



# solar hot water



LILI



*four flat-plate panels installed on a private house in Lincolnshire. The panels are approximately one square metre each, making them easy to transport, and to lift onto the roof.*

## what is it?

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 is the water that eventually comes out of the hot tap. In this type of system, there are issues around the water in the panels freezing in winter (so 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; their extra complexity is reflected in their price.

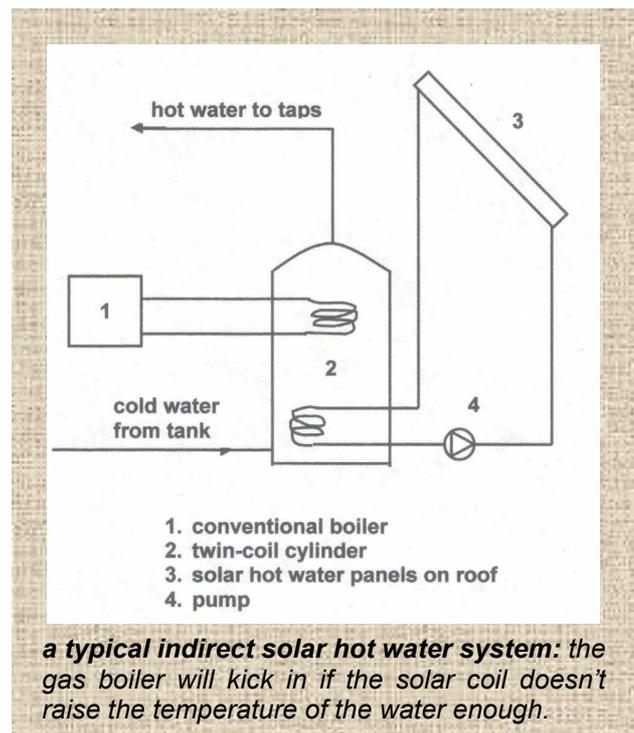
## what are the benefits?

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. CO<sub>2</sub> is an important greenhouse gas. In pre-industrial times there were 290ppm (parts per million) of CO<sub>2</sub> in the atmosphere; now it is 370ppm.

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 1-4°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 evacuated tubes are typically in the range £3500 to £8000; flat-

plate typically £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 and minimizes re-emission; in the UK's climate, selective surface flat-plate collectors are only slightly less efficient than evacuated tube, but much cheaper, and if you require more hot water, you can add another panel.

You can buy a system installed, self-build and install, or self-build and then have your system installed by a professional. Government grants of £400 are available for systems (self-built or off-the-shelf) installed by a professional (see below).

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

## resources

### courses

- self-build: LILI - see below
- general: Centre for Alternative Technology (01654) 702400 [www.cat.org.uk](http://www.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* – £6 from LILI

### web

- National Energy Foundation – information and advice about renewable energy: [www.nef.org.uk](http://www.nef.org.uk) or 01908 665555

### suppliers / installers

- LILI supply solar hot water kits
- National Energy Foundation (above) for a list of suppliers / installers

### grants

- [www.lowcarbonbuildings.org.uk](http://www.lowcarbonbuildings.org.uk) 0800 915 0990; government grants for installation



course participants assembling their own panels.

Contact us or visit our website to find out more about our factsheets, manuals & books, residential weekend courses, presentations and shop. You can also become a 'Friend of LILI', and receive our biannual newsletter, discounts on our courses, and help us to make a difference.

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