Holding out for a HERO (Home Energy Retrofit Occupation): Lessons Learned from the Oregon Workforce Training Ecosystem

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ABSTRACT

With the Inflation Reduction Act (IRA) placing a significant focus on energy efficiency improvements in existing residential buildings, many states are facing the realization that their state lacks both an adequate residential energy efficiency workforce and a cohesive understanding of the means for developing that workforce quickly. Developing a statewide residential workforce ecosystem requires a range of considerations, including:

- Working to bring new entrants into the residential energy industry
- Upskilling existing residential contractors on energy efficient equipment installation techniques
- Developing relationships with community-based workforce development organizations
- Connecting existing workforce training programs and organizations with specialized energy efficiency trainers and curriculum
- Delivering training designed to meet the needs of historically underinvested communities and which creates more equitable societal and climate outcomes
- Braiding funding from city, state, and utility partners to meet multiple goals
- Identifying priority workforce needs and career pathways that align with industry-vetted training/credentials
- Ensuring jobs offer "high road" outcomes that provide quality, equitable, well-paid employment with clear advancement opportunities
- Creating and/or connecting workers and employers to, and through, online resource hubs

Due in part to investments made by Energy Trust of Oregon and the passage of a localized "Green New Deal" program called the Portland Clean Energy Fund in 2018, residential energy workforce training programming has gotten a head start in Oregon. This paper details the multiple, connected workforce training initiatives and strategies that have been undertaken since 2018 to help ensure that a diverse, well-trained residential energy workforce is ready to meet the demand for energy efficiency retrofits created by both local and federal investments.

Introduction

Like many sectors of the clean energy economy, the residential energy industry has entered a transformational phase. Increasing support for climate action has been met by unprecedented levels of investment in energy efficiency interventions and smart grid enabled technologies for the average American home. At the same time, there are general workforce shortages in the broader building industry and a wave of retirements in key trades is expected as

part of the anticipated 'silver tsunami'[1]. These factors threaten the effective implementation of key climate programs and the promise of the clean energy economy. To accelerate growth of the residential clean energy sector and meet climate goals and imperatives, workforce challenges must be preempted and addressed proactively with forethought. The dynamic of many older workers retiring will provide the challenge and opportunity to replace a predominately white/male industry with a trades workforce that is younger and more diverse. This is especially true when considering how to best create opportunities for accessible career pathways for disadvantaged populations that are often left out of technology transitions and economic prosperity.

Rigorous workforce training initiatives and strategies are needed to help ensure that a diverse, well-trained residential energy workforce is ready to meet the demand for energy efficiency retrofits created by inherent market forces and both local and federal investments. The Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) both prioritize energy efficiency improvements in existing residential buildings. Federal, state, and local entities are facing shortages of both an adequate residential energy workforce and a cohesive understanding of the means for developing that workforce in a relatively short period of time.

Based on our review of clean energy workforce training initiatives nationally, local gap analyses, and practical experience designing and implementing our own workforce training initiatives, this paper asserts that a successful residential energy workforce ecosystem requires a range of considerations, including:

- Working to bring new entrants into the residential energy industry
- Upskilling existing residential contractors on energy efficient equipment installation techniques
- Developing relationships with community-based workforce development organizations
- Connecting existing workforce training programs and organizations with specialized energy efficiency trainers and curriculum
- Delivering training designed to meet the needs of historically underinvested communities and which creates more equitable societal and climate outcomes
- Braiding funding from city, state, and utility partners to meet multiple goals
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This paper investigates the progress and challenges we face as a nation in developing a residential clean energy workforce, considers key learning from multiple jurisdictions, and illuminates progress made in one specific locality and within one specific state. Ultimately, this paper provides a high-level roadmap of key areas to consider when planning, developing, and delivering workforce training that can help expand the capacity of the home retrofit contracting

[1] According to a recent Oregon Department of Energy (ODOE) report, "workers and business owners with expertise in electrical, HVAC, and plumbing work are older than the average age of workers in Oregon and nearing retirement age" and "Oregon may lose current firms due to this demographic trend."

industry. Before delving into key considerations and approaches for new worker program development, the paper describes a recently developed *Home Energy Retrofit Occupations (HERO) Academy* in Oregon, which can serve as an example of an equity-centered, job-readiness, work-based training program that offers a streamlined pathway into residential construction careers.

Background

Construction industry employment is poised for significant growth, with the Northwest expected to see 53% of the growth coming from within 'Residential Shell' jobs (including weatherization technicians), 6% within 'Residential HVAC' jobs (including heat pump installers), and 9% within 'Residential Other' jobs (including residential energy auditors and water heater installers) (CETI 2023, 3-4). Oregon recently adopted a goal of installing 500,000 heat pumps by 2030 and has identified HVAC installation and maintenance occupations as a key occupation and priority for workforce development (Oregon HB 3409 2023, 2).

Workforce training has been a central tenant of Earth Advantage's mission since its inception in 2006. As a mission-based nonprofit organization focused on moving the residential construction and remodeling industry to more energy efficient practices, it is essential to educate the tradespeople who are in the field performing this work. While much of the focus originally was on upskilling existing contractors and builders, training has evolved to address the growing need of drawing new entrants to this industry. In part, this evolution was informed by a sequence of analyses from 2020-2023 in the Portland, Oregon metropolitan area and across Oregon. This research identified gaps in training delivery and opportunities to make stronger connections between workforce development trainings, workforce programs/providers, participant career pathways, and municipal, state, and utility funders. It highlighted the perspectives of industry training and union organizations, and provided insight into the existing barriers that prevent new workers from entering and/or succeeding in the construction and solar industries, especially lower income, people of color and women.

In Portland, Oregon, there are a number of strong construction workforce training programs focused on preparing new workers for jobs in the overall construction industry. However, a majority of workers in these programs go on to union apprenticeship programs and often end up working in commercial construction, which creates a gap in the number of workers who commit to residential construction. Earth Advantage and its partners seek to develop and communicate career pathways for residential clean energy jobs that are clearly identifiable and attractive to those looking for a stable career with good prospects for advancement and growth. One challenge of residential sector jobs is the lower pay rates and fewer apprenticeship opportunities available as compared to the commercial trades, and this dynamic is part of the reason that programs like the HERO Academy will bring value to the residential sector.

New Worker Demand

While the residential construction industry is poised for growth, the workforce is in decline, with approximately 41 percent of the current construction workforce retiring by 2031 (NCCER 2017). The construction workforce is currently composed of a majority demographic that is white and male, with a median age of 42 years old. Approximately 26% of current

workers are over the age of 55 and will be retiring in the coming years (BLS, 2024. Labor). The residential construction industry provides ample opportunities for workers to earn a living wage without the need to attend college for multiple years or take on significant debt. This means that historically and currently, BIPOC and women are left out of this career sector, and an opportunity exists to balance the scales for the next generation of workers.

Many workforce programs exist to provide participants from Black, Indigenous, People of Color (BIPOC) communities with a clear pathway for entering the commercial sector through pre-apprenticeships, apprenticeships, and unions. For example, the Portland-based Oregon Tradeswomen and Constructing Hope pre-apprenticeship programs have agreements with UA Local 290 (Plumbers & Steamfitters), the International Brotherhood of Electrical Workers, and several other local union chapters to offer direct entry, allowing their graduates priority start dates for paid apprenticeships in these unions.

Wage differences between residential and commercial sectors also play a key role in employment discrepancy. Commercial construction companies depend on union labor to fill critical roles, and the collective bargaining power of unions has led to the Davis Bacon and related acts that establish prevailing wages for workers on government contracts. The difference is significant between prevailing wage rates and regular median wages, making jobs that offer prevailing wages very appealing for workers. According to the Bureau of Labor Statistics, the median wage for a carpenter in Oregon working on residential construction is $26.38 hourly, median wages for a carpenter in commercial construction is $29.72 hourly, and prevailing wages for carpenters working on government projects in Oregon is $45.80 (BLS, 2024. Nonresidential) (BLS, 2024. Residential) (BOLI, 2024). Residential companies are typically much smaller in scale and unable to qualify for government construction contracts, which means residential workers are not eligible for the higher prevailing wage rates available to commercial construction workers.

In contrast to these types of commercial sector opportunities, the lack of a clear pathway and support network to guide participants towards the residential industry has been recognized as a barrier. This is especially true for participants from populations that have been historically underrepresented and/or do not have direct connections to employers within the industry. A deliberate and concerted effort is needed to close this training gap and build community relationships that support a clear pipeline for trainees to enter safe and inclusive working environments within the home energy retrofit industry to meet climate and equity goals.

New Worker Program Development: HERO Academy

Earth Advantage's *Home Energy Retrofit Occupations (HERO) Academy* is a recently developed new worker training program based in Oregon that incorporates many of the approaches and best practices outlined in this paper. This program is an outgrowth of a multi-year process of implementing and evaluating residential workforce training offerings for new workers from historically disadvantaged communities, including but not limited to people of color, low-income residents, LGBTQIA+, women, and individuals coming from the criminal justice system. The HERO Academy leverages and builds upon the success of local pre-apprenticeship programs to move diverse participants from unemployment and/or low-income jobs to home energy efficiency careers.

The HERO Academy utilizes a Work-Based Learning (WBL) model, which according to U.S. DOE is "a training approach that illustrates a streamlined approach to supporting career pathways for trainees and workers… (that) combines paid on-the-job training (OJT) with formal classroom or online instruction that is aligned closely with employer needs (DOE, 2023)." Pre-apprenticeship graduates can participate in the HERO Academy as a viable next step training opportunity that offers trade specialization job-readiness training, industry-recognized certifications, work-based learning experiences, and a direct pathway into job placement with guaranteed wages within the residential Energy Auditing, HVAC and Water Heating industries. The HERO Academy aims to addresses some of the challenges of recruiting and retaining new workers within the residential industry in part by offering a shorter, more intensive program that focuses on energy auditor, air source heat pump, and heat pump water heater "energy/installation specialist" pathways instead of generalists in the trade. These career pathways were selected based on in-depth market research that demonstrated high worker demand, significant carbon reduction benefits, and increased probability of "high road" outcomes offered by these trades. This first iteration of the HERO Academy will implement training and grow the workforce within these specialized pathways, and Earth Advantage anticipates there will be opportunities to add additional home retrofit career pathways in the future.

The HERO Academy job-readiness training program is designed to help disadvantaged populations move into these energy efficiency careers through advanced skill building combined with OJT. The program will engage and involve contractor employers who have specific hiring needs for new entry-level workers and can provide OJT, ensure safe and inclusive workspaces, and commit over the long-term towards hiring and supporting the advancement of workers not traditionally represented in the residential construction sector. The program benefits employers by offering an opportunity to more easily onboard and integrate a new employee who brings with them wage and tool stipends, wrap around services, career coaching, and on-the-job training support. Through the program, employers are also able to provide their existing workers with specialized industry-recognized certifications and in-field mentorship training, which allows the dual opportunity to upskill their current workforce while also expanding their workforce.

The HERO Academy provides a holistic work-based learning program that addresses the need to decarbonize Oregon's housing stock, promote equitable workforce development, and advance racial and social justice. The remaining sections of this paper provide an exploration of program development best practices that went into the design of the HERO Academy and that can provide a roadmap of key areas for consideration.

Key Considerations for New Worker Development

This paper outlines key considerations to new worker development that have been identified over several years of industry research and workforce training experience. Many of the approaches have been successfully implemented by workforce development training programs delivered across the country and were identified through participation in the U.S. DOE Better Buildings Workforce Accelerator. This collaboration unified stakeholders with the aligned goal of creating the conditions that allow new workers from historically underinvested &/or underrepresented populations to succeed in the residential construction industry.

Workforce development programs that aim to bring new workers into the residential home retrofit workforce will benefit from evaluating and prioritizing the following areas which are explored further within this paper:

- Employer Engagement
- Community Partnership Development
- Industry Exposure & Recruitment
- Career Pathway Development
- Entry-Level Training
- Job-Readiness Training
- Work-Based Learning
- "High Road" Outcomes

Before initiating such efforts, a program would need to perform market research to analyze the need for, and potential viability of, any new workforce development training program addressing the home retrofit sector. In addition, a program should also ensure they've identified and documented job seeker dynamics, including current and potential future barriers to entry, necessary outreach, resources and support mechanisms, and factors that lead to success, particularly among historically underrepresented groups. These deep dives are beyond the scope of this paper.

Employer Engagement

Employers in the home retrofit industry have long been looking for effective avenues and opportunities to hire entry-level new workers who are reliable, trainable, have good work ethic, and are motivated to work on upgrading our existing housing stock. According to the U.S. Department of Energy (DOE), the top reasons that residential building employers have cited for experiencing hiring difficulty are: competition / small applicant pool (most common reason); lack of experience, training, or technical skills (second most common); and insufficient non-technical skills (third most common) (DOE 2023, 154). While employers in the residential construction industry often cite workforce shortages and hiring demands as an impediment to their business' success, they also often admit they don't have the time or clarity as to how they can meaningfully participate in workforce development programs.

A critical component of any successful workforce development training program is employer and industry engagement. Ideally this takes place early and often throughout the program and invites contributions towards program design and curriculum to ensure the program meets specific workforce needs. Workforce development programs must take proactive steps to identify and understand employer and industry needs to design effective programs that prepare trainees to be job ready. This engagement can take the form of an employer advisory board, industry survey, or one-on-one interviews. Programs should first engage employers who have a vested interest in workforce development (e.g. those with workforce needs and a commitment to energy efficiency and social equity) and aim to build trust by ensuring their input and feedback contributes towards successful program and hiring outcomes. Minority and women-owned contractors working in energy efficiency should also be prioritized because they are more likely to provide inclusive working environments, and access to new worker trainees can benefit their

businesses. Employer recruitment can be accomplished by communicating workforce training and hiring opportunities via established contractor networks (particularly those serving minority contractors) and performing direct outreach to contractors. Job fairs, networking events, jobsite tours and on-site trainings are some engagement events used to connect with contractors. Employers need workforce development training programs that can provide a clear pathway to access highly trained job candidates to satisfy workforce needs, diversity goals, and build capacity to take advantage of increasing demand for home energy upgrades.

Once fully engaged in the program, employers should then make a commitment to participate in, and hire job candidates from, the workforce development program. This can be accomplished by signing a participation agreement, such as a Community Benefit Agreement (i.e., community workforce agreement, economic opportunity plans) that specifies requirements regarding wages, benefits, working conditions, job quality, incentives, support services, and more. An example of this type of agreement can be found within the Portland Clean Energy Fund (PCEF) program's Workforce and Contractor Equity Agreement. This type of agreement can lay out clear expectations and a roadmap to create equitable opportunities and jobs. If funding allows, employers may be further incentivized to host and hire trainees by offering wage offsets or other financial benefits for their participation.

Community Partnership Development

Partnerships allow programs to access a broader range of resources, expertise, and networks and can offer opportunities to tap into diverse perspectives, knowledge, and support systems. Partnerships can also provide valuable insights into the specific needs and challenges faced by different communities and industries, ensuring that training programs are tailored to meet those needs effectively. Collaboration with regional workforce boards, committees, and advisory groups dedicated to construction industry workforce development can offer opportunities to leverage combined efforts and further enhance alignment and coordination in addressing workforce gaps. Community-based organizations (CBOs) often have established relationships and trust within underserved or marginalized communities, making them essential partners in facilitating outreach and recruitment efforts to reach and engage potential trainees. It is critically important that these relationships are cultivated with cultural competency and allow for authentic engagement throughout the collaboration process. This includes identifying and understanding needs, actively seeking input, involvement in decision-making, and respecting expertise and lived experience. Programs will also want to ensure that the collaboration is mutually beneficial and allocates resources equitably between the CBOs and the workforce development program in recognition of the strengths and assets that each partner brings to the table. By working together in this way, programs can develop culturally competent recruitment strategies and provide targeted support services to ensure the participation and success of all trainees, regardless of background or circumstance.

Notably, partnerships facilitated through programs like PCEF have proven instrumental in connecting workforce training organizations to diverse communities. In doing so, programs have been developed with the aim of addressing cultural and linguistic barriers faced by BIPOC populations. One such program is a workforce training partnership between Earth Advantage and LatinoBuilt to offer a *Sustainable Homes Professional (SHP)* training designed to serve Latinx contractors looking to enter the home retrofit industry (DOE, 2024). This two-year contractor

development project will provide up to 32 Latinx-owned businesses with technical training and ongoing 1:1 mentorship support. The training is Latinx-led, offered in both English and Spanish, and addresses common barriers that Latinx owned businesses face. Another Earth Advantage partnership is with five Portland-based pre-apprenticeship training programs to offer *Introduction to Sustainable Homes & Careers* training for new workers, which has created awareness of the careers in residential construction for over 850 trainees from diverse backgrounds. It's through these types of collaborations that train-the-trainer opportunities can offer a promising strategy, allowing for culturally specific and bilingual training delivered by trusted minority contractors/associations that can foster more inclusive training environments.

Coordinating with local industry training centers is another crucial step in the success of a workforce development training program. These training centers can serve as hubs of expertise and resources within their respective industries, providing access to technology labs and facilities, specialized equipment, and experienced instructors. By partnering with these centers, workforce development programs can leverage their existing infrastructure and knowledge base, ensuring that training is aligned with industry standards and best practices. As a byproduct of this type of collaboration, trainees often have a higher likelihood of networking and connecting with professionals and employers in their field of interest. These connections can lead to valuable mentorship, job placement opportunities, and a deeper understanding of industry expectations and trends. Additionally, these centers can often deliver career coaching and job development support services as well as host industry events, workshops, and job fairs, providing trainees with exposure to real-world scenarios and potential career paths.

Industry Exposure & Recruitment

Industry exposure and recruitment strategies are paramount for addressing workforce challenges and fostering diversity in the construction sector. A critical aspect is combatting the misconception that construction trades are less prestigious or financially rewarding than professions requiring a college degree. This stigma undermines efforts to attract new workers and must be addressed collectively to appeal to a younger and more diverse talent pool. To achieve this, it's imperative to highlight the benefits of a career working in the home retrofit and weatherization sector, including the variety of daily tasks, problem-solving opportunities, advancement and entrepreneurial potential, and pathways to business ownership. Even more important, the industry must do a better job at providing social context and telling the story of community impact as a means of inspiring workers to enter this industry.

Younger audiences seek opportunities to make a meaningful and positive impact on their community, and the industry would benefit from reframing the work to align with community benefits. Following Earth Advantage training, pre-apprenticeship graduates complete a training evaluation and regularly comment on the level of inspiration they have from learning about the opportunities available to make direct impact in their communities. Below are past responses from youth workforce development trainees upon completion:

- *"I found this valuable because I knew this work was a thing, but learning more about it made me want to know more and become a part of this community."*
- *"I want to work for [the Tribes] in the future for housing projects they have planned and if I can bring this training into that I would make better homes for my community."*

- *"What this training has introduced to me is life changing. Right now, I'm the happiest I've ever been in terms of my working life. There are so many opportunities out there, and I'm really interested in pursuing home energy audits. I feel like that could open some really awesome doors in the future."*

Outreach efforts must begin early, targeting youth in middle and high schools to dispel misconceptions and showcase the opportunities in clean energy careers. Career counselors need to be equipped with accurate information and training to guide students effectively. Outreach efforts should also be culturally sensitive and inclusive, providing information and resources in native languages and engaging with community-based organizations for effective grassroots outreach. This can also be accomplished by leveraging the creation of video content and social media campaigns with construction industry influencers and culturally-specific ambassadors, members of a race or cultural group already trained and working in the industry who can help build awareness of these careers in their community, facilitate outreach and recruitment, and potentially even lead full trainings in native languages.

Career Pathway Development

Career pathway development is an integral step in the development of an effective workforce training program. Providing clear pathways to get into, as well as advance within, the residential industry is essential for individuals looking to start their career. While commercial construction has long had well-established union/apprenticeship programs and pathways, the residential market lags behind, presenting both a current weakness and a future opportunity.

The lack of defined pathways in residential green building poses a significant barrier to developing a strong clean energy workforce. Workforce programs should perform analysis and planning in order to develop their locally applicable career pathways and guidance for trainees. As an example, the City of Portland has created a city-wide mandate that requires a Home Energy Score (HES) be produced for all homes that are publicly listed and sold, and as a result, the demand has increased for trained and credentialed workers who can perform a HES Assessment. This policy created the necessary conditions to allow for HES Assessor jobs to become an entry-level starting point for new workers to then pursue additional Home Energy Rating pathways, such as Energy Auditors, HERS Raters, and beyond.

Residential career pathways should prioritize positions with "high road" potential (see 'High Road Outcomes' section for more info) and clearly outline how increasing levels of expertise can be demonstrated through the progressive completion of industry-recognized training and credentials. Including pathways that encourage workers to advance into supervisory roles (project manager, crew leader, etc) and eventual business ownership in the home retrofit sector, as well as crossing over into new construction, will help ensure trainees understand the benefits that residential construction can provide.

To address these challenges, Earth Advantage collaborated with industry stakeholders to perform this analysis, which ultimately led to the development and launch of the Oregon Residential Construction Career Hub.[2] This online workforce development platform offers up-to-date career pathways, industry-recognized training, and credential information, along with

[2]Oregon Residential Construction Career Hub: https://residentialcareerhub.org/

statewide job listings and employer engagement opportunities. The career pathways on the Hub serve as an invaluable resource for trainees looking to enter energy efficiency careers within the residential construction industry. Each pathway offers descriptions for primary positions of need, required or optional trainings/credentials, salary ranges, benefits, challenges, and links for further information or training registration. Figures 1 & 2 illustrate localized career pathway analysis.

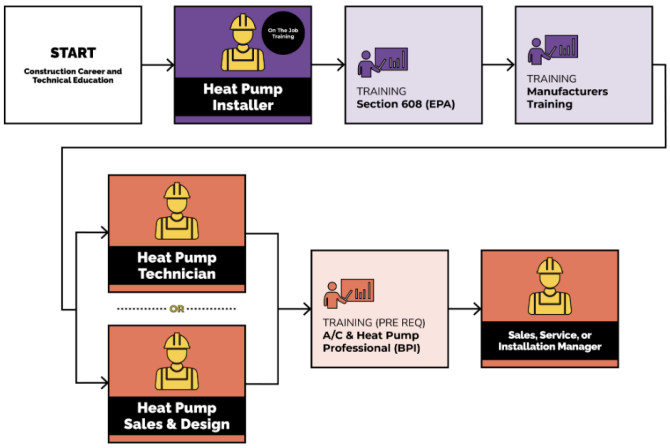

Figure 1. Career Pathway for Heat Pump Installers. *Source:* Oregon Resid. Construction Career Hub 2024.

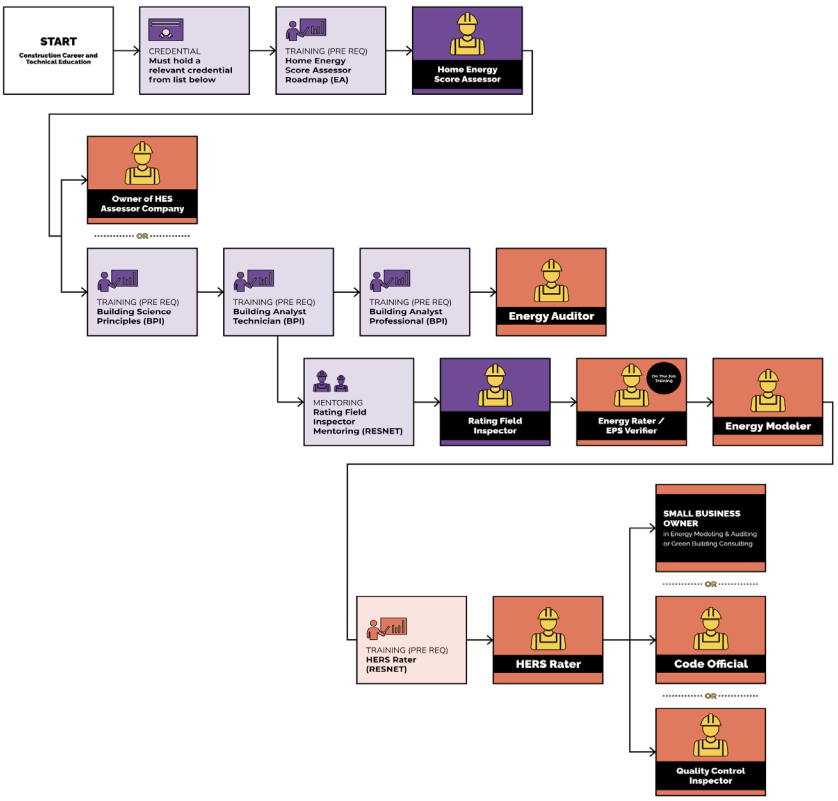

Figure 2. Career Pathway for Home Energy Score Assessors, Energy Auditors, Rating Field Inspectors, and HERS Raters. *Source*: Oregon Residential Construction Career Hub 2024.

This type of localized and accessible information enables career coaches and trainees to gain better clarity on the opportunities available, and to request more detailed career navigation guidance. There are several nationally applicable online career resource hubs that focus on the residential construction industry which can be leveraged towards these efforts, such as Green Workforce Connect[3], Green Buildings Career Map[4], and HVAC Career Map[5] websites.

Entry-Level Training

The residential construction industry would benefit from better pathways for individuals to go from high school student to tradesperson with a clear description of work environments and prospective income. In the 2022-2023 school year, over 6,000 Oregon youth did not remain enrolled in high school because of struggles with traditional coursework and challenging life situations; it is important to find ways to help these youth earn diplomas and access positions in the trades that support on-the-job learning and instruction (ODE 2023). Many pre-apprenticeship programs offer alternative GED instruction and opportunities to support this population.

Pre-apprenticeship training programs that focus on general construction-related careers already exist in many urban areas across Oregon. They offer foundational construction training and wrap-around services designed for historically underinvested communities. These programs are approved by the Oregon Bureau of Labor & Industry (BOLI) to provide core construction skills and employment readiness training. Pre-apprenticeship and apprenticeship programs have proven to lead to improvement in worker diversity in the union trades, seeing a 55-57% increase in enrollment of women and people of color from 2011-2020 (Petrucci 2021, 4).

To date, these programs have primarily focused on union apprenticeship and commercial industry outcomes but are well-positioned to expand their training programs to incorporate residential energy efficiency training. By partnering with the organizations who can offer energy efficiency training instruction, industry connections, and career pathway expertise, pre-apprenticeship programs can easily become equipped to connect trainees to the clean energy industry. Earth Advantage has developed a foundational building science and career pathway training curriculum. We have partnered with these existing programs across Oregon to embed our product into their existing programs. Graduates of these 2-5 day trainings gain an understanding of job opportunities in residential green construction, and are then recruited into more advanced training, mentorship, and scholarship opportunities.

Job-Readiness Training

While pre-apprenticeship and other entry-level training can serve the purpose of providing participants with a solid foundation in construction, a next step training program that can serve as a bridge is needed to provide trainees with clear career pathways into the residential construction field. This type of job-readiness technical training program should offer specialized training in careers that can offer livable wages that are competitive with union apprenticeships. To support inclusivity and diversity goals, such programs should prioritize employer

[3] Green Workforce Connect: https://greenworkforceconnect.org/
[4] Green Buildings Career Map: https://greenbuildingscareermap.org/
[5] HVAC Career Map: https://hvaccareermap.org/

engagement, financial incentives (wage offsets, tool stipends, etc.), and provide direct entry into employment and/or work-based learning (e.g. on-the-job training or apprenticeship models).

Leveraging diversity, cultural competence, and subject matter expertise among training partners and instructors helps to ensure that the program is culturally responsive, geographically specific, and technically proficient. Offering training at no cost, and ideally providing training stipends, addresses the financial barriers faced by low-income individuals, enhancing accessibility. By addressing historical disparities in access to training opportunities, workforce training initiatives will contribute to restorative justice and promote equity in the workforce.

Core components of the training program should include practical hands-on learning (to keep trainees engaged), industry credentials, and wrap-around services to support new workers as they transition. Accommodating different learning styles is essential. Many individuals thrive through job simulations and hands-on demonstration/lab experiences rather than traditional classroom instruction. Partnering with manufacturers to ensure product-specific training, incorporating on-site learning experiences, internships, and mentorships will ensure practical skill development. Cross-training should also be emphasized to provide trainees with a diversity of skill sets. This will enable them to adapt and pivot their services to different sectors, as needed, to respond to fluctuating funding cycles in energy efficiency programs. Training should not only cover fundamental knowledge and practical skills, but also include elements such as workplace expectations, jobsite safety, communication, problem-solving, conflict resolution, resume writing, interviewing, and customer service skills that will enhance participants' professional readiness and workplace success. Furthermore, engaging employers throughout the training process will help bridge the gap to employment opportunities. Employers need to be engaged as program partners by encouraging them to participate in jobsite tours, job shadows, guest speaker presentations, classroom training, hiring events, and/or mock interviews; this connects trainees and potential employers, thereby helping to improve job placement.

Work-Based Learning

Work-Based Learning (WBL) models, including On-the-Job Training (OJT) and apprenticeships, represent integral experiential learning components when developing a skilled workforce. Combining practical experience and structured learning, WBL programs offer clear pathways for entry-level employment and compensation, while closely aligning with the evolving needs of employers. By directly engaging with industry employers and stakeholders, these WBL programs can facilitate the seamless transition from technical job-readiness training to meaningful employment opportunities within the residential construction sector.

At their core, WBL programs blend hands-on experience with employer instruction, fostering a dynamic learning environment that prepares individuals for the demands of real-world construction settings. Apprenticeships offer participants the opportunity to “earn as they learn” while embarking on a multi-year journey of skill development under the guidance of seasoned professionals. This structured approach not only equips apprentices with essential trade-specific knowledge, but also instills a sense of professionalism and responsibility that is vital for long-term career success.

The significance of WBL programs lies in their ability to address the dual challenge of skills development and workforce retention within the residential construction industry. By providing trainees with practical, job-relevant experience, these initiatives bridge the gap

between classroom learning and on-site application, ensuring that graduates are well-equipped to meet the evolving demands of the industry. The structured nature of WBL fosters a culture of continuous learning and growth, encouraging individuals to pursue mastery in their chosen field while unlocking pathways to higher earning potential and career advancement.

While apprenticeships offer a proven framework for skill development, the implementation of new programs tailored to the unique needs of the residential construction sector presents its own unique set of opportunities and challenges. Unlike commercial trades, which often have well-established apprenticeship pathways, many trades within the residential construction industry can lack formalized apprenticeship training structures, necessitating innovative approaches to workforce development. In this context, WBL programs serve as a flexible and adaptable solution, capable of addressing immediate skill gaps while laying the groundwork for long-term industry sustainability.

One notable example is the development of On-the-Job Training (OJT) programs that can be custom designed to provide trainees with practical experience in home retrofit construction. These initiatives offer participants a streamlined opportunity to develop essential skills under the mentorship of experienced professionals. Implementing a supervised OJT program can offer a crucial entry path into licensed trades without the commitment of a lengthy apprenticeship. This approach addresses the need for a network connecting trainees with employers, providing them with practical experience over several months. By matching industry needs with appropriate training benefits, it builds trust with employers and lays the groundwork for potential formal apprenticeship programs to be implemented down the line. Following job-readiness training, an OJT framework can offer experiential learning, in-field mentorship, and periodic classroom training to ensure trainees develop essential skills, close knowledge gaps, and earn professional certifications that will help them excel in the residential construction sector.

Central to the success of WBL programs is the active involvement of employers, who play a pivotal role in shaping the learning experience and facilitating meaningful employment opportunities. By engaging directly with industry stakeholders, program organizers can ensure that a clear, tangible, and achievable training plan is developed that aligns closely with the needs of employers, thus enhancing the employability of graduates. Moreover, offering incentives such as wage offsets, training subsidies and administrative support can encourage greater participation from employers, fostering a collaborative ecosystem conducive to workforce development.

An example of an OJT program can be found within Earth Advantage's pilot Water Heater Installer training program made possible through a collaboration between Earth Advantage, Great Northwest Installations, Portland General Electric (PGE), and Energy Trust of Oregon (EA, 2024). The program provides recent pre-apprenticeship graduates with the opportunity to obtain 12 weeks of paid work-based learning with a plumbing contractor, focusing on various occupational roles within the business and emphasizing heat pump water heater installations. The program is part of a U.S. DOE-funded Smart Grid Test Bed Collaboration administered by PGE as the local utility and intended to increase energy efficiency and grid resilience in two neighborhoods in North Portland (PGE, 2024). This Water Heater Installer pilot was designed to provide an opportunity to gather insights on improvement opportunities and set the stage for the larger HERO Academy workforce training program presented herein that aims to integrate more robust job-readiness training as a precursor to this type of OJT program.

High Road Outcomes

The term "high road" refers to career outcomes for workforce training participants that lower barriers to participation, support cultural diversity, and improve retention for non-traditional workers. This includes employment opportunities that offer competitive wages, clear pathways for advancement, job security, benefits, and opportunities for continual skill development and professional growth within a supportive and inclusive work environment. These outcomes prioritize sustainable employment that aligns with the values and goals of the individual, the workforce training program, and the broader community.

At the forefront of achieving these outcomes lies the strategic prioritization of career pathways that not only provide immediate employment, but also pave the way for sustained and fulfilling careers within the residential construction industry. This entails a thorough evaluation and selection process of pathways that can offer participants from historically marginalized communities the promise of high road outcomes.

In addition to creating pathways for individual success, effective workforce training programs can also prioritize initiatives that support contractor development and small business ownership among program graduates. Begin by equipping participants with the necessary skills, knowledge, and resources to excel as contractors. In this way, workforce programs can aspire to not only empower individuals to pursue entrepreneurial endeavors, but also contribute to the growth, sustainability, and diversification of the residential construction industry as a whole.

Central to realizing high road outcomes is the implementation of targeted strategies aimed at ensuring equitable access to opportunities and resources for all participants. These strategies may include the provision of wage subsidies for entry-level workers, establishing living wage standards to ensure fair compensation, and offering longer-term support services such as mentorship, career coaching, and wrap-around assistance to address trainee needs.

Wrap-around services and career coaching provide crucial support by allowing a program to problem-solve with a training participant to address any social needs (e.g., childcare, transit cards, housing/utility assistance), equipment provision (e.g., boots, tools, PPE), workplace issues (jobsite culture advising), and/or service referrals (mental health, legal) that might arise. These services are vital for ensuring the retention and success of new workers, as they support overcoming barriers to consistent workforce participation.

Employers also undertake additional risks, efficiency losses, and expenses when hiring trainees or new workers without previous industry employment experience. Offering partial wages offsets for entry-level workers can help contractors employ and effectively train and mentor their new staff while ensuring they can offer living wages. A portion of these financial incentives can also be made contingent upon the trainee successfully completing a 90 day employment retention period. Including these types of approaches and services in program design can help to ensure successful employment outcomes.

Fostering inclusive workplace cultures in residential construction is vital for increasing diversity and ensuring all workers feel valued, respected, and empowered to succeed. The industry faces significant challenges in overcoming its historically exclusive nature, often leading to dissatisfying experiences for underrepresented groups. This necessitates the implementation of trainings and initiatives to combat discrimination, promote diversity, and cultivate environments of belonging and inclusion where individuals from all backgrounds can thrive and contribute meaningfully to the industry's success.

It is critical to design workforce training programs to track and measure participant outcomes, and to then utilize that information in an iterative program evaluation process. This will allow for continuous improvement, ensuring that the program remains effective, relevant, and responsive to the needs of participants and the evolving demands of the industry.

Earth Advantage worked closely with National Renewable Energy Laboratory (NREL) to develop a technical assistance report under the DOE Better Buildings Workforce Accelerator that evaluated workforce development program and trainee tracking software (Tuttle 2022). The report provides valuable insights and methodologies for evaluating these types of platforms, offering guidance on selecting software that effectively tracks key metrics such as employer engagement, job postings, trainee demographics, and credential attainment, thereby enhancing workforce development program evaluation and improvement efforts for training providers. Ensuring effective outcome tracking and evaluation will provide valuable insights into a program's impact, strengths, and areas for enhancement, ultimately maximizing its efficacy in preparing individuals for success in the workforce.

Collaboration with community organizations, engagement with industry stakeholders, and ongoing investment in equity training, diversity initiatives, and continuous education programs are essential components of a holistic approach to achieving high road outcomes in residential construction workforce training programs. Through these concerted efforts, training programs can empower individuals to realize their full potential, build thriving and sustainable careers, and contribute to the creation of a more equitable, inclusive, and prosperous industry landscape that benefits workers, employers, and communities alike.

Conclusion

Across the nation there is an imperative to train and support a new, more diverse generation of residential energy specialists who will be ready to deliver efficiency and electrification services in response to growing market demand. The HERO Academy provides a template for the many considerations that go into an impactful, equitable workforce training initiative. The HERO Academy training model recognizes the many challenges inherent in attracting and retaining new workers into the residential clean energy industry, especially those from historically underserved communities.

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