

## Enhancing State Clean Energy Workforce Training to Meet Demand

### Executive Summary

Recent state policy and federal funding initiatives are driving the demand for clean energy in both the short and long term. This increased demand has created the need for many more workers trained or retrained in a variety of clean energy jobs. In response, states are utilizing funding under the American Recovery and Reinvestment Act of 2009 (ARRA) to expand existing workforce training efforts and to create new programs that will meet the demand.

State initiatives in several policy areas are increasing the demand for clean energy in states across the country, particularly over the long term. Such actions include renewable energy and/or energy efficiency resource standards or goals, public benefit funds to support clean energy, building energy codes, and tax incentives for clean energy. For example, a recent study of state renewable portfolio standards--one of the most widely used measures--estimated that renewable electricity generation from the 31 states with binding standards will grow from 137 terawatt-hours (TWh) in 2010 to 479 TWh by 2025, an increase of 250 percent.<sup>1</sup>

In addition, the infusion of over \$32 billion in new clean energy funding from ARRA has increased the deployment of clean energy in all states. This increased funding is creating demand both in the short term, as states work to spend funding by their spring 2012 deadlines, and in the longer term, as many states seek to recycle funding through various financing mechanisms. ARRA programs cover a range of technologies and resources including: energy efficiency, renewable energy, electric grid modernization, carbon capture and sequestration, advanced nuclear energy, and fuel cells. ARRA funding increased federal support for existing clean energy programs by as much as 20 fold over typical annual appropriations and created entirely new programs as well. For example, the Department of Energy (DOE) funding for the State Energy Program grew from \$125 million in 2007 to \$3.1 billion (to be spent in three years) under ARRA; the Weatherization program funding increased 11 fold to \$5 billion under ARRA; and ARRA introduced \$4.5 billion in new funding for Smart Grid and Transmission Modernization.

States thus face both a short-term and long-term shortage in skilled clean energy workers. This shortage includes existing and emerging clean energy occupations. A study of clean energy business in California, which has grown significantly under state policy initiatives and ARRA-induced efforts, found that 71 percent of respondents had trouble recruiting employees with adequate skills and experience.<sup>2</sup> In a national survey of the energy industry, 72 percent of energy professionals reported that the energy efficiency and renewable energy sectors will face a shortage of qualified workers in the next five years.<sup>3</sup> A study by the Lawrence Berkeley National Laboratory found that the workforce in the energy efficiency sector could increase two- to four-fold by 2020.<sup>4</sup>

Fortunately, states are able to access a portion of the ARRA funding designated for clean energy projects, as well as several workforce specific programs within ARRA, to enhance clean energy worker education and training, perform market research, and provide financial assistance. ARRA funding provides an opportunity for states to build upon and expand existing workforce efforts now and to develop innovative solutions that can help sustain their progress in the future, beyond the end of ARRA funding. Many strategies are similar to those used for other sectors. In addition, states are developing new ways to partner with a diverse set of players, leverage private sector resources, and make workforce training more accessible.

Examples of activities include:

- *Developing statewide curricula and certification programs with community colleges.* For example, the **Colorado** Governor’s Energy Office, in partnership with its community colleges, is developing eight weatherization certificate programs to be delivered through a combination of online, classroom, and field teaching methods to approximately 460 residents;
- *Coordinating state, local, and private sector workforce training efforts.* **Arkansas** has created the Energy Sector Partnership, comprising representatives from several state agencies, workforce development non-profits, and clean energy industries to help implement a statewide energy sector strategy for workforce development projects. The partnership will create a standardized curricula and set of training practices that replace a current patchwork of local and regional workforce standards;
- *Improving access to available training.* **Wyoming** has simplified access to training by incorporating mobile labs to provide weatherization and energy efficiency training to individuals living in remote or rural areas. The mobile training labs are equipped with computers, software, diagnostic equipment, and tool kits to facilitate comprehensive training;
- *Using data to assist clean energy workforce development.* Seven states, **Colorado, Iowa, Montana, Nebraska, South Dakota, Utah, and Wyoming**, have formed the Northern Plains and Rocky Mountain Consortium to jointly survey employers in the clean energy industry and disseminate the findings to employers and job-seekers. These efforts will provide up-to-date, industry-driven information and help design training that will meet the skill and competency needs of potential employers; and
- *Leveraging private sector funding to build larger, longer-term training programs.* **California**’s Clean Energy Workforce Training Program is leveraging over \$23 million in private sector funding to create a \$75 million investment program that will train more than 20,000 workers in the clean energy sector. The program also combines funding from the ARRA State Energy Program and existing state resources including the Alternative and Renewable Fuel and Vehicle Technology Program established by state legislation, and the Governor’s Discretionary funds under the Workforce Investment Act.

## Background

Three factors are driving the need for quality training programs to build a clean energy workforce:

- State policy drivers;
- ARRA funding for clean energy; and
- Need for qualified clean energy workers to meet current and future demands.

In addition, ARRA funding for clean energy workforce programs provides an opportunity for states to meet the need for training programs in the short and long term. Many states are using these funds to create new curricula and training programs that will help sustain their progress in the future--beyond the end of ARRA funding.

### *State Policy Drivers*

State policy decisions can be a key factor in driving the demand for clean energy investments and qualified workers, particularly over the long term. For instance, a recent study estimated that renewable energy generation from the 31 states with binding renewable energy portfolio standards will grow from 137 terawatt-hours (TWh) in 2010 to 479 TWh by 2025, an increase of 250 percent<sup>5</sup>. States and territories have taken action in several policy

areas including renewable portfolio and/or energy efficiency standards or goals, public benefit funds to support clean energy, building energy codes, and tax incentives to support clean energy:

- Thirty-six states have **renewable portfolio standards** or goals<sup>6</sup> and 24 states have some form of **energy efficiency resource standards**<sup>7</sup>;
- Nineteen states have **public benefit funds** (PBFs) supporting energy efficiency; 20 states have PBFs for renewable energy<sup>8</sup>;
- Eleven states have adopted the most recent **building energy codes** or more stringent codes in the residential sector (IECC 2009); 15 have done so in the commercial sector (ASHRAE 90.1-2007)<sup>9</sup>; and
- Forty-seven states have one or more **tax incentives** supporting renewable energy; 24 states have one or more tax incentives directed at energy efficiency.<sup>10</sup>

### ***ARRA Funding for Clean Energy***

ARRA increased the funding dedicated to the clean energy programs by as much as 20 times over typical annual federal appropriations and created entirely new programs. For instance, ARRA has provided over \$32 billion for direct spending on clean energy programs administered by the DOE and the Department of Housing and Urban Development (HUD). This funding has dramatically increased the total budget of existing programs, for example:

- State Energy Program (SEP) funds went from \$125 million in 2007<sup>11</sup> to \$3.1 billion (to be spent in three years) under ARRA (DOE); and
- Weatherization Assistance Program went from \$227 million<sup>12</sup> for 2008 to \$5 billion under ARRA (DOE).

ARRA also added new projects and funding avenues for clean energy programs:

- \$3.2 billion in Energy Efficiency and Conservation Block Grants (EECBG) (DOE);
- \$4.5 for Smart Grid and Grid Modernization (DOE);
- \$2 billion in advanced battery manufacturing grants (DOE);
- \$1.2 billion in energy efficiency and renewable energy research (DOE);
- \$300 million in energy efficient appliance rebates (DOE); and
- \$1 billion in the Public Housing Capital Fund to award competitive grants for renovation and energy conservation retrofits (HUD).

ARRA funding for clean energy is both a short-term and long-term driver of demand. The bulk of the funding has been obligated by the DOE to states and will need to be spent by February 2012. In addition, many states are looking to develop sustainable financing programs through their SEP and EECBG programs by creating revolving loan funds and by leveraging private sector monies. Those efforts will help recycle ARRA dollars and carry investments and demand for clean energy workers into the future.

### ***Need for Qualified Clean Energy Workers to Meet Current and Future Demands***

The clean energy industry is currently struggling with a shortage of qualified workers to design, install, operate, and maintain an assortment of machinery, equipment, and devices and it is expected to face growing demand in the coming years. The shortage exists for both existing occupations that are transforming via retraining (e.g., electricians retrofitting buildings for energy efficiency, machine operators crafting wind turbine components, and technicians maintaining them) and emerging occupations that require a new range of skill sets and training (e.g., home energy raters, energy auditors, and solar panel installers).

Several studies point to the current and expected near-term shortages. A recent survey of clean energy business in **California**, which found that 71 percent of respondents had trouble recruiting employees with adequate skills and experience,<sup>13</sup> demonstrates the shortage already evident in many states, particularly in places where demand has been building over many years. In a national survey of the energy industry, 72 percent of energy professionals reported that the energy efficiency and renewable energy sectors will face a shortage of qualified workers in the next five years.<sup>14</sup> The electric power industry faces a wave of “baby boomer” retirements in the next decade, with one-third of the current 400,000 electric power jobs becoming vacant by 2013,<sup>15</sup> a portion of which are tied to clean energy technologies, such as smart grid, renewable energy, and advanced coal generation with carbon capture and storage.

In addition, the demand for a well-trained clean energy workforce is projected to grow significantly in the coming decades. A recent study by the Lawrence Berkeley National Laboratory (LBNL) found that the workforce in the energy efficiency sector could reach from a 220,000 person-year equivalent (PYE) in a low-growth scenario to a 380,000 PYE in a high growth scenario in 2020. This would represent a two- to four-fold increase in the size of the energy efficiency sector from 2008, and does not account for future climate legislation or national energy efficiency standards.<sup>16</sup> A study by the American Solar Energy Society (ASES), which included a broader definition of clean energy occupations, estimated that the renewable energy and energy efficiency sectors combined could reach 16.3 million jobs by 2030. This compares to 9 million jobs in 2007, and assumes no new federal-level clean energy policy initiatives.<sup>17</sup>

#### ***Opportunity Provided by ARRA Funding for Clean Energy Workforce***

To help meet the needs in the short and long term, ARRA has provided a specific boost for state efforts to develop clean energy workforce and training programs. The DOE has provided up to \$100 million for smart grid workforce training. The Department of Labor (DOL) allotted \$500 million for research, labor exchange, and job training projects that prepare workers for careers in energy efficiency and renewable energy. These funds are being allocated through Green Jobs Act grants in five categories:

- \$190 million for State Energy Sector Partnerships and Training Grants;
- \$100 million for Energy Training Partnership Grants;
- \$150 million for Pathways Out of Poverty;
- \$50 million for State Labor Market Information Improvement; and
- \$5 million for Green Capacity Building Grants.

All the funding in the five categories of grants has been awarded by the DOL to the states and has to be spent within a specific deadline, ranging from November 2010 to January 2013. For instance, the State Energy Sector Partnerships and Training Grants have to be spent by January 2013; Energy Training Partnership Grants by January 2012; Pathways Out of Poverty by January 2012; State Labor Market Information Improvement by May 2011; and Green Capacity Building Grants by November 2010.

In addition, states can use a portion of the funding dedicated to clean energy, described previously, for clean energy workforce training. The State Energy Programs (SEP), supported by ARRA funds, include clean energy workforce training as one of their programmatic activities. Of the total \$3.1 billion in DOE SEP grants, 25 states allocated a total of nearly \$43 million toward energy efficiency workforce development.<sup>18</sup> States also are using a portion of their Weatherization Assistance Program (WAP) funding for clean energy workforce training. For instance,

**Delaware** has allocated \$2.4 million out of its \$13.7 million weatherization funding toward workforce training and technical assistance.<sup>19</sup> **New Jersey** has allocated \$22.8 million for training and technical assistance out of its \$118.8 million in WAP funding.<sup>20</sup>

### **Challenges**

Several barriers are responsible for the shortage of a skilled clean energy workforce, including:

- Lack of training and certification programs to provide education and to standardize skills across industries;
- Lack of communication and coordination among stakeholders; and
- Lack of available data and tools to identify types of jobs needed and gaps in workforce training efforts.

#### ***Lack of Training and Certification Programs to Provide Education and Standardize Skills***

Training a skilled clean energy workforce requires the availability of curricula across a multitude of occupations. It also requires sufficient number of training and certification providers such as community colleges, technical/vocation schools, and universities with enough courses targeting the clean energy sector. While recent efforts have begun to address these needs, many states face shortages in one or both areas.

For example, a study in the state of **Washington** found that there are few postsecondary programs or courses specifically designed for the renewable energy sector. Vocational programs and applied technical courses in secondary schools and some colleges preparing students for careers in the energy industry also have been consolidated or eliminated over the years, creating a gap in training.<sup>21</sup> Another study of the energy efficiency sector found that most courses offered by community colleges and technical schools and through union apprenticeship training programs lack a specific focus on energy efficiency and do not meet the demand for energy efficiency-specific training. Out of 492 education and training programs, this study could identify only 43 educational organizations offering a certificate or degree program directly related to energy efficiency or at least two energy efficiency-related courses and energy efficiency training organizations offering explicit energy efficiency courses or programs.<sup>22</sup> Furthermore, employers in the residential energy efficiency industry have expressed concerns that existing training programs in many community colleges do not have the capability and resources to combine classroom and lab training with field training, producing graduates with limited practical experience and hands-on training.<sup>23</sup>

The lack of quality training and certification is exacerbated by the diversity of industries and jobs that can be classified as part of the clean energy economy. The text box on this page, which lists over 50 occupations in just three clean energy areas, illustrates this point.<sup>24 25 26</sup> The industry's workforce needs are thus varied, and many academic and workforce training institutions may not be fully aware of the diverse industry needs specific to their state.

### ***Lack of Communication and Coordination Among Stakeholders***

Active communication and coordination among clean energy workforce stakeholders are critical to linking the demands of the clean energy sector with the available supply of workers. Historically, many workforce development programs have struggled to incorporate robust stakeholder input into their plans and thus have strained to identify current and future labor shortages and design training curricula to accurately meet industry needs. Clean energy, as a relatively new sector, adds a whole set of new players (e.g., in state government, the private sector, and non-profits) that states need to consult. The diversity of clean energy workforce stakeholders, which includes government at all levels, community partners, industry, educational institutions, and unions, exacerbates the challenge of effective communication and coordination and can lead to duplicate trainings or failure to provide comprehensive training covering the key skills that workers will need. The Task Force on America's Future Energy Jobs, a group of companies, labor organizations, and education and training institutions convened by the National Commission on Energy Policy, has cited the lack of communication among stakeholder groups, especially between the electric power sector and training institutions, a key challenge in building a steady supply of trained energy workers.<sup>27</sup>

### ***Lack of Available Data and Tools to Identify Types of Jobs Needed and Gaps in Workforce Training Efforts***

There is a lack of available data and tools to measure the need for clean energy workers and to assess where the greatest need for clean energy projects will be located geographically. Several states have commissioned reports or sought grant money to study the best way to develop their clean energy sector. Limited knowledge exists about what types of jobs are needed, where job demands will be in the future, the education and skill requirements of those jobs, and the related curriculum development needs. In order for states to develop effective clean energy workforce programs, they need to compile information about where clean energy jobs will be located and what skills will be needed for those positions. These assessments need to start with a careful analysis of states' existing capabilities, strengths, and the opportunities to build on those.

### **Clean Energy Jobs**

*Clean energy jobs include a variety of new and existing skills across multiple sectors. Below is a list of occupations in three leading clean energy sectors:*

**Energy Efficiency:** Construction laborers, sheet metal workers, installation workers (floor, ceiling, wall), concrete masons and concrete finishers, heating, air conditioning and refrigeration mechanics and installers, hazardous materials removal workers, carpenters, plumbers, pipefitters and steamfitters, electricians, boilermakers, energy field auditors, home energy rating specialists, building analysts, building performance contractors, building envelope specialists, and weatherization auditors.

### **Renewable Energy**

Team assemblers, solar/wind electrical engineers, solar photovoltaic installers, solar thermal technicians, solar installation managers, project foreman, solar designers, solar engineers, electricians, technicians, plant operators, pipefitters, lineworkers, ironworkers, boilermakers, millwrights, stock and material movers, computer-controlled machine tool operators, machine setters, customer service representatives, production, planning and expediting clerks, machinists, maintenance and repair workers.

### **Smart Grid**

Utility management positions of smart grid programs (project office leadership, program support, quality assurance, planning, functional support, implementation operations and support, functional specialists), meter installers and service providers, intelligent Transmission and Distribution (T&D) automation device producers, communications system products and services providers, and software system providers and integrators.

## State Strategies on Workforce Development and Training Using ARRA Funding

With the help of ARRA funding, states are creating and ramping up workforce development and training programs to support the growth of the clean energy sector. Many such efforts build on pre-ARRA efforts and include initiatives such as enacting green jobs legislation, establishing statewide working groups and taskforces, setting curricula development mandates, providing workforce training and job corps programs, and creating job training centers. The text box on this page shows examples of such efforts by several states.

With the infusion of ARRA dollars, states are looking to build upon existing programs and create new opportunities for developing a trained and ready clean energy workforce. States also are moving quickly to ramp up their clean energy workforce programs in response to the ARRA spending deadline of February 2012. Some of the leading strategies for developing clean energy workforce development programs using ARRA funding include:

- Developing statewide curricula and certification programs with community colleges;
- Coordinating state, local, and private sector workforce training efforts;
- Improving access to available training;
- Using data to assist clean energy workforce development; and
- Leveraging private sector funding to build larger, longer-term training programs.

### *Developing Statewide Curricula and Certification Programs with Community Colleges*

States are integrating clean energy workforce training into existing curricula and certification programs as well as developing new curricula and programs to meet the demands of the clean energy job market. These efforts often involve standardizing curricula and training materials to establish common credentials that can enhance the portability of training for workers and certainty of available skills for employers. Community colleges, with their connections to local and regional markets and their flexibility to respond to emerging industries, are playing an important role in preparing workers with the skills and competencies needed for clean energy industries. Vocational and technical schools and universities also can be partners in this effort.

### Examples of State Clean Energy Workforce Development Efforts

**Connecticut:** Executive Order establishing Blueprint for Green Collar Job Creation in 2009 to develop guidelines to train clean energy workforce.

**Colorado:** Green Jobs Working Group convened by the Governor's Energy Office in 2008 to begin discussions about clean energy workforce development. Led to legislation establishing the Green Jobs Colorado Advisory Council to administer the Green Jobs Colorado Training program and coordinate green job activities.

**Florida:** Legislation passed in 2008 requiring state universities to create a statewide workforce development initiative focused on college-level degrees, technical training, and public and commercial awareness of alternative energy.

**Michigan:** Michigan Green Jobs report released in 2009 surveying clean energy private sector jobs in the state to provide information on current job numbers and opportunities for growth.

**New York:** Clean Energy Industry report released in 2009 inventoried workforce training programs, characterized the clean energy labor market, and identified future needs. Green Jobs Green New York legislation passed in 2009 provided \$8 million for workforce development activities. Developed a network of 13 energy efficiency and 32 renewable energy learning centers in partnership with community colleges and vocational schools.

**Oregon:** Green Jobs Growth Plan 2011 to 2019 report (forthcoming) recommending the development of a sectoral approach for industry sectors with greatest potential for green jobs growth.

**Vermont:** Sustainable Jobs Fund created in 1995 providing early stage grant funding and technical assistance to businesses interested in developing jobs and markets in the clean energy sector.

**Washington** State’s Center of Excellence for Energy Technology at Centralia College is coordinating community and technical college programs leading to clean energy careers. One of its projects, the Energy Industry Skill Standards, convenes the state’s public workforce system, labor unions, community and technical colleges, and employers to develop standards that will serve as technical benchmarks for entry into the clean energy sector. Because of the participation of all these stakeholders, colleges and unions across the state agree to develop curriculum and training that will reach those standards.

The **Colorado** Governor’s Energy Office (GEO) is partnering with two community colleges in developing eight weatherization certificate programs, delivering training through a combination of online, classroom, and field teaching methods, and utilizing a Web-based performance tracking system. The Colorado Weatherization Training Partnership program will train approximately 460 residents in various weatherization positions and create a certificate requirement for weatherization workers that will be used across the state. GEO is utilizing approximately \$1 million in ARRA DOE/SEP funding to support the effort. This program is one of nine programs totaling \$19 million, five of which are ARRA funded, focused on building a skilled clean energy workforce across the state. Colorado’s state agencies, non-profit organizations, and businesses have formed the Green Jobs Workforce Collaborative to coordinate these programs around four priority areas: business outreach and engagement, research, referral between grants and employers, and marketing.

The **West Virginia** Green-Collar Job Training Program has provided \$1 million from ARRA DOE/SEP funding to the state’s community and technical college system to develop curriculum and certification programs in four key energy areas: wind, solar, building performance, and energy codes. The curricula and certification programs will be adopted statewide.<sup>28</sup>

**North Carolina**, working in collaboration with its community college and university system, is using \$6.85 million from its ARRA DOE/SEP funding to develop a clean energy worker training program. The curricula will address current and projected workforce needs in sectors related to energy efficiency, renewable energy, and alternative fuels. The program will include regional training hubs as well as other on-site distance and immersive learning components. Another \$1 million in ARRA DOE/SEP is being used to provide continuing education to building inspectors in 100 counties to improve code implementation and enforcement.<sup>29</sup>

### ***Coordinating State, Local and Private Sector Workforce Training Efforts***

Partnerships among multiple stakeholders are critical to the development and rollout of effective clean energy workforce programs as they enable states to leverage and align existing workforce training efforts and help identify future industry needs. Each state will have a different mix of players, depending upon the industries and organizations active in the state and the population it is targeting. The DOL’s Energy Sector Partnership and Training Program emphasizes working through a cross-section of stakeholders including: state energy, workforce and economic agencies, energy efficiency and renewable energy businesses, educational organizations, labor and trades, and related non-profits. Each of these entities brings to the table its own knowledge, experience and resources to ensure a coordinated and regionally consistent approach to training workers for jobs in the clean energy sector, for instance:

- **State energy offices** provide information about clean energy projects in the state and where funding is being allocated, which can then be used to identify workforce training needs;
- **Employers and industry representatives** help identify current and future labor needs, design training curricula based on workforce needs, and hire people who successfully complete training;



- **Workforce Investment Boards (WIBs)** and their associated one-stop career centers serve as coordinating hubs by connecting people to jobs and to the skills necessary to secure a job. WIBs are comprised of public- and private-sector members who can provide strategic leadership on clean energy workforce development issues in their communities;
- **Community colleges** help develop courses and curricula that prepare workers to fill specific needs identified by clean energy industries;
- **Labor unions** connect participants to opportunities in union apprenticeship programs; and
- **Community-based and non-profit organizations** help recruit target population, identify participant needs and barriers to success, deliver training, and evaluate outcomes.

The **Arkansas** Energy Sector Partnership is creating a workforce training system with statewide input and outreach. Nine Regional Partnership Teams, comprising 10 local WIBs, non-profits, and energy efficiency and renewable energy industries, will determine the training needs in their areas, recruit participants, contract with training providers, work with the two-year colleges and apprenticeship programs to coordinate job placement, and assist with the rollout of the program around the state. Two energy centers of excellence are developing curricula and programs in energy efficient building, construction and retrofitting, renewable electric power, and energy efficiency assessment. The curricula will be used by the state's 22 two-year colleges and seven apprenticeship programs. The partnership is a broad coalition including representatives from the Department of Workforce Services, Arkansas Workforce Investment Board, Arkansas Economic Development Commission, Arkansas Association of Two-Year Colleges, Arkansas Apprenticeship Coalition, Arkansas State Office of Apprenticeship, Arkansas Department of Career Education, and the Regional Partnership Teams.<sup>30</sup> The Partnership received funding from DOL's State Energy Sector Partnership and Training Grant.

**Kentucky's** Workforce Investment Board (KWIB) is coordinating the identification and creation of energy and green job activities in the state. KWIB's efforts cover middle-skill workers in traditional occupations to highly skilled engineers with a four-year degree. Kentucky is thus focusing on programs for plumbers, pipefitters, and steamfitters focusing on green awareness and sustainable technologies; energy efficiency and renewable energy education for energy auditors/raters; training for smart grid technology installation and maintenance professionals; and a unique partnership between the Hopkinsville Community and Technical College in Kentucky and Austin Peay State University in **Tennessee** to provide training in chemical engineering technology fields in support of regional renewable energy industries. KWIB has appointed a 20-member Kentucky Energy Sector Partnership, a voluntary partnership of state, local, and private sector interests, to develop a statewide energy sector workforce development plan, provide oversight for the implementation of plan strategies, and integrate training initiatives. The program is using funding received from DOL's State Energy Sector Partnership and Training Grant.

**Connecticut's** Green Jobs Partnership program is working with industry organizations and various energy efficiency and renewable energy industry employers to create sustainable clean energy recruitment, training, placement, and retention activities. Each industry partner contributes differently, according to its member-base and technology needs. The Connecticut Business and Industry Association is promoting the Partnership training programs to its 10,000 members and conducting surveys to inform the Partnership about current and projected green skills and hiring needs of clean energy employers. The Connecticut Center for Advanced Technology, which promotes the development, manufacturing, and utilization of renewable energy and hydrogen/fuel cell technology, is advising the Partnership about the training and hiring needs of renewable energy, hydrogen, and fuel cell companies. Northeast Utilities is working with the partnership to identify and address the training needs driven by its planned \$110 million investment in smart grid technology and energy efficiency. In addition to clean energy

industry involvement, the Partnership also includes workforce development, economic development, education and training, non-profit, and labor organizations.<sup>31</sup> The program is funded through DOL's State Energy Sector Partnership and Training Grant.

**New Jersey's** Weatherization Training Consortium is a collaboration led by the Department of Labor and Workforce Development (LWD) that includes New Jersey Vocational Technical Schools, the Black Ministers Council of New Jersey, Laborers International Union of North America, Laborers Local Union 55, and state and county workforce agencies. The Consortium provides a 10-week training targeting unemployed and underemployed urban centers. Each member of the Consortium plays a specific role: The Black Ministers Council of New Jersey is leading outreach and recruiting; the Workforce Investment Boards is administering an entry test for Adult Basic Education once individuals have joined the program; the New Jersey Council of County Vocational-Technical Schools is providing a five-week basic skills re-orientation, life skills and job readiness training; and the New Jersey Building Laborers Training & Apprenticeship Fund is providing the weatherization vocation training in the last five weeks of the program. Once participants graduate, Laborers Local Union 55 assists with job placement, with help from the Black Ministers Council of New Jersey. The program is funded through a grant from the DOE to the New Jersey Department of Community Affairs (DCA). DCA provided a portion of the grant to LWD.

#### ***Improving Access to Available Training***

Workers and companies that recently have entered or seek to enter the clean energy marketplace often face financial and logistical barriers in accessing and participating in training programs. Clean energy workforce training can be prohibitively expensive, with certifications required by state programs costing hundreds or even thousands of dollars. In addition to the training costs, employed workers pursuing a career in the clean energy sector can find it difficult to commit significant amounts of time to participate in job training programs or attend programs with inflexible hours or limited training sites. In response, states are pursuing various strategies to make clean energy workforce training accessible. This includes providing financial support to workers who wish to pursue clean energy-related technical and professional training or retraining and offering courses at a variety of times and locations and in a variety of formats so that training is convenient and accessible to all targeted populations.

The **Kansas** State Energy Office (SEO) has several opportunities available for workers to lower the up-front costs of clean energy workforce training. The SEO is providing 100 scholarships to residents who want to receive training to become energy auditors and additional scholarships for workers with existing certifications from RESNET or the Building Performance Institute to attend supplemental training. In addition to scholarships, SEO has purchased equipment that new energy auditors can borrow or rent at a nominal fee from qualified energy auditor training institutions and other public agencies to minimize their startup costs.

**Ohio's** Energizing Careers Program, funded through DOL's State Energy Sector Partnership and Training Grants, is reimbursing the cost of training up to \$6,000 for full-time employees, with preferential project funding to companies located in the 44 Ohio counties affected by the restructuring of the automotive industry. The program assists companies that manufacture components for the solar, wind, and biomass industries.<sup>32</sup>

**Washington** has enhanced access to training by tailoring its workforce program to better meet the time, logistical, and specialized support needs of target populations. The state is using its State Energy Sector Partnership and Training Grants funding for training and job placement of approximately 4,700 individuals in three categories: workers in the construction industry who have been dislocated in the current economic downturn; workers currently employed in the industry but at risk of losing their jobs unless they can update their skills in energy efficiency; and at-risk youth, low-income adults, and people with disabilities. Participants in the first two groups receive

compressed training for industry-recognized certificates that enhance employability with a shorter time commitment and opportunities for distance and hybrid learning that they can access while remaining employed full-time. Participants in the third group receive career planning support, support for longer-term educational persistence, and support developing technical competencies in the clean energy sector.<sup>33</sup>

**Wyoming**, with the second lowest population density of any state and almost half of its recent population growth occurring in rural areas, is using a portion of its State Energy Sector Partnership and Training Grants towards mobile labs to provide weatherization and energy efficiency training to individuals in remote or rural areas. Three programs, offered by the Wyoming Electrical Joint Apprenticeship Training Committee (a union-supported apprenticeship program), Eastern Wyoming College (EWC), and Sheridan College are using mobile training labs that are equipped with computers, software, diagnostic equipment, and tool kits to offer training in remote areas.<sup>34</sup> The first program will train electricians to work on industrial wind turbines. The focus of EWC training is on green construction technology; solar panel and small residential wind turbine installation; and weatherization training for contractors and retailers. Sheridan College is providing energy efficient construction training to contractors at construction sites around the state. Training schedules for the mobile labs are being publicized through brochures and news releases to newspapers and broadcast media.

#### ***Using Data to Assist Clean Energy Workforce Development***

States need to improve the collection, management, and availability of workforce data for the clean energy sector to identify emerging workforce needs and facilitate future efforts to measure progress. States have started addressing some of these data gaps by developing websites that provide inventory of clean energy education and training programs at community and technical colleges. The Midwest Power Skills website, the result of a collaboration between **Iowa** Workforce Development, the Midwestern Governors Association, and the Global Midwest Community and Technical College Consortium, contains information from a number of Midwestern technical and community colleges about clean energy programs and courses. Iowa Workforce Development also has a website, “Iowa’s New Energy Economy,” which lists clean energy-related employment and training opportunities.

To assist states with their data efforts, the DOL provided \$48.8 million in State Labor Market Information Improvements Grants (SLMIIG) to 30 states to support the collection and dissemination of labor market information. States are using this funding for data collection and estimation activities related to clean energy industries, occupations, and skill requirements; data dissemination through various outreach strategies to inform job seekers, the public workforce system, education and training providers, and other organizations of the occupational skills and growing needs of the clean energy industries; and strategies for posting job openings to online job banks that will be highlighted for easy recognition as clean energy jobs by job seekers.<sup>35</sup>

Seven states, **Colorado, Iowa, Montana, Nebraska, South Dakota, Utah, and Wyoming**, have formed the Northern Plains and Rocky Mountain Consortium to improve the quality and availability of labor market information region-wide using SLMIIG funds. Through collaboration on employer surveys, the Consortium aims to acquire more information on the growing clean energy industries in the region and then disseminate the information more widely. Within this partnership, Wyoming is using its share of the ARRA DOL/SLMIIG funding to survey businesses to determine clean energy job trends, analyze skills requirements and salaries of clean energy jobs, develop informational brochures on clean energy jobs to distribute to dislocated workers, and conduct a statewide clean energy jobs conference.<sup>36</sup>

Other states, including **Alabama, Arizona, Florida, Georgia, Idaho, Kentucky, Minnesota, New Mexico, Pennsylvania,** and **Tennessee** are using SLMIIIG funding to undertake surveys of their businesses to gather information on clean energy jobs currently available and to identify short- and long-term training priorities to meet the needs of the clean energy sector. In addition to this effort, Idaho will survey educational institutions to gather data on courses and programs that result in clean energy certifications, licenses, and skills; New Mexico will deploy “Green Recovery Workstations” where job seekers at various community locations can access inventories of skills required for clean energy jobs, match those skills to occupations where their skills are transferrable, and explore clean energy educational opportunities at institutions throughout the state; and Tennessee will develop an online, self-service labor exchange module to assist and partner clean energy job seekers with employers.<sup>37</sup>

**Oregon** is using its SLMIIIG funding to take its clean energy workforce training to the next level by drilling down on occupational data. In 2009, the Oregon Employment Department completed a survey to count the number of green jobs in the state, determine what wages they were paid, understand what education and training was required to obtain them, and project the demand for those jobs in coming years. Results from the survey were published in *The Greening of Oregon’s Workforce: Jobs, Wages, and Training*. Building on the green jobs survey, Oregon is using the SLMIIIG funding to develop statewide green jobs career pathways roadmaps, carry out WorkKeys profiles of green jobs (to connect to the National Career Readiness Certificate), and enhance the state’s skills-based job matching system, iMatchSkills, for green job identification and reporting.

#### ***Leveraging Private Sector Funding to Build Larger, Longer-Term Training Programs***

Some states are using public-private partnerships to expand and build upon their existing clean energy workforce development programs. Leveraging private sector funding presents an opportunity to expand the impact of state programs and ensure the fiscal sustainability of the programs over a longer timeframe. This relatively new practice in the workforce training area, demonstrated in the experiences of **California** and **Michigan**, presents promising examples of how it can be done in other states.

The **California** Clean Energy Workforce Training Program (CEWTP) is leveraging a third of its total workforce training funding from the private sector. The program combines \$20 million in State Energy Program/ARRA funding with \$15 million from the California Energy Commission’s Alternative and Renewable Fuel and Vehicle Technology Program, \$12 million from the Public Interest Energy Research Program, \$5 million in EDD Workforce Investment Act funds, and over \$23 million in public-private partnership matching funds. The CEWTP is the largest state-sponsored green jobs training program in the nation with a \$75 million investment to train more than 20,000 new and transitioning workers for jobs in the clean energy sector. The program is a partnership between multiple state agencies (e.g., California Energy Commission, California Employment Development Department, and the Employment Training Panel) and the governor’s office, and is funding local Workforce Investment Boards (LWIB), community colleges, and non-profits to lead regional workforce training partnerships around the state.<sup>38</sup>

CEWTP has already awarded \$31 million to 48 LWIBs and community colleges to provide clean energy training programs.<sup>39</sup> These awardees in turn are leveraging funding and in-kind donations from various sources, including the private sector, to scale up their training programs:

- Long Beach City College is leveraging additional resources from Siemens USA, the City and Port of Long Beach, and the Pacific Gateway Workforce Investment Network. Siemens USA is offering internships for students to create on-the-job experience;

- The City of Richmond’s BUILD Green Careers Academy has received equipment and capital from the Chevron Corporation (\$400,000), Home Depot (\$40,000), and Pacific Gas & Electric (\$20,000) to help stretch program dollars to enhance sustainability of the program. It has trained 90 people thus far with a waiting list of over 200; and
- The South Bay Workforce Investment Board’s Gateways to Green Building Pre-Apprenticeship Program is partnering with the U.S. Green Building Council, Build It Green, the Association of Energy Engineers, and the Century Center for Economic Opportunity, which are providing trainers at a discounted rate to prepare workers for candidacy and entrance into apprenticeship programs.

The **Michigan** Academy for Green Mobility (MAGM) provides another example of leveraging private sector funding, in this case to train automobile engineers on next-generation hybrid and battery technologies. MAGM is a partnership between Michigan Department of Energy, Labor & Economic Growth (DELEG), the workforce development system, education and training providers, automotive manufacturing employers, and automotive suppliers (e.g., Chrysler, DENSO, Ford, General Motors, and Nissan). MAGM is administered by a governing board made up of six representatives from the private sector, four from the universities, and three from government workforce development and non-profits. Over 275 engineers have been trained through MAGM endorsed courses since August 2009. Michigan invested over \$500,000 from its Green Jobs Initiative to fully support the first 200 incumbent workers. Michigan Works! Agencies supported an additional 40 dislocated engineers, and is paying 50 percent of the training costs of additional incumbent workers. Industry employers matched the 50 percent contribution of the Michigan Works! Agencies. MAGM is also a partner in Michigan’s State Energy Sector Partnership Grant where \$1.7 million of the grant is dedicated to education and training for advanced energy storage. MAGM works closely with Michigan Technological University and Wayne State University in developing the curricula and imparting training to ensure they meet the requirements of the industry.

### **A Look Ahead**

Clean energy workforce development is a dynamic and challenging area and states, along with federal, local, and private players, are working to be responsive to the needs of the clean energy market and to better understand where they can receive the best bang for their buck. One area of future focus is the creation of nationally consistent standards for clean energy workforce training programs to help streamline training practices and certifications. The DOE and the National Renewable Energy Laboratory are developing voluntary national guidelines for workforce involved in residential energy efficiency retrofits. These guidelines will help establish nationally recognized work specifications and skill standards that trainers and certification providers can use to prepare workers for clean energy jobs. The guidelines will include four components: analyzing job tasks, defining minimum technical standards for making specific energy efficiency improvements, developing standard work specifications, and skill standards specifying the minimum knowledge, skills, and abilities a worker must possess.<sup>40</sup>

In addition to government-led efforts, there are other non-profit and private sector efforts to streamline requirements. The Building Performance Institute (BPI) also has established widely accepted industry standards for residential buildings and retrofit industry workers. BPI provides training through a network of training affiliate organizations, individual certifications (e.g., Building Analyst Certification, Building Envelope Certification), company accreditations, and quality assurance programs. BPI recently released standard work requirements for four new certifications: air sealing installer, air sealing crew lead, insulation installer, and insulation crew lead. Several states now require BPI certification for their clean energy programs. For example, the Home Performance with Energy Star programs in **New York, New Jersey, Oregon** and **Vermont** all require BPI-certified Building Analysts to conduct energy audits. In addition, the National Association of Manufacturers (NAM), along with The

Manufacturing Institute, has launched a new Manufacturing Skills Certification System that will train and certify entry-level workers in all sectors of manufacturing, including alternative energy and energy efficiency. Deployed through community colleges, individuals will earn National Career Readiness Certificates, equipping them with core foundational skills to begin careers in the manufacturing sector. These industry-led efforts can substantially aid state initiatives in training clean energy workers that includes industry-endorsed standards, common curriculum, and methods of teaching to ensure that workers in the clean energy sector have those skills.

As the pace of public and private investment in the clean energy sector grows, the demand for a skilled workforce will simultaneously increase. Many of the elements necessary for states to build a robust clean energy workforce already exist, and ARRA has provided a boost of funding so that states can strengthen their clean energy workforce training programs. As ARRA funding winds down, states will need to develop strategies to carry their efforts into the future.

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