

Go Solar with Copper

Copper plays key role in the production of solar thermal technology

Heating a home accounts for the lion's share of a typical utility bill. According to the 2007 Buildings Energy Data Book, nearly 43 percent of the average household bill is spent on heating one's home and water supply.

One cost-efficient solar technology that is gaining popularity and offering some financial relief is solar thermal water heating.

Basically, a solar thermal water heating system provides heat for water, space or even the swimming pool by using the sun to heat air, or a fluid which acts as a heat transfer medium, that transfers the heat from the sun to your home through a series of copper tubes.

While there are a variety of components and systems on the market, one ingredient remains the same: copper. Because of its superior thermal conductivity, copper lends itself perfectly to solar [technologies](#).

"There have been improvements in system design over the years, but copper appears to be the standard," said senior research analyst for the Florida Solar Energy Council, John Harrison.

Active solar thermal heating systems begin with solar thermal collectors. These collectors absorb energy from the sun. A heat-transfer fluid then transfers the heat from the collectors through a heat exchanger coil immersed in a storage tank where it will be distributed to its final destination. This process can be used to heat potable and non-potable water that flows into your home as well as the water that fills your pool.

In discussing the materials that make up a system, Harrison emphasized copper's "heat-transfer capabilities", which make it ideal for solar collector applications. According to the analyst, aside from possessing superior thermal conductivity, the metal's "durability and long-life span are preferred for the transport (piping) systems." The desirability of copper for use in these applications is further enhanced by the fact that copper not only is 100 percent recyclable, but much of the tubing and piping in circulation today is made from recycled copper.

"Solar systems encounter some pretty harsh environments as far as heat and water pressure are concerned," Harrison said. "The use of copper has been, and it appears will continue to be, the material of choice for the system piping – both for the collection and for the transport functions in these systems."

"We use copper exclusively in all our absorber construction because copper is the best [conductor](#)," said Billy Byron, managing partner of Alternate Energy Technologies, LLC, Jacksonville, FL. "Copper conducts twice as much heat as aluminum or other metals.

The more heat that is absorbed via the copper, the more heat that is transferred to the storage tank.”

There are several different types of solar thermal systems, passive and active. Passive solar thermal systems have no pumps or controls to circulate hot water, and active systems use pumps to circulate the water, or a heat transfer fluid that runs through the solar thermal collector. Deciding which system is best for your home depends on two factors: the type of climate in which you live, and the size of the space you’re trying to heat.

“Some collectors that have been developed use plastic materials as the absorber, but the vast majority still uses copper,” Harrison said.

“Copper really suits solar thermal production perfectly,” said Robert Weed, vice president at the [Copper Development Association](#). “Regardless of what new technology comes along, expect copper to remain an integral part of most systems.”

Installing a solar water heating system is best left to the licensed professional. Today, as an incentive to homeowners to make the switch to this technology, local and state governments are making funds available to defray—or in some cases cover—the cost of converting to these efficient systems. In fact, some utility companies also are offering additional rebates when installing a new system.

According to ENERGY STAR, a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy, installing a solar thermal system will cut your annual water heating costs in half, and can eliminate 4,000 pounds of carbon dioxide emissions annually (the equivalent of not driving your car for four months out of the year).

It’s not at all surprising that a metal which is known for its green characteristics would also be an enabling component in the successful operation of solar thermal energy production.

While some may advocate the use of alternative metals in the creation of these systems, it’s important to remember that there also will be a reduction in the quality of performance with such a switch. “Many entrepreneurs will try to substitute cheaper, inferior materials,” Byron said. “But in doing so, they’re also decreasing the performance and life expectancy of the finished product.”

Visit our blog www.coppertalk.org

Follow us on Twitter <http://twitter.com/coppertalk>