



# California Occupational Guides

Guide for



## Solar Thermal Installers and Technicians in California

**May also be called:** Solar Energy Systems Installers; Solar Hot Water System Installers; Solar Thermal Repair Technicians

### What Would I Do?

Solar Thermal Installers and Technicians install, maintain, and repair solar energy systems designed to collect, store, and circulate solar-heated water for residential, commercial, or industrial use. Typically, solar water heating technology is used to heat water to three temperature levels: low for swimming pools, medium for space heating and cooling and domestic water heating, and high for steam production for electric generation.

Solar water heating systems are set up in conjunction with a standard water heater. There are two types of solar water heating technology: active and passive systems. Active systems use fans or pumps to move heat to warm water. Passive systems use sunlight to store energy and rely upon gravity to move hot water into a storage tank. They do not require pumps to move water.

Solar water heating technology uses the sun's rays to heat liquid in copper or plastic tubes located inside solar collector panels, such as parabolic troughs. The heated liquid coming from the solar panels transfers heat to the water heater through exchange coils inside the storage tank or a heat exchanger added to the existing water heater tank. The storage tank provides preheated hot water to a conventional water heater for immediate use. For swimming pools, the water is pumped through a filter, then solar collector where the water is circulated to be heated by the sun, and returned to the pool. Solar water heating saves energy by reducing the amount of time a regular water heater must operate.

Installers plan the layout of the system by determining the placement of tanks and pumps; they also perform on-site evaluations to ensure the best placement of solar panels to obtain optimal sun exposure. Solar Thermal Installers mount pre-assembled solar panels or systems. They install storage tanks or heat exchangers into existing tanks. They also install pumps, valves, pipes, and ducts. Solar Thermal Installers set up and adjust electrical or electronic controls and sometimes do routine maintenance. In new construction, they follow blueprints to connect piping, ducting, controls, and wiring. Installers also demonstrate start-up, shut-down, maintenance, diagnostic, and safety procedures to solar thermal system owners. What tasks the Installer performs in plumbing, electrical, or roofing activities depends upon the employing firm and licenses the Installer holds. Some firms may have specialized professionals, such as electricians, perform the specific tasks of their field, such as the electrical wiring.

### Tools and Technology

Solar Thermal Installers commonly use a variety of power and hand tools including extruders, propane torches, and wrenches. Smart phones and laptop computers are used to perform solar site shade analysis.

### Important Tasks and Related Skills

Solar Thermal Installers generally have skills closely related to those in the more traditional occupations of plumber and heating, air conditioning, and refrigeration mechanic and installer. However, the Solar Thermal Installer's knowledge of solar energy systems and the use of green materials in their work separate them from the standard plumber or heating and air conditioning technician. The following table lists the main tasks common to the job of Solar Thermal Installers and Technicians. Each task is matched to a sample skill required to carry out the task.

<i>Task</i>	<i>Skill Used in this Task</i>
Design active direct or indirect, passive direct or indirect, or pool solar systems.	Technology Design
Perform routine maintenance or repairs to restore solar thermal systems to baseline operating conditions.	Equipment Maintenance
Apply operation or identification tags or labels to system components, as required.	Information Ordering
Assess collector sites to ensure structural integrity of potential mounting surfaces or the best orientation and tilt for solar collectors.	Critical Thinking
Connect water heaters and storage tanks to power and water sources.	Mechanical
Determine locations for installing solar subsystem components, including piping, water heaters, valves, and ancillary equipment.	Design
Fill water tanks and check tanks, pipes, and fittings for leaks.	Near Vision
Identify plumbing, electrical, environmental, or safety hazards associated with solar thermal installations.	Problem Sensitivity

Source: U.S. Department of Labor [Occupational Information Network \(O\\*NET\)](http://onetonline.org) at onetonline.org

### Working Conditions

Solar Thermal Installers work outdoors in most types of weather. The work requires lifting heavy tools and equipment as well as the confidence to work on rooftops and in cramped quarters. Additionally, Installers may risk injury by cuts from hand and power tools; however, risks are minimized by following proper safety procedures. Most Installers work 40 hours per week, but they may work much longer hours during the spring and summer. Harsh weather conditions, such as thunderstorms, may delay work schedules.

This occupation is not heavily unionized at this time. However, some Solar Thermal Installers and Technicians may belong to the plumbers and pipefitters or sheet metal workers unions.

### Will This Job Fit Me?

The job of Solar Thermal Installer may appeal to those who enjoy working outdoors at work activities requiring practical, hands-on problems and solutions; accordingly, this occupation does not involve a lot of paperwork. This occupation also generally interests those who are attentive to detail and thorough in completing work tasks.

## ***What Wages and Benefits Can I Expect?***

### **Wages**

A formal salary survey is not available. However, references to annual wages range from \$20,000 to \$75,000; hourly wages range from \$10 to \$35 per hour. All salaries depend on the pay structure established by each employer for work performed, the nature of the project, and the skills of the specialists. Generally, workers in large cities earn higher wages than those who work in small towns and rural areas.

### **Benefits**

Solar Thermal Installers typically receive benefits such as health and life insurance, vacation, holidays, and pension plans. Self-employed Installers are responsible for purchasing their own insurance and retirement plan.

## ***What is the Job Outlook?***

As this is an emerging occupation, the number of Solar Thermal Installers and Technicians in California is unknown at this time. Employment opportunities should increase in the future considering society's growing interest in environmental protection and the development of alternative energy sources. Additionally, consumers benefit from local utility rebates, tax credits, and the American Recovery and Reinvestment Act (ARRA) incentives, thus encouraging a growing demand for Solar Thermal Installers and Technicians.

## ***How Do I Qualify?***

### **Education, Training, and Other Requirements**

Many employers prefer to hire candidates with a high school diploma or the equivalent and some construction experience. Entry-level Solar Thermal Installers and Technicians generally receive on-the-job training by working as a helper to more experienced employees. Also, entrants into this occupation frequently transfer into solar occupations from related construction jobs. For example, many entry-level Solar Thermal Installers have attended an apprenticeship program for one of the construction trades such as carpenters, electricians, heating and air conditioning installers, plumbers, or sheet metal workers. Generally, beginning Installers also attend solar technology programs at community colleges or vocational schools to acquire the technical skills needed for the solar industry.

### **Experience**

Many employers prefer to hire individuals with solar thermal installation experience. However, some will accept experienced plumbers and electricians.

### **Early Career Planning**

High school preparation courses in English, mathematics, physics, computer technology, drafting, blueprint reading, and shop courses are helpful for students interested in becoming Solar Thermal Installers. Preparatory training programs for Solar Thermal Installers and Technicians are also available through Regional Occupational Programs (ROP). Programs include Building Trades; Construction Technology; Electrical Apprenticeship; Heating, Ventilation, and Air Conditioning (HVAC); and Plumbing. To find an ROP program near you, go to the California Association of Regional Occupational Centers and Programs Web site at [www.carocp.org/carocps.html](http://www.carocp.org/carocps.html).

### **Licensing and Certification**

Individuals working as employees work under the license of the employer. Those wishing to enter self-employment as a Solar Installation Contractor must pass a written exam, along with a fingerprint background check, to obtain a specialty Solar Contractors License through the California Department of Consumer Affairs, Contractors State License Board. Applicants for a contractor's license must be over 18 years of age with a minimum of four years' experience as a journey-level worker in their

specific trade. Licenses are valid for two years. To renew a license, applicants must complete a renewal application and pay the appropriate fees; a written test is not required to renew a license. Contact the agency that issues the license for additional information.

Certification is voluntary. However, certification broadens skills and enhances employment opportunities. The North American Board of Certified Energy Practitioners (NABCEP) offers professional certification to qualifying applicants. Candidates must be at least 18 years of age, pass a written exam, and provide documentation of a minimum of four years' experience installing solar hot water systems or two years' experience installing solar pool heating systems. For more information, go to the U.S. Department of Labor's Career InfoNet Web site at [www.acinet.org](http://www.acinet.org) and scroll down to "Career Tools." Click on "Certification Finder" at [www.acinet.org/certifications\\_new/default.aspx](http://www.acinet.org/certifications_new/default.aspx) and follow the instructions to locate certification programs.

### **Continuing Education**

Continuing education is required to maintain NABCEP certification. Applicants must complete 18 hours of continuing education within three years of their initial certification. The educational requirements consist of six hours reviewing the National Electric Code, six hours covering NABCEP Task Analysis, and six hours of photovoltaic or renewable energy instruction. In addition, Installers must provide evidence for completing the installation of three solar thermal systems during the three-year certification period.

### **Where Can I Find Training?**

There are two ways to search for training information at [www.labormarketinfo.edd.ca.gov/?Pageid=1013](http://www.labormarketinfo.edd.ca.gov/?Pageid=1013):

- [Search by Field of Study](#) to find what programs are available and what schools offer those programs. You may use keywords such as: Solar or Solar Thermal.
- [Search by Training Provider](#) to find schools by name, type of school, or location.

Contact the schools you are interested in to learn about the classes available, tuition and fees, and any prerequisite course work.

### **Where Would I Work?**

According to results from the 2009 *California Green Economy Survey*, Solar Thermal Installers work for Specialty Trade Contractors which include electrical; plumbing, heating and air-conditioning; and outdoor swimming pool contractors. Some employment was also reported in Engineering Services and Educational Services such as trade schools, colleges, and universities.

### **Finding a Job**

Direct application to employers is one of the most effective job search methods. Many schools and training providers operate placement centers for their students. Jobs may also be found through registration with temporary employment agencies and through classified advertisements in newspapers and trade publications. Internet job listings also provide helpful local job leads. **Online job opening systems** include JobCentral at [www.jobcentral.com](http://www.jobcentral.com) and CalJOBSSM at [www.caljobs.ca.gov](http://www.caljobs.ca.gov).

To find your nearest One-Stop Career Center, go to [Service Locator](http://www.servicelocator.org) at [www.servicelocator.org](http://www.servicelocator.org). View the [helpful job search tips](http://www.labormarketinfo.edd.ca.gov/occguides/JobSearchTips.pdf) at [www.labormarketinfo.edd.ca.gov/occguides/JobSearchTips.pdf](http://www.labormarketinfo.edd.ca.gov/occguides/JobSearchTips.pdf) for more resources. (requires [Adobe Reader](#)).

### **Yellow Page Headings**

You can focus your local job search by checking employers listed online or in your local telephone directory. Below are some suggested headings where you might find employers of Solar Thermal Installers and Technicians.

- Solar Energy Contractors

- Solar Energy Equipment and Systems Dealers
- Solar Energy Equipment and Systems Manufacturers and Distributors
- Solar Energy Equipment and Systems, Service and Repair
- Solar Products Dealers and Services

### **Find Possible Employers**

To locate a list of employers in your area, use “Find Employers” on the LaborMarketInfo Web site at [www.labormarketinfo.edd.ca.gov/aspdotnet/databrowsing/empMain.aspx?menuChoice=emp](http://www.labormarketinfo.edd.ca.gov/aspdotnet/databrowsing/empMain.aspx?menuChoice=emp)

- Select the search for employers by occupation.
- Select a geographic area.
- Search for an occupation by keyword, occupation, or category.
- Select one of the top industries that employ the occupation.
- This will give you a list of employers in that industry in your area.
- Click on “View Filter Selections” to limit your list to specific cities or employer size.
- Click on an employer for the street address, telephone number, size of business, Web site, etc.
- Contact the employer for possible employment.

### **Where Could This Job Lead?**

Advancement in solar installation occupations usually translates into higher wages. Opportunities for advancement are greater for those working for large contractors. Experienced Installers may advance into positions such as building superintendents, cost estimators, or salespeople and marketers. Others with strong business skills may become self-employed by opening their own businesses.

### **Related Occupations**

Below is a list of occupations related to Solar Thermal Installers and Technicians.

- Heating, Air Conditioning, and Refrigeration Mechanics and Installers (49-9021.00)
- Helpers of Pipelayers, Plumbers, Pipefitters, and Steamfitters (47-3015.00)
- Plumbers, Pipefitters, and Steamfitters (47-2152.00)
- Sheet Metal Workers (47-2211.00)
- Solar Energy Installation Managers (47-1011.03)
- Solar Energy Systems Engineers (17-2199.11)
- Solar Photovoltaic Installers (47-4099.01)

### **Other Sources**

- California Department of Consumer Affairs  
[www.dca.ca.gov](http://www.dca.ca.gov)
- Contractors State License Board  
[www.cslb.ca.gov](http://www.cslb.ca.gov)
- American Solar Energy Society  
[www.ases.org](http://www.ases.org)
- California Solar Energy Industries Association  
[www.calseia.org](http://www.calseia.org)
- North American Board of Certified Energy Practitioners  
[www.nabcep.org](http://www.nabcep.org)
- Sheet Metal Workers International Association  
[www.smwia.org](http://www.smwia.org)
- Solar Energy Industries Association  
[www.seia.org](http://www.seia.org)

- United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry  
[www.ua.org](http://www.ua.org)

These links are provided for your convenience and do not constitute an endorsement by EDD.

### **For the Career Professional**

The following codes are provided to assist counselors, job placement workers, or other career professionals.

<b>System</b>	<b>Code</b>
SOC – <a href="http://www.bls.gov/soc">Standard Occupational Classification</a> at www.bls.gov/soc	
Solar Thermal Installers and Technicians	47-2152
CIP – <a href="http://nces.ed.gov/pubs2002/cip2000/">Classification of Instructional Programs</a> at nces.ed.gov/ pubs2002/cip2000/	
Solar Energy Technology/Technician	150505
TOP – <a href="http://www.cccco.edu/Portals/4/AA/TopTax6_rev0909.pdf">Taxonomy of Programs</a> Taxonomy of Programs at www.cccco.edu/ Portals/4/AA/TopTax6_rev0909.pdf (California Community Colleges)	
Energy Systems Technology	094610

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