles that limit or otherwise obstruct attracting students to HVACR programs, as well as strategies and tactics that might be used in attracting students into these programs.

Researchers then convened two focus groups, with a total of 29 participants, representing a broad range of workforce training stakeholders. These focus groups leveraged the learnings from the interviews and identified specific messages and methods for attracting students into HVACR training programs. One of the key focal areas for these sessions was the review and evaluation of relevant video clips, because of their identified significance during interviews in terms of messaging and communication strategies.

## ■ Findings

### Appeal of the Career

In analyzing interview and focus group data, researchers found that the HVACR skilled trades can be an excellent choice, particularly for workers who are not as well suited to more traditional desk jobs or lengthy educational programs. Specific benefits highlighted, include:

- The career is financially rewarding with clear opportunities for advancement.
- Preparing for the career does not require a four-year degree or associated debt, and one can even be paid while in training.
- Depending on one's interests and aptitudes, training can prepare workers for a variety of careers, providing the freedom and independence to control their own career paths.
- Even entry-level workers can feel a sense of accomplishment for helping to keep people safe and comfortable and solving their problems, and for helping to combat climate change.
- The career provides an opportunity to work both independently and as part of a team, and excel at work that is physically stimulating, tactile, and outside (rather than in an office).
- The work varies from day to day, and allows for creativity in overcoming challenges, solving problems, and fixing or creating things and then seeing them work.
- Changes in technologies offer opportunities for workers to keep their skills up-to-date and stay on the cutting edge.
- Current worker shortages, absence of the threat of outsourcing, and society's sustainability goals, all ensure that trained HVACR technicians will be in demand over the long-term.

### Barriers to the Career

Despite numerous advantages, stakeholders in the interviews and focus groups identified current and impending shortages in the number of available and well-trained HVACR workers as a significant challenge. Seasoned workers are retiring while new candidates are scarce, in part because the career does not seem attractive to career seekers. Stakeholders identified the following key barriers:

- Lack of public knowledge about the benefits of (or even the existence of) HVACR careers;
- Lack of early exposure to the field;
- The cultural stigma against blue collar work;
- Lack of guidance and information provided about HVACR programs; and
- The general view that HVACR jobs, like other "hard labor" jobs, are seen as monotonous, boring, and unfulfilling.

### Overcoming the Gaps

Overcoming these barriers will require finding new and fresh approaches to communicating the appeal of HVACR careers. Interviewees and focus group participants identified shortcomings of current outreach and engagement strategies, and the attributes of approaches likely to be more successful. Specific findings include that:

- New technologies and media for communication can provide new outreach modes.
- Blanket campaigns to raise awareness must be supplemented by more targeted campaigns that reflect the different communication styles and messages that are needed to effectively reach different types of stakeholders.
- The audience must be able to relate to the information that is being conveyed.
- Many high school students may not be able to relate to older "ambassadors" regardless of how compelling the message is or how well established, knowledgeable, or dynamic the speaker is.
- High school students will most likely relate better to younger technicians who are successfully making their way in the trade, and who can be more appropriate role-models.

- The message must engage the student on more than a practical level.
- The emotional bond created by the sharing of stories can be an effective means of communication.

## ■ Recommendations

The interviews and focus groups helped to identify some of the advantages to a career as an HVACR technician, the barriers to recognizing those advantages (or to even be aware of the trade), and messages and media for communicating to potential workers. Recognition of these factors is only the first step towards finding and implementing solutions to address the serious shortfalls in developing a skilled, trained, and available HVACR labor pool. To take this a step further, the authors made a number of short- and long-term recommendations. The most compelling of these recommendations are to:

1. Promote among a broad array of stakeholders, and in particular high school and career counselors, awareness and understanding of the unique appeal of the skilled trades and to the needs of some students to have exposure to this career option by providing short- and long-term opportunities and resources for professional development.
2. Create compelling promotional programs to convey to students the attractiveness of HVACR careers and actively disseminate these programs to the right audiences. In particular, create videos featuring young technicians telling their stories of why they love their work. These technicians should be role models (not just the “usual suspects”) who communicate on a personal level the tangible and intangible benefits of the career. This might also include finding novel ways to reach out to potential students where they are (since some of the best candidates are not likely to be at the high school job fair).
3. Create an organization that brings the entire range of stakeholders together to develop roadmaps that lay out the necessary actions, the ideal contributors, and a sense of timing and outcomes. In the short-term, this organization might engage in activities such as creating and delivering a “traveling road-show” to reach out to students; a speaker’s bureau; or a clearinghouse to facilitate internships, job shadowing, and summer employment opportunities. Institutionalize this organization to create a sustained effort and broaden the scope.
4. Develop a short-term research plan to fill critical gaps in understanding of the issues and find actionable solutions, and work with policymakers to elevate the priority of related research, as well as training and education, to apply identified solutions at scale.

Every stakeholder in the HVACR industry—students, parents, counselors, faculty, administrators, new and seasoned technicians, employers, and industry leaders—can work together to meet environmental goals, while simultaneously creating jobs and successful careers. The need for these skilled workers is great, and the California Community Colleges are well positioned to play a pivotal role in promoting and producing a skilled HVACR workforce.



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# Table of Contents

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I.	<a href="#">Introduction</a> .....	10
	<a href="#">Acknowledgments</a> .....	10
	<a href="#">Background</a> .....	10
	<a href="#">Approach</a> .....	11
	<a href="#">Contents of this Report</a> .....	11
II.	<a href="#">Interviews</a> .....	14
	<a href="#">Interview Methodology</a> .....	14
	<a href="#">Interview Findings</a> .....	14
III.	<a href="#">Focus Groups</a> .....	24
	<a href="#">Focus Group Methodology</a> .....	24
	<a href="#">Focus Group Findings</a> .....	25
IV.	<a href="#">Analysis</a> .....	32
V.	<a href="#">Conclusions</a> .....	36
	<a href="#">Findings</a> .....	36
VI.	<a href="#">Recommendations</a> .....	40
	<a href="#">Recommendations to Promote Short-Term Actions</a> .....	40
	<a href="#">Recommendations to Promote Longer-Term Actions</a> .....	43
VII.	<a href="#">Appendix</a> .....	48
	<a href="#">Interviews</a> .....	48
	<a href="#">Focus Groups</a> .....	49





# Introduction

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## ■ Acknowledgments

The authors would like to thank all the many interview and focus group participants: without this input from the “boots on the ground,” we could never have gotten such a clear picture of the issues faced by this population. In particular, we would like to thank Darrow Soares of Mt. San Antonio College, who was instrumental in helping to recruit participants. We would also like to acknowledge the assistance and support of Jim Caldwell, without whose leadership, this study would not have happened. And, as always, we could not have done it without EEC Executive Director Benjamin Finkelor’s mentorship and guidance..

## ■ Background

In the spring of 2015, Doing What Matters and the University of California at Davis (UC Davis), with assistance from the Research and Planning Group for California Community Colleges (RP Group), undertook a research project to propose methods to attract more students to California Community Colleges’ Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) certificate programs. The impetus for the HVACR project came from the recognition that the trades in general, but the HVACR industry in particular, face serious shortfalls in developing a skilled, trained, and available labor pool over the next 20-30 years. According to the Air-Conditioning, Heating, and Refrigeration Institute (AHRI), an estimated additional 57,000 skilled workers are needed each year to work in the HVACR industry. Several reasons have been identified for the labor shortage in the HVACR industry, including:

- Young people have been overly conditioned to think of the trades as a “lesser calling” compared to the more popular career paths, such as computer programming, application design, investment banking, etc.;
- Significant numbers of technicians are reaching retirement age;
- There is not only a shortage in technicians, but particularly in well-trained technicians.
- The increase of environmentally friendly and energy-efficient heating and air conditioning systems; and
- The development of more technologically complex systems.

In California, as is the case elsewhere in the country, community colleges are well positioned to play a major role in training qualified workers for the numerous careers within the HVACR industry and to help address the identified labor shortage. However, one of the challenges mentioned above, is getting young people (mostly graduating high school students) to consider careers in the HVACR field. This will most likely be the greatest barrier to overcome as it involves creating a culture shift in terms of the value placed on jobs in career and technical education programs that include HVACR.

The goal of this project was to gather information from a cross section of stakeholders concerned about the issues presented above, with the hope that the findings would support the efforts of California Community Colleges (CCCs) and partner institutions to best address the issues of attracting, retaining, and successfully graduating students in the HVACR programs. To this end, the project used a qualitative research design that included one-on-one interviews and focus groups.

## ■ Approach

The research team used a two-phased approach to investigate how these challenges might best be addressed. What follows is a description of each of these phases.

### Phase I: One-On-One Interviews

Researchers conducted thirty-nine phone and in-person interviews with a range of different stakeholder groups. The goal of these interviews was to: identify the range of opinions about current HVACR training at CCCs; the existing barriers and obstacles that limit or otherwise obstruct attracting students to HVACR programs; and identify what strategies and tactics might best be used in attracting new, continuing, and re-entry students into these programs. Videos emerged as a consistent theme for promising communication media.

### Phase II: Focus Groups

The responses from the interviews helped us identify issues to be addressed, methods for assessing those issues, and questions designed to obtain answers. These questions were posed in a set of focus groups (Phase II). The purpose of these questions was to help flesh out the concerns and/or validate the ideas and opportunities that were identified by many of the interviewees.

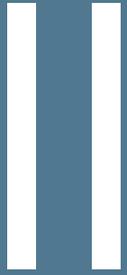
The principal aim of these focus groups was to leverage the learnings from Phase I and use them to identify specific messages and methods for attracting students into Career and Technical Education (CTE) programs, and particularly HVACR programs. Videos were a focus for these sessions because of their significance in the interviews.

Researchers conducted two focus groups, with a total of 29 participants. Each focus group included a broad range of workforce training stakeholders. We describe the methods used to develop and carry out the focus groups later in this report, as well as the findings and general themes.

## ■ Contents of this Report

In this report, we provide a compilation of the information gleaned and lessons learned from the one-on-one interviews and focus groups. Section II provides details about the one-on-one interviews and the major takeaways from these conversations. Section III describes the focus groups in detail and presents the insights and advice provided by focus group participants. Section IV and V outline our analyses and findings. Finally, Section IV sets out our recommendations.





# Interviews

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# Interviews

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## ■ Interview Methodology

Researchers conducted one-on-one interviews with stakeholders from community colleges, high schools, and industry within CTE programs, and in particular the HVACR field. The interviews were designed to cover a wide variety of topic areas, including:

- Aspects about the HVACR industry that make it a great career choice;
- Barriers to attracting students into HVACR programs;
- Approaches to outreach, communication strategies, and effective messaging for reaching diverse student populations, parents, and high school counselors;
- Practices for reaching and attracting a more diverse student base (re-entry, former military personnel, high school drop-outs, women, etc.); and
- Identification of student success factors and strategies to increase student success in HVACR programs.

In the Appendix, we present the interview participants, logistics for the data collection, and the interview guide. What follows are detailed findings from these interviews organized by themes that emerged across the interviews.

## ■ Interview Findings

### Barriers

#### *Skills and Characteristics of Promising HVACR Workers*

As mentioned earlier, there is a recognized need for more workers to enter the HVACR industry. However, most of those interviewed indicated that there is a significantly expanded skill set required of today's HVACR technicians. Interviewees described the skills they felt were essential and those that would be useful for workers going into the HVACR field to possess and have developed in their HVACR program. These include a combination of soft and technical skills.

#### Essential Skills

- Soft skills (ability to work together, be on time, personable, communication skills – written, verbal, and via technology)
- The ability to learn by doing
- Good with hands
- Problem-identification and solving skills

#### Useful Skills

- Math skills
- Common sense physics and spatial awareness

- Diagnostic, critical-thinking, or problem-solving skills
- Computer skills (most young people already have this)
- Not afraid of or put off by physical labor
- Tenacity
- Focused on completing a job and providing a solution to the customer

### *Lack of Public Knowledge About HVACR Careers*

Despite the fact that many highly notable people even in technology like Bill Gates, Steve Jobs, and Mark Zuckerberg never finished college, there is often a stigma in our society associated with the failure to attend college. This has resulted in pressure from parents, teachers, high school counselors, and students themselves to focus on four-year degree programs when considering career options. Seventy-nine percent of the people interviewed were in agreement on the focus on four-year degree programs and added that this focus has come at the exclusion of CTE programs being presented to students as additional viable career options. Half of those interviewed agreed that high school counselors, for the most part, are unfamiliar with CTE programs offered at community colleges; therefore, they do not typically present trades as an option. Furthermore, fifty-eight percent of respondents said high school students do not know about HVACR because they have not had exposure to HVACR careers.

Another factor exacerbating the lack of public knowledge about the trades and further limiting students' exposure has been the elimination of the vast majority of trades-oriented "shop" classes and high school CTE programs over the last 40 years. Seven out of 24 respondents also added that the elimination of shop classes in high schools limits students' opportunities to find out whether or not they like working with their hands. In the words of an interviewee:

"In 1970, we had 6000 shops in high school and MS classes in California. In 1997, we had 600 and in 2009 only 350 shop classes were left. When you look at that decline in opportunities for a demographic of students [that has] an influence on what young people are aware of [and] what are careers out there. You can do a career fair [and other things], but it really doesn't give young people opportunities to understand what that field looks like."

The majority of interviewees mentioned that they did not learn about the HVACR industry from their high school counselors/teachers or from other more mainstream venues; rather, they learned about the field from someone in their social network – particularly from family members who are or were actively involved in the trades.

### *Lack of Early Exposure to the Field*

There is a need for more internships and summer job placement opportunities where students can get real work experience, similar to union apprenticeships. This would produce more highly skilled workers and help quickly identify students who are not well-suited for this type of work. Community colleges should consider offering some classes at night so people can take advantage of these types of work experiences, which are typically offered during the day, as well as ensuring synergy between class content and job experience. In the words of an interviewee:

"The HVACR programs I see are not producing the kinds of technicians that employers want. I see a small minority of the students that come out with lots and lots of really high level theory... I think most people who go into the trade are repelled by that and had enough of it in high school... Guys and women who are wanting to go to community college to do learn this trade really want more hands on experience, more diagnostic problems, learn how to weld and bend metal, how to run wire, how piping works. They want to work with big machines, cranes, that's all exciting stuff, that's what they want to do. I think employers value

experience over education in this field. If I was at community college I would make a strong representation around internships, summer job placements, things where people could get to work and really experience what it's like and perhaps maybe even be a kind of thing like the union apprenticeships where they work during the day and go to classes at night. I think that would produce a better outcome and get rid of some of the people that don't really belong there. I've hired lots of kids out of these schools and a lot of them don't really know anything. If you had a program with internships and you go there for the first year and got a summer job placement with the idea that you come back in the fall and in the fall I might do something where they actually maintain the job two days a week and go to school three, that focuses you, makes it so you have a reason you want to learn, see how it's applied, solving real problems... then go into a lab and learn how to weld something, go back to job with new skill. That would be my approach. I think semester after semester of classroom work is not right.”

### *Blue Collar Stigma*

According to interview participants, one of the biggest barriers in attracting students to the HVACR trades is a significant stigma throughout our society associated with blue collar labor. A university education is considered the goal for most students. Many in our society consider a four-year college degree to be the “ticket to the American Dream,” and parents who were not educated themselves often dream of being able to give their children the best start to their adult lives as possible by sending them to college. If students’ aptitudes, interests, and temperaments are not well suited to a four-year degree, however, we are setting them up for failure, and doing them a tragic disservice.

Jeremy Anderberg shares some historical insights into the spread of the “blue collar stigma” in his article *Reviving Blue Collar Work: 4 Myths About the Skilled Trades* (November 2014).

After WWII, more and more folks began enrolling in four-year colleges, spurred on in large part by vets getting their tuition taken care of by the US government through the GI Bill. Virtually unlimited free education? Who wouldn't take that deal? If you could make a living with your mind and not have to physically work hard, all the better. In addition, the economy was shifting from manufacturing and agriculture to a more intellectual and service-oriented market. Today, over three-quarters of Americans work in some kind of white collar position. As the four-year education trend gained steam, teachers and administrators began to play more of an advisory role towards students, helping them decide where to go, which colleges they could get into, etc. These counselors guided their best and brightest students towards prestigious four-year institutions, while shuttling poorer performing students towards tech or vocational schools. Learning a trade became thought of as the career track for those students that couldn't hack it in college, and nobody wanted to think of themselves as second-rate.

What also emerged from the interviews were the “unintended” consequences of the stereotyping of the trades, which include a general lack of public knowledge about the HVACR field, potential students not getting exposed to the trades, and the disappearance of the vast majority of CTE programs in the high schools.

### *Lack of Guidance and Information About Programs*

Across the board, we found that most high school and community college counselors had limited knowledge about HVACR programs. One effect of this limited awareness was that students who were not familiar with HVACR typically happened onto their HVACR program. Unless students know about HVACR programs and ask for information associated with them, there are few channels available to discover these programs.

In California Community Colleges, counselor ratios range from 800 to 1, to more than 1,800 to 1. Therefore, community colleges do not have the capacity to adequately serve all students. Like high school counselors, community college counselors typically focus their efforts on students planning to transfer to a four-year institution. This institutional focus on transfers, combined with the pressure to maximize their use of limited resources, can, and often does, mean that counselors have limited familiarity with CTE programs that are offered on their own campuses.

For both high school and adult students, the draw to a program is really based upon their personal awareness of the field as a viable and achievable goal, or upon the ability of their guidance counselor to identify their aptitudes and the counselor's knowledge of appropriate careers.

### *Completion*

Faculty interviewed indicated that the HVACR program dropout rate was higher than for most CTE programs. Many indicated that students frequently dropped out of HVACR programs because they were not really prepared for a rigorous, complex, and service-focused program. Interestingly enough, faculty mentioned that their older students were less likely to drop out.

“A majority of HVACR students at our college are 35 to 40 years old. These students do not dropout of the program. Many of our students are looking for a job to pay the bills so that they can go onto a four-year college engineering program.”

### *The Appeal*

HVACR careers are appealing for a range of reasons, some of which are obvious, such as meeting different people, working on different equipment, and earning good wages; whereas others are less obvious, such as leadership opportunities, little repetition in the work, the capacity to have direct access to customers and make them comfortable, and to have an impact on energy efficiency and the environment. Gaining a clear understanding of the appeal of this profession is critical to finding effective ways to promote it. What follows are appealing qualities associated with the HVACR field that emerged from the one-on-one interviews.

### *Emotionally Satisfying Work*

Contrary to the perception that construction jobs and other “hard labor” jobs are monotonous, boring, and unfulfilling, the HVACR trades offer many different opportunities for doing fulfilling work. Two-thirds of respondents pointed to “helping people” and “solving their problems” as a source of satisfaction with the job, and five of those respondents specifically discussed “keeping people safe and/or comfortable.” Half of those interviewed also discussed a sense of accomplishment from fixing or creating something and seeing the results of their hard work. Three out of 24 interviewees said it was “satisfying knowing they were helping to combat climate change.” The sense of accomplishment possible in this field surpasses most entry-level professions. In the words of one interviewee:

“Walking into a large high-rise building where you’ve got 1000 people in that building complaining constantly that they’re uncomfortable, either too hot, too cold, air is stuffy, [and] being able to walk into that building, analyze [the] entire building, figure out what needs to [be] corrected, and actually correcting [the problem] in the building, and being able to listen to people say ‘this is the best it’s ever been.’”

Another person added:

“I think being able to physically see something be created or is left after you’re done, if you’re replacing a whole heating or AC system, this is something someone will rely on 10-15 years, your work will be represented for 10-15 years, satisfaction in knowing did a good job and it

will take care of people for 10-15 years and keep them comfortable. See final product of your work, get to actually have something tangible when you're done, more valuable in today's culture where things are digital and non-tangible."

A third person shared:

"When a service company gets calls during a heat wave, they will prioritize elderly and infants because it's a health hazard. You're not only making someone more comfortable and taking care of customer and making them happy, protecting peoples' lives with being able to provide cooling when it's extremely hot."

### *Financially Rewarding Work*

Four-fifths of those interviewed pointed out that workers in the HVACR trade can make a very good living, even without a four-year degree or a union job. The relatively high starting salary can provide for a modest family living wage, and there are excellent opportunities for advancement, particularly for a new employee with good skills and a good attitude. Another financial advantage is that HVACR students will emerge from their studies with significantly less student debt than students who attend a four-year university. In the words of a current community college student and non-union apprentice:

"It's a living wage. Beforehand was working two part time jobs and going to school, now making more, current wage is \$16 as an apprentice. I'm 21, just going to school and working full time. Each progression in my classes, once I pass and show I succeeded with quality grade, can increase wage and get a raise."

A community college faculty member added:

"The entry level pay for an HVACR technician is one of the highest amongst CTE programs and competes well against students who have completed their baccalaureate degree. Additionally, given that those students who are highly motivated have a variety of options that will increase their income. Some go on to a four-year institution to get their engineering degree, others go on to get an MS or PhD. Others start their own business while others can become the chief engineer of an industrial company, or like me become a CC faculty in an HVACR program. All of these options lead to significantly higher earning potential."

A different interviewee mentioned:

"It's such a lucrative industry... Much larger opportunity for self-employment and business development where work for self or run own company in HVACR industry. So many people started off not knowing anything about HVACR, learned everything they needed on the job, took relationships with them and started own separate company."

### *Multiple Career Paths in the HVACR Industry*

Two-thirds of interviewees asserted that this industry offers stable employment and that there are plentiful opportunities for growth and advancement within the field. A little over one third of those interviewed (37.5%) also discussed how the flexibility and diversity of related career paths can ensure that a person is a good match for the job. One person interviewed shared:

"Starting off in the HVACR industry can lead to many different job opportunities... it's the beginning of something greater, you learn electrical, plumbing, mechanical, you can take that in any which direction you can, it's not just one thing; it's like a key that opens many different doors."

Another person added:

“Because demand is really, really good, I’ve been able to move and work wherever I’ve wanted to... I’ve been to 44 of 50 states as a result of my work; a lot of people I know have been international. That’s the sexy side of our industry but nobody would ever think of that.”

A different participant mentioned:

“Two major things I tell them, a couple of our managers, high school education only, have earned actual patents from the US government because of ideas for better processes, now one of our headlining products. No college education, able to do that because they had a great sense of imagination. The other thing I always talk about is the fact that [our company president] started here as a loader in our warehouse and he moved up, now he’s the president of our company. So I always proudly talk about, if he can, you can.”

A fourth interviewee shared:

“After 3-4 years working in the trade, you can go to the state license board and look at becoming own independent contractor... Can be a great opportunity for a small business that people need.”

### *Matching the Person to the Work*

Fifty-eight percent of those interviewed agreed that an HVACR career is not for everyone. However, the nature of the work done by HVACR technicians is very well-suited to a particular subset of graduating high school students and re-entry workers who prefer not to work in a structured and fixed location, such as an office environment, and who prefer not doing the same thing over and over every day. Half of the respondents said the work is physically stimulating and is perfect for individuals who like to work with their hands. For example, for many people putting things together and making them work can be a very satisfying way to spend a workday. Other people like to work outside, both independently and as part of a team. Seventy-nine percent of those interviewed also mentioned that the HVACR field is for people that like intellectual stimulation, as it often involves creative problem-solving. One interviewee shared:

“There’s a lot math, engineering that’s involved with it [HVACR], having a creative mind, finding a better way for a process to work. This is one of those things where it’s not just heavy labor. A lot of kids today don’t like to hear the words heavy labor, but when I talk to them, it’s not just a physical thing, it’s a creativity thing, you need to use your mind and how you want something to look, how you lay out a particular project, how you run a new AC system in a new home or even more challenging in an old home where you have to replace the entire thing, how do you make that better? You’re challenged to do that and you’re condoned to do that because if it means a most cost effective and efficient approach, managers will always welcome that.”

A second person commented:

“Every day a new adventure, get to travel different places, meet different people, up on rooftops working on different units... I like it, it’s not just a mental game, it’s a puzzle you’re putting together and a lot of hands on and it’s fun to get into once you get rolling.”

Another insightful comment was:

“If I were able to go into a high school and select a team of people that I would send into a skilled trade track of HVAC service track, I’d look for problem-solving, puzzles, are you attracted to that kind of thing. How comfortable are you sitting at that desk, being under close supervision, if you bristle at that you’re my kind of person, like using tools, taking things apart, if you’re kind of serious about doing something with your life, not lazy or apathetic but more driven. If you’re a highly intelligent underachiever, restless but haven’t found your way

yet. If you're the kind of person who set their sights on a middle class income, not satisfied with a retail or construction job."

## Communicating The Appeal

As mentioned in the introduction of this report, a significant barrier to getting students to consider the HVACR industry is the lack of information about the different types of work, jobs, and careers in this field. When considering entering the HVACR trade, it is crucial to become exposed to what the career is like. Researchers asked interviewees to share their thoughts on how potential HVACR students could be reached.

### *Outreach Strategies*

Interviewees suggested the following approaches to expose students to the HVACR field:

- Show and tell in schools (in classes, assemblies, and career days),
- Field trips to facilities,
- Job fairs,
- Professional development focused on HVACR for high school and CCC counselors, and
- Parent familiarization with HVACR careers.

Interviewees mentioned "live demonstrations" that connect science to real life as the most effective strategy. One interviewee shared:

"Create a curiosity with them, sweat a fitting on a copper pipe, talk to them about how solder sucked up inside. You bring science to life in the work that you're doing so when you can show students this is what you learn in science but here's how we do it every day, then it becomes real for them and then they get fascinated by it. Any time you can, create a demonstration that ties academic principle to a real life thing."

A different person commented:

"Best way to evangelize is every contractor gets in front of some class, somewhere, to talk about what they do... If you call the high school and talk to chemistry department and tell them you want to have a discussion and day-to-day applications of thermodynamics, heating and cooling, I've done that at my kids' high schools, and chemistry department likes it because it's real world application... In high school if you go and express interest and volunteer early in the cycle they'll be happy to stick you in later in the year."

Another person added:

"Job fairs, career days, we can talk about energy efficiency, motors, systems, variable frequency drives, cold air generators, see machinery in motion. So many are tactile learners anyway so to see that would be huge. I brought a bottle of compressed air to show and tell for my kid in elementary school. Explained pressure, in tires etc., had hose, pointed in air, let air out, hear it, and do until frost pattern, let them come up and touch it. I explain that's what we do with mechanical equipment, make that frost. Teacher said that had a big impact, best show and tell, kids talked about it later."

A fourth interviewee spoke about the importance of early exposure. They also shared a barrier faced by K-12 schools when it comes to field trips:

"Field trips to different places, community college programs that have HVACR programs. The biggest limitation that prevents schools from being able to do that is funding for buses and substitutes. Without providing the \$400 for [a] bus and \$200 for [a] substitute [schools cannot provide field trip opportunities]. In late 90s early 2000s, Groundhog Day job shadowing

really made a big difference in people's lives. It's very important, expose young people to opportunities. It can easily be done at a high school or community college level, if plant managers and facilities people would simply take them on the roof, be able to show [students] how [the] system is working and what it does. That becomes an eye-opening factor."

### *Know Your Audience*

The emotional connection that the sharing of stories can create is an effective means of communication. As we mentioned earlier in this report, one of the goals of this project is to better understand how to reach different students and other populations that can impact whether or not students consider and see HVACR as a viable career option. The way the messaging is delivered is key; it needs to be personal and the audience must be able to relate to what is being conveyed. "Ambassadors" must connect to the audience. For example, high school students will most likely relate to younger technicians who are successfully making their way in the trade as opposed to older, more well-established and knowledgeable technicians, simply because high school students may not be able to relate to the older presenter no matter how compellingly they speak. On the other hand, teachers and parents will most likely connect to well-qualified and prepared professionals. One interviewee shared:

"Start younger. People trust people that are like them. If I was at a community college and I was trying to attract kids, I would mentor at all the different levels of the chain of responsibility. Kids, teachers, parents. With high school kids I would have a 20-something HVACR tech with 5 years [of ] experience give presentations and I would talk about lifestyle, show pictures of their cars and girlfriends and the stuff that shows I'm doing well, I've got money and a job, I have toys... They'd want somebody that looks successful to them but is close to their age. And then for teachers I would have engineers to do that and talk about the complexities and make it clear to the teachers that this is a real career, real concepts behind this, not just labor. And then with parents, have contractors talk about advancement potential, how they went from being an unsettled kid to being a successful businessman. Most contractors started out as techs, that's how it works in this industry. Have contractors give parents the vision of a successful life they can have."

### Another participant noted:

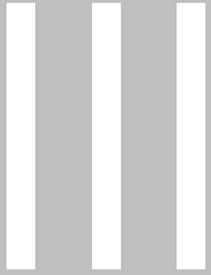
"Thinking about the younger generation, a lot of it, and I was very rebellious, maybe it'd be more insightful for a younger person to say I'm about your age and I'm making good money, going to progress... If it's coming from an older person, they're nagging me, it'll take years to get there. The bigger picture is starting, getting to that point."

### Another insightful comment was:

"People don't like to hear this but I've talked to techs about this and most agree, most AC techs don't aspire to be AC techs, they fail into the job. They know somebody in the industry, need a job, find [them]selves in the job, a proportion succeed at it and stay. They don't feel a sense of failure, they feel a sense of vindication, but they don't aspire to it, [they] did it as a second choice by and large. But then they succeed, make a good living and have a good life, against what was seen as the odds, is actually a vindication. Most technicians are proud of that, wear it as a badge of honor."

The Phase I interviews provided a rich source of understanding regarding what is happening in this field, and provided an excellent springboard for more focused exploration of solutions in Phase II.





# Focus Groups

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# Focus Groups

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## ■ Focus Group Methodology

Focus groups allowed us to take the information gained in the interviews to the next level, by beginning to identify ways to use the information to solve identified barriers and challenges. This required a more focused discussion than a survey would allow.

Focus groups are an excellent method of getting a more nuanced understanding of the considerations and preferences of participants, while at the same time allowing group discussions that help zero in on general issues that might not be discernible in individual interviews. Another benefit of a focus group is that it provides the opportunity to bring together people with different perspectives to see the issues from another point of view, and perhaps sharpen their own understanding of the issue.

The research team conducted two focus groups: one in Northern California and the other in Southern California (see the Appendix). Participants represented a wide range of perspectives including recent graduates of high school and of the HVACR training programs, instructors, high school counselors, and employers.

The purpose of the focus groups was to use the lessons from the one-on-one interviews conducted in Phase I to elicit information about messaging and communication strategies that would be effective in attracting and retaining different types of students considering an HVACR program. To this end, researchers prepared a focus group script (see the Appendix) centering on learning the benefits of the HVACR trades; compelling ways to communicate those benefits (focused on video, since that emerged from the interviews as potentially effective); and how the California Community Colleges, the HVACR industry, and society as a whole could improve recruitment effectiveness. This included asking questions about what compelled focus group participants to enter the HVACR trade; getting their feedback on the effectiveness of several videos illustrating different messages and approaches to presenting the trades to prospective students; and discussing the thoughts and ideas from the videos and participants' personal backgrounds that could be used to develop effective outreach practices and messaging to convey the value of entering the HVACR industry to prospective students, counselors, parents, and others. Understandably, for this type of research method, the facilitators were responsive to the discussion by the participants, and the script was not used word for word, rather it was adapted as needed, as the discussion progressed.

The topics that were discussed were:

- Benefits of the HVACR Career: Asking participants about their background and involvement in the HVACR trade, how they came to be in it, and what they found to be the benefits of the career;
- Video as a Compelling Medium for Storytelling: Showing participants a number of video clips from a range of sources to illustrate a spectrum of different messages and approaches to presenting the trades to prospective students; and
- Next Steps: Discussing the thoughts and ideas that came out of the videos and personal backgrounds of focus group participants on the most attractive elements of the HVACR industry and how best to reach and communicate to prospective students, counselors, parents, and others.

The following sections provide details on the information that emerged from the focus groups. It is organized by participants' draw to HVACR, feedback on videos promoting HVACR careers, and takeaways that can be harnessed to develop effective outreach and retention practices, as well as messages to create compelling promotional materials.

## ■ Focus Group Findings

### The Appeal

#### *Family Influence*

One highly noticeable trend in both focus groups was that many participants became involved in the HVACR industry as a direct result of a family member being involved in the trade. Home-based exposure to the skills, tasks, and rewards of “working with my hands” also figured prominently in responses about their own beginnings and attraction to the trade.

#### *Participants' Reasons for Entering the HVACR Field*

Focus group participants share a wide variety of reasons why they were attracted to careers in the HVACR industry, confirming many of the benefits of HVACR careers cited in the one-on-one interviews. These characteristics included:

- Personal satisfaction
- Job security
- Opportunities for advancement
- Living wages
- Flexible career paths (sales, service, install, controls, design, etc.)
- Variety of everyday tasks--no two days are the same
- Not a regular 9-5 office job
- Independence
- Challenging/problem solving/troubleshooting
- Lower educational investment to complete a CTE program

#### *Communicating the Appeal*

Video is an excellent medium for communicating the benefits of the field to potential students through a combination of practical information and personal stories from people who have gone into the HVACR field. This is especially true for students who are visual learners or for whom an emotional connection would be far more powerful than a recitation of facts and figures.

Researchers presented participants in both focus groups with a set of seven one- to three-minute video clips designed to present the trades, various approaches to attracting students, and other aspects of CTE. Each video focused on one or more of the following attributes:

- The ability to earn decent money
- The ability to advance in the industry
- Opportunities to be in a problem-solving environment
- Challenging, interesting, pride of work
- Providing a valuable service to the customer and community

### General Themes

In response to the videos, facilitators identified a number of general themes--some are related to the industry itself while others are more personal in nature. These are illustrated in the table below. In addition, the table shows whether a theme was identified in one specific video or whether there was mention of the theme across multiple videos. Focus group participants cited that the “HVACR field having high wages” was mentioned in 4 out of the 7 videos, followed by a “four-year degree is not necessary/ but available,” “job growth opportunities/mobility,” “diverse work environment/workforce,” and “important and valued career,” which were cited in 3 out of the 7 videos.

Themes Identified and their Frequencies Across Videos							
Themes and Characteristics of the HVACR Industry	Welding Jobs	Mike Rowe: Workers Needed	ASHRAE	Sheet Metal Workers	Faculty and Value of HVACR	Skills USA Program	Brazil
<b>Industry Advantages</b>							
High wages - can be comparable to wages that require four-year degrees	<b>X</b>	<b>X</b>		<b>X</b>	<b>X</b>		
A four-year degree is not necessary/ but is available		<b>X</b>		<b>X</b>	<b>X</b>		
Job-growth opportunities/ mobility	<b>X</b>	<b>X</b>	<b>X</b>				
Diverse work environment/ workforce			<b>X</b>	<b>X</b>		<b>X</b>	
Field is critical to modern life, involves things people use daily	<b>X</b>		<b>X</b>				
Highly skilled	<b>X</b>						
High-demand field	<b>X</b>						
Multiple careers/ career path - applied engineering			<b>X</b>	<b>X</b>			
Job security				<b>X</b>			
“Free” on the job training				<b>X</b>			

Themes and Characteristics of the HVACR Industry	Welding Jobs	Mike Rowe: Workers Needed	ASHRAE	Sheet Metal Workers	Faculty and Value of HVACR	Skills USA Program	Brazil
<b>Personal Rewards</b>							
Important and valued career	<b>X</b>					<b>X</b>	<b>X</b>
Sense of accomplishment / personal satisfaction	<b>X</b>			<b>X</b>			
Interesting work	<b>X</b>						<b>X</b>
Opportunity for women and students of color			<b>X</b>			<b>X</b>	
Opportunity to form a strong self-image	<b>X</b>						
Chances to be creative/artistic	<b>X</b>						
The work is fun							<b>X</b>
Costs less than a four-year degree, less student debt					<b>X</b>		
Opportunity to travel			<b>X</b>				
The work is cool	<b>X</b>						
Protecting the future			<b>X</b>				
Personal connection						<b>X</b>	
<b>Cross-Cutting</b>							
Environmentally focused, Green design/ technology, sustainability/ energy saving			<b>X</b>		<b>X</b>		
Attracting younger people				<b>X</b>			
Team work						<b>X</b>	
Soft skills						<b>X</b>	
Leadership						<b>X</b>	

### *Videos Evaluated*

Focus group participants evaluated 7 video clips. In the Appendix, we provide a brief description and the URL source for these videos.

#### Welding Jobs in Demand

In this video, the principal speaker was a welder who appeared to be about the same age as the 18-24 year old community college student population that is being targeted. The tone of his comments was along the line of “I can’t believe they pay me for this,” which was potentially very motivating. He appeared believable and spoke from the heart. There was no sense that viewers were being talked down to, or that an authority figure was trying to pressure them to pick a career.

The welder shared his personal story of progressing from cleaning the shop floor to parts welding to computerized laser welding. His enthusiasm was infectious as he described how much he enjoyed the opportunity for creativity and for using his valuable judgment to determine how to make a unique contribution. He had a bit of a “misfit” look which helps to cement the connection with the viewer, allowing them to envision that this could be their story someday.

Out of the 7 videos, this was by far the best liked among focus group participants, and it most strongly resonated with focus group attendees. It was the best example of the production values and focus people found most compelling, although the group did note that adding how much money a welder receives would have made an even stronger case.

#### Mike Rowe

Overall, attendees thought this was a strong video. Focus group participants identified the following major points in the video:

- There will be much growth in the industry over the next two decades. Many employers will be seeking qualified people to fill their jobs.
- HVACR technicians do not need a four-year degree.
- College is not a guarantee to success, many vocations offer the same opportunities.
- Salaries are often comparable to professions that require a four-year degree.

#### ASHRAE

Focus group participants generally liked this video. We told participants that this video focused on HVACR engineering and not HVACR technicians, but that it was included as an example of a particular approach that could be applied to any discipline. Despite this encouragement to imagine the approach applied to HVACR technicians, many attendees noted that there was an overemphasis on the engineering aspects of the trade. Overall this video was the most distinctive in terms of content focus; it strongly presented women in the field, engineering elements in general, and sustainability/green technology.

The main themes from this video were:

- Great opportunity for women and students of color
- Applied engineering
- Sustainability
- Diverse working environment
- Multiple opportunities
- Green design
- Necessary
- Travel
- Mobility
- Environmentally focused

- Green technology
- Protecting the future

#### Sheet Metal Workers

The general sentiment among focus group participants for this video was that the messages were generally on target, but not very compelling. Focus group participants identified the following major points in the video:

- Many jobs available
- Good pay
- Job satisfaction
- “Free” on the job training
- Diversity of workforce
- Job security
- Attracting younger people
- Downplays real value of four-year degree
- Career path

#### Faculty Member

As a “talking head” presentation, this video was definitely among the focus groups’ least favorite. Themes from the comments included:

- Good pay
- Reduced cost of education
- Four-year degree not necessary, but still available
- Saving energy
- Environmental benefit
- Green energy
- Sustainability
- High wages

#### SkillsUSA

Mike Rowe on SkillsUSA generally received a positive reaction among focus group participants, but participants thought that it was unfocused compared to other videos. The general themes included:

- Personal connection
- Teamwork
- Highly skilled
- Diversity
- Women
- Soft skills
- Leadership
- Valuable trade

#### Harry Tuttle from “Brazil”

This video was a fictional portrayal of an HVACR worker as a sort of sleuth/superhero. It did not resonate with the participants. The video was by far the least well-liked of all the videos presented. The few positive comments from participants were that the video portrayed employment in the HVACR field as fun, interesting, and important work. The focus group participants felt the “Brazil” video was an example of what not to do in a video aimed at attracting people to the trade.

### *Overall Response to Videos*

Focus group participants generally agreed that videos would be a great resource if they were geared toward high school students, parents, faculty, high school and college counselors, and adults returning to school to change careers. In addition, they felt that short vignettes would be most compelling to young people today, as well as being easier to update and to produce.

The Welding Jobs video was by far the most well received. Specific reasons included:

- The spokesman in the video was approximately the same age as the target population of 18-24 year olds. He also had a bit of a “miss fit” look.
- The message was clear and not overwhelming (not too much information).
- The spokesman appeared believable, spoke from the heart, and conveyed excitement that this type of work is “fun”--“I can’t believe they pay me for this.”
- The video showed a direct application of the skill.
- There were a lot of flashing lights and torches, which probably added to the appeal of the video.

With regard to improving the video, the group cited that they would add how much money a welder receives and show more variety of who is in the field.

The Sheet Metal Workers video did reasonably well, as did both Mike Rowe videos – any of these three could help guide the development of videos for attracting students. The main message cited by the group from SkillsUSA was related to the idea of establishing a career. One participant, a high school counselor, seemed taken by the idea of having SkillsUSA (or something like it) available to her students.

The Faculty Objectives and Brazil videos were problematic in different ways, but largely provide guidance on presentation styles best avoided.

ASHRAE was the only video that showed gender diversity (men and women). However, the spokespeople appeared to be college educated from a four-year institution. The ASHRAE video was also well-liked, but needs some improvements in focus and presentation if the video is to be used as a model for promoting HVACR.

Feedback from the participants suggested that an ideal video should be professionally produced, with experienced documentary filmmakers, who would interview and film the work of individual technicians (one per video). The goal would be to have technicians tell their story and connect on emotional and aspirational levels with the audience. This approach would help capture the technician’s enthusiasm for their occupation and highlight elements of their job that would give the viewer a clear sense of what it is like to work in HVACR.

### *Wrap Up*

The intent for this section of the focus groups was to generate some discussion on the role that entities, like those represented by the participants, could play in taking this to the next step, and particularly on concrete recommendations for CCC. Unfortunately, in both focus groups, earlier segments generated so much discussion that there was not time for rich discussion.

IV

Analysis

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# Analysis

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Researchers recorded comments from both phases of the research and took extensive notes during and after the sessions, particularly with regard to positive comments and conveyed images of the HVACR trade. In our analysis, we were able to list 248 words or phrases covering 108 unique comment items that participants used to positively portray trades in general or HVACR in particular. Comments from both groups were used in the analysis.

Overall, the most frequent positive comments revolved around the lack of any need for a four-year degree to become a working member of the trade, and the relatively high income and wage levels enjoyed by people in the trade. Participants also noted that choosing a CTE path minimized the costs of developing skills and largely precluded incurring much of the debt that is often associated with a four-year degree.

Participants also noted that the sense of accomplishment, personal satisfaction, and other “intangibles” as strongly contributing to the attraction to the trade. Also along this line were positive comments on the day-to-day variation in tasks and challenges, the satisfaction of successful problem solving, and the creativity involved in working in the trade. Personal independence and largely being able to control one’s own career path and developing additional skills were also noted.

Sustainability and Green technology were very common points raised by both the interviewees and focus groups. Focus group participants noted the change in regulations and demands upon the building trades with NetZero and other administrative initiatives that will keep the need for trained HVACR technicians in demand over the long term.

Both focus groups cited that the field also offered opportunity, advancement, and flexibility for a person’s career path depending on their interests and aptitudes. Emerging technologies in controls and systems may help attract young people--particularly millennials who have been raised on smartphones and computer technologies to view the trade differently.

The content analysis described above is commonly used in social science research. It is a way to systematically identify important themes and impressions. The “Word Cloud” below is a graphical depiction of the most commonly used words, and reflects this content analysis. The illustration captures the relative frequency of words by adjusting the size and position of words on the ‘list’. The more a specific word appears, the bigger and bolder it appears in the word cloud. Unlike a chart or histogram, the advantage of this presentation style is that it distributes attention beyond the top five or so items occurring in the list and can intuitively convey some of the major themes.





V

# Conclusions

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# Conclusions

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The skilled HVACR technician trade is an excellent career: jobs are numerous, the work is uniquely well-suited to a large fraction of the populace, jobs are relatively stable, it pays well upon entry, and the path to advancement is clearly laid out and encouraged. These skilled workers are key to efforts to achieve environmental goals through improving the performance of HVACR systems. Unfortunately, there is a growing shortage of skilled HVACR workers. The skilled trades are seen as “dirty,” low-status, physically difficult, boring, low-paying, and unskilled. While some acknowledge that HVACR technicians are key to addressing important issues facing our society, they are generally not highly valued, and new workers are not attracted to the career. An extensive outreach and communication campaign to attract workers could help to address these issues, but it is not likely to be effective without an insightful understanding of some of the current gaps.

The goal of this project was to gather information from a cross section of stakeholders concerned about issues facing the HVACR trade, with the hope that the findings would support the efforts of California Community Colleges (CCCs) and partner institutions in attracting, retaining, and successfully graduating students in HVACR programs.

The project used a “bootstrap” method of qualitative research design to identify broad issues and then drill down to gather more specific information. Researchers conducted 39 phone and in-person interviews, with a range of different stakeholder groups, to identify the primary issues that could then guide a set of more extensive focus groups. The goal of these interviews was to identify the benefits of the career and the existing barriers and obstacles that limit or otherwise obstruct attracting students to HVACR programs, as well as strategies and tactics that might be used in attracting students into these programs.

Researchers then convened two focus groups, with a total of 29 participants, representing a broad range of workforce training stakeholders. These focus groups leveraged the learnings from the interviews and identified specific messages and methods for attracting students into HVACR training programs. One of the key focal areas for these sessions was the review and evaluation of relevant video clips because of their identified significance during interviews in terms of messaging and communication strategies.

## ■ Findings

In this study, stakeholders in the interviews and focus groups observed that: a career in the HVACR skilled trades has a wide range of significant advantages, including that the career is financially rewarding with clear opportunities for advancement; preparing for the career does not require a four-year degree or associated debt, and one can even be paid while in training; and depending on one’s interests and aptitudes, training can prepare workers for a variety of careers, providing the freedom and independence to control their own career paths. In addition, stakeholders reported that: even entry-level workers can feel a sense of accomplishment for helping to keep people safe and comfortable and solving their problems, as well as helping to combat climate change; this career

provides an opportunity to work both independently and as part of a team, and to excel at work that is physically stimulating, tactile, and outside (rather than in an office); and the work varies from day to day, and allows for creativity in overcoming challenges, solving problems, and fixing or creating things and then seeing them work. Finally, stakeholders observed that changes in technologies offer opportunities for workers to keep their skills up-to-date and stay on the cutting edge; and that current worker shortages, the absence of the threat of outsourcing, and society's sustainability goals, ensure that trained HVACR technicians will be in demand over the long-term.

Despite numerous advantages, stakeholders in the interviews and focus groups identified current and impending shortages in the number of available and well-trained HVACR workers as a significant challenge. Seasoned workers are retiring while new candidates are scarce, in part because the career does not seem attractive to career seekers. Stakeholders identified the key barriers as being: a considerable lack of public knowledge about the benefits of (or even the existence of) HVACR careers; the lack of early exposure to the field; the cultural stigma against blue collar work; the lack of guidance and information provided about HVACR programs; and the general view that HVACR jobs, like other "hard labor" jobs, are seen as monotonous, boring, and unfulfilling.

Overcoming these barriers will require finding new and fresh approaches to communicating the appeal of HVACR careers. Interviewees and focus group participants identified shortcomings of current outreach and engagement strategies, and the attributes of approaches likely to be more successful, including that: new technologies and media for communication can provide new outreach modes; blanket campaigns to raise awareness must be replaced by more targeted campaigns that reflect the different communication styles and messages that are needed to effectively reach different types of stakeholders; the audience must be able to relate to the information that is being conveyed (for example, many high school students may not be able to relate to older "ambassadors" regardless of how compelling the message is or how well-established, knowledgeable, or dynamic the speaker is); the message must engage the student on more than a practical level; and the emotional bond created by the sharing of stories can be an effective means of communication.



# VI

## Recommendations

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# Recommendations

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The interviews and focus groups helped identify some of the advantages to a career as an HVACR technician, the barriers to recognizing those advantages (or to even be aware of the trade), and messages and media for communicating to potential workers. To take this a step further, the authors developed a number of recommendations. Recommendations are organized into two categories: those that are actionable in the short-term, and those that are broader in scope and will require cultural shifts and institutional reprioritization over the long-term.

## ■ Recommendations to Promote Short-Term Actions

### Overcome the Barriers

*Promote Awareness and Understanding of Other Options:* High school teachers, counselors, and parents are not aware enough of the skilled trades or how attractive and viable an option it could be for many career-seekers, and that not everyone is well suited to attending a four-year college. They also do not know how to detect the subtle signs that this might be a good career path, or to identify promising students.

Develop professional development programs for high school and career counselors to promote awareness and understanding of the unique appeal of the skilled trades and to the needs of some students to have exposure to this option. These programs should convey the importance of these trades and provide real world experience in evaluating these options.

*Take Immediate Steps to Address Lack of Respect for Skilled Trades:* In general, our society does not try to hide its lack of respect for the working class, and blue collar workers in particular. The stigma associated with a “vocational” education can be felt strongly, and clearly communicates that the HVACR trade (among others) is not a good direction to take, unless you are out of other options. Dialog should be aimed at shifting the conversation away from a four-year degree or the military as the only ways for a young person to be successful. Dialog should include HVACR and other trades into the discussion of viable career opportunities. Care should be taken not to create an either/or proposition. While this is a pervasive problem that will require long-term remedies, there are steps that can be taken now to set the stage for longer-term efforts.

Develop informational campaigns to begin to celebrate the accomplishments of workers in the trades, focusing on the tangible effects of workers’ efforts and skill.

Actively develop ways to counteract some of the negative stereotypes held by the mainstream, such as the blue collar stigma.

Provide opportunities and resources for a range of stakeholders to learn about CTE programs and career benefits, and obtain resources to promote HVACR careers.

## Communicate the Appeal

*Create a Campaign that Conveys the Unconventional Appeal of this Career:* Many—even the CC CTE faculty we spoke with—felt that it is difficult to convey the benefits of this career. However, once we got participants talking about what they love about the career, they had a lot to say.

Seek out workers in the HVACR trades, with a focus on the emotional aspects of having a successful career that helps people. Identify role models who personify these aspects. Mike Rowe, for example, is a good spokesman who effectively conveys pride in workmanship and value for workers.

Create videos and other compelling tools to tell the stories of workers who love their work. Develop promotional material that highlights the diversity of careers and benefits of entering the HVACR field.

Actively distribute and promote these materials to high school and community college incoming students.

*Tailor the Message to the Recipient:* Currently, much of the focus of outreach efforts is centered on high school students, and does not attempt to specifically reach older, re-entry students; former military personnel; displaced workers; women; and people of different ethnicities. Even students identified as college-bound would benefit from some real-world skills (and maybe they would find that they have a great aptitude or interest).

Develop messages tailored to different student populations, including older students, veteran, displaced workers, women, people with different ethnic heritages, and even college-bound students.

*Find the Right Audience:* Some of the best and most successful workers might be easily overlooked, including: underachievers in high school; those not actively engaged with traditional career guidance; and workers that are non-traditional in appearance, ethnicity, gender, or dress.

Develop outreach messages that go beyond the “usual suspects.” This might include developing messages that these individuals find more compelling, and also reaching out to them where they are (since they are not likely at the high school job fair).

*Learn from Your Competition:* There is fairly fierce competition for these student populations both from four-year institutions and the military. Both have invested heavily in outreach and are successful in attracting young people. Nothing like this exist for the trades.

Examine the communication and marketing strategies used by four-year universities and the military, which have proven successful in attracting students. Identify strategies from these campaigns that might work to recruit students into the HVACR field.

## Make Necessary Changes

*Provide a Clear Roadmap:* A career seems abstract and not real until one becomes aware of the relationship between training and jobs, and the progression of skills and capabilities that lead to an engaging career. This career “roadmap” needs to be a simple proposition, with a clear path to a desirable destination. On the other hand, it needs to include different scenarios illustrating the diverse paths that can be taken. Universities and the military do a good job of this, the HVACR industry can help by articulating this career roadmap.

Create a depiction of the career pathways for the HVACR industry (green technology, sales, design, installation, etc.) that clearly convey what courses students need to take, how rigorous the program will be, and other expectations required of students. It also includes a career roadmap.

*Provide Data and Make Tools to Evaluate Financial Impacts of Alternatives:* Graduating high school students and potential transfer students need to have confidence that there is a viable alternative to a four-year university education. There is a compelling financial case to be made for obtaining training for an HVACR career. This financial case would be quite persuasive in today’s economy, and provide students and parents with the information needed to make the best decisions. However, more solid data needs to be collected or made more accessible to support these calculations, such as the magnitude of debt one can expect to result from a four-year degree, the realistic job prospects for students with more academic training, the likelihood of graduates having to resort to taking jobs that are not in their field, and the number of workers unemployed/underemployed at the end of their chosen educational/career pathway. Learning a skilled trade and working in the field, in addition to earning a degree, can be the most valuable and economically feasible career choice.

Conduct a study to review existing data, and gather any unavailable data, to provide a solid basis for evaluating the financial costs and benefits of different educational and career alternatives.

Develop “calculators” that allow individuals to estimate the financial impacts of various choices.

Identify commonly encountered scenarios, as well as compelling case studies, to illustrate the financial impacts of different choices, and disseminate this information.

*Address Logistical and Procedural Barriers:* The interviews and focus groups described in this report identified a set of logistical and procedural barriers that have hindered some of the elements of the effort to expose students to HVACR careers. These barriers are all surmountable, although it may take a concerted effort by local champions or policymakers to find these solutions.

Identify and provide solutions to barriers such the cost of buses for under-resourced K-12 schools to take students on fieldtrips, liability issues related to engagement of minors and availability of workers comp insurance.

*Create an Integrated Organization to Promote HVACR Careers:* Many stakeholders have an interest in addressing the shortage of qualified technicians, so a coordinated approach that is well targeted could be quite effective. An integrated, multi-sector campaign could attract different stakeholders—such as HVACR trainers, students, high school personnel, parents, employers, and

policy-makers—each of whom brings a different piece of the puzzle to the table. No one of these entities can provide the entire solution. While each category of stakeholders has a unique set of perspectives and actions available to them, they have common goals, and working together will ensure solutions that are more effective and likely to be sustained.

Bring the entire range of stakeholders together to create an organization to develop short-term and long-term roadmaps that capture the necessary actions, the ideal contributors, and a sense of timing and outcomes. In the short-term, this organization might engage in activities such as developing:

—An interdisciplinary outreach team of technicians, CC instructors, HS educators, industry employers, and even individual technicians and recent graduates that could create and deliver a “traveling road-show” to reach out to schools.

—A speaker’s bureau of technicians or other stakeholders who would be able to speak from experience as well as passion for the HVACR profession. This could be coordinated by people in the HVACR industry to provide.

—A clearinghouse to facilitate matching students desiring an internship, job shadowing, and summer employment opportunity with a contractor willing to provide that experience.

*Pursue Follow-up Research:* While the results of this study have provided a number of promising approaches to solving the problems described in this report, additional research would allow for development of a very tightly-focused campaign. For example, it became quite clear that future investigations must focus more closely on high school students surveying their opportunities, current students in a Community College HVACR program, and recent graduates of the programs who have some field experience. Another follow-up research study could develop guidance for educators and parents to help them identify students who would blossom on an HVACR career path.

Develop a short-term research roadmap to fill gaps in understanding of the issues and find actionable solutions.

## ■ Recommendations to Promote Longer-Term Societal Change

### Overcome the Barriers

*Overcome Educational Sector Bias in Favor of Universities:* Students who are not seeking a university education are clearly discouraged at all levels. Even within the community colleges, the focus is on transferring to a university, not on providing exposure to the trades.

Heighten awareness, within educational institutions, of CTE education and attributes of the skilled trades. Also target campaigns to promote awareness with other educational institution stakeholders.

*Take Longer-Term Steps to Address Lack of Respect for Skilled Trades:* Short-term actions cannot fully address this cultural construct. More sustained efforts over the long term are needed. Countering the negative stereotypes of blue-collar workers over the long term requires an integrated campaign that dispels these stereotypes.

Develop broad-based and institutionalized awareness campaigns and continue campaigns to celebrate the work of this important sector over the long term.

Find longer term and more sustained ways to provide opportunities and resources for a range of stakeholders to learn about CTE programs and career benefits, and obtain resources to promote HVACR careers.

*Encourage Others to Communicate the Appeal:* In the short term, the community colleges and industry can make a concerted effort to communicate to target populations. In the long term, however, engagement must come from a broader cross-section of society.

Encourage federal and state employment and labor departments, national labor unions, HVACR trade associations that are national in scope, and policymakers who work to promote quality HVACR services to contribute to the effort to portray the importance of this career. Include a role for mass media in portraying these jobs as viable and honorable careers.

## Make Necessary Changes

*Address the Broader Community:* Our society needs to reverse our current cultural values surrounding the skilled trades and reintroduce the culture of valuing this work. We need to get back to recognizing the value of the skilled workers who provide services that are essential to our economy and quality of life. The general public needs to be aware that tradespeople are critical in providing services that reduce energy use and combat climate change. This should lead to a more respectful attitude towards the trades and training.

Identify the need for growth of the HVACR industry and other trades over the next 50 years, and the impact of these trades on delivering sustainability and environmental solutions. Present HVACR as being on the front lines of the technical solution to many problems and challenges for the future.

*Institutionalize an Integrated Planning Organization with a Broader Scope:* The planning organization recommended as a short-term action above, may initially be a pilot effort. If successful, it should be replicated in other regions, or by national or industry-wide institutions, so that it can help to create the critical mass needed to make a substantial sustained change.

Evaluate the effectiveness of the integrated planning organization created earlier, and devise policies and programs to replicate its successful aspects. Institutionalize this organization to create a sustained effort and broaden the scope.

*Pursue Broader Follow-up Research Initiatives:* Achieving the vision described in this study will help prepare the California (and beyond) workforce to contribute to: reducing greenhouse gas emissions, addressing an aging infrastructure, and promoting an equitable economy that provides opportunities for full and fulfilling employment.

Work with policymakers to elevate the priority of related research, as well as training and education, to apply these approaches at scale. The magnitude of these potentials should lead to a major research initiative, promoted at the highest levels.



VII

Appendix

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# Appendix

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## ■ Interviews

### Logistics and Participants

This phase of the research cast a broad net to identify individuals with some connection to the HVACR education field, or who could have a stronger connection. Scheduling the interviews was challenging, and ultimately researchers conducted thirty-nine telephone interviews over about two months.

Interview Participants	
CC Faculty	18
CC Counselors	3
Industry Representatives	8
Students	10
<b>TOTAL</b>	<b>39</b>

These interviews were audio-recorded, although researchers also captured copious notes during the interviews, which greatly facilitated analysis.

A detailed interview guide was prepared for each type of participant. However, since the objective of these interviews was to discover some of the barriers and driving forces that come into play, some interviews strayed from the guide in places in order to pursue a particularly interesting finding. The interview guide is presented below.

### Interview Questions

#### *Barriers to Pursuing a Career in HVACR*

- What are the Skills and Characteristics of Promising HVACR workers?
- Describe the HVAC technician “workforce of the future”? How different is it from today’s workforce? What needs to change to make it come to reality?
- What are HS grads’ perceptions of the HVAC career? What influences these perceptions, and how accurate are they?
- 

#### *Appealing Factors of an HVACR Career*

- For what kind of student is the HVAC career (“of the future”) a good fit? Are there specific interests or aptitudes that are particularly useful?
- What messages might be most effective in recruiting these students?
- What are the best ways to reach the right students?
- Given the need to recruit more, and more qualified students, what do you think the priorities of the Community Colleges’ HVACR programs should be?

## ■ Focus Groups

### Logistics and Participants

Researchers selected invitees to provide a broad cross-section of the stakeholders involved in workforce training. They first identified participants by contacting stakeholders in their professional networks and the networks of the Community Colleges, and then by snowball sampling to identify individuals with different perspectives.

A lengthy process ensued, of iteratively reaching out to invitees, providing more information, inviting them to participate in a poll to select dates, selecting dates, assessing availability, and reaching out again to start the process over again. This is the only way to coordinate such a large and fluid group. The dates were finally established to accommodate the most participants, and the list of participants was complete. The table below summarizes the locations and participants who ultimately participated in the focus groups.

Northern California		Southern California	
February 23, 2016		March 17, 2016	
Davis		Walnut	
UC Davis Energy Efficiency Center		Mt. San Antonio Community College	
Participants:		Participants:	
CC Administrator	1	Former students, employed as Techs	5
Contractor	4	Faculty, Instructor, Teacher	5
Employer	1	Service Manager, Business Owner	5
CC Faculty	5		
High School Staff	2		
<b>TOTAL</b>	<b>13</b>		<b>15</b>

Each of the focus groups was about two hours. Participants in the groups were informed of their rights and provided consent to participate, and their identity was not made public at the focus groups. At the first focus group, nametags corresponding to the names of fictional characters were given out so that the facilitators could refer to them by name (and track who said what on the recordings) without actually using their real names. With the consent of the participants, the groups were videotaped and audiotaped, although the videotape in Northern California had technical difficulties and was not available to the researchers. Fortunately, the facilitators and researchers also took extensive notes. A snack was provided at some point during or after each of the groups, and participants were given a \$100 gift card to thank them for their contribution to the study. During the focus groups, participants were asked to articulate their opinions, in several ways, and in some cases worksheets were provided for them to record specific comments.

After the focus groups, the facilitators and researchers reviewed the recordings and completed worksheets, and updated the notes captured during the sessions. The notes of all groups were combined, and the findings were distilled into conclusions and recommendations.

## Focus Group Questions

### *Appealing Factors of the HVACR Career*

Please tell us your first name, your job title and a brief description of what you do. Also think back and share what was it that drew you to your field? (Go around the table, about 2.5 minutes per person = 25 min)

Some of the people here are not technicians currently working in the HVACR field, or are pretty new. We'd like those of you who currently work as techs in HVACR to explain what some of the most significant advantages are for being an HVACR tech.

Write down a few things that you think are the most significant advantages (non-tech folks: you probably don't know, but note what you think the advantages are). (Provide a couple minutes to write down top advantages. If need be, prompt... – 5 minutes)

Now, get into pairs and...

- For those of you who are currently working as technicians, please try to explain these advantages: What are some of the non-traditional or unexpected advantages? Why is that an advantage? In what way does that advantage satisfy you?
- For those of you who are not current technicians, if any of this surprises you, probe further... Ask why? Share what was on your list, and discuss whether it was on the mark or not.

When you're all done, we'll go around the room and ask each pair to share their conclusions: if possible, we'd like the non-technician to explain what they heard, and the technician to correct or expand on that if needed. (Break into pairs, matching one technician and one non-technician, if possible. (Allow time for discussion. – 10 minutes)

OK, let's go around the table and ask each pair to share their conclusions. Non-technicians: what did you learn? Technicians: did they get it right? Also share one thing that surprised you. (Go around the table and ask each pair to share their findings with the group. Collect the individual lists at the end. - 15 minutes)

### *Appealing Factors of the HVACR Career*

Please tell us your first name, your job title and a brief description of what you do. Also think back and share what was it that drew you to your field? (Go around the table, about 2.5 minutes per person = 25 min)

One way of communicating the rewards of this career is to produce a compelling video and make it as available as possible to potential career candidates. We'd like to show you some clips from several videos that illustrate several approaches to attracting students to a particular field (not necessarily HVACR tech). Feel free to take notes during the videos, and we will pause after each video to give you a few seconds to complete recording your thoughts on the video, focusing particularly on these three questions:

- What are some of the key points of the message you think they're trying to convey in each video?
- How compelling do you think each video is in encouraging people to enter this field?
- What works and what doesn't work about each of these videos?

At the end, we'll have some time to discuss your answers to the these questions

(Show videos and pause after each to write down key points. Seven videos, totaling 12:20. 30 seconds between each = 15:20. After all the videos, continue discussion)

Can some of you share what you wrote down about the videos? Overall, were there similarities, differences, overall feedback? (key points, what works and what didn't work, how compelling...)

What do you think is the message that would be most effective in encouraging people to enter the HVACR field? (Open discussion - 10 minutes)

### *Moving Forward with Solutions*

What role do you think organizations and individuals in your line of work should play in spreading this message? (Open discussion – 5 minutes)

What would you recommend as concrete actions for Doing What Matters and CCC's to increase enrollment resulting in students attaining HVACR technician's certificate and getting a job as a technician? (Open discussion – 5 minutes)

## Sources of Video Clips Shown to Focus Groups

Title	Description	URL
Welding Jobs in Demand	Michigan Economic Development Corporation, promoting skilled labor, focuses on a relatable individual welder whose enthusiasm for his job is infectious. Started at the bottom and ultimately worked up to a stimulating career.	<a href="https://www.youtube.com/watch?v=9oTnab4FM-ho&amp;list=PLnd4jjRa4RAbB5Wfc2PE516ChjiiRi22X">https://www.youtube.com/watch?v=9oTnab4FM-ho&amp;list=PLnd4jjRa4RAbB5Wfc2PE516ChjiiRi22X</a>
Mike Rowe	Mike Rowe, host of Discovery Channel's "Dirty Jobs" series, and spokesman for Ford Trucks, makes a powerful argument for the skilled trades.	<a href="https://www.youtube.com/watch?v=yihG89SB00g">https://www.youtube.com/watch?v=yihG89SB00g</a>
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers lets young, minority, and female engineers describe the attractions of their field, in a light-hearted and informative way.	<a href="https://www.youtube.com/watch?v=P1sqBI9aPtA">https://www.youtube.com/watch?v=P1sqBI9aPtA</a>
Sheet Metal Workers	Sheet Metal Workers International Association, labor union representing HVACR technicians, shows and tells the benefits of a union position in the trades, including excellent wages and getting a paycheck while in training.	<a href="https://www.youtube.com/watch?v=le6NKM3hVE">https://www.youtube.com/watch?v=le6NKM3hVE</a>
Faculty Member	Santa Ana College Engineering Department Co-Chair describes the importance of sustainability and her passion for environmentally beneficial careers.	
SkillsUSA	Young people are seen competing at the annual SkillsUSA International Competition. They are enjoying competing as part of a team while gaining valuable job skills.	<a href="https://www.youtube.com/watch?v=Q3gW1b-tl9c">https://www.youtube.com/watch?v=Q3gW1b-tl9c</a>
Harry Tuttle from "Brazil"	Character in surreal British movie takes pride in his ninja-like skills for guerrilla HVAC servicing.	<a href="https://www.youtube.com/watch?v=dht_3NziwSw">https://www.youtube.com/watch?v=dht_3NziwSw</a>

(Note that these videos were captured from various sites on the internet for research purposes, and no permissions were sought or granted).

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