

Rooftop Solar Thermal Technologies

WHAT IS SOLAR THERMAL TECHNOLOGY?

Solar thermal technologies capture heat energy from the sun and use it to pre-heat water and air for homes, businesses, and industrial uses, such as crop and process drying. Solar thermal technologies can help residential, commercial and industrial buildings become more energy efficient, helping consumers and businesses save money, reduce greenhouse gas emissions, and support California manufacturing and installation jobs.

The potential for rooftop solar thermal technologies to reduce California's greenhouse gas emissions and natural gas use is especially great. California homes and businesses use 2.5 billion therms of natural gas annually simply for heating water (1). That is comparable to 3% of total statewide greenhouse gas emissions, and equal to the total storage capacity of natural gas in the state, including Aliso Canyon (2).

WHO USES SOLAR THERMAL?



Residential

The California Energy Commission estimates that 42% of residential natural gas usage is for water heating. Solar thermal can reduce a significant portion of this natural gas use—50% to 80% for an average residential solar heating systems. One of the fastest growing solar thermal markets is affordable housing.



Commercial

Many school, community and commercial pools are heated with natural gas. Solar can do most of that work by efficiently capturing the sun's heat. Hospitals, hotels, restaurants, and laundry facilities are also good commercial applications for solar thermal technologies.

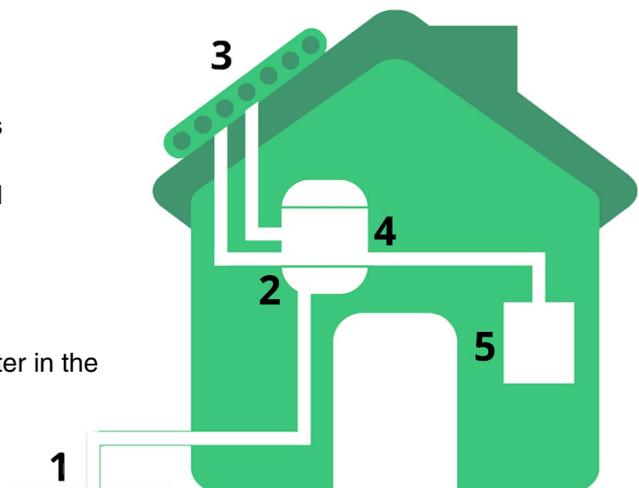


Industrial

Solar heating is used in large industrial applications, such as crop and process drying. When combined with chillers, solar heating can also provide air conditioning. The LA Valley College installed the largest solar thermal air conditioner in the U.S., in 2009.

HOW DOES SOLAR THERMAL WORK?

1. Cold water is drawn into the cylinder from the mains
2. Fluid is then transported to the rooftop solar thermal panels/collectors
3. Solar energy then heats the fluid
4. The heat from the fluid is then transferred to the water in the cylinder, which is then used in the home
5. A boiler can be used to heat water on cloudy days



SOLAR THERMAL TECHNOLOGIES IN CALIFORNIA

There are several types of solar thermal technologies. The most common type is solar water heating (SWH) which works like a conventional water heater, pre-heating water and storing it in a well-insulated tank. SWH systems operate in parallel with (and, in fact, can prolong the life of) a conventional water heater. When the consumer has a need for hot water, the solar-heated water is drawn first, saving the consumer 50-80% on energy costs (3). Another emerging technology, solar air heating, uses the sun's energy to pre-heat ventilation air. A third technology, solar cooling, combines hot water with chiller systems to reduce air conditioning loads. The Los Angeles Valley College has one of the largest such systems in the country.



Sources:

1. California Air Resources Board, "Climate Change Scoping Plans Appendices," available at http://www.arb.ca.gov/cc/scopingplan/document/appendices_volume1.pdf
2. Using a conversion factor of 0.005302 metric tons CO₂ eq/therm from U.S. EPA, "Calculations and References," downloaded from www.epa.gov/cleanenergy/energy-resources/refs.html, and 2013 total CA greenhouse gas emissions of 459.3 million metric tons CO₂ eq, <http://www.arb.ca.gov/cc/inventory/data/data.htm>; https://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/undrgrnd_storage.html
3. Department of Energy, <http://energy.gov/energysaver/estimating-cost-and-energy-efficiency-solar-water-heater>.

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