
Workforce Development in Vermont's Thermal Sector

Challenges and Opportunities for Meeting Vermont's 2030 Climate Goals

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This report has been reviewed by EAN internship staff and senior fellows

INTRODUCTION

The trades workforce shortage is not a new phenomenon in the United States. According to a 2008 report by the Center on Wisconsin Strategy and the Workforce Alliance, a power sector survey showed that more than 50% of respondents predicted they would lose 20% of the trades workforce in the next 5-7 years.¹ That trend continues as more tradespeople retire, often without anyone to take their place. Vermont's labor force alone was reduced by 11,500 workers between the years of 2007 and 2020 and the state ranks 4th in the nation with the highest portion of the population at retirement age.² In addition, during the years from 2012 to 2016, 4,000 more households moved out of Vermont than moved into the state.³

This comes at a time when Vermont is preparing to substantially ramp up energy efficiency activity as one strategy for reaching state climate goals established in the Global Warming Solutions Act passed by the Legislature in 2020. The law requires Vermont to reduce greenhouse gas (GHG) emissions to 80% below 1990 levels by the year 2050, with interim goals of 26% and 40% established for the years 2025 and 2030 respectively. The energy used to heat and cool buildings and to provide hot water (referred to as "Thermal Energy" or simply "Thermal" by many) accounts for 34% of GHG emissions in Vermont and is the state's second largest source of GHG emissions. Improving energy efficiency and the use of clean energy technologies in buildings is a key strategy (or "pathway") for meeting state climate goals. Vermont has invested already in expanding the delivery of energy efficiency, weatherization, and clean energy technologies and services to help households reduce energy costs and improve comfort, health, and safety. However, "while energy efficiency policies can create jobs, the available local workforce determines the scale and quality of implementation."⁴

Over the past five years, the Energy Action Network (EAN) has invested significant time and effort into creating an Emissions Reduction Pathways Model which identifies and quantifies technologies and practices that can provide pathways for reaching Vermont's climate goals. Among those in the pathway for reducing GHG emissions from thermal energy by 2030 are:

- 200,000 cold-climate heat pumps;
- 200,000 heat pump water heaters; and
- 148,102 homes weatherized.

Achieving this level of activity will require substantial ramp up and scaling of current market activity. Finding the workers to install and service the current level of market activity is already a challenge, and companies providing energy efficiency services who were interviewed all had waitlists ranging from one to six months. As noted in the 2020 Vermont Clean Energy Industry Report,⁵ many companies currently providing energy efficiency and weatherization services in Vermont experience barriers to hiring including:

- A lack of workers with the required training, skills, and experience;
- A small applicant pool; and
- Insufficient qualifications among those who apply.

This is not unique to Vermont. According to a national study completed by the American Council for an Energy Efficient Economy (ACEEE), "80% of energy efficiency employers report difficulty in finding qualified job applicants to fill open positions."⁶ According to the 2021 Clean Energy Industry Report, Vermont currently has 9,832 energy

¹ White, Sarah, and Jason Walsh. "Greener Pathways: Workforce Development in the Clean Energy Economy." Community Wealth, 2008.

² "State of Working Vermont 2020." Public Assets Institute, 2020.

³ "State of Working Vermont 2019." Public Assets Institute, 2019.

⁴ Shoemaker, Mary, and David Ribeiro. "Through the Local Government Lens: Developing the Energy Efficiency Workforce." ACEEE, 2018.

⁵ "2020 Clean Energy Industry Report." BW Research Partnership, 2020.

⁶ Ibid.

efficiency workers, a decrease from 10,741 workers in 2020. The need for the rapid scaling of energy efficiency services in order to meet state climate goals for the building sector warrants new research on:

- How many workers will be needed to reach 2030 goals;
- Where the workforce will come from for filling those jobs;
- What education and/or training will be needed to prepare the workforce for those jobs; and
- What recruitment or other techniques will be needed to ensure the jobs are filled by workers

This report is the result of an EAN Summer Internship research project designed to address these questions. The project included estimating the future workforce needed to achieve state targets for reducing GHG emissions from energy use in buildings. Interviews were conducted with a variety of energy efficiency, weatherization, and clean energy companies to learn of their workforce experiences in the current market. Interviews were also conducted with state education and training leaders. An assessment was done of current and potential strategies for recruiting trainees and workers and retaining workers once they enter the energy efficiency, weatherization, or clean energy industries. Recommendations were developed for new strategies and initiatives for meeting future workforce needs. This report is the written deliverable from the research project. Results from the project were also presented virtually in a Lunch and Learn event delivered to members of the Energy Action Network⁷.

HOW MANY WORKERS WILL BE NEEDED?

This section uses EAN's Emissions Reductions Pathways model (the EAN Model) along with data collected from interviews with various companies providing energy efficiency services to estimate the current and projected workforce numbers if Vermont is to reach its 2030 emissions goals. It should be noted that both models are subject to change as ramp up efforts are likely to shift year by year. The full methodology can be found in Appendix A.

RESULTS

SINGLE-ZONE COLD CLIMATE HEAT PUMPS

Key Assumptions (based on information provided by experienced heat pump contractors):

- One worker has 1,372.8 working hours available per year
- The most productive crew can install around 137 units per year with 2 workers in the crew
- The least productive crew can install around 86 units per year with 3 workers in the crew
- One office staff member is needed per 10 crew members for various administrative and other support purposes

⁷ [EAN Lunch and Learn](#)

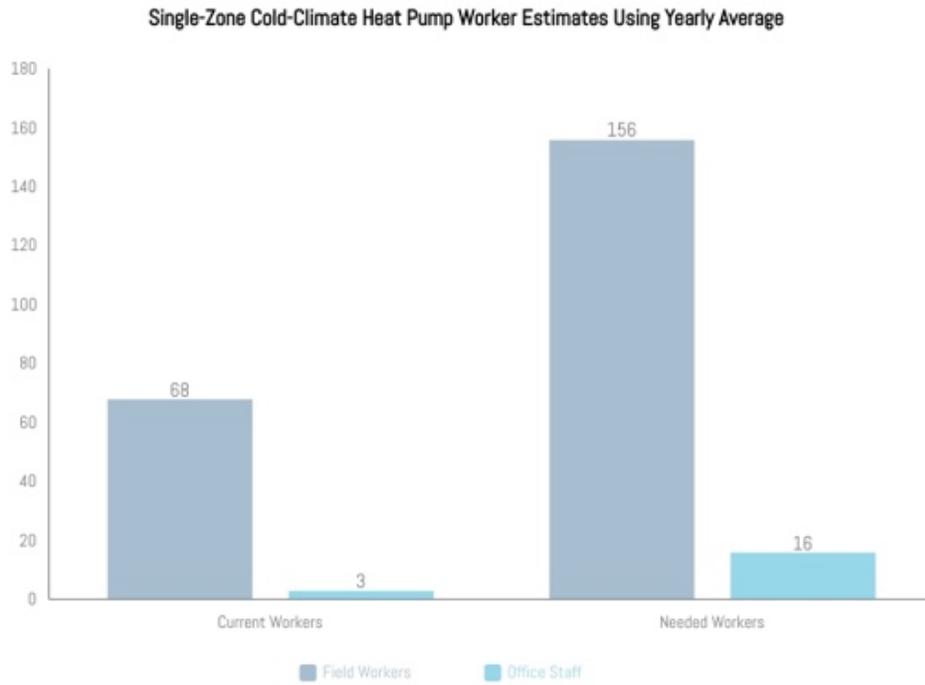


Figure 1. Workforce increase if a steady installation rate is used starting in 2020 and going until 2030.

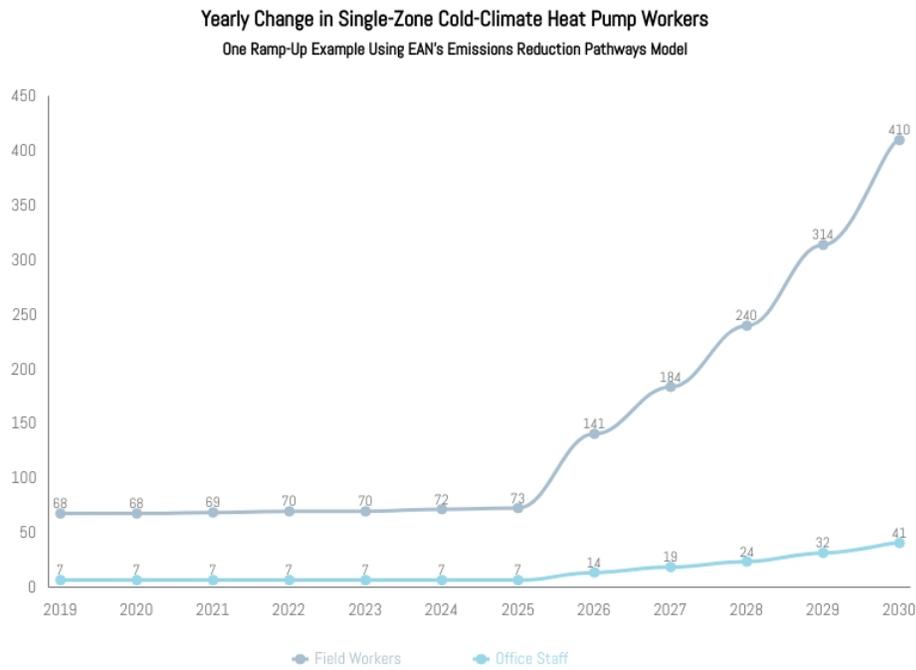


Figure 2. Workers necessary in each given year to correspond with predicted numbers of heat pump installations per year. It is more likely that workforce need will mirror this graph as ramping up rates change from year to year.

MULTI-ZONE COLD CLIMATE HEAT PUMPS

Key Assumptions:

- One worker has 1,372.8 working hours available per year
- The most productive crew can install around 69 units per year with 2 workers in the crew
- The least productive crew can install around 46 units per year with 3 workers in the crew
- One office staff member is needed per 10 crew members

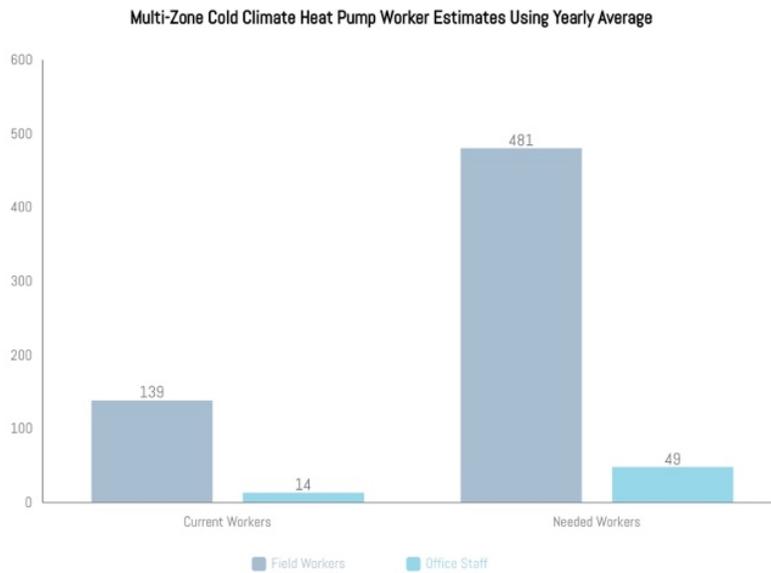


Figure 3. Workforce increase if a steady installation rate is used starting in 2020 and going until 2030.

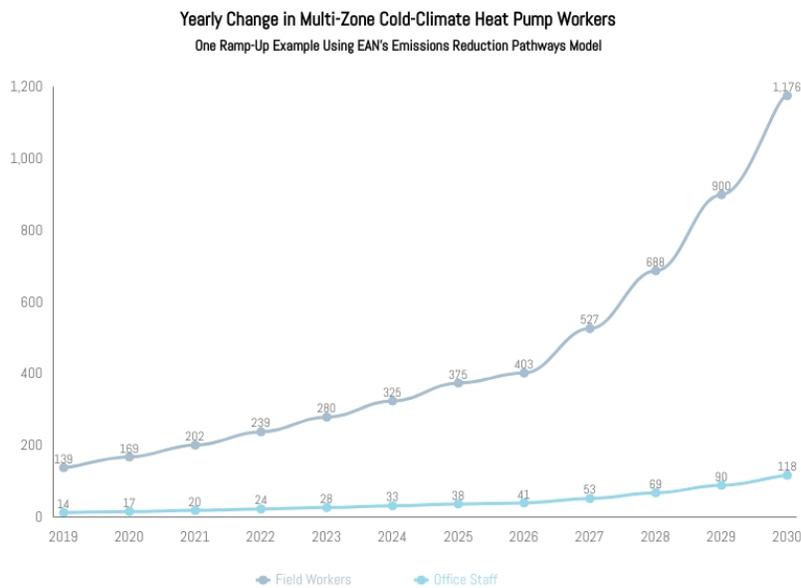


Figure 4. Workers necessary in each given year to correspond with predicted numbers of heat pump installations per year. It is more likely that workforce need will mirror this graph as ramping up rates change from year to year.

HEAT PUMP WATER HEATERS

Key Assumptions:

- One worker has 1,372.8 working hours available year
- The most productive crew can install around 172 units per year with 2 workers in the crew
- The least productive crew can install around 137 units per year with 3 workers in the crew
- One office staff member is needed per 10 crew members

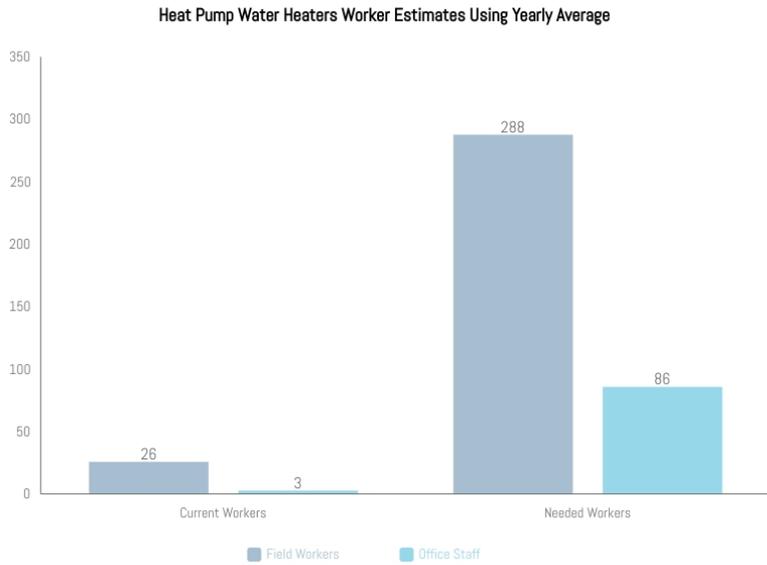


Figure 5. Workforce increase if a steady installation rate is used starting in 2020 and going until 2030.

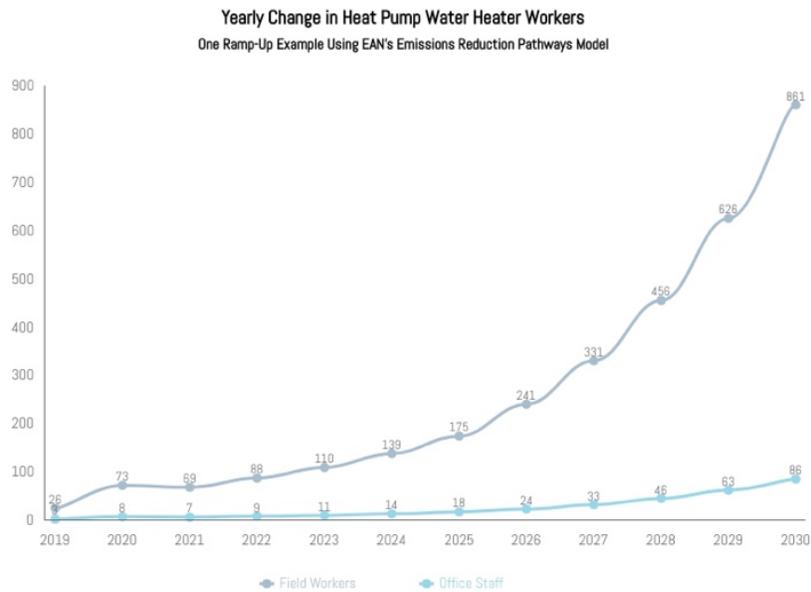


Figure 6. Workers necessary in each given year to correspond with predicted numbers of heat pump installations per year. It is more likely that workforce need will mirror this graph as ramping up rates change from year to year.

WEATHERIZATION

Key Assumptions:

- One worker has 1,372.8 working hours available per year
- The most productive crew can weatherize around 20 homes per year with 4 workers in the crew
- The least productive crew can weatherize around 11 homes per year with 5 workers in the crew
- One office staff member is needed per 10 crew members
- One energy auditor is needed per 90 buildings

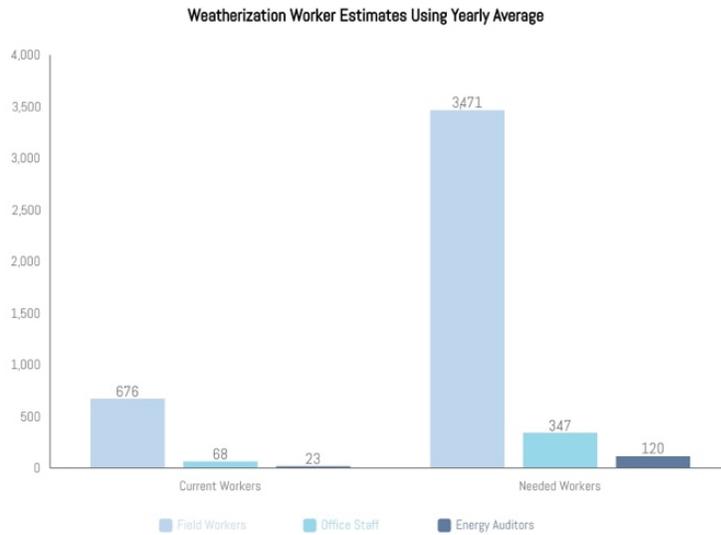


Figure 7. Workforce increase if a steady weatherization rate is used starting in 2020 and going until 2030.



Figure 8. Workers necessary in each given year to correspond with predicted numbers of homes weatherized per year. It is more likely that workforce need will mirror this graph as ramping up rates change from year to year.

WHAT ARE THE WORKFORCE CHALLENGES CURRENTLY?

According to the national US Energy and Employment Report⁸, 91% of construction employers, 80% of professional and business services employers, and 87% of manufacturing employers in energy efficiency reported moderate to severe hiring difficulty in 2019. Within the construction industry specifically, installation workers and technicians were reported to be the most difficult positions to fill. An important component of this research was to interview leaders of key agencies and businesses currently providing energy efficiency, weatherization, and/or clean heating equipment and services in Vermont. Below are experiences, insights, and challenges noted by a variety of agencies and companies involved in the delivery of energy efficiency, weatherization, and clean energy services. The interviews help identify the opportunities and challenges as Vermont seeks to scale up the energy efficiency, weatherization, and clean energy workforce moving forward.

ENERGY CO-OP OF VERMONT – WEATHERIZATION COMPARED TO OTHER CAREER PATHS

The Energy Co-op of Vermont is managed by Brian Gray. Serving Northwest and Central Vermont, the Co-op provides a variety of energy services including the installation of cold-climate heat pumps, weatherization, and fuel delivery. In addition to delivering heating oil and kerosene, the Co-op also delivers advanced wood heat. As stated on their website, the Co-op's goal is to help customers transition to renewable fuels and technologies when it makes sense for them. In an interview with Gray, he spoke of the difficulties in finding carpenters for weatherization work. Gray believes this is mainly because people who have the skills needed to do weatherization projects often choose other avenues instead which may be "more glamorous."

ENERGYSMART OF VERMONT – THE IMPORTANCE OF COMPETITIVE WAGES

EnergySmart of Vermont is managed by Paul Zabriskie and is a part of Capstone Community Action serving Central Vermont. One of Capstone's many services is helping homeowners with weatherization, and they are part of the Weatherization Assistance Program (WAP) funded largely by the U.S. Department of Energy, with 70% of Capstone's weatherization services going to providing services offered by WAP to income-eligible households at no charge. EnergySmart accounts for the other 30% of Capstone's weatherization work, providing energy efficiency and weatherization services to households not eligible for WAP. EnergySmart installs cold-climate heat pumps and provides residential energy efficiency and weatherization services. In an interview with Zabriskie, he mentions the importance of providing competitive wages, especially because "there's a tension between the marketplace and what it feels this work is worth." For example, the cost to send someone into a 130-degree attic, or a wet, dirty basement, is higher to the worker than it might be to the customer. "You're not going to be able to hire someone to do this job at \$13.80 per hour," he says. "They'll choose to flip burgers instead for that hourly rate."

CHAMPLAIN VALLEY WEATHERIZATION – THE CHALLENGES OF UNEMPLOYMENT BENEFITS

Dwight DeCoster is the director of Champlain Valley Weatherization, part of the Champlain Valley Office of Economic Opportunity. The agency provides weatherization services to about 200 income-eligible households per year in Northwestern Vermont. According to testimony DeCoster gave to the Legislature in February of 2021, unemployment benefits in effect at that time as part of Covid-19 relief efforts increased the challenge of finding new workers for his agency. "With current unemployment benefits at the level they are," he says, "and our necessary starting wages, it has been hard to attract our workforce." For example, DeCoster recently attempted to hire a subcontractor administrator. After interviewing four potential candidates, one was not fully qualified, one was not a good fit, and two were offered

⁸ "2020 US Energy and Employment Report." National Association of State Energy Officials, Energy Futures Initiative, 2020.

the position at \$22 per hour plus benefits. Both qualified applicants declined because they claimed the wages were too low.

BUILDING ENERGY – THE TRAINING TIMELINE

Russ Flanigan is a senior energy specialist and project manager at Building Energy, a construction company whose business model uses a “whole systems approach” to provide customers with both energy efficiency and renewable energy technologies and services. Building Energy provides energy efficiency and weatherization services, cold-climate heat pumps, and solar electric systems in Central and Northwestern Vermont. In an interview, Flanigan comments on the difficulty of being able to train workers in a timely manner and keep up with demand, saying “I can’t train people quick enough to do the work.”

COVER HOME REPAIR – A SHORTAGE OF TRADESPEOPLE

Cover Home Repair is a nonprofit organization serving the Upper Valley that provides free weatherization services to low-income households. Directed by Bill Neukomm, the organization is unique in its use of volunteers and its implementation of a “Do it Yourself” (DIY) model (discussed in more detail below in the Job Recruitment section). Because Cover Home Repair is not able to provide insulation services, they focus their efforts on air sealing and repair work. Neukomm uses paid crew leaders to guide his volunteers, and each leader must be at least a journeyman carpenter. Even though he has a substantial network of people interested in doing weatherization work, Neukomm is not able to find enough qualified tradespeople to serve as crew leaders, and is currently down to only one. “I don’t have any problem finding volunteers to do the work,” Bill notes in an interview. “But somebody who can take responsibility to manage the crew, teach people what to do, and design the jobs? That’s what I’m missing right now.” When asked about training processes and the need to train more people, his response is, “Where are you going to get the ‘more people’ from?”

VERMONT ENERGY CONTRACTING AND SUPPLY – WORKFORCE SHORTAGE

Vermont Energy Contracting and Supply is a company that focuses on heating, ventilating, and air conditioning (HVAC) services and on plumbing. After installing cold-climate heat pumps for the past 20 years, the company considers heat pumps its specialty. Vermont Energy Contracting and Supply is Vermont’s leading heat pump installer. Heat pumps constitute 70% of their business, and the company had over 100 heat pumps to install in July 2021 alone. Mark Stephenson, the owner and general manager, speaks in an interview about the difficulty of recruiting new workers to add to their current crew of 25 employees and 5 subcontractors. “We have an employment advertisement out twelve months of the year,” he says. “Every day of the year we are looking.”

Given the estimated number of additional workers needed to meet Vermont’s energy goals and the challenges noted by multiple numerous energy efficiency, weatherization, and clean energy companies, substantial work is needed to determine how the future workforce will be developed. The remainder of this report examines the training and recruitment process in order to highlight issues and opportunities, as well as spotlight organizations doing valuable and creative work.

WHAT CAN WE LEARN FROM THOSE CURRENTLY OFFERING TRAINING?

According to Tom Cheney, Executive Director of Advance Vermont, the majority of new jobs require postsecondary training, and his organization’s goal is to ensure that 70% of Vermonters hold a credential of value by 2025. However, the need to train more workers is made difficult by Vermont’s declining workforce. In an interview with Maureen Herbert of Vermont Technical College, she speaks about how not only is there a declining youth population due to declining birth rates, but a lot of people are retiring as well. “We’re going to start losing people who can not only teach but can do the work,” she said.

In addition, according to Geoff Robertson of the Vermont Sustainable Jobs Fund, a recent study by the Kauffman Foundation found that companies may start in Vermont, but they don’t often scale in Vermont and usually end up leaving instead. Vermont’s low unemployment rate (2.6%) further lessens the pool of potential trainees. As Brian Gray notes, “There’s no way we’d be able to pull the workforce needed from just the 2.6% who are currently unemployed.” It will be important to focus on underemployed Vermonters as well. Finally, according to Carolyn Weir of the McClure Foundation, Vermont has not only the lowest continuation rate to college among low-income students in New England, but also has the highest percentage of 18 to 24 year-olds living in poverty. Tom Cheney further notes that while 60% of high school students from Vermont go on to college or career and technical education (CTE), only 55% of those students actually complete the program they started.

EXAMPLES OF CURRENT TRAINING ORGANIZATIONS IN VERMONT

Presented below are organizations involved in construction trades-related training programs in Vermont that were interviewed for this report. Appendix B includes examples of specific training programs each organization offers.

RESOURCE

ReSOURCE is a nonprofit training organization directed by Thomas Longstreth. The organization assists those who have barriers to employment and serves between 200 to 300 trainees per year. ReSOURCE focuses on two categories of workforce training. The first is work experience training, intended for someone who has never worked due to age, disability, public assistance, or other reasons. This training prepares the student to be ready for further skills building. The second is workforce development, geared towards those making a job transition or who have prior experience in the workforce. This results in placing the trainee in a job. While the organization is currently based in Burlington, Longstreth hopes to expand the number of training courses offered from three or four to eight, and to have at least 50% of the courses located outside of Burlington. He also hopes to develop training for heat pump certifications and HVAC.

VERMONT TECHNICAL COLLEGE

Vermont Technical College operates an office of Continuing Education and Workforce Development (CEWD) in addition to their undergraduate curriculum. Headed by Maureen Herbert, CEWD focuses on non-traditional students looking for a career transition or additional professional development assistance. According to Herbert, “CEWD meets students where they are.” The office enables students to obtain certifications and training and to continue on to an advanced degree, if desired. For energy efficiency, weatherization, and clean energy work, CEWD offers green-energy trainings such as Building Performance Institute (BPI) and HVAC training and certifications, as well as electrical, plumbing, manufacturing, and business training programs.

ADVANCE VERMONT

Advance Vermont (referenced above) is a collective impact organization focusing on policy, data/research, facilitation, and changing the narrative around career and technical education. According to Executive Director Tom Cheney, the goal of the organization is to “ensure that every Vermonter has access to the education and training they need.”

VERMONT WORKS FOR WOMEN

The mission of Vermont Works for Women is to help women find career paths and develop skills. Glenn McRae of the Northeast Transportation Workforce Center has collaborated with Vermont Works for Women in the past and described some past and present programs in an interview.

THE BENEFITS AND NECESSITY OF CERTIFICATIONS AND TRAINING

Although there are many components in the structure, accessibility, and curriculum of training and certifications that can be improved upon, it is generally agreed that certifications are useful and necessary. One of the most important reasons for certifications is safety. According to Clean Energy Development Fund Manager Andrew Perchlik, “It’s important to have a standard of safety in order to both protect customers and make sure that renewable energy, which is still new in its market development, is considered safe and reliable.” Paul Zabriskie of EnergySmart VT comments on how weatherization workers should understand how changes to a building could affect the indoor environment, and know how to do that in a safe way. Safety also includes protecting workers. In a testimony, Dwight DeCoster emphasized the need for special equipment or training to work with asbestos, vermiculite, or lead (each of which may be present during the weatherization of older buildings).

In addition to safety, certifications work to enhance the reputation of companies, and can provide a basis for an increase in wages as well as the quality of installations. Zabriskie details the role certifications play in defining a brand and creating expectations between consumers and the services they are hiring. Russ Flanigan of Building Energy notes that certifications are sometimes required for projects to be eligible for various state energy efficiency, weatherization, and clean energy incentives.

RECOMMENDATIONS FOR CERTIFICATION AND TRAINING STRUCTURE

Based on interviews with energy efficiency, weatherization, and clean energy companies as well as leaders of training organizations and programs, it is clear there are a variety of challenges to address related to certifications and training.

BREAKING DOWN FORMAL CERTIFICATIONS

Russ Flanigan of Building Energy notes that heat pump installation is specialized. “That’s why you see all the heat pump people advertising for new hires,” he says. “You can’t find them, and if you can find them you can’t afford them.” Thomas Longstreth of RESOURCE notes that there are multiple different certifications required to service or install a heat pump. While the many certifications make sense because electricity can be dangerous, it creates a barrier to those who may not be willing to go through the long and arduous training necessary to become a master electrician and to then subsequently move into HVAC. To help address this issue, Longstreth recommends dividing the installation process into different components, distinguishing between the electrician-dependent wiring work and the rest of the actual installation work that does not require an electrician. Using this approach, an electrician would hardwire the device and do the wiring work at the site, while the rest of the installation work would then be done by an installer who is not a licensed electrician. Tom Cheney of Advance Vermont agrees with this strategy noting, “We can break this down for our workforce so that they don’t all have to go to the highest level of training.”

BUILDING UP SUPERVISOR CAPACITY

Another barrier to increased workers in energy efficiency is the requirement for a 1:1 ratio between masters or journeymen and apprentices. Research should be done on how to safely and effectively increase this ratio, because according to Longstreth, “That’s a real bottleneck to how many trainees we can move through a system.” Even a 1:2 ratio would double the number of trainees who could be trained and moved into employment.

“ON-THE-JOB” VERSUS “IN-THE-CLASSROOM” TRAINING

Mark Stephenson of Vermont Energy notes that classroom training alone is not sufficient for trainees to move into the trades. “The workers we need are not front row people,” he explains. “They’re hands on folks. Smart, but in a different way. We all learn differently.” There should be more emphasis on hands-on learning and on-the-job training. Stephenson recommends that training schools collaborate with private contractors to “put together proper training programs that are hands-on and teach people what they actually need to know once on the job.” It’s important to recognize differences in learning styles and the nature of this work in order to better tailor the structure of training programs and opportunities.

MANAGING EXPECTATIONS

Paul Zabriskie of EnergySmart VT further emphasizes the importance of on-the-job learning, especially when managing expectations of weatherization trainees. He notes there is a disconnect between the idea of weatherization work and what the actual work entails. There is a big difference, for instance, between learning building science in the classroom and then going to the job site and being placed “in a monstrously hot attic at the other end of a hose that’s blowing dust.” Solely being in a classroom builds unrealistic expectations of what the job will actually entail in the field. Zabriskie believes there needs to be an accurate understanding of what the work will be while learning how to do it at the same time. He also notes that there needs to continue to be mobility and advancement opportunities for crew members. “If you don’t give your crew members advancement,” he said, “they walk.” According to Zabriskie, most energy auditors in Vermont are crew members who started “in the trenches” of weatherization work and worked their way up. However, Zabriskie is now seeing trainees who go through building science certifications and expect to move right into higher level positions, skipping the undesirable part of weatherization work. “So one of the challenges,” Zabriskie said, “is you train people, they have some history with building trades, get a building science certification... and they don’t want to go into the trenches, they want to do the puzzle.”

CERTIFICATION TESTING STRUCTURE

Paul Zabriskie of EnergySmart VT uses BPI certification to illustrate the way the structure of certifications can “miss the mark” of the demographic being trained. BPI is the certification used by energy auditors and is required by the State of Vermont to access various incentives for energy efficiency and weatherization projects. However, when Zabriskie sent staff to get certified, he realized “it wasn’t a test about their knowledge of building science, it was a reading comprehension test.” Zabriskie says he has great workers. Energy auditors, weatherization workers, and many in the construction trades don’t have to be good readers to be diligent, smart, and reliable employees. However, it seemed that the certification process was testing academic skills more than what really mattered for that job. In the end, Zabriskie says, “The certification was denied not because the workers didn’t know their stuff, but because they weren’t great at taking tests.” He notes that the process has improved since, but in his view there remains further room for improvement.

RECOMMENDATIONS FOR TRAINING PROGRAM CURRICULUM

Several companies and training organizations interviewed for this report provided recommendations on ways to finetune the structure and curriculum of training programs to better serve the energy efficiency, weatherization, and clean energy markets and those working in them.

BROAD, TRANSFERABLE SKILL SETS

While delivering legislative testimony, Richard Faesy, principal and co-founder of Energy Futures Group, was asked what weatherization workers will do when Vermont reaches its goals and there is no more work. While Faesy

emphasized that Vermont is in no danger of running out of weatherization work soon, he recommended training workers not only in weatherization, but in broader skills like carpentry. This would help enable workers to move into other carpentry-related fields if weatherization work is no longer needed. Echoing the Center on Wisconsin Strategy and the Workforce Alliance’s statement that “Many skills of the greener future are closely related to the skills of today,” Paul Zabriskie of EnergySmart VT agrees that training should be “more comprehensive than building science certifications and certificates of completion. It has to serve the whole business environment and function given the realities of people who can do this work.”

Building those transferable skills involves being able to “stack credentials,” highlighted by both Maureen Herbert of Vermont Tech and Tom Cheney of Advance Vermont as an important component of training. According to Herbert, it helps articulate what each student’s options are, so they are able to map out career paths accordingly. In addition, focusing on broad, transferable skills allows green energy to become more accessible, since it can easily be built on the existing foundation of state workforce systems. “Retrofitting American cities,” claims the Center on Wisconsin Strategy and the Workforce Alliance in a report, “requires not ‘green construction workers,’ but rather workers with traditional construction skills who also have up-to-date training on energy-efficient construction.” There’s no need to necessarily invent new programs, but rather embed green skills in already-existing curricula.

BUSINESS SKILLS

When creating curricula for energy efficiency-focused training programs, it’s important not to forget the business side of the work. Faesy of Energy Futures Group commented that business management is an important component that is not often discussed. Zabriskie of EnergySmart agrees, highlighting how important it is to train people how to be employers if businesses are to expand. “To successfully scale this industry,” he says, “we have to help people develop their business skills, help them be employers, and help them understand how to create culture.”

SOFT SKILLS

In addition to business and technical skills, “soft skills” are important. In fact, EnergySmart VT and Vermont Energy place priority on soft skills. Zabriskie of EnergySmart says he looks for soft skills more than hard skills when recruiting – for example, an aptitude for spatial awareness, a good work ethic, or behavior that is supportive of other workers. “We don’t need trained workers” says Mark Stephenson of VT Energy. “We need the right attitude and the right aptitude. We’ll train them.”

RECRUITING WORKERS FOR TRAINING

Well-tailored training programs cannot be successful without enough Vermonters enrolling in them and going on to work in energy efficiency, weatherization, or clean energy. It appears that currently the CTE schools and programs in Vermont are able to recruit and accept enough students for each organization’s capacity. Maureen Herbert of Vermont Tech says, for example, that the BPI and HVAC training programs have steady enrollment, while Thomas Longstreth of ReSOURCE notes he is finding there is usually enough interest to fill his programs. However, they both agree that companies continue to reach out seeking more trained students. It appears that at their current scale and output, the training programs are not keeping pace with the increasing demand for new workers trained for weatherization, energy efficiency, and clean energy installation work.

Part of what may be limiting the ability of training and certification programs to grow is difficulty finding staff and teachers to train the students. This then limits the amount and size of programs being offered. According to Longstreth, “There are such good opportunities for someone very skilled in construction and we aren’t always able to pay top dollar,” referring to potential trainers who would rather use their skills in more profitable ways than teaching. In addition, the retirement trend affects the amount of skilled tradespeople who are available and willing to teach courses.

WHO TO TARGET

HIGH SCHOOLS

As stated by Mark Stephenson of VT Energy Contracting and Supply, college is just one of many opportunities, and “our high schools need to be talking with kids very realistically about what these opportunities are.” Even though there has been effort in some cases to raise awareness about the trades in high school, the challenge remains to find ways to interest the students. Carolyn Weir of the McClure Foundation recounts a Department of Labor presentation to high school students about apprenticeships in the trades. According to Weir, the students could not have been less interested. “It’s hard to tell if it is because you don’t want to look interested in front of your friends, or if the way the information that’s being presented really isn’t landing,” she says. “It comes down to making sure that in our school systems students have the opportunity to have experience with blue collar trades,” says Brian Gray of Energy Co-op of Vermont. He recalls how there used to be opportunities to do woodshop or carpentry in high school, but offerings like those are now located on separate campuses and are considered separate from school itself. If the energy efficiency sector expects to recruit Vermont workers, effort will be needed to raise awareness among high school students. Simply giving presentations may not be enough, and a resurgence of incorporating technical education into high school curriculum and providing widely-known, integrated opportunities for hands-on work will be necessary.

THE UNDEREMPLOYED AND NON-TRADITIONAL LABOR POOLS

While high school graduates are the “leakiest part of the bucket,” according to Weir, “they are not the only part of the story.” The energy efficiency sector should also focus on recruiting those who are underemployed, looking to make a career transition, or have barriers of entry to the workforce. Tom Cheney of Advance Vermont noted that although Vermont has one of the lowest employment rates (if not the lowest) in the country, “it doesn’t mean people are in the employment that they want, or an employment that’s particularly lucrative or meaningful to them.” Similarly, consideration should be given to helping transition industries that are sunseting. Finally, the trades in Vermont are considered an overwhelmingly white, middle-aged, male profession, but that is far from the only demographic who can do this work. There should continue to be effort to make those of different demographics have the resources and access to training programs, and feel comfortable entering this field.

WHAT TO TARGET

MINDSET

Mindset is a barrier holding back the training pipeline. Carolyn Weir is the Executive Director of the McClure Foundation, which funds grants and incentives for workforce initiatives. The Foundation support initiatives that provide incentives for college and trade education; raise awareness of the value of college and trade educations; and promote the development of specific career pathways. Weir explains that a previous narrative - a skepticism that there were no good jobs in Vermont - has changed. There is now a strong understanding that Vermont has many well-paying employment opportunities. The challenge now, she says, is to change the narrative of what postsecondary education should look like. Colleges and training providers are working to update the image of their typical student, but there remains a stigma about the trades that must change. In the energy efficiency, career, and technical education communities, there is a general understanding of, and agreement about, an existing bias against the trades. Parents want their kids to go into a degree program, says Herbert of Vermont Tech. Gray of Energy Co-op of Vermont corroborates, explaining that parents bring this mindset to their children, wanting them to go to college and get white collar jobs, even though blue-collar jobs may provide better opportunities. “It’s looked down upon to go to tech school as opposed to taking college credit courses,” he says in an interview. Russ Flanigan notes, “People don’t realize that the trades are a really good career,” and as Tom Cheney notes, we must do a better job of showing that “it’s not college or bust.”

AFFORDABILITY

“Public perception about the affordability of college and career training is a huge issue in Vermont,” says Weir. Although the Community College of Vermont (CCV) is the most affordable college in the state, it still ranks among the highest community college tuitions in the country. This cost barrier is reflected in a survey carried out by Advance Vermont, which discovered that 88% of Vermonters who do not have a postsecondary credential believe postsecondary education is important. However, when asked if they believe it is worth the cost, the answer is “no.” “Changes in the perception of affordability can drive enrollment,” says Weir. It is important not only to find ways to make college and trade education more affordable, but to also put more emphasis on the value proposition of the investment. For example, when comparing the cost of attending a traditional four-year college with a technical school or community college, the latter is not only less expensive but can provide a specific and clear employment path going forward, sometime at a higher wage than non-trade jobs. It’s better than going into debt and then not being able to find a job out of college, emphasizes Brian Gray of Energy Co-op of Vermont. In addition, many clean energy companies and other trades companies are offering financial incentives for employees obtaining training and certifications. “Once somebody comes on board,” says Mark Stephenson of VT Energy, “we’re paying them to get licenses and training, and we’re giving them an automatic raise when they successfully complete the course.”

Case Study: Transportation Systems Academy (TSA)

Glenn McRae is the director of the Northeast Transportation Workforce Center (NETWC), which is a program embedded within the UVM Transportation Research Center. Both centers collaborated in 2008 to establish a Transportation Education Development Pilot Project, which consisted of four demonstration programs. One of those demonstration programs was the Transportation Systems Academy, run in collaboration with the Community High School of Vermont (CHSVI), VT Works for Women, two Vermont Career and Technical Education (CTE) Centers, and the Vermont Associates for Training and Development.

The goal of the Academy was to link secondary-ed students to career possibilities, notably the construction trades, while putting a focus on transportation maintenance and operations work. It also aimed to change the demographic of the very traditional white, male, middle-aged road worker, by incorporating non-traditional labor pools like:

- People under the supervision of the Correctional Department,
- Students in high school programs in corrections facilities,
- Mature workers,
- New Americans, and
- Women.

During an interview with McRae, he highlighted the importance of targeting those non-traditional pools, saying “There are large populations not represented in transportation fields that could be available for these very real job and career opportunities. You’ve got to have a set of strategies for introducing them to the possibility of that.”

The first Transportation Systems Academy (TSA) took place in the Northern State Correctional Facility in Newport, working with CHSVI. Students received basic certifications that would provide a first stage of training focusing on the essentials for being safe on the work-site, as well as providing some job-specific training units. Some basic certifications included OSHA 10, First Aid, and Flagging/Roadside Safety. In order to provide students with an advantage during the search for entry level jobs, TSA used VTTrans’ training and certification standards, in order for VTTrans to recognize the certifications and give preference to those students during their job search.

Strong partnerships were an indispensable part of the pilot, and TSA collaborated with CHSVI, VTTrans, and employers. CHSVI is the largest high school in the state, embedded within the Vermont Department of Corrections. Glenn McRae

characterized the high school as “an under-acknowledged and under-utilized resource” that provides many partnership opportunities for sectors looking to engage in workforce development. Because CHSVT already runs many CTE programs, TSA decided to build their curriculum into the already-established program, rather than creating a new, separate program. VTrans was also heavily involved, advising on specific curriculum and key certificates, as well as providing some trainers. Finally, employers were some of the most important partners, as McRae noted that “It’s one thing if you educate kids, but if employers aren’t acknowledging that, it’s really problematic.” By incorporating strong partnerships with employers, TSA was able to create pipelines from training to job.

After the pilot session concluded, CHSVT adopted the TSA program into their curriculum and made it their own. Meanwhile, the Transportation Research Center created a toolkit so other entities can adopt the program.

While talking with McRae, he noted a direction he would take the TSA if he had the opportunity to do it again, recommending that the program should be more interdisciplinary. It would still focus on the target industry, transportation in this case, but would generate fundamental skill sets that could speak broadly to several different industries. Establishing a broader curriculum is especially important when many of the students enrolled in the program have higher-than-average barriers to employment. It may disadvantage them to steer them towards very specific job opportunities. Instead, they should be able to choose from a variety of options to make sure jobs are consistently available to them. “I think that having a broad-based curriculum building a foundation of essential competencies and certifications will both attract more potential industry partners, and more potential new workers from different groups,” said McRae.

The important work of the Transportation Systems Academy touches on many aspects needed to improve workforce recruitment, training recruitment, and training curriculum challenges. These include:

1. **Targeting non-traditional labor pools** - Many of these Vermonters may experience high barriers to employment, so it is important to provide accessible training programs that will provide them with resources and opportunities for steady employment. It also helps change the demographic and build a more diverse workforce
2. **Teaching broad, transferable skills** -In order to make the green energy sector more accessible and provide steady employment opportunities to the incoming workforce, training programs should incorporate a curriculum that allows workers to transition from sector-to-sector, while still communicating the importance of the target sector, which in this case would be energy efficiency services. This both ensures that awareness is being raised about the target sector but puts workers first by allowing flexibility in their career paths.
3. **Establishing strong partnerships** - Partnerships are integral to making sure that programs are designed to meet the needs of all stakeholders involved. Partnerships can help streamline program development and make it more cost-effective by incorporating new material into already-existing programs and institutions. In addition, partnerships can help ensure workers are into jobs at the conclusion of training.

RECRUITING WORKERS FOR EMPLOYMENT

FRAMING

Successfully placing a trained worker in a job begins with job recruitment. In turn, the success of job recruitment activities depends, in part, with the way the area of work (or “field”) seeks workers, and the way positions are framed for the work needing to be done.

Weatherization work, for instance can be an uncomfortable and physically demanding job. It is also important work that helps households reduce energy bills and improve comfort, safety, and health. Several industry professionals interviewed for this report note that the trades in general can provide relatively high wages early on compared to entry-level service and retail jobs and can lead to opportunities to own one’s own business later (Weir, McClure Foundation). Currently,

weatherization work is reported to pay a minimum of \$20 per hour in Vermont. For HVAC and heat pump installation work, according to Mark Stephenson of VT Energy, positions start at \$40,000 per year, often with benefits such as health care, dental, retirement, or paid vacation. Stephenson is aware of HVAC and heat pump workers without a college degree working their way up to earning \$100,000 to \$150,000 per year. While the work may be challenging and dirty at times, Zabriskie from EnergySmart VT notes it's important to acknowledge the career path it enables and the fact that one can sustain a family, earn a livable wage, and have opportunities for advancement.

It is also important to frame the context for the work in a way that interests potential employees. Russ Flanigan of Building Energy and Paul Zabriskie of EnergySmart VT emphasize the opportunities to learn the science of buildings while doing weatherization work. Buildings are like puzzles, Zabriskie says, and weatherization workers are able to look at the puzzle and think about the way their measures will change the quality of the building. He also notes that many of his workers get to observe the craftsmanship of buildings constructed 200 years ago when people still used hand tools, which is intriguing to many.

Finally, it's important to frame the ways that energy efficiency services need not only hands-on workers in the field, but also "the bookkeepers and graphic designers of the world," says Carolyn Weir of the McClure Foundation. "We are really trying to raise awareness of those other occupations," she says, "which are really part of the larger business-to-business service sector, that are also in high demand among the same employers." For every 10 people in the field, says Zabriskie, you also need one person in the office. It is important to advertise the ways people can get involved with energy efficiency that isn't necessarily going to trades school and learning HVAC or construction.

CULTURE

The culture of a workplace may be one of the most important aspects of not only recruiting workers, but retaining them. As Dwight DeCoster of Champlain Valley Weatherization emphasized, because of the unpleasant nature of weatherization work, many employers in the field recruit based on their ability to take care of their employees and provide consistent work and strong benefits. "That's what they have to sell, because quite frankly it's not easy or fun work," he said. Tom Cheney of Advance Vermont agrees with this, noting "we've seen employers step up and be creative in filling this gap, and that trend needs to continue with the support of the State and the education and training community." Employers need to make sure that they are using techniques to stay professional and create a safe, healthy, and positive work environment for their employees.

BUSINESS ASSISTANCE COACHING

One example of an initiative to improve the quality of employers in energy efficiency is the Business Assistance Coaching Program funded by the Vermont Sustainable Jobs Fund. Geoff Robertson, the Fund's Director of Business Assistance explains how the program provides coaching to Vermont companies on new recruiting techniques and ways to be better employers and to attract and retain workers. More programs like this would be beneficial to aiding the culture employers are creating, and ways they are framing their companies. Not only can employers create a positive culture to help recruit new workers, but the relationships and culture among coworkers can also be an important part of recruitment.

WORD-OF-MOUTH

Paul Zabriskie pays existing staff to bring in new workers. "We pay up to \$1,000 for every successful referral," he says. This not only incentivizes staff to find prospective employees, but also uses the communication of existing experiences to build a strong culture among coworkers "Everybody who does this work runs into adversity," says Zabriskie. "Having a personal connection with someone who has persevered and demonstrated you can get through it, matters. Having that sense of camaraderie is critical." New workers who are able to talk to seasoned workers about the difficulties of the job and experience of the job, are reassured by a strong culture in the workplace and a supportive network of co-workers. It

doesn't matter how many certifications a new employee might have, or how well-trained they are, because "the job is about the experience," and "it always goes back to culture," says Zabriskie. One in four people EnergySmart hires don't last the first month, he explains. "The first time they're in a searing attic, the first time they come face to face with a spider the size of a meatball while bellying through a knee wall, they're done." One of the most important parts of recruitment "is the culture you're recruiting somebody into." His employees have created an atmosphere of working together, team building, and leading by example, which creates the kind of culture that enables the ability to attract and retain workers.

RETENTION

Retention is a critical component of recruitment that is often understated. It is not enough to attract a worker to a job if they don't stick with it - a problem some energy efficiency companies noted. "The limiting factor right now is being able to hire good candidates that want to stick around and learn and do this type of work," says Geoff Wilcox, administrator of the Weatherization Assistance Program. Russ Flanigan of Building Energy notes how it is becoming increasingly easy to switch jobs. That burdens his company because "we spend a bunch of time training somebody and then they're off to the next thing." Smart, targeted framing of the career pathways in the energy efficiency industry as well as creating a positive and inviting culture can have positive impact in retaining workers and make sure companies continue to invest in new hires.

PARTNERSHIPS

Partnerships between college and trade education institutions and employers are critical to successful recruitment. A pipeline that is founded on collaboration and experience and that creates a symbiotic relationship between employers, training programs, and students is key. Partnerships benefit the training programs by giving access to employers' needs so that the programs can be better designed and structured to match those needs and career tracks. Thomas Longstreth of ReSOURCE notes how they make their programs as flexible as possible "and adapt to meet employer need. We really want to be a partner for employers who are struggling to hire," he says. "Partnership needs to start in the design phase," recommends Glenn McRae of NETWC, so that the relationship between training and employment can be collaborative from the start. Partnerships benefit employers because they are able to be introduced to students and recruit directly from those in training, at a time when "demand is limitless, and the employers can't keep up."⁹ Finally, it benefits students, who are able to be introduced to the field and participate in hands-on work, as well as be introduced to companies who often hire them right out of training. According to Maureen Herbert at Vermont Tech, students know that if they take a training program, they'll get at least an interview. Vermont Tech itself has nearly a 100% placement rate for all programs, according to Herbert.

Although partnerships are a key component of recruitment and improvement of training structures, not all clean energy companies are aware of or have partnerships. In a conversation with Mark Stephenson of VT Energy Contracting and Supply (specializing in heat pumps), he expressed interest in establishing future partnerships with training organizations, something his company does not currently do. He may be representative of other companies not aware of partnership opportunities with training organizations, and provides an outreach opportunity regarding partnerships.

MISSION

A unique aspect of energy efficiency, weatherization, and clean energy work in buildings is the mission of the work. "It takes a special type of person who believes in the mission of weatherization and likes working with their hands."¹⁰ The mission is salient whether a worker is passionate about climate change, or not. If climate change is not important to the worker, providing a service for their community is. As Mark Stephenson of VT Energy says, you don't need to be into

⁹ Longstreth, Thomas. Personal interview, 30 June 2021.

¹⁰ Wilcox, Geoff. Personal interview, 15 July 2021.

efficiency, but rather into providing a valuable and high quality service for your fellow neighbors. “You go home at the end of the day, and you’ve accomplished a visible task,” he says, which is a very rewarding feeling. On the other hand, for those who do feel strongly about climate change, they can say they are part of the solution, even with all of the challenges and adversity in the work. “When you go home at night,” says Russ Flanigan of Building Energy, “you may be tired and you may be dirty, but you can say to your kids, ‘I’m part of the solution for global warming.’”

Case Study: Cover Home Repair

Cover Home Repair is a nonprofit run by Bill Neukomm, which provides free weatherization services to income-eligible Vermonters. Cover Home Repair is privately funded and is not part of Efficiency Vermont’s Efficiency Excellence Network (EEN), setting it apart from the five agencies providing income-eligible weatherization services as a part of the Weatherization Assistance Program (WAP).ⁱ While Cover Home weatherization cannot be considered comprehensive because they do not provide insulation services, they are still able to make an impact on homeowners’ energy use and efficiency by providing repairs and air sealing services. The demographic Cover Home serves is largely elderly, with many recipients living in mobile homes with Social Security income that may range from \$500 to \$2,000 per month. The organization also runs on a volunteer and DIY-based model, which provides many opportunities for workforce expansion, but also many challenges when thinking about program rules for WAP and required standards for Efficiency Vermont’s EEN.

Do-It-Yourself Weatherization

Cover Home Repair’s DIY program began during the Covid-19 pandemic. Because of the demographic served, many of Cover Home’s weatherization recipients were among the most vulnerable to the virus, with inadequate housing, old age, insufficient health care, and underlying medical conditions. “We did not want to be responsible for infecting or killing anyone in the name of weatherization,” said Neukomm in an interview. As a result, the organization switched their model and began to upload tutorial videos on their website, design weatherization checklists for their homeowners to fill out, deliver supplies kits, and provide technical support over the phone or from a six-foot distance, so that homeowners could begin to weatherize their homes themselves. Lisa Ricci, their volunteer coordinator, would take donated supplies and create customized kits based on each homeowner’s analysis of need, and afterwards would talk each homeowner through the recommended tasks. As a result, the weatherization measures from the DIY program were able to save homeowners around 100 gallons of fuel per winter, achieving the organization’s motto of “make people warmer, save a few bucks.”

Do-it-yourself weatherization was also a key component to increasing the scale of work. Normally, Cover Home can complete around 6 jobs per week for a 12-week period in the winter, but with DIY, they were able to pick up 40 to 50 additional jobs. As a result, Neukomm confidently says the program will be continued even after the pandemic subsides. DIY may also be a key component to keeping up with Vermont’s goals despite labor shortages. Neukomm believes that “if you don’t have a labor force, I think the only option is to think about how you can roll out a statewide DIY.” However, he also believes that something like that would never happen, because it would be very difficult to maintain standards. He calls into question the way these standards are structured and created while discussing the volunteer aspect of Cover Home Repair.

Volunteer-driven Weatherization

Before the introduction of the DIY model during the pandemic, Cover Home Repair based its services on a volunteer model that would have two to four volunteers weatherize a home under the supervision of a fully trained staff member. Volunteers are a great way to use the mission of weatherization as a recruitment tactic, because while not many people would want to crawl over a mobile home, there are many people who want to do something about climate change or provide services for people who may not be able to afford them. Because of the appeal of weatherization’s mission despite the uncomfortable nature of the work, Neukomm is able to recruit 300 to 400 volunteers year-round. While some of the workers may come with relevant skills, those with no skills are still able to learn all the tasks and perform

them well. Neukomm recounts volunteers ranging from salesmen from a Subaru dealership, to the senior management team from Mascoma Bank, to the thoracic surgery department from Dartmouth-Hitchcock.

Neukomm believes the success of his volunteer model calls into question the strict standards and certifications necessary for weatherization work, saying very candidly that they simply aren't necessary for the work they are doing. He wholeheartedly agrees that training is important, argues that there really isn't a need for every weatherization worker to spend the time and resources in order to achieve lofty industry standards, as long as they are being led by well-trained and certified crew members.

After speaking with Neukomm, it becomes clear that Cover Home Repair is a creative organization doing important work. Their approach suggests some issues for future consideration by those involved in workforce development for weatherization services in the future including:

1. **Breaking down the structure and standards of certifications and training** - This builds on comments from weatherization employers above about the opportunity to break down certifications so that certain aspects of energy efficiency, weatherization, and clean energy work can become more accessible to workers without the need for intensive, time-consuming certifications for all workers. An example discussed above suggested breaking down heat pump installation between electricians and installers, so the installers don't need as much training and certification as the electricians. The same approach could potentially apply for weatherization work and could potentially allow for more creative ways to solve the current and expected energy efficiency, weatherization, and clean energy workforce shortage in Vermont.
2. **Incorporating volunteer and service-learning models into energy efficiency** - More research is needed on how to develop programs that are able to use mission and service-based volunteerism to carry out energy efficiency tasks as well as provide opportunities for temporary employment opportunities.
3. **Incorporating DIY models into energy efficiency** - Similarly, more research is needed on how to incorporate homeowners in the energy efficiency process. This could help increase the number of services provided by decreasing the number of tasks done by certified and licensed professionals to only those that are completely necessary.
4. **Drawing from different labor pools to drive recruitment** - A volunteer model can not only increase the number of workers able to perform energy efficiency services, but could also introduce people in different careers to the work and may inspire them to transition permanently into energy efficiency, weatherization, or clean energy work.

RECRUITING WORKERS FROM OUT-OF-STATE

It may become necessary to look beyond Vermont for the workforce needed to meet the state's climate goals. Several companies interviewed for this report discussed the need to have an open mind and consider the options. Many also emphasized some concrete and challenging barriers to that approach. Carolyn Weir of the McClure Foundation states, "We can be thinking creatively about how to support relocation of specifically credentialed folks to this state to meet especially critical labor market needs in addition to a core strategy of investing in the talent of the people in Vermont." It is worth noting that some interviewees disagreed, and believed that focusing on those in Vermont was both an easier and more worthwhile strategy. In order to further the dialogue on the possibility of out-of-state recruitment, this next section will talk about the barriers this idea faces, as well as some local examples that may be expanded upon to be used as potential models for this effort. The examples stay within Vermont's borders, so further research is necessary to continue to search for viable models that may contribute to better feasibility of outside recruitment to Vermont, whether permanent or temporary.

When discussing out-of-state recruitment, it's important to understand that the energy efficiency sector cannot be isolated from other factors that play into employment, like being able to live in Vermont in the first place. "There's a lot

of jobs here that pay very well,” says Maureen Herbert of Vermont Tech, “but there are some barriers for people just getting here and living here - we have to think more about a comprehensive statewide policy beyond just training.”

The largest barrier to outside recruitment is affordable housing. It is not cheap to live here, says Brian Gray of Energy Co-op of Vermont, and “paying livable wages is not enough to get folks to move here.” Bill Neukomm adds that even if people were recruited from out-of-state, they would have no place to live. He cites his own residence in the Upper Valley, discussing how a studio next door rented for \$1,740 per month with no utilities and no internet.”

It is well understood that there is a shortage of affordable housing for workers in many different retail, service, agricultural, and other fields in Vermont, and it has been exacerbated recently by a phenomenon referred to as ‘Covid refugees’. Throughout the pandemic, Vermont experienced an increase of people moving to Vermont to buy property and escape the virus. However, as Maureen Herbert of Vermont Tech says, “They are a very different demographic than the one who’s going to do weatherization work.” As a result, not only are they buying and renting available property, but they are driving up the prices.

A recent Vermont Digger article noted how many affordable rental housing units have turned into short-term rentals that are largely unaffordable and impractical for working Vermonters or those looking to move to Vermont for work.¹¹ Presented below is a case study of an innovative approach underway in Southern Vermont that is developing new, energy-efficient affordable housing for workers.

Case Study: Shires Housing

Stephanie Lane is the Executive Director of Shires Housing, a Bennington organization providing affordable housing at the nexus of workforce development and energy efficiency. Shires Housing provides both rental and homeownership opportunities in energy-efficient housing units, while focusing on providing affordable housing for working Vermonters. Their eligible-income range usually includes families who earn between 30% and 80% of the state’s median income, depending on the size of the family.

Lane comments on the affordable housing problem in Vermont, citing a strong competition for very limited resources, especially when considering how Vermont is a small and rural state. Bennington, for instance, has a 0.4% vacancy rate.

The incomes Shires Housing is able to serve is dictated by the requirements of their funding sources, so they are currently not able to provide housing for a higher-paid workforce like the trades and energy efficiency sector. However, Lane comments that they would “love to see more of a mixed-income approach,” and are working to find ways to incorporate higher income brackets into their housing projects.

Shires Housing provides an example of an organization working to help Vermont’s affordable housing crisis, and important takeaways from their work include:

1. **Thinking creatively about ways to combine energy efficiency, affordable housing, and workforce development** - Shires’ values as an organization provide inspiration towards ways that the energy efficiency sector can intersect with other important issues Vermont faces. There is additional research needed on how to make sure workers who are constructing energy-efficient, affordable homes are also guaranteed affordable housing in some way.
2. **Establishing partnerships with affordable housing organizations** - Partnerships could be a key to establish the intersection of affordable housing with energy-efficiency workforce development. This could help ensure that the energy-efficiency sector is not operating in isolation, but rather part of a broader, more comprehensive workforce development plan.

¹¹ Thys, Fred. “Contractors in Stowe cannot find carpenters. Carpenters cannot afford housing.” Vermont Digger, 5 July 2021.

POTENTIAL MODELS FOR OUT-OF-STATE RECRUITMENT

CEDF Manager Andrew Perchlik suggests an intriguing model for outside recruitment involving what could be called ‘traveling tradespeople’. He mentions an example where certain companies would bring in electricians to work on a project and house them in RVs for the duration of that project. However, this model has only been used for large project and he is not sure how something like that would work in the residential sphere. The concept of temporarily housing electricians and other tradesmen trained for energy efficiency services could be worthy of additional research. Such research could investigate whether this sort of practice is feasible in Vermont, especially during the ramp up to meeting 2030 climate goals during which it is likely that Vermont’s homegrown workforce will not yet be at the capacity to handle the energy efficiency, clean energy, and weatherization work needing to be done.

Another potential model for bringing in outside, potentially temporary workers, would incorporate a service-learning and corps model. Corps programs most commonly engage young adults for certain periods of service that address various sectors or community needs, while developing their work skills and job experience. Carolyn Weir of the McClure Foundation emphasizes a renewed interest both locally and nationally in service-learning, and how it can provide a triple-benefit of skills training, helping communities, and relationship-building. Currently, the Vermont Youth Conservation Corps (VYCC) is a successful and popular program, and they have received funding for a Serve, Learn, and Earn program spearheaded by VYCC, Audubon VT, VT Works for Women, and ReSOURCE. Vermont also has a well-known AmeriCorps program, and Bill Neukomm of Cover Home Repair currently has a volunteer through the AmeriCorps program who is on a path to becoming a crew leader. Finally, research has begun on the prospect of creating a Climate Justice Jobs Corps in Vermont. The Vermont Natural Resource Council, Vermont Conservation Voters, and Stowe Energy Committee have begun developing a plan for the corps. A group of students at Middlebury College worked in partnership with these stakeholders to create a research report that goes into detail about the structure, goals, and potential funding of a Climate Justice Jobs Corps.¹² Continuing research on these corps and service-learning models may be one option for quickly and effectively ramping up work on energy efficiency services that attracts both Vermonters and those from out-of-state.

Case Study: Looking to Vermont’s Health Care Sector

Although healthcare may seem like it has little to do with energy efficiency, Vermont’s healthcare sector has been experiencing very similar issues related to workforce shortage, and their approaches can be used both as models and red flags to Vermont’s growing energy efficiency sector. A report by the Rural Health Services Task Force in 2020 cites an aging workforce, large quantity of retiring workers, and limited pool of licensed healthcare professionals as drivers of the healthcare workforce shortage, noting 3,900 nursing-related vacancies in 2020 as a low estimate.¹³

One approach for increasing Vermont’s healthcare workforce that has both benefits and drawbacks is the “traveling nurses” model. As noted earlier in this report, a “traveling tradespeople” model could be one way to expand out-of-state recruitment and temporarily fill vacancies in times of high need for the energy efficiency sector. Traveling nurses, who are hired through staffing agencies for a few months at a time and are provided with housing and food accommodations, provide critical staff support. However, they cost two to four times more, making it a financially unsustainable model. Vermont’s healthcare sector continues to look for other creative ways to expand the in-state health care workforce.

Informed by this information, a key recommendation for the energy efficiency sector regarding ‘traveling tradespeople’ is to:

- 1. Keep temporary recruitment from out-of-state as an option for times of great need, but do not rely on it as a long-term substitute for in-state workforce development initiatives** – It is recommended that

¹² “[Blueprint for a Climate Justice Jobs Corps in Vermont.](#)” Middlebury College, 2021.

¹³ “Rural Health Services Task Force.” Green Mountain Care Board, 15 January 2020.

stakeholders in the energy efficiency sector research strategies and opportunities to recruit, develop funding plans for, and engage in initiatives that obtain traveling workers as a backup plan for certain circumstances.

In their report, the Rural Services Task Force recommended a variety of strategies to expand the health care workforce, some of which are in the process of or have been put into law. Below are some recommendations that share themes with energy efficiency workforce issues. Cross-sector collaboration is advised as a way to explore incorporating these recommendations in the energy efficiency sector.

1. **Enter the interstate nurse licensure compact** - This recommendation evolved into S.48 passed by the Vermont Legislature in 2020. It will go into effect on February 1, 2022. Vermont will join 34 states in a compact that allows nurses to travel and practice from one state to another without having to relicense. It provides flexibility during recruitment and is intended to help attract healthcare workers to Vermont.
2. **Decrease barriers to employment and create career pathways, with an emphasis on non-traditional labor pools** - This recommendation address opportunities to train and recruit new workers with an eye towards reaching those with high barriers to employment. There are unrealized opportunities both in the health care and energy efficiency sectors (and possibly other sectors as well) to collaborate and learn from each other regarding this strategy.
3. **Expand apprenticeships** - The healthcare sector echoes many energy efficiency employers' calls for more in-field training, noting that there must be an emphasis on hands-on learning in order to help both the learning process and retain interest in the field.
4. **Remove some credentialing restrictions to help expand access** - The healthcare sector has noted some barriers to entry due to high credentialing requirements. This coincides with calls in the energy efficiency sector to restructure certifications in order to broaden the pool of potential workforce members and make training more accessible.
5. **Raise the H-2b cap to allow for more outside recruitment** - H-2b is a Visa program that allows nonimmigrants to perform nonagricultural labor on a temporary basis. Additional research is needed to understand how this approach may or may not be feasible for the energy efficiency sector.
6. **Take advantage of Corps programs** - The healthcare sector noted difficulty in accessing so called "Corps programs" programs due to high competition. It is clear that corps models such as the National Health Service Corps and Nurse Corps are viable and promising approaches that generate interest in these fields, address immediate and short-term workforce needs, and provide opportunities for permanent recruitment. Further work is needed to assess the applicability of this approach for the energy efficiency sector.

CONCLUSION

Throughout the interviews conducted for this report, many lessons have surfaced regarding workforce development in the thermal sector. When designing and reforming current training and certification structures and practices, it should be kept in mind to break down formal certifications, build up supervisor capacity, increase on-the-job training, manage expectations, and improve the testing structure. Training curriculum should include broad, transferable skill sets, soft skills, and business skills to prepare students more holistically for success in the field. Training recruitment should focus on shifting the mindset and improving both affordability and conceptions of affordability, while employment recruitment should incorporate smart framing, mission-based recruiting, goals for positive work culture and retention, and strong partnerships. Opportunistic recruiting pools include high school students, the underemployed and unemployed, non-traditional labor pools, and workers from out-of-state.

In addition, this report provides many areas for future research and engagement. These include:

- Developing partnership outreach programs for companies that may not have established training-to-job pipelines;

- Incorporating justice-based training programs targeted for non-traditional labor pools;
- Developing mission and service-based volunteer programs or Corps programs;
- Incorporating do-it-yourself models into energy efficiency;
- Cautiously preparing for the possible of a ‘traveling tradespeople’ program; and
- Thinking creatively about ways to combine workforce, energy efficiency, and affordable housing.

Organizations and sectors like the Northeast Transportation Workforce Center, Cover Home Repair, Shires Housing, and Vermont’s Health Care sector have incorporated programs and models that introduce or incorporate these themes and can be used as inspiration for further initiatives.

The workforce challenge is not isolated to energy efficiency, nor to Vermont. It is a daunting and challenging issue, but one in which many organizations and companies are already thinking creatively, and one that provides many opportunities both regarding the futures of Vermonters and the future of the climate.

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APPENDIX A: WORKFORCE NEED METHODOLOGY

Considerations:

- Yearly work hours, time off, and logistics assumptions are from a conversation with Paul Zabriskie of EnergySmart VT.
- The range of hours for installation / weatherization and range of workers per crew were taken from conversations with or testimonies from EnergySmart VT, Energy Co-op of Vermont, Champlain Weatherization Services, Building Energy, and VT Energy Contracting and Supply.
- The averages of most productive and least productive numbers are used for each graph.
- All final numbers are rounded to the nearest whole number.
- 2018 and 2019 are the latest up-to-date count of heat pumps and heat pump water heaters installed, and homes weatherized, so they are used as a baseline for each calculation.
- According to State Senator Andrew Perchlik, BW Research is working on incorporating a present-day count of each type of worker in an upcoming Clean Energy Industry Report, so final results may shift after that information comes out, since workers as of 2019 was an estimate calculated using the assumptions gathered.

Overarching Assumptions:

- For each type of installation, it is assumed that crews spend 100% of their working time doing those tasks.
- A worker has 1,372.8 hours available for installation or weatherization per year
 - One work week is 40 hours and one year is 52 weeks, meaning 2080 hours per year. Time off including sick days, paid vacation, or holidays is 20% of yearly hours, which leaves 1,664 hours. Logistics take up 15-20% of remaining hours, which leaves between 1331.2 and 1414.4 hours. That averaged is 1,372.8 hours on the job per year per worker.

Single-Zone Cold-Climate Heat Pumps

Least productive (hours)	10			Units per year per crew						
Most productive (hours)	16			Most productive (crew with 2)						
Total available time	1,372.8			Least productive (crew with 3)						
Least productive (crew)	3									
Most productive (crew)	2									
Year-by-year										
Year	Units	Change	Most Productive (field)	Least Productive (field)	Average (field)	Most productive (office)	Least productive (office)	Average (office)		
2018	8,262									
2019	11,012	2,750	40	96	68	4	10	7		
2020	13,771	2,759	40	96	68	4	10	7		
2021	16,549	2,778	40	97	69	4	10	7		
2022	19,352	2,803	41	98	69	4	10	7		
2023	22,188	2,836	41	99	70	4	10	7		
2024	25,066	2,878	42	101	71	4	10	7		
2025	27,993	2,927	43	102	72	4	10	7		
2026	33,664	5,671	83	198	140	8	20	14		
2027	41,076	7,412	108	259	184	11	26	18		
2028	50,764	9,688	141	339	240	14	34	24		
2029	63,427	12,663	184	443	314	18	44	31		
2030	79,979	16,552	241	579	410	24	58	41		
Yearly Average										
Year	Units	Change (overall)	Change (per year)	Most productive (field)	Least productive (field)	Average (field)	Most productive (office)	Least productive (office)	Average (office)	
2019	11,012									
2030	79,979	68,967	6,270	91	219	155	9	22	16	

Multi-Zone Cold-Climate Heat Pumps

Least productive (hours)	20			Units per year per crew						
Most productive (hours)	30			Most productive (crew with 2)						
Total available time	1,372.8			Least productive (crew with 3)						
Least productive (crew)	3									
Most productive (crew)	2									
Year-by-year										
Year	Units	Change	Most Productive (field)	Least Productive (field)	Average (field)	Most productive (office)	Least productive (office)	Average (office)		
2018	5,508									
2019	8,436	2,928	85	192	139	9	19	14		
2020	12,002	3,566	104	234	169	10	23	17		
2021	16,271	4,269	124	280	202	12	28	20		
2022	21,316	5,045	147	331	239	15	33	24		
2023	27,223	5,907	172	387	280	17	39	28		
2024	34,085	6,862	200	450	325	20	45	32		
2025	42,007	7,922	231	519	375	23	52	38		
2026	50,517	8,510	248	558	403	25	56	40		
2027	61,640	11,123	324	729	527	32	73	53		
2028	76,179	14,539	424	953	688	42	95	69		
2029	95,182	19,003	554	1246	900	55	125	90		
2030	120,021	24,839	724	1628	1176	72	163	118		
Yearly Average										
Year	Units	Change (overall)	Change (per year)	Most productive (field)	Least productive (field)	Average (field)	Most productive (office)	Least productive (office)	Average (office)	
2019	8,436									
2030	120,021	111,585	10,144	296	665	480	30	67	48	

Heat Pump Water Heaters

Least productive (hours)	8			Units per year per crew						
Most productive (hours)	10			Most productive (crew with 2)						
Total available time	1,372.8			Least productive (crew with 3)						
Least productive (crew)	3									
Most productive (crew)	2									
Year-by-year										
Year	Units	Change	Most Productive (field)	Least Productive (field)	Average (field)	Most productive (office)	Least productive (office)	Average (office)		
2018	9,510									
2019	11,036	1,526	18	33	26	2	3	3		
2020	15,369	4,333	51	95	73	5	9	7		
2021	19,493	4,124	48	90	69	5	9	7		
2022	24,697	5,204	61	114	87	6	11	9		
2023	31,262	6,565	77	143	110	8	14	11		
2024	39,547	8,285	97	181	139	10	18	14		
2025	50,000	10,453	122	228	175	12	23	18		
2026	64,372	14,372	168	314	241	17	31	24		
2027	84,131	19,759	230	432	331	23	43	33		
2028	111,297	27,166	317	594	455	32	59	46		
2029	148,648	37,351	435	816	626	44	82	63		
2030	200,000	51,352	599	1122	860	60	112	86		
Yearly Average										
Year	Units	Change (overall)	Change (per year)	Most productive (field)	Least productive (field)	Average (field)	Most productive (office)	Least productive (office)	Average (office)	
2019	11,036									
2030	200,000	188,964	17,179	200	375	288	20	38	29	

Weatherization

Least productive (hours)		70	Units per year per crew							
Most productive (hours)		120	Most productive (crew with 2)		19.6					
Total available time		1,372.8	Least productive (crew with 2)		11.4					
Least productive (crew)		5								
Most productive (crew)		4								
Year-by-year										
Year	Units	Change	Most Productive (field)	Least Productive (field)	Average (field)	Most productive (office)	Least productive (office)	Average (office)	Energy Auditors	
2018	27,186									
2019	29,289	2,103	429	919	674	43	92	67	23	
2020	32,269	2,980	608	1302	955	61	130	96	33	
2021	36,492	4,223	861	1846	1354	86	185	135	47	
2022	42,476	5,984	1221	2615	1918	122	262	192	66	
2023	50,956	8,480	1730	3706	2718	173	371	272	94	
2024	62,972	12,016	2451	5252	3851	245	525	385	134	
2025	80,000	17,028	3473	7442	5458	347	744	546	189	
2026	95,776	15,776	3218	6895	5056	322	690	506	175	
2027	110,392	14,616	2981	6388	4685	298	639	468	162	
2028	123,933	13,541	2762	5918	4340	276	592	434	150	
2029	136,479	12,546	2559	5483	4021	256	548	402	139	
2030	148,102	11,623	2371	5080	3725	237	508	373	129	
Yearly Average										
Year	Units	Change (overall)	Change (per year)	Most productive (field)	Least productive (field)	Average (field)	Most productive (office)	Least productive (office)	Average (office)	Energy Auditors
2019	29,289									
2030	120,021	90,732	8,248	1682	3605	2644	168	361	264	92

APPENDIX B: EXAMPLES OF CURRENT TRAINING PROGRAMS

ReSOURCE Programs:

Youth Build

Youth Build is a ReSOURCE program that targets 16 to 24 year-olds who have dropped out of high school. It is a year-long program, and results in each trainee receiving their high school degree, an Occupational and Safety Hazard (OSHA) 10 certification, and a National Center for Construction and Education Research (NCCER) certification, as well as placement in a job. According to Longstreth, trainees in the program spend half of their time in the classroom and the other half at a job site. “They’re learning construction skills while doing affordable housing construction, weatherization work, and other public service-type improvements.”

Construction 101 and Weatherization 101

Each of these programs provide six weeks of intensive training. Although six weeks may seem short, this duration has proven to be sufficient since many employers are providing much of the training themselves on the job site. According to Longstreth, “If we can get someone NCCER-certified with broad construction skills, those with an interest in becoming an electrician or heat pump specialist could move into that pretty easily... If they want additional training and show aptitude, it seems like the employer is willing to do that training on the jobs.” The programs provide students with a stipend to increase the ability to enroll and also include a focus on “soft skills” like professionalism and worker safety. Each trainee is placed with an employer for the last two weeks and trainees are often hired by the employer at the end of the program.ⁱⁱ

Vermont Technical College Programs:

Apprenticeship Programs

CEWD specializes in developing apprenticeships during which students are employed by a company while simultaneously receiving related instruction and mentorship. Apprenticeships often lead to certifications and licensure for the employees. The electrical and plumbing program is consistently the most popular for apprenticeship opportunities.

BPI Certification

This hands-on, 40-hour course includes a four-hour online exam, and a one-hour field exam. Hebert clarified it is “next-level” training not entry-level training, noting that other centers offer introductory weatherization training in order to get started in such work before moving onto BPI certification.

Advance Vermont Resources:

MyFutureVT

MyFutureVT.org is a newly-created career database that contains career resources in one place so potential students can compare training programs. Because the database is newly developed, there are no results yet on the effectiveness of the resource. However, Advance Vermont is tracking metrics and intends to determine whether certain clicks on training programs are leading to increased enrollment in the programs.

Vermont Works for Women Programs:

Weatherization Program

Vermont Works for Women used to have a weatherization program that trained formerly incarcerated women or women on probation and parole in basic weatherization skills using on-the-job training. The women would earn certificates and typically move on to obtain contracts and jobs. Unfortunately, this offering was not financially viable and is no longer in operation.

Trailblazers

Trailblazers is now the organization’s training program for the construction trades. In addition, Vermont Works for Women uses their network to refer students to apprenticeships and to on-the-job training programs with private companies.

¹ The 5 agencies are: Capstone, Champlain Valley, BROCC, SEVCA, and NETO

ⁱⁱ A precursor to these programs was a year-long training and community service program that graduated 25 to 30 trainees per year. Since this was not meeting the demand, Construction and Weatherization 101 were developed instead.