



Centre for  
Alternative  
Technology

# SOLAR WATER HEATING

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## Solar Water Heating or Solar Electricity?

These are two very different technologies. To produce electricity you need 'photovoltaic' (PV) solar panels, which are a much more expensive option than solar water heating. See our **Solar Photovoltaic Power** information sheet for details.

## How does solar water heating work?

Solar collectors, or panels, are designed to absorb as much of the sun's heat as possible. They contain water, which once hot usually travels to a coil in a hot water cylinder and transfers the heat to the water there - known as an 'indirect' system.

In 'direct' systems, water from the panels goes straight into the cylinder - these are generally unsuitable for areas with very hard water.

Solar water heating panels should provide most of the hot water needs of an average household for the sunniest four or five months of the year. The rest of the time they will contribute to the heating needed. Over a whole year, about half of your hot water will have been heated by the sun.

In most cases solar water heating panels will not provide space heating because there isn't sufficient sun in the winter, when you need heating most (although on a bright, clear winter's day they can make a welcome contribution). Some panels will need to be drained in the winter months to avoid frost damage. You can also use solar water heating for swimming pools.

## Why install a solar water heating system?

Installing solar water heating has considerable environmental benefits and reduces the carbon dioxide emissions caused by burning fossil fuels. It's a really good way to make your home more environmentally friendly, and can also save you money - a properly installed solar water heating system should pay for itself within its lifetime.

## Is my roof suitable?

Ideally, solar panels should be south-facing and free of shade, at an angle of between 20 and 50 degrees. Panels facing south-east or south-west will also operate efficiently. Rooftop panels are the most common, but they can also be mounted at ground level. You will need about 1m<sup>2</sup> per person.

## How will a solar panel feed in to my existing heating system?

You need to have a conventional water heating system as well, such as a gas, oil or wood fired boiler (or even just a back-boiler on a wood stove), to top up the heat from the panels when necessary and provide hot water and space heating in the winter. If wood fuel comes from a sustainable source it will not contribute to climate change when burned, as the carbon dioxide released will be absorbed by replanted trees. See our **Wood Fuelled Home** information sheet for advice.

You can add solar panels to most existing hot water systems, though you will usually have to add an additional 'pre-heat' water cylinder or change your existing one to a twin coil cylinder. You may need a pump to circulate the water, and some regulating equipment to prevent overheating.

It is more difficult to use solar water heating with a 'combi' boiler because they are designed to take cold mains-pressure water, and solar systems supply hot or warm low-pressure water (although new modulating combi boilers will accept pre-heated water). Check with the boiler manufacturer or a solar engineer to see if your boiler is suitable.

If your boiler needs replacing, a condensing boiler is the most efficient type - for further details ring your local Energy Efficiency Advice Centre (Freephone 0800 512 012). Condensing boilers are more expensive but the savings on fuel should compensate for the extra cost within a few years - and from then on you're saving money and fuel! Do also make sure that your cylinder is well-insulated, with a good thick cosy jacket.

For further information our booklet **Tapping the Sun** is an invaluable guide to choosing and installing a solar water heating system, and describes how to choose a system that is right for you, and how it will fit into your plumbing system. See the CAT Publications list for further details.

## How much will it cost?

There are two main types of commercial solar water heating panel available - flat plate and evacuated tubes. Evacuated tubes are slightly more efficient, so you would need a smaller

surface area than with a flat plate system. Tube systems are also slightly more expensive. The cost of a commercial flat plate system including installation, for an 'average' house ranges from about £2,500 to £4,000. Evacuated tube systems usually cost from £3,500 to £5,500. If the cost seems high check what it includes - for example, scaffolding can be expensive if your roof is hard to access (putting systems in to new buildings, or on new roofs obviously saves costs). If you spend a lot installing a system you may not necessarily get your money back within its lifetime (though it would still have environmental benefits).

To work out if a solar water heating system is worth installing from a financial point of view, you need a rough idea of how much you spend on hot water throughout the year, and when you use it. You can then work out how long it would take to get back your investment in solar panels. As electric heating is more expensive than gas, a solar water heating system will recover its costs more quickly if you have electric water heating.

There are a few grants to help with the initial capital needed to install a solar water heating system. The **Low Carbon Building** scheme covers the UK, but there are sometimes local grants, which may be additional to the Low Carbon grants, or might be more generous. See below for contact details.

### **So how do I get a system installed?**

There are lots of solar water heating installers around, so it is always worth getting a few quotes to compare prices. Don't be pressured into signing something by door to door salesmen or companies offering 'special discounts' - they may not offer as much of a saving as it seems.

You can get a list of grant-accredited installers from the Low Carbon Buildings scheme (see below). Alternatively, you could just look under 'Solar' in the Yellow Pages.

Personal recommendation is usually a good way to find an installer. Beyond this, membership of a trade body is a good sign of competence, as they will have certain codes of conduct. The Solar Trade Association, IDHEE and similar bodies maintain lists of their members (see below).

### **Can I make and install panels myself?**

You can also build and install your own DIY solar panels using old radiators or aluminium fins on copper pipes. These DIY panels can be installed for anything from around £500 upwards.

We publish an explanatory booklet called **Solar Water Heating: A DIY Guide** (it's worth getting **Tapping the Sun** too for information about how to fit it into your plumbing system).

If you have good plumbing skills then you may be considering buying and installing a system yourself. However, as you'd not be able to claim a grant and you'd have to pay full VAT, do think carefully about whether it is the best option.

### **Further Information:**

For details of the CAT publications mentioned see the relevant leaflets or [www.cat.org.uk/catpubs](http://www.cat.org.uk/catpubs)

CAT runs many residential courses, including some on solar water heating. For details, see [www.cat.org.uk/courses](http://www.cat.org.uk/courses) or ring 01654 704952.

We have many solar water heating systems on display here at CAT. To find out about visiting us, see the relevant leaflet or [www.cat.org.uk/visitus](http://www.cat.org.uk/visitus)

### **Grants & Trade Associations:**

**Low Carbon Buildings** *Tel: 0800 915 0990; web: [www.lowcarbonbuildings.org.uk](http://www.lowcarbonbuildings.org.uk)*  
UK-wide grant scheme supporting domestic and larger scale renewable energy systems.

**Energy Saving Trust**  
*Freephone: 0800 512 012; web: [www.est.org.uk](http://www.est.org.uk)*  
Can help you take energy efficiency measures and give details of any local grants.

**Solar for London**  
*Tel: 020 7089 6989; [www.solarforlondon.org](http://www.solarforlondon.org)*  
Grants for London (additional to above scheme)

**NIE Your Energy**  
*Tel: 08457 455 455; [www.nie-yourenergy.co.uk](http://www.nie-yourenergy.co.uk)*  
Grants for Northern Ireland (additional to LCBP)

Alternative grant scheme in Scotland:  
**Energy Saving Scotland Renewables Grants**  
*Tel: 0800 512 012; web: [www.est.org.uk/schri](http://www.est.org.uk/schri)*

**Solar Trade Association** *Tel: 01908 442 290; Web: [www.solar-trade.org.uk](http://www.solar-trade.org.uk)*  
Trade body who promote high standards of service in the solar water heating industry.

**The Institute of Domestic Heating & Environmental Engineers (IDHEE)**  
*Tel: 02380 66 89 00; Web: [www.idhee.org.uk](http://www.idhee.org.uk)*  
Professional body promoting the installation of safe and energy efficient central heating systems.

**Association of Plumbing & Heating Contractors**  
*Tel: 024 7647 0626; Web: [www.aphc.co.uk](http://www.aphc.co.uk)*  
Plumbing industry trade association. Members give a warranty on work done.

**Institute of Plumbing & Heating Engineering**  
*Tel: 01708 472 791; Web: [www.ciphe.org.uk](http://www.ciphe.org.uk)*  
Trade body. Members must prove competence through recognised qualifications or experience.