

# Wanted: well-trained installers

If current growth scenarios for the US solar market hold true, the country will need an unprecedented 5,000 installers by 2015. The sector has to ensure that its installers are well-trained and work is underway in several organisations to provide the much-needed education and certification.

**T**he solar industry became notorious for leaving homeowners with leaky roofs and bone-chilling showers three decades ago during the United States' last green energy boom. »We blew it by allowing anyone to do the installations,« says Roger Ebbage, director of energy programmes for Lane Community College in Oregon, a two-year public institution, like most community colleges, that offers both academic and technical training courses to meet the needs of its local community. »They made mistakes. They didn't have the detailed solar background needed.«

Now, with the US solar market growing again – in 2007 by more than 80% for photovoltaics and over 50% for solar hot water – the industry needs to ensure that its installers are well-trained this time around, says Ebbage, who runs a nationally recognised solar training programme at the college.



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Not only this huge PV installation on the Oregon State Capitol Salem, USA, needs professional maintenance. With the US solar market growing again, the lack of well-trained installers becomes evident.

*Photo: SMA*



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Ryan LeBlanc, renewable instructor for the Solar Living Institute, California, wiring a PV combiner box. His institute trains hundreds of people a year to be advanced PV installers.

Photo: Solar Living



Inverter installation for a grid tied system in Sonoma County. The strongest need for ensuring solar systems are properly installed is in California, which is the biggest PV market in the U.S.

Photo: Ryan LeBlanc, Solar Living

To that end, the industry has undertaken a massive effort toward creating standards for training and certifying installers. The stakes are high. If current growth scenarios hold true, the country will need an unprecedented 5,000 installers by 2015, according to federal estimates. Given that both certified and uncertified installers number only in the hundreds now, the training effort has a long way to go in less than eight years.

»We all want to make sure this time around when solar energy systems are installed, they are done the right way. But the big question now is: Will we have enough installers in the out years?« says Glenn Strahs, a scientist in the Solar America Initiative (SAI), a U.S. Department of Energy programme designed to make solar energy cost-competitive with conventional electricity sources. The SAI is preparing for new photovoltaic installations that total an expected 5 to 10 GW<sub>p</sub> by 2015.

Currently, there are 365 PV installers and 40 solar thermal installers in 40 states who are certified by the New York-based North American Board of Certified Energy Practitioners (NABCEP), which offers a national voluntary certification programme. Statistics are not kept

on installers working without certification, but it is estimated to be only in the hundreds, according to Jane Weissman, executive director of the Interstate Renewable Energy Council (IREC), another key player which accredits programmes that train installers.

### California: big need for trainers

The strongest need for ensuring solar systems are properly installed is in California, which is the biggest PV market in the U.S. and the second largest solar thermal market in the U.S. behind Florida. »We have a big need for training a huge amount of demand and not nearly enough installers,« says Liz Merry, programme manager for the Northern California Solar Energy Association. The demand is driven in part by the California Solar Initiative (CSI), which aims to install 3,000 MW<sub>p</sub> of PV power to reduce peak demand (see *S&WE* 3/2007 page 118).

»People call regularly to our office, saying they're trying to find installers,« says Merry. »The industry is basically only six years old. There aren't that many people available who have enough experience to train the installers,« she says. Ryan LeBlanc, renewable instructor for the Solar Living Institute, California, agrees. »Finding qualified trainers is an interesting problem. I've worked with lots of people in the industry who know their stuff and are good contractors and install systems appropriately, but it takes a certain kind of personality to be a trainer.«

### Incentives for trainings

Finding and training installers is just one part of the challenge. There's also some disagreement about who should install solar systems and exactly what skills are crucial. Some argue that journeyman electricians and plumbers are best suited. »We want plumbers and electricians,« says Jon Miller, executive director of the Oregon Solar Energy Industries Association. »Training is definitely a big issue because it's essentially new technology in the solar electric and solar hot water industry. It's new technology for traditional journeyman plumbers and electricians. It's different equipment,« he says. For example, PV works off DC current, he says. And solar hot water involves glycol-based heat transfer fluids that run through the panel. »Getting electricians

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PV panel placement on the Lane campus – Lane Community College’s renewable energy programme trains about 10 to 12 students a year to be solar installers.

Photo: Lane Community College



and plumbers to transition to wanting to do solar is not easy and hasn't been easy,« adds Johnny Weiss, executive director of Solar Energy International, a 16-year-old educational nonprofit organisation. »In the grid connected market, the systems have to be installed to the electric code. Then you have to work with electricians. Absolutely. This is high voltage-electricity.«

In California, one of North America’s largest unions is trying to organise solar installers, saying that all installers should be certified electricians. But Sue Kateley, executive director of the California Solar Energy Industries Association (CALSEIA), says customers should be able to choose whether they want to do business with union or non-union solar companies: »What we’re working on is entry-level training. You need people who know ladder safety. They don’t have to be engineers, but skilled, sensible trades people. Electrical work is just one component of installing a solar system. If you think

of what you need, you’re crossing different skills. You need to know roofing. Electricians don’t normally do the kind of roof work that is typical for solar installers.«

The U.S. also needs some national leadership, says Weiss. »I think our national leaders should support the grassroots and regional training efforts,« he says. »I don’t think we need a new level of training bureaucracy on top. We need incentives at the federal and state level so the existing infrastructures can incorporate solar and renewable energy curriculum into the training process.« Community colleges could expand their training efforts, for example, he says.

For major PV installation companies like California-based Sunpower and Maryland-based Sunedison, there is no time to wait for government training incentives. With record demand for their product, the installers are doing their own training. So far, they have been able to keep up with demand. »It’s constrained, but

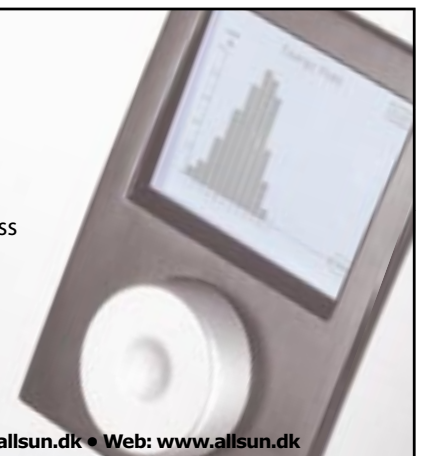


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manageable,« says Thomas Werner, Sunpower CEO. Adds Jigar Shah, chief strategy officer for Sun Edison: »We haven't found it difficult to find qualified installers for today. But we expect it to be difficult in the future.«

### Certification: record number of applicants

While the U.S. industry faces a number of challenges training workers to install PV and solar thermal systems in this expanding market, work is underway in several organisations to provide the much-needed education and certification. Perhaps the largest and most comprehensive approach comes from NABCEP, which is a voluntary national certification programme. Made up of renewable energy stakeholders from the industry, organisations, state government, schools, and the trades, the all-volunteer board offers a national certification for solar thermal and PV installers who have at least one year of experience and pass a national exam. The organisation does not train solar installers, but verifies skills learned elsewhere.

Applicants for NABCEP PV certification must complete one of seven prerequisite tracks laid out by the organisation. The tracks delineate what kind of experience the installer must have for certification and allows for trade-offs between classroom training and hands-on experience. For example, a PV installer with only two years' experience must complete a NABCEP-recognised training programme, while a PV installer with four year's experience can forego the classes.

Similarly, solar thermal installers have the option of eight prerequisite tracks. Only one year of experience is required if an applicant has a certain level of education or licensure, such as a four-year degree in engineering or two-year renewable energy technical degree. Licensed contractors in solar or construction-related areas also need only one year of experience for solar thermal certification. All of the applicants must take the written exam.

Word is clearly out that the job market is growing for solar installers: A record number of applicants sat for the spring 2007 NABCEP exam. That test resulted in 74 PV and 26 thermal newly certified installers, nearly a quarter of the total in the nation.

The written test is »very detailed and not a casual assessment«, says IREC's Weissman. To ensure students receive the necessary information and training for the test, IREC has taken on the task of reviewing and accrediting curriculums throughout the nation. »We make sure people who do the training – whether it's a private organisation, a community college, an industry group – are teaching the right skill set,« Weissman says.

Accreditation does not come easily. A programme must be in operation for one year before IREC will begin review, a process that can take up to another year. The New York-based organisation scrutinises curriculum based on international standards set by the Colorado-based Institute for Sustainable Power Quality (ISPQ). The programme must pass muster, not just based on curriculum, but also the financial standing of the teaching institution and safety of the training facility.



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A 4.5 kW<sub>p</sub> grid tied PV system installed by the US company Pure Power Solutions in a Healdsburg vineyard, California.

Photos (2): Ryan LeBlanc, Solar Living



Installation of an off-grid PV system in Lake County. The job market is growing for installers, numerous institutes provide training to meet the needs of the changing industry.

### Training programmes with waiting lists

So, far a handful of programmes have won accreditation. They are listed on the right. As enrollments in solar training programmes grow, with some schools reporting waiting lists, IREC is seeing an up tick in interest among institutions that want accreditation. The growing interest also became apparent late last year when the organisation sponsored a renewable energy workforce training conference, which drew a sell-out crowd of 200 people. Given its popularity, conference planners reserved a larger space for a second conference planned for March 2008 in Hudson, New York, with a 350-people limit, according to Weissman.

Meanwhile, the Solar Living Institute trains »hundreds« of people a year to be advanced PV installers, says LeBlanc. The Institute offers PV »boot camps« for beginning installers and electricians. In 2008, the institute will transform its two PV programmes into programmes that meet NABCEP guidelines. The first will prepare entry-level students to take the entry-level NABCEP test. The second will prepare more advanced students to become NABCEP-certified installers.

»In our classes, we get people from all over the country. There are definitely classes where it's 50-50 California and the rest of the country,« renewable instructor LeBlanc says. The institute has seen rapid growth in recent years, with the advent of grid-type systems, net metering, and rebate programmes for grid systems. »This has all changed the game« and increased the need for training, LeBlanc says. »Before this, we didn't have equipment designed to be grid-type. Now we do. Now we have all kinds of manufacturers and different inverter manufacturers.«

Also providing training to meet the needs of the changing industry is Solar Energy International (SEI). Much of SEI's work is geared toward training technicians to design and install working systems, says executive director Weiss. »A large base of our students are licensed plumbers and electricians who want to get into solar work,« he says. »We see a lot of trades people excited about renewable energy technologies. They have skills, equipment and competence, but there are extra things they need to learn.«

SEI teaches plumbers and electricians how to deal with batteries, solar panels and DC electricity, among other things, he says. SEI works with about 1,500 students a year, including homeowners, educators, marketing people – and electricians and plumbers. SEI for the first time has a waiting list for its PV class, he says. This year, SEI is offering about five solar thermal and 36 PV classes, says Kathy Fontaine, office manager for SEI. It recently added four new solar thermal classes in response to demand.

#### List of IREC's ISPO Accredited & Certified Awardees as of July 2007

Florida Solar Energy Center, Cocoa, Florida
Solar Energy International, Carbondale, Colorado
Midwest Renewable Energy Association, Custer, Wisconsin
State University of New York at Farmingdale, New York
State University of New York at Delhi, New York
North Carolina Solar Center, Raleigh, North Carolina
Sun Pirate, Cotati, California
Lane Community College, Eugene, Oregon

At the Solar Living Institute, demand has also been much higher for training in PV, says LeBlanc. About 98 percent of the students are trained to install PV systems, he adds. »Thermal systems aren't viewed as sexy technology,« he says. In addition, solar thermal systems developed a bad reputation in the 1980s because the government then dropped its rebates, forcing many solar companies out of business. This left most customers with solar thermal systems with no one to maintain them, he explains. »Anyone who is interested in solar goes to PV because there's more money and there are rebates,« LeBlanc says. However, he notes, solar thermal systems are much less expensive than PV, which makes them attractive. The number of solar thermal rebates – and the interest in installing solar thermal systems – is now increasing.

Adds Ebbage: »If utility scale wind power is excluded, the renewable energy industry is overwhelmingly PV. I think PV has gained favour because it's more elegant to create electricity using a technology that has no apparent moving parts and lasts 25 to 30 years than to create hot water with a pump and pressure technology that, in the minds of some, doesn't work in cloudy climate regions like the Northwest.« He notes that Lane Community College expects students to study both solar thermal and PV technologies.

In addition to well-established programmes like the Solar Living Institute's and SEI's, some new programmes are gearing up. The Silicon Valley Leadership Group is creating a Solar Center of Excellence, whose mission is to develop the foundations, standards and workforce that will enable the California industry to continue its rapid growth. One goal is to »create training programmes to fuel a sustainable workforce with curricula, certifications, and accreditation standards for work in the solar industry,« says the group's white paper, »Solartech«.

Already operating in California is a programme run by the Sacramento Public Utility District (SMUD) that now provides training to about 70 people from around the country. The programme has a waiting list. The publicly owned utility initiated the programme at the request of its board, which wants to see more solar installed in its own territory and in California, says Mike Keese, PV project manager for SMUD.

»One of our charges is to develop a self-sustaining solar industry that does quality installs. A 3-day workshop for advanced solar installers scheduled for September was overflowing with participants,« he says. SMUD's

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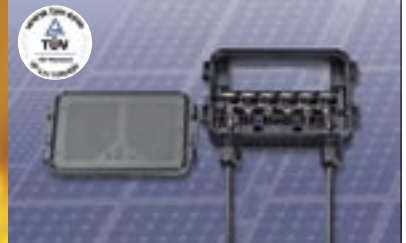
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Students of the Lane Community College are installing inverters on the Lane campus. The College based in Oregon expects students to study both solar thermal and PV technologies.

Photo: Lane Community College



workshops focus on issues such as how to design a system and address issues like shading, types of mounting systems, how to match PV modules to inverters. »Every solar panel has different operating specifications. Installers need to know how to put them together into a system to make them work with an inverter. They have to do it safely. This is way above entry-level electrical work.«

Not only does SMUD train installers; it also educates building inspectors. SMUD educates building inspectors about the electrical code, and how it pertains to solar installations. »It's hard for them to keep up and the technology is constantly changing. The code is constantly being updated,« he says.

Just to the north, in Oregon, Lane Community College runs a training programme as part of its associate degree of applied science degree. »The intent is to provide educated installers to the PV and solar thermal industry,« says Ebbage. The programme meets Oregon's licensing requirements, which are closely aligned with NABCEP certification requirements, Ebbage says. »For PV, you

need 4,000 hours of documented installation, hands-on experience. You need a sub-license on the PV side for electrical and also for plumbing side. You don't need to be a journeyman. To install electrical renewable energy systems, you only need to have a limited renewable energy technology license,« he explains. Ebbage would prefer to train journeyman electrician and plumbers as solar installers. »Journeyman can do any wiring on the planet. That means residential, commercial or heavy duty industrial.« They need 8,000 hours of hands-on experience, he adds. Lane Community College's renewable energy programme, which was launched in 2003, trains about 10 to 12 students a year to be solar installers. Right now there's a bottleneck getting students through the system, Ebbage says.

»To do hands-on work, you have to be trained by a training agent, someone certified by the joint apprentice training committee under a mandate from the state Bureau of Labor and Industries,« he says. However, right now there aren't enough trainers available to meet the demand.

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## Training fund: US\$ 1 million in New York

Given the large demand, states are beginning to channel funds toward some of the training programmes. About half of the states now have renewable portfolio standards – requirements that an increasing percentage of the state's power come from renewable energy each year. Meanwhile, Congress is debating creating a national standard.

New York is a model state in this regard, says IREC's Weissman, because it has created a US\$ 1 million grant programme for institutions that offer solar installation training. The money goes toward equipment, curriculum development, instructors and other necessary elements to make a strong programme. »Other states offer some very good training. But what makes New York so unique is that it's not just running different workshops and seminars, but is making sure schools can offer training on a regular basis,« she says. The New York State Energy and Research and Development Authority (NYSERDA), a state entity known nationally for its innovative support of green and distributed energy, handles the funds.

NYSERDA's thinking has evolved as it has worked in the training programme. Jeff Peterson, NYSEDA's programme manager for energy resources, says that initially the authority thought it would need to channel funds into scholarship money to attract students to the programmes. It quickly found out that was not necessary. »The feedback we're getting from the schools is that they have more demand for the classes than they have space. The desire to take these classes is very high.«

The interest appears to be driven not just by the job market, but by a broader interest in renewable energy that has emerged in the United States, particularly among younger people who often cite their support for green energy in polls. »It's exciting to people, so it's only natural that they want to pursue this,« Peterson says.

Given the industry's attention to training, and the eagerness within the population to learn the necessary skills, it appears likely that the solar industry will be spared the embarrassment of the first US green energy boom.

»That was such a black eye in the 70s and 80s. There was a tax credit and any guy or gal with a truck and ladder decided they could install this stuff,« Weissman says. »We don't want that to happen again. Now, the training and the infrastructure is much more sophisticated than it was 20-plus years ago. We've turned the corner.«

*Lisa Cohn, Elisa Wood*

Lisa Cohn and Elisa Wood are U.S.-based writers who specialise in energy issues. Visit them at [www.realenergywriters.com](http://www.realenergywriters.com)

### Further Information:

**California Solar Energy Industries Association (CALSEIA):**

[www.calseia.org](http://www.calseia.org)

**California Solar Initiative (CSI):**

[www.gosolarcalifornia.ca.gov/csi/index.html](http://www.gosolarcalifornia.ca.gov/csi/index.html)

**Florida Solar Energy Center:** [www.fsec.ucf.edu](http://www.fsec.ucf.edu)

**Institute for Sustainable Power Quality (ISPQ):** [www.ispq-central.com](http://www.ispq-central.com)

**Interstate Renewable Energy Council (IREC):** [www.irecusa.org](http://www.irecusa.org)

**Lane Community College:** [www.lanec.edu](http://www.lanec.edu)

**Midwest Renewable Energy Association:** [www.the-mrea.org](http://www.the-mrea.org)

**New York State Energy and Research and Development Authority (NYSERDA):** [www.nyserda.org](http://www.nyserda.org)

**North American Board of Certified Energy Practitioners (NABCEP):** [www.nabcep.org](http://www.nabcep.org)

**North Carolina Solar Center:** [www.ncsc.ncsu.edu](http://www.ncsc.ncsu.edu)

**Northern California Solar Energy Association:** [www.norcalsolar.org](http://www.norcalsolar.org)

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**Sacramento Public Utility District (SMUD):** [www.smud.org](http://www.smud.org)

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**Solar America Initiative (SAI):**

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**Solar Energy Industries Association (SEIA):** [www.seia.org](http://www.seia.org)

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**Solar Living Institute:** [www.solarliving.org](http://www.solarliving.org)

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