



solar hot water



two flat-plate panels installed on a private house in Buckinghamshire. The panels are approximately 1.4 square metres each, making them easy to transport, and to lift onto the roof.

what is it?

Also known as 'solar thermal', a domestic solar hot water system is one which absorbs the sun's energy and transfers it to a storage cylinder. It is different from photovoltaics; solar hot water panels do not produce electricity, they heat water directly.

In the UK it will not be the sole provider of hot water; it will complement a conventional system using gas, oil, electricity or solid fuel, but it will pre-heat water so that bills are drastically reduced. During summer months the system can provide all the hot water needed by a household.

Panels can either transfer heat to a separate pre-heat cylinder, or heat a twin-coil cylinder via the bottom coil.

In a *direct* system, the water that passes through the panels eventually comes out of the hot tap. In this type of system, there are issues around the water in the panels freezing in winter (they need to be drained) and lime-scale build-up; in an *indirect* system, the water in the panels passes through a heat exchanger (coil) in the cylinder and then back to the panels in a continuous loop. Anti-freeze can be added, and there is no problem with lime-scale build-up.

The two main types of collectors are flat-plate and evacuated tube. Flat-plate collectors heat the water directly, evacuated tubes contain a fluid which evaporates at low temperatures,

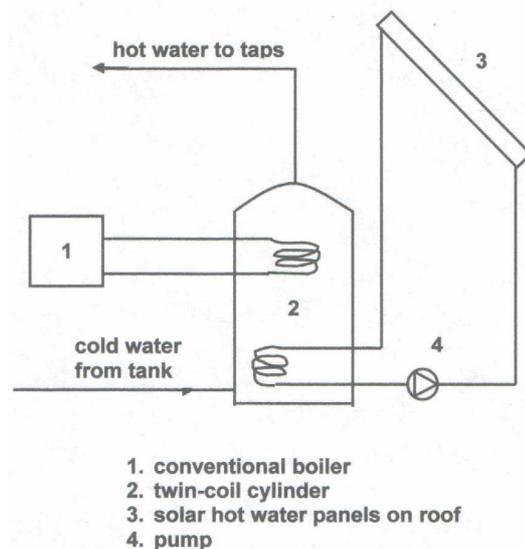
and the resulting gas rises and condenses on a manifold, transferring its heat as it does so.

what are the benefits?

Solar hot water, along with photovoltaics, wind power, hydro, wave and tidal power and geothermal energy are renewable energy sources which don't involve the burning of fossil fuels, and its associated problems.

Burning fossil fuels releases nitric oxides, nitrogen dioxide and sulphur dioxide into the atmosphere. This causes acid rain which damages forests, wildlife and human health; it also releases carbon monoxide, nitrous oxides, lead, particulates and hydrocarbons, which pollute the atmosphere, and cause damage to plants and ecosystems, and human health, especially respiratory problems. The burning of fossil fuels adds an extra 5 billion tonnes of carbon dioxide into the atmosphere each year. CO₂ is an important greenhouse gas. In pre-industrial times there were 290ppm (parts per million) of CO₂ in the atmosphere; now it is over 380ppm, and increasing by 2ppm per year.

Most scientists agree that the increase in the amount of greenhouse gases in the atmosphere is raising the earth's temperature, and that it could rise between 1-



a typical indirect solar hot water system: the gas boiler will kick in if the solar coil doesn't raise the temperature of the water enough.



4°C in the next 100 years (there is only a 5°C difference between now and the last ice age); this would mean lower overall global rainfall, global biomass reduction and extinction of many species, and for humans it would mean desertification, famine, forest fires, increase in tropical diseases, and flooding due to the melting of polar ice.

what can I do?

Solar hot water is probably the most cost-effective renewable energy technology that you can install in a domestic situation in this country, with the shortest payback time. A DTI investigation into solar hot water systems in the UK from 1970-2000 found that a typical system will provide 72% of a household's hot water over the course of a year (c. 15% in winter and 100% in summer). This is assuming that the roof is south-facing – although if it faces south-east or south-west there will only be a 5% loss of efficiency.

The first thing to do is to choose either evacuated tubes or flat-plate collectors. Installed prices for both are typically in the range £2500 to £5000. If you choose flat-plate, make sure that the collectors have a selective surface – a special coating that maximizes the absorption of solar radiation



entire system including twin-coil cylinder, expansion vessel and pump & control set

and minimizes re-emission; in the UK's climate, selective surface flat-plate collectors are only slightly less efficient than evacuated tubes. However, there is more to go wrong with evacuated tubes, and there have been quality issues. Try asking the salesman for a copy of the product's EN12975 test report, and remember that cheap doesn't always mean good value.

You can buy a system installed, self-build and install, or self-build and then have your system installed by a professional. There are often government incentives to install renewables. For solar thermal, the latest is the Renewable Heat Incentive (see below).

There are (cheaper) special systems for swimming pools, consisting of a large area of black tubing.

resources

courses

- LILI - see below
- Centre for Alternative Technology (01654) 702400 cat.org.uk

books

- Home and Geddes, 2000, *Tapping the Sun: a solar water heating guide*. From CAT publications – see above
- Paul Trimby, 1998, *Solar Water Heating: A DIY Guide*, CAT publications (see below)
- *Self-build Solar Hot Water Manual*, LILI
- these books and more available from LILI

web

- National Energy Foundation – information and advice about renewable energy: nef.org.uk or 01908 665555

suppliers / installers

- norfolksolar.co.uk - LILI's tutor
- National Energy Foundation (above) for a list of suppliers / installers

grants

- decc.gov.uk / 0300 060 4000 - ask / search for Renewable Heat Incentive

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