

# Skill gaps revealed

Barry Friedman outlines the findings of a recent report by the National Renewable Energy Laboratory on the US Solar Installation Labour Market.

**A**S OF August 2011, US installers employed approximately 46,500 permanent solar workers (defined as employees that spend at least 50% of their time on solar-related work). About 33,000 employees are engaged in solar activity for more than 75% of their time, for a range of approximately 32,000 to 38,000 full-time equivalent workers (FTEs). A solar installation FTE is defined as a full time-time employment – approximately 2080 labour hours – for one person for the duration of a year, or two people for six months each, and so on.

About half of the jobs identified in this study, *Solar Installation Labor Market Analysis*, were derived from the random sample of the broader construction sectors, for which solar installation activity was not previously quantified. **Solar installation firms also employ nearly 20,000 additional temporary and seasonal employees.**

These estimates represent gross jobs associated with the solar installation sector; measuring net jobs is a separate question beyond the scope of this report. Net job estimates would account for potential lost jobs through displacement from other fields.

**Online:** [renewableenergyfocus.com](http://renewableenergyfocus.com)

DOE announces R&D funds to take promising renewable energy technologies to market

<http://tinyurl.com/btnmhbo>

Solar Thermal: Spain shows the way forward for CSP

<http://tinyurl.com/c99qmcf>

Valos and Gehrlicher joint venture to offer large-scale solar PV projects for utilities in California

<http://tinyurl.com/c6wz2x3>

### Key market growth drivers

The availability of cash grants in lieu of tax credits, known as “1603 Treasury grants”, the tax credit for manufacturing investments, and the availability of third-party ownership and lease options, have all contributed to unprecedented growth in the US solar market. **Under the 1603 programme, some 15,900 photovoltaic (PV) energy projects were installed between January 2009 and July 2011, with a total nameplate electric capacity of about 597MW.**

The 30% manufacturing tax credit, for renewable energy manufacturing investments (under Section 48 of the Internal Revenue Code), helped drive utility-scale projects. The highest concentration of utility-scale solar investments has been in California, Nevada, Arizona, and New Mexico. **As of September 2011, approximately 1.5GW of utility-scale PV or concentrating solar power (CSP) capacity is under construction, centered in California and Arizona.**

The rapid expansion of third-party ownership business models for solar installations also drove the labour market expansion in 2010. The value proposition of guaranteed savings and no up-front costs was particularly appealing to consumers and businesses during a period of slow economic growth.

### Labour supply

Because there is no unified national standard licensing requirements or mandates, determining the supply of adequately trained workers is difficult. A first step is to characterise offerings of certified training providers such as the North American Board of Certified Practitioners (NABCEP).

To date, many training providers have no consistent mechanism to track their graduates’ employment, though most (71%) of training programmes have an advisory board made up of local employers.

Other key labor supply-side data findings:

- 46% of training is provided by community colleges and 7% by four-year universities.
- 6% of training time is spent on sales, whereas **employers expect 42%**

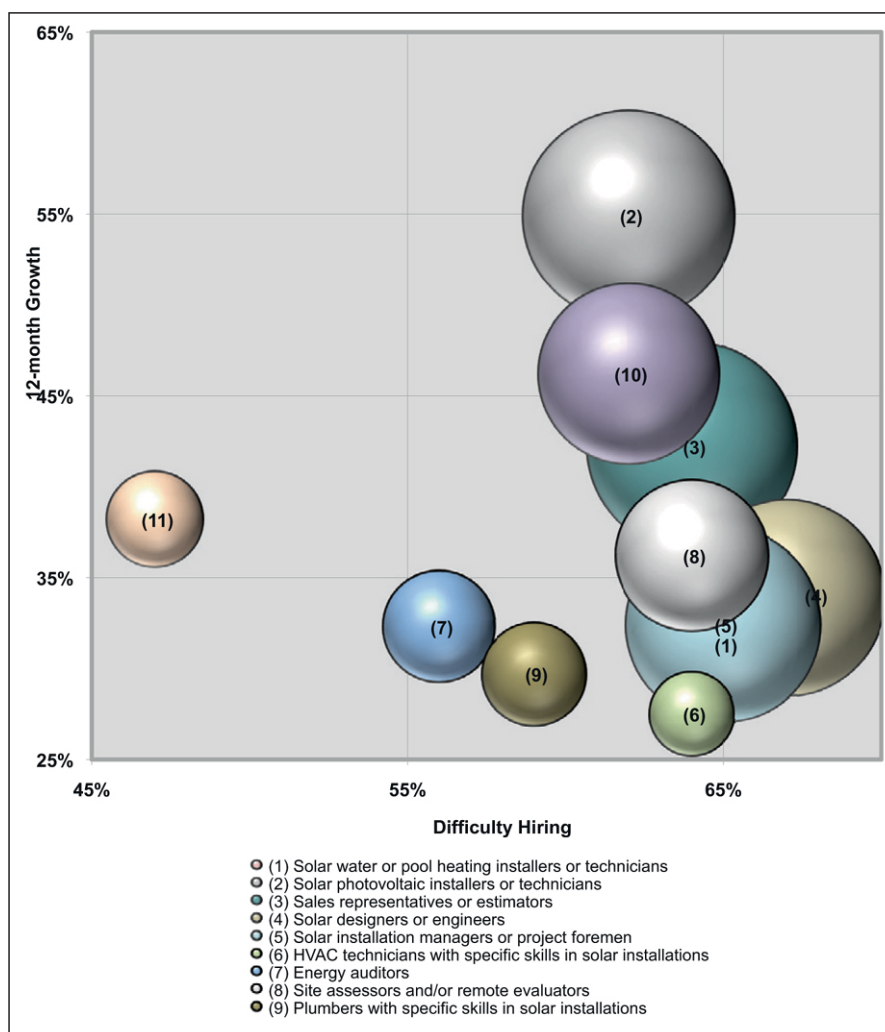


Figure 1. Growth, difficulty hiring, and number of employing firms (bubble size corresponds to the percentage of firms hiring that occupation)

### increase in the number of individuals engaged in sales.

- 52% of PV training programs require two-year associate’s degree or less for faculty and 91% prefer licensed electricians for their faculty.
- Entry-level PV training courses average about 100 hours, with 40 those hours spent on hands-on activities.
- 38% of training providers are funded in part by the public workforce system (e.g., through the US Department of Labor)

Solar installers often are involved with other types of work (eg. electrical work, plumbing, construction). As a result, it can be difficult to properly ascertain solar-related activities within a traditional occupation. For

example, existing aggregated data on electricians who install solar panels but cannot distinguish between solar and non-solar electricians. Within traditional construction related sectors, it is expected the categories that will add the most jobs over the next year are laborer, construction manager, and electrician (Table 2, page 61).

### Employer preferences

The vast majority of employers prefer on-the-job training (82%), which was a significant preference over the other options (See Figure 2, page 60). After that came courses taught through industry-specific associations or groups – such as IREC and the American Solar Energy Society

Occupation	Firms Reporting Difficulty Hiring	Firms Employing	Median Hourly Wage
Solar water and pool-heating installers and technicians	65%	33%	\$15–\$24
Solar PV installers and technicians	62%	72%	\$15–\$25
Sales representatives and estimators	64%	70%	\$19–\$32
Solar designers and engineers	67%	62%	\$19–\$31
Solar installation managers and project foremen	65%	61%	\$20–\$30
HVAC technicians with specific skills in solar installation	64%	11%	\$14–\$25
Energy auditors	56%	20%	\$17–\$25
Site assessors and remote evaluators	64%	37%	\$16–\$25
Plumbers with specific skills in solar installation	59%	17%	\$18–\$30
Electricians with specific skills in solar installation	62%	53%	\$20–\$31
Roofers with specific skills in solar installation	47%	15%	\$15–\$25

Table 1. Firms reporting difficulty hiring, firms employing, and wage range, by occupation: as business booms the growing skills gap seems to be widening

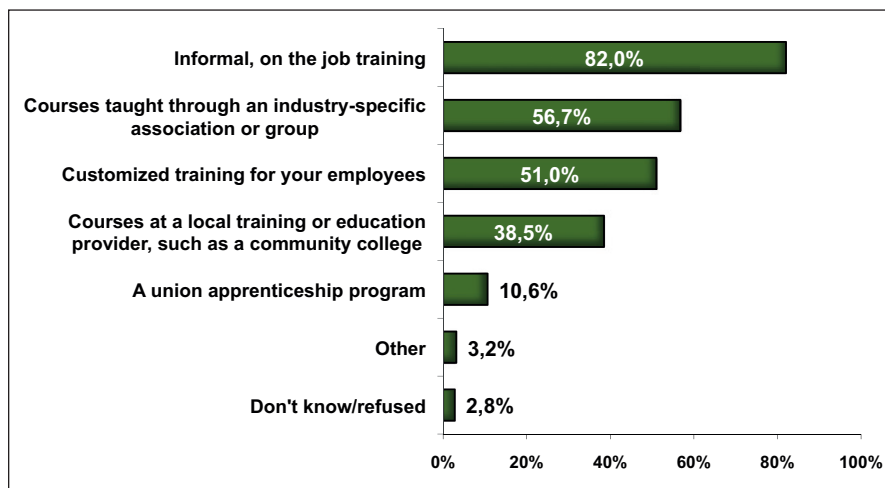


Figure 2. Employer's training preferences: on-the-job preferred

(ASES) – and customised training for employees.

Meantime, as Figure 3 (next page) pageshows, employers are most interested in workers with customer service, construction, and electrical experience and knowledge of electrical code. Firms that employ technicians and installers who work on PV installations reported that it is “very important” that new hires possess electrician experience or

skills (61%). The majority of firms employing technicians and installers who work on solar heating and cooling installations reported it is “very important” that new hires have customer service skills.

Similarly, 52% stressed the need for a general understanding of the mechanics and engineering of solar power, while 49% said they considered general construction experience is also very important.

### Future productivity

Finally, the analysis concludes that increasing competitive market forces and worker experience will tend to improve solar installation labor productivity, as do:

- Improving worker training and agreement on best practices
- Developing labour-saving technologies and increased technology and practice standardisation
- Encouraging uniformity among state and local installation labour requirements in areas such as licensure and accreditation.

As with any early stage market, one would expect improvement in labour productivity over time, scale, and industry development. Given the fact that the US is still early in market development, supply and distribution chains will likely become more efficient over time.

Well-trained installers are better positioned to innovate ways to reduce installation time, troubleshoot issues in real time, maximise safety and performance, and keep workers and occupants safe from fire and other potential hazards through proper on-the-job safety protocols.

Advances in technology can also result in significant installation labour productivity gains and concomitant reduction in staff required per project per installed megawatt. Improvements include interlocking panels, tool-less assembly, plug-and-play potential options, and other streamlined technologies. In addition, PV systems can be installed more efficiently when integrated into new construction, compared with retrofitting existing structures with PV systems.

### About:

The data for the Solar Installation Labor Market Analysis was gathered by National Renewable Energy Laboratory using a mixed-method (telephone and web) questionnaire for solar photovoltaic (PV) and solar heating and cooling (SHC) technology installers throughout the United States in August 2010. Utilising standard methodological approaches, the report represents the first statistically valid job count in the solar installation sector.

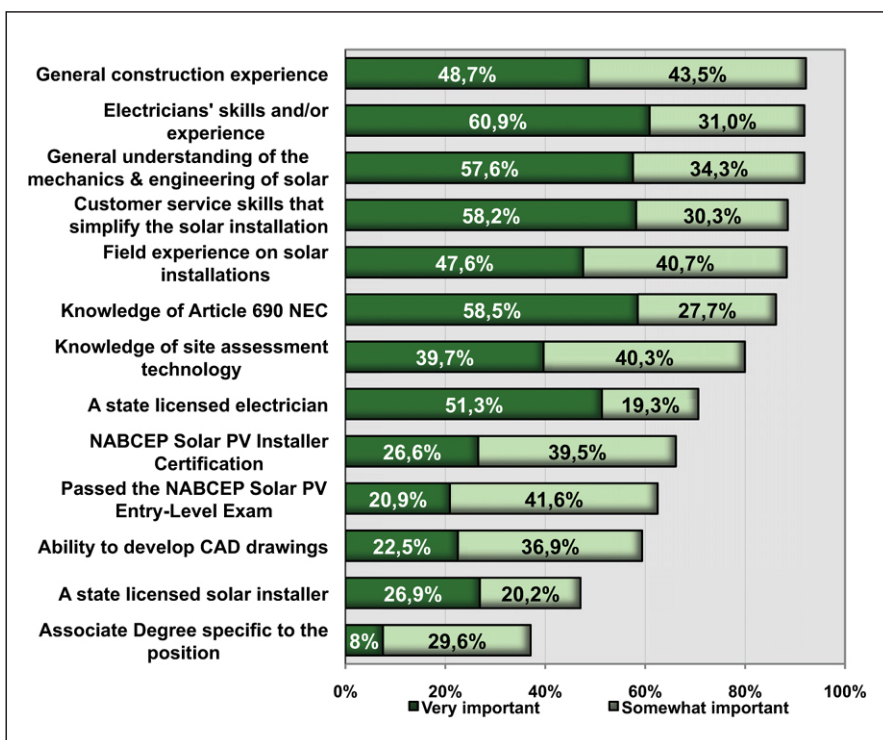


Figure 3. Skills, areas of knowledge, and the educational certifications solar PV installer employers look for in their labour force, rated by importance

The sample of respondents includes 1425 unduplicated completed questionnaires from a census of solar PV and solar heating and cooling installers, and

from a random sample of firms in construction industries that engage in solar installation business activities. This is the first study to use a random sample of

the broader construction economic sectors to ensure their inclusion in the solar installation job count, giving a fuller picture of the market.

### Key findings

- In most regions of the United States, installation companies expressed strong interest in workers with real-world construction and electrical experience and knowledge. They place an emphasis on informal on-the-job or hands-on training.
- Most installation companies surveyed (about 8 in 10) were optimistic about the future.
- Companies prefer experienced workers and are having difficulty finding them. About half (52%) of firms reported “some” or “great” difficulty in finding entry-level candidates who have the appropriate skills and training; 59% reported difficulty finding non-entry-level employees.
- Due to expansion of large utility-scale PV installations, US labour productivity is likely to improve in the future, suggesting caution about future projections of jobs needed.

SOC Code	Description	2010 Jobs	2011 Jobs	Openings (Including Replacements)	Median Hourly Earnings
47-2061	Construction Laborers	1,230,182	1,270,695	48,856	\$15.58
11-9021	Construction Managers	703,519	728,712	30,707	\$23.53
47-2111	Electricians	657,642	670,446	30,787	\$21.98
47-2073	Operating Engineers and Other Construction Equipment Operators	384,214	392,416	15,472	\$18.99
51-4121	Welders, Cutters, Solderers, and Brazers	370,668	369,955	14,954	\$17.03
51-2022	Electrical and Electronic Equipment Assemblers	185,146	178,318	3,610	\$13.77
49-9099	Installation, Maintenance, and Repair Workers, All Others	153,881	156,373	5,041	\$15.71
17-2071	Electrical Engineers	150,634	150,660	4,899	\$39.28
17-3023	Electrical and Electronic Engineering Technicians	150,620	149,416	3,640	\$26.23
49-9098	Helpers—Installation, Maintenance, and Repair Workers	133,775	135,553	8,366	\$11.73
51-2041	Structural Metal Fabricators and Fitters	93,908	93,580	3,002	\$16.37
47-3013	Helpers, Electricians	86,654	90,010	5,415	\$13.11
49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	71,524	70,956	1,571	\$24.31
51-2023	Electromechanical Equipment Assemblers	54,237	52,752	1,108	\$14.73
47-3019	Helpers, Construction Trades, All Others	21,669	22,204	998	\$12.66
Total		4,448,274	4,532,047	178,426	\$19.26

(EMSI 2010)

Table 2. EMSI Employment Demand Projections Made in 2010