A report from the
MASSCAP Green Career Ladder Initiative

Energy Efficiency/Weatherization Workforce Planning Partnership

WORKFORCE NEEDS ASSESSMENT

Conducted for:
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MASSCAP
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1. New England Clean Energy Council – NECEC developed a report on residential energy efficiency workforce needs and released it in June 2009: "Projecting Workforce Needs of the Massachusetts Residential Retrofitting Energy Efficiency Programs (2008-2012)."

    → Kevin Doyle, Principal, Green Energy Economy – The independent consultant hired by the New England Clean Energy Council to develop their residential energy efficiency workforce needs report. The Partnership used not only the information from the report he developed but also additional data via conference call at a Partnership meeting, an in-depth conversation with Navin Associates, and a webinar.

2. 13 Key Interviewees: The following people graciously gave their time and expertise to assist with the research in this report:

    → Atlantic Weatherization – Darren Palm;

    → Massachusetts Department of Housing and Community Development Low Income Weatherization Program – Dave Fuller;

    → Building Diagnostics – Bruce Torry;

    → National Consumer Law Center – Charlie Harack;

    → Green Home Solutions – Paul Marquis;

    → Peregrine Energy Group – Steve Weisman;

    → Conservation Services Group (CSG) – Mark Donovan;

    → Quinsigamond Community College - Kathleen Manning, Mary Knittle;

    → JFYNetworks – Gary Kaplan;

    → Stellaris – Jim Paul;

    → Hoisted/Portable Engineers Local 4 Apprenticeship and Training – Bill Mooney;

    → Women in the Building Trades (recently defunct) – Mary Ann Cloherty;

    → Boston Power Inc. – Ted Harding.

3. South Middlesex Opportunity Council (SMOC) – Dave Harrison organized, conducted, and provided a written account for two focus groups;

4. Quincy Community Action Program (QCAP) and South Coastal Workforce Investment Board (SCWIB) – Liz Hughes and Alicia LeClaire conducted an interview with IMPACT Employment Services;

5. World Education SABES Central Resource Center – Laurie Sheridan conducted the key informant interview with Mary Ann Cloherty.

MASSCAP Green Career Ladder Initiative
Workforce Needs Assessment

I. EXECUTIVE SUMMARY

MASSCAP is the statewide association of the 24 Community Action Agencies (CAAs) in Massachusetts. CAAs were created more than 40 years ago under a federal mandate to combat poverty. Combined, CAAs serve over 440,000 low-income people annually, two-thirds of them with incomes below 125% of the federal poverty level. For more than 30 years, CAAs have been the lead agencies of the Weatherization Assistance Program (WAP) funded through the MA Department of Housing and Community Development (DHCD) with U.S. Department of Energy and other federal funding.

MASSCAP organized a Green Career Ladder Initiative Partnership (GCLIP) with a goal of utilizing the SkillWorks funding to conduct a research project to identify existing and future potential "green" jobs and training program options that will assist low-income, lower-skilled people to attain jobs in the emerging "green" workforce. The GCLIP consisted of CAAs, employers, Workforce Investment Boards (WIBs), and ABE/ESOL providers to determine the industries and occupations that will be "greening up" in three regions in the state (Boston, South Coastal, South Middlesex) that further inform the Green Career Ladder model.

Findings

1. Residential Energy Efficiency Workforce Needs Report[1]
    - Under current assumptions, the residential retrofit market will be a good job supporter from 2010-2012, but not phenomenal.
    - Many jobs will go to incumbent workers working with contractors already in the field, and/or to workers with contractors who will migrate to residential energy efficiency work.
    - Many of the training programs currently operating and/or planned for the immediate future are aimed at existing and "would be" contractors with construction experience.
    - Community-based job training programs for auditors should be building relationships with employers now so that there is a good fit between training and employment.
    - It is critical to track the changes that regulators and utility companies are making and to let decision makers know your ideas for innovations that can create more jobs.
    - A federal "cap and trade" system would likely produce lots of additional money for the state's residential energy efficiency retrofitting system.
2. Key Informant Interviews
    - Overall, "green" industries are growing with promise for future employment.

[1] New England Clean Energy Council. *Residential Energy Efficiency Workforce Needs Report.* Kevin Doyle, Green Economy, Massachusetts Low Income Energy Affordability Network (LEAN). June 2009.

- The best opportunity for entry level "green" jobs, both now and in the near future, is in residential weatherization/insulation work.
- There appear to be opportunities, both now and in the near future, for employment as a Hazardous Waste Technician, HVAC Technician, or Energy Utility Technician.
- Presently energy efficiency commercial work involves large contractors who employ members of trades/unions, but it represents a potential market for construction and/or weatherization/insulation workers.
- The solar industry is experiencing growing pains but has potential for future employment; questions remain as to the number of entry level jobs that will emerge.
- Battery technology for electric cars is another growing industry with potential.
- Wind does not appear to be a serious employer at this time.
- There appears to be a void in weatherization/insulation technician training.
- Upward mobility in the "green" sector requires additional licenses/certifications.

3. Community Action Agency Assessment
   - Local business owners are working to stay updated on the latest "green" technology and feel it will have an impact on their future with finances driving the market.
   - Unemployed residents are interested in weatherization/insulation work and participating in a training program, but are concerned about: meeting expenses while in training; whether or not there are training programs available; and job placement upon completion.

<u>Recommendations</u>

- As a top priority, establish a 1-2 week weatherization/insulation technician training program, which directly involves local contractors and a trainer experienced in the weatherization field, to provide hands-on energy efficiency training. Include an outreach plan to build working relationships with weatherization/insulation contractors and local businesses.
- Develop working/referral relationships with reputable Hazardous Waste Technician Training programs and explore options to make the training more accessible to those facing travel and other employment barriers.
- Develop strong working/referral relationships with 1) those community colleges with training programs for utility workers, 2) Massachusetts Green Institute Training Centers that offer training for green licensing and certifications, 3) state and local governmental units (e.g. planning boards) to increase awareness of upcoming public and private sector projects, and 4) local trades/unions, to monitor their apprenticeship eligibility requirements and explore collaborations (e.g. pre-apprenticeship).
- Develop committees with WIB leadership and the participation of CAAs and other organizations to assess and develop partnerships regarding local green job opportunities.
- Build working relationships among CAAs, WIBs, and ABE programs to enhance capacity to respond to program opportunities in the green economy.

- Incorporate "soft skills" in employment training programs.
- Initiate outreach to large construction companies involved in private and commercial energy efficiency projects with a goal of establishing a referral/working relationship that could possibly lead to future training programs.
- Consider incorporating green concepts and terminology into existing training programs.
- Develop a plan to monitor changes in national, state, and local "green" policies, utilities energy efficiency projects, standards, licenses/certifications, and training opportunities, as they relate to potential opportunities for low-income people.

II. INTRODUCTION

The mission of all Community Action Agencies (CAAs) is to assist low-income people to attain financial self-sufficiency. For 30 years, CAAs have delivered the Weatherization Assistance Program (WAP) to income-eligible households across the state. In the past 15 years the CAA network also has run energy efficiency programs funded by Investor Owned Utility (IOU) companies across the state. Efficiency work is done for income eligible customers as either a "piggyback" to the WAP funding or as a "stand alone" unit.

The need for new workers in energy conservation and clean-energy generation is growing. The new employment opportunities resulting from this growing field will offer pathways out of poverty for disadvantaged individuals, while promoting cost savings and increased stability for low-income communities. In 2009, MASSCAP's Workforce Development Committee set as a primary goal the development of a Green Career Ladder Initiative to respond to a) unmet employer needs and b) long-term economic trends leading to new employment opportunities in energy conservation and renewable energy generation. In June 2009, MASSCAP received a planning grant from SkillWorks at The Boston Foundation for an Energy Efficiency/Weatherization Workforce Partnership (Partnership) initiative to develop a robust partnership among CAAs, employers, Workforce Investment Boards (WIBs), and ABE/ESOL providers. The goal was to determine the industries and occupations that will be "greening up" in three regions in the state (Boston, South Coastal, South Middlesex) in order to further inform the Green Career Ladder model.

In July, MASSCAP organized three meetings of the Green Career Ladder Initiative Partnership (the Partnership) with the following participating organizations:

- MASSCAP
- Action for Boston Community Development, Inc. (ABCD)
- Quincy Community Action Programs, Inc. (QCAP)
- South Middlesex Opportunity Council (SMOC)
- Metro Southwest Regional Employment Board (MSW REB, Inc.)
- South Shore Community Action Council, Inc. (SSCAC)
- South Coastal Workforce Investment Board (SCWIB)
- Low-Income Energy Affordability Network (LEAN)
- City of Boston, Office of Jobs and Community Services (JCS)
- Massachusetts Department of Elementary and Secondary Education (ESE)
- World Education, SABES Central Resource Center (CRC)
- Community Teamwork Inc. (CTI)

One objective of the Partnership was to utilize the SkillWorks funding to research existing and future potential "green" jobs and training program options. With the assistance of Navin Associates, a consulting firm experienced in social science data collection, the Partnership agreed to focus on three research questions:

1. What are the existing and projected "green" jobs (entry level and next tier), available for low income residents of three CAA regions (*Boston, South Coastal, South Middlesex*)?
2. What are the qualifications for entry level and upward mobility?
3. What elements should job training programs include to meet existing and projected need?

III. METHODOLOGY

Originally the Partnership had planned on conducting a survey of energy efficiency contractors. However, in 2008, National Grid and NStar (on behalf of themselves and other Massachusetts utilities) contracted with the New England Clean Energy Council (NECEC) to investigate residential, commercial and industrial energy efficiency workforce needs in Massachusetts under certain growth assumptions. The final report "Projecting Workforce Needs of the Massachusetts Residential Retrofitting Energy Efficiency Programs (2008-2012)," by Kevin Doyle, Principal, Green Economy, was completed in May 2009 and was available for this report. Since the NECEC's report was available, the Partnership agreed that the best utilization of its time and resources would be to supplement the findings in the NECEC report with: 1) key informant interviews that would reach beyond weatherization/insulation to other sectors and 2) client focus groups conducted by the Community Action Agencies involved in the Partnership to obtain information from potential training program participants.

Specifically, the Partnership undertook the following data collection efforts through a combination of efforts by Partnership members and Navin Associates:

- Review the NECEC residential efficiency workforce needs report, which included a survey of most residential weatherization/insulation contractors in Massachusetts;
- Review the companion NECEC commercial/industrial energy efficiency workforce needs report, if available;
- Conduct 10-20 interviews with key informants in "green" sectors including weatherization, energy auditing, solar, wind, hazardous waste, building trades, and job training providers;
- Conduct 2-3 focus groups with low-income residents from the 3 target areas;
- Review and summarize available literature on labor market analysis and green job training initiatives.

The Partnership directed all data to be submitted to Navin Associates for analysis and development of this report.

Limitations of the Study

- The NECEC commercial/industrial energy efficiency workforce needs report was not available. As a result, only the NECEC residential efficiency workforce needs report was used, thereby limiting most of the data to weatherization/insulation work in the residential sector;
- The goal of researching "green" employment opportunities was very broad; as new data were collected, new areas of inquiry emerged that sometimes could not be investigated (see "Recommendations for Further Research" below);
- Ultimately, fewer interviews and focus groups than planned were carried out (namely, thirteen key informant interviews, two focus groups from one target area, and one interview focusing on the needs of people temporarily without homes) due to:

- Summer scheduling – Many targeted key informants and Partnership members were unavailable due to vacation and other conflicts;
- Short timeframe – Eight weeks was an extremely short timeframe to meet with the Partners, develop a research design, and conduct the research;
- Limited funds for consultants.

These limitations should be taken into consideration when reviewing the results of this report.

Recommendations for Further Research

The area of existing and future "green" jobs is extremely large and emerging, with many parts to explore and consider.

- "Green" Industries – Further research would be useful in areas such as recycling, electric and hybrid automobiles, trades/union participation, retail work in marketing and selling green products, new battery technology, environmental services (air pollution, water conservation, etc.), and so on.
- Private and Commercial Energy Efficiency – This study was unable to access much data regarding private and commercial energy efficiency contractors. It is an area to seriously consider for future research.
- HVAC Technicians – While this was discussed in this report and it showed significant opportunities for immediate and future employment, further research into the skills required and the training options available could be beneficial.
- Support Staff – It would be beneficial to conduct further research into the benefits of adding green concepts and terminology to existing support staff training programs.
- Trades – Many if not most "green jobs" in weatherization probably will go to members of various trade unions (e.g. carpenters, electricians, plumbers, etc.). The possibility of working with the unions on referrals to their apprenticeship programs and/or developing pre-apprenticeship or other training opportunities should be considered for future research.

IV. LITERATURE REVIEW

This literature review was provided by Patricia Pelletier, MASSCAP Planning and Development Specialist, who summarized the material reviewed by MASSCAP as part of a grant from SkillWorks at The Boston Foundation for an Energy Efficiency/Weatherization Workforce Partnership (Partnership) initiative. Please see Appendix A for a more detailed list of materials reviewed.

The United Nations Environment Program defines green jobs as "work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution."

Defined more by industry than occupation, they (green jobs) reside primarily in the sectors that make up the clean energy economy (energy efficiency, renewables, alternative transportation, and fuels). Some of these jobs seem intuitively green: solar panel installers, wind tower mechanics, biofuel technicians. Many do not. A machinist punching parts for wind turbines may also punch parts for decidedly less green purposes, and her work may not look different from a job across town producing components for an oil refinery. Creating a new energy economy will involve creating some brand new industries and many brand new jobs. But even more of it will involve transforming the industries and jobs we already have. From a workforce development perspective this means less focus on creating courses of study and curricula from scratch, and more on embedding green curricula for green skills into existing programs.[2]

As the federal and many state governments seek solutions to energy conservation and efficiency problems, it is probable that the weatherization field will expand and change in the coming years to meet increased interest and demand and as the field diversifies. As a result, this is an opportune time for prototyping policies and programs within green industry for increasing training and subsequent employment of low-skilled workers, including:

- *Policies* that promote the integration of workforce and weatherization work, which to date have been siloed at the federal, state, and local levels;
- *Training programs* that prepare low-skilled workers for entry-level jobs; and
- *New entry-level work structures* that enable lower-skilled, lower-literacy individuals to enter and move up through the energy efficiency industry.

As the United States moves toward greater energy efficiency and energy conservation as a key economic development strategy, creating the systems and structures that build a qualified workforce is critical to the success of the strategy and to the ability of the country to improve the environment. The weatherization field can play a leadership role in prototyping and then integrating new structures and processes that will provide opportunity and advancement for a wide range of workers, including those most traditionally left out of the economy.[3]

[2] Sarah White & Jason Walsh. *Greener Pathways, Jobs and Workforce Development in the Clean Energy Economy.* 2008.
[3] The Annie E. Casey Foundation. *Growing a Quality Weatherization Workforce.* May 2009, p.12.

The weatherization field is but one of the sectors anticipated to grow substantially as a result of the infusion of ARRA funding and the overall focus on developing alternative energy sources in this country. There seem to be four areas in which most agree job opportunities will be created: Energy Efficiency; the Wind Sector; Biofuels; and Solar Power.

Research shows that the vast majority of jobs associated with these categories are in the same areas of employment that people already work in today, in every region and state of the country. For example, constructing wind farms creates jobs for sheet metal workers, machinists, and truck drivers, among many others. Increasing the energy efficiency of buildings through retrofitting relies, among others, on roofers, insulators, and building inspectors. What makes these entirely familiar occupations "green jobs" is that the people working in them are contributing their everyday labors toward building a green economy.[4]

The U.S Department of Labor reports the following "*in demand*" occupations, regardless of overall occupational growth levels, because the work is central to a high-growth industry, like energy or construction: Construction laborers; Sheet metal workers; Insulation workers; floor, ceiling and wall workers; Cement masons and concrete finishers; Carpenters; Plumbers, Pipefitters, and Steamfitters; Electricians; and Boilermakers. The Bureau of Labor Statistics reports "*faster than average growth*" for occupations across all industries including: Heating, air conditioning and refrigeration mechanics and installers and Hazardous materials removal workers. Further, the "Greener Pathways"[5] report notes the following key points regarding the Energy Efficiency industry:

- Jobs in energy efficiency retrofitting look a lot like traditional construction jobs;
- While only two of these occupations show faster than average projected growth, the Department of Labor identifies all 20 as "in demand" because they are critical to high growth industries;
- Every $1 million invested in efficiency retrofits generates eight to eleven on-site jobs. Job numbers rise if we include indirect economic effects;
- State and municipal retrofitting programs will need to be tied to regional training programs, as the construction and building trades face imminent shortages of skilled workers;
- A good place to start greening career pathways in the building trades is through union apprenticeship and related programs, some of which are currently constructing workable pathways out of poverty;
- Some construction jobs have high wages, but offer only seasonal employment.

The Greener Pathways report also notes that the "jobs to watch" in energy efficiency include Energy and indoor air quality auditors; Deconstruction workers (removing/recycling materials/debris from structures); HVAC operations and maintenance technicians; Systems technicians; and Solar installer and technicians.

[4] Political Economy Research Institute, University of Massachusetts-Amherst. *Job Opportunities for the Green Economy: A State-By-State Picture of Occupations That Gain From Green Investments.* Robert Pollin & Jeannette Wicks-Lim. June 2008.

[5] The Workforce Alliance, The Apollo Alliance, Center on Wisconsin Strategy. *Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy.* 2008.

The "Greening of the World of Work: Implications for O*NET-SOC and New and Emerging Occupations" report prepared for the U.S. Department of Labor[6] identified 215 occupations that qualified as either "green increased demand," "Green enhanced skills," or "green N&E," (new and emerging). Those related to energy efficiency/weatherization include, but are not limited to:

- Insulation Installers
- Insulation Workers (floor, ceiling, wall)
- Installation Helpers
- Weatherization Installers and Technicians
- Carpenters
- Laborers
- Energy Auditors

According to CleanEdge Inc., an independent analyst firm, the market for renewable energy expanded from $9.5 billion in 2002 to over $55.4 billion in 2006, nearly a six-fold increase in just four years. By 2016, it is expected to grow to over $226 billion. Moreover, jobs in renewables, efficiency, and demand-side management are applicable to workers at every level of the academic and skills ladder. Clean energy jobs run the gamut from Ph.D research to solar panel installation, energy audits, weatherizing buildings, and wind turbine maintenance.[7]

The "Green Economic Recovery Program—Impact on Massachusetts" study conducted by the Center for American Progress,[8] reports that Massachusetts's share of national green economic recovery program ($2.4 billion based on combining state's population and gross domestic product) will result in a total job creation of 42,530. This impact, in the context of the June 2008 Massachusetts labor market, will result in a reduction of the unemployment rate (June 2008 figure) of 5.3% to 4.2%. These Massachusetts job estimates are based on a distribution of green public- and private-sector investments, as follows:

- Energy efficient building retrofits: $939 billion
- Mass transit and freight rail: $649 million
- Smart grid: $235 million
- Wind power, solar power, and advanced biofuels: $704 million

(These investment figures are meant to be broadly illustrative of investment possibilities in order to estimate job creation across sectors.)

The New England Clean Energy Council (NECEC) reports the following "New Energy Efficiency Jobs Emerging":[9]

- Home construction and renovation: performance testing and computer diagnostics
- Building controls and automation: energy management systems
- HVAC system installation and maintenance: computer diagnostics/testing
- Retrofit/replace: inefficient lighting and HVAC systems
- Evaluation services: building performance

[6] National Center for O*Net Development. *http://online.onetcenter.org/*. Raleigh, NH, 2/12/09.
[7] The University of Massachusetts. *Clean Energy for the Commonwealth.* February 2008.
[8] Center for American Progress. *Green Economic Recover Program, Impact on Massachusetts. 2007.*
[9] New England Clean Energy Council Development Group. *Preparing the Green Jobs Future.* Spring 2009.

- Operation and Management services that lower long term energy costs
- RE systems and Distributed Generation: installation and maintenance
- Produces: manufacture, sales, installation and maintenance
- R&D of new products and services
- Architecture and engineering specialists
- High skilled specialty trades in organization labor

During the NECEC 2007 Workforce Summit in October 2007, participants from industry, state, municipal, and quasi-government agencies, labor unions, and higher education identified critical workforce skill gaps, and proposed "acceleration initiatives" to grow the region's clean energy economy.[10] Their findings seem to best summarize the energy workforce needs in New England and Massachusetts as follows.

Clean energy growth/skills gap categories identified during the NECEC workforce summit:

- Energy auditors: industrial, commercial, and residential
- Installers/retrofit and conversion (e.g., PV and solar thermal, insulation)
- Technicians: lab, manufacturing, engineering tech
- Engineers with energy training and energy scientists
- Green design and construction (e.g., LEED accredited with energy focus)
- Facilities and operations management (e.g., certified energy managers)
- Trainers/educators (industry and academic, credit and non-credit)
- Public communications/education (with energy or sustainability training)

Workforce summit participants also suggested a number of initiatives that should be implemented over the next 1-2 years to develop a world-class clean energy workforce in Massachusetts that keeps pace with rising job/skill demands:

Jobs-specific:

1. Clean energy curriculum development for K-12 and higher education
2. Funding for priority initiatives (clean energy jobs bill, university R&D)
3. Low-income community partnership and investment
4. Licensure/certification
5. Jobs demand forecast using multiple inputs (e.g., policy, employers)
6. Information clearinghouse for jobs, educational/training programs, internships and related topics (e.g., career pathing)

Policy/awareness-focused:

1. Public awareness and civic engagement
2. Upgrade building code/zoning policy to spur demand
3. Align permitting, zoning with global standards and best practices to drive projects

In 2007, the Weatherization Assistance Program Technical Assistance Center developed a report "Core Competencies for the Weatherization Program" that provides competencies that a weatherization worker should possess depending on their position. For example, an auditor needs

[10] University of Massachusetts. *Clean Energy for the Commonwealth.* Appendix 2.

to conduct diagnostic testing that may not be required of an installer. These increasing levels of competency also provide a career or development path for agency and contractor personnel. Core competencies (basic competencies, safe work practices, building evaluation, measure evaluation, measure evaluation, final inspection, consumer education, monitoring, program management, and training) are listed in more detail in the full report, "Core Competencies for the Weatherization Assistance Program, March 26, 2007."[11]

[11] Weatherization Assistance Program Technical Assistance Center. *Core Competencies for the Weatherization Assistance Program Companion Matrix.* March 26, 2007.

V. FINDINGS

This section includes findings from several sources. First is the recently released Massachusetts residential energy efficiency workforce needs report that was referenced earlier. This is followed by the results of 13 key informant interviews, and finally a summary of CAA assessments.

1. Finding from New England Clean Energy Council's Report[12]

The NECEC report included the following:

- Survey data from 64 of 100 energy efficiency contractors representing 90% of the residential market in Massachusetts;
- Estimates of energy efficiency-related employment through community action agencies' low-income weatherization assistance programs;
- Data from the Massachusetts Department of Energy Resources;
- Utility Program Reports;
- Interviews/surveys with executives at Conservation Services Group (CSG), Center for Ecological Technology (CET), RISE Engineering, and others.

The researchers estimated projected funding for two model programs: 1) the Massachusetts Low Income Weatherization Assistance Program and 2) the Massachusetts Residential Conservation Services (*MassSave*) Program. The results were that the funding will more than quadruple from $86 million in 2008 to $346 million in 2012. Moreover, they estimated those figures to be conservative, representing a floor, not a ceiling. With this increase in funding, listed below are the projected increases in employees for the two energy efficiency programs utilized in the report:

Projected Employees (FTEs[13])	**2008**	**2012**	**Change**
Low Income (CAP) Program	300	824	524 (166% increase)
RCS (MassSave) Program	498	2020	1522 (405% increase)
Total	798	2844	2046 (256% increase)

The report breaks down specific energy efficiency workforce needs:

Projected Employees (FTEs) *(Low Income (CAP) and RCS (MassSave) Programs)*	**2008**	**2012**	**Change**
Insulation/Air Sealing	276	881	605 (219% increase)
Auditor	95	250	203 (163% increase)
HVAC/R[14]	184	799	615 (334% increase)
Management and Support Staff[15]	243	893	650 (267% increase)

[12] This section utilizes two versions of the NECEC report – a draft supplied by Kevin Doyle of Green Economy (namely, *Massachusetts Residential Energy Efficiency Workforce Needs Draft Report*) and a later version distributed for a webinar (namely, *Projecting Workforce Needs of the Massachusetts Residential Retrofitting Energy Efficiency Programs (2008-2012),* A Case Study from the New England Clean Energy Council's Energy Efficiency Workforce Needs Research Project; NECEC Program Manager, Kevin Doyle, Green Economy).

[13] The report counted the workforce needs in "full time equivalents" (FTEs). Each FTE represents the equivalent of one person working full time in the job category; it is not the same as number of individual people employed.

[14] The report notes that they have less confidence in their HVAC/R estimates due to the assumptions of increased heating system replacement and other work that requires relatively large consumer co-pays in the RCS program.

Despite this increased demand, the report provides several reasons why the workforce needs will not be as dramatic as the statistics seem to portray:

- Energy prices have dropped, which has reduced the portion of residential energy efficiency demand driven by customer desire to save money on rising energy bills;
- The economic recession has hit the construction and remodeling industry particularly hard, throwing thousands of carpenters, remodelers, electricians, HVAC/R workers and plumbers out of work and pushing many existing contractors to pursue new markets such as energy efficiency;
- Massachusetts had a push in 2008 to prepare for high energy prices in the winter that has led to a significantly expanded corps of auditors and new energy efficiency contractors, causing the state to have the ability to serve a large number of customers per auditor;
- Improved information on the ARRA funds has led programs to lock in existing contractors, recruit new ones, and hire auditors and administrative support staff. As it became clear that AARA funds would be available, contractors have reached out to seek energy efficiency work.

At a recent "webinar" presentation of the report, some workload and recruitment/training questions from the contractor survey results were highlighted, revealing that:

- Contractors are interested in expanding to meet expected work load and feel strongly that they will be able to meet the expanded workload;
- When asked about their interest/ability to expand production if the number of weatherization projects increased 25%, contractors responded with a strong "Yes." As the amount of hypothetical expansion went up (50%, 100%, 150%) their responses gradually became less positive. Contractors would be encouraged to expand production if a group of jobs (e.g. 200, 300) were guaranteed;
- Contractors reported that the best sources for recruiting new crew members were #1 friends, #2 co-workers/network, and #3 advertising;
- Contractors reported that a partially subsidized training center would be useful to expanding their production;
- Contractors reported that the lowest source of recruiting new crew members was the Unemployment office, the second lowest was relatives, and then educational institutions.

The industry has acted swiftly to implement a creative initiative aimed at increasing the technical skills of existing contractors, establishing an interim training "boot camp" specifically designed to ramp up the available field contractor base. It was scheduled to become operational in June 2009. Moreover, the state of Massachusetts has plans to create a statewide energy efficiency/renewable energy training initiative and facility with at least three sites.

<u>NECEC Report Recommendations</u>

- "Assist existing and underemployed contractors who are interested in pursuing energy efficiency work by offering financial assistance in the form of grants or interest-free/low

[15] Includes Manager, Administrative Assistant, Administrative Staff, Project Coordinator,

interest loans so they can expand their businesses through purchasing trucks and equipment and hiring additional work crews";

- "Develop an outreach campaign to 'spread the word' to potential contractors";
- "Recruit unemployed and underemployed workers and develop training programs directly connected to local contractors";
- "Form partnerships with local training programs that offer not only residential energy efficiency job training but also a wider array of skill development aimed at 'green' building and/or renewable energy."

NECEC Report Conclusions

- "Under current assumptions, the residential retrofit market will be a good job supporter from 2010-2012, but not phenomenal";
- "Of those jobs that are supported, many will go to incumbent workers at contractors already in the field, and/or to workers at contractors in the building trades who will migrate to residential energy efficiency work";
- "Many of the training programs currently operating and/or planned for the immediate future are aimed at existing and 'would be' contractors";
- "Community-based job training programs for auditors, weatherization/insulation techs, air sealers, and HVAC techs should be building relationships with employers now so that there is a good fit between training and employment";
- "Regulators and utility companies are making changes to the state's residential energy efficiency retrofit system and dramatically increasing funds for all forms of energy efficiency. It's critical to track these changes and to let decision makers know about your ideas for innovations that can create more jobs";
- "A federal 'cap and trade' system would likely produce lots of additional money for the state's residential energy efficiency retrofitting system."

2. Finding from Key Informant Interviews

Twenty-five key informants that could significantly expand the Partnership's knowledge base regarding "green" industries. Thirteen interviews were conducted with representatives from: Atlantic Weatherization; Stellaris Solar Company; Peregrine Group; Conservation Services Group; Sustainable Design Consulting and Project Administration; Quinsigamond Community College; National Consumer Law Center; Massachusetts Department of Housing and Community Development; Building Diagnostics Help; JFY*Networks*; a former staff person of Women in the Building Trades; Hoisting and Portable Engineers Local 4 Apprenticeship and Training Fund; and Boston Power Inc. The themes that emerged were as follows (see Appendix ___ for full summary):

a. Existing Entry Level "Green" Jobs

- 69% reported that weatherization/insulation workers would be the job most available for entry level work both now and in the future;

- 31% reported that there is entry level work in manufacturing/assembling (*solar panels, batteries for electric cars*);
- 23% reported there would be jobs for administrative support and HVAC technicians;
- 15% reported a need for entry level workers as hazardous waste technicians and for commercial re-lamping.

Significant Quotes:

"No question, right now the most entry level jobs, while not sexy or exciting, is simply doing weatherization/insulation work."

"There seems to be a real opening for work in weatherization/insulation."

"I think that there will be jobs in solar manufacturing as machine operators."

"We are applying for government assistance for a new plant to make batteries for electric cars which would mean 300-500 jobs, many would be entry level."

"All of the green sectors will need support staff."

"We are not accepting new apprentices for heavy equipment workers in November as usual due to the slow economy and I'm in contact with the other trades and they aren't either. The jobs are not there and won't return until the banks release the money."

"The whole idea of green jobs is ephemeral-the jobs are not really there yet."

b. Future Entry Level "Green" Jobs

- 92% reported the overall future for "green" jobs looks good and should get better;
- 69% reported that weatherization/insulation work would see growth in the future;
- 31% reported that the future of opportunity for "green" jobs is hard to predict;
- 31% reported that there would be a need in the future for energy efficiency auditors;
- 31% reported that investments/incentives were the key to future "green" jobs;
- 23% reported that there would be increased work in manufacturing of solar panels or batteries for electric cars;
- 23% reported that there would be increased work for those in the trades/unions and in overall working with "green" products, materials, systems.

Significant Quotes:

"Overall, the future looks good. Some of it depends on development of solar and wind"

"We see 'green' in the discussions of every building project we work on from new highways to large building construction. I'm not sure how much we who operate heavy equipment are in the mix but we see it everywhere we work."

"Right now things are getting better but it's hard to say if it will continue."

"The future depends on funding. Investment drives the market."

"In the future, the most jobs will continue to be in weatherization/insulation."

"The future of solar depends a lot on how the new start-up companies do."

"The future of electric cars depends on battery technology and we feel we can be leaders in this field."

"This is a growing field and it is more than weatherization."

c. Skills/Qualifications for "Green" Entry Level Jobs

- 62% reported that "soft skills" would be the most important qualification (*attitude, people skills, punctuality, dependability, etc.*);
- 62% reported that basic Reading/Math skills would be needed (*6^{th} – 9^{th} grade levels*);
- 54% reported hands-on weatherization training would be needed;
- 54% reported that basic construction/carpentry skills would be needed;
- 38% reported that speaking good English was preferred but not required;
- 38% reported that a high school education would be needed;
- 31% shared their opinion of weatherization training (*40 hrs, ½ class, ½ hands-on training*);
- 31% reported that a basic knowledge of equipment (*blower door fan, infrared camera*, etc.) would be needed;
- 23% reported that knowledge of building science, health and safety issues, and basic job readiness skills *(e.g. National Career Readiness Certification)* would be needed.

Significant Quotes:

"As far as academic skills, that depends but I would think that basic Reading and Math skills would be sufficient."

"Trades require a high school education or GED, clean CORI, and work experience."

"To start out, you need a good attitude. That goes a long way."

"We need workers who want to do weatherization work. It's tough work."

"Someone with a construction background is a definite plus."

"Being able to communicate in English is useful but not required."

"They need to know how to use the equipment."

"To enter our apprenticeship as a heavy equipment operator, you need a high school education or GED, 18 years of age, a valid driver's license, live within our jurisdiction, and pass an aptitude test developed by the state."

"They need basic building science – how thing are put together in a building."

d. Next Tier "Green" Jobs

- 62% reported that the "next tier" of green jobs would be energy auditor;
- 54% reported that the "next tier" of green jobs would be crew chief;
- 38% reported that becoming an individual contractor would be the way to move up;
- 31% identified commercial opportunities and supervisor (*solar/battery manufacturing, hazardous waste, foreman*);
- 23% identified installing solar panels and LEED certification (technicians, architect);
- 15% identified Electrician, Trainer, HVAC technician, and "green" policy specialist/Eco-consulting (e.g. consulting on "green" construction projects, consulting on emerging "green" policies/regulations/standards, etc.).

Significant Quotes:

"Any weatherization work needs a state energy auditor."

"We've been looking for energy auditors for which you need skills beyond entry level."

"A good weatherization/insulation worker can move up to a crew chief or even go into business for yourself as a contractor."

"After our 4-5 year apprenticeship, they often move on to other areas of our work from becoming a foreman to building management, to health and resources, or doing training like I do. Of all the workers in our field, 99% started as apprentices."

"A HERS rating forms the basis for Energy Star certification, and Energy Star certification forms the basis for more comprehensive, "whole-house" certifications like LEED. This suggests a potential career path."

"After working in solar manufacturing, you could move up to be a supervisor."

e. Skills/Qualifications for Next Tier "Green" Jobs

- 69% reported training to gain knowledge, licenses, and certifications (e.g. *written exams*);
- 23% reported college degrees and good people skills.

Significant Quotes:

"As you move up, you need to know the technology which means getting licensed / certified or join a trade. This requires passing written exams that are often arduous."

"To move up to be a Solar Technician or Engineer require significant technical training including a college degree."

f. Bilingual Workers Market

- 69% reported being bilingual would be a definite plus for dealing with weatherization customers and workers;
- 15% reported speaking Chinese would be a definite plus due to overseas factories in China (*solar, battery manufacturing*).

Significant Quotes:

"Being bilingual is a definite plus. It is useful in working with customers whose first language is not English as well as being a crew chief or contractor who has workers whose first language is not English."

g. Employee Characteristics Identified by Employers as Missing

- 54% reported good attitude and work ethic is what employers complain is missing;
- 15% reported hands-on weatherization testing skills is what is missing

Significant Quotes:

"What's missing is basic stuff, be reliable, be on time, no boorish behavior."

"Employees lack hands-on skills using diagnostic testing equipment."

h. Green Career Lattice

- 54% reported weatherization worker to crew chief to independent contractor;
- 31% reported energy auditor to Home Energy Rating System (HERS) or Building Performance Inc. (BPI) raters.
- 15% reported moving from weatherization residential to commercial and up from solar worker to the trades.

Significant Quotes:

"Weatherization/insulation workers can move up to crew chief and maybe become a contractor."

"Mostly moving up requires learning new things and obtaining new certifications and/or degrees."

"If you start out as a Weatherization/Insulation technician, I suppose you could move on to be an auditor and it would seem that possibly you could move from residential to commercial."

i. Comments

- 38% added that overall green sectors are going to be growing;

Significant Quotes:

"I just want to add that the areas of environmental and energy efficiency services is not going away. They are growing."

"Trades/Unions are falling all over themselves to get the new "green" money. I just hope that women and minorities are not left behind."

The key informant interview protocol did not include a specific question about training but many provided insights into what kind of training program they felt would be effective. Some noteworthy comments were:

"I would just like to say that any training program has to be married to jobs."

"A weatherization training program needs a trainer who has done the work."

"*A good weatherization/insulation training program could be done in 5 days with 50% of the time spent in the classroom and 50% spent doing hands-on training in the field."*

"You can get an OSHA Certification that includes 6 certifications by completing a 40 hour training program. It's a week not a year or 4 like a college degree."

"A pre-apprenticeship program can really help."

The opinions of the key informants were varied. Some felt strongly that the field was growing in every way but others voiced concerns such as:

"I do not see any openings for entry level jobs in commercial energy efficiency because basically the trades have the market. If they need labor work, they use their apprentices."

"I do not think that wind will be much of a factor around here. It's just a harder animal to tame, lots of hoops to jump through such as regulations, zoning restrictions, public perceptions, and land area demands, etc."

"We believe that electricians should not be the sole installer of solar panels because

they are not structural experts. Contractors should do it with electricians being responsible for connection."

"One of the largest barriers to growth in energy efficiency is that the utilities have a monopoly in the field and they also cover all the costs to do the training of energy auditors and provide subsidies for their clients. Smaller start-up companies cannot compete."

3. Finding from Community Action Agencies Local Assessment

The participating CAAs organized 2 focus groups (one with 6 individuals seeking full-time employment, the other with 8 local business owners and residents[16]) and an interview with the Director of IMPACT, which provides traditional career counseling and job placement services for homeless individuals in Boston and Quincy. The results of their discussions follow.

Business Owners / Residents Focus Group Notes

- Despite no formal "green initiative training," all were engaged in environmentally friendly practices, agreeing that serious expansion of green technology started 10 years ago.
- Transition to "greening" began with energy efficiency practices to reduce costs.
- Expansion became mandatory through regulations on disposal of business waste by-products (*e.g. flammable liquids, electronic equipment, construction/demolition waste*).
- Businesses need to be educated on best "green" practices to compete in marketplace.
- Participants spend at least one week annually in the classroom or training facility to keep pace with technological or industry changes.
- Hiring with previous "green" training was essential to the profitability of a business or employer but it is difficult to fill positions with competently trained personnel.
- High school/trade schools need to do better preparing emerging apprentices.
- Colleges need to attract more and better qualified teachers in "green" fields.
- Could be job openings in automotive (*few technicians skilled in "green" repairs*).
- As public is better educated, consumers will demand better "green" products.
- Consumers want to save money which should translate into jobs in energy efficiency / insulation (*production and products*) and better use of recycling materials.
- Money was the largest barrier to expanded "greening":
  - → Difficult economic times make companies hesitant to re-tool factories;
  - → Educational facilities hesitant to spend for qualified teachers;
  - → Housing costs and building starts are examples of the problem;

[16] Focus group participants (8): 1) Owner of mid-size building construction company, 2) Owner of mid-size automobile repair business, 3) Owner of HVAC company, 4) Director of nationwide job placement agency, 5) Construction job site supervisor, 6) Licensed master electrician who works for area town, 7) Employee of large non-profit agency, 8) Software engineer.

→ Tradesmen do not have capital to expand or seek further education.

Unemployed Clients Focus Group Notes

- All would accept any full-time position with a living wage and health benefits.
- Largest barrier to finding employment was the competition for jobs.
- Other identified barriers to employment were lack of available jobs, multiple part-time laborers hired versus full time laborers, and lack of a decent wage rate.
- All were interested in training or certification programs.
- All were interested in working in building construction or weatherization.
- One third of participants expressed an interest in higher education (*community college*).
- Identified barriers to securing training or achieving certifications were:
  - → Obtaining a living wage to maintain expenses while in training;
  - → Lack of a sufficient number of training programs to meet the overwhelming need;
  - → Need for job placement services following the training.

Interview with Director of IMPACT Employment Services, a program for people temporarily without homes

- Many IMPACT clients have a background in construction and would be able to transition to "green" jobs with some additional training.
- Most IMPACT clients have a high school diploma or GED.
- IMPACT has a 70% retention rate at job placements after 6 months.
- Many IMPACT clients are interested in attending community college to upgrade skills.
- Some barriers to employment include:
  - → Aging and physical limitations that could be barrier to working in construction;
  - → Lack of computer proficiency;
  - → Substance abuse and addiction issues;
  - → Criminal records;
  - → Lack of transportation;
  - → Lack of clothing;
  - → Lack of a safe place to store acquired tools/materials.

VI. DISCUSSION

This section discusses "green" jobs, both present and future, as well as job training options, and provides recommendations. The secondary and primary data collected for this report indicate that many aspects of the economy are "going green" with some new industries and new job opportunities emerging. However, the number and range of new employment opportunities are still unclear, particularly for entry-level candidates without construction-related skills/experience. There are definitely going to be new "green" job opportunities. The question is how many, in what areas, and who will be eligible.

A. Entry Level "Green" Jobs

The following areas are capable of providing entry level opportunities both now and in the future:

1. Weatherization/Insulation Technician – It appears that this is the field that will have the most entry level jobs the soonest. It can be broken down into 2 distinct categories:

    a. *Residential* – This offers the most significant opportunity for entry level employment. Independent contractors will be looking for reliable, hard working weatherization/insulation technicians who know how to use the equipment (blower door fan, infrared camera). One of the central findings of "Projecting Workforce Needs of the Massachusetts Residential Retrofitting Energy Efficiency Programs (2008-2012)" highlighted in earlier in this report is 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."* While the estimated number of weatherization job opportunities seems to be less than originally projected, significant opportunity still exists for the next few years because of the scale of ARRA and the increased federal focus on green jobs.

    What is required is that workers are dependable and have a willingness to "get their hands dirty." The work does not require significant academic skills, though a high school education would be preferred, nor does it require strong English communication skills. In fact, as energy efficiency demand expands, many interviewed for this report agreed that in some markets it would be a distinct advantage to be bilingual, not only in dealing with customers whose first language is not English, but also as a crew chief able to communicate with non-English speaking workers.

    Not only does this area represent a good opportunity for entry-level jobs, it also seems to be an area where there are insufficient training programs, possibly because in the past, all training was done on-the-job. However, as this field grows and standards are established, workers will need skills to use the equipment and conduct quality weatherization/insulation work. Community colleges are moving to provide many training programs for "green" jobs. However, they have plans for training programs that are longer and more academic than required for entry-level weatherization/insulation jobs. Several interviewees from the field suggested:

    - Approximately 50% classroom work to ensure that the trainee knows basic building science and safety rules and how to use the equipment;
    - 50% hand-on training in the field;

- Use only trainers who have done the work and know firsthand what is required;
- Build a strong relationship with contractors so that they will consider hiring participants;
- Consider methods of connecting contractors to training (e.g. paid internships for trainees, contractors as speakers/trainers, on-site training with contractor permission, etc.).

b. <u>*Commercial*</u> – This was universally described by those involved in residential energy efficiency as a "whole different world than residential." Most in the residential market did not venture at all into the commercial market and often had no knowledge of it. However, it is a fact that commercial and industrial buildings consume 59,427 trillion Btu, compared to 21,054 trillion Btu consumed in residential buildings in the United States.[17] So there seems to be a market for energy efficiency work. While this report includes limited discussions with those directly involved in the commercial energy efficiency market, those that did offer opinions seemed to agree that:

- Commercial work is handled by large construction companies;
- Trades/Unions have cornered the market on the work;
- Trades/Unions do not often hire for entry-level labor work because they can use their apprentices to cover it;
- Trades/Unions are not accepting new apprentices as usual, due the slow economy. However, the jobs are waiting when the banks finally start to release funding;
- Trades/Unions expect increased work opportunities due to the "green" movement;
- Most commercial energy efficiency work is done on the construction of large new buildings, not on existing ones due to a long-term cost/benefit ratio that often makes it not worth the investment;
- Those with weatherization/insulation skills in residential energy efficiency have not been able to market their skills to work in the commercial market, but if the commercial energy efficiency market expands significantly, perhaps they could;
- This could be a growing area that, if penetrable, offers significant opportunities;
- Any training program would have to have a direct connection to large construction companies or the trades/unions.

2. <u>Solar</u> – Many voiced their belief that there would be many new opportunities for "green" jobs in the solar field but the entry level job opportunities currently are hard to find. Many felt that opportunities would depend on the cost/benefit ratio. The area of most opportunity seems to lie in developers considering "going solar" for new home construction, given the growing interest in the market and the potential for cost incentives (e.g., federal guaranteed loans, tax rebates). Recently Robert Culver, CEO of MassDevelopment, challenged the green sector to prove that "green homes can be built as economically as they claim" by holding a

[17] Sarah White & Jason Walsh, *Greener Pathways, Jobs and Workforce Development in the Clean Energy Economy.* 2008, p. 12.

competition to pitch strategies to create sustainable homes that can be sold for a moderate price ($225,000-$330,000) and be "zero or near-zero net energy." The one or two top contenders will get exclusive rights to develop two pieces of land the agency owns in Devens, Massachusetts.[18] As the costs come down, the job opportunities could go up. It appears that the market has started to grow in California. In his September 3rd speech on the status of the stimulus funding package, Vice President Joe Biden highlighted the 500 million dollars targeted for Solyndra Solar, the Fremont California solar company that makes solar panels. The funding would produce approximately 3000 new jobs in construction for a new factory and 1,000 long term jobs. But in New England, the solar market is still in its infancy. As one interviewee put it "the future of solar in this area depends on the success of the new solar startup companies." A recent Boston Globe article quoted Ian A. Bowles, Massachusetts Secretary of the Office of Energy and Environmental Affairs, when he reported on a survey of the state's nearly 100 solar energy employers that showed that the number of jobs grew from 1,086 in 2007 to 2,075 in 2008 as indicative of the health and welfare of local solar energy.[19] However, the same article quoted the concerns and doubts of economists and policy analysts. Among those we spoke with who were connected to the field, it was agreed that the following would offer the best opportunities for entry level jobs for low income people:

a. *Solar Panel Manufacturing* – There may be jobs working on the machines that make solar panels. As the demand increases, the jobs will as well. The training required is the same as for any machinist and, theoretically, vocational high schools or job training programs could prepare low-income people to fill these positions. However, Evergreen Solar, the largest solar panel manufacturer in Massachusetts recently announced an overseas expansion through subcontracting partnership with Jiawei Solarchina Co. in Wuhan, China, to lease a factory on the Jiawei campus, where it will make solar panels. The reasoning given was that Evergreen could grow in China for less money than it could at locations in the United States.[20] They felt compelled to take the deal because the Chinese government provided a low-interest loan that pays for 70% of the new factory's cost. Even worse news was that in August of this year, SCHOTT Solar made the decision to close its Billerica production plant and to relocate the 180 full-time and 45 part-time workers.[21] If Massachusetts-based solar companies could obtain the same kind of federal guaranteed loans that Solyndra Solar in California has, it is possible that they would expand their facilities here.

b. *Solar Panel Installations/Assembly* – As solar installations increase, it was felt by many that there could be labor positions installing the panels. While this seems to be another potential area of entry level employment, a conflict has emerged between electricians and construction contractors over who will be licensed to install solar panels. Moreover, solar PV installation certification requires passing a difficult written exam that requires high level math skills (e.g. trigonometry). That said, it would seem that construction contractors would be more open to hiring entry level workers to assist with installation

[18] Lowell Sun, Page 17. *Green Building Contest in Devens.* Hiroko Sato. 8/24/09
[19] Boston Globe, Business Section, Page B5. *State predicts bright future for jobs in solar energy.* Joyce Pellino Crane, Chris Reidy, 9/9/09
[20] Boston Globe, Business Section, Page B7. *Operations Executive Resigns at Evergreen.* Erin Ailworth. 8/26/09
[21] Billerica Minuteman. *Solar Panel Production Company Closes its Doors.* Max Bowen. 8/11/09

than electricians who have apprentices. Again, the future is unknown. Many believed that solar is going to be an emerging "green" sector with new opportunities but how it all plays out is still to be determined.

3. Hazardous Waste – This seems to be a potential option for entry level workers due to what appears to be a stable market now and in the future, as well as credentialing requirements that can be realistically completed. To obtain an OSHA certification, with 6 certifications to work with chemicals, requires a 40 hour training program with a cost of $1000 or $2000. There are limited training options to obtain this certification in this area and the cost could be an issue, but it is an untapped opportunity that could be realistic for the entry level worker. There also are possibilities to advance to be a supervisor, laboratory technician, or specialized chemical technician. As mentioned earlier in this report, the Bureau of Labor Statistics reports "*faster than average growth*" in this field.
4. Wind – It seems that wind turbines are not made in Massachusetts. Also, installation requires significant training and was not identified as a potential employment opportunity. There were some who felt there could be entry-level positions with maintenance of wind turbines after they have been installed. However, many interviewees commented that "nothing happening in wind" or "wind just requires too many things to fall into place to be viable." One example of an operational wind turbine is at Holy Name High School in Worcester, where it not only provides all the electricity for the school, but enables the school to sell back the excess energy to the state at a profit. However, despite being on a hill and physically viable, it took them 10 years to finally get the wind turbine installed and it was finally completed due in large part to significant grants and donations they obtained to assist with the installation cost.
5. Utilities – Throughout the research, it was clear that the utilities were a major employer and trainer for many areas of "green" entry level employment.
    a. Weatherization/Insulation – The utilities have been working to meet the projected increases in residential energy efficiency work for some time. However, they subcontract most of their energy efficiency work to a few large contractors with Conservation Services Group (CSG) being the largest. One interviewee estimated that 90% of the residential energy efficiency work completed was done by CSG. It would appear that CSG and other larger energy efficiency contractors could be viable options for future employment but they may be more challenging than small contractors.
    b. Energy Utility Technician – It has also been reported that the utilities have an aging workforce and are working to ensure that they have a sufficient available workforce to meet the emerging requirement for hi-tech skills. They have collaborated with community colleges for the last 3 years to address this projected need (*Middlesex, Quinsigamond, and North Shore)* by offering a 1-year program for Energy Utility Technician with an academic and internship component as well as an option to move on to a 2-year Pre-Engineering Associates Degree. This could offer opportunities for appropriate referrals and/or future collaborations.
6. Support Staff – It was agreed that as all the various "green" industries grow, there could be job opportunities for support staff. As standards and credentials are established and formalized, it is possible that those interested in working in "green" areas as support staff who possess a basic knowledge of the technology will have an advantage in seeking

employment. With this in mind, it is possible that support staff training programs might want to consider incorporating green concepts and terminologies.

B. Next Tier "Green" Jobs

The following were higher level employment options for those that start out in an entry level "green" job and look to move up to better themselves. Most require additional training or education.

1. Weatherization Crew Chief – An entry level weatherization worker can aspire to be a crew chief, which requires good leadership skills and an in-depth knowledge of weatherization / insulation work.

2. Independent Contractor – A weatherization crew chief with a solid knowledge of weatherization/insulation work and the resources to obtain equipment and a truck can establish a weatherization/insulation business. Training in starting and running a small business would be helpful.

   A Weatherization Career Lattice might be Worker – Crew Chief – Independent Contractor or Worker – Crew Chief – Energy Auditor.

3. Energy Auditor – This is a position that requires significant knowledge of residential energy efficiency work and requires good people skills, good computer skills, solid building science knowledge, and good academic skills but it does not require a college degree. As weatherization/insulation work increases, the need for energy auditors also increases. The future demand is debatable. Some feel there will be a strong demand and others feel that the utilities have already geared up and presently have significant numbers to meet the projected future expansion. An energy auditor that seeks to advance can obtain additional certifications to become a Building Performance Inc. (BPI) or Home Energy Rating System (HERS) rater or move to become a Leadership in Energy and Environmental Design (LEED) certified auditor or architect.

   An Energy Auditor Career Lattice might be: Auditor – HERS/BPI rater – LEED certified auditor – LEED architect.

4. HVAC Technician – This is an additional certification that a construction or weatherization worker can obtain to increase his/her employability and expand his/her options. It is more complicated that simple energy efficiency work but presents an opportunity to advance in the energy efficiency field and if crossover from residential to commercial expands, will be a valuable asset. As stated earlier in this report, the Bureau of Labor Statistics reports "*faster than average growth*" in this field and the 2009 New England Clean Energy Council's Workforce Residential Energy Efficiency Needs Report validates this finding. Further research into this area would be worthwhile.

   An HVAC Technician Career Lattice might be: Technician – Supervisor – Laboratory/Chemical Technician

5. Trades/Unions – As the green industries expand, all the trades/union positions will also expand. There should be additional needs for carpenters, electricians, sheet metal workers, plumbers, and so on. And, as the work involves new technology, additional licensing and certifications may be required. Developing a working/referral relationship with apprentice

programs should be considered and pre-apprenticeship programs that specialize in "green" licensing and certifications could be a next tier opportunity.

A Trades/Union Career Lattice might be: Pre-Apprenticeship – Apprentice – License – New Licenses/Certifications.

6. Solar Manufacturing Supervisor, Technician, Engineer – The next tier job for an entry level worker manufacturing solar panels is to become a supervisor. If the individual wishes to become a technician or engineer, a college degree would be required.

   A Solar Manufacturing Career Lattice might be: Working on Machines – Supervisor – Solar Technician/Engineer.

7. Energy Efficiency Engineers – A new field of engineering, which many young engineering students are considering. It, of course, requires a bachelor's degree.

8. Licensing/Certifications – It seems that as "green" industries explore new technologies, new licensing and certifications will be required. It appears that the community colleges and possibly the new training centers being set up around the state are planning to provide the training to obtain these licenses/certifications.

VII. RECOMMENDATIONS

- As a top priority, establish a 1-2 week weatherization/insulation technician training program, which directly involves local contractors and a trainer experienced in the weatherization field, to provide hands-on energy efficiency training. Include an outreach plan to build working relationships with weatherization/insulation contractors and local businesses.
- Develop working/referral relationships with reputable Hazardous Waste Technician Training programs and explore options to make the training more accessible to those facing travel and other employment barriers.
- Develop strong working/referral relationships with 1) those community colleges with training programs for utility workers, 2) Massachusetts Green Institute Training Centers that offer training for green licensing and certifications, 3) state and local governmental units (e.g. planning boards) to increase awareness of upcoming public and private sector projects, and 4) local trades/unions, to monitor their apprenticeship eligibility requirements and explore collaborations (e.g. pre-apprenticeship).
- Develop committees with WIB leadership and the participation of CAAs and other organizations to assess and develop partnerships regarding local green job opportunities.
- Build working relationships among CAAs, WIBs, and ABE programs to enhance capacity to respond to program opportunities in the green economy.
- Incorporate "soft skills" in employment training programs.
- Initiate outreach to large construction companies involved in private and commercial energy efficiency projects with a goal of establishing a referral/working relationship that could possibly lead to future training programs.
- Consider incorporating green concepts and terminology into existing training programs.

- Develop a plan to monitor changes in national, state, and local "green" policies, utilities energy efficiency projects, standards, licenses/certifications, and training opportunities, as they relate to potential opportunities for low-income people.