

## Solar water heating has potential to reduce GHG emissions in U.S.

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Heating water with solar thermal in the United States could save consumers US\$8 billion a year in retail energy costs, according to a report prepared for the Department of Energy.

“Solar water heating represents a significant opportunity to reduce natural gas use in the building sector” where a large fraction of water heating energy is derived from natural gas, either from direct use or from electric water heating, where natural gas is the marginal fuel for much of the year, explains ‘The Technical Potential of Solar Water Heating to Reduce Fossil Fuel Use & GHG Emissions in the United States.’ Greater use of solar thermal could reduce annual CO2 emissions by 50 to 75 Mt and protect against fuel price escalation.

“Use of solar water heating in the U.S. grew significantly in the late 1970s and early 1980s, as a result of increasing energy prices and generous tax credits,” it notes. “Since 1985, however, expiration of federal tax credits and decreased energy prices have virtually eliminated the U.S. market for SWH.”

Recent increases in energy prices, concerns of GHG emissions and improvements in solar heating systems “have created new interest in the potential of this technology,” it continues. “One of the readily deployable technologies available to decrease use of natural gas is solar water heating.”

The Department of Energy projects imports of liquefied natural gas to increase 500% by 2020.

Further analysis of the availability of roofs would provide greater understanding of the potential of solar water heating and, “even applying conservative assumptions for rooftop availability, there are clearly significant opportunities for SWH in both new and retrofit markets,” the 21-page report explains. “The relatively short life of conventional electric and gas water heaters (10-15 years) provides significant opportunities for ongoing end-of-life retrofits with SWH units.”

“The actual potential of SWH depends largely on economic and market barriers to the deployment of current and future SWH systems,” it concludes.

Energy used for water heating in the U.S. is a “significant fraction” of the total energy demand, at 12% of total residential energy expenditures. Much of the existing market for SWH is swimming pool heating and domestic SHW systems in Hawaii, which has state and utility incentives as well as the highest energy prices in the country.

“Beyond standard economic metrics such as payback time or return on investment, there are a number of factors that may limit adoption of SWH,” including the fraction of buildings not occupied by owners. One study of the roof area available for solar PV estimates that 22% of residential and 65% of total roof area on commercial buildings is available for solar installations, but the smaller size of SWH systems would allow a greater fraction of buildings to deploy SWH (a typical residential SWH system occupies 64 ft2 of roof space, while a typical residential PV system occupies 400 ft2).

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**SolarEM**

**solar energy marketing, inc.**  
P:678-261-4650 F:678-799-7588  
info@solarenergymarketing.com  
www.SolarEM.net