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## Solar Power Goes Prime Time

When it comes to renewable energy, you want to do the right thing (if you're like most homeowners). But you also want to be sure the options you choose are reliable and affordable. You owe it to yourself to learn about the improvements in solar power -- and the tax credits and rebates that are helping make it affordable for you and your family.

By Greg Cook

Amy Whalen and her sons Orlando, 6, and Angelo, 4, are the new owners of this Habitat for Humanity house, equipped with electricity-generating photovoltaic panels and solar thermal collectors for heating water. Photo by Amy Glickson, courtesy of National Renewable Energy Laboratory

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### Two Solar Technologies You Need to Know About Now

Want to reduce your need for conventional water heating by at least half and minimize your personal impact on the environment at the same time? You can do both today with a solar water-heating system.

Interested in actually seeing your electric meter spin backwards while your home generates more electricity than it consumes at times of low energy use? This is possible with photovoltaic solar panels.

Solar water heating is already economically feasible. Generating your own electricity with photovoltaic solar panels, however, still costs more than it would to buy power from your utility. But keep in mind that when building or buying a new house, solar can be folded into the mortgage, so you can conceivably save more in energy costs than shows up in your higher monthly payment.

According to the U.S. Department of Energy, both solar water heating and photovoltaic panels are reliable and easy for the building industry to install (there's even a new do-it-yourself kit for solar water heating on the market [www.fafco.com](http://www.fafco.com)). The DOE's Solar America Initiative has set a goal to make solar energy totally cost competitive by 2015. In the meantime, tax credits at the federal, state, and local levels are succeeding in encouraging homeowners to adopt solar technologies now.

Workers install the array of photovoltaic panels and solar thermal collectors that provide electricity and hot water to the Whalens' house. Photo by Pete Beverly, courtesy of National Renewable Energy Laboratory

### Solar Water Heating

Using solar power to heat water for swimming pools has been common in Sunbelt states for years. The pool pump sends cold water from the pool to solar collectors, where the water absorbs heat from the sun and then flows back to the pool. This dramatically reduces, or even eliminates, the cost of warming water for a swimming pool.

Solar water heating systems for potable water (water that is safe to drink) typically have two main parts: a solar collector and a storage tank. The sun is used to heat water or a heat-transfer fluid.

- Direct circulation systems pump potable water through the collectors and then store it in a tank, which could be a modified standard water heater tank.
- Indirect systems pump heat-transfer fluid through the collectors, and then transfer the heat to potable water through a heat exchanger. In colder climates, a drainback system keeps water from freezing in outdoor



pipes.

PATH (Partnership for Advancing Technology in Housing) says the material cost and professional installation of such systems range from \$2,500 to \$3,500. (Such systems produce about 80 to 100 gallons of hot water per day.) Because solar water heating requires very little electricity to operate and burns no fossil fuels, it offers an environmentally sound way to heat water. [10 Tips for Energy Efficiency](#)

Photovoltaic roofing shingles manufactured by United Solar look like conventional roofing but provide electricity at the rate of 17 watts each. Photo by Stellar Sun Shop, courtesy of National Renewable Energy Laboratory



[Green Building and Remodeling Materials](#)

## Solar Electricity Generation

The process of converting light to electricity is called the photovoltaic effect. It's like a tree leaf absorbing solar energy for photosynthesis. Here's how it works:

Sunlight is absorbed by a cell that allows electrons to separate from their atoms and flow to produce electricity. Solar cells are grouped together in flat plates called modules, and several modules connected together are called an array. Several such arrays produce enough electricity for a household. Thin-film solar panels are even made to look like shingles so they blend in with traditional roofing.

Some states have net metering, which simply means you get a credit back from your utility for the power you produce that exceeds what you use. This applies to a home system that produces more power than it needs during the day and sends it back to the electric grid. At night, the house draws power from the grid.

Turning sunlight directly into electricity with photovoltaic cells is becoming more efficient, which means fewer cells are needed to produce the same amount of power. This improvement in efficiency is bringing down the cost.

According to the DOE's National Renewable Energy Laboratory, the installed cost of a 2-kilowatt system that will offset the needs of a very energy-efficient house will be from \$16,000 to \$20,000. If electricity for such a home costs \$100 per month, the system would pay for itself in about 15 years (or fewer if your utility offers net metering).

Thermal collectors from Solar Industries atop the shade structure heat the water for this lap pool. Photo by Gen-Con, Inc., courtesy of National Renewable Energy Laboratory



[Federal Tax Credits for Energy Efficiency Database of State Incentives for Renewables and Efficiency](#)

## Tax Credits for Solar

Tax credits on your federal income tax are a big deal, and they've recently been extended for a year. They're now available for solar improvements made to your home between January 1, 2006 and December 31, 2008.

These credits can amount to 30 percent of what you spend -- with a cap of \$2,000 for solar water heating and \$2,000 for photovoltaic equipment. If you install both, you can get a \$4,000 credit. (Qualifying improvements do not include a hot tub or swimming pool.)

Refunds and tax incentives at the state level and for local utilities vary, but they can be substantial. The state of New Jersey offers homeowners up to a whopping 50 percent in rebates for solar systems. Arizona and California also are big supporters of solar. Tax incentives could include exemption of sales tax or property tax. See the Web sites below for more information on this topic.

[Alliance to Save Energy](#) [BP Solar Savings Estimator](#) [A Consumer's Guide to Buying a Solar Electric System](#) [National Renewable Energy Laboratory](#) [PATH: Partnership for Advancing Housing Technology](#) [Photovoltaic Electricity Generation](#) [Solar Water Heating](#)

## Online Resources for Solar Energy

