

Build a Solar Heater

Gary Reysa

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for \$350

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After walking into our new workshop one December morning and finding the inside temperature to be a bone-chilling 10°F (-12°C), I decided that it was time for a heating system! Given the rising costs of propane and our environmental concerns about using nonrenewable fossil fuels, a solar solution seemed fitting.

I reviewed many solar collector concepts, and finally decided to install a thermosiphon air collector on the south wall of the building. The concept is elegant and simple. A thermosiphon design uses only the buoyancy of heated air to circulate air through the collector, eliminating the cost, maintenance, and energy consumption of fans, sensors, and controllers commonly used in other collector designs. On a sunny day, in a cold climate like ours here in Bozeman, Montana, this simple system can produce the heat equivalent of burning about 2 gallons (8 l) of propane.

To minimize material use, I integrated the collector within the building's structure. I also tried to make the collector easy to construct using readily available materials. In fact, making this collector should only take one trip to the hardware store and US\$350. Set aside two or three days to complete the project.

How It Works

The thermosiphon collector consists of clear, corrugated polycarbonate panels fastened to vertical 2 by 6s. The clear panels, on the building's south face, admit sunlight. An

absorber—in this case, two layers of black metal window screen—suspended inside the collector captures the sun's heat energy. The air around the mesh expands and rises as it warms, creating a convection current. Vents located at the top and bottom of the collector allow air to circulate and become heated. Cool air enters the lower vent, is heated by the absorber, and rises through to the upper vents that exit into the building's interior. This circulation of air continues as long as the sun shines on the collector.

Materials used to construct the thermosiphon collector can be found at most lumberyards and hardware stores.

