

Youth Onramps to Green Jobs in the Energy Sector

Emily Curley, Alliance to Save Energy

ABSTRACT

Teacher, doctor, lawyer. These ubiquitous jobs are all professions that a young person might consider when pondering a career. What is the best way to assure that environmental jobs appear atop the list of jobs that young people will consider before entering college, a training program, or the workforce?

Because of attrition and the growth of the sector, many jobs within energy efficiency fields will be available within the next ten years. Utilities, community action programs, weatherization agencies, energy auditing programs, and state energy offices just to name a few, will be facing the retirement of their most qualified workers just as the need for workers in professional and skilled positions is greatest. In order to prepare for this combination of need and scarcity of human resources, factors that determine career path selection deserve further study.

This paper seeks to determine which factors influence the career selection of graduating high school students: When do they make their decision, and what factors influence their decision.

Determining how and when to influence young people to enter the green workforce may be key to creating programs in schools that will prepare young people to fill the onslaught of energy efficiency jobs that are and will continue to be needed to improve our building stock and generally green the country.

The Need

The funds going into green jobs from various state and federal sources are unprecedented, leaving challenges in bringing the program goals to scale and meeting the ambitious deliverables that these contracts spell out. New funding, coupled with steady gains in efficiency-related jobs over the past decade are creating an unprecedented need for workers.

Even before considering “new” jobs, energy efficiency’s share of the clean-tech marketplace has been slowly rising. In the average state, the proportion of energy efficiency jobs in the clean energy economy grew from 8.82 percent in 1998 to 9.85 percent in 2007. However, states vary greatly in the percentage of jobs in the clean energy economy going toward energy efficiency. As of 2007, 42.67% of Maine’s clean energy workforce was dedicated to efficiency; in West Virginia, only 1.27% of the workforce was (The Pew Center on the States 2007).

And new energy efficiency jobs are rapidly growing. According to an Environmental and Energy Study Institute briefing across the clean-tech sector, “strategies to tackle climate change are projected to create 4.5 million net jobs by 2020.” Of the new jobs created, “energy efficiency accounts for most of these new jobs, roughly 3.5 million. Renewable energy accounts for an additional 1 million net jobs” (Environmental and Energy Study Group 2009). Within the green jobs sector, jobs in energy efficiency are clearly outpacing jobs in other sectors.

For example, the American Recovery and Reinvestment Act legislated \$5 billion to the Weatherization Assistance Program (WAP) as compared to 2007 where only \$663 million had been dedicated to the WAP (United States Department of Health and Human Services 2010).

Corresponding with the huge increase in funding is the goal to retrofit one million homes per year; in 2007, just over 104,000 homes were weatherized (US DOE 2009).

The following table illustrates the scale of new workers that will need to be added to reach the goal of weatherizing one million homes per year:

Position	Role	Current Number	Number Needed	Length of Training
Intake and Eligibility	Identifying and verifying eligible families	1,000	4,000+	4-6 weeks
Energy Auditing/ Inspection	350 audits each per year	1,000	3,000	8 months
Quality Control Inspectors	525 quality control inspections on homes per year	900	2,000	2-4 months if outside hire
Production	Installing weatherization measures; a crew can complete one house in 2.5 business days	2,150 full and part time crews; 5,700+ staff	14,285 direct hire or private contractor crews + staff complement of nearly 38,570 people	6 – 8 weeks
Program Management	General office positions; technical and administrative monitoring	2,580	5,000 + 650 technical staff	
Weatherization Trainer	Train tens of thousands of additional workers		700 more	

Source: Weatherization Assistance Program Technical Assistance Center (WAPTAC)

Including the jobs above, weatherizing 1,000,000 homes per year will require more than 68,000 part-time or full-time jobs in the WAP network, approximately 55,000 new positions since 2008 (Dubay & Gereffi 2008).

And while the need for workers is ballooning, many parts of the energy sector are steadily losing workers. In the utility sector: “The average age of workers in the energy industry is now over 50, and the industry estimates that up to half of its current workforce—more than 500,000 workers—will retire within 5 to 10 years” (Department of Labor 2007). Across the energy efficiency services sector, about 15% of Program Administrators and more than 35% of the Building Industry is likely to retire in the next five years. When taken in conjunction with the need for workers in new and expanded areas of the energy efficiency sector, the scarcity of workers mounts.

Trends in Onramps to Energy Efficiency Jobs

There are many training programs that a high school student may undertake to qualify for green jobs, specifically those having to do with energy efficiency,

Career and Technical Education (CTE)

High school programs training students to carry out skilled trades have been around for decades and are beginning to offer programs that incorporate “green” skills into the existing trades as well as create new programs to fill demand. However, the struggle with providing

training programs is that energy jobs cut across sectors of employment and there is not always a direct career path between job training programs and employers. Schools have difficulty providing career education programs in areas that cross sectors, such as Information Technology, compared to jobs such as those in construction, hospitality, health care, and manufacturing that are easier to describe and often have one specific job waiting at the other end.

For example, when looking specifically at entry level positions doing residential or commercial energy audits in the “Energy efficiency services” job grouping, the Environmental Defense Fund’s Green Jobs Guidebook for California suggests that, at a minimum, an Associate’s degree could be sought in a wide range of topics: Building Materials, Environmental Science, Environmental Studies. A Home Energy Rating System (HERS) certification is also required, and a bachelor’s degree is preferred. There is no clear educational path to become an energy auditor and, as seen in the chart above, auditors require the most time to be trained (typically at least 8 months) whereas other weatherization jobs may only require 2 weeks of training.

To actually carry out weatherization upgrades on homes, many of the targeted follow-up jobs are performed by traditional CTE trades – insulation installer, HVAC technician, machinist, welder, carpenter, electrical system installer, plumber, and roofer – and have recommended coursework that directly corresponds to the trades. According to the Green Jobs Guidebook, under the “Green building project installation and operations” job cluster, 14 out of 15 jobs require no more education than apprenticeship or trade school.

The rush to create new trades in CTE programs shouldn’t overshadow traditional construction fields that may be taking on a green tint through weatherization projects and green building. Although there has been a recent resurgence in CTE programs, “between 1982 and 1994...the number of students who completed three or more courses in a single vocational program area slipped from 34 percent to 25 percent. Furthermore, students with disabilities, or with low grades, accounted for a growing proportion of vocational course-taking in high schools during this period” (Gordon et al. 2002). The stigma of going into a trade rather than to a four year school still exists.

CTE programs as a whole will need to ramp up and recruit new students to all job clusters, not just the newest energy jobs.

Trade and Apprenticeship Programs

Apprenticeship is primarily a private sector activity consisting of structured, long-term (typically 3 to 4 years), on-the-job training combined with related theoretical instruction, leading to certification of journey worker status in a skilled trade (US GAO 1992). Apprentices are often paid during their training time, and can expect a raise upon completing the training. It is common for apprentice programs to be run by a labor union, large company, or college/trade school and the sponsoring organization voluntarily puts on and pays for the program.

Many apprenticeship programs that currently exist are in traditional construction and manufacturing fields.

Trends in apprenticeship enrollment are hard to pin down. In 1990, however, while “employment has grown by 18 million since 1980, the use of apprenticeship has been declining relative to this growth. The United States had about 280,000 registered civilian apprentices” the equivalent of “about 2 percent of the number of U.S. college students” (US GAO 1992).

US Apprenticeship enrollment lags considerably behind other European countries, Australia, and Canada in terms of the percentage of the workforce of all ages enrolled in apprenticeship programs. In 2003, 1.4% of 15-24 year olds in the US enrolled in apprenticeship programs, compared to 3.8% in France, 5.7% in Canada, 14.8% in Australia, and 18% in Germany (Sharpe & Gibson 2005).

Apprenticeships to train weatherization workers may be able to build onto existing training programs as "...weatherization uses the same basic skills as many of the construction crafts, it is a perfect fit for pre-apprenticeship programs" (Wilson 2009).

Apprenticeship is the primary training route for many energy efficiency jobs, specifically those in energy auditing an installation.

Green Job Partnership Programs

Many states are now creating partnerships of diverse agencies to form Green Job Partnership programs that seek to support the training of new workers into green jobs, in some cases using stimulus funds to try to put people back to work (or to work the first time in the case of young people).

New Jersey formed a partnership between The New Jersey Department of Labor and Workforce Development, industry, and educational institutions, participants; Connecticut's Green Job Partnership convenes workforce development, economic development, policymaking, education and training, nonprofit, labor, and industry organizations; California's Clean Energy Workforce Training Program combines the efforts of 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, to leading a statewide partnership of state agencies, educational institutions, local workforce investment boards, community organizations and employers.

The fact that these partnership programs are reaching across departments and sectors could be a great asset in terms of training a person not only in technical job skills, but also in recruiting trainees, managing the trainees' case to tackle barriers and avoid drop out, teaching soft-skills needed to hold any job, and creating pipelines into which to feed the newly trained workers.

As these partnerships are so new, only time will tell how successful they are and what elements of partnership are most crucial.

Community Colleges

Community colleges across the US have been growing recently as the cost of higher education grows and as they add new programs to reflect demand in new and emerging job fields. Particularly in response to demand in energy efficiency jobs, community and technical colleges have been developing new programs for fields such as auditing and sustainable construction, "however relatively few two-year colleges currently offer energy efficiency as a dedicated program; many programs include energy efficiency within broader subjects such as in environmental sciences, buildings sciences or engineering technology" (Hardcastle & Waterman-Hoey 2009).

Despite the increase in the number of energy-efficiency specific programs, "this new capacity may still be inadequate to keep pace with industry growth and surging demand for a

skilled energy efficiency workforce. Enhancing coordination between the energy efficiency industry and educational institutions would help to expand professional development opportunities and ensure that the foundational skills required by industry are integrated into education and training programs” (Hardcastle & Waterman-Hoey 2009).

Research again finds that more work needs to be done to more directly connect industry skills required to training and educational tracks to ensure that people coming out of school are ready to plug in to jobs in the field, and quickly.

Certificate Programs

Generally speaking, certificate programs that give workers a standardized, recognized credential to carry out work in their field have been certifying unprecedented numbers of workers.

One of the most recognized certifying bodies for energy and construction fields is the Building Performance Institute (BPI 2009). BPI has a number of affiliate organizations across the country that are licensed to conduct the BPI training and issue certificates in areas such as building analyst, building envelope, HVAC, and others.

According to their website, “The network of training affiliate organizations has grown by more than 35% [from January to August] 2009, from 70 to 95. Another 21 organizations are ready to sign affiliate agreements, and an additional 87 organizations are in the process of becoming training affiliates. If all are successfully integrated into the network, BPI expects to have 203 affiliates by the end of 2009, an increase of almost 300% over 12 months.” And adding the more affiliates certainly was needed to support demand as “the number of individuals who have achieved professional certification credentials from BPI has also grown, from 2,737 to 4,666, a 70% increase between December 31, 2008 and August 1, 2009” (Building Performance Institute 2009).

Home Energy Rating System (HERS) certification training which is required as mentioned above for many jobs that deal with weatherizing homes that have been audited has also been growing. “In 2008 RESNET exceeded 1,000 members. At the end of 2009, RESNET had 1,767 members in good standing” (Residential Energy Services Network 2010).

Certificate programs are important for many reasons, among them to assure a homeowner that this is a widely regarded skill that the trainee has received as well as ensure a degree of quality control that can be backed by a large, credible organization.

Four Year College

Four year college also exists as an option for high school students and can be beneficial in training for careers such as engineering or others that require a high level of education and degree of technical knowledge.

The most relevant skill set coming out of four year colleges, aside from the need for office workers, managers, and others with a degree of technical oversight, is that of engineers. According to an LBNL survey, finding an engineer trained and experienced in energy efficiency to fill a position can take 12-15 months. Some reasons for this may be that 50-60% of graduating PhD engineers are not US citizens, energy is not the highest paying engineering field, and the energy efficiency services sector often requires an engineer with good communications skills which can be a rare combination (Goldman 2010).

Up and down the post-secondary training spectrum, the need to ramp up quickly in the face of historical enrollment declines is and will remain a challenge until infrastructure and clear career paths can be established. The rush for new partnerships to enter the field may facilitate this transition, however, concentrated, organized, and targeted recruitment, partnership, and action is required.

How and When to Influence Young People

When Career Decisions Are Made

Much research suggests that kids make life-long decisions quite early in life. In examining students that drop out, Representative George Miller, D- Calif., chairman of the House Education and Labor Committee, identified elementary and middle school as the crucial time to prepare students for success in high school. “It is often possible to identify as early as sixth grade up to half of the students who will not graduate,” said Robert Balfanz, a Johns Hopkins University researcher (Matthews 2009). In “The Silent Epidemic: Perspectives of High School Dropouts” a report by Civic Enterprises, forty-five percent of dropouts surveyed said they started high school poorly prepared by their earlier schooling. Many of these students likely fell behind in elementary and middle school and could not make up the necessary ground. A student’s decision to drop out is often the result of a long series of negative experiences—academic failure, grade retention, or frequent suspensions—that begin before the ninth grade.

Studies show that the transition from middle and junior high school can greatly impact a student’s success in future years. This is the age where students disengage from the academic agenda of American schools because they either do not feel that they can succeed in these institutions or because they come to place little value or even negative value on being at school. Developmental declines in school engagement often observed during early adolescence are primarily a consequence of the nature of the middle year’s school transitions. Further, the pathway to high school dropout is often crystallized for youth at risk for school disengagement as a result of these experiences (Eccles 2008). Therefore it is imperative during these formative years of adolescence that students receive the guidance and attention necessary to be successful in academics.

In another study, when asked to identify what grade level they began thinking about career choices between 5th to 12th grade, 19% of students (the largest percentage share) said that they began in 5th grade (Borchert). This study again supports the notion that young people self-identify and at least preliminarily begin thinking about careers at an early age.

Factors that Influence Career Decisions

Much research done on the factors that influence high school students’ career selection are field-specific and/or focus on a specific racial or gender subset such as African Americans, Latinos, and women. A survey of academic research undertaken on the topic finds that much research has been done in the medical field, examining factors that lead students to enter a medical profession. However, there are a number of studies that examine, more generally, the influential factors on career choice among high school students.

Factors that influence future employment are varied. Various studies examine a range of important personal, social, and environmental aspects. Some of the most influential factors are discussed in detail below:

Self-efficacy. One particularly interesting and widely studied factor is called “self-efficacy.” Defined as “people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (Bandura 1994), research suggests that self-efficacy beliefs exert a strong, direct influence on career choice and affect other vocational directives such as interests, values, and goals (Bandura 1995).

When applied to a career decision context, perceived self-efficacy is a major factor among all groups especially women and disadvantaged groups. Students who believe with higher levels of confidence that they will be able to succeed in a given field or path are more likely to strive for higher or nontraditional levels of employment. For example, girls have historically been shown with a lower self-efficacy in science and math than boys which would lead them to believe that they would not be as capable to perform in scientific or mathematical careers and relate less to those fields. However, girls with a high degree of self-efficacy in math or science are more likely to seek out careers that are traditionally male-dominated.

Another study examining math self-efficacy, ethnic identity, and career interests found that “career interest was predicted by mathematics self-efficacy, and self-efficacy was, in turn, influenced by ethnic identity, academic achievement, and socioeconomic status (O’Brien, Martinez-Pons & Kopala 1999).

Among Black and Latino youth, challenges such as “language barriers, incongruity between cultural values and the values of educational institutions, anticipated and experienced academic isolation, and socioeconomic inequities” can work in two ways. In some students the will to overcome is great enough to foster greater self-efficacy (Constantine, Kindaichi & Miville 2007), but not for others.

However, “performance accomplishments” – past performance related to a given skill or field – also contribute to the development to strong self-efficacy, so the influential factors are not limited to uncontrollable forces (Bandura 1994).

Generally speaking, “Participation in future-oriented career behavior, such as career exploration and planning, can promote many individuals’ career decision-making processes. For example, career planning, vocational skill development, and an orientation to the adult world have been shown to facilitate school-to-work transitions” (Constantine, Kindaichi & Miville 2007). In order to boost self-efficacy and expose students to careers in the field, experience that builds students’ confidence that they are capable to carry out careers in the energy field are an important step to building the workforce.

It would seem, then, that an important barrier to young people entering fields has as much to do with perception, and perceived skill based on various social, academic, and personality traits, as with external factors. Studies of and efforts to boost students of all socioeconomic groups’ self-efficacy in the skill fields relevant to energy efficiency jobs could be important to lead more students to self identify as being capable in those fields and that the jobs pertain to their gender, class, or ethnicity among other factors. Equally important in overcoming bias is actual experience and past performance in these fields, possibly to prove that one has a skill even if they initially perceive that they do not.

Family. Parental behaviors are associated with young adolescents' career development and continue to be a factor through high school. There are many facets to adolescent career development – and parents and family structure seem to play a role in nearly all of them.

In terms of career development and maturity, which signifies readiness to accomplish work-related tasks at appropriate life stages, a literature review undertaken in 2004 found studies suggesting that “psychological variables such as support and expectations may influence adolescents' career development to a greater degree than demographic variables. There are also indications that providing career development information to their parents can increase adolescents' career maturity” (Whiston & Keller 2004). Throughout many facets of career development, parental involvement, family structure, and parental opinions influence the child's career certainty, indecision, as well as self-efficacy (Whiston & Keller 2004).

Demographic variables and structural influences such as socioeconomic status, race, and education level still have some bearing on children's career decisions. Researchers found that students with parents who undertake unskilled jobs tended to be more limited in their job interests whereas their peers with parents in professional or skilled professions indicated broader interests in artistic and social careers (Whiston & Keller 2004). This indicates that children with parents in unskilled jobs may prematurely rule out many career professions.

Findings on how much influence parents actually have on their children's development of vocational interests are inconclusive with several studies contradicting one another, but psychological factors, such as anticipated parental support for careers, seem to have more of a bearing on student career choices.

School. Students are exposed to careers through school, of course, by their teachers and guidance counselors, extracurricular experiences such as field trips, and through outside groups working with the school, or career fairs.

Of these influences, one study found that, “perceived teacher support was significantly correlated with career decision-making self-efficacy and vocational outcome expectations” (Methany, McWhirter & O'Neil 2008). Interestingly again, as seen with parental involvement in career decision making, it is *perceived* support for a given career that seems to have the biggest impact.

Conclusions

There is no doubt that preparing students to fill the positions that will be necessary to reach the goals of current funding programs that seek to upgrade our national residential building stock, put people back to work or create new jobs, and begin to reduce emissions and energy usage from the building sector will take coordinated effort on a scale not seen within the energy efficiency field.

In order to create and direct students to a variety of onramps that can lead to employment within the energy efficiency sector, work should be done to make students aware that if they go into a CTE and/or apprenticeship program, jobs are awaiting them on the other side – jobs with benefits, with potential for advancement, and that will be secure even when ARRA money dries up. Green Job Partnership training programs that are emerging may be a good way to handle top-to-bottom issues with recruitment, training, and placement as partnerships form between public, educational, and private companies.

Wherever possible, certificate and apprenticeship programs should be built into courses of study to allow a student to walk away with a legitimate, widely-recognized credential and on-the-job experience that they can get paid for while they go to school – building self efficacy, allowing someone to make a living while training, and sending them into the field with an officially documented skill to use and build on.

Beyond just recruiting students and making them aware of the opportunities available to them, building self-efficacy in the energy field is also important. Mentoring and interning opportunities for students, starting as early as possible, would provide real life experiences that could help shape attitudes and perceptions for a young person about their aptitudes and possibilities for employment later in life.

In high schools, we should look at the curriculum and educational culture. Right now, energy efficiency rarely if ever exists as a required element in science curriculum, neither within the environmental science classes or just general science. If we're going to create a generation of energy-literate citizens who are aware of the opportunities in the field, teaching them the basics in high school should be a priority. Furthermore, teacher training in environmental science best practices plus training on aiding the career development of their students should be considered. Too often only the "best" or college-bound students receive the "perceived support" that is so important to students' career choices. Schools should aid in breaking the stigma that only four-year colleges can yield good jobs. Unfortunately, due in part to declines in CTE and apprenticeship program enrollment in the mid-80s to early 90s, we are facing a time where over 35% of workers in the building industry are likely to retire in the next 5 years with comparatively few experienced journeymen to fill their places. Counselors should also be alerted that trade jobs in the construction and manufacturing fields and emerging jobs in energy auditing and efficiency are in high demand right now.

Socially and culturally, gaps still remain in self-efficacy of women and minorities in terms of believing that certain jobs apply to them. Much work has been initiated to recruit women and minorities into Science Technology Engineering and Math (STEM) fields, but there is still a long way to go. Traditionally marginalized groups will all be crucial to filling the gaps in our workforce, as the critical "social justice" aspect of green jobs builds momentum.

Although current trends and factors lead to some conclusions about how and where to focus green career recruitment efforts, the bottom line is that more research is needed to determining how and when to influence young people to enter the green workforce.

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