Building Decarbonization Utilizing High Road Practices is the Path to Equity and Efficiency

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ABSTRACT

A shortage of skilled construction workers threatens to undermine progress towards the elimination of greenhouse gas pollution from existing buildings. Not only are there not enough workers to get the job done, but too many of the workers in the current residential construction market lack the skills needed to do the job right. Poor quality work can compromise energy efficiency or lead to refrigerant leaks that damage our climate.

This paper does not provide a detailed accounting of the number of workers per craft that will be needed, but rather seeks to answer questions about workforce development strategies that program administrators can build into decarbonization programs to improve the recruitment, training and retention of skilled workers.

The Construction Trades Workforce Initiative (CTWI) is a partner in a High Road Training Partnership (HRTP) project funded by the California Workforce Development Board (CWDB) aimed at identifying ways to address these problems by structuring programs to support high road job growth in the difficult to serve residential decarb market. The HRTP project is a stakeholder discussion that has allowed program administrators, municipalities, employers and labor representatives to raise questions and share ideas.

A key lesson we have learned is that grafting workforce development strategies onto residential rebate programs likely won't work, while direct install programs, if qualified with key strategies such as prevailing wage and apprenticeship utilization standards paired with contractor accountability requirements and project aggregation that allows for larger contracts are far more likely to attract high road contractors and to achieve robust workforce development objectives.

Introduction

The major premise of this paper is that direct install programs with strong labor standards and targeted hire policies can support the rapid growth of the skilled workforce needed to achieve climate goals while building a stronger and more inclusive middle class, particularly in the low income communities that suffer the most from climate change.

For energy efficiency program administrators, the idea of deliberately designing programs to achieve workforce development and equity goals in tandem with environmental goals is catching on quickly. The California Energy Commission (CEC) has shaped its new Equitable Building Decarbonization program in almost perfect alignment with recommendations that we outline later in the paper. The Biden Administration's hugely successful climate legislation package (Inflation Reduction Act, Infrastructure Investment & Jobs Act and Chips Act) also incorporates many of these ideas. A notable example from the IRA is a new approach to energy efficiency tax credits that provides a 6% credit for projects that do not pay prevailing wage or use apprentices, and a 30% credit for projects that do pay a prevailing wage and use apprentices.

Though it is too soon to see conclusive results from these new programs, we are able to show how key workforce development strategies have performed in other settings to glean insights into how these practices are likely to contribute to the success of residential decarbonization.

The growing popularity of workforce development strategies in decarb programs stems from the multiple value streams these strategies generate. Reshaping the construction workforce to feature more skilled middle class blue collar workers is good for the overall economy. It honors the principle of a just transition. It also contributes directly to the energy efficiency goals these programs are designed to promote.

Building a high performance building or bringing an older building up to the standards necessary to support climate goals requires getting a lot of details right. Building envelopes that aren't properly sealed and insulated are both inefficient and uncomfortable. A poor choice in managing a medium size electrical panel in an existing residential structure could make completing the task of electrifying a home more difficult and

expensive. Water heaters and HVAC systems offer tremendous potential for improved efficiency, but are also among the more difficult appliances to install correctly.

To reliably get the best environmental performance from heat pump HVAC systems requires an efficient appliance, correctly sized, featuring a low GHG potential refrigerant. It also requires proper design, and flawless execution of installation, maintenance and end of life decommissioning. If there is a refrigerant leak at any of these points, that impacts climate. If the refrigerants are over or under pressurized, that compromises efficiency and generates premature wear and tear on the system.

The potential for reliable performance for water and space heaters isn't being realized at present in the residential retrofit market. According to the CEC 2021 Integrated Energy Policy Report, "only about 10 percent of residential and 25 percent of commercial HVAC replacements are permitted and inspected to ensure compliance with California's quality installation requirements." (CEC, 2021 Integrated Energy Policy Report). The majority of this non permitted work in the single family and small multifamily residential building setting are being installed by under trained, underpaid, non union workers. This results in poorly and improperly installed equipment. A CEC study found that the "poor-quality installation of cooling systems results in a 20- to 30-percent increase in energy use" (CEC, California Long-Term Energy Efficiency Strategic Plan).

More competent construction work could make a huge difference in progress towards meeting our climate goals. Here is how the CEC put it in their 2021 California Building Decarbonization Assessment:

"Efficient electrification of space and water heating in California's buildings combined with refrigerant leakage reduction presents the most readily achievable pathway to a greater than 40 percent reduction in greenhouse gas emissions by 2030". (CEC, 2021 California Building Decarbonization Assessment)

We also agree with the CEC assessment of what is wrong with the current residential market:

"The market for workers involved in single-family projects is different from that in multifamily or commercial projects. The former is price-driven and has high labor turnover, whereas the latter two are typically unionized, well-trained, and stable, and there is performance driven competition between firms." (CEC, 2021 California Building Decarbonization Assessment)

We agree as well with the end goal for market transformation identified in the CEC report:

"Successfully decarbonizing California's building sector requires ramping up the clean energy workforce and enabling workers to transition away from the gas sector while maintaining wages, promotional opportunity, health coverage, and retirement plans." (CEC, 2021 California Building Decarbonization Assessment)

The fundamental challenge is how to transform the single family and small residential construction market to better resemble the commercial construction market. Better yet would be for the residential market to look like the public works market.

A "typically unionized, well trained and stable" construction workforce is highly desirable, and a worthy policy goal for environmental, economic and social reasons. The unionized construction workforce is highly trained, productive, and has middle-class earning potential. Public construction programs that feature strong labor standards and which are structured to support efficient deployment of skilled labor are a key to building such a workforce.

This paper identifies program elements that will help foster the change that is needed and explains how individual programs can fit together within a larger system to complement one another and support more rapid change.

Direct install programs with aggregated projects, strong labor standards, and targeted hire policies can support the rapid green workforce growth needed to achieve climate goals while building a stronger and more inclusive middle class, particularly in the low income communities from which the construction industry recruits most of its workforce. Note that these are the same communities that suffer the most from the impacts of climate change.

Our goal is several fold. One is to explore how to organize work at the project level to more efficiently use skilled craft workers. We also show how complementary programs can work together to foster faster market transformation. This is necessarily a complex problem with many moving parts. We begin by presenting evidence from historic events and programs to underscore key principles that shape recommendations that we outline later in the paper.

Each section that follows focuses on a key element of program design that can support high road outcomes. The final section ties these elements together and presents a workable model for low income residential decarbonization that will maximize progress towards addressing climate change while also advancing economic and equity goals.

- High Standards Support Faster Recruitment
- Workforce Development Strategies at Scale Can Create Their Own Market Conditions
- Joint Labor Management Training Programs Build a Better Skilled Workforce
- Public Works Model Reduces Cost and Improves Quality

High Standards Support Faster Recruitment

The Great Recession starting in 2007 decimated the construction workforce, cutting it nearly in half (BLS, 2011). This was the sharpest decline in the construction workforce since the 1929/30 Great Depression. When the economy began to recover, the shortage of construction workers placed real constraints on any economic activity that required construction. For the overall construction industry, a full recovery to the workforce numbers of 2006 took approximately ten years.

So long as the marginal cost of labor for most contractors is overtime, the market is going to have to pay a hefty premium. The sooner the workforce recovers to the level that no longer requires paying overtime, the sooner you eliminate these contractor premiums.

There was considerable variation among the crafts in the time it took to recover, and a clear pattern. The fastest to recover were the electrical crafts. The key traits that make the electrical crafts stand out are instructive. Unlike most crafts, Electricians require a state license based on a rigorous test of skills. That applies to union and non union Electricians alike. The pay for Electricians is also among the highest in the building trades, and there is less difference between union and non union pay rates than for most other crafts. Prospective electrical workers noticed these factors and flocked to the electrical crafts.

Higher standards didn't limit growth. Quite the opposite. We think this is an important lesson to bear in mind when contemplating how to rapidly expand the decarb market.

Workforce Development Strategies at Scale Create Their Own Market Conditions

California's High Speed Rail (HSR) saw plenty of delay due to lawsuits and NIMBY opposition, but once it overcame those hurdles, it demonstrated remarkable successes in the workforce development arena which could be replicated in the decarb market.

Construction of the first segment of California's HSR is a mostly union job, located in the Central Valley, an area that previously had some of the lowest rates of union construction work in the state. Despite the challenging geography, prevailing wage labor poured into place, and has kept the project's construction schedule moving without a single delay due to a workforce shortage. The project has now created more than 13,000 high road jobs.

That massive success is a product of the fact that this is a dependable, large, long duration project on which construction is organized under the terms of a Project Labor Agreement (PLA) deliberately designed to meet agency, labor and community needs.

The project features a multi-billion dollar set of contracts for dependable work that is not subject to the whims of the economy or interest rates. That dependability helped a lot with recruitment. The ramp up pace worked for the unions, and lead times were long enough that contractors and their union partners could plan to meet ambitious goals, recruit a workforce, staff up apprenticeship training programs , etc. All of this work was organized under the terms of a PLA negotiated with the State Building and Construction Trades Council. These factors allowed for the development of a well oiled workforce development machine.

The goals of the PLA were as follows: to facilitate the steady supply of labor, prevent labor disputes and promote the efficiency and timely execution of construction projects; to ensure the communities, small businesses and residents along the corridors benefit from the project during construction; and to provide an optimal opportunity to combat poverty and high unemployment (CHSRA, 2024).

The PLA featured strong targeted hire goals that focused on providing opportunities for workers from low income communities, veterans, the justice impacted, single custodial parents and other populations that experience barriers to employment. The HSR has consistently met or exceeded these goals. Fully 70% of its construction workforce has come from disadvantaged communities. This is a proud accomplishment both for the authority and for its union partners.

We have observed that building decarb programs face the same need to rapidly grow the skilled construction workforce, and many at least rhetorically share the type of community benefits goals that were built into the HSR PLA. Building decarbonization is also like HSR in that it is going to take a generation to complete, and that there is likely going to be quite a lot of stable public funding that is available for many years to come. That sends a powerful market signal to prospective workers contemplating a commitment to a 3 to 5 year apprenticeship program.

Though individual building decarb programs tend to be very small by comparison to the HSR, if those programs are aligned in purpose and organized appropriately, they can collectively replicate the scale and other characteristics that enabled the HSR workforce development strategy to succeed at meeting both the construction objectives and community benefits spelled out in the HSR PLA.

Construction labor markets are regional in nature, and so too are many of the training programs that serve them. Within the service area of any regional training center there are going to be many decarb programs, including local, regional, state and national programs. The more of these programs that we can align in terms of their workforce development strategies, the more successful those strategies will be.

Key aspects of this HSR PLA that we would like to see consistently replicated in energy efficiency programs include commitments to prevailing wage, apprenticeship utilization and targeted hire goals and strategies. If building decarbonization programs collectively commit to these strategies, they can work together to fill up state licensed training centers and rapidly scale the workforce as needed to meet our climate and equity objectives.

Joint Labor Management Training Programs Build a Skilled Workforce

A fundamental aspect of union construction work is the rigorous training. A portion of the hourly prevailing wage paid by every union contractor is reserved for a contribution to a Joint Labor Management training program. For the Operating Engineers in Alameda County the training contribution is $1.05 per hour. For the Cement Masons it is $0.64 per hour and for the Laborers it is $0.50 (DIR, 2024). This payment covers both initial training during the apprentice period, and access to free continuing education courses for the duration of a union construction worker's career. This craft specific training covers everything from basic skills to sophisticated green building techniques.

Those funds pay for classroom training in a state-of-the-art training center that is the pride of every craft. The joint labor management approach that defines union construction relies on a combination of classroom and on the job training to prepare workers for skilled work. For an Operating Engineer, an apprenticeship entails 520 hours of classroom training and 6,200 hours of on the job training guided by an assigned journeyman. For the Cement Masons, a full apprenticeship entails 432 hours of classroom training and 4,200 hours of on the job training, while the Laborers require 240 hours of classroom training and 4,000 hours of on the job training.

In contrast to union contractors, all of whom, as a requirement of their labor agreements, pay for classroom training for their employees, many non union contractors do not do anything of the kind, and most pay their less well trained workers considerably less than union contractors do. The contrast can be striking.

The combination of rigorous training, union representation and prevailing wages work together both to ensure the consistent high quality of union construction and to transform what could be low wage jobs into family sustaining middle class jobs. In California, participation in a state certified apprenticeship training program increases the earning potential of a construction worker by 33% seven to eleven quarters after entry. (CPL, California Policy Lab). Additionally, it improves retention and results in a 9% greater likelihood of continued employment. (CPL, California Policy Lab). These state certified apprenticeship training programs are addressing the trifecta of programs associated with the residential construction market - lack of training, low pay, and high turnover.

The superior training and economic mobility associated with participation in Joint Labor Management training programs and employment by union contractors is a big part of what motivates many local jurisdictions to enter Community Workforce Agreements or PLAs that feature local hire policies. The agreements result in better built public works and a stronger middle class, which is good for the economy. In the context of decarbonization work, these agreements could be a key tool to make the transition more just.

Public Works Model Reduces Cost and Improves Quality

The establishment of prevailing wage and apprenticeship utilization requirements for publicly funded construction projects was one of the key innovations of the New Deal. It has endured for nearly 100 years for good reason. This combination contributes to the development of a skilled, middle-class, blue-collar construction workforce.

While the public works designation applies to projects as little as $2,000 for federal prevailing wages, and $1,000 for California prevailing wage, in practice most publicly funded construction projects are far larger and lend themselves to the efficiencies of scale. Municipal public works departments often look at a bike path not as a series of little individual projects arranged along a corridor, but as one aggregated project that can be let under one contract with the price advantage that scale can provide.

The two biggest historic sources of funding for energy efficiency subsidies for single family homes or small multi-family buildings have been the IRS energy efficiency tax credits or the "rate payer" funded energy efficiency programs governed by the California Public Utilities Commission (CPUC). Both of these funding sources have historically been exempted from public works labor standards requirements, and both have also focused mostly on retail delivery, one home at a time.

One of the challenges facing decarbonization program designers is how to apply the public works model to a residential decarb market that has historically been organized around a simple rebate model that treats every home as an individual project and that lacks any sort of labor standards beyond the minimum wage.

A City of Berkeley municipal sidewalk repair program (also known as a low carbon transportation project) demonstrates how a smartly designed program can utilize a wholesale model of delivery for home improvement services (City of Berkeley, 2024). While sidewalk repair is simpler than home energy retrofits, the sidewalk repair program nonetheless offers some important lessons. This model can use skilled workers to provide high quality work at a far lower overall project cost than consumer driven retail rebate programs. As we will explain later, this program demonstrates practices that if applied to building decarbonization, could dramatically improve program performance.

For the home or business owner, there are several advantages to using the city provided sidewalk repair service. The city keeps costs low by contracting on a wholesale basis, and further reduces the price by agreeing to pay for half the work. The union contractor used by the City for this contract also assures that the work is consistently high quality union workmanship.

The city estimator surveys properties with reports of damaged sidewalks and prepares bids for every home or business that needs work. The city then sends a letter to home and business owners presenting a bid and offering to cover half the cost if the home/business owner agrees to let the city manage the work on the city's schedule.

If the homeowner accepts the City proposal, their project goes into a cue. City puts a contract out to bid every 1-2 years and picks one contractor to do the work. The current contract covers 600 homes. The contractor chosen must complete them within a specified time, but is free to schedule them to support operational efficiency.

When the contractor schedules individual projects, the City forwards the money to the contractor to do the work and then bills the customer to collect their 50% cost share. This greatly simplifies billing for the contractor as the contractor has just one client as opposed to hundreds..

The contractor works on approximately 5 projects at a time, typically all clustered within a few blocks. This allows for very efficient deployment of both labor and equipment. The backhoe, for instance, can redeploy from one home to the next in just a few minutes, as opposed to having to be loaded onto a flatbed truck, tied in place, driven several miles then unloaded by reversing the sequence. This extreme convenience allows a

backhoe to be used as a labor saving device on much smaller projects than could otherwise justify the cost of dispatching a backhoe, and it dramatically reduces the cost of the backhoe for every project that uses it.

The tight clustering allows for efficient dispatch of labor too. Not only do employees spend more time on construction and less on moving around, but the larger workforce attending to the cluster of 5 projects allows the contractor to have more Laborers who can float from project to project as needed to ensure that the more skilled and costly Cement Masons and Operating Engineers are able to focus on the work that demands their skills.

The full contract is just large enough to keep a construction crew optimized for this scope of work busy at a tempo of 5 projects at a time on a continuous basis through the year, which translates to about 500 projects per year. A lesson here is that for this scope of work, just 500 projects per year, in a sufficiently focused geography, is a scale that can support an efficient wholesale delivery model.

The contract is competitively bid with job quality standards consistent with the Community Workforce Agreement for public works programs in Berkeley. This guarantees prevailing wages, access to training, targeted hire etc. The contractor currently awarded the work happens to be a small minority owned business with a total workforce of just over 20 employees including both the construction and office personnel. They are signatory to the Operating Engineers (operates the backhoe), Cement Masons and Laborers. The signatory status for all relevant crafts ensures high quality workmanship associated with the union model of organizing the work.

That this contract is held by a union contractor is not a surprise. Union contractors will compete for large contracts with labor standards for a variety of reasons. The scale has its own inherent appeal. But union contractors are also willing to bid on large public works projects because they know it's hard for low road contractors to undercut them based on cheating. Instead, competition tends to be based on productivity and quality, which the highly skilled union workforce is very good at.

One of the most common techniques for cheating is misclassification. That is where the contractor pays a Laborer’s salary to someone doing carpentry or plumbing. A certified payroll can’t on its own protect against this. On a large aggregated contract, that form of cheating can be discovered with a random inspection, and the consequences of getting caught can be large enough to have real deterrence.

The residential construction industry is a source of a disproportionate share of our economy’s labor violations, so this is not a trivial issue (The Century Foundation, 2023). If the sidewalk repair program were disaggregated to be 600 little tiny projects, the task of compliance monitoring for labor violations would be impractical, and low road contractors would bank on that.

Also worth noting is that the construction workers participating in Berkeley’s sidewalk repair program are predominantly people of color. Many of them are residents of formally designated disadvantaged communities and all of them earn the prevailing wage for the craft that they have trained for. This result is not an accident, but the consequence of thoughtful program design.

In contrast to union contractors, all of whom as a requirement of their labor agreements pay for classroom training for their employees, many non union contractors do not do anything of the kind, and most pay their less well trained workers considerably less than union contractors do.

Conclusion

In this paper, we have explored the merit of incorporating strong workforce development strategies into building decarbonization programs. Doing so will contribute to the recruitment, training and retention of the skilled workforce needed for decarbonization efforts to reach their greatest potential. That potential can be measured not just in tons of greenhouse gas pollution avoided, but also in the creation of a larger skilled construction workforce, with a particular emphasis on creating career opportunities for blue collar workers recruited from disadvantaged communities.

We have also found that this approach is far more likely to succeed in the context of direct install programs than with rebate programs. Accordingly, we would like to encourage a pivot towards a greater reliance on direct install programs that feature the gamut of workforce development strategies that we have outlined.

These strategies start with employing the New Deal innovation of the public works model with prevailing wage and apprentice utilization requirements that we know lead to better recruitment, training and retention, as well as economic mobility for blue collar construction workers. These strategies work best when there is real accountability, which is easiest to achieve in the context of larger projects. Larger projects also offer the potential for economies of scale, which can reduce overall costs even while using more skilled labor. We'd like to encourage programs to aggregate work to create larger contracts. Finally, we have shown that targeted hire policies such as those that were incorporated in the PLA for the California HSR project can be tremendously successful and provide substantial community benefits in addition to decarbonization.

Our hope is that the aggregated high road direct install model will become commonplace as the "go to" program design for agencies engaged in residential decarb. If enough agencies do so, this work could substantially improve the structure of the residential construction workforce as a whole to emphasize higher skilled and higher paid work. If the programs feature targeted hire policies promoting recruitment from disadvantaged communities, that would be even better. The resulting economic mobility for residents of disadvantaged communities through their high road employment could be one of the most important equity outcomes these programs could provide.

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