



GREEN JOBS IN THE RESIDENTIAL ENERGY EFFICIENCY INDUSTRY

THE HOME PERFORMANCE INDUSTRY PERSPECTIVE ON TRAINING AND WORKFORCE DEVELOPMENT

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Executive Summary

Millions of dollars are currently being invested across the United States in green job creation and energy efficiency. As training centers, community colleges and other workforce development specialists design curricula and prepare their students for placement in the residential energy efficiency industry, they need to know what employers are looking for in their workers. Since training providers seek curriculum guidance from private-sector partners and recruit companies to hire their program participants, the Home Performance Resource Center asked Efficiency First, the national Home Performance trade association representing more than 800 businesses and organizations in all 50 states, to ask its members to provide the industry perspective on employment growth and employers' workforce training needs.

Interviews with more than 20 industry leaders and the *2010 Efficiency First Workforce Survey* of 161 companies in 36 states reveal that the current Home Performance industry is primarily composed of small businesses (89% of survey respondents have fewer than 50 employees). Major job categories within the industry include:

- Home Performance auditors, raters and estimators who evaluate the energy efficiency of the home and suggest areas for improvement
- Retrofit technicians who conduct a basic retrofit or weatherization work
- Skilled laborers who complete electrical work, plumbing, heating, ventilating, and air conditioning (HVAC) mechanical system upgrades, and window and door replacement
- Quality assurance providers who certify Home Performance improvements
- Office and support staff who provide administrative, managerial, promotional, and clerical support for the field workforce and customers

At present, the industry is growing slowly, but 95% of the companies surveyed anticipate growth within the next 1-2 years. Hopeful that policies and programs at all levels of government will spur customer demand, many types of companies are investing in the future by preparing their current workforce to work in the Home Performance industry. As demand picks up, companies are likely to bring back laid-off employees, give more work to underemployed subcontractors, and hire new staff with previous experience in the remodeling, home appliance repair, weatherization and residential construction sectors. Should demand continue to grow, there will be room in the industry for new entrants with limited residential construction and building analysis experience.

To rapidly prepare workers for jobs in the Home Performance industry, training providers should immediately focus on retraining the incumbent workforce and provide on-the-job and industry certification training for unemployed construction, HVAC and remodeling industry workers. As the industry grows, training programs should increase their capacity not only to train larger numbers of students, but also to offer additional courses, such as basic building science education for new entrants, training for office

and support staff, a wider range of industry certifications, and continuing education on emerging technologies and trends. Since a majority of companies today are most concerned about staying in business or growing their customer base, policymakers and program managers should make sure that customer demand for home retrofits keeps pace with the supply of workers being trained by workforce development providers nationwide.

While this report does not focus on the demand side, it does present employers' recommendations for preparing the workforce to participate in the Home Performance industry. The recommendations target two distinct audiences: 1) educators, training providers and workforce development specialists, and 2) policymakers and retrofit program managers. Though the recommendations are summarized below in individual sections, both groups must work together to support the creation of jobs in the Home Performance industry.

SUMMARY OF RECOMMENDATIONS FOR WORKFORCE/TRAINING ORGANIZATIONS

Pre-Screen: Evaluate candidates' physical, psychological and intellectual aptitude for positions in the Home Performance industry *before* training begins. Individuals interested in the Home Performance industry should be screened on two fronts: 1) their desire and 2) their ability to fulfill industry requirements for specific positions.

Train to Industry-Approved Standards: Until one national set of standards for Home Performance industry training is developed by the U.S. Department of Energy, teach to existing industry-accepted standards, as national policies and local Home Performance programs will likely require employee certifications and company accreditations tied to these standards. Existing standards include those established by the Building Performance Institute (BPI), the Residential Energy Services Network (RESNET) and the North American Technical Excellence (NATE) for the HVAC industry.

Train in the Field: Expose trainees to a variety of circumstances and teach them how to safely deal with various types of residential energy and health-related issues. Classroom learning is not sufficient, nor is one week of lab and field training. Important skills include equipment use and maintenance, air sealing, insulation materials and techniques, code compliance, HVAC, electrical work, plumbing, knob-and-tube wiring mitigation, moisture and mold abatement, asbestos removal, and lead paint protocols, among others.

Teach Other Relevant Skills: Include instruction on other relevant skills and provide information that will make trainees more effective on the job. These include modules on health and safety, professionalism, sales and customer service, problem-solving, software and energy modeling, local incentive or utility program rules and requirements, basics of energy conservation, and complementary skill sets such as installation of photovoltaic systems or solar water heaters.

Develop Employer Relationships: Establish a group of Home Performance industry advisors who can offer information about changing industry standards, hire from the

program, and be a general source of advice about what's working and what's not. Work with industry associations, such as Efficiency First, to gain a broader industry perspective and reach multiple employers at once. Keep employers engaged by offering additional benefits, such as free marketing and community recognition, assistance with other business issues, candidate screening, financial compensation for providing on-the-job-training, internships and apprenticeships, and other incentives for superior mentoring or program participation.

Develop Long-Lasting Relationships With Trainees: Develop a system for long-term communications with trainees. Keep in touch until they are placed in jobs, and follow up with program participants to know who has found work, who is still looking, who may need additional training, and which companies are looking for additional staff.

SUMMARY OF RECOMMENDATIONS FOR POLICYMAKERS

Match Supply and Demand: Develop training programs in conjunction with policies that will grow the market for Home Performance companies. Expand the market for the residential energy efficiency industry by passing proposed legislation such as HOME STAR, quickly implementing programs that offer property assessed clean energy (PACE) financing and home audit and retrofit rebates, and educating homeowners about the value of residential energy efficiency.

Offer Funding Consistency: Allocate a steady stream of training funds over several years rather than making several short-term investments in workforce training. Escalate funding in response to increases in retrofit program scale or homeowner demand.

Provide Clear and Reliable Information: Provide businesses with a solid understanding of what standards, certifications and licenses will be required, and the timelines for program implementation. Avoid delays in program initiation, which can actually *slow* business growth as customers hold off on Home Performance investments until rebates and incentives become available.

Simplify Training Access and Subsidization. Provide businesses with simple methods to access training and be sensitive to the cash-flow issues of contractors when designing subsidies for training programs and certification exams.

Allow Choice in the Training Marketplace: Make training rebates or discounts available for redemption through all certified training providers.

Support Training Within Industry: Provide funding to offset the cost of on-the-job training, apprenticeships and mentoring.

Problem and Background

Already in 2010, hundreds of millions of dollars have been allocated by the U.S. Department of Labor, state public utility commissions, employment development departments, community colleges, foundations and others to support “green jobs” training and education.¹ In California alone, the California Energy Commission, the California Employment Development Department, the Employment Training Panel, the California Workforce Investment Board and the Green Collar Jobs Council have made \$75 million available to help state agencies, educational institutions, local workforce investment boards, community organizations and employers to “deliver 21st century green job training programs for workers with all levels of experience.”²

While companies support the creation of quality jobs and understand both the economic and environmental value of home energy retrofits, many Home Performance employers view green jobs training programs as “putting the cart before the horse.” To spur market growth and create jobs, Home Performance contractors, who take “comprehensive whole-house approach to identifying and fixing comfort and energy efficiency problems in a home”³ have encouraged government entities to develop programs and policies that focus on generating additional customer demand for retrofits through incentives and rebates, outreach and education to homeowners, and regulatory requirements. The result has been a flood of legislation and funding to encourage residential audits and retrofits, including municipal financing programs, utility-run residential energy efficiency incentive programs, ordinances requiring energy audits when homes are sold, and the proposed HOME STAR retrofit rebate and financing program.⁴

These policies should help to stimulate customer demand and create the need for additional workers in the Home Performance industry, but they are often developed in separate silos from the policies and funds that support workforce development and training. Designed primarily by political and educational leaders, workforce development programs are geared toward improving worker employment readiness and creating jobs for specific target populations (i.e. veterans, at-risk youth, ex-offenders, low-income workers and disadvantaged individuals), but often fail to reflect the reality of the marketplace or the real needs of employers. While the lack of industry-accepted standards for air sealing and insulation work until recently has meant that the majority of training programs to date have focused training on home energy auditors and heating, cooling and building envelope specialists, improving the efficiency of America’s residential building stock on a large scale will require an adequate supply of workers trained to complete comprehensive whole-home energy retrofits.⁵

Although training providers and educators recognize the importance of aligning program goals with industry needs, the nature of the Home Performance industry (new, rapidly changing, and comprised mainly of small, entrepreneurial companies) poses a number of challenges to policymakers, educators and program administrators who are developing relevant training programs. Both employers and training providers note

that there is greater need for industry involvement in the design and implementation of residential energy efficiency training programs. This report presents the Home Performance industry's perspective on critical elements of successful training programs and the types of policies that are most likely to result in new job creation in the Home Performance industry.

The State of the Industry

Home Performance and building science were established from lessons learned about energy efficiency during the 1970s, including learning from the United States Weatherization Assistance Program (WAP) created in 1976 to help low-income families reduce energy consumption and costs.⁶ However, it was not until the last five years that residential retrofit incentives and building efficiency requirements at all levels of government have begun to spur significant growth of the Home Performance industry.⁷

A few examples of the policy drivers behind the growth of the Home Performance industry include:

- Utility Demand Side Management (DSM) programs
- Statewide Home Performance with ENERGY STAR retrofit incentive programs in New York, Massachusetts, Vermont and Oregon (beginning in 2005)
- Federal allocation of \$24.4 billion to promote energy efficiency through the 2009 American Recovery and Reinvestment Act (ARRA)⁸
- California's AB811 legislation authorizing the development of property-assessed clean energy (PACE) financing mechanisms throughout the state
- The Home Star Energy Retrofit Act of 2010 that is currently moving through Congress

While such wide-scale government interest in promoting residential retrofits is relatively new, the components of the Home Performance industry are not. Aside from a few companies specialized in Home Performance, the majority of Home Performance contractors hail from the ranks of the established home construction, remodeling, weatherization, HVAC and insulation industries.

When people talk about the “residential energy efficiency market,” they are creating a fiction. There is NO single [energy efficiency] market: there are however, new construction markets, HVAC replacement markets, appliance replacement markets, water heater replacement markets, and a light bulb market. The hardest “market” to tackle is that for which there is no natural market—elective retrofits. Convincing home and business owners to make elective investments (beyond simple lighting upgrades), when there is no forcing event like equipment failure, is a tough sell. It's taking concerted effort, learning, and persistence to get deep savings with high participation rates. HOME STAR is part of that effort. ... The market has to be created, and that will take public investment.

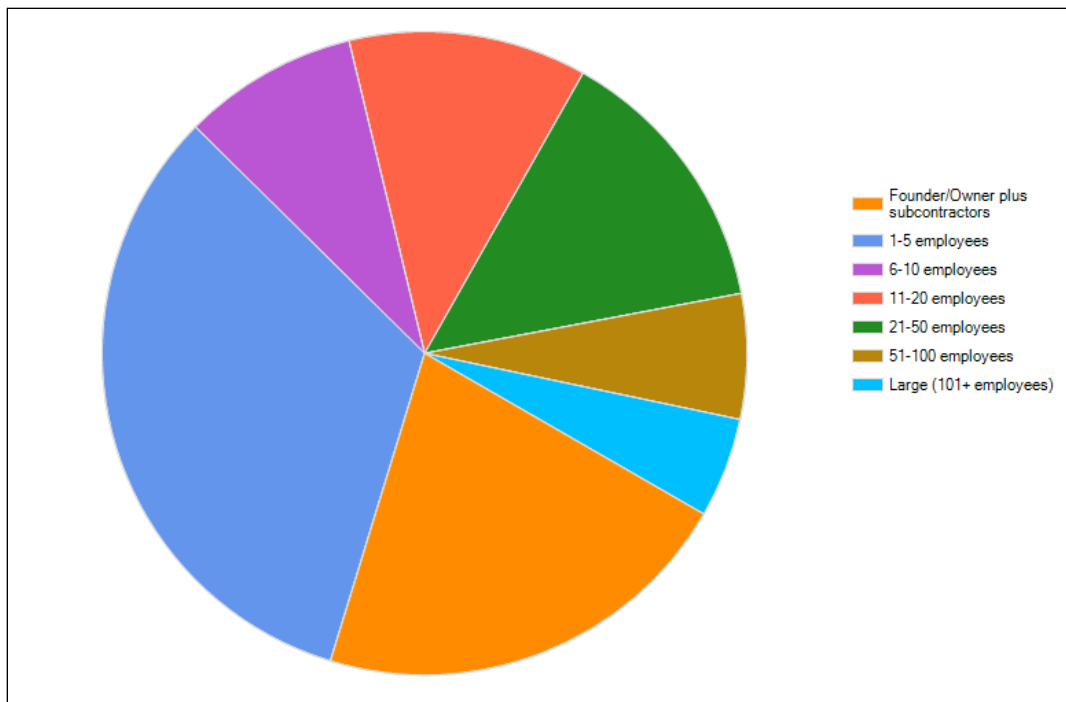
— William R. Prindle,
Vice President, ICF International

Consistent with the construction industry, where more than 90% of contractors are small businesses, the majority of Home Performance companies are small and entrepreneurial (often the company founder plus a few staff or subcontractors). Though there is no data currently available on the size breakdown of the Home Performance industry, a report jointly produced by Efficiency First and the Center for American Progress⁹ found that:

- Insulation is installed by more than 22,000 firms, 85% of which employ fewer than 20 people.
- The specialty trade of roofing insulation is installed by nearly 20,000 contractors around the country, 88% of which employ fewer than 20 people.
- Windows are manufactured and installed by more than 130,000 people working for nearly 7,000 firms in the United States, 82% of which employ fewer than 20 people.
- The production and installation of HVAC equipment employs around 2 million people in the United States, and nearly 90% of them work for firms of fewer than 20 people.
- Nearly 850,000 people manufacture or install interior or exterior lighting equipment in the United States—nearly 90% of whom work for firms of fewer than 20 people.

Similarly, the *2010 Efficiency First Workforce Survey*¹⁰ found that of 158 survey respondents that provided information about company size, 89% were companies with fewer than 50 employees. The remainder were split between companies with 51-100 employees (6%) and large companies with more than 100 employees (5%).

Home Performance Industry: Breakdown by Company Size



Source: 2010 Efficiency First Workforce Survey

Entrepreneurial contractors and HVAC technicians are not the only ones seeing the opportunity in the Home Performance business. New government incentives, utility rebates, efficiency requirements and financing tools have also motivated many larger construction, HVAC and insulation companies to add Home Performance as an additional division or line of service. For example, the Sacramento-area production builder, Grupe Homes, that was building 300-400 homes a year prior to 2007, is in the process of shifting internal resources toward their recently launched Home Performance division, Green Home Solutions. Grupe has retained several key employees from their warranty division to work in Home Performance because these employees already have experience working in people's homes.¹¹ Many companies that were hit hard by the recent slowdown in new construction see Home Performance as a way to stay afloat in the current economy. Since energy efficiency retrofits help homeowners save on their household energy costs, the industry delivers a service that companies can sell even during tough economic times.

Finally, the Home Performance industry also encompasses equipment manufacturers and distributors, and many companies offering a range of specialized support services, including training providers, consultants, marketers and customer outreach specialists.

Industry Concerns and Challenges

As the only national Home Performance industry trade association, Efficiency First represents more than 800 businesses in 50 states and Washington, D.C., including more than 700 contractors and 50 training providers. The *2010 Efficiency First Workforce Survey* results indicate that 95% of companies anticipate growth within the next two years, but growth will be dependent on when policies and incentive programs begin to increase customer demand for home energy retrofits. Consistent with the findings of a study conducted in Massachusetts on the state's energy efficiency workforce needs, the *2010 Efficiency First Workforce Survey* results show that, to date, recruitment of new workers (at least at the entry levels) has not been a challenge for Home Performance companies.¹² Given the current economic environment, companies have not had difficulty hiring retrofit workers, but they anticipate that finding qualified staff will become more difficult when the recession ends and customer demand for all types of residential construction and remodeling work picks up again.

Home Performance companies today are less concerned with how to recruit and train their workforce and more concerned with business development. In fact, 71% of companies said they expected it to take less than one month to fill vacancies in entry-level retrofit technician positions, and 62% believed they could hire qualified Building Analysts or Home Energy Auditors within this timeframe.¹³

When asked about recruitment and hiring preferences, many companies said their primary concern was either staying in business in the current economy or finding new avenues for growth. Employers emphasized that no type of training would be sufficient if there are no jobs to fill. Even the most successful statewide Home Performance with

ENERGY STAR (HPw/ES) program—run by the New York State Energy Research and Development Authority (NYSERDA)—has completed a maximum of 6,343 HPw/ES retrofits per year,¹⁴ and industry experts estimate that roughly 250,000 residential retrofits were completed nationwide in 2009.¹⁵

Thus, while the “Department of Energy is calling for American homes to be retrofitted for energy efficiency and reduced greenhouse gas emissions at a rate of 10 million per year by 2020,”¹⁶ this expectation for growth is highly optimistic, if not unrealistic. A labor analysis conducted by Bain & Company for the nonprofit Chicago Green Jobs for All confirmed what many employers already suspected: The study concluded that despite the City of Chicago’s recent emphasis on building green jobs training opportunities for disadvantaged Chicagoans, existing training capacity is already “sufficient to meet even aggressive retrofit demand projections.”¹⁷ While the problem today seems to be too much training and not enough jobs for training program graduates, the anticipation of high growth in this industry means there is a need to begin laying the groundwork for a robust and effective recruitment, training and retention plan for the Home Performance industry workforce. Throughout the data collection process undertaken for this report, employers expressed the following concerns:

- Once demand grows, how quickly will we be able to scale and find qualified workforce?
- How can we train our employees fast so they can become trainers themselves?
- When the economy rebounds, will we be able to keep good employees in this industry when other construction jobs provide more pleasant working environments?
- What benefits over traditional construction can we provide in the building performance industry?

Employment Growth Projections

With no comprehensive data available on the number of people employed in the Home Performance industry, and no certainty about the level of investment that will go toward increasing residential energy efficiency in the years to come, it is impossible to say how many jobs will be created. However, many researchers, industry experts and advocacy organizations have attempted to equate dollars invested to job creation. Their methodologies differ, from company estimates of the amount of retrofit project revenue that would be needed per additional hire, to more elaborate macroeconomic models using input-output models to project direct, indirect and induced jobs (those created when households spend energy savings elsewhere).

Multiple estimates for residential retrofit industry employment growth (see table on page 11) suggest that an average of 12-13 direct and indirect jobs will be created per \$1 million of investment, or 40,000-70,000 jobs per year to achieve a 25% reduction in residential energy consumption by 2025.¹⁸ Using an average of the job creation

estimates described in the table below yields predictions of employment growth in the range of 670,000 to just over one million jobs by 2025, which is in the same ballpark as the numbers calculated by the American Council for an Energy-Efficient Economy (ACEEE),¹⁹ though significantly higher than the conservative estimates provided by the researchers at the Lawrence Berkeley National Laboratory, who “do not explicitly account for the impacts of proposed federal climate change legislation with aggressive greenhouse gas reduction targets or a national energy efficiency portfolio standard.”²⁰

While these calculations can provide ballpark estimates for job creation in the Home Performance industry, they should always be accompanied by several caveats:

- In all of these scenarios, the ratio of jobs created per dollar of investment will vary across states. States with more experience supporting Home Performance programs will experience a lower ratio of new jobs to dollar of investment due to the higher productivity of the existing Home Performance workforce.
- Even when induced effects are excluded, not all of the jobs will be direct home assessment and retrofit jobs. Industry experts assume 12-30% of new jobs created in the Home Performance industry will be overhead jobs (administrative, managerial, etc.)
- Not all jobs will be new jobs for new employees. Existing companies will add Home Performance assessments to their list of customer offerings and retrain workers to complete Home Performance assessments and retrofits.²¹

Scenarios for Estimating Job Creation per Dollar Invested in Efficiency Retrofits

Jobs Created per \$1 million Invested	Source of Estimate
11.9 direct and indirect jobs (including manufacturing jobs)	Pollin, Robert, Heintz, James and Garrett-Peltier, Heidi. <i>The Economic Benefits of Investing in Clean Energy: How the economic stimulus program and new legislation can boost U.S. economic growth and employment.</i> Department of Economics and Political Economy Research Institute (PERI), University of Massachusetts, Amherst, and Center for American Progress, June 2009.
21.5 direct and indirect jobs	<i>New Energy for America: The Apollo Jobs Report: For Good Jobs and Energy Independence.</i> Institute for America’s Future, the Center on Wisconsin Strategy, and the Perryman Group, January, 2004.
11.11 direct jobs	HOME STAR economic model for Silver Star prescriptive track created by Matt Golden of Recurve, Inc., and colleagues
10 direct and indirect jobs	UC-Berkeley RAEL Jobs Calculator, Daniel Kammen and Max Wei
8.32 direct jobs	Kevin Doyle, <i>Final Report of Investigation into Residential Energy Efficiency Workforce Needs</i>

Recognizing the complexity of the various models and predictions, Matt Golden, president and founder of the San Francisco-based Home Performance company, Recurve, Inc., explains that the simplest way to calculate jobs is to divide the level of projected investment in residential retrofits by \$90,000 (or the amount roughly equal to double the average retrofit worker salary, due to the cost of overhead, materials and additional support staff). In some states, he says, “the denominator may be as low as \$70,000, but anything lower and you will put yourself out of business.”²² Using this method for calculating jobs yields a ratio of 11.1 direct Home Performance industry jobs per \$1 million of investment in *prescriptive* energy efficiency measures (HOME STAR’s SILVER STAR track) and 11.4 direct Home Performance industry jobs per \$1 million of investment in *performance*-based home energy improvements (such as the HOME STAR legislation’s proposed GOLD STAR track).²³ In contrast, spending on oil, natural gas and coal generates 5.3 jobs per \$1 million in spending, roughly half the number of jobs created by the Home Performance industry.²⁴ Though differing business models may dictate the amount of project revenue required per additional worker, the methodology described above should be useful to states and regions trying to evaluate how many jobs will be supported by local investments in residential energy efficiency.

Overall, the Center for American Progress and PERI conclude that the potential market for residential energy efficiency is equal to \$400 billion (assuming an average household retrofit investment of \$4,000 per unit²⁵ and a customer base of the roughly 100 million occupied housing units in the U.S.)²⁶ Using an average of 12.6 annual jobs per \$1 million of investment, retrofitting our country’s entire residential building stock has the potential to create more than 50 million jobs, or 1.3 million jobs per year until 2050.²⁷ An even more conservative estimate that assumes the average-size single-family home in the United States only makes an investment of \$2,500 for basic energy-efficiency retrofits (caulking to plug air leaks and adding insulation to attics and basement ceilings) would result in 3.2 million jobs or approximately 79,000 jobs per year until midcentury. If the HOME STAR Coalition is correct in their predictions that the program could help retrofit 3.3 million homes in two years (or 1.65 million homes per year) with an average household investment of \$2,500, there would be a market of over \$4 billion per year, or the potential to create almost 52,000 jobs annually.²⁸

However, the definition of “retrofit” varies by company and region, and for a variety of reasons, it is highly unlikely that all homeowners would strive to high efficiency goals defined by Home Performance with ENERGY STAR (HPw/ES) standards. In the most recent year for which data are available (2009), fewer than 25,000 homes underwent HPw/ES retrofits, and by December 2009, 62,633 existing homes had been improved to HPw/ES standards.²⁹ With either lower numbers of retrofit customers or smaller investments per household, the job creation potential for the Home Performance industry could be considerably less. In fact, in a recent report commissioned by the Conservation Services Group on the residential energy efficiency workforce in Massachusetts, Kevin Doyle of the environmental consulting firm Green Economy concludes that “the number of truly new job opportunities for individuals seeking jobs

and careers in residential energy efficiency will almost certainly be fewer than media accounts and political announcements have suggested.”³⁰

In any case, the actual number of new jobs in the Home Performance industry will vary by region due to a number of factors, including local retrofit incentives, financing options, climate, past program success, and local variations in awareness of the environmental, economic, and social benefits of increased home energy efficiency.

Job Types and Requirements

In their report on the energy efficiency services sector (EESS), researchers at the Lawrence Berkeley National Laboratory found that:

...many “new” energy efficiency jobs will actually be existing jobs that are refocused toward providing more energy efficient practices and services. There are currently two primary paths for those who want to enter the EESS workforce:

- *Existing occupations (e.g., HVAC technicians, lighting contractors, construction trades, project managers) which are transformed into more energy efficiency-focused positions via retraining, and*
- *Emerging occupations that are somewhat unique to the EESS (e.g., home energy raters, commissioning services, energy/Home Performance services, energy auditors).*³¹

Kevin Doyle, consultant to the Conservation Services Group and Northeast Energy Efficiency Council, reports similar findings:

One million jobs translates to:

- *One third - existing home remodeling and Home Performance industry workers getting additional work,*
- *One third - people in the building trades moving into energy efficiency, and*
- *One third - new entrants.*³²

While there are multiple estimates of how the Home Performance workforce is divided across occupational types, in general, about 60-66% of building retrofit jobs are construction-related field positions, 12- 30% are administrative or office positions, and the remainder are in manufacturing.³³ The following sections provide further detail on the different occupational categories within the Home Performance industry and provide an overview of the job requirements for each.

JOB CATEGORIES IN THE FIELD OF HOME PERFORMANCE RETROFITTING

In addition to understanding the size of the workforce that needs to be trained, policymakers and training program administrators should understand the types of jobs that would result from growth in the Home Performance industry.

Models for structuring the Home Performance retrofit process vary by program and by retrofit company business model (audit only vs. comprehensive retrofit services, dividing the responsibilities of the auditors and the retrofit workers into two positions vs. training workers to handle both tasks, etc.). However, the majority of retrofit jobs have five major components:

- 1) *Audit or Home Performance Assessment*: This phase involves utility bill analysis, a conversation with the homeowner or tenant, and a series of diagnostic tests to evaluate the energy efficiency of the home and areas for improvement. Though assessment components vary by company, this phase usually includes a blower door test, infrared camera evaluation, a duct leakage test, an insulation assessment, and the “test-in” or establishment of baseline energy performance. Based on the assessment, a report is generated for the customer providing retrofit recommendations and in some cases, cost estimates.
- 2) *Basic Retrofit*: The basic retrofit generally includes sealing air leaks around chases and can lights; insulating attics, basements, and/or crawlspaces; and duct sealing.
- 3) *Skilled Work*: In some cases, more complex or specialized repairs are undertaken by the customer, such as electrical work, plumbing, heating, ventilating, or air conditioning (HVAC) mechanical system upgrades, window and door replacement, and carpentry work to close off air leakage pathways.
- 4) *Quality Assurance and Testing*: In the final phase, the “test-out” verifies the energy performance improvements over the baseline established by the test-in, and assures the homeowner that the improvements have produced tangible, safe results. In some cases, the test-out results may be required before rebates or incentives can be processed.
- 5) *Customer and Staff Support*: Throughout the process, retrofit companies need administrative, managerial, promotional and clerical support staff who can assist and manage the field workforce, interact with customers, and serve as a liaison to program managers and policymakers.

Promotional Jobs

Given generally low consumer awareness of the benefits of Home Performance retrofits, promotional and marketing activities are necessary to reach out to potential customers and complete sales of initial energy assessments and subsequent retrofit work. Industry experts assume that promotional jobs will represent 15-20% of the jobs in a typical Home Performance company. These roles include:

- Analysts/auditors/estimators³⁴
- Business development
- Marketing and consumer education
- Inside and outside sales staff

The *2010 Efficiency First Workforce Survey* results show that 46% of companies plan to hire staff for promotional positions within the next two years. Of these, 75% plan to hire building analysts or auditors as well. In some cases, lead generation and advertising may be outsourced to another company specializing in customer outreach, education or marketing. Several new business models are developing in this arena, including online search sites that generate referrals, companies that develop on-bill marketing tools, marketers that will implement customer outreach through house parties, and others. Though not generally classified as Home Performance companies, these marketing and advertising businesses will grow in sync with overall retrofit industry growth, and likely create additional job opportunities for people with backgrounds in sales, marketing or business development.³⁵

Job Requirements and Good Candidates: Conversations with Home Performance companies reveal that employers look for the following characteristics in their promotional staff:

- Good interpersonal skills
- Previous sales experience
- Knowledge of residential construction
- Pleasant and professional appearance
- A “green” or sustainable life philosophy

Though not required, many employers will seek auditors or estimators with Building Performance Institute (BPI) Building Analyst certification or HERS Rater training from the Residential Energy Services Network (RESNET). This is especially true where the receipt of incentives requires sign-off by a HERS-certified or BPI-certified or -accredited contractor.³⁶ In cases where auditors and estimators are part of the promotional staff, employers may also screen for physical requirements, such as the candidate’s ability to work in a small crawl space or the strength to pull oneself into an attic hatch.

In general, good candidates for these promotional jobs will be people with previous sales, marketing or business development experience, especially in construction-related industries.

Field/Labor Jobs

Though Home Performance companies typically complete two to three times the number of energy audits as they do retrofit jobs, the actual home retrofit is the core of the Home Performance business and the way to actually make home energy efficiency improvements. Retrofit crews often work in teams of two or three, bringing in specialized subcontractors and trades people as necessary. An average retrofit project takes approximately four days to complete, though smaller projects can be completed in under a day, with others lasting several months. In some business models, the auditors and estimators are considered part of the field team and also help with retrofit work. In others, they are strictly involved with the customer outreach and assessment phase and leave the actual retrofit job to other workers.

Most work falls into the following job categories:

- *Entry Level:* Air sealing, duct sealing, and insulation installers who generally work in the home’s basement (or crawl space) and attic
- *Intermediate/Advanced Level:* Experienced air sealers, duct sealing and insulation technicians; on-site crew supervisors, construction and retrofit managers³⁷
- *Skilled Labor:* Carpenters, electricians, plumbers, HVAC technicians and window replacement specialists
- *Analysts/Auditors/Estimators/Quality Assurance Inspectors*³⁸

These jobs typically represent 60-75% of the jobs in the Home Performance industry.³⁹

Interviews with Home Performance contracting companies also reveal the following wage information, though wages vary significantly by market and worker experience:

Approximate wage ranges for Home Performance field/labor jobs

Job Type	Wages
Field Technicians (entry-level)	\$10-\$20/hour
Crew Leads	\$14-\$20/hour
Building Analysts/Raters	\$15-\$22/hour
Mechanical Systems and Skilled	\$25/hour and up
Sales	Generally salary or fee per job plus commission

Source: 2010 Efficiency First Workforce Survey

Job Requirements: Home retrofit job candidates are often hard to find, because they require the worker to both have the professional skills and attitude to leave a good impression on the customer and the willingness/stamina to work long hours in dirty, uncomfortable spaces performing manual labor.

The following list of skills and characteristics were selected by Efficiency First survey respondents as the primary characteristics they seek in their field labor workforce (listed in order of importance to the industry, with the percent of survey respondents who selected this choice in parentheses):

- Good attention to detail (78%)
- Good customer service, interpersonal and communication skills (78%)
- Problem-solving and critical thinking skills (76%)
- Reliable transportation, driver’s license, clean driving record (64%)
- Drug-free (64%)
- Physically fit: able to lift 75 pounds, able to fit through minimum crawl space dimensions⁴⁰ (56%)
- Construction or trade background (55%)
- Willing to get dirty (50%)

- No criminal background, or at least no theft or violence (46%)
- Able to accurately and legibly write and interpret reports (39%)
- “Green” or sustainable life philosophy (39%)
- Not claustrophobic—able to maneuver in tight, dark spaces (28%)
- Not afraid of heights: able to climb ladders easily and confidently (23%)
- Can withstand heat (22%)
- Able to work on knees for long periods of time (16%)

While the Home Performance industry has relatively low educational entrance requirements (limited math and reading skill levels are needed for entry-level retrofit jobs), employers emphasize the importance of a worker’s attitude and basic professionalism. It is important not only that their crew can “swing a hammer,” but also that they “show up, show up on time, show up ready to go, listen and follow directions, and be someone who is polite to their co-workers and customers.”⁴¹ Finally, it is important to employers that their workers can perform tasks quickly, without compromising quality.⁴²

Good Candidates: There is no better pool of candidates for the Home Performance industry than the unemployed construction workers who have been especially hard-hit by the economic recession. The Bureau of Labor Statistics estimates that construction employment has decreased by 2.1 million jobs since 2006, with residential construction alone down by 1.3 million.⁴³ With residential construction jobs down 38% since 2006, about one in four construction workers are unemployed and looking for work.⁴⁴ Since the building and construction trades constitute about 75% of the overall workforce in the energy efficiency services sector, it makes sense to look to building and construction trades people as the talent pool for the Home Performance workforce.⁴⁵

Primary targets for retraining include:

- Construction workers
- Remodelers
- HVAC technicians
- Insulation installers
- Painters

Finding qualified candidates will be harder in places that have no history of ratepayer-funded energy efficiency programs, because construction workers and trades people may lack not only the appropriate skills, but also a general awareness that residential energy efficiency is even an issue or that getting into the industry requires special skills.⁴⁶ Should the industry scale at higher rates than anticipated, there will also be a need to train additional people with less experience in residential construction, remodeling and home appliance repair. Though employers recognize that new entrants to the field will likely have less direct construction experience, they believe that athletes, former military personnel and other physically fit people will have the greatest success working in the field, due to the physically demanding nature of Home Performance work and the need for workers to fit into small spaces.

Office and Support Jobs

While much of the work is in the field, Home Performance companies note that as their businesses grow, they have an increasing need for various kinds of support staff. In fact, one-quarter of Efficiency First survey respondents indicated that they expect to hire for administrative positions within the next two years, and just under one-fifth plan to hire managerial staff within the same time frame. No matter what the business model, data collected in the field must be processed and managed, rebate forms must be filed, business investments must be financed, and employee paychecks must be cut. The day-to-day administrative and managerial responsibilities of any Home Performance company provide job opportunities for people with very different skill sets than those who work on retrofit crews.

Office and support positions in this industry include:

- Administrative (human resources, information technology, etc.)
- Data entry, report writing and proposal development
- Customer service
- Rebate processing
- Financial advising
- Purchasing and inventory management
- Engineering
- Business, construction and project management

As the industry grows, there will be an increased need for all types of support workers for the Home Performance industry. Though the exact ratio of these jobs to field positions depends on the company's business model and the productivity of the workforce, industry experts suggest that office and support jobs should represent 12-30% of the overall jobs created.⁴⁷

Job Requirements: Job Requirements will vary by position, but in general, people with previous experience with these types of jobs, especially in construction-related industries, are most likely to be hired first. For example, survey respondents specified a need for accountants who know how to use QuickBooks for Contractors and engineers who can use Wrightsoft's Right-Suite® software.

Accreditation and Quality Control Jobs

The final category of workers involved in the home retrofit process provide quality assurance and company accreditation. These jobs fall within private companies, utilities, government program offices, and standards-setting organizations such as BPI and RESNET. Jobs in this arena include:

- Trainers (i.e. BPI or HERS for auditors, asbestos identification and removal, lead abatement, OSHA 10 and first aid training for field laborers)
- Certification exam proctors for written and field tests
- Third-party verifiers and quality assurance inspectors (tied to incentive program requirements from utilities or government programs)

- Third-party verifiers and quality assurance inspectors (tied to certifying organizations such as BPI or RESNET)

As more programs tie incentives to industry certifications, demand for qualified trainers will grow accordingly. BPI, which provides certifications for residential retrofit contractors, experienced a five-fold increase in the number of certifications between 2005 and 2008, and estimates that the number almost tripled between 2008 and 2009.⁴⁸ As demand for training grows, BPI is concerned that there will not be enough qualified trainers, especially for their Heating, Envelope, and Multi-Family certifications.⁴⁹

The Lawrence Berkeley National Laboratory also emphasizes the growing need for qualified trainers. In *Energy Efficiency Services Sector: Workforce Education and Training Needs*, the study's authors report that the WAP network will need an estimated 700 *additional* trainers by summer 2010, and that many community colleges rely on a small group of key instructors to teach courses, many of whom are nearing retirement age.⁵⁰

Job Requirements: The best trainers and verifiers have several years of experience in the field and a high level of technical competence. According to Jeff Catlin, president and CEO of the Energy Conservation Training Company in Portland, Oregon, explains that the three most important characteristics of trainers are enthusiasm, technical excellence and the ability to communicate. To find candidates with these characteristics, he recruits from his training courses, where students have already been screened for their ability to get jobs in the Home Performance industry. By seeking out the most engaged students in his classes, he can find candidates for future trainer positions—people who have a construction background, a thirst for learning and can learn quickly.

John Tooley, one of the nation's leading building science experts, cites a list of characteristics that he believes are essential for good supervisors or trainers. These include two types of knowledge and three types of skills:⁵¹

Two Types of Knowledge:

- 1) *Knowledge of the work (have a minimum of six continuous months work in the field)*
- 2) *Knowledge of the responsibilities, i.e. production, cost, quality, safety*

Three Types of Skills:

- 1) *Leading*
- 2) *Instruction*
- 3) *Improving methods*

INDIRECT JOBS

While this report focuses on direct jobs within the Home Performance industry, it should be noted that the growth of the industry will create jobs in other related and supporting industries as well, such as equipment and materials manufacturers, utilities, retrofit program administrators and government agencies. John Smith, a market manager at insulation products manufacturer Johns Manville, explains: "If the industry

grows, we will see increases in employment on the production side as well. We could go back to full operation at all of our plants and even open new ones. For our production line workers, we'd basically need people with a high school education. Other positions might include mechanics, electricians, skilled tradesmen and process control equipment technicians."⁵² Reports such as the Lawrence Berkeley National Laboratory's *Energy Efficiency Services Sector: Workforce Education and Training Needs* study and *Energy Efficiency, Innovation, and Job Creation in California*⁵³ by Prof. David Roland-Holst of the UC-Berkeley Center for Energy, Resources and Economic Sustainability provide more information on the indirect and induced jobs that could result from an increase in residential energy efficiency.

Standards and Certifications

As the residential retrofit industry grows, contractors are concerned that workers follow industry-approved safety protocols and make sure that retrofit jobs actually improve a home's overall performance, as even *one* highly publicized retrofit mistake could significantly dampen customer demand and curtail industry growth. Recognizing the need for consistency and quality control, groups including BPI, RESNET and the Environmental Protection Agency have established widely accepted industry standards for residential buildings and retrofit industry workers. BPI and RESNET are the two main national organizations that work with affiliates to provide certifications relevant to the Home Performance industry.

The Building Performance Institute (BPI) is a national standards and credentialing organization for residential energy efficiency retrofit work. As an independent, not-for-profit organization, BPI brings together leading building science experts from across North America to develop standards using a consensus-based methodology. BPI provides training through a network of training affiliate organizations, individual certifications, company accreditations and quality assurance programs. The most common BPI certification for the Home Performance industry is the Building Analyst certification, which allows a certificate-holder to "go beyond a traditional energy audit to perform comprehensive, whole-home assessments, identify problems at the root cause and prescribe and prioritize solutions based on building science."⁵⁴ Other BPI certifications that are commonly used in the Home Performance industry certify workers to:

- Quantify performance and prescribe improvements to help tighten the building shell, stop uncontrolled air leakage and optimize comfort, durability and HVAC performance (Building Envelope)
- Optimize the performance of gas- and oil-fired heating systems to help save energy and ensure occupant comfort, health and safety (Heating),
- Understand the role of the air conditioning and heat pump systems within the whole home and how to diagnose and correct problems properly to achieve peak performance (Air Conditioning and Heat Pump)

- Apply building-as-a-system fundamentals to diagnose problems and improve the performance of larger, more complex residential structures (Multi-Family)
- Apply house-as-a-system fundamentals to the specific needs particular to the various types of housing technologies (Manufactured Housing)⁵⁵

BPI has also just released standard work requirements for four new certifications (Air Sealing Installer, Air Sealing Crew Lead, Insulation Installer and Insulation Crew Lead) and is working with a limited number of BPI Affiliates to develop pilot training courses that include training for attic and floor air sealing, insulation prep, duct sealing, walls and combustion safety.⁵⁶ Finally, BPI offers accreditation to companies that comply with the requirements set by BPI to enhance the delivery of consistent, quality-focused building performance services. The organization expects to be approved before June 2010 by the American National Standards Institute (ANSI) as an accredited standards-setting organization following the required International Organization for Standardization (ISO) process.⁵⁷

The Residential Energy Services Network (RESNET) provides certifications for HERS Raters, Home Energy Survey Professionals and Qualified Contractors. A HERS Rater is an energy analyst who is trained to compile data about a home, its building envelope and energy features, and then determine predicted energy performance using the Home Energy Rating System (HERS). In addition to visual inspection, the rater uses testing equipment, such as blower doors and duct testers, to determine a HERS Index score for the home.⁵⁸ The ratings also provide evaluation of the cost-effectiveness of options to achieve greater energy efficiency.

EnergySmart Contactor/Builder is a new RESNET designation “specifically for contractors and builders who are qualified in energy efficient practices, including the skills and knowledge to complete energy efficient retrofits, installations and building projects in a safe and efficient manner.” A Home Energy Survey Professional (HESP) is an individual certified by an accredited HESP Provider to conduct a basic onsite energy audit.⁵⁹

Other relevant standards-setting organizations include North American Technician Excellence, Inc. (NATE), which offers an HVAC Efficiency Analyst certification for technicians in the heating, ventilation, air conditioning and refrigeration industry; the U.S. Green Building Council, which offers a LEED for Homes Green Rater certificate program; and the National Association of Certified Home Inspectors (NACHI).

In some cases, states or regions have their own required certifications. Workers commissioning heat pumps and testing and sealing duct systems in areas served by the Bonneville Power Administration in the Pacific Northwest are required to have the Performance Tested Comfort System (PTCS) certification.⁶⁰ The California Energy Commission has its own certification process for HERS Raters and is developing standards for the HERS II Rater certification exam to qualify energy analysts who are “trained to compile data about existing and newly constructed residential buildings that include single-family homes and multi-family buildings of three stories or less.”⁶¹

Examples of Policies and Programs That Require Industry Certifications

National: The GOLD STAR performance path of the proposed HOME STAR program would require home energy auditors to have BPI Building Analyst or HERS Rater certifications, and contracting firms to have BPI accreditation. Quality assurance requirements would drop from 15% to 10% if 100% of the individual contractors working on a job are BPI-certified. In all cases, the contractor would be required to conduct an energy audit before beginning work, and a test-out when the retrofit is complete.

State: Many state Home Performance with ENERGY STAR programs require BPI-accredited contractors to perform home energy evaluations and conduct the test-in and test-out. For example, the HPw/ES programs in New York, New Jersey, Oregon and Vermont all require BPI-certified Building Analysts to conduct energy audits.

Local: In Portland, Oregon, the Clean Energy Works program requires contractors to be BPI-certified to qualify for incentives.

In Bellingham, Washington, Sustainable Connections offers discounted home and business energy assessments, access to energy improvement financing, and additional incentive money (about \$500-\$1,500) for qualifying projects through their Community Energy Challenge program, which requires all participating contractors to hold BPI certification.

Utility: In Texas, Austin Energy's Demand Side Management programs only work with BPI- or HERS-certified contractors on Home Performance jobs.

Contractors who participate in the Georgia Power and Southface Home Performance with ENERGY STAR programs must possess a BPI Building Analyst I certification.

In California, Pacific Gas & Electric is developing a whole-house retrofit program that will require BPI, HERS and CA HERS II certification for all participating contractors. In the interest of safety, the utility guarantees that every job "will require a combustion safety test by a BPI-certified Building Analyst contractor or sub."

Municipally run utilities are also developing programs tied to standards. Utilities operating under the Bonneville Power Administration require Performance Tested Comfort Systems (PTCS) certified technicians to install residential heat pumps and duct systems. The Sacramento Municipal Utility District (SMUD)'s new Home Performance program will also require auditors to have a BPI Building Analyst certification.

To streamline training practices and certifications, the Department of Energy and the National Renewable Energy Laboratory are developing nationally recognized retrofit standards for worker certifications and training program accreditation. The process will include analyzing job tasks; defining minimum technical standards (ASHRAE, NECA, etc.); developing standard work specifications, skill standards and training content and pedagogy; and accrediting training institutions and certifying trainers.⁶² The Home Performance with ENERGY STAR (HPw/ES) program jointly administered by the Environmental Protection Agency and Department of Energy also incorporates standards

for using a comprehensive, whole-house approach to improving household energy efficiency and comfort. HPw/ES programs currently exist in 29 states. As energy efficiency programs at the state, local and utility level continue to grow, many are requiring compliance with the HPw/ES standards and are requiring homeowners to hire either BPI or RESNET-certified contractors to qualify for financing or incentives.

The State of Training Today

Training for weatherization and Home Performance dates back to the creation of federal weatherization programs in the late 1970s, and many existing home retrofit incentive programs have provided contractor training and support since their inception.⁶³ Because the education and training system for retrofit workers is decentralized and constantly evolving, no comprehensive data are available on the total expenditures to date that have been allocated toward training the Home Performance workforce.

Chandler von Schrader, manager of the ENERGY STAR Home Improvement Program at the Environmental Protection Agency, believes that HPw/ES programs generally dedicate up to 25% of their budgets to workforce training. He elaborates:

Some newer programs are getting started without a heavy investment in contractor infrastructure, believing that the demand/opportunity is great enough for contractors to step forward with their own training resources. However, I will say that nearly all programs promote/require certified BPI technicians, and that more and more are tapping into to community colleges to augment training. Beyond community colleges, there are emerging training resources that have strong curricula—both class and field. Beyond traditional training approaches, distant learning is becoming popular, allowing students to train at their own pace and time.⁶⁴

In the last year there has been a significant increase in funding for “green jobs” training and workforce development. Of the total \$3.1 billion given out by the Department of Energy in State Energy Program (SEP) grants under the American Recovery and Reinvestment Act, 25 states allocated almost 43 million toward energy efficiency workforce development.⁶⁵ The 2009 Recovery Act also provided \$500 million to the Department of Labor to fund new training programs and related research to support the development of a “green” workforce. These funds are being allocated through Green Jobs Act grants in five categories:

- State Energy Sector Partnership and Training Grants
- Energy Training Partnership Grants
- Pathways Out of Poverty
- State Labor Market Information Improvement
- Green Capacity Building Grants

Two other types of grants are also available that are being used for green career training:

- Community-Based Job Training Grants intended to build the capacity of community colleges to train workers in the skills required to succeed in high growth, high demand industries
- Workforce Innovation in Regional Economic Development (WIRED) grants bringing together state, local and federal entities; academic institutions; investment groups; foundations; and business and industry to address the challenges associated with building a globally competitive and prepared workforce⁶⁶

In addition to ARRA State Energy Program and Department of Labor funding for workforce development, training providers are receiving grants from:

- State Workforce Investment Boards (created under the Workforce Investment Act of 1998)
- Private foundations
- Other state agencies that support workforce development and skills training, such as California's Employment Training Panel or Massachusetts' Commonwealth Corporation

Examples of State-Level Efforts to Coordinate Funding Streams and Energy Retrofit Training Programs

Several states have efforts under way to coordinate training programs across multiple training providers and merge disparate funding streams to build effective, scalable training programs.

- The MassGREEN Energy Efficiency Skills Initiative in Massachusetts is leveraging several funding sources to create a single repository housing all Massachusetts energy efficiency and building science training activities, materials and energy-efficiency delivery services. The funding sources include nearly \$2 million in state funding, an additional \$1 million from the Department of Housing and Community Development federal Training and Technical Assistance stimulus money, and a portion of auction revenues from the Regional Greenhouse Gas Initiative. www.massgreentcc.com
- Through the Clean Energy Workforce Training Program (CEWTP) the California Energy Commission has leveraged ARRA State Energy Program dollars with additional funds from the Alternative and Renewable Fuel and Vehicle Technology Program established by AB118 (Núñez, Chapter 750, Statutes of 2007), Workforce Investment Act, Governor's Discretionary funds, and private and local funds to create a pool of money totaling \$75 million for green jobs training. www.energy.ca.gov/greenjobs
- "Building the Energy Efficiency Workforce of the Future," a work group of the Northwest Energy Efficiency Taskforce (NEET), has begun developing a strategic coordinating body to broker information and resources across multiple training providers in Idaho, Montana, Oregon and Washington. www.nwppc.org/energy/neet/workgroups/5.

TRAINING PROGRAM EFFECTIVENESS

The flood of money recently made available for green worker training has not only created new Home Performance training programs across the country, but has also supported the expansion of existing training programs, such as those for BPI Building Analyst or HERS Rater certification. The Lawrence Berkeley National Laboratory's *Energy Efficiency Services Sector: Workforce Education and Training Needs* report summarizes the state of training today:

Energy efficiency training and education is provided through professional trade associations and unions for construction contractors and trades, utility ratepayer-funded energy efficiency programs, third-party and trade association programs, community and technical colleges, universities, and third-party certificate and accreditation programs. In states and regions that are just ramping up energy efficiency programs, these types of efforts and even a basic EESS education and training infrastructure are often lacking.⁶⁷

Though many types of training are being developed, their relevance to local employers and ability to get program graduates placed into jobs vary widely. Lauren Carson, Director of Business Development at Clean Edison, explains:

The dominant models emerging around the country are community colleges, nonprofits, efficiency program managers, and for-profit training entities. It seems that community colleges do not have the ability to deliver field training. Most training programs focusing on certifications (HERS, BPI, etc.) are also falling short on field training. It seems that mentoring after graduation would better prepare graduates for actual work duties. Also, paid internships are starting to emerge as a way to better prepare the workforce before deployment.

Many training programs are still in their infancy and have been modifying their curriculum and training style in response to employer feedback. Though the Department of Energy's standards development process should help provide some consistency in training, at this time there is little quantitative data on the effectiveness of training programs nationwide. Based on feedback from interviews with industry leaders and *2010 Efficiency First Workforce Survey* data, the following section presents a brief overview of the industry's perspective on the six different training program types most commonly utilized by the industry today: 1) nonprofit or community-based training centers, 2) community college courses, 3) union training programs, 4) industry certification training affiliates, 5) online courses and 6) on-the-job training.⁶⁸

NONPROFIT TRAINING CENTERS OR COMMUNITY-BASED ORGANIZATIONS

Popularized by Van Jones as "Green Collar Jobs Training," these types of programs are characterized by their focus on the entry-level, manual labor workforce. They are predominantly grant-funded and generally target specific populations, including high school dropouts, ex-offenders, veterans, disadvantaged and unemployed urban youth,

low-income individuals, displaced workers and unemployed individuals.⁶⁹ Examples include the:

- Oakland Green Jobs Corps' Solar and Green Construction training
- Rising Sun Energy Center's Green Energy Training Services (GETS) program for entry-level positions in the energy efficiency and building performance industries
- Seattle Jobs Initiative's Weatherization Technician Training Program
- Chicagoland Green Collar Jobs Initiative's Weatherization Training

Because the bulk of Home Performance industry jobs require considerable time spent in people's homes, employers are reluctant to hire individuals with a past criminal record, a history of drug abuse, or unstable mental health. They are also concerned that candidates have a clean driving record and current driver's license. Finally, employers need retrofit workers who can meet the physical requirements of the job (i.e. physically able to belly-crawl within an 18" by 24" crawlspace, lift heavy equipment and climb ladders).

While these programs can be a good source of field training, some employers suggest that a greater emphasis should be placed on securing jobs for trainees after graduation, rather than preparing them for work that is not a good match for their skills, backgrounds or physical characteristics. Making sure the training is relevant is something that should be done in the planning phase of the training. By engaging employers early on in this process, the training provider can make sure their graduates have a place to work upon completion of the program.

Employers suggest that these types of training organizations could improve their placement rates by increasing their intake standards and creating strong relationships with each trainee in order to keep in communication with them until they are placed in a job. This requires a job counselor and/or staff familiar with case management practices, training program design and employer needs. Tracking metrics (date of hire, wages, etc.) is important, but employers believe that training program staff should routinely check in with both the employer and the employee.

COMMUNITY COLLEGE COURSES

The Lawrence Berkeley National Laboratory's *Energy Efficiency Services Sector: Workforce Education and Training Needs* study identified five community college programs as energy efficiency education/training leaders: 1) Lane Community College, 2) Hudson Valley Community College, 3) Laney College, 4) Iowa Lakes Community College and 5) Oakland Community College. They report that "Demand for these programs is uniformly high and exceeds capacity; many programs have waiting lists. Contacts at several of these programs report an increase in enrollment by four-year degree holders looking to receive practical training as preparation for a job in the EESS."⁷⁰

While Home Performance contractors support community college training programs in theory, many express the concern that they produce sub-par graduates, mostly due to the instructors' lack of practical experience and the limited opportunities for hands-on

training. Employers suggest that while community colleges offer a good opportunity for generalized classroom learning, few have access to sites for field training or the resources or desire to stretch beyond the classroom.⁷¹ Further, though the Center for Energy Efficiency and Building Science (CEEBS)⁷² learning centers in New York train more than 2,000 students per year using a curriculum developed by Hudson Valley Community College, in most parts of the country community college education programs often only produce a small number of graduates (around 30 per year) who may have limited practical experience working in the residential construction or remodeling industries.

To address their training concerns, employers suggest that colleges train to industry standards, provide short courses, offer evening classes so currently employed trainees can take them after work, and make sure the classroom and lab training are paired with field training whenever possible. Some community colleges, such as Laney Community College in Oakland, California, have already responded to the need for shorter courses and have created a less comprehensive curriculum for a six-week course to complement their more in-depth certificate program, which is offered over three semesters.⁷³ Others, such as Mt. Hood Community College in Gresham, Oregon, and Clark College in Vancouver, Washington, are partnering with the Energy Conservation Training Company to provide a week or more of field training for students. The Building Performance Institute has also recently partnered with the American Association of Community Colleges to get more than 1,200 community colleges across the country to teach to BPI standards and provide students with the opportunity to test for industry certifications.⁷⁴

UNION TRAINING PROGRAMS

The growth of the Home Performance industry has prompted a coalition of unions to develop their own training and apprenticeship programs. The Laborers' International Union of North America (LiUNA), for example, is converting several of their 60 existing training centers around the country to provide sites for weatherization and Home Performance training. With 60 credentialed weatherization trainers and roughly 10 active weatherization training centers, LiUNA has certified over 200 workers as Weatherization Installers, Supervisors, and Energy Auditors. Kevin Pranis of Change to Win explains that LiUNA is well positioned to train the Home Performance workforce because the unions not only have the capacity to provide training for large numbers of workers across the U.S. with consistent curriculum and standards (last year alone LiUNA trained 100,000 construction workers), but the unions also have decades of experience developing and perfecting workforce training pedagogy. The coalition estimates that should the industry scale quickly due to HOME STAR incentives or other rapid increases in customer demand, LiUNA could realistically provide quality training for 50,000 workers in 12 months.⁷⁵ So far, training programs in New York, New Jersey, Washington, D.C., Mississippi, Oregon and Washington have trained both unemployed construction workers and new entrants to the field from low-income communities.

A recent agreement by BPI and LiUNA will allow home energy retrofit workers trained by LiUNA to receive dual certification from BPI and LiUNA. While BPI is currently conducting a review of the LiUNA curriculum to make sure the curriculum meets its standards, the dual certification option should significantly increase the industry's confidence in the quality of LiUNA's training and grow the number of BPI-certified and LiUNA-credentialed workers available to meet the requirements established by a growing number of state and local programs and proposed in the federal HOME STAR legislation.⁷⁶

The industry as a whole is mixed on whether organized labor should be involved at all in an industry dominated by small companies, but some contractors believe that the unions provide a talented worker pool from which to draw experienced trades people.

Regardless of the industry's view of the role of organized labor in the Home Performance industry, contractors insist that:

- Union training programs should teach to industry-accepted standards (i.e. BPI, RESNET)
- Unions should avoid creating their own Home Performance training certifications, and certainly not push for them to be required for government program incentives or funding
- Training programs should be open to all if they are publicly funded.

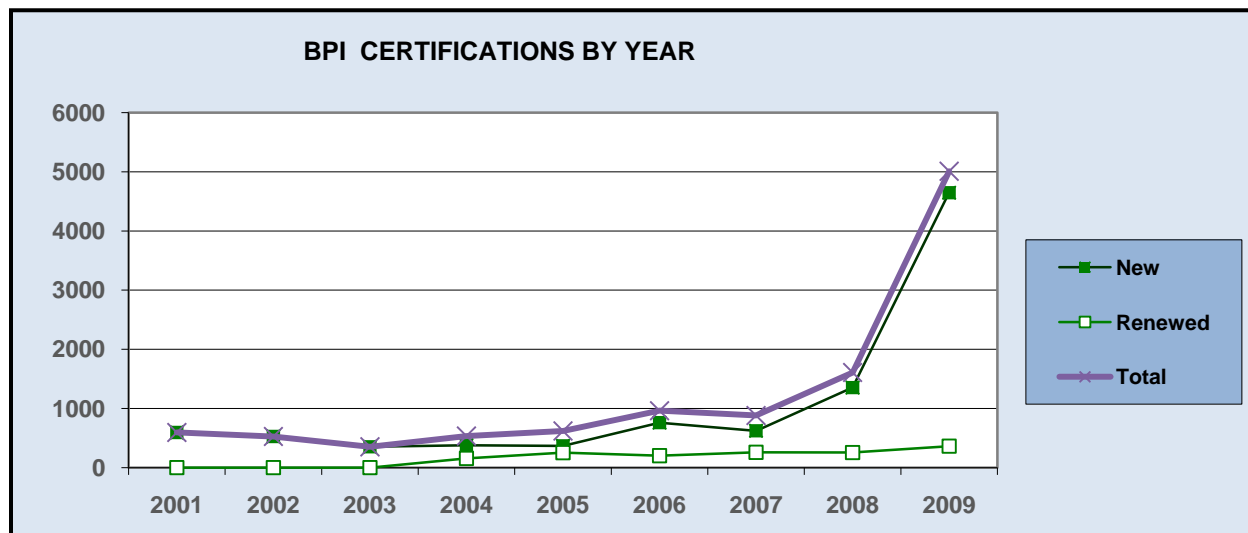
INDUSTRY CERTIFICATION TRAINING AFFILIATES

As the predominant industry certifications for raters, estimators and retrofit crews come from organizations that develop *standards*, not *curricula*, there is room for many types of organizations to develop their own education and training programs. Indeed, many private-sector companies and nonprofit organizations have risen to the challenge by providing both classroom and hands-on field training that give participants general building science education, as well as preparing them for the certification tests.

Within the BPI network there are 171 certified training organizations, also known as BPI Affiliates, which have had their curriculum approved for training students for the 11 BPI certifications. The number of BPI Affiliates has been increasing every year since 2005; as of April 2010, BPI had certified 10,000 individuals and expected to double that number before the end of 2011.⁷⁷ Private-sector companies that license their curricula for BPI certification training include Clean Edison, Performance Systems Development (PSD), Atlas Efficiency Solutions, Saturn Resource Management, the Institute of Environmental Management and Technology and the Energy Conservation Institute. Nonprofit and governmental organizations that offer BPI curriculum licensing include Southface and NYSERDA.

In addition to certifying individuals, BPI has offered accreditation to 500 companies whose employees hold at least two BPI certifications: one Building Analyst and one certification in the contractor's specialty area (i.e. an HVAC company would have at least one Building Analyst and one Heating or Cooling certified contractor).

BPI Certifications by Year



Source: Steve Cowell CSG. "Residential Retrofit: At the Nexus of National Energy Policy" Presentation at the 2010 ACI Conference in Austin, Texas. April 19, 2010.

RESNET has a similar network structure. The organization enables accredited organizations such as community weatherization agencies, community colleges and private organizations to provide residential weatherization and building performance training. As of April 2010, RESNET had 44 Energy Rating training providers,⁷⁸ up from 24 in 2006 and 34 in 2008. They estimate that 1,200 to 1,600 individuals per year complete training with RESNET-accredited training organizations⁷⁹ and currently have over 4,000 individuals certified as Home Energy Raters and Home Energy Survey Professionals.⁸⁰

While demand for certification training is expected to increase exponentially in coming years, Home Performance contractors express two types of concerns with these programs:

- 1) That there is some inconsistency in worker "readiness" despite passing training program exams, especially for the field exam portion, where passing is more subjective since it is dependent on the trainer or training program requirements. Though field experience is necessary in order to pass the tests, "just passing the test does not mean you are ready to work."
- 2) That BPI and RESNET only provide standards for training for a few specific occupations within the industry. (Until April 2010, there were no standards for certifying retrofit workers, such as Air Sealing Technicians or Insulation Installers).

In order to address these concerns, BPI has been encouraging training providers to put additional emphasis on field work in the curriculum. BPI is about to launch a process for online customer feedback and will be doing additional quality review of existing BPI Affiliate training.⁸¹

Though *2010 Efficiency First Workforce Survey* results show that less than half of employers expect job applicants to have BPI Building Analyst or HERS Rater certifications before hiring, employers do say that certifications demonstrate that a candidate is really invested in the field. More than 50% of Home Performance employers are also willing to cover employee costs to go through certification courses post-hire, especially where workforce training subsidies are available to offset the costs of training and certification.⁸²

Outside regions with program requirements for certified contractors or specified performance standards, the market may not yet adequately support builders and contractors who are certified by BPI or RESNET. As a consequence, contractors may not be willing to invest their own time and money to receive this training.⁸³ Interviews with contractors reveal that as long as there is a certified contractor within the company to conduct the test-in and test-out phases of each retrofit and complete the sign-off on the job, it may not be necessary for all workers within the company to become certified. However, this may vary according to the requirements of the applicable residential energy efficiency programs. In some cases, the requirement of a certified “contractor” refers to the company; in others, it applies to the individual worker. Regardless of which definition is used, we are likely to see increased demand for certified raters, analysts and retrofit works in the years to come, so getting industry certifications will be a worthwhile investment.

ONLINE COURSES

For preliminary recruitment and basic training, online courses are a relatively inexpensive alternative to building new facilities and hiring faculty.⁸⁴ Online tools make it easy to offer course work at times and locations that are convenient and accessible to all types of target training populations. They also provide a good option for preparing workers for careers in residential energy efficiency on the order suggested by the American Recovery and Reinvestment Act, which expects training programs to “include the ability to begin or expand training expeditiously.”⁸⁵ Companies such as Saturn Resource Management already offer distance learning options for individuals wishing to complete the RESNET/HERS or BPI Building Analyst written exams. The company’s newest course offers a Weatherization Energy Auditor training tailored specifically for the DOE Weatherization Assistance Program and utility conservation programs.⁸⁶

For high-functioning, self-motivated and tech-savvy individuals, online training is a great way to make training accessible at the learner’s preferred pace. However, these distance learning options are no substitute for hands-on training. Especially for populations that lack professional and/or construction experience, one-on-one, face-to-face instructional time is crucial, as in-person training models give instructors the opportunity to teach “basic professional skills” as the learning opportunities arise.⁸⁷

For these reasons, online study courses may be a preferred alternative for workers who already have jobs or experience in the Home Performance or residential construction and remodeling industry. In some cases, training programs like those offered by the

Energy Conservation Training Company in Portland, Oregon, combine access to online coursework with classroom training to give students the benefit of reviewing materials on their own, as well as the mentoring, networking, and camaraderie benefits that students gain in the classroom setting.

ON-THE-JOB OR POST-HIRE TRAINING

A final option for training, and the one considered the most effective among current Home Performance companies, is on-the-job (OJT) or post-hire training, also known as Training Within Industry (TWI). This type of training usually occurs after employees have a basic understanding of the fundamental concepts, theories and terminology and falls into a few categories: employee mentoring, apprenticeship programs, general education of existing staff, manufacturer training and continuing education.

In the first and second types, new workers are generally placed on teams with more experienced workers for a period of time until they learn the necessary skills to work on a project independently. During the training period, the trainee may serve as an assistant to his or her mentor, and their performance is constantly being observed to determine their readiness to work independently or move into a more senior position. For the most entry-level field positions, the training period is usually a minimum of four weeks, with many employers reporting training times of approximately three months.⁸⁸ With employer training, each company may have their own program and procedures, tailored to meet the individual business and worker's needs.

In other cases, employers offer general training for staff on basic Home Performance principles and work practices. These in-house trainings include topic-specific discussion sessions; gatherings to discuss best practices or staff questions; workshops "to educate each other about projects, products, and policy"; and participation in industry-relevant conferences such as those hosted by Affordable Comfort, Inc. (ACI).⁸⁹

Manufacturers also typically target existing companies and workers to train them on how to use specific equipment, industry-relevant tools, software and other technologies. In some cases, the product supplier charges for their training; in others, the training is free and used as a marketing and sales tool. For example, in September 2009, insulation manufacturer Johns Manville offered a free hands-on training in St. Louis for about 25 of their general contractor customers, which included training on selling retrofit jobs, the EPA's whole-home performance program, blower door testing, using an infrared camera, and sidewall "drill and fill."⁹⁰ While Johns Manville notes that this kind of comprehensive training is rarely provided by insulation companies, they do commonly hire equipment manufacturers to train contractors because proper installation varies by process and setting.

The pros and cons of various types of training are summarized below in the chart on pages 32 and 33.

Summary of Training Program Pros and Cons

Training Type	Pros	Cons	% of Industry Rating Effective or Very Effective
Mentoring (within company)	Trainers have first-hand experience since they do the job on a daily basis; trainer certification follows the trainer, not the company, so encourages mobility, highly competitive wages and accuracy. Public funds can be leveraged with employer resources; employers can choose mentor-trainee pairs that are a good fit; trainees learn on the job while earning wages; jump-starts the industry since trainees are productive while learning; works well with the TWI model; enables trainees to quickly move up the career ladder and become trainers themselves; takes place at times/places convenient to the trainee; allows access to non-English speakers without the cost of interpreting a training program; offers quick identification of barriers to employment/referral back to support services; allows testing and analysis of various training models/methodologies.	May slow down company productivity; may require uncompensated time commitment from experienced workers.	88%
Training/skills update offered by professional or trade association	Training program has connections to employers; generally utilizes experienced trainers; can teach skills as requested by employers	May require payment (sometimes significant); may not have training infrastructure and need to partner with other institution; may be best for incumbent workers and not offer sufficient training for new entrants; may not lead to a certification	66%
Training for industry certifications by a BPI or RESNET affiliate	Trainers often have experience working in industry; always teach to industry-accepted standards; often have close links to employers	May require payment (sometimes significant); inconsistency in the experience and skill level of the certified workers; passing a test does not ensure worker readiness; lack of a single industry standard; until recently, no standards existed for retrofit worker certification	62%

Product manufacturer training	Incumbent workers can learn latest technologies and materials	Generally only provide training on specific equipment or materials use; infrequent; may require payment	44%
Community college special certificate program	Ability to scale through curriculum replication at other colleges; willingness to work with employers; often low-cost or free for students	Instructors often lack practical experience; limited opportunities for hands-on training; specialized certificates confuse industry and lack quality assurance	42%
University education	Students can learn theory as well as application of building science principles; good for higher-level technical or management positions	Only relevant for specific positions within industry; slow to scale	33%
Community college semester-long courses	Give students more education and exposure to industry; ability to scale through curriculum replication at other colleges; willingness to work with employers; often low-cost or free for students	Instructors often lack practical experience; limited opportunities for hands-on training; may be slow or not fit incumbent workers' schedules; often only produce a small candidate pool	31%
Nonprofit energy efficiency training programs	Serves target populations (unemployed, low-income, people with barriers to employment); free or low-cost for trainees; willing to work with employers	Trainees may not meet industry requirements (drug-free, no criminal record, etc.), often lack professional skills, and often have limited relevant work experience; program is generally completely reliant on grant funding and government subsidies; programs are incentivized to <i>train</i> , not to <i>place</i> trainees.	N/A
Union training programs	Trainers have years of experience conducting workforce training for construction-related industries; unions can pre-screen candidates; employers can hire program graduates without long-term commitment	Employers required to pay union wages; current industry skepticism about role of unions in industry	N/A
Online	Students can learn at their own pace; course material available 24/7 for review; good complement to on-the-job or field training; requires less investment in training infrastructure; ability to scale training rapidly; may be translated into many languages; provides an easy way to track training institutions, trainers and trainees	Limited opportunities to coach students on professional skills; lacks important hands-on and learning-by-doing component; may not work for trainees who lack self-motivation or computer skills; may require payment	N/A

In sum, all models have advantages and disadvantages and the “best” model depends on the population being served, the goals of the training, the funding and capacity of the training organization, and the needs of local industry. However, most effective models are a hybrid models that combine several of these training types. As the industry grows, it will need training providers of all types, and employers will ultimately decide which local programs (and even which trainers) produce graduates who help them succeed. Trust established between employers and training providers will be essential to supporting repeat transactions, but exactly how that happens will vary between geographic regions. This is not to say there cannot or should not be industry standards; rather, training providers should develop their own curricula and ways to provide field experience for trainees in accordance with industry standards and local demand.

The following section provides recommendations for designing and maintaining effective training programs that meet employer needs.

Recommendations for Workforce/Training Organizations

PRE-SCREEN

To make sure that trainees are on a track that can actually lead to employment, many employers suggest that more work should be done up front to assess candidates’ physical, psychological and intellectual aptitude for positions in the Home Performance industry. This could be accomplished by developing competitive selection criteria and a process for identifying appropriate Home Performance industry training candidates. Candidates interested in the Home Performance industry should be screened on two fronts: 1) their desire and 2) their ability to fulfill industry requirements for specific positions. Under the first screen, candidates should be asked what type of role they plan to fill within the industry (i.e. office/administrative, sales/auditing, field labor, etc.) In the second step, employee skill sets and backgrounds should be matched with the lists included in the “Job Types and Requirements” sections of this report. Brian Bovio of New Jersey-based Bovio Heating and Air Conditioning explains that “Pre-qualification of workers (drug, criminal and *education of work conditions*) is critical to not waste employer or training program resources.”⁹¹

TRAIN TO INDUSTRY-APPROVED STANDARDS

For a new and growing industry like Home Performance, standardization and simplicity are important. Rather than try to interpret the significance of a number of different certifications, accreditations and licenses from different institutions, employers prefer training programs to teach to existing industry-accepted standards. Industry certifications following these standards provide the employer with the assurance that the job candidate has a sufficient level of building science knowledge and has mastered a specific set of skills. The *Greener Skills: How Credentials Create Value in the Clean Energy Economy* report published by the Center on Wisconsin Strategy accurately

describes the importance of meaningful and standardized training certifications and credentials. The authors report:

After sifting through hundreds of clean energy credentials, one thing became clear: All credentials are not created equal. To be worthwhile, credentials should be: (1) meaningful in the labor market, because they have value to employers; (2) transparent, so workers know how to earn them; and, where possible, (3) embedded in a pathway, clearly connected to either a job or the next level of training; (4) standardized, reflecting common measures of competence; and thus (5) portable—not limited to a particular region, employer, or institution. Developing common standards and conferring commonly recognized credentials for verified occupational skills offers a firm path forward. For workers it provides mobility, bargaining power, and higher returns in the labor market. For employers it provides assurance that job applicants have the skills they need. And for consumers it provides critical information on the quality of work they can expect. National standards can help guarantee both quality jobs and quality work, in and outside of “green” sectors.⁹²

Recurve president and founder Matt Golden emphasizes the need for training programs to follow industry standards, regardless of the type of educational institution or curriculum. He believes teaching to industry-accepted standards will not limit programs' ability to teach creatively or to integrate other material. Golden explains, “BPI does not have ‘training,’ it has standards. You can learn any way and anywhere you want. Just pass the BPI test.”⁹³

While worker certifications are not uniformly required by Home Performance programs today, forthcoming policy will likely tie incentives to standards and require further certification of the residential energy efficiency workforce. By teaching to existing standards, training programs can position themselves to be a source for employee recruitment when such programs do come into place.

Further, training providers should keep track of efforts by the Department of Energy to provide standard work specifications based on job task analyses and technical standards. This process, coordinated by the National Renewable Energy Laboratory, will lead to a system of accreditation for training providers and certification of trainers. The DOE has set a goal of having the standards ready for public comment by fall 2010, and expects to finalize one set of internationally recognized training standards (equivalent to NABCEP for the solar industry) accredited by the Institute for Sustainable Power (ISP) by 2011.⁹⁴

TRAIN IN THE FIELD

The most consistent message reiterated by survey respondents regarding training for retrofit workers was that classroom learning alone is not sufficient preparation for work in the field. Classroom study typically teaches students how to operate diagnostic equipment and other technologies used in the field, but many employers stated that one week of lab and field training is not enough to expose workers to different circumstances and teach them how to safely deal with different kinds of problems encountered in real homes. This is especially true for new entrants who have little or no experience working in the residential

construction, appliance repair or remodeling industry. One respondent to the *2010 Efficiency First Workforce Survey* commented, “So much of the training we see advertised out there is just awful. Can you imagine someone auditing your home who had a three-day course including blower door, IR camera, CAZ safety work, and all the other 'stuff' they need to know? It's nuts. I wouldn't let them near my home. Anything short of a 10-day course, spread over (at least) 28 days (allowing time for homework, the brain to absorb, etc.) is not acceptable in my mind. And THEN there needs to be at least a dozen mentoring sessions. At that point the new 'professional' is only moderately dangerous.”

An assessment by consultant Kevin Doyle of the workforce needs of residential energy efficiency companies in Massachusetts concluded that while there is still a place for less experienced new entrants, “these workers should spend more time in basic training courses with a more extensive field component.”⁹⁵ In addition to receiving a classroom education on the energy efficiency industry and basic building science principles and terminology, employers believe that new entrants and existing workers should learn:⁹⁶

- Equipment use and maintenance
- Air sealing
- Insulation materials and techniques
- Combustion safety⁹⁷
- Code compliance
- Knob-and-tube wiring mitigation
- Moisture and mold abatement
- Asbestos removal
- Lead paint protocols
- Heating/cooling plant
- Window and door replacement
- Applied math
- Professional skills for customer interaction

Most successful programs today include field work, internships, apprenticeships or other on-the-job training. These components should be expanded wherever possible and introduced in programs that rely more heavily on classroom education or distance learning. Further, by offering repeated opportunities for program participants to practice what they have learned, training programs can help trainees improve their work speed, as the time it takes new hires to complete basic tasks is often a concern for employers.

To more fully integrate field opportunities into program curricula, the issue of who pays for liability insurance—the employer or the training program—when workers are in the field should be further addressed.

TEACH OTHER RELEVANT SKILLS

In addition to teaching trainees the basics of building science, combustion safety and how to be effective in the field, programs should include instruction on other relevant

skills and provide information that will help trainees be more effective on the job. These could include modules on:

- Health and Safety (OSHA 10, First Aid, CPR)
- Soft skills (dressing appropriately, showing up on time, etc.)
- Sales, customer service and appropriate interaction (speaking articulately, wearing shoe covers in the house, etc.)
- Problem solving
- Basic energy modeling
- Computer programs and energy modeling software (i.e. Energy Pro, TREAT, Wrightsoft Right-Suite® Universal, Recurve, REM/Rate™, or EnergyGauge®)
- Local incentive or utility program rules and requirements
- Basics of sustainability and energy conservation
- Complementary skill sets, such as PV and solar water heater installation
- Emerging technologies

DEVELOP EMPLOYER RELATIONSHIPS

Home Performance contractors spend much of their time at job sites or developing new business, making it difficult for them to commit significant amounts of time to participation in local job training programs. However, 81% of Home Performance companies surveyed said they would like to be involved in a local training program or that they would at least like to know more.⁹⁸ Building an employer advisory council or establishing a group of Home Performance leaders who can offer information about changing industry standards, provide feedback on what is and what is not working, and be a general source of advice for program administrators and instructors is essential to running an industry-relevant training program. The same employers can also be encouraged to hire program graduates at the end of each training cycle. Using a business mind-set, the training program would view the employer as a customer and work to establish their trust and build a positive reputation. If the program does a good job of providing the company with well-prepared candidates, the employer will look to them for future hiring needs and spread the word to other employers in their network.

A common challenge for training programs can be identifying local employers and reconciling the workforce needs of companies of different sizes and types. By working with national industry associations, such as Efficiency First and local Home Performance industry groups, training programs can gain a broader industry perspective and have fewer channels for reaching multiple employers at once.⁹⁹ In addition to providing quality job candidates, training programs may keep employers engaged by offering additional benefits, such as:

- Free marketing and name recognition in the community (using supporting employers' names and logos whenever possible)
- Customer outreach and homeowner education about retrofits (using trainees to conduct customer outreach about the benefits of home retrofits to build the local customer base)
- Assistance with other business issues (financing, incentives, etc.)
- Job candidate screening

- Subsidies for providing on-the-job training, internships, apprenticeships or permanent job placements
- Incentives for superior mentoring

DEVELOP LONG-LASTING RELATIONSHIPS WITH TRAINEES

In addition to developing relationships with employers, training providers and educational institutions should develop a system for long-term communication with their trainees (another set of customers) and hire a case manager to manage these relationships. Trainees' contact information should be readily available to preferred employers (those who offer program guidance or support). Training program managers should keep in touch with trainees until they are placed in a job, and have mechanisms in place to follow up with program participants to know:

- Who has found work
- Who is still looking for work
- Who may need additional training
- Which companies are looking for additional staff

Programs should also keep track of starting wages and benefits, as well as the tenure of the relationship between their trainee/student and the employer. Past graduates should be invited back to speak about their work experiences and to mentor current program participants. Patch Garcia, Chief Culture Officer at Recurve, suggests that program managers should “treat each cohort as a graduating class. [They should] take individual photos of each trainee, add their bio and resume to [their] Web site or database, and update it once they become employed.”¹⁰⁰

Finally, training providers should consider offering trainees opportunities for advanced classes or continuing education to maintain industry-certifications.

Training Program Best Practices

PROFILE 1: ISLES' CENTER FOR ENERGY AND ENVIRONMENTAL TRAINING

Isles' Center for Energy and Environmental Training (CEET) is the latest addition to Isles, a 29-year-old community development and environmental organization in Trenton, New Jersey. As a green jobs training center, CEET is clearly furthering Isles' mission to “foster more self-reliant families in healthy, sustainable communities.” With a primary focus on providing high-quality training in the field of energy efficiency and healthy buildings, CEET trains 1) unemployed or underemployed individuals, 2) workers seeking to change fields or enhance their skills or certifications, and 3) existing employees (at the request of employers). Many New Jersey employers are pleased with the quality of workers they have hired directly from the program.

Training, Certification and Education Programs Offered: CEET collaborated with Conservation Services Group to establish an entry-level curriculum, which was not readily available to individuals wishing to get into the energy efficiency field. The

program has expanded and revised that Energy Efficiency Assistant curriculum and will be submitting it to BPI for certification review under the new standards for Air sealing/Insulation Installers. As a BPI Affiliate, CEET also provides Building Analyst, Envelope Professional and Heating Professional courses and certification exams, and intends to offer Multi-Family certification this year. The center also offers Solar Panel Installation and EPA Lead Repair, Renovation, and Painting classes. The majority of training has been conducted at the program center in Trenton. However, CEET serves trainees throughout the state, and trainings have been offered at community centers in Newark, Camden and New Brunswick as part of a state grant.

Trainee Backgrounds and Experience: Since January 2009, Isles has trained 260 unemployed or underemployed individuals, and over half are now working in the energy efficiency field. The center has also provided customized training for employers (including public utilities and private contractors) and training for 112 individuals seeking to advance their skills. Overall, since January 2009, the breakdown of Isles training is roughly 30% incumbent workers seeking energy efficiency skills, 38% unemployed or underemployed with some construction experience, and 32% new entrants to construction or energy efficiency work.

Program Duration and Frequency: Since January 2009, Isles has completed 16 Energy Efficiency Assistant classes (seven days), 11 Building Analyst classes (six days) and 12 duct modules (two days). Customized training has also been offered as requested by employers, and the center schedules other classes based on interest expressed by individuals and employers.

Training Curriculum: Generally, trainings are divided into equal parts classroom learning, onsite learning laboratories and field work. The center is in the process of developing online modules that will enhance existing training. Curricula are selected or developed based on research, review and continual efforts to enhance the program.

Participant Placement Rate: Over 50% of those who have come to the program seeking to enter the energy efficiency field and completed a training program have been placed in related jobs. Another third are currently interviewing for positions. Isles continues to work with the other trainees, providing review material and opportunities to work in new learning laboratories. The center also provides additional training in cases where potential employers note a need.

Training Program Cost: Cost varies by course and whether or not certification exams are included. (Many students elect not to take the exams immediately; some want to get some on-the-job experience first.) The courses alone generally range from five to seven days, with training fees (not including exams) ranging from \$1,100 to \$1,500. Under a state grant, CEET training was free for unemployed or underemployed individuals during 2009.

Available Employment Subsidies: New Jersey employers who pay at least \$15 per hour are eligible to receive a subsidy of 50% of a new employee's salary for up to six months if they hire one of the program's 2009 unemployed or underemployed graduates.

Program Funding: The New Jersey Department of Labor and Workforce Development provided a start-up grant for Isles' CEET program and provided the employer incentive. Employers pay for customized training.

Private-Sector Employer Engagement: Isles has an employer council and has been pleased to get continuing inquiries from additional employers every week. The center sends flyers periodically about course offerings, posts a schedule on their Web site, and talks regularly with employers about their needs for additional workers.

PROFILE 2: RISING SUN ENERGY CENTER GREEN ENERGY TRAINING SERVICES

The Green Energy Training Services (GETS) program based in Berkeley, California, is designed to prepare adults (18 years old and older) who lack Building Performance knowledge or who experience barriers to employment for entry-level jobs leading to careers in the Energy Efficiency and Building Performance industries. For many unemployed, under-employed and displaced workers, GETS provides the crucial first step in a pathway towards a green career.

Rising Sun Energy Center has contracted with the cities of Richmond and Berkeley to implement the "GETS Energy Services" program. GETS graduates are offered "bridge employment" to work as GETS Energy Services crew members assisting with the testing and remediating/retrofitting of moderate income homes. Customers of the program are "moderate income qualified" so that the program is not competing with the employers the program is serving. Moderate income is defined as being just beyond the income requirements for low-income programs such as LIHEAP, Energy Partners, WAP, etc. Trainees, homeowners and the city governments all benefit, as the cities are meeting their Climate Action Plan goals using the GETS graduates (who get "on-the-job" in field experience working on real homes) while providing Home Performance work at heavily subsidized rates or for free to income-qualified residents who would otherwise not be able to afford such services.

Training, Certification and Education Programs Offered: Currently, GETS program graduates receive a "Certificate of Completion" issued by Rising Sun Energy Center when they have completed the GETS training and scored a 75% or better on the GETS written final exam. Rising Sun Energy Center is in the process of affiliating with the Building Performance Institute and aligning the GETS program with BPI's new entry-level certifications. Rising Sun Energy Center's goal is to prepare students with a BPI-approved training course for these entry-level certification exams, which are then proctored by a BPI-approved Rising Sun Energy Center employee.

Trainee Backgrounds and Experience: GETS is designed to be "Building Performance Grade 1." This means GETS is an appropriate first point of entry into Building Performance for those beginning their construction careers or those wanting to widen their range of employable skills. GETS trainees come from wide variety of backgrounds. Some GETS students encounter one or more barriers to employment (such as recent incarceration, previous gang affiliation, chronic unemployment, veteran status, etc.), while others are displaced construction workers. GETS candidates are pre-screened for

basic residential construction knowledge. Typical construction experience among GETS trainees ranges from novice (having completed a nine-week carpentry-union-approved pre-apprenticeship training) to advanced (displaced construction workers). Currently, GETS is only offered to residents of the Richmond and Berkeley.

Program Duration and Frequency: GETS is a 100-hour training course implemented over four weeks. As of May 2010, Rising Sun Energy Center has trained four cohorts (a total of 76 graduates) with an average cohort size of 19 trainees. Five more trainings are currently planned for 2010.

Training Curriculum: GETS is a replicable training model and is licensable through Rising Sun Energy Center. The GETS curriculum consists of four main training paths: theoretical (“The Big Ideas”), soft skills (“Professional Skills Development”), applied math (“Time for Math!”) and hands-on lab training (“Technical Training”). The curriculum is designed to prepare a trainee for a life-long career in the Home Performance industry. This is accomplished by improving the trainee’s understanding of the fundamental laws of physics influencing energy movement throughout a home, and giving the trainee the opportunity to gain familiarity with the tools, practices and language of the Home Performance industry. All GETS instructors are required to have BPI Building Analysts accreditation.

Rising Sun Energy Center, the designers of the GETS program materials, recognized that GETS would need to be applicable to a wide range of trainees in a wide range of settings. Because of this, Rising Sun Energy Center engineered a high degree of flexibility into the program materials. The licensed GETS materials are designed to give a licensee all of the tools (and the training on how to use those tools) to implement a successful GETS program of their own. This includes a GETS Instructor Manual, GETS Participant Handbook, tools and materials purchase list, and an in-person training by Rising Sun Energy Center staff.

Participant Placement Rate: As of May 2010, Rising Sun Energy Center has placed 11 out of 76 GETS graduates in either building performance or energy efficiency oriented work. The majority of the remaining graduates have been placed in other construction-related fields by Rising Sun Energy Center’s partner, the municipal RichmondBUILD construction trades training program.

Training Program Cost: While the program is free for trainees, the initial set-up costs range from \$15,000 to \$20,000 depending on the resources already available to the training organization. The GETS program requires both classroom and lab space. Each cohort (averaging 19 participants) costs between \$2,000 and \$2,500 in materials and around \$4,500 in instructor wages (a lead GETS Instructor and one assistant instructor who is a GETS graduate).

Available Employment Subsidies: Employer incentives vary, but employers who have hired GETS graduates can qualify for ETP (Employment Training Panel), OJT (On-the-Job), and EZ (Enterprise Zone) funds to name a few.

Program Funding: GETS is currently funded by the cities of Berkeley and Richmond, corporate donors, and other grants.

Private-Sector Employer Engagement: Rising Sun Energy Center engaged local employers in the early stages of program planning. The GETS Employer Council serves to advise Rising Sun Energy Center on curriculum development as well as serve as an open forum for government officials to connect and converse with local business owners.

Recommendations for Policymakers

MATCH SUPPLY AND DEMAND

In order to see how well states understand the importance of building a market for Home Performance *before* or *concurrently* with the development of worker training programs, 2009 ARRA State Energy Program (SEP) funding allocations were further analyzed. By breaking out the funds directed toward supporting residential energy efficiency improvements (demand side) and those that support training for this industry (supply side), we could compare the level of investment in each.¹⁰¹ Overall, the data show that of the total 2009 SEP allocation of \$3.1 billion, approximately \$250 million, or 8%, went toward activities that should spur demand, and just over 1%, or \$43 million, went toward training workers for participation in the residential energy efficiency industry. Only four states allocated funds toward training without also using SEP funds to spur customer demand in residential energy conservation, whereas 11 states invested in activities to encourage residential energy efficiency without any allocation for worker training.¹⁰² While the amount of spending on demand-side activities was roughly eight times the amount allocated toward workforce training, it either wasn't enough, or the demand-side activities have not yet motivated customer response, since the overall sentiment from employers regarding workforce training was that the government had "put the cart before the horse."

More concerned about growing customer demand than building worker supply, few companies expressed having difficulty filling entry-level retrofit positions in the current environment. While demand for energy efficiency courses and community college training programs is high, the availability of jobs in the Home Performance industry is limited. Regarding the need to match demand with worker supply, Brian Bovio of New Jersey-based Bovio Heating and Air Conditioning remarked: "The Green Jobs program in Camden has several workers left that have not been placed. It has been very refreshing over the last year while we have been extremely busy in a depressed market that we have been able to find qualified people relatively easily."¹⁰³

Employers are not alone in this concern. Training program administrators also cite the need to increase homeowner awareness and grow the customer base for the Home Performance industry as a top policy priority. Dave Trovato, a project manager at the Seattle Jobs Initiative, explains, "We did a pilot of our Weatherization Technician Training Program with one cohort of 18 students, and so far only a third have found jobs. We've learned a lot from employers and would be ready to offer it again once the labor market is ready to absorb our program graduates. For now, we are trying to be responsive to local economic demand and will hold off on training again until businesses are actually hiring."¹⁰⁴

As an industry largely driven by policy incentives and requirements, policymakers should consider the total amount of funding available in a region to spur demand for home performance retrofits (incentives, low-cost financing, and leveraged homeowner investment) to determine the appropriate level of investment in workforce training. Though there is no definitive rule for the appropriate ratio, employers anticipate that approximately 11 jobs can be created per \$1 million of new company revenue; thus an approximate job growth estimate can be calculated for any region by estimating the total amount of home retrofit investment that will likely result from demand-creation programs and policies.¹⁰⁵

HOME STAR, PACE financing and utility incentives and rebates can play a part in addressing employers' concern that customer demand has not kept pace with the level of investment in worker training.¹⁰⁶ These demand-generating policies and programs should spur the growth of the industry—the first step toward any successful workforce development initiative. In testimony to the EPA, Matthew Phillips, residential DSM program manager at Austin Energy, explained that 27 years of residential efficiency program experience has taught him the importance of developing “strategies to increase supply (contractors) and demand (consumer awareness) at the same time.”¹⁰⁷ The city of Berkeley, California, provides a good example of how this works. The city has used its Energy Efficiency Community Block Grant (EECBG) and ARRA Weatherization funds to build a customer base and is leveraging the expanded training at Cypress Mandela Training Center, Laney Community College and RichmondBUILD/Rising Sun to train people to work on the subsidized home retrofit jobs.¹⁰⁸

Further, while training programs targeting poor or disadvantaged workers with little work experience may be politically attractive, employers actually have the hardest time finding qualified trainers and managerial staff, positions that require significant experience and previous education.¹⁰⁹ By making sure training grants and employment subsidies are available for all types of individuals, companies and positions, policymakers will guarantee that funds are being directed toward industry employment growth, not just politically popular initiatives.

MAKE FUNDING CONSISTENT OVER TIME/LINK FUNDING TO CONSUMER DEMAND

It is not only the creation of training programs that matters; it is also their ability to sustain themselves over time and evolve as the industry scales. Training program providers and employers expressed concern that the recent infusion of cash (through ARRA funds and other statewide investments) will not last. The two-year time frame for spending stimulus funding means that at the end of the period, funds will drop off. To support long-term growth in the industry, training funds should be consistent over several years, or escalated in response to increases in program scale or consumer demand.

PROVIDE CLEAR AND RELIABLE INFORMATION

Businesses trying to assess how many employees to train or hire need clear information about what incentives and requirements are likely to affect their business in the coming years, as well as the timelines for program implementation. Having a solid understanding about what standards, certifications and licenses will be accepted and/or required helps

businesses decide what kind of investments to make in workforce training. Inconsistent messages or sporadic program support harms business planning. Further, delays in incentive program initiation may actually *slow* business growth as customers hold off on Home Performance investments until rebates and incentives become available. The California Energy Commission's coordination of six regional Residential Retrofit Building Summits throughout the state provides one example of how government can support further sharing of information across the multiple organizations involved in scaling the Home Performance industry. During these summits, workforce training providers, educational institutions, energy efficiency program managers, Workforce Investment Boards, contractors, small business assistance centers and others were brought together for a day to build relationships and share relevant information.

SIMPLIFY TRAINING ACCESS AND SUBSIDIES

With so many training programs available, employers note difficulty figuring out which are legitimate and what appropriate training pathways look like for their employees. Helen Perrine, Senior Advisor to Affordable Comfort, Inc., recommends the development of a national registry of trainers, training organizations, training programs and curriculum, building on the one that ACI has already initiated.¹¹⁰ This registry should be focused on residential energy retrofit training and should be explicit about the number of years of experience the trainer has had of actual field experience, trainer certifications and accreditations, trainer areas of expertise, training program offerings, etc.

In addition to being difficult to evaluate, training can be prohibitively expensive for Home Performance companies just entering the field, and existing contractors report spending considerable amounts (approximately \$1,500 per employee) on employee training for certifications required by government programs. To facilitate workforce development, Home Performance programs should simplify access to training and limit unnecessary paperwork or procedures for training subsidies, especially given that paying the full costs of training up front can be difficult for small companies.

Rather than directing training incentives to employed workers and contractors who can pay all training costs up front (as, for example, is required by New Jersey's Home Performance with ENERGY STAR program, where contractors receive a 75% rebate *after* all required certificates are earned), policies designed to encourage new business creation and quality assurance for homeowners should be sensitive to the cash-flow issues of contractors. The Wyoming Department of Workforce Services offers one such example: Business Training Grants for new and existing workers can provide up to \$4,000 per trainee per fiscal year, where the business receives 75% of the total grant within one week after a payment request has been approved. The remaining 25% is paid to the employer 90 days after the completion of training if the trainee is still working for that employer.¹¹¹

ALLOW CHOICE IN THE TRAINING MARKETPLACE

If training rebates or discounts are offered, they should be available for redemption at all certified training providers. Enabling a selection of training providers will prevent

training bottlenecks, as have occurred in New York and New Jersey where Conservation Services Group/Honeywell is the only program that can offer state-approved rebates. Greater diversity of training providers also creates a natural quality control system that eliminates ineffective organizations, leaving only the most successful programs in place.

SUPPORT TRAINING WITHIN INDUSTRY

In addition to offsetting training costs, policies and programs should provide funding to offset the cost of on-the-job training and mentoring. Some employers would like to see further government support for a Training Within Industry (TWI) workforce development system, similar to that created by the United States Department of War during World War II when the shortage of trained and skilled personnel was viewed as a hardship for the manufacturing industry.¹¹² As one of very few success examples of large-scale training in the history of the United States, a similar model for the retrofit industry could meet the Department of Labor's recommendation that current training methods be modeled after programs "with previous success in serving priority populations."¹¹³

Using a TWI model could accomplish the following:

- Jump-start the residential energy efficiency industry by creating jobs instead of paying institutions to train without regard to job placement
- Spend training funds only on workers with real potential for a defined career path within the Home Performance industry instead of on students who are not suitable for the industry (physically, professionally, etc.)
- Offer the fastest way for trainees to gain portable industry skills, as they would gain field experience on a daily basis.¹¹⁴

Several existing programs already support a form of TWI, by covering 50-130% of the cost of hiring new employees. Scott Needham, president of Princeton Air Conditioning in Princeton, New Jersey, goes to Isles when he needs a new employee, because the 50% wage subsidy Isles offers for the first six months provides a strong incentive, and he knows that Isles trainees have received quality preparation for Home Performance retrofit work. An on-the-job training program in California's Sacramento County reimburses 50% of the employer's subsidized wages for up to six months for hiring dislocated workers;¹¹⁵ JobsNow! in San Francisco makes hiring a new employee free through September 30, 2010;¹¹⁶ and San Bernardino's Subsidized Training and Employment Program (STEP) offers as much as 130% in wage subsidies for new hires for up to six months.¹¹⁷ These incentives essentially serve as funds to support hands-on training, because even if an employee changes employers after the trial period, they have still received valuable work experience.

While funding for on-the-job training should be expanded, policymakers should not fund OJT to the exclusion of other types of training, because OJT is limited by the number of businesses that have the capacity to provide training and mentoring (a problem for a small but rapidly growing industry composed primarily of small companies), and because OJT can be "problematic for [teaching] energy efficiency solutions that require new techniques or an approach that differs from common practice."¹¹⁸

Recommendations for the Development of Home Performance TWI Programs

Pre-Screen: Before offering training, make sure candidates meet occupational requirements. This process is more similar to recruiting for the military than it is to applying for a typical construction job due to the extreme physical nature of the labor-related positions.

- Have candidates take online placement tests to determine appropriate sector: office job, auditor, laborer, etc.
- Create an online recruiting, training and tracking system that provides up-to-date reporting data for the program including the number of trainees and the number of companies participating.
- Provide each candidate a personal identification number (PIN) so her/his success can be tracked all the way through this TWI system. By assigning PINs to trainees we are able to track each trainee's progress through an articulated career ladder. By assigning PINs to individual trainers (*not* training organizations) we are able to identify and report on the most/least successful trainers, companies and training programs. It can also help identify dishonest employers who are trying to game the system, etc.

Train and “Graduate” Field Workers from Online Courses: Have trainees take the basics online so they are useful the first day on the job. Basics include OSHA safety, first aid, asbestos and lead identification, customer service know-how, tool identification and more, depending on the sector. Individuals who pass all courses in a sector receive approval to work as a subsidized trainee (for a maximum of one year).

Get a Job: Graduates of the online courses get hired by BPI or other accredited employers who have employees who have already become certified trainers. Employers apply for subsidies, thereby notifying the organization that the trainee is employed. Trainers work with trainees until they are ready to pass the next skills test, and then sign a “permission slip” for the trainee to take the next level of testing. The trainer's PIN is on the permission slip; if a trainee fails the test three times, the subsidies stop immediately and the trainer is given a mark against his training record. The trainee moves through the levels. As skill level increases, the employer can be paid increasing levels of financial subsidies.

Trainers may be given training subsidies as well; perhaps for developing training tools and/or bringing on specialized training professionals (such as an Asbestos Remediation professional).

Once a trainee graduates through the all designated courses, she/he takes a final exam and becomes a trainer her/himself. She/he can now take on another trainee with the company, which causes the company to grow because they have more subsidized trainees.

—Patch Garcia, Recurve

Conclusions

Approximately two-thirds of Home Performance companies today have no more than three years of experience in the industry, and are currently retraining existing employees for work in this field or cautiously making new hires as their businesses grow. Funds and policies are needed now to spur customer demand and to offset the costs of getting the current workforce up to speed on Home Performance principles and best practices. Once policies and programs at all levels of government spur further customer demand, companies anticipate rapid growth. Their first hires will likely be former employees who were laid off due to the recession, and unemployed workers with residential construction, remodel, home appliance repair, and weatherization experience. As an industry that relies heavily on subcontractors, growth will also likely increase the work that is farmed to underemployed “subs” or skilled trades people. Finally, as the industry scales, there may be job opportunities for new entrants, especially those who have taken the time to invest in skills training and hold industry-accepted certifications.

While it is important to establish the infrastructure now for the full range of occupations within the Home Performance industry, workforce training funds should follow investments to increase residential demand for energy efficiency upgrades. Increasing homeowner awareness and improving the economics of retrofits through incentives and financing are just as much a part of workforce development as the training programs themselves, since they are the first step toward creating new jobs. Furthermore, the training needs of companies will change as the industry evolves, so reliable sources of long-term funding should be developed to provide a sustained source of support to the industry as it grows. Though there is no “best” way to train workers for participation in the industry, policymakers and trainers will need to build trust with local employers and be sensitive to local market conditions. The Home Performance industry represents a tremendous opportunity to create thousands, if not millions, of new jobs, while simultaneously addressing economic, health, safety, comfort and climate concerns. Policymakers and training providers should work together to support the growth of Home Performance companies and adapt their funding and training strategies in response to changing employer needs over time.

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²² Interview with Matt Golden, president and founder of Recurve, Inc. April 1, 2010.

²³ The slightly higher figure for performance-based retrofits can be attributed to the fact that prescriptive programs eliminate the need for Home Performance analysts and energy auditors.

²⁴ Pollin, et al.

²⁵ "An average-sized single-family home in the United States would require an investment of as little as \$2,500 in energy-efficiency retrofits to produce a cost savings in the range of 30% per year. This would involve caulking to plug air leaks in the house and adding insulation to attics and basement ceilings. For an additional \$2,500, further energy savings are available through replacing windows with air leaks and installing energy efficient appliances." From Pollin, et al. *The Economic Benefits of Investing in Clean Energy: How the economic stimulus program and new legislation can boost U.S. economic growth and employment*.

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³⁴ In some business models, auditors and estimators are considered part of the field team and also help with retrofit work. In others, they are strictly involved with the customer outreach and assessment phase and leave the actual retrofit job to other workers.

³⁵ Examples include OPOWER, Wattbot, New Leaf and One Block off the Grid.

³⁶ See the section on Standards and Certifications beginning on page 20 for more detail.

³⁷ Construction and retrofit managers may also be considered "office jobs" by some companies, as they often spend less time in the field and more time in the office handling managerial responsibilities.

³⁸ As noted above, some companies consider their auditors or estimators a part of the field retrofit team; others do not.

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¹⁰³ Bovio

¹⁰⁴ Trovato

¹⁰⁵ Matt Golden's HOME STAR jobs estimates (unpublished). Public education campaigns to increase homeowner awareness of the benefits of energy efficiency, regulatory policies that require an "efficiency first" loading order, the elimination of utility Total Resource Cost test barriers, and data transfer protocols also play a role in supporting the growth of the industry. The effect of these policies on regional retrofit demand, though harder to calculate, should not be excluded from job growth calculations.

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Appendix I: Demand Creation Policies and Incentives for Residential Energy Efficiency

Federal = □ State = ■ Utility = □ Local = ■

State	Personal Tax	Corp. Tax	Sales Tax	Property Tax	Rebates	Grants	Loans	Bonds	Green Building
Federal	2	3				2	4		
Alabama					8		1 6		
Alaska					2 2		4		
Arizona	1			1	1 14		1		3
Arkansas					1 11		1 5		
California					68	1 5	2 9 2		4
Colorado					29 2	1 1	1 2 1		
Connecticut			1		3 25	1	2 4 1		
Delaware					2	2			
Florida					26	2	1 4		1
Georgia		1	1		1 16		7		
Hawaii					3 2		1		1
Idaho	1				1 21		1 3		
Illinois					3 15	2 1	1	1	1
Indiana	1	1			1 34	1	1		
Iowa					23	1	1 3		
Kansas					8		1 1		
Kentucky	1	1	1		18	1	1 3 1		
Louisiana					1 3		2		
Maine					4 2		2 1		
Maryland	1	1		2 3	2 10		5		
Massachusetts					2 27 2	1	6 1		
Michigan	1				2 31	1			
Minnesota					83	1 6	6 5		
Mississippi					7		1 3		
Missouri	1		1		1 34		1 2		
Montana	1	1			10	1	1	1	
Nebraska					7	1	1		
Nevada				1	6		1		
New Hampshire					17	2	4 2 1		
New Jersey					10 1	1 1	2		
New Mexico	1	1			11			1	
New York	1	1		1	7 18	3	3 1		1

North Carolina			1		2 17 2	1 1	3 10		1 2
North Dakota					1 2	1	3		
Ohio				1	1 18	1	1 1 1		
Oklahoma	1				7		4 2		
Oregon	1	1			9 42	1	3 11		1
Pennsylvania					1 12 1	6 1 2	4 1 5		
Rhode Island					1 5		1 1		
South Carolina	1		1		1 8		1 5		
South Dakota					1 9		2		
Tennessee					11	1	3 3		
Texas			1		54		2 3		
Utah					10		2		
Vermont					13 4		3 1 1		
Virginia			1	1	2 3		2 1		1
Washington					1 75	1 3 2	11		1 1
West Virginia			1						
Wisconsin					8 12	2	2 6		
Wyoming					9	1	1 1		
District of Columbia					2				
Palau									
Guam									
Puerto Rico					2				
Virgin Islands					1	1			
N. Mariana Islands									
American Samoa									
Totals	15	11	9	6	978	59	211	3	

Source: www.dsireusa.org/summarytables/finee.cfm

Appendix II: Job Growth Calculations

Table 1: Residential Energy Efficiency Jobs Created Per \$1 Million of Investment

Scenario	Dollars	Jobs	Source
1	\$ 1,000,000	11.9	(direct & indirect jobs) Pollin, Robert, Heintz, James and Garrett-Peltier, Heidi. The Economic Benefits of Investing in Clean Energy: How the economic stimulus program and new legislation can boost U.S. economic growth and employment. Department of Economics and Political Economy Research Institute (PERI), University of Massachusetts, Amherst & Center for American Progress, June
2	\$ 1,000,000	21.5	(direct & indirect) New Energy for America: The Apollo Jobs Report: For Good Jobs and Energy Independence. Institute for America's Future, the Center on Wisconsin Strategy, and the Perryman Group, January, 2004.
3	\$ 1,000,000	11.1	(direct jobs) Home Star economic model created by Matt Golden & colleagues
4	\$ 1,000,000	10	(direct and indirect jobs in Job-years) UC Berkeley RAEL Jobs Calculator
5	\$ 1,000,000	8.3	(direct jobs) Kevin Doyle, Final Report of Investigation into Residential Energy Efficiency Workforce Needs
	\$ 1,000,000	12.6	Average

Table 2: Job Growth Estimations Using President Obama's Proposed Renewable Portfolio Standard & Average Cost of Home Performance Financial Incentives/kW

Metric (unit)	Number	Source
Total Residential Energy Consumption including losses (quadrillion Btu)	23	EIA Annual Energy Outlook 2010, Residential Sector Key Indicators and Consumption- 2025 Predictions -Energy Consumption by Sector
Reduction Amount using Obama RPS of 25% reduction by 2025 (quadrillion Btu)	6	
Reduction Amount (in kw)	190,388,381	
Cost of home performance financial incentives (\$/kw)	298	Average for Austin 2004-08 DSM Programs
needed investment for this much reduction (\$)	56,735,737,468	
Investment required (in billion \$)	57	
Total annual jobs created (scenario 1)	42,197	
Total annual jobs created (scenario 2)	76,239	
Total annual jobs created (scenario 3)	39,396	
Total annual jobs created (scenario 4)	35,460	
Total annual jobs created (scenario 5)	29,503	
Average per year:	44,559	
Jobs by 2020:	445,588	
Jobs by 2025:	668,382	
Jobs by 2050:	1,782,353	

Table 3: Job Growth Estimations Using President Obama’s Proposed Renewable Portfolio Standard & Utility Levelized Lifecycle Cost of Home Performance Financial Incentives/kWh

Metric (unit)	Number	Source
Total Residential Energy Consumption including losses (quadrillion Btu)		EIA Annual Energy Outlook 2010, Residential Sector Key Indicators and Consumption- 2025 Predictions -Energy Consumption by Sector
Reduction Amount using Obama RPS of 25% reduction	6	
Reduction Amount (in kwh)	1,667,802,215,514	
Utility levelized lifecycle cost (\$/ kwh)	0.06	Average for Austin 2004-08 DSM Programs
needed investment for this much reduction (\$)	94,147,435,066	
Investment required (in billion \$)	94	
Total annual jobs created(scenario 1)	70,022	
Total annual jobs created (scenario 2)	126,511	
Total annual jobs created(scenario 3)	65,374	
Total annual jobs created(scenario 4)	58,842	
Total annual jobs created (scenario 5)	48,957	
Average per year:	73,941	
Jobs by 2020:	739,410	
Jobs by 2025:	1,109,116	
Jobs by 2050:	2,957,642	

Table 4: Job Growth Estimations Using HOME STAR Projections (with low average retrofit cost per home)

3.3 million homes in 2 years	Home Star Projections
1,650,000	homes per year
\$2500	avg. retrofit cost per home (low)
4,125,000,000	annual market for EE
12.6	avg. jobs/yr
51,975	jobs/ year

Table 5: Job Growth Estimations Using Total Market Size Estimates

	Avg. Retrofit Job = \$4000	Avg. Retrofit Job = \$2500
Occupied Housing Units in the U.S.	100,000,000	100,000,000
Potential Market (\$)	4,000,000,000,000	250,000,000,000
Average jobs/ \$1 million invested	12.6	12.6
Total Number of Jobs	50,400,000	3,150,000
Jobs/yr until 2050	1,260,000	78,750

Appendix III: Existing Program Budget Allocations for Workforce Development and Training

The tables below show examples of the breakdown of four state residential energy efficiency program budgets between overall program administration/incentives and funds allocated toward training and workforce development. The four programs demonstrate how dramatically budgets vary by state and that all have found different ways to meet their state’s Home Performance workforce training needs.

Wisconsin Focus on Energy	
Item	Amount
Total Residential Budget for July 1, 2007 to Dec. 31, 2009 and allocated budget for 2010	\$91.4 million
HPwES total for July 1, 2007 to Dec. 31, 2009 and allocated budget for 2010	\$8.4 million
Total Targeted for HP Program (July 1, 2007 through 2010)	\$10.6 million
Percent allocated to workforce training	approximately 25%
Primary Source of Training	Direct training via Wisconsin’s Focus on Energy program and program staff. Unsuccessful attempts have been made in the past to transition this training to other entities (tech colleges, etc), but, given the limited interest at that time in home retrofit, there was no take up. Today, the widespread attention being paid to home retrofit work is creating more interest in taking on the training and the program is now working again to partner with tech colleges, labor unions and builder associations to deliver the needed trainings and certifications.
Other Training Partners	None, because of the lack of other organizations interested in delivering training in the state. Focus on Energy is currently working to ramp up in preparation for future programs like HOME STAR, shifting resources away from direct training to working with qualified organizations to deliver Train the Trainer programs to be able to step out of the role as sole training organization for BPI and RESNET in the state of WI.
Reliance on Outside Training Partners	Very Low to Date

Source: Sara Van de Grift, Residential Programs Director, Wisconsin Focus on Energy, www.focusonenergy.com

New York State Energy Research and Development Authority (NYSERDA)	
Item	Amount
5 Year HPw/ES Program Total (2006-2011)	\$71,232,972
Annual Total HPw/ES Budget (includes all incentive funds)	\$14,246,592
Total Annual Incentive Funds (includes contractor production incentives, homeowner incentives, tuition reimbursement, certification reimbursement, and contractor accreditation reimbursement)	\$9,894,592
Total Annual Implementation Funds (includes contracting costs for managing the HPw/ES program, workforce training, technical field support, software support, incentive processing, development of program policies & procedures, and program	\$4,352,000
Training Implementation Budget for 2006-10 (included in the HPw/ES budget)	\$4,558,151
Training Incentives for 2006-10 (includes tuition reimbursements and certification reimbursements)	\$3,206,610
Funds to Workforce Development (includes estimated training incentives from July 1, 2006 through March 2010 & training implementation funds allocated from July 1, 2006 until June 30, 2010)	\$7,764,761 (11%)
Primary Source of Training	Training is conducted at learning centers who are members of the Center for Energy Efficiency & Building Science (CEEBS). CEEBS is headquartered at Hudson Valley Community College (HVCC). HVCC works under a competitively solicited contract to deliver building science/energy efficiency training in the Systems Benefit Charge (SBC) utility territories in support of NYSERDA energy efficiency programs. Most CEEBS learning centers are the Workforce Development departments at community colleges.
Other Training Partners	The NYS Builders Association Research & Education Foundation (NYSBA REF) and NY Building Performance Contractors Association (BPCA) provide technical and related business training that complements and supplements the classes conducted by CEEBS.
Reliance on Outside Training Partners	High, but training programs are funded by NYSERDA.
Source: Lee Butler, Project Manager, REAP, NYSERDA www.nyserda.org	

Efficiency Vermont	
Item	Amount
2007-2011 Program budget for Existing Homes, including Home Performance with ENERGY STAR (approximate)	\$9,000,000
Percent of Budget Spent on Home Performance w/ Energy Star Program	roughly 60-80%
Estimated expenses on BPI trainings (program has no separate budget for training and estimate does not include resources spent on staff time to provide ongoing training and technical support to contractors, such as one-on-one field mentoring of contractors to prepare them for the BPI field tests or ongoing technical assistance and QA to participating contractors in the Vermont Home Performance with ENERGY STAR service.	greater than \$20000 (less than 1%)
Primary Source of Training	Efficiency Vermont directly offers BPI trainings to about 10-20 individuals per year who go on to become active Vermont HPwES contractors. These 2-week BPI trainings twice annually cover the Building Analyst, Shell, and Heating certifications.
Other Training Partners	Vermont Technical College (VTC), Vermont Works for Women, ReSource, and other Vermont organizations. VTC offers trainings on installation methods through their Center for Sustainable Practices. Contractors are also encouraged to attend conferences such as Affordable Comfort to get BPI continuing education credits.
Reliance on Outside Training Partners	Medium. Efficiency Vermont has their own trainings, but contractors also receive training through other partners.

Massachusetts (National Grid MA, Nstar, Unitil, Western MA Electric, & Cape Light Compact)	
Item	Amount
2010-12 Total Budget for Residential & Low Income Energy Efficiency Program Administration	\$528,012,754
2010-12 Sum of Residential Retrofit-related Items (Multi-family Retrofit, MassSave, O Power, Energy Star Lighting & Appliances, Residential Education, Workforce Development, Deep Energy Retrofit, Residential New Construction & Major Renovation (statewide pilot), Statewide Marketing & Education, Low Income (1-4 Family Retrofit), Low Income Multi Family Retrofit, Low Income Statewide Marketing & Education, Low Income Energy Affordability Network Funding)	436009829 (83% of total)
2010-12 Allocation of Budget to Sales, Technical Assistance & Training	87780165 (17% of total)
2010-12 Allocation of Budget to Workforce Development	1054343 (.2% of total)
Primary Source of Training	The Green Jobs Act of 2008 created the Massachusetts Clean Energy Center to accelerate job growth and economic development in the state's clean energy industry. This new quasi-public agency serves as a clearinghouse and support center for the clean energy sector, making direct investments in new and existing companies, providing assistance to enable companies to access capital and other vital resources for growth, and promoting training programs to build a strong clean energy workforce that capitalizes on the job opportunities created by a vital new industry.
Other Training Partners	To ensure that both the experience of the training provider and associated curriculum allows the program administrators to meet safety and quality standards, residential energy efficiency program administrators are working with all of the following: Colleges and universities, co-op programs, local vendors and equipment suppliers, training facilities (including the Fitchburg training facility), and union-supported training programs. The Commonwealth Corporation, MassGREEN Energy Efficiency Skills Initiative, and Massachusetts Office of Labor and Workforce Development are also supporting the development of training programs at community colleges, schools, training centers, and community-based organizations across the state.
Reliance on Outside Training Partners	High.
Sources: 2010 – 2012 Massachusetts Joint Statewide Three-Year Electric Energy Efficiency Plan, October 29, 2009.	
http://www.ma-eeac.org/docs/DPU-filing/ElectricPlanFinalOct09.pdf	
Marybeth Campbell, Workforce Development Director, Massachusetts Clean Energy Center. www.masscec.com	
Theresa Rowland, Commonwealth Corporation. http://www.commcorp.org/	

Appendix IV: ARRA State Energy Program Breakdown

Table: 2009 ARRA U.S. Department of Energy State Energy Program (SEP) Allocations Between Demand Creation and Workforce Development Activities

	Demand Side Spending with no Workforce Training Allocation			
	Workforce Training Allocation with no Demand Side Spending			
State	2009 ARRA SEP Funding Allocation	Demand Side Allocation*	Workforce Training Allocation*	Percent of State SEP Allocation
Alabama	\$ 55,570,000		\$ 100,000	0.2%
Alaska	\$ 28,232,000	\$ 2,500,000	\$ 1,750,000	6.2%
Arizona	\$ 55,447,000			
Arkansas	\$ 39,416,000	\$1,984,968 \$768,829	\$ 5,522,995	14.0%
California	\$ 226,093,000	\$ 50,212,451	\$20,000,000 (\$9.16 million toward residential EE)	4.1%
Colorado	\$ 49,222,000	\$ 5,688,328		
Connecticut	\$ 38,542,000	1) \$5 million 2) \$4 million	\$ 550,000	1.4%
Delaware	\$ 24,231,000	\$ 12,000,000		
Florida	\$ 126,089,000	\$ 5,000,000		
Georgia	\$ 82,495,000	\$500,000; \$500,000; \$500,000	\$ 500,000	0.6%
Hawaii	\$ 25,930,000	1) \$3,000,000 2) \$1,187,500 3) \$250,000		
Idaho**	\$ 28,572,000			
Illinois	\$ 101,321,000			
Indiana	\$ 68,621,000			
Iowa	\$ 40,546,000			
Kansas	\$ 38,284,000	1) 350,000 2) \$250,000 3) \$500,000 4) \$481,000	\$ 250,000	0.7%
Kentucky	\$ 52,533,000	\$ 2,000,000		
Louisiana	\$ 71,694,000	\$15,170,450 (total for residential & commercial) 2) \$2,638,339	\$ 2,638,340	3.7%
Maine**	\$ 27,305,000	\$ 8,950,000	\$ 2,200,000	8.1%
Maryland**	\$ 51,772,000	1) \$7,500,000+ (0.4*1000000)	\$ 1,250,000	2.4%
Massachusetts**	\$ 54,911,000			
Michigan	\$ 82,035,000			
Minnesota	\$ 54,172,000	1) \$2,194,734 2) \$8,137,150	\$ 3,888,997	7.2%
Mississippi	\$ 40,418,000		\$ 400,000	1.0%

Missouri**	\$ 57,393,000			
Montana	\$ 25,855,000	\$ 306,958		
Nebraska	\$ 30,910,000	1) \$315,000 (portion) 2) \$585,000	\$315,000 (portion) + \$1,910,000	6.7%
Nevada	\$ 34,714,000			
New Jersey**	\$ 73,643,000	1) \$4,000,000 2) \$4,000,000 3) \$17,000,000		
New Mexico	\$ 31,821,000			
New York**	\$ 123,110,000			
North Carolina	\$ 75,989,000	\$ 10,000,000	1)6,850,000 2) 1,000,000	10.3%
North Dakota	\$ 24,585,000		\$ 16,500	0.1%
Ohio	\$ 96,083,000	1)8000000 2) \$30,000,000 (portion for aggregated residential)		
Oklahoma	\$ 46,704,000			
Oregon**	\$ 42,182,000			
Pennsylvania	\$ 99,684,000			
Rhode Island	\$ 23,960,000	\$ 2,298,476	\$ 250,000	1.0%
South Carolina	\$ 50,550,000	\$ 3,040,000	\$ 910,000	1.8%
South Dakota	\$ 23,709,000			
Texas	\$ 218,782,000	\$ 5,000,000	\$6,000,000 total (\$1,369,230 toward residential EE training)	0.6%
Tennessee	\$ 62,482,000			
Utah	\$ 35,362,000	1) \$3,000,000 2) \$3,000,000	\$ 750,000	2.1%
Vermont**	\$ 21,999,000			
Virginia	\$ 70,001,000	\$ 15,000,000		
Washington	\$ 60,994,000	1)\$14,500,000 2) \$38,500,000 (portion)		
West Virginia	\$ 32,746,000		\$ 1,000,000	3.1%
Wisconsin**	\$ 55,488,000			
Wyoming**	\$ 24,941,000	\$ 3,480,000		
Total U.S.	\$3.1 billion	\$ 252,696,458	\$ 42,566,761	
Percent of Total SEP Allocations		8.2%	1.4%	

*See state-by-state listing below for descriptions of funding allocations.

**Denotes states that already had a statewide home performance program in place before the 2009 Recovery Act was passed. Thus, the lack of ARRA SEP allocations toward residential energy efficiency is not indicative of the state's overall investment in residential retrofit programs or training.

Sources:

www.naseo.org/programs/sep/recovery/State%20Energy%20Program%20ARRA%20Update%2004212010.pdf; state energy department and ARRA Web sites

List of Demand-Side and Workforce Training SEP Allocations by State

Alabama

Workforce Development: Alabama will conduct a series of training seminars for energy efficiency professionals on the subjects of Energy Audits, High Performance Buildings, Home Energy Rating Systems, and Building Energy Codes.

www.adeca.alabama.gov/Energy/default.aspx

Arkansas

Demand Side: Employer Assisted Home Energy Assistance Loan (HEAL); Energy Efficiency Outreach

Workforce Development: 1) Provide training to the HVAC industry to better design and size HVAC equipment. =2) Building Training Centers of Excellence: Develop curriculum, facilities and equipment to train residential energy auditors, raters and weatherization employees. Grant to be made to community colleges for implementation.

www.arkansasenergy.org/energy-in-arkansas/energy-policy-and-legislation/recovery-2009.aspx

California

Demand Side: California Comprehensive Residential Building Retrofit Program: with regional groups of local governments, utilities, community colleges, national and state energy and affordable housing programs, and private and public energy and building contracting experts. Re-trained construction workers, contractors, and youth entering the job market will be deployed to improve the energy efficiency and comfort in California's existing housing.

Workforce Development: California Clean Energy Workforce Training Program: The California Energy Commission, the California Employment Development Department, the Employment Training Panel, and the California Workforce Investment Board, in collaboration with The Green Collar Jobs Council, are leading a statewide partnership of state agencies, educational institutions, local workforce investment boards, community organizations and employers to deliver 21st century training programs for workers with all levels of experience.

www.energy.ca.gov/recovery/sep.html

Colorado

Demand Side: Advance energy efficiency in existing homes. The GEO will expand its current "Insulate Colorado" program to provide additional incentives available statewide. Furthermore, a new menu of incentives will be added to address duct sealing, furnace replacement, air sealing, lighting, appliance replacement and an energy audit subsidization program. The GEO will implement a new approach to bundle incentives for a "whole house tune-up" and accompany the full upgrade with vouchers toward the purchase of a Solar PV system for the home, supporting the principle of "efficiency first."

www.rechargecolorado.com/images/uploads/pdfs/GEO_ARRA_Program_Goals_and_Objectives.pdf

Connecticut

Demand Side: 1) new program that will offer rebates for residential and commercial geothermal systems with a goal of 600 installations; 2) rebates for residential and commercial solar thermal systems with a goal of 1,000 installations

Workforce Development: training and certification of building operators and inspectors to comply with new building code energy components

www.ct.gov/recovery/cwp/view.asp?A=3711&Q=438980

Delaware

Demand Side: Delaware Energy Answers Home Performance Program

www.recovery.gov/Transparency/RecipientReportedData/pages/RecipientProjectSummary508.aspx?AwardIdSur=43560&AwardType=Grants

Florida

Demand Side: The Florida Residential Retrofit program, upon independent verification of the completed improvements, will offer a rebate to Florida homeowners that have an energy audit and make sufficient energy efficient improvements to capture at least a 20% improvement in their home energy efficiency.

www.flaseia.org/Incentives/docs/SEPAllocationOverview.pdf

Georgia

Demand Side: Residential Energy Efficiency Grant Program: 1) Electric Cities of Georgia: to assist member utilities with the development and operation of residential energy efficiency programs to reduce residential customer energy usage and to promote energy efficiency in the residential market throughout the state; 2) Estes Heating & Air Conditioning Inc. to provide energy efficiency improvements to residential homes with a focus on low- to middle-income, elderly and disabled homeowners; 3) Oglethorpe Power Corporation: to create and/or expand energy efficiency programs available to the residential sector served by each participating EMC.

Workforce Development: Southface Energy Institute: to conduct energy-efficient design training sessions for builders, trade contractors, real estate agents and appraisers throughout the state.

www.gefa.org/Index.aspx?page=476

Hawaii

Demand Side: Funding support will provide increased energy efficiency for the following programs: 1) Residential Solar Water Heating Program, 2) Residential Energy Star Program and 3) Residential Peer Education/Monitoring Program

www.hawaiiirenewable.com/wp-content/uploads/2009/12/Recovery-Act-Energy-Awards-for-Hawaii-12-14-09.pdf

Indiana

Demand Side: Support public energy outreach and education campaigns that will provide information to consumers on the importance of energy conservation, as well as tips on reducing energy consumption.

Workforce Development: support training programs to help transition Indiana's workforce from energy intensive, high environmental impact production processes to more energy-efficient and environmentally friendly alternatives.

www.in.gov/oed/2583.htm

Kansas

Demand Side: Efficiency Kansas: 1) Rebates for Efficiency Kansas Energy Audits: To offset the costs of the energy audit, the first 1,000 participants who complete an approved project through Efficiency Kansas will receive a \$350 rebate; 2) Equipment for New Energy Auditors: To minimize startup costs for energy auditors, particularly for those that may have been previously unemployed, SEO has purchased 50 "packages" of equipment that energy auditors can borrow or rent (at a nominal fee) from the three qualified energy auditor training institutions and other public agencies; 3) The State Energy Office contracted with Trozzolo Communications Group for professional marketing and promotional assistance; and 4) Loan Fee Rebates to Lenders: Partner Lenders receive a \$250 rebate to defray upfront administrative costs and thus reduce costs for borrowers.

Workforce Development: Energy Auditor Training: To improve the quality and breadth of the energy auditor industry in the state, Kansas will subsidize costly technical audit equipment and also provide; 2) Energy Auditor Scholarships: scholarships for additional professional training.

www.kcc.state.ks.us/energy/arra.htm

Kentucky

Demand Side: Home Performance with ENERGY STAR: provides seed funding for a program that offers services to owners of existing homes to evaluate a home's energy efficiency, recommend cost-effective improvements, maintain a list of qualified contractors and provide a quality assurance service that verifies that improvements have been properly installed. This would serve the population that doesn't qualify for low-income weatherization services.

<http://www.energy.ky.gov/NR/rdonlyres/4E7C37F3-BD70-4CA8-AF7C-5E0A3DF93A07/0/KentuckySEPRRecoveryActProgramActivities5122009E.doc>

Louisiana

Demand Side: 1) Enhance the current DNR HERO program: In the residential sector, the program will provide support for homeowners to improve the efficiency of existing homes; 2) promote the purchase of new energy-efficient ENERGY STAR appliances through participating utility company partners that will offer coupons for the purchase of qualifying appliances.

Workforce Development: Education, Training, and Outreach: teacher training, public education, home energy rater equipment

www.dnr.louisiana.gov/sec/execdiv/techasmt/programs/ARRA_2009/SEP/SEP_Fact_Summary%20Sheet.pdf

Maine

Demand Side: Residential Weatherization and Efficiency program: Every homeowner in Maine will be eligible to receive rebates of \$1,500 to \$3,000 for energy efficiency projects. Over the next two years, up to 4,000 homes could be retrofitted with rebates from the Maine Home Performance program. Unlike Low-Income Weatherization, there are no income limits on the Home Performance rebates administered by the Efficiency Maine program. Preapproved weatherization projects that reduce fuel usage for heat and hot water by 25% would be eligible for up to \$1,500 in rebates while those that achieve energy savings of 50% or more would be eligible for up to \$3,000. To qualify for a rebate, homeowners must have an energy audit performed by a certified auditor. Eligible improvements under the program include insulation and air sealing, energy-efficient replacement windows, high-efficiency heating and hot water equipment, including solar water heaters, programmable thermostats and water-saving devices.

Workforce Development: Professional Training; Education & Training Scholarships / Labs/ Program Development

www.maine.gov/mpuc/recovery

www.maine.gov/tools/whatsnew/index.php?topic=puc-recovery-documents&id=75563&v=article

Maryland

Demand Side: 1) Multi-Family Housing Retrofits for Low and Moderate Income Families. 2) innovative public financing programs such as the EmPOWERing Financing Initiative will enable property owners to leverage private capital in order to implement efficiency improvements.

Workforce Development: Clean Energy Skills Training & Building Energy Codes Technical Assistance: MEA has established a strategy for developing the workforce needed to support the energy efficiency and renewable initiatives for the state. Included is advanced training and technical assistance with building energy codes; support educational and workforce training efforts that will help familiarize the state's workforce with important sustainable energy approaches. Specifically, Maryland will help fund training programs focused on the construction and building industries, including planning and building code officials, architects, engineers and other stakeholders.

www.energy.maryland.gov/documents/FY2010programbooknwedit.doc

Minnesota

Demand Side: 1) Clean Energy Resource Teams (CERTs) have over 300 organizations and citizens involved in implementing local energy conservation and renewable energy projects. CERTs will provide outreach through multiple organizations throughout the state to maximize the number of households participating in residential energy conservation programs; 2) will develop and implement residential energy efficiency programs to reach a variety of income levels. An energy efficiency loan offering, supplementing existing Minnesota Housing Finance Agency (MHFA) loan products and using MHFA's lender network will target households with incomes of \$93,000 and lower.

Workforce Development: Training programs to train energy professionals, including auditors, energy managers, building operators, contractors, architects and engineers, building inspectors.

www.state.mn.us/mn/externalDocs/Commerce/State_Energy_Program_ARRA_State_Plan_060109123823_SEP_ARRA_StatePlan.pdf

Mississippi

Demand Side: Energy Efficient Buildings – Building Energy Codes: Provide training on energy efficiency codes to the commercial, industrial and residential sectors. Work with local communities to educate them on the benefits of energy building codes.

Workforce Development: Work with a community college to develop curricula and prepare workers for the green economy. This will ensure that Mississippi’s workforce is able to compete for advanced jobs in the renewable energy, energy efficient and green building sciences, design and maintenance fields. This program will work in conjunction with other green workforce development initiatives that the State is pursuing.

www.mississippi.org/index.php?id=659

Missouri

Demand Side: Funding will go toward encouraging Missourians to reduce their energy consumption by increasing the energy efficiency of their homes

Workforce Development: Missouri will expand its existing Energy Center program, which includes a variety of home efficiency programs, building energy codes, and education and training initiatives

Montana

Demand Side: Education and Information: An expanded information campaign is directed at homeowners, businesses and local governments about the benefits of energy efficiency in structures and facilities.

www.recovery.mt.gov/deq/default.mcp

Nebraska

Demand Side: 1) Update the state’s building energy codes as appropriate. Upgrade the state’s efforts on building energy code compliance and inspections. 2) Develop and distribute information on energy efficiency and renewable energy choices so that Nebraskans can make wise decisions on their energy use.

Workforce Development: The Energy Office will provide information on residential and commercial building energy codes, and conduct training and certification of city and county code officials and members of the construction industry. Develop renewable energy curricula at Nebraska’s technical community colleges.

www.neo.ne.gov/ARRA/Plan.pdf

New Jersey

Demand Side: 1) Financing program for residential energy efficiency, via NJHMFA, offering financing to single family and multifamily (1-4 units) owners; 2) multi-family energy efficiency improvement loan program for multifamily residences; 3) energy efficiency programs for customers of municipal-owned utilities, who are currently ineligible for NJ’s Clean Energy Program incentives.

www.state.nj.us/bpu/agenda/announcements/arra.html

New Mexico

Demand Side: program includes initiatives to expand residential weatherization assistance to families above the low-income eligibility threshold for the Weatherization Assistance Program

Workforce Development: Statewide professionals training, green-collar workforce development, energy codes inspectors' training

www.emnrd.state.nm.us/ecmd/documents/SEPARRAPlan.pdf

New York

Workforce Development: provide training opportunities for installers

www.nyserda.org/Economicrecovery/sep.asp

North Carolina

Demand Side: Promoting Residential Energy Efficiency and Renewable Energy: 1) Promoting energy efficiency in new affordable housing units: North Carolina will work in two targeted sectors to improve energy efficiency in new affordable housing; 2) Energy efficiency audits and implementation for existing homes: North Carolina will provide partial funding toward the cost of comprehensive home energy audits for owners of existing homes and grants to assist homeowners with implementing audit recommendations.

Workforce Development: 1) Growing North Carolina's Green Workforce: Through its community college and university systems as well as other workforce development agencies, North Carolina will develop a multi-level program to meet the training and workforce needs of the emerging green economy. The curricula will address current and projected workforce needs in sectors related to energy efficiency, renewable energy, and alternative fuels. The program will include regional training hubs as well as other on-site, distance and immersive learning components.

2) Continuing education for residential and commercial building code inspectors – North Carolina is actively working to improve its energy codes for residential and commercial buildings.

North Dakota

Demand Side: 1) Establish an Emergency High Efficiency Furnace Rebate Program, which will assist victims of the 2009 spring floods with the incremental cost of installing a high efficiency furnace to replace standard efficiency furnaces and heating systems; 2) EERE Rebates to Utilities: North Dakota utilities (including co-ops) are receiving funds for consumer rebates for installation of energy efficiency and renewable energy equipment.

Workforce Development: 1) North Dakota State University: HERS Training; 2) North Dakota Association of Builders: Energy Efficient Building Practices Training for Building Trades Classes

www.communityservices.nd.gov/stimulus/sep

Ohio

Demand Side: Making Efficiency Work: Ohio's existing buildings and new construction present significant opportunities for reduction in energy waste through energy audits, lighting retrofits, heating ventilation and air conditioning retrofits, geothermal installations, deployment of green

building techniques and technologies, and improvements to building envelopes through air sealing and insulation. The following activities are included: demand reduction, energy building codes, geothermal, lighting and thermal efficiency for commercial and residential sectors. 2) Banking on New Energy Financing (The Energy Alliance)

www.development.ohio.gov/recovery/StateEnergyProgram.htm

Rhode Island

Demand Side: Residential Building Energy Efficiency Initiative: OER proposes to issue an RFP to utilities, government entities, ESCOs, lending institutions, other for profit and not-for-profit entities for programs to help residents lower energy bills with one home visit, to expand, extend and/or create cost effective energy efficiency programs that would provide professional one stop comprehensive audits, seal critical leaks and drafts, replace incandescent bulbs with compact fluorescent lamps, provide/install water efficiency devices, check insulation and appliances. Loan values would range from \$1,000 to \$10,000 per household. The OER anticipates up to 10 grants for between \$100,000 to \$500,000. Leveraged funds of \$5,000 per retrofit, total \$7.5 million may come from sources including (but not limited to) utilities, government agencies, homeowners, private contractors or lenders or nonprofit entities as determined through the competitive solicitation.

Workforce Development: Building Energy Code Upgrade, Training and Compliance Initiative: Provide funds to the Rhode Island Building Code Commission to continue to work with state and local elected officials and other stakeholders including the local building inspectors, as well as planners, architects and members of the construction industry to achieve 90% compliance with a residential energy code or codes that meets or exceeds the most recent International Energy Conservation Code. Provide energy code training to building officials, design professionals, construction trade associations, contractors and trades people.

www.recovery.ri.gov/programs/pdf/StateEnergyProgram_81.041.pdf

South Carolina

Demand Side: Low-Income Manufactured Housing Retrofit & Evaluation-assess the efficacy of various energy conservation retrofits for low-income residents of manufactured housing. SCEO will work with the OEO's Weatherization Assistance Program, the South Carolina Technical College System, the South Carolina Department of Commerce Workforce Program and the Central Electric Cooperative of South Carolina. Collectively, the program's goals are to weatherize 200 homes, provide efficient roof retrofits on 200 homes, retrofit an additional 200 homes with efficient heat pumps and install ENERGY STAR appliance upgrades in 200 homes.

Workforce Development: South Carolina Energy Efficiency Training Center Collaborative: The SCEO, in partnership with the Governor's Office of Economic Opportunity (OEO), the South Carolina Technical College System and the South Carolina Department of Commerce, will create the South Carolina Energy Efficiency Training Center Collaborative, which will provide energy efficiency-related training, continuing education and accredited degrees to enable South Carolina's workforce to fully respond to the increased interest in energy efficiency across the state.

www.energy.sc.gov/index.aspx?m=39&t=117

Texas

Demand Side: Energy Education and Outreach Program: An enhanced and focused outreach and education campaign to encourage renewable energy use and support energy efficiency efforts for all Texans will contribute to energy savings, emissions reductions, cost savings and job creation.

Workforce Development: Energy Sector Training centers

www.seco.cpa.state.tx.us/arra/sep/training/estc_awards.php#wharton

Utah

Demand Side: Whole Home Audit Program. Builder Rebates for High Performance Home Building. This program will provide homebuilders with a rebate for high-performance construction, and will entice builders to strive for aggressive energy efficiency standard in the homes that they build. 2) Direct Installation Insulation Program.

Workforce Development: Residential and Commercial Energy Training.

www.geology.utah.gov/sep/stimulus/sep_formula.htm

Virginia

Demand Side: The state's Residential Energy Efficiency Rebate Program will receive funding to encourage energy efficiency improvements and retrofits. Rebate Program for owners of residential and commercial property in Virginia for energy efficiency improvements. Residential upgrades that might be eligible once final program rules are developed, include new heating and cooling systems, windows, lighting, and programmable thermostats.

www.govtech.com/dc/729569

Washington

Demand Side: 1) The Community-Wide Urban Residential Energy Efficiency Program will enhance financial and technical assistance programs by directing municipal, state and federal funds, as well as electric and gas utility funding, toward greater comprehensive use of diverse energy efficiency measures to impact multiple sectors within the state. 2) Energy Efficiency and Renewable Energy Loans and Grants Program Fund, including grants for residential buildings.

www.commerce.wa.gov/DesktopModules/CTEDPublications/CTEDPublicationsView.aspx?ItemID=7348&Mid=863&wversion=Staging

West Virginia

Workforce Development: West Virginia Green-collar Job Training Program: The program will establish and implement green-collar job training curricula and certification programs in West Virginia. Will include building energy performance (train and certify technicians to assess residential and commercial building energy use, before and after energy retrofitting; train and certify technicians to install energy-saving measures, e.g. windows, doors, insulation, HVAC system efficiency measures) and energy codes. Participants (contractors, code officials, engineers, architects, building owners and operators) will learn requirements of the most

recently published energy code from the International Code Council, currently the 2009 International Energy Conservation Code.

www.wv.gov/sec.aspx?ID=115

Wyoming

Demand Side: Expanded Weatherization Program: An expansion of the weatherization program to households with income levels of up to 250% of the poverty level, or approximately \$65,000/year for a family of four. Leveraging the infrastructure and reporting systems being developed to deploy more weatherization contractors. Program seeks 1% participation or approximately 480 homes.

www.wyomingbusiness.org/pdf/energy/SEP_ARRA_Plan_final_7-21-09.pdf



The Home Performance Resource Center is a national 501(c)(3) nonprofit organization formed to conduct public policy and market research in support of the Home Performance industry. The Resource Center develops research materials for policymakers, energy program managers and industry stakeholders to promote job creation, economic recovery, lower household energy bills and deep reductions in residential carbon emissions through improved home energy efficiency.

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The Home Performance Resource Center is supported by Efficiency First, a national nonprofit trade association representing Home Performance contractors and related industries. Visit www.efficiencyfirst.org.

