

Solar Collector

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Derivation: "solar" is from Latin solaris, of the sun; "collector" is from Latin colligere, to gather together.

Modules and collectors are two entirely different technologies that both make use of the sun's energy. Solar-electric (photovoltaic; PV) modules produce electricity, and solar *collectors* heat air or water. Residential solar collectors come in three categories—pool collectors, domestic hot water collectors, and hot air collectors.

Pool collectors are usually either rows of black plastic pipe or molded plastic, or synthetic rubber mats with small tubes integrated into the mat. These collectors do not generate high-temperature water, but that's not their job. Pools only need to be kept at about 80°F (27°C) for comfort. Heating to this relatively low temperature is what these simple collectors do best. A rule for system sizing is to use roughly the same collector area as your pool's surface area.

These roof-mounted polypropylene solar pool collectors offer a fast payback and easy installation.



Courtesy www.solarexpert.com



A flat-plate solar domestic hot water collector (left) and an evacuated tube collector (right).

A pump circulates water between the pool and the collector when sensors indicate to a controller that the water temperature in the collector is higher than that in the pool. Solar pool heating systems are some of the most cost-effective renewable energy systems available, perhaps only beaten in simplicity and effectiveness by a person getting warmed up by lying in the sun.

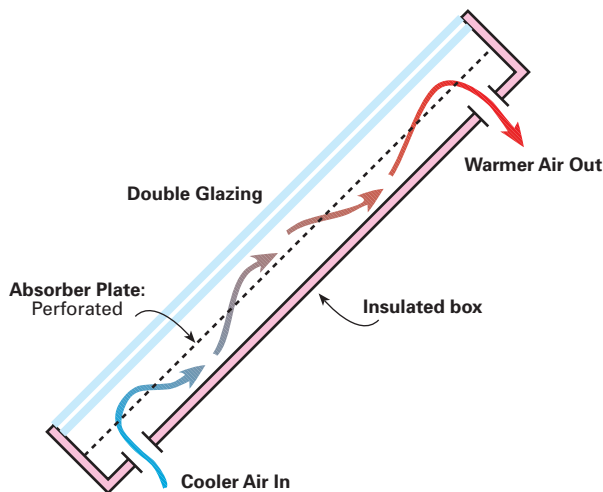
Solar domestic hot water (SDHW) collectors come in two types—flat plate and evacuated tube. In residential systems, both are designed to heat water for domestic uses, such as showering, and dish and clothes washing. They also can be used in conjunction with radiant floor space-heating systems.

Flat-plate collectors are simpler and less expensive than evacuated tube collectors, but larger, bulkier, and heavier for the same output. They typically consist of insulated metal boxes with glass tops, with a grid of tubes bonded to an absorber plate inside.

Evacuated tube collectors generally use double-walled glass tubes with a vacuum between the walls. A selective surface on the inner tube allows the sun's radiant energy to enter, but not so easily exit. The vacuum provides excellent insulation. Inside the tube, you'll find either water or a copper absorber plate filled with a heat-transfer fluid.

With either type of collector, heat is transferred from the collector to an insulated storage tank via pumps or by thermosyphon (passive transfer). Pumps can be powered directly by a PV module, or by AC or DC electricity from other sources.

Cutaway View of Solar Hot Air Collector



Solar hot air collectors look very similar to flat-plate hot water collectors. But instead of containing plumbing, the insulated box has a suspended black absorber plate that allows air to circulate around it. Openings in the box accept ducting that is routed through a home's roof or walls, and into the living space.

Sensors and controls operate a blower, which turns on when the collector's temperature is higher than the home's temperature. Colder air from inside the home is pulled into the collector, and heated air from the collector is vented into the room.

Heating your home, pool, or domestic water with the sun's energy can be cost effective and rewarding. After insulating your home and incorporating any passive solar design features, solar heating is an excellent next step. In fact, producing solar heat is generally more cost effective than producing solar electricity. There's no shortage of sunshine—you just need to invest in the collectors to harvest the sun's energy and use it!

Access

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