

PREPARING THE AMERICAN WORKFORCE FOR A GREEN JOBS ECONOMY

**Testimony before the House Committee on Education and Labor,
Subcommittee on Workforce Protections
Hearing Entitled “Green Jobs and their Role in our Economic Recovery”
March 31, 2009
10:00 a.m., Rayburn House Office Building – Room 2175**

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INTRODUCTION

Good morning, Chairwoman Woolsey. My name is Kathy Krepcio and I am the Executive Director of the John J. Heldrich Center for Workforce Development at Rutgers, the State University of New Jersey. I am pleased to offer testimony today about preparing the nation's workforce for a 'greener energy' economy -- with a special focus on green collar jobs in the energy industry.

As one of the nation's leading university-based research and policy centers dedicated to the American workforce, the Heldrich Center believes that the emergence of a “green” economy will lead to a new generation of jobs -- as well as the eventual transformation of traditional occupations across many industry sectors.

As the United States makes its transition to a cleaner energy economy, state and national policy makers are working to identify the specific occupations and skills that workers must have to succeed in this emerging energy revolution. To assist them, Heldrich Center researchers recently produced a research brief to assist educators and others interested in training “green” workers in the skills employers are and will increasingly demand. This report, entitled *Preparing the Workforce for a Green Jobs Economy*, defines the types of entry level and middle-income “green jobs” that are most likely to grow, describes the factors driving the anticipated growth in different industries, and outlines strategies for training a 21st Century workforce with these relevant skills.

What is a Green Job?

Green jobs can be broadly defined as jobs that involve protecting wildlife or ecosystems, reducing pollution or waste, or reducing energy usage and lowering carbon emissions. Our research focused on the nation's energy industry, and in that vital sector green jobs will be concentrated in the energy efficiency (EE) sector, with growth also expected in the renewable energy (RE) sector.

The **Energy Efficiency sector** generally involves retrofitting residential and commercial buildings to use less energy, as well as developing and manufacturing products that save energy. Weatherization and building retrofits will likely provide the greatest number of green jobs -- at least in the short term. For residential weatherization, most jobs require low- to moderate-skills preparation. In commercial and industrial retrofitting, there is a wider range of educational and training needs. Common occupations in these areas include:

- Electricians
- Building Weatherization Occupations
- Heating/Air Conditioning Installers
- Electrical Engineers
- Carpenters, Carpenter Helpers
- Mechanical Engineers
- Construction Equipment Operators
- Cogeneration Construction and Operation
- Roofers
- Measurement and Verification Technicians
- Insulation Workers
- Energy Management Analysts
- Construction Managers
- Building Inspectors, Auditors

The Renewable Energy sector focuses on creating, installing, and maintaining technologies that generate energy from resources that are naturally replenished and generally do not emit the greenhouse gasses that contribute to global warming. Renewable Energies include wind, solar, geothermal, and hydropower.

While the majority of Renewable Energy occupations are now in manufacturing, there are also jobs associated with heavy construction and installation, and operations and maintenance. For example, in the wind energy sector, the occupations vary from entry-level construction laborers to advanced engineers. Sheet metal workers are needed in the production of wind turbines, and construction workers will build cogeneration units and work on upgrading the nation's electric grid.

For example, common occupations in **wind energy** include:

- Environmental, Energy Engineers
- Construction Equipment Operators
- Iron and Steel Workers
- Industrial Truck Drivers
- Sheet Metal Workers
- Industrial Production Managers
- Machinists, Millwrights
- Operators, Maintenance Technicians
- Electrical Equipment Assemblers

There is a widespread misconception that the vast majority of "green jobs" will be in the Renewable Energy area. In fact, most of the immediate job opportunities will be created in the Energy Efficiency sector as homes and businesses are retrofitted to use less energy,

and as manufacturers develop new energy-saving products. In terms of money saved, Energy Efficiency may be the cheapest 'alternative fuel' around.

A key point is that many Americans do not realize that most immediate green job openings will not be "new" occupations, but rather traditional occupations, some with a new layer of "green" skills, knowledge, and credentials. These green job workers will include construction workers, cost estimators, financial analysts, auditors, computer technicians, accountants, manufacturing workers, truck drivers, salespersons, scientists, engineers, and many others — as long as their jobs have something to do with energy conservation or increasing the supply of renewable or clean energy sources.

And, the main distinction between jobs in the Energy Efficiency and Renewable Energy sectors that is important for workforce and education professionals to understand has to do with the mix of occupations and employers in these sectors, and the green skills and certifications workers need to obtain these various jobs. (1)

While green job occupations will be found across all industries and at all levels of education, the largest number of green jobs in the nation's energy sector will be in occupations that require an apprenticeship, professional certificate, or one to two years of postsecondary education. For renewable and sustainable energy occupations, the distribution of required education and training preparation is more varied, and specific to the type of renewable energy.

As you know, the development of green jobs is receiving a significant boost from passage of the new Federal stimulus bill, the American Recovery and Reinvestment Act. Although the general direction of "green job" growth is clear, our research report *Preparing the Workforce for a Green Jobs Economy* stresses that the specific hiring and training needs of clean energy employers will vary significantly from state to state.

A significant challenge for education and training providers will be how to best prepare jobseekers with the right skills for the right jobs at the right time that meets emerging demand for workers in real time. To meet this challenge of getting the balance of skilled workers into jobs that exist, our researchers recommend that education and workforce professionals work closely and collaboratively with energy policy makers and energy employers to track the primary drivers of job growth -- that is, technology development, economic conditions and energy policy.

What Drives Growth in Green Jobs?

To understand what fundamentally drives growth in green jobs, and thus where best to invest education and training dollars, it is important to know that transformation to a new energy economy and thus growth in green jobs in the United States depend on three major drivers:

Technological Advances. Many energy efficiency and renewable energy technologies are more expensive than traditional fossil fuel technologies. As these technologies become less expensive, the market will adopt them faster. It is impossible to predict

which emerging technology — wind, solar, hydrogen — will dominate future energy markets and therefore employ future workers. It is much more likely that the nation's energy future will be a patchwork of many different clean energy resources.

Economic Conditions. Because Energy Efficiency and Renewable Energy technology is capital intensive, energy prices and the economy affect businesses' and consumers' willingness and ability to invest. Like many other industries, the current economic downturn has dried up credit for installers of renewable technologies, causing manufacturers to reduce their payrolls. As traditional fuel prices rose over the past few years, energy efficiency and renewable technologies became more economically viable. The decline in fuel prices lowers demand for alternatives.

Federal and State Energy Policy. Clean energy incentives (such as tax credits, rebates, or renewable energy certificate trading programs) and economic development initiatives can spur private-sector investment, particularly for risk-averse businesses. In general, public policies designed with a long-term goal in mind give businesses the signal they need for wide-scale investment in green energy and technologies.

Green Job Numbers: Myth or Real Math?

Green jobs are extremely difficult to quantify. There is no clearly defined federal government standard for counting green jobs, nor is there likely to be one, since there is no consensus today on what constitutes a green job.

Today, most green energy jobs are currently found in the Energy Efficiency sector. According to the American Solar Energy Society, in 2007 there were 3.75 million jobs in the Energy Efficiency area, and 218,000 jobs or about 5% of all green energy in the Renewable Energy area. (2) While today's renewable energy job numbers are smaller, it is predicted that they will constitute the faster growing jobs – most significantly because of public policy efforts to increase the degree of the nation's energy supply that comes from renewable sources.

Various industry associations and research organizations, however, have attempted to provide estimates of green jobs in order to offer a better understanding of the potential magnitude of jobs in the energy efficiency and renewable energy areas. But, these green job growth projections vary widely, owing to many factors – such as the ambiguity of green jobs, unknowns about future economic conditions and/or the pace of technological advances, the degree and types of federal and state public policies (including stimulus dollars) and their eventual impact on job creation, and whether economists are calculating direct and/or indirect jobs (like administrative or information technology staff) created by the green energy industry.

It remains to be seen if the stimulus package will create the promised 500,000 green jobs by the end of 2010, but it is certain that there will be enormous opportunities for workers with a wide range of education and skills. The ways in which the federal government and states spend the stimulus money will affect the number of jobs that are created by the

stimulus plan, as will the pace of the public and private sector's uptake of key energy efficiency and renewable energy incentives. Again, it is important that workforce stakeholders work closely with industry to provide knowledge and skills training, both traditional and green, that will be necessary to meet the new, emerging demand.

Where Will the Green Jobs Be?

Across the nation, the demand for energy efficiency jobs and competencies is likely to be quite similar — the majority of Energy Efficiency jobs are in the retrofitting of buildings.

However, the demand for Renewable Energy jobs and skills will vary by state, as other factors such as workforce strengths, natural resources and geography, infrastructure, and policy priorities also play a large role in where renewable energy industry is located.

Workforce Strengths. Since demand is fairly consistent for Energy Efficiency, all state or regional workforce agencies might consider preparing workers for retrofitting and weatherization occupations. Industry growth in the renewable energy sector will vary by state, with companies attracted to existing workforce capabilities, such as manufacturing skills, or states with a high number of skilled science and technology workers.

Natural Resources and Geography. Solar collection capacity is strongest in the southwest and in states like Florida and Texas. Wind strength and consistency needed for large turbine installations is found along the coasts and in the Great Plains states. Green jobs related to biofuels made from feedstock will dominate in the Midwest and in other agricultural states. U.S. Department of Energy maps and data for all renewable resources across the nation are located at www1.eere.energy.gov/maps_data/renewable_resources.html.

Infrastructure. In renewable energy manufacturing, a state's industrial capacity influences the location of alternative energy component manufacturers, which are more likely to locate in states with industrial facilities and networks already in place. And size matters: wind turbine blades can be up to 200 feet long and weigh 40 tons, so manufacturers need to locate close to where wind turbines will be constructed, and near water or rail, since some of the components are too large to transport by road.(3)

State, Regional, and Local Policy. In the absence of centralized, national, long-term energy strategies, several states are leading in Energy Efficiency and Renewable Energy development. By early 2009, 20 states had established various energy efficiency resource standards, which mandate efficiency levels through savings goals. At least 29 states have created renewable energy portfolio standards that charge utilities to supply consumers with a percentage of their energy from renewable sources. (4) The economic incentives attached to these energy targets or goals will play a powerful role in creating demand for workers. In addition, numerous states or regional associations have designated economic development initiatives for clean energy sectors.

For example, New Jersey, while not in the Sun Belt, has the second highest number of solar installations behind California (over 3,500 residential, commercial, and industrial installations) because of a strong rebate system put into place by policymakers to promote the growth of the solar industry in the state. (5) In addition, the large number of flat roofs on warehouses and big box retail stores provide the infrastructure for capturing the sun's energy.

Newton, Iowa is another example where geography, infrastructure, and economic development targets created green jobs. In November 2008, TPI Composites opened a 316,000 square foot wind turbine facility in this manufacturing town that was reeling from the loss of Maytag, which at one time employed one out of every five residents.(6) As a result of TPI Composites' new facility, 500 green jobs were created.

What Skills and Competencies are Green Energy Employers Seeking?

As noted earlier, green energy jobs will most likely be traditional jobs — construction workers, manufacturing production workers, accountants, scientists — many of which require a new, green layer of skills and knowledge.

Employers in the Energy Efficiency and Renewable Energy sectors interviewed for our research stressed that that workers applying for green jobs first need the basic skills and traditional competencies, degrees, and other recognized credentials associated with a particular job. “Green” competencies, where they are necessary, must be learned either in tandem with or after learning the core skills associated with a given occupation.

In the short term, not every green job will require particular green skills or certification. Manufacturing workers in a solar panel facility, for example, may not require anything more than the basic skills required of others working in advanced manufacturing environments. In the world of weatherization and installation and maintenance of Renewable Energy and Energy Efficiency technologies, standards for certification and training are highly variable, especially at the entry level. In some home weatherization programs run by local utilities, for example, entry-level workers may need little more than basic construction laborer or installation skills, such as an air sealer who caulks gaps in windows.

Standards embraced by employers or mandated by funding programs, however, often have implications for the training and certification needs of workers. Workers who obtain nationally recognized credentials associated with common standards for jobs in the Energy Efficiency and Renewable Energy sectors may have a better chance at obtaining a job even if the job does not require it. For example, a solar panel installer may prefer, but not require, that installers obtain a nationally recognized certification, such as a Photovoltaic Installer Certificate from the North American Board of Certified Energy Practitioners. Employers are the best and most up-to-date source of information on which certifications and levels of education are required for a particular green job.

In addition to certifications, employers stress that eventually broad sets of green knowledge, which cross many industries and occupations, will become increasingly important for job advancement, and may be considered basic knowledge in the future clean energy economy. These green concepts include:

- **Sustainability.** How ecological systems work and the conditions under which they can function well now and into the future, including a basic understanding of the interconnectedness of human activity and the natural world, the effects of energy consumption, waste disposal, and the effects chemicals and other manmade substances have on natural systems — from waterways to air quality and climate.
- **Green Technologies, Standards, and Processes.** Awareness of the policies, nationally recognized standards, equipment, and work practices that mitigate the environmental impacts of human activity, including energy use. From solar panels, to tax incentives, to weatherization and green manufacturing standards, many aspects of business and government are changing to enable the transition to a clean energy economy.
- **Life Cycle Analysis.** The environmental and economic effects of a product at every stage of its existence, from extraction of materials through production to disposal and beyond. According to employers, life cycle analysis is of great usefulness in showing the benefits of using green technologies to consumers.

What Can the Nation’s Workforce and Education Systems Do to Prepare Workers for Green Jobs in the Emerging Energy Economy?

The Energy Efficiency and Renewable Energy sectors are positioned to have a long-term transformative effect on the nation’s economy. If the promise of the green energy economy holds true, the nation will experience benefits in both combating climate change and helping to restore economic strength and employ a large number of workers in the United States.

In order to respond to the very complex and evolving energy industry needs, stakeholders must develop a coordinated, flexible workforce development infrastructure. Such systems, which formalize communication networks, articulation agreements, and other linkages among key stakeholders, will also position states and programs to be competitive for federal and foundation grants. To be effective, state agencies and other key stakeholders should explore the following strategies:

Use Federal and State Public Policy as a Roadmap

Develop “green jobs policy experts” in educational institutions and workforce development organizations who can create partnerships with employers, state environmental, energy, and economic development leaders to understand policy developments and to discern their likely effects on job growth in key areas of the energy economy and to identify potential employers. The Database of State Incentives for

Renewable Energy (www.dsireusa.org) provides detailed information on state renewable energy initiatives and provides a good starting point.

Build Partnerships with Employers and Labor Unions

Establish a green energy advisory council with the leaders of companies, utilities, and labor unions to create a strategic venue for interaction and an ongoing feedback mechanism that ensures training programs and curricula are driven by industry's priority workforce needs. Employers can identify demand for certifications, hiring and recruitment policies, and specific occupations, as well as which jobs will draw from labor unions.

Since labor unions and employers often provide significant amounts of training themselves, they can also provide needed guidance on key gaps that exist within the education and training system that need to be filled. This will assist states to build training systems that build upon and support employer and union-led efforts rather than coming into competition with them.

Develop a Green Jobs Workforce Collaborative or Green Jobs Talent Network

Encourage green job growth in states and effectively meet employer demand as it evolves, through forming a voluntary collaboration network around the green energy industry. This sector approach creates a coalition of educational institutions (from high school to university), workforce and economic development system stakeholders, labor and community-based organizations, green energy companies, and industry associations in order to provide and support a trained and job-ready workforce for green jobs.

The Los Angeles Infrastructure and Sustainable Jobs Collaborative offers an example of a talent network approach, bringing together public and private partners to provide a seamless training and education infrastructure for low-income residents to be trained for livable wage occupations within the utility industry. Partners include utilities, labor unions, high schools and vocational-technical schools, community colleges, and universities.

Through research and the development of the New Jersey TLD Talent Network (a collaborative workforce model for the transportation, logistics, and distribution industry), the John J. Heldrich Center for Workforce Development has identified key elements of effective talent networks. These include:

- **Identification of Assets.** Create an inventory of the public and private assets in states or regions to identify gaps and eliminate overlap. Map out existing training opportunities, including programs managed by employers, unions, community-based organizations, and educational institutions. Chart the funding streams available through various private and public entities to support green job growth and training efforts and look beyond traditional funding sources.
- **Cultivation of Career Pathways.** Support low-skilled, low-income workers to move into higher-skilled jobs that pay better wages through education and green jobs training. Ensure that training results in a nationally recognized credential. In addition,

states should focus on accreditation of training programs and on creating “stackable” credentials through articulation agreements. For example, Los Angeles developed the Green Careers Training Initiative (GCTI) in association with the Apollo Alliance and the city’s Green Retrofits program. Among GCTI’s goals are to create “green career ladders” in order to link low-income residents with union apprenticeship and community college training programs, as well as provide incumbent worker training. Such programs can provide means for worker advancement as well as lifelong learning opportunities.

- **Alignment of Green Jobs Workforce Training Efforts with Economic Development Initiatives.** Establish a connection between attracting green energy businesses and customized training and hiring and recruitment systems. In Georgia, Suniva, Inc. built a new manufacturing facility for silicon solar cells. Through a partnership with Gwinnett Technical College and Georgia Quick Start, the state’s free, customized workforce training program, Suniva is ramping up to its projected workforce of 100 jobs.
- **No Duplication of Training or Curricula.** Ensure that workers in multiple locations have access to training that is relevant to employers by developing mechanisms to share curricula that result in credentials that are in high demand by employers and are not otherwise available. Consider developing centralized training centers that provide students with the opportunity to get hands-on training using state-of-the art equipment, thus potentially conserving costs. For example, Florida’s Solar Energy Center receives \$3 million in operating funds from the University of Central Florida and provides continuing education programs in alternative energy technologies through a partnership of universities, community colleges, technical institutes, workforce agencies, and industries. Besides solar energy training, hands-on classes in home energy rater training, fuel cell technology, and disaster relief are taught at the center.

Conclusion

The Energy Efficiency and Renewable Energy industries have enormous potential to create new business and job opportunities for millions of American workers. The American Recovery and Reinvestment Act, the steady movement toward a clean energy economy, and the rising price of traditional fossil fuels are several of many factors that will determine how many jobs are ultimately produced in the green economy.

States and communities with innovative energy policies and coordinated workforce development systems aligned with employers will emerge as leaders in this new green economy. Stakeholders who wish to partake in the federal stimulus training funds for green jobs will need to be committed to preparing their workforce by building well coordinated, flexible strategic partnerships among industry, labor unions, community based organizations and educators.

All and all, green jobs employment and training efforts will be better poised to succeed by:

1. Tracking the effects of key drivers of energy sector job growth — technology, economic conditions, and public policy — on the real-time hiring needs of employers.
2. Creating a green jobs talent network to coordinate education and training with economic development efforts and the emerging workforce needs of employers.
3. Focusing education and training efforts on providing industry-recognized credentials where needed, developing career pathways for workers, and complementing — not duplicating or circumventing — employer and labor union-led training efforts.

We believe that taking these steps will enable state, regional, and/or local green jobs initiatives to build a more responsive, sustainable, flexible and coordinated workforce education infrastructure. An effective green jobs workforce strategy will produce multiple benefits, including ensuring that training leads workers to real job opportunities, helping businesses to be more competitive, and garnering federal green jobs training grants.

Thank you for this opportunity to testify and share these research findings from the Heldrich Center for Workforce Development.

Endnotes

1. Kate Galbraith, “Dark Days for Green Energy,” The New York Times, February 3, 2009.
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3. Jason Walsh and Sarah White, “Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy.”
4. Ibid.
5. James O’Neill, “New Jersey’s Largest Solar Field Planned,” NorthJersey.com, September 25, 2008 (accessed at: www.northjersey.com/environment/environmentnews/NJs_largest_solar_energy_field_planned.html).
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