

Solar Photovoltaic Installers

Snapshot

Career Cluster(s): Architecture & Construction; Business Management & Administration; Science, Technology, Engineering & Mathematics

Interests: Technology; renewable energy; installation; manual labor

Earnings (Yearly Average): \$44,890

Employment & Outlook: Much Faster Than Average Growth Expected

OVERVIEW

Sphere of Work

Solar photovoltaic (PV) installers, also known as PV installers, assemble, set up, and maintain rooftop or other systems that convert sunlight into energy. Owners of these businesses may be self-employed, with a team of installers as employees.

Work Environment

Although some installation work may take the installer inside spaces such as attics and crawl spaces, the bulk of the work is done outdoors, as solar panels are typically fixed to rooftops. Photovoltaic panels must have clear access to sunlight to function properly.



Installing solar panels on a roof. Photo via iStock.com/zstockphotos. [Used under license.]

Occupation Interest

PV installers have an interest in the latest renewable energy technology and are well-suited to the sometimes-arduous manual labor required to install this equipment. They do not mind working outdoors in varying weather conditions and heights. They have an aptitude for math, in order to calculate angles, measurements, and areas.

A Day in the Life—Duties and Responsibilities

At the jobsite, PV installers verify the measurements and design of the structure on which the PV system is being assembled. For PV systems on flat roofs, PV installers must first add a structure that allows the PV system to be mounted at an angle. PV installers set up new systems on support structures and place PV panels or PV shingles on top of them. Once the panels are in place, they sometimes

Duties and Responsibilities

- Planning PV system configurations based on customer needs and site conditions
- Measuring, cutting, and assembling the support structure for solar PV panels
- Installing solar modules, panels, and support structures according to building codes and standards
- Connecting PV panels to the electrical system
- Applying weather sealant to equipment being installed
- Activating and test PV systems
- Performing routine PV system maintenance

connect the panels to electrical components. After the system is in place, PV installers must test the system and its components.

Depending on the job and state laws, PV installers may connect the solar panels to the electrical grid, although electricians sometimes do this task. Once the panels are assembled, workers check the electrical systems for proper wiring, polarity, and grounding, and they also perform maintenance as needed.

Profile

Interests: Things, Data, People

Working Conditions: Both Inside and Outside

Physical Strength: Heavy Work

Education Needs: On-The-Job Training, High School

Diploma with Technical Education,
Junior/Technical/Community College, Apprenticeship

Licensure/Certification: Varies By State

Opportunities for Experience: Apprenticeship

Interest Score: RC

WORK ENVIRONMENT

Immediate Physical Environment

Because photovoltaic (PV) panels convert sunlight into electricity, most PV installation is done outdoors. Residential installers work on rooftops but also sometimes work in attics and crawl spaces to connect panels to the electrical grid. PV installers who build solar farms work at ground level.

Solar photovoltaic installers risk falls from ladders and roofs, shocks from electricity, and burns from hot equipment and materials while installing and maintaining PV systems. To reduce the risk of injury, PV installers must wear safety equipment, such as harnesses, gloves, and hard hats.

Human Environment

PV installers may work alone or as part of a team. Installation of solar panels may require the help of roofers and electricians. Installers may also interact with clients at the jobsite, and should always be courteous, especially when working on someone's private dwelling. The owner of the installation business must routinely interact with employees and is responsible for all staffing, including helping to resolve disputes.

Technological Environment

PV installers use a variety of hand tools and power tools, including drills, wrenches, saws, and screwdrivers, to set up PV panels and connect them to frames, wires, and support structures. They must be well-acquainted with the latest in solar panel technology to keep pace with client demands and be able to both install and maintain the equipment.

EDUCATION, TRAINING, AND ADVANCEMENT

High School/Secondary

PV installers typically need a high school diploma. An emphasis on math, science, and courses related to trades work is beneficial. Business-related courses are also an asset, to prepare for one day being self-employed in the field.

Suggested High School Subjects

- Algebra
- Chemistry
- Construction Math
- Earth or Life or Physical Science
- Economics
- English
- Entrepreneurship
- Geometry
- History
- Physics

- Pre-Calculus
- Psychology
- Statistics
- Technical Writing
- Trigonometry

Related Career Pathways/Majors

Architecture & Construction Career Cluster

- Construction Pathway
- Design/Pre-Construction Pathway
- Maintenance/Operations Pathway

Business, Management & Administration Career Cluster

- General Management Pathway

Science, Technology, Engineering & Mathematics Career Cluster

- Engineering & Technology Pathway
- Science & Mathematics Pathway

Postsecondary

Some PV installers take courses at local community colleges or technical schools to learn about solar panel installation.

Courses range from basic safety and PV knowledge to system design. Although course length varies, most usually last a few days to several months.

Adult Job Seekers

Some candidates, especially those with construction experience, enter the field by taking online training courses.

Professional Certification and Licensure

Some states require a license for PV installers. Contact your state's licensing board for more information.

PV installers must travel to jobsites, so employers may require them to have a driver's license.

Although not required for employment, certification demonstrates competency in solar panel installation. The Electronics Technicians Association, International

Transferable Skills and Abilities

Ability to work at heights

- Working on roofs, ladders, or lifts that are far above the ground

Communication Skills

- Conveying information effectively to clients, team members, and other workers

Detail-oriented

- Following instructions to ensure that the system works properly

Math Skills

- Calculating angles, measurements, and areas using algebra, geometry, and trigonometry

Mechanical Skills

- Working with complex electrical and mechanical equipment to build support structures for solar panels, connect the panels to the electrical system, and troubleshoot problems

Physical Stamina

- Carrying panels and other heavy equipment
- Climbing ladders many times throughout the day

Physical Strength

- Lifting heavy equipment and materials weighing up to 60 pounds

Fast Fact

One in 18 people world-wide owned their own business in 2016. Uganda led the way, with 28.1 percent entrepreneurs per capita. Source: entrepreneur.com



The city of Kampala, Uganda. Photo by Simisa, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons.

(ETA) and the North American Board of Certified Energy Practitioners (NABCEP) offer certification for PV installers. Some states require that for projects to qualify for solar-related subsidies, all PV installers working on the projects must have certification.

Additional Requirements

Some PV installers learn their trade on the job by working with experienced installers. On-the-job training usually lasts between 1 month and 1 year. During training, PV installers learn about safety, tools, and PV system installation techniques.

Electrician and roofing apprentices and journey workers may complete photovoltaic-specific training modules through apprenticeships.

Solar PV system manufacturers may also provide training on specific products. Such training usually includes a system overview and proper installation techniques for the manufacturer's products.

Military veterans may benefit from the Solar Ready Vets program, which is funded by the US. Department of Energy (DOE) and prepares veterans to connect with training and jobs in the solar industry.

EARNINGS AND ADVANCEMENT

Earnings depend on worker experience, whether they are self-employed, and the industry in which they work: electrical and other wiring installation; plumbing, heating, and air-conditioning; or utilities. Median annual earnings of PV installers were \$44,890 in 2019. The lowest 10 percent earned less than \$31,600, and the highest 10 percent earned more than \$63,880.

PV installers may advance to become a project supervisor or project manager after gaining experience in the trade. PV installers may also transition to sales roles within the industry, given their knowledge of and experience with PV installation. They also may choose to start their own PV installation business.

EMPLOYMENT AND OUTLOOK

PV installers held 12,000 jobs in 2019. Six percent were self-employed. Employment is expected to grow much faster than the average for all occupations through the year 2029, at a rate of 51 percent, due to the continued expansion and adoption of solar PV systems. As the cost of PV panels and shingles continues to decrease, more households are expected to take advantage of these systems, resulting in greater demand for the workers who install and maintain them. The increasing popularity of solar leasing plans—in which homeowners lease, rather than purchase, systems—should create additional demand, because homeowners no longer bear the upfront costs of installation. Demand may be greatest in states and localities that provide incentives to reduce the cost of PV systems.

About 2,300 openings for solar photovoltaic installers are projected each year, on average, over the decade. Many of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as to retire.

Despite fast growth, this occupation is small and has limited employment; therefore, strong competition for jobs is expected. Job candidates who complete a course in photovoltaic systems at a community college or technical school should have the best opportunities. Those who enter apprenticeships also are expected to have extremely good job opportunities. Candidates with experience in construction occupations, such as laborers, roofers, and carpenters, should have better job opportunities than those without construction experience.

Related Occupations

- Carpenter
- Construction Laborer/Helper
- Electrician
- Glazier
- Heating, Air Conditioning, & Refrigeration Mechanic/Installer
- Ironworker
- Masonry Worker

- Plumbers/Pipefitter/Steamfitter
- Roofer
- Sheet Metal Worker

MORE INFORMATION

American Solar Energy Society (ASES)

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Electrical Training Alliance

5001 Howerton Way, Suite N
Bowie, MD 20715
888.652.4007
www.electricaltrainingalliance.org

Electronics Technicians Association, International (ETA)

5 Depot Street
Greencastle, IN 46135
800.288.3824
eta@eta-i.org
www.eta-i.org

Interstate Renewable Energy Council (IREC)

P.O. Box 1156
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National Center for Construction Education & Research (NCCER)

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www.nccer.org

North American Board of Certified Energy Practitioners (NABCEP)

56 Clifton Country Road, Suite 202

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Solar Energy Industries Association (SEIA)

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