CHARTING YOUR SOLAR COURSE

Courtesy www.sanjuancollege.edu

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Looking to break into the solar biz? Even in these challenging economic times, there are jobs to be had in this growing market, and with government funds and decreasing costs fueling new projects and green job training, the time is right to make your move. With a little know-how, the right training, and a sunny disposition, you can be on a new, green career path.

Finding Your Path

The first step is to find the job you would like in the solar energy industry. Research the various careers and which skills are required. A good place to start is the online help-wanted ads. The job descriptions posted on job search and company Web sites will help you determine what skills and credentials are needed for specific jobs. Social networking Web sites, like Facebook and LinkedIn, are excellent resources as well. You can connect with professionals in the field who might be willing to share their experiences and answer your questions.

While much of this article discusses installation and system design training, there are many specialties within the solar industry to consider. What path you choose depends on what skills you have—and what skills you're willing to learn. Opportunities are plentiful in associated fields as well—most notably energy efficiency, energy management, and building sciences. But even if you're not tech-savvy or interested in field work, you can still find a job in solar energy. The industry depends upon an ever-growing nontechnical workforce, with jobs ranging from truck drivers and warehouse managers to accountants and staffers in human resources and public relations.

The Installer Path

Decades ago, besides know-how, all you needed to do PV installation work was a working knowledge of electricity and a truck. There was little oversight or regulation. The *National Electrical Code* didn't even include PV systems until 1983—the birth year of solar's Section 690.

Long gone are the days of learning by trial and error on the job. The majority of solar industry jobs now require specialized training and, in some cases, a trade license, apprenticeship time, and certification. Fortunately, there is no shortage of training options. With more than $500 million in funds from the Economic Stimulus Act and other governmental grants earmarked for green job training, more options are coming. However, some new training companies are making misleading claims about the quality of their training and trainers, making it more important than ever for you to do your homework before signing up.

The level of training you require depends on your ultimate objective, your current skills, and any local requirements. Before you select your training program, be sure to consider the education and credentials required by your local jurisdiction to work legally and to qualify your customers' systems for incentives.

If you are an electrician wanting to incorporate PV installation into your business or a roofer interested in learning the hardware for mounting on roofs, then hands-on training, such as assembling a working system, is essential. If you are an engineer, advanced-level classes—for example, those covering in-depth, PV-specific *NEC* issues—will aid

your move into design work or manufacturing. If you are fresh out of high school or making a dramatic career change, an engineering degree may be the foundation you need to get a job as a PV system designer.

Even if you wish to get an office job at a solar energy company—say as an administrative assistant, accountant, or office manager—having some technical background will be helpful. Adding a few online courses to your résumé may differentiate you from other job candidates, and a basic understanding of the technology will help you do your job more effectively.

Weighing Your Options

With the increased national interest in the solar industry, more schools and organizations are developing solar training programs and curricula. To find the program that best suits your needs, the "Schools/Organizations Offering PV Education" table starting on page 40 provides information for more than 150 solar education providers, from RE-specific training centers to university programs. But first it's helpful to examine the pros and cons of various training options.

On-Site Workshops & Programs. An increasing number of organizations and companies offer renewable energy classroom workshops and programs—ranging from a few days to several weeks. While most include hands-on training, some use lectures and textbooks exclusively. Programs can be short, intensive weeklong courses or months-long courses through a college or trade school. The important thing to remember is that full training takes time and dedication—learning to install a safe, reliable, code-compliant system takes much more than a five-day course.

The most popular courses—and the ones with the longest waiting lists—are those that offer a balance of hands-on and book learning, and let you work individually or in groups to assemble (and sometimes install) a working system.

Compared to online courses, one advantage of on-site learning is the face-to-face interaction with instructors and other students—and the networking that naturally occurs and may lead to future jobs. Programs that offer hands-on learning allow students to work with and install system components in a supervised setting, adding to and solidifying concepts learned during lectures.

Most of these programs are open to anyone who has the desire to learn. If you can pay the workshop fee and you're willing to travel to the site, then you're in. Fees—which can vary from a couple hundred to several thousand dollars—and related travel expenses may be too costly for some, as most programs do not offer financial aid and require time off from work.

Many programs are not generally accredited through an organization recognized by the U.S. Department of Education, and therefore cannot be taken for college credit. However, they may have accreditation from ISPQ (see "Quality Control & RE

Assessing Your Solar Self

Whether you're selecting your first career or making a career change, do a thorough self-assessment to determine what RE job is most suitable for you and what skills you'll need to learn. The clearer you can be about your current skill set and the direction you want to go, the easier it will be to choose the most appropriate training route.

Determine your transferable skills. Dissect each job you've held and any life experiences you've had (volunteer work, hobbies, sports, etc.) to determine what skills you've accrued. Chances are, even if you're entering the work force for the first time, you have some skills that will transfer to a job in solar energy. An information technology specialization or knowing how to do Web site coding, for example, might be useful in the design of data-monitoring systems.

Gauge your interests. Be realistic about your likes and dislikes regarding various activities. If you do not like heights, then becoming a PV system installer is probably not the best vocation for you. Roofers, already familiar with waterproofing and fall protection, typically make excellent candidates for installation of PV modules and mounts. If you're detail-oriented by nature, then you might find your calling as a project manager or an energy efficiency auditor.

Consider your priorities. Take an inventory of the job characteristics that are most important to you—autonomy, security, interpersonal relations, helping others, work schedule, salary, and work environment. Your personal preferences will help you narrow job options and focus on your most appropriate opportunities.

Courtesy Maria O'Farrell

If installing renewable energy systems is your career path, hands-on experience is critical to your future success in the field. This type of training is also helpful for those looking to apply concepts learned in the classroom.

Education" sidebar on page 47). Most offer a certificate of completion. These certificates should not be confused with industry-recognized certifications, such as that offered by the North American Board of Certified Energy Practitioners (NABCEP). Some of these programs meet criteria set by NABCEP and may fulfill educational requirements needed to qualify for taking the NABCEP exam, and/or qualify as continuing education credits required to maintain NABCEP certification.

Depending on your background and existing skill set, attending a workshop or two may get your foot in the door with a solar company, but you'll likely need to pursue some level of certification or additional credentials if you're serious about making a career in the industry.

Courtesy Maria O'Farrell

On-site workshops and courses typically devote significant time to classroom learning, studying RE system concepts before students head into the lab yard for hands-on training.

Online Courses. Many well-established training centers now offer online courses, which generally run from four weeks to several months. The curricula is usually the same as the classroom courses offered by the same provider, but without the on-site group dynamic or hands-on opportunities. Instructors are available for questions, and communication is usually via e-mail and message boards. However, responses can take anywhere from minutes to days, depending on the number of students in the course and message timing.

Students can interact and pose online questions, but they complete lessons and perform classroom exercises, quizzes, and homework on their own, which can be an advantage compared to group settings, since instructors can gauge each student's level of understanding independently. A key benefit of online education is the lack of geographical constraints: All you need is an Internet connection. If there are no solar workshops offered in your area, you can still participate in RE training courses via distance learning. Online courses also offer greater flexibility and convenience for people who work or have families. The slower, self-paced schedule can be both a blessing and a curse, allowing students to retain and synthesize the information but requiring a fair amount of self-discipline to stay focused.

Online courses are a good way to prepare for a basic, hands-on course, but they also can be a good way to recap, or expand upon, material learned in a hands-on course or workshop.

Community colleges offer a variety of certificate, degree, and continuing education programs to train technicians for careers in manufacturing, maintenance, and installation of RE systems. Many programs have good reputations, and unlike RE training centers, tend to have more support for students, like financial aid and career counseling. Classes can accommodate part-time and working students, and most credits are transferable to four-year colleges offering bachelor's degrees and higher. Plus, tuition costs are considerably less compared to four-year schools. Like other RE training programs, those at community colleges are in high demand and often have long wait lists.

A two-year associate's degree could be a good fit for newcomers to the solar work force who might benefit from having a degree or for individuals wanting to shift their career in an entirely new direction. Two-year programs can include hands-on shop time—and internships spent working side-by-side with trained technicians in the field. Having a degree tends to carry a bit more weight when it comes time to apply for certain jobs and garner higher starting salaries.

Solar Training at Energy Fairs & Conferences

National solar event organizers know their venues are the perfect time to offer training opportunities, and attendees can take maximum advantage of their time away from work. Training can be as short as hour-long seminars on specific solar topics during an energy fair to full pre-event workshops ranging from several days to a week. These trainings can help get folks up to speed on different solar topics before they attend the solar event—or they can offer learning opportunities for those wanting to start solar businesses. For individuals already in the biz, NABCEP continuing education credits are offered through new product training and technical updates. One example is the upcoming "Solar Success" training to be held before the 2010 ASES National Conference (see www.solar-success.org for more information).

Certificate vs. Certification?

Earning NABCEP's entry-level certificate should not be confused with NABCEP professional certification. An entry-level certificate demonstrates that the certificate holder has gained a fundamental knowledge of PV systems suitable for a supervised, entry-level position with a dealer/installer or other PV company. While this is a benchmark to strive for in your own training, it is *not* a sufficient qualification for an installation training provider or self-employed installer.

You may spend some of your time completing general education requirements for a more rounded education, and find that required classes are offered infrequently (i.e., every other semester). Smaller class sizes can mean more personal attention from your instructor and more time with the equipment, but it also means there are fewer spots available, which may make it harder to get classes you need.

Some people appreciate a general educational foundation and feel that taking a variety of course topics keeps the educational experience diverse. Others favor a more focused route. In that case, pursuing a one-year certificate or enrolling in noncredit continuing education courses may be the best option. Such programs may be a good fit for career changers looking to test the waters or those already in the work force who want to enhance their existing skills. For an even quicker fix, consider shorter, job-specific training offered through vocational or trade schools.

Informational interviews with a program's directors or instructors can be helpful in assessing whether a program will meet your needs—and whether the classes you want will be offered when you need them. As with any other training option, you'll want to verify the experience and qualifications of the instructors, and talk to recent graduates to find out whether the program proved valuable in the job market and opened the right doors.

Four-Year Schools. Numerous colleges and universities offer undergraduate and graduate degree programs that lay the groundwork for careers in RE. Typically, RE-related coursework falls under engineering, building science, or various environmental programs.

Until recently, there were few programs that focused specifically on RE, but more and more schools recognize the growing need for RE-specific training and have specialized four-year degrees to prepare students for a range of careers in the renewable energy industry. The Oregon Institute of Technology in Portland, the State University of New York in Canton, Illinois State University in Normal, and Appalachian State University in Boone, North Carolina, are among the schools leading the way. Such programs often have a strong focus on engineering principles and offer coursework in PV, wind, biomass, hydropower, and geothermal energy, as well as energy management and energy efficiency. (Note: The table starting on page 40 lists several university programs, but isn't all-inclusive.)

While a college degree is not necessary for success in the solar industry, it certainly doesn't hurt to have one. However, if you would like to work in product development or in energy management, then a degree is essential. Depending on the program, you may find yourself spending more time in the lecture hall than in the field. Look for programs with a strong hands-on component and internship placement, and be sure to take advantage of every opportunity to do field work. Four-year degrees are more expensive and time consuming, but starting salaries tend to be higher, depending on the market and the position. Financial aid and scholarships can lessen the financial burden for those who qualify.

Apprenticeships. In some jurisdictions, an apprenticeship is a requirement to earn your license to install PV or solar thermal systems. Most programs combine paid on-the-job training with related classroom instruction. An apprentice works under the supervision of a license holder, generally a master electrician, plumber, or HVAC technician. Typically, an apprentice will work during the day and attend night or weekend classes at a technical school or community college. Depending on the jurisdiction and the license, an apprenticeship program may last from one to four years. Upon completion of the program, an apprentice must pass a written exam to qualify to work for a licensed contractor and supervise other apprentices. In some states, this allows an installer to pull permits and start an installation business.

(continued on page 46)

Some RE training centers offer students hands-on opportunities to work on many different system types and mounting structures.

Courtesy www.solarenergy.org

Schools/Organizations Offering PV Education*

web extra

For more details on programs, see the expanded table at www.homepower.com/webextras

State	School or Program Name	City	Phone	Web Site
AR	John Brown Univ.	Siloam Springs	479-238-8743	www.jbu.edu/science/renewable_energy
AZ	Coconino Comm. College	Flagstaff	928-526-7696	www.coconino.edu/ academics/curriculum/collegecatalog
	Arizona State Univ.	Tempe	480-727-6963	www.schoolofsustainability.asu.edu
	Rio Salado College	Tempe	480-446-0400	www.erenewableresource.com
	Pima Comm. College	Tucson	520-206-7134	www.pima.edu/program/construction/solarinstaller-cert.shtml
CA	Cabrillo College	Aptos	831-479-6235	www.cabrillo.edu/academics/cem
	Humboldt State Univ.	Arcata	707-826-4345	www.humboldt.edu/~ere
	UC Berkeley Extension	Berkeley	510-642-4151	www.extension.berkeley.edu/profseq/solar.html
	CCAC Int. Polytechnic Inst.	Calexico	760-357-2995	—
	Applied Professional Training	Carlsbad	800-431-8488	www.aptc.edu
	Orange Coast College	Costa Mesa	714-432-5072	www.orangecoastcollege.edu/academics/divisions/technology
	Sun Pirate	Cotati	415-332-7246	www.sunpiratesolar.com
	College of the Redwoods	Eureka	707-476-4347	www.redwoods.edu/Departments/construction
	Boots on the Roof	Fremont	888-893-0367	www.bootsontheroof.com
	The Solar Living Inst.	Hopland	707-472-2458	www.solarliving.org
	Golden West College	Huntington Beach	714-892-7711 x52180	www.goldenwestcollege.edu/environment
	College of Marin	Kentfield	415-457-8811 x8200	www.marin.cc.ca.us
	Allied Business Schools	Laguna Hills	800-732-7410	www.training4green.com
	Solar Universe/Solar Univ.	Livermore	925-455-4700	www.sunprotraining.com
	LA Trade Tech. College	Los Angeles	213-763-3701	www.lattc.edu
	East LA Skills Ctr.	Los Angeles	323-224-5970	www.elasc.adultinstruction.org
	New Tech. Training Inst.	Los Angeles	818-247-0989	www.newtechtrain.com
	Ohlone College	Newark	510-742-2360	www.ohlone.edu
	Meritt College	Oakland	510-434-3840	www.ecomerritt.org
	The English Ctr.	Oakland	510-836-6700 x104	www.englishcenter.edu
	MiraCosta College	Oceanside	888-895-8186	www.mccae.org
	Pasadena City College	Pasadena	626-585-7274	www.pasadena.edu
	Diablo Valley College	Pleasant Hill	925-685-1230	www.dvc.edu
	Sierra College	Rocklin	916-660-7900	www.sierracollege.edu/programs/solarenergy.html
	Sonoma State Univ.	Rohnert Park	707-664-2430	www.sonoma.edu/ensp
	American River College	Sacramento	916-484-8675	http://web.arc.losrios.edu/~electron
	Skyline College	San Bruno	650-738-4354	www.skylinecollege.edu
	SDSU College of Ext. Studies	San Diego	619-594-5821	www.ces.sdsu.edu
	Green Career Inst.	San Francisco	866-545-5441	www.greencollarschool.com
	City College of San Francisco	San Francisco	415-239-3285	www.ccsf.edu
	CACTUS	San Jose	818-687-1323	www.greencactus.org
	Metropolitan Ed. District	San Jose	408-723-4222	www.metroed.net
	San Jose City College	San Jose	408-206-9704	www.sjcc.edu/Acad/Divisions/applied/solar.html
	Solar Training Inst.	San Jose	408-625-7400	www.trainingforsolar.com
	College of San Mateo	San Mateo	650-574-6133	www.collegeofsanmateo.edu/solar
	Step Up Education	Santa Cruz	800-800-1638 x687	www.solarclassesonline.com
	Santa Monica College	Santa Monica	310-434-8652	www.smc.edu
	EnerCal Inst.	Santa Rosa	800-627-9642	www.enercai.com
	Santa Rosa Junior College	Santa Rosa	707-527-4246	www.santarosa.edu/instruction/cte/go-green.php
	Stanford Univ.	Stanford	650-723-2300	www.stanford.edu
	California South Bay Univ.	Sunnyvale	408-400-9008	www.csbu.us/green-energy-certificate-program.php
	Brooks Engineering	Vacaville	707-332-0761	www.brooksolar.com
CO	Univ. of CO Continuing Ed.	Boulder	303-735-1005	http://conted.colorado.edu
	Solar Energy Int. (SEI)	Carbondale	970-963-8855	www.solarenergy.org
	Quinntas RE	Denver	303-733-4055	www.quinntas.org
	Colorado School of Mines	Golden	303-273-3844	www.energyminor.mines.edu
	Red Rocks Comm. College	Lakewood	303-914-6306	www.rrcc.edu
	Arapahoe Comm. College	Littleton	303-734-3701	www.coloradotraining.com

Note: New programs continue to be implemented across the United States. Information in the table is current as of February 2010. "—" means did not reply.

Type	Years in Place	SHW	ISPQ Accred.	ISPQ Cert. Trainers	NABCEP Certified Installers	NABCEP Entry-Level Exam	Online Courses	Hands-On Courses	College Credit	Cred./ Degrees Offered
Univ. or college	< 1	✓			1 (pend.)			✓	✓	BS
Comm. college	10							✓	✓	AAS
Univ. or college	2	✓					✓	✓	✓	BS+
Comm. college	< 1					✓		✓		
Comm. college	2	Pend.				✓		✓	✓	Cert.
Comm. college	3	Pend.				✓		✓	Pend.	
Univ. or college	35	✓						✓	✓	BS, MS
Univ. or college	—	—		—	—	—		✓	✓	—
Vocational	—	—		—	—	✓	—	—	—	—
Vocational	17				1	✓		✓	✓	AA pend.
Comm. college	—	✓		—	—	—	—	✓	✓	—
RE training ctr.	3	✓	✓	1	1	✓	✓	✓		
Comm. college	3	✓			1	Pend.		✓	✓	
RE training ctr.	2	✓	✓		1	✓	✓	✓		
RE training ctr.	11	✓	✓		5	✓	✓	✓		
Comm. college	8	✓				✓	✓	✓	✓	Cert.
Comm. college	3					✓		✓	✓	
Vocational	< 1	Pend.				✓	✓			
RE training ctr.	< 1	Pend.	Pend.		1			✓		
Comm. college	2					✓		✓	✓	Cert.
Vocational	3					✓		✓		
Vocational	< 1				1	✓		✓		
Comm. college	2	Pend.				✓		✓	✓	Cert. pend.
Comm. college	33	✓				✓		✓	✓	AA
Non-profit org.	—	—		—	—	✓	—	✓	—	—
Comm. college	< 1	Pend.				✓		✓		
Comm. college	—	—		—	—	✓	—	—	—	—
Comm. college	10	✓				✓	✓	✓	✓	Cert., AA
Comm. college	< 1					Pend.		✓	✓	Cert. pend.
Univ. or college	30	✓							✓	BA, BS
Comm. college	1				2	✓		✓	✓	Cert.
Comm. college	2				1	✓		✓	✓	Cert.
Univ. or college	2	✓					✓			Cert.
RE training ctr.	2	✓			1		✓	✓		
Comm. college	1					✓		✓	✓	
RE training ctr.	—	✓			—	✓		✓	✓	—
Vocational	1					✓		✓		
Comm. college	3				1	✓		✓	✓	Cert. pend.
RE training ctr.	1					Pend.		✓		
Comm. college	5					✓		✓	✓	Cert. pend.
RE training ctr.	2					Pend.	✓			
Comm. college	< 1							✓	✓	AA, Cert.
RE training ctr.	1	✓				Pend.	✓		✓	
Comm. college	—	—		—	—	✓	—	✓	—	—
Univ. or college	30	✓					✓	✓	✓	BS, PhD
Univ. or college	1		✓			✓		✓	✓	Cert., MS
Individual Trainer	22		N/A	Pend.	N/A			✓		
Univ. or college	3	✓					✓	✓	✓	Cert.
RE training ctr.	19	✓	✓	9 (6 pend.)	22	✓	✓	✓		
RE training ctr.	1		✓	6 (pend.)	2	Pend.		✓		
Univ. or college	30	✓						✓	✓	BS
Comm. college	30	✓			2	✓		✓	✓	Cert., AA
Comm. college	1	✓				✓	✓	✓	✓	Cert.

Schools/Organizations Offering PV Education, cont.'d

State	School or Program Name	City	Phone	Web Site
CT	Gateway Comm. College	North Haven	203-285-2426	www.gwcc.commnet.edu
FL	UCF Florida Solar Energy Ctr.	Cocoa	321-638-1473	www.fsec.ucf.edu
	USSolar Inst.	Key West	305-744-3445	www.ussolarinstitute.com
	Solar Source Inst.	Largo	800-329-1301	www.solarsource.net
	Westside Tech. Ctr.	Winter Garden	407-905-2009	www.westside.ocps.net/technical_programs/alternative_energy
GA	Solairgen	Dahlonega	706-867-0678	www.solairgen.com
HI	Hawaii Pacific Univ.	Kaneohe	808-236-7908	www.hpu.edu
IL	John A Logan College	Carterville	618-985-2828	www.jalc.edu
	Kankakee Comm. College	Kankakee	815-802-8864	www.kcc.edu
	Illinois State Univ.	Norma	309-438-3557	www.tec.ilstu.edu/renewable_energy
LA	Baton Rouge Comm. College	Baton Rouge	225-216-8436	www.mybrcc.edu
	Louisiana CleanTech Network	Kenner	504-343-4638	www.lacleantech.net
MA	Cape Cod Comm. College	Barnstable	508-362-2131	www.capecod.mass.edu
	Benjamin Franklin Inst. of Tech.	Boston	617-423-4630	www.bfit.edu
	Massasoit Comm. College	Brockton	508-588-9100	www.massasoit.mass.edu
	HeatSpring Learning Inst.	Cambridge	800-393-2044	www.heatspring.com
	Bristol Comm. College	Fall River	508-678-2811 x2264	www.bristolcc.edu/noncredit
	Greenfield Comm. College	Greenfield	413-775-1472	www.gcc.mass.edu
	AltE Univ.	Hudson	877-878-4060	www.altestore.com
	Springfield Tech. Comm. College	Springfield	413-755-4501	http://cbt.stcc.edu/specialinterest
	Quinsigamond Comm. College	Worcester	508-751-7904	www.qcc.mass.edu
MD	Frostburg St. Univ., WISE Ed. Program	Frostburg	301-687-4298	www.frostburg.edu/renewable
	Nat. Joint Apprent. & Training Comm.	Upper Marlboro	301-715-2320	www.njatc.org
ME	Kennebec Valley Comm. College	Fairfield	207-453-5000	www.kvcc.me.edu
MI	Fond du Lac Tribal & Comm. College	Cloquet	218-879-0891	www.fdltcc.edu
	Wayne State Univ.	Detroit	313-577-3716	www.eng.wayne.edu/page.php?id=1505
	Oakland Comm. College	Royal Oak	248-246-2553	www.oaklandcc.edu/est
	Northwestern Michigan College	Traverse City	231-995-1701	www.nmc.edu/ees
	Macomb Comm. College	Warren	586-445-7191	www.macomb.edu
MN	Lake Superior College	Duluth	218-260-9920	www.lsc.cc.mn.us
	Hibbing Comm. College	Hibbing	218-312-9807	www.hibbing.edu
	KidWind Project	St. Paul	651-917-0079	www.kidwind.org
	St. Paul College	St. Paul	651-846-1583	www.saintpaul.edu/ContinuingEducation/Pages/SolarTech.aspx
MO	Evergreen Inst.	Gerald	303-883-8290	www.evergreeninstitute.org
	Metropolitan Comm. College	Kansas City	816-604-1000	www.mcckc.edu
	Crowder College	Neosho	417-451-3223	www.crowder.edu/SCIENCE-TECHNOLOGY
MT	Univ. of Mont., Applied Comp. & Elect.	Missoula	406-243-7916	http://ace.cte.umt.edu/energy
NC	Appalachian State Univ., Dept. of Tech.	Boone	828-262-6361	www.appstate.edu
	Central Piedmont Comm. College	Charlotte	704-330-6531	www.cpcc.edu/gs
	Sandhills Comm. College	Pinehurst	910-692-6185	www.sandhills.edu
	Central Carolina Comm. College	Pittsboro	919-542-6495 x236	www.cccc.edu
	North Carolina State Univ.	Raleigh	919-513-0775	www.ncsc.ncsu.edu
NH	Lakes Region Comm. College	Laconia	603-524-3207 x763	www.lrcc.edu
NJ	Middlesex Comm. College	Edison	732-906-4681	www.middlesexcc.edu/institute
NM	Central New Mexico Comm. College	Albuquerque	505-224-5217	www.cnm.edu
	Northern New Mexico Comm. College	Espanola	505-747-2264	www.nnmc.edu/academics/departments/engr
	San Juan College	Farmington	505-327-5705	www.sanjuancollege.edu/reng
	NM State Univ., Inst. for Energy & Envt.	Las Cruces	575-646-2038	www.nmsu.edu
	Luna Comm. College	Las Vegas	505-454-5370	www.luna.edu
	Santa Fe Comm. College	Santa Fe	505-428-1641	www.sfccnm.edu
NY	Ctr. for Sustain. Ener. Bronx Comm. Coll.	Bronx	718-289-5332	www.csebcc.org
	SUNY Canino School of Engr. Tech.	Canton	315-386-7411	www.canton.edu/csoet/alt_energy
	SUNY Delhi	Delhi	607-746-4545	www.delhi.edu

Type	Years in Place	SHW	ISPQ Accred.	ISPQ Cert. Trainers	NABCEP Certified Installers	NABCEP Entry-Level Exam	Online Courses	Hands-On Courses	College Credit	Cred./ Degrees Offered
Comm. college	—	—		—	—	✓	—	✓	—	—
RE training ctr.	30	✓	✓		1	✓	Pend.	✓		
RE training ctr.	1	✓			1	✓	✓	✓	✓	
Post-secondary	3	✓			2	✓	✓	✓	✓	Cert.
Vocational	2	✓				✓	Pend.	✓		
RE training ctr.	6	✓	✓		1	Pend.		✓		
Univ. or college	3					✓	✓		✓	
Comm. college	—	—		—	—	✓	—	✓	—	—
Comm. college	2	✓			1	✓		✓	✓	Cert., AA
Univ. or college	—	—		—	—		—	—	✓	BS
Comm. college	—	—		—	—	✓	—	✓	—	—
RE training ctr.	2	✓		1 (pend.)		✓	✓	✓		
Comm. college	3	✓				✓		✓	✓	Cert.
Univ. or college	—	—		—	—	✓	—	✓	—	
Comm. college	< 1					✓	Pend.	✓	Pend.	
RE training ctr.	1		✓		1	✓	✓	✓		
Comm. college	—	—		—	—	✓	—	—	—	
Comm. college	3	✓		1 (pend.)	1	✓		✓	✓	Cert., AA
RE training ctr.	3	✓	✓	1	1	✓		✓		
Comm. college	3		✓		2	✓	✓	✓		
Comm. college	—	—		—	—	✓	—	✓	—	
Univ. or college	2					✓		✓		
Trade org.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Comm. college	—	—		—	—	✓	—	—	—	
Comm. college	3					✓	✓	✓	✓	Cert.
Univ. or college	5	✓							✓	Cert., MS
Comm. college	30	✓					✓	✓	✓	AAS, Cert.
Comm. college	< 1					✓		✓	✓	AAS, Cert.
Comm. college	< 1						✓	✓	✓	Cert.
Comm. college	—	—		—	—	✓	—	—	—	
Comm. college	< 1				1	✓		✓		AA pend.
RE training ctr.	< 1	✓						✓		
Comm. college	1	✓			2	✓		✓		
RE training ctr.	8	✓	Pend.				✓	✓		
Comm. college	1						✓		✓	Cert.
Comm. college	31	✓				Pend.	✓	✓	✓	AA, AAS, Cert.
Univ. or college	2				1	✓	✓			AAS
Univ. or college	30					✓		✓	✓	BS, MS
Comm. college	1				1	✓		✓	✓	AA
Comm. college	—	—		—	—	—	—	—	—	
Comm. college	1	✓			1	✓		✓	Pend.	Cert., AA
Univ. or college	6	✓	✓		2	✓	Pend.	✓		
Comm. college	3	✓			1	✓				Cert., AS
Comm. college	< 1					✓		✓		
Comm. college	1	✓				✓		✓	✓	
Comm. college	< 1	✓					✓	✓	✓	BS
Comm. college	10	✓						✓	✓	AAS
Univ. or college	—	—		—	—	—	—	—	—	
Comm. college	3	✓						✓	✓	AAS
Comm. college	5	✓			1	✓		✓	✓	AAS
Comm. college	6	✓	✓			✓		✓		
Univ. or college	3					✓	✓	✓	✓	BS
Univ. or college	6		✓		1			✓	✓	

Schools/Organizations Offering PV Education, cont.'d

State	School or Program Name	City	Phone	Web Site
NY	ETM Solar Works	Endicott	607-785-6499	www.etmsolar.com
	Farmingdale State Univ. of New York	Farmingdale	631-420-2450	www.farmingdale.edu
	SUNY Ulster County Comm. College	Kingston	845-802-7171	www.sunyulster.edu
	SUNY Orange County Comm. College	Middletown	845-344-6222	www.sunyorange.edu
	Consortium for Worker Ed.	New York	212-414-2380	www.cwe.org
	Ulster County Board of Coop. Ed.	Port Ewen	835-331-5050	www.ulsterboces.org
	Dutchess Comm. College	Poughkeepsie	845-431-8907	www.sunydutchess.edu/cfweb
	SUNY Rockland Comm. College	Suffern	845-574-4465	www.sunyrockland.edu/go/cppd
	SUNY Coll. of Env. Science & Forestry	Syracuse	315-470-6817	www.esf.edu/outreach
	Hudson Valley Comm. College	Troy	518-629-4835	www.hvcc.edu
	Alfred State College, Ctr. for Comm. Ed.	Wellsville	607-587-4017	www.alfredstate.edu
OH	Cuyahoga Comm. Coll., Ctr. for Sustain.	Cleveland	216-987-3027	www.tri-c.edu
	Wright State Univ.	Dayton	937-775-5145	www.cs.wright.edu/mme/future-grad-rce.shtml
	Sinclair Comm. Coll., Ctr. for Energy Ed.	Dayton	937-512-2183	www.sinclair.edu
	Cincinnati State Tech. & Comm. College	Evendale	513-569-1497	www.cincinnatistate.edu
	Owens Comm. College	Maumee	567-661-7163	www.owens.edu
	Hocking College, Energy Inst.	Nelsonville	877-462-5464 x7035	www.hocking.edu
	Tri-County Career Ctr.	Nelsonville	740-753-3511	www.tricountyhightech.com
	Oregon Career & Tech. Ctr.	Toledo	419-697-3450	www.oregoncityschools.org
	Univ. of Toledo	Toledo	419-530-2241	www.utoledo.edu
OR	Central Oregon Comm. College	Bend	541-383-7270	http://noncredit.cocc.edu
	Lane Comm. Coll., NW Energy Ed. Inst.	Eugene	541-463-3977	www.nweei.org
	The Oregon Inst. of Tech.	Portland	503-821-1250	www.oit.edu/portland/programs/renewable-energy-engineering
	Portland Comm. College	Portland	503-244-6111	www.pcc.edu/programs/electronic-engineering
PA	Northampton Comm. College	Bethlehem	610-332-6260	www.northampton.edu
	Harrisburg Area Comm. College	Harrisburg	717-221-1338	www.hacc.edu/GreenTechnology
	SEDA-COG's Energy Resource Ctr.	Lewisburg	570-524-4491	http://erc.sedacog.org
	Infinite Solar Training Facility	Philadelphia	215-464-6460	www.solarschoolpa.com
	Comm. College of Allegheny County	Pittsburgh	412-237-2525	3www.ccac.edu
PR	Univ. of Puerto Rico Aguadilla	Aguadilla	787-890-7118 x264	www.uprag.edu
RI	New England Inst. of Tech.	Warwick	800-736-7744 x3420	www.neit.edu
TN	Cleveland State Comm. College	Cleveland	423-473-2447	www.clevelandstatecc.edu
	Pellissippi State Comm. College	Knoxville	865-694-6666	www.pstcc.edu/bcs
	Tennessee Tech. Ctr. at Pulaski	Pulaski	931-424-4014	www.ttcpulaski.edu
TX	Austin Comm. College	Austin	512-223-7525	www.austincc.edu
	ImagineSolar	Austin	512-443-5725	www.imaginesolar.com
	Houston Comm. College	Houston	713-718-5253	www.hccs.edu
	Ontility Energy Solutions	Houston	877-558-7479	www.ontility.com
	Alamo Colleges, St. Philips College	San Antonio	210-486-2499	www.alamo.edu/spc/acad/dest
	Texas State Tech. College Waco	Waco	254-867-3206	www.waco.tstc.edu/epc
UT	Salt Lake Comm. College	Sandy	801-957-5252	www.slcc.edu/continuinged/solar.asp
VT	NorthWoods Stewardship Ctr.	E. Charleston	802-723-6551	www.northwoodscenter.org
	Green Mountain College	Poultney	802-287-8030	www.greenmtn.edu
	Vermont Tech. College	Randolph Center	800-728-1783	www.vtc.edu
WA	Edmonds Comm. College	Lynwood	425-640-1509	www.edcc.edu
	Shoreline Comm. College	Shoreline	206-396-8446	www.northwestsolarcenter.org
WI	Lakeshore Tech. College	Cleveland	920-693-1238	www.gotoltc.edu
	Midwest RE Association	Custer	715-592-6595	www.the-mrea.org
	Northeast Wisconsin Tech. College	Green Bay	920-498-6908	www.nwtc.edu
	Madison Area Tech. College	Madison	608-246-6800	www.ceret.us
	Milwaukee Comm. Service Corps	Milwaukee	414-372-9020	www.milwaukeecommunityservicecorps.org
	Mid-State Tech. College	Wisconsin Rapids	715-422-5428	www.mstc.edu

Type	Years in Place	SHW	ISPQ Accred.	ISPQ Cert. Trainers	NABCEP Certified Installers	NABCEP Entry-Level Exam	Online Courses	Hands-On Courses	College Credit	Cred./ Degrees Offered
Other	10	✓		2	3		✓	✓		
Univ. or college	9		✓	2	2	✓		✓		
Comm. college	—	—		—	—	✓	—	✓	—	
Comm. college	—	—		—	—	—	—	—	—	
Other	—	—			—	—	—	—	—	
Other	5	✓		2 (pend.)	2	✓		✓		
Comm. college	2	✓				✓		✓	✓	
Comm. college	< 1	✓				✓		✓		
Univ. or college	6			1	1	✓		✓		BS
Comm. college	6		✓	3	1	✓		✓	✓	Cert.
Univ. or college	3				1	✓		✓		
Comm. college	< 1	✓				✓		✓		Cert., AAS
Univ. or college	2	✓						limited	✓	MSE
Comm. college	< 1					✓		✓	✓	Cert., AAS
Comm. college	2				1	✓	Pend.	✓	✓	Cert., AAS
Comm. college	5	✓			1	✓		✓		AA pend.
Univ. or college	—	—		—	—	✓	—	✓	—	AAS
Other	—	—		—	—	✓	—	✓	—	
Other	1					✓				
Univ. or college	23							✓	✓	BS+
Comm. college	1	✓		1	1	✓				Cert. pend.
Comm. college	6	✓	✓	1	1	✓		✓		AAS
Univ. or college	5	✓					✓	✓	✓	BS
Comm. college	1								✓	Cert., AAS
Comm. college	< 1					✓		✓	✓	AAS
Comm. college	< 1				1	✓		✓	✓	AA pend.
RE training ctr.	—	—		—	—	—	—	—	—	
RE training ctr.	2	✓	✓		1	✓		✓		
Comm. college	—	—		—	—	—	—	—	—	
Univ. or college	—	—		—	—	✓	—	✓	—	
Univ. or college	< 1	✓				✓		✓	✓	AAS
Comm. college	5	✓			1	✓		✓	✓	Cert., AAS
Comm. college	< 1	✓				✓	✓	✓		
Other	< 1	✓				✓		✓	✓	
Comm. college	—	—	✓	—	—	✓	—	—	—	
RE training ctr.	7	✓		1	3		✓	✓		
Comm. college	—	—		—	—	—	—	—	—	
Other	1	✓	✓			✓	✓	✓		
Comm. college	1	✓				✓		✓	✓	AAS
Comm. college	< 1	✓				✓		✓	✓	Cert., AAS
Comm. college	2				2	✓		✓	✓	AAS
RE training ctr.	2				2			✓		
Univ. or college	2	✓						✓	✓	Cert., BS
Univ. or college	2	✓				Pend.		✓	✓	BS
Comm. college	< 1	✓					✓		✓	AA
Comm. college	3	✓				✓		✓	✓	Cert.
Vocational	< 1				1	Pend.		✓	✓	AAS
RE training ctr.	1	✓	✓	3 (8 pend.)	13	✓		✓	✓	
Comm. college	2	Pend.			2	✓	✓	✓	✓	Cert., AA
Comm. college	3	✓		9 via SEI	22 via SEI		Via SEI	✓	✓	Cert.
Other	< 1					✓		✓		
Comm. college	2	✓			1	✓	✓	✓	✓	AA

Required or not, an apprenticeship program can be a great way to get the hands-on training and education you need. From day one, you earn a paycheck, and depending on the employer or program, you can earn college credit toward an associate's or bachelor's degree—in some cases, your employer may even reimburse you for all or part of your tuition fees.

Many states operate an apprenticeship and training division to assist with the process, and the U.S. Department of Labor recently launched its Office of Apprenticeship to help connect individuals with government-approved apprenticeships. Since state regulations and training opportunities vary, it is best to contact your state's licensing board to find approved apprenticeship programs in your area. If you plan to pursue NABCEP certification down the line, you will also want to confirm that the apprenticeship program meets the program's experience and education eligibility requirements.

Both union and non-union training centers sponsor apprenticeship opportunities. The National Joint Apprenticeship and Training Committee (NJATC), a collaboration between the International Brotherhood of Electrical Workers and the National Electrical Contractors Association, has become very active in PV education and training. (Note: Many individual JATC training centers, which were too numerous to list in the table, offer solar training for electricians.) Local chapters of the Associated Builders and Contractors association and the Independent Electrical Contractors Association might have leads. Individual plumbing, HVAC, and electrical contracting companies may also operate apprenticeship programs.

Choosing an Installer Training Program

Before selecting a program, ask plenty of questions to ensure that the program you choose is reputable and the right one for you.

Get Student References. Don't just read "canned" testimonials. Ask the program for a few local contacts who went through the program, and ask around for others to get all sides of the story.

Investigate the Training Center. What organization or individual administers the program and what are their qualifications? Is the institution respected and known by the leading industry groups, such as the American Solar Energy Society or Solar Energy Industries Association? Is the program accredited by the IREC's ISPQ? How many of the instructors on staff are NABCEP-certified installers or ISPQ-certified trainers? (See the "Quality Control & RE Education" sidebar.)

Scope Out the Facility. When possible, visit the training facility to see if the latest equipment is being used and that the site is well-maintained. Disorder can indicate safety issues and disregard for regulations. Are there procedures that ensure safety and safe practices? For installation and design courses, does the facility have a roof or building to work with? The more realistic the setting, the more valuable the training.

Look Into the Course Content. What does the training program promise to prepare you for? Do the leading industry groups recognize the legitimacy of the specific training or certification? What skills will you have upon completing the program or course? How long has the institution offered the specific training? Is the course preparing you to pass a test, or is it training you to do a job properly? How many students are in each course? How much hands-on time do you get with projects and equipment?

Ask for Credentials. Who is the course instructor, and what are their qualifications? Find out exactly who teaches the specific course, and don't hesitate to ask for résumés and/or biographies. How many years has the instructor worked in the field and in what capacity? How many systems have they installed? What types of systems have they installed? Is the instructor NABCEP- or ISPQ-certified? The best instructors are those with extensive field experience—they've designed

The Higher Education Exception

The trade-off for college credit is that you may not find a program with IREC ISPQ accreditation. Many postsecondary institutions (i.e. community colleges, universities, trade/vocational schools, institutes of technology) have not sought IREC ISPQ accreditation. Instead, most higher education institutions and programs seek accreditation by an accrediting agency or state approval agency recognized by the U.S. Secretary of Education as a "reliable authority as to the quality of postsecondary education." In the absence of IREC ISPQ accreditation, the next best way to evaluate a postsecondary program is to look at the instructors' credentials, internship opportunities, and hands-on component of the curriculum. Some postsecondary professors or instructors may be NABCEP-certified installers or IREC-independent master trainers, but that's generally the exception rather than the rule.

On-site, hands-on training can be the most valuable kind, putting your book learning to the test.

Courtesy www.sanjuancollege.edu

Quality Control & RE Education

The Interstate Renewable Energy Council (IREC) became the North American licensee for the Institute for Sustainable Power Quality (ISPQ), which serves as one venue for RE education quality control. ISPQ develops guidelines and standards for comparing the "content, quality, and resources" of RE training programs. Their International Standard 01022 establishes standards and metrics to accredit and certify training programs and instructors. As of January 2010, 25 programs are accredited, and there are 10 certified master trainers and 17 certified instructors.

The IREC awards formal recognition for five ISPQ designations: Accreditation for Training Programs, Accreditation for Continuing Education Providers, Certification for Independent Master Trainers, Certification for Affiliated Master Trainers, and Certification for Instructors. Each candidate must undergo a comprehensive audit, which may take up to one year to complete, and supplemental documentation or an on-site visit is required. After initially achieving ISPQ status, certificate holders are reviewed annually during the five-year award cycle and must pay annual fees.

Another quality-control organization is the North American Board of Certified Energy Practitioners (NABCEP). This volunteer board is comprised of RE stakeholder representatives who have developed and implemented nationally recognized credential and certification programs, including voluntary certifications for professional PV and solar thermal installers, and will soon include wind installers. These certifications are in accordance with standards set forth by the National Organization for Competency Assurance and the International Organization for Standardization, as well as in compliance with the *National Electrical Code.* NABCEP's credential is widely recognized as a good measure of professionalism and is required by some jurisdictions to work as an installer. There are more than 1,000 NABCEP-certified PV and solar thermal installers. More than 3,000 individuals have passed the NABCEP entry-level PV exam (see "Certificate vs. Certification" sidebar on page 39).

When you're shopping for installer training programs, first consider those that have both ISPQ accreditation with ISPQ-certified trainers, and/or NABCEP-certified installers. These instructors should be well-versed in industry safety and quality practices, and pursuing the continuing education necessary to maintain certification.

and installed systems for many years, made mistakes along the way (and learned from them), and can explain these concepts in a classroom.

Consider Local & State Requirements. Talk to your local inspections office, Secretary of State's office, solar energy association, and utility about the local, regional, and state regulations for PV and solar hot water systems. Are there any license or certification requirements in your local jurisdiction?

Job Hunting Resources

Once you have the training you need, the next step is to find a job. Here are a few places to start your search:

Green Job Expos. These popular events are being hosted all around the country. A quick Web search will yield nearby events.

RE Employment Web Sites. Post your résumé and search job boards at the following sites:

- American Solar Energy Society: www.ases.org
- Green Jobs: www.greenjobs.com
- *Home Power's* job listings: www.homepower.com/resources/jobs/
- Renewable Energy World: www.renewableenergyworld.com
- Solar Energy Industry Association: www.seia.org
- *Solar Pro*: www.solarprofessional.com

What education or credentials do you need to work legally and qualify for grant programs and incentives? Do you need an electrical or plumbing license, apprenticeship time, NABCEP certification, or any other specific education?

Be Patient. Solar professionals are responsible for people's investments and safety—an improperly wired PV system or shoddy workmanship can be a hazard to utility workers, homeowners, and others. Don't just take the first-available seat in any course—be prepared to wait for an opening in a top-notch program. Use the time wisely to update your résumé, work on your business plan, get some advance education, or read up on industry advancements.

Access

David Del Vecchio (david@solarvillage.com) is a mechanical engineer who has been installing PV systems since 1998. A graduate of the Georgia Institute of Technology and a NABCEP-certified PV installer, he owns Solar Seed, a North Carolina consulting and design company. Del Vecchio teaches PV courses for the NC Solar Center, Solar Energy International, and a local community college.

Resources:

American Solar Energy Society • www.ases.org

Institute for Sustainable Power Quality • www.ispq-central.com.

Interstate Renewable Energy Council • www.irecusa.org

North American Board of Certified Energy Practitioners • www.nabcep.org

Solar Energy Industry Associations • www.seia.org