

Building a Workforce of Solar Installers in the Northeast

By JANE M. WEISSMAN

As you walked down the cavernous hallway at the Convention Center in Long Beach, California last September, the line of people registering for the Solar Power 2007 conference was literally out the door and blocks long. Sessions were standing room only and the trade show was a crush of blue suits and Bluetooths. It was an amazing crowd of more than 12,000 investors and companies. Yes, that's 12,000 people at a solar conference. It makes one stand up and cheer. Volatile prices at the pumps, rising retail electric grid prices, creative state incentives, and confirmed proof of climate change all have made solar energy steady front-page news and a hot investment on the Street.

This heyday for solar markets translates into increasing availability of jobs at all levels, including manufacturing and distribution, design and engineering, sales and marketing, and installation and service. Accompanying these are jobs in traditional building trades, such as electrical, plumbing, and roofing.

In a 2007 American Solar Energy Society publication, *Renewable Energy and Energy Efficiency: Economic Driver for the 21st Century*, author Roger Bezdek reports that in 2006, there were 450,000 jobs in renewable energy throughout the country. The renewable energy industry was responsible for 196,000 direct jobs and another 256,000 jobs were attributed indirectly to the industry. The Solar Energy Industries Association predicts that by 2020, solar will be a \$15 billion industry employing 150,000 people. The U.S. Department of Energy estimates that accomplishing its Solar America Initiative by 2015 may require as many as 5,000 trained installers.

It is well documented that jobs in solar

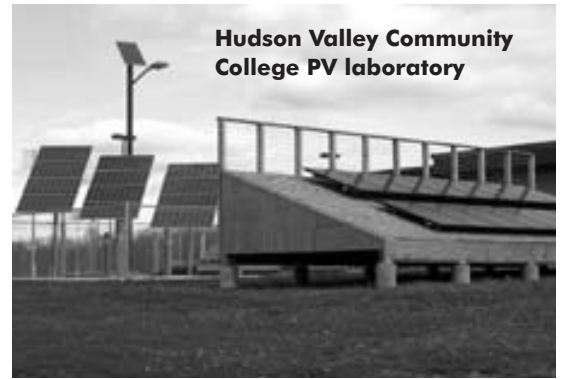


A team of professional solar installers

are on the rise. Now, the question on the front burner is how we make sure that there are qualified employees, especially competent installers. There can be market pull. Products can be on the shelf. But without a crew of crafted workers on the roofs, the solar energy potential could diminish, or, even worse, collapse.

The renewable energy industry is fortunate to have a number of first-rate

training centers—the Florida Solar Energy Center, Solar Energy International, the Midwest Renewable Energy Association, the North Carolina Solar Center, and the Great Lakes Renewable Energy Association. The dedicated programs at these centers have provided experienced instructors and well-trained students, but as the market grows, the workforce need is outstripping the training opportunities.



A solar installers' class at Ulster BOCES.

Training in the Northeast

Community colleges and technical schools are responding to the increasing demand for a skilled workforce by offering renewable energy courses. These courses range from stand-alone seminars, energy certificates, and associate degrees to customized training for business and industry. In response to the demand, classes are expanding from short workshops to semester-long courses. Some community colleges are also incorporating renewable and alternative energy technology into existing trade programs, such as construction, electrical, HVAC, and industrial maintenance trades.

In November 2005, Hudson Valley Community College, near Albany, opened a photovoltaic (PV) laboratory as part of its installation curriculum. Recently, Hudson Valley received state approval to offer a five-course, 19-credit certificate program in photovoltaic installation. This certificate, offered through the School of Engineering and Industrial Technologies, is part of its Electrical Construction and Maintenance Program.

Joseph Sarubbi, chairman of the Electrical Construction and Maintenance Department at Hudson Valley, says, "Hudson Valley Community College was origi-

nally unsure of the potential growth of the photovoltaic industry and decided to move cautiously towards training a workforce that didn't exceed demand. Our strategy was to supplement an already popular and successful Electrical Construction and Maintenance Associate's Degree Program by introducing photovoltaic courses as an additional load to students' schedules."

The College of Technology at the State University of New York at Delhi also offers photovoltaic training courses as an extension of its existing curriculum in Electrical Construction and Maintenance. This allows an individual who is qualified to work as an electrician the opportunity also to become skilled in PV installation. Delhi offers a for-credit introductory PV design and installation course as well as continuing education training for contractors and PV practitioners through short-term workshops.

In collaboration with Cape Cod Community College, Upper Cape Technical

School and Cape Cod Technical School in Massachusetts have implemented interdisciplinary classroom and lab activities in the environmental technology and construction trade programs. These programs focus on energy efficiency, conservation, and renewable energy. The real-world projects enable contextual learning and promote workplace readiness.

Currently, Cape Cod Community College is reaching out to other colleges in the state to share its success. Cape Cod, Greenfield, and Middlesex Community Colleges are now developing articulated courses and certificate programs, as well as exploring opportunities for associate degree programs.

The Center for Business and Technology at Springfield Technical Community College offers a 40-hour Photovoltaic Installer Certificate Program designed for architects, engineers, electricians, general contractors, and others interested in developing a career in photovoltaics.

Since March 2005, the Ulster County

Board of Cooperative Educational Services (BOCES) Adult Career Education Center in upstate New York delivers non-credit, solar energy training through its Photovoltaic Practitioner Institute.

SUNY Farmingdale's Solar Energy Center conducts a five-day workshop on "Installation and Maintenance of Residential Photovoltaic Grid-Connected Systems." Each workshop has a maximum enrollment of 25 participants.

The Center for Sustainable Energy at Bronx Community College offers two levels of photovoltaic installation training. The introductory course was first offered in December 2004 and the advanced workshop was added in April 2006. Each course is 20 hours.

The National Joint Apprenticeship and Training Committee's (NJATC) staff and training partners have delivered dozens of PV training programs over the past eight years at local Joint Apprenticeship and Training Committees (JATC) training centers. The NJATC is a joint program between the National Electrical Contractors Association (NECA) and the International Brotherhood of Electrical Workers (IBEW).

Many local JATC programs now provide apprenticeship and journeyman upgrade training on PV systems. More than 50 JATCs and IBEW locals have also installed PV systems on their facilities, including a 60-kW system at IBEW Local 363 in Harriman, New York, a 30-kW system at Local 263 in Latham, New York, and a 5.4-kW system at Local 103 in Dorchester, Massachusetts.

Jim Dunlop, a curriculum specialist at the NJATC, says, "With the debut of the NJATC PV curriculum and instructional resources, electrical apprentices in the NJATC/IBEW/NECA program will receive extensive classroom and hands-on training with photovoltaic systems and equipment at 280 local JATCs across North America. This national approach to standardized curriculum and training is intended to ensure a supply of highly skilled and competent journeymen electricians."

A National Model

Among the many states with workshops and training programs, New York provides a national model. Installer training is a top priority for the New York State Energy Research and Development Authority (NYSERDA). NYSERDA is supporting the development of an in-state network of training programs to provide accessible and quality instructional opportunities for those already in the renewable energy trades or planning to enter the profession. NYSERDA has invested nearly \$1 million in developing seven accredited solar training centers and continuing education programs across the state, partnering with SUNY Delhi, SUNY Farmingdale, Ulster County BOCES, Alfred University, Hudson Valley Community College, the City University of New York, and IBEW's local Joint Apprenticeship and Training Committees.

Raising the Bar for Installers

Since 2003, the North American Board of Certified Energy Practitioners (NABCEP) has been awarding professional credentials to renewable energy installers. Both the photovoltaic and solar thermal programs are based on strict, psychometric principles and credentialing guidelines. The

program is rigorous, requiring documentation of experience and/or training and the passing of a four-hour exam (administered twice a year).

NABCEP's competency standards for certification send a clear message to consumers and public officials that the industry is committed to high-quality, safe, and ethical business practices and high workmanship standards.

Joel Gordes, former executive vice president of the New York Solar Energy Industries Association and co-chair of NESEA's BuildingEnergy08 Conference, says, "A national certification program is absolutely essential if we are not to repeat the disastrous experience of the solar thermal industry in the 1970s and 1980s. Consumers must be confident that there are stringent, third-party national standards ensuring that qualified people are installing solar systems."

For students wanting to get into the solar photovoltaic field, NABCEP also offers an entry level Certificate of Knowledge. After taking a course from an approved provider and passing a national exam, this certificate attests that the recipient has achieved basic knowledge, comprehension, and application of the



Richard Gottlieb teaches an Introduction to Photovoltaics course at Greenfield Community College.

key terms and concepts of photovoltaic system operations. The certificate by itself does not qualify an individual to install PV systems, but it does prepare them to enter the field.

A number of colleges and schools in the Northeast offer NABCEP's Entry Level Certificate of Knowledge, including the Augusta Electrical Joint Apprenticeship and Training Committee, Bronx Community College, Cape Cod Community College, Cattaraugus BOCES, Greenfield Community College, Hudson Valley Community College, Kennebec Valley Community College, New Hampshire Community Technical College, Springfield Technical Community College, SUNY Farmingdale, Tri-City Joint Apprenticeship Training and Committee, and Ulster County BOCES.

Many colleges hire local industry experts and NABCEP-certified installers to teach courses. The lead instructor at SUNY Farmingdale's workshops is NABCEP-certified Gay Canough. Hudson Valley Community College has formed a partnership with Renewable Power Systems, a local PV installation company, to provide its students with practical hands-on PV training. One of the owners, Kevin Rose, is also NABCEP-certified. At Bronx Community College, instructors Jonathan Lane and Anthony Periera are NABCEP-certified. Richard Gottlieb, another NABCEP-certified installer, teaches at Ulster BOCES and at Greenfield Community College, and Chris Kilfoyle, also NABCEP-certified, teaches the PV Installer Certificate Program at Springfield Technical Community College.

Looking Ahead

With today's growing market, serious attention on workforce development is finally emerging. Many states are looking closely at the NYSERDA workforce model. Through its new PV Training Pilot, the Massachusetts Technology Collaborative will advance the development of self-sustaining photovoltaic installer training programs. Other states are also exploring ways of building in-state training capa-

New Text Books

Photovoltaics: Design and Installation Manual

Solar Energy International, 2007

This is an updated and revised textbook manual on how to design, install, and maintain a photovoltaic system. This manual offers an overview of photovoltaic electricity and a detailed description of PV system components, including PV modules, batteries, controllers, and inverters. Electrical loads are also addressed, including lighting systems, refrigeration, water pumping, tools, and appliances. The manual covers chapters on sizing photovoltaic systems, analyzing sites, and installing PV systems. The manual also includes detailed appendices on PV system maintenance, troubleshooting, and insolation data for over 300 sites around the world.

Photovoltaic Systems

National Joint Apprenticeship and Training Committee (NJATC) and American Technical Publishers, 2007

Developed in partnership with American Technical Publishers, the NJATC has written a textbook that covers the fundamentals, design, and installation of PV systems with emphasis on safe, code-compliant, and quality installations. The book covers the principles of photovoltaics and how to effectively incorporate PV systems into stand-alone or interconnected electrical systems. The content includes system advantages and disadvantages, site evaluation, component operation, system design and sizing, installation requirements, and recommended practices. Common scenarios and procedures are discussed throughout. Specified electrical requirements are in accordance with the 2005 edition of the National Electrical Code.

bilities. One way to learn about training in your area is to check with your state energy office and/or the organization that administers your state's clean energy fund.

On the national scene, certification and training is included in the Department of Energy's Solar America Initiative market transformation area. Section 604 in the new Energy Independence and Security Act of 2007 authorizes solar energy training through grants for curriculum development, internship programs, and other related activities. It is unknown at this time what level of funding will be appropriated. In the same energy bill, the Green Jobs Act was passed into law.

In mid March 2008, NYSERDA is sponsoring the second national workforce education conference focusing on instructional strategies, curricula development, best practices, and teaching models for a wide variety of renewable energy and energy efficiency jobs.

The training structure for PV installers, though reasonably well developed in the U.S., is currently limited. More local training is needed so that students can easily

find opportunities within a reasonable distance to where they work and live. As more solar energy training becomes available, training needs to be based on industry standards so that the right skills are taught using the right equipment. Training should address issues of safety and codes and include hands-on laboratories and on-the-roof experience. Instructors need to update their own knowledge in response to changes in the industry as new materials, techniques, codes, and standards emerge. Quality training is an essential cornerstone leading to a strong workforce, consumer acceptance, and sustainable markets.

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