

Whatever happened to solar hot water? 2005

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At the turn of the century (1900), solar hot water was in the ascendant in the U.S., and by the turn of the next century (2000) solar hot water was a fact of life in Cyprus (95% of homes), Israel (90%), but had virtually disappeared in the U.S. (~2%). Photovoltaic systems that are ten times as costly and one fourth as efficient are now widely accepted and desired by increasing numbers of residential and commercial customers, but solar hot water remains in limbo. What went wrong and what can be done about it?

The mystery of solar hot water's disappearance has been a "cold case," attracting no attention from the energy pundits, politicians, and news media. Perhaps if we asked CSI to investigate we could find out why such an attractive and effective solar solution is missing in action. The CSI team would find a complex set of disincentives and perverse incentives that have made solar hot water appear unattractive and consigned it to a small niche market – when common sense and conservative economics suggests it should be an integral part of virtually every home in the Sun Belt and many homes in sunny, colder climates.

The fundamental problem is the poor accounting we do today in determining the true cost of energy. If we count the full costs of fossil fuel burning (environmental and health impacts, global warming) we would see solar hot water start to appear. However, several other factors have also contributed to the surprisingly weak demand for domestic solar water heaters. These include the developer driven housing market (to whom first cost is key, not reduced operating cost for homeowners or Society); the regulated utility systems (rewarded for building power plants not installing solar applications even if they are more cost effective); subsidies for fossil fuels and nuclear plants; and profound ignorance about solar hot water among the building industry, regulatory agencies, banks, design firms, and homeowners. There are also still faint memories of flawed early active solar water heating systems (1970s) that froze, failed (controls, pumps), fell apart, or simply got in the way when it was time to reroof.

In many ways it has been a virtual perfect storm of obstacles, with very little commitment from manufacturers to re-energize the market. The Japanese parent company that owns Rheem (the owner of Solahart) may find that it makes more sense to sell gas water heaters that must be replaced more often. Other small manufacturers find it hard to sell the volume needed to reduce prices. As a result solar hot water systems are usually installed as an “unusual” niche item, driving up the cost and the challenge of installation.

You might argue that PVs are only popular because there are tax incentives (subsidies to offset subsidies), and you would be partly correct. But even PV with tax incentives is usually less economically desirable than solar hot water systems, particularly simple integral systems. For example, a building

integrated integral solar hot water system installed in Village Homes (Davis, CA) is now in its 29th year of service. One of the six tanks recently developed a small leak and was bypassed at very low cost. Over the 29 years of service this system has provided about 290 mBTU of solar energy. The original cost was less than a \$1000 for a cost of about a penny per kwh equivalent.

To bring solar hot water back into the market we need to rethink our approach. First we need to do our accounts properly (solar hot water 2-10¢ kwh equivalent v/s fossil fuels 6-20¢kwh). Second we need to provide mechanisms that reward utilities for installing solar hot water, as one Florida utility already does, by encouraging or requiring them to install solar water heaters and then charging for the system at standard prices as the solar energy is delivered. This is much easier today thanks to telemetering advances. We also need to accelerate real time metering and time of use based costs, this makes solar hot water look even better because it helps reduce demand at the critical August afternoon peak periods.

An educational outreach program for the key stakeholders is also needed. This has to address both the new housing market and the much larger retrofit market. Banks should be encouraged to reward builders that install solar hot water with a instantaneous back up water heater by offering buyers a better loan package, recognizing their reduced utility costs. Retrofitting older subdivisions, rather than one house at a time, will also be important. This would probably be easiest for a utility company, but an innovative solar provider could also find the best street orientations, best home layouts (least obstacles, shortest pipe runs) for minimal installation cost, and pop in 200, 500 or 1000 solar water heaters in a few days.

Everyone wins with solar hot water. The simplest solutions are often best, integral systems or thermosiphon systems; but active systems, evacuated tube collectors and heat exchangers can make solar hot water feasible in almost any climate. We don't need 3,000 a year or 10,000 a year, but a million a year or three million a year. As we pass Hubbert's Peak of world oil production we have no viable alternative but to finally get smart and return to solar water heating.