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ENERGY PRACTITIONERS
BEFORE THE
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT
COMMITTEE ON SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
JUNE 19, 2007

Mr. Chairman, Representative Giffords, and Members of the Committee, thank you for the opportunity to appear before you today to discuss education and training programs to facilitate the adoption of solar energy technology.

I am the Executive Director of the Interstate Renewable Energy Council, a non profit organization working with state agencies, communities and industry across the country. Along with technical assistance, targeted outreach, promoting uniform guidelines and standards, and consumer protection, we focus on some of the current and often difficult issues facing expanded renewable energy use such as connecting small-scale renewables to the utility grid and developing quality assessment programs for renewable energy professionals, products and training programs. The Interstate Renewable Energy Council offers third-party verification of training programs and instructors using an application and audit assessment process based on standards developed by the Institute for Sustainable Power which is used internationally. This

framework of standards and metrics verify that training programs and instructors have met predetermined and consistent criteria. The Interstate Renewable Energy Council is celebrating its 25th anniversary this year.

I also serve as the Vice Chair of the North American Board of Certified Energy Practitioners, NABCEP, a national, non profit corporation offering professional credentials for renewable energy installers. NABCEP was started in 2002 with the first certification program for solar electric installers launched in 2003. To date, there are 365 certified solar electric installers from 40 states. Both the photovoltaic and solar thermal programs are based on strict, psychometric principles and credentialing guidelines. It is a rigorous process requiring documentation of experience and/or training and the passing of a 4-hour exam. NABCEP's competency standards for certification sends a clear message to consumers and public officials that the Industry stresses high quality, safe and ethical business practices and workmanship standards. The bar has been raised for professional services for the solar industry.

This is a perfect time to be talking about training and building a competent and strong workforce.

The solar industry reports that solar electric installations grew by over 20% in 2006. If the goals of the Photovoltaic Industry Road Map are met, total installed capacity could increase to 9,600 MW by 2015. Direct employment would increase from 20,000 now to 62,000 by 2015.ⁱ

The US Department of Energy estimates that as many as 5,000 trained installers may be needed by 2015 to accomplish their new Solar America Initiative.ⁱⁱ

A survey conducted by the investment bank Jefferies & Company in February 2007 said that among renewable energy sources, solar power is viewed as likely to contribute most to the world's primary energy supplies by 2020.ⁱⁱⁱ

According to a report released in March 2007 by Clean Edge, global clean-energy markets are ready to quadruple in the next decade, growing from \$55.4 billion in revenues in 2006 to more than \$226.5 billion by 2016 for four technologies -- biofuels, wind power, solar photovoltaics and the fuel cell and distributed hydrogen market.^{iv}

Add to these facts and market-based predictions rising retail electric grid prices, volatile pump prices, climate change, the increasing value of energy independence, and new and expanded state and federal policies. All of these influences are resulting in new “green-collar” jobs.

Training Trends

Over the years, the renewable energy industry has been fortunate to have a number of 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. These dedicated programs have provided us with experienced instructors and well-trained students. But as the market grows, so does the need for quality and accessible training opportunities.

We are starting to see encouraging trends.^v

- More and more Community Colleges and Technical Schools (high schools and private) are offering Renewable Energy Courses. These range from stand-alone courses, new energy certificates, associate degree programs, and customized training for business and industry.
- Classes are expanding from 3 to 5 day workshops to semester-long courses.

- Students range anywhere from 18-45 years of age. They may be existing college students in energy programs, other technology disciplines, existing trades people, those looking at changing careers or those who are currently working in the industry and are upgrading their skills and knowledge.
- Some Community Colleges are incorporating renewable and alternative energy technology into existing trade programs such as construction, electrical, Heating, Ventilation & Air Conditioning, and industrial maintenance trades programs.

In Eugene, Oregon, Lane Community College Energy Management Program offers a degree and certificate program with a concentration for Renewable Energy Technicians.^{vi}

Cape Cod Community College Construction Technology program was recently relocated under the umbrella of the Environmental/Renewable Energy Program. All of the Renewable Energy and Energy Efficiency courses will be electives for the Construction Tech program.

The curriculum at two technical high schools on Cape Cod in Massachusetts has been developed so that renewable energy is integrated into existing shops and academic areas with articulations at Cape Cod Community College.

In January 2006, Austin Community College and the Texas State Energy Conservation Office advertised the offering of a 48-hour, 14-week course in solar electricity. The class at Austin Community College sold out two weeks ahead of the official start date prompting Austin Community College to offer a second section for the 2006 winter semester.

In November 2005, Hudson Valley Community College in Troy, New York opened its photovoltaic laboratory providing students hands-on experience installing photovoltaic systems. The courses are included in the college's Electrical Construction and Maintenance program curriculum.

Madison Area Technical College's Consortium for Education in Renewable Energy Technology is a partnership among multiple institutions to share instructional resources and expertise. The curriculum is designed to supplement traditional degree and apprenticeship programs and serve the needs of workers and employers.

The Renewable Energy Diploma Series at North Carolina State University is structured so that intensive technology training covers not only the technical aspects but also the policy and business parts of the industry.

Through internship programs, students are gaining in-field, on-the-roof installation experiences in New York through the state and industry mentor/student program. The program is administered by the New York Solar Energy Industry Association and supported by the New York State Energy Research and Development Authority (NYSERDA).

And the National Joint Apprenticeship & Training Program, the training arm for the IBEW, offers its members and local unions quality training in photovoltaics. In fact, they just published a text book on Photovoltaic Systems, which is an important contribution to training around the country.

Question 1. Is there sufficient number of people trained and if not, is there a sufficient number of training programs?

If market past performance continues and current projections are realized, these emerging training opportunities fall far short of expected demand for qualified workers. The Solar Energy Industries Association predicts that direct employment could increase from 20,000 now to 62,000 by 2015. The US Department of Energy estimates that 5,000 trained installers could be needed to meet their goals. To date, we have just 365 certified solar electric installers and 40

certified solar thermal installers. While there are more installers who have not become NABCEP-certified, and while some of them hold licenses providing evidence of competency, there is still a growing demand for trained and qualified workers.

And, even though we are seeing more Community Colleges and other educational providers offer training programs and even with distance learning and web-based instructional opportunities, we need more classroom and hands-on training tailored to meet local labor needs. We need to see alliances developed and advisory committees established between training centers and local business and industry. Curriculum needs to include real-world preparation for solar installers with field and laboratory experiences provided.

Question 2. Are such programs necessary or useful for prospective solar panel installers and consumers?

The programs described above are providing a critical service to support a strong and growing solar industry. However, their reach is limited and training opportunities need to be broadened.

As part of the Solar America Initiative (SAI), the DOE Solar Energy Technologies Program is analyzing the current situation to identify needs for the training and certification of photovoltaic system designers and installers. A task force has been convened to study and report on these issues.

As training programs are offered by a variety of educational providers, how do potential students know that they will be taught the skills and knowledge they will need to do a good job? Do the facilities include the right equipment and hardware for training? Are there procedures that ensure safety and safe practices? Are the programs managed in a fiscally responsible way?

Are the teachers qualified? These are some of the questions that come to mind as more courses are offered and enrollment increases.

While many states support 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 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 for those who are planning to enter the profession. To date, NYSERDA has invested nearly \$1,000,000 in developing seven accredited solar training centers and continuing education programs across the state, partnering with SUNY Delhi, SUNY Farmingdale, the Ulster County Board of Cooperative Educational Services (BOCES), Alfred University, Hudson Valley Community College, the City University of New York and local Joint Apprenticeship & Training Committees/IBEW.

The NYSERDA program is one to emulate and replicate as it serves as a proven model for future training programs.

Question 3. How can the quality of training programs be ensured?

Training needs to be based on industry standards so that students are taught the right skills with the right equipment.

The Interstate Renewable Energy Council, with input from industry and education subject matter experts, recommends the following guidelines for practitioner training:

- Training should be designed to provide educational, training, and skill development experiences that lead to defined workplace knowledge, skills, and abilities.

- Training should appropriately addresses issues of safety, codes, and core competencies of an industry-approved task or job analysis.
- Training should be taught in an atmosphere with appropriate facilities, tools, safe practices as well as administrative and managerial quality.
- Training should offer a formal and planned learning structure where the learner receives some sort of feedback and the learner's progress is monitored.
- Training should be taught under the administration of a legally registered entity.
- Training programs and learning objectives should be assessed and receive independent approval or accreditation.

Closing Remarks

The foundation is in place for training and developing a strong workforce. NABCEP's third-party verification and certification programs result in a means for consumers to identify qualified installers and encourage the development of a well-qualified workforce. NABCEP has set industry standards high...now we need to provide the training to meet these standards.

Mr. Chairman, Representative Giffords and members of the Committee, this concludes my prepared statement. I would be happy to take any questions.

ⁱ Our Solar Power Future. PV Energy Road Map. www.seia.org

ⁱⁱ DOE Solar America Initiative (SAI) Funding Opportunity Announcement, October 11, 2006. The goal of the SAI is to reduce the cost of solar photovoltaic technologies so that they become cost-competitive by 2015.

ⁱⁱⁱ March 7, 2007. RenewableEnergyAccess.com

^{iv} Clean Energy Trends 2007. Authors: Joel Makower, Ron Pernick and Clint Wilder, Clean Edge.

^v *Trends in Practitioner Training for the Renewable Energy Trades*. Weissman, J.M. and Laflin, K. Proceedings American Solar Energy Society Conference, July 2006, Denver, CO.

^{vi} *Workforce Education for Renewable Energy: Lessons Learned from a National Gathering of Educators*. Weissman, J.M., Ferranti, A. and Laflin, K. Proceedings American Solar Energy Society Conference, July 2007, Cleveland, OH.