

Solar Hot Water (SHW)

What is Solar Hot Water (SHW) technology?

Solar Hot Water technology utilises radiation for heating water. Thus, the abundant free energy from the sun can be harnessed to meet part of the domestic hot water demand and reduce the consumption of conventional fuel, which causes climate change and pollution.

The UK receives vast amounts of solar energy which on average equals 60% of the annual amount received on the equator. The available range of high quality products enables householders to make effective use of the Sun. Thus, even in the spring and autumn and on clear winter days the solar hot water system can be useful.

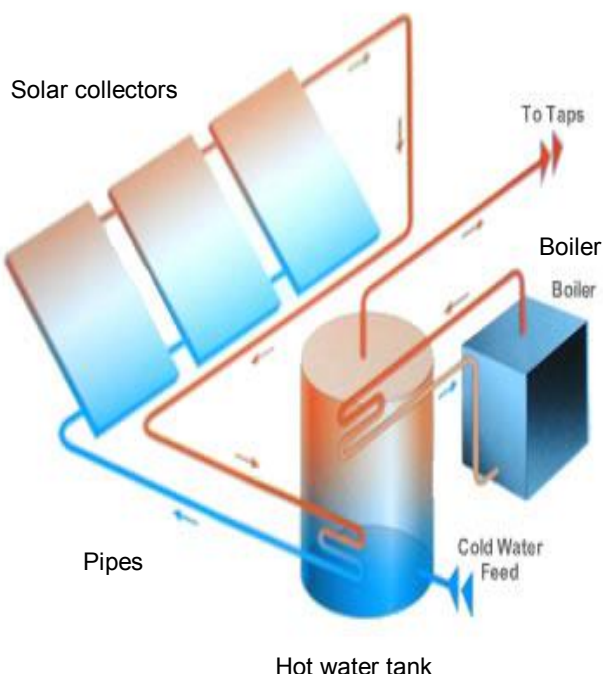
The systems consist of solar collectors, a preheat tank (optional), a pump, a control unit, connecting pipes, the normal hot water tank (or a replacement tank from £250), and a conventional heat source (a standard solar system in the UK cannot provide enough heat to supply hot water at the desired temperature, throughout the year). Solar Hot Water systems will typically convert 40 to 50% of the solar energy falling on the solar collectors into useful heated water.

Are SHW systems suitable for domestic use?

SHW technology is ideally suited to use on residential buildings, providing hot water. The use of active solar heating in households has grown substantially in the UK over the last few years, with many examples already in operation (see photo). SHW systems can be incorporated into buildings in various ways. Sloping rooftops are an ideal site, where collectors can simply be mounted using frames. Systems can also be incorporated into the actual building/roof fabric. In most SHW systems, only the collectors are visible. They look similar to dark roof lights. The overall area of the collector array may be typically 3-4 square metres.



How does a typical system work?



The principle is straight forward. When the sun is shining, water is pumped through the [solar panel](#) and is heated by solar energy. This heated water then flows through a heat exchanger, warming the water stored in the [hot water cylinder](#). If necessary, a boiler provides top-up heating.

An electronic controller constantly compares the temperature of the solar collectors with the temperature of the water in the cylinder. Whenever the collectors are hotter than the cylinder, the controller switches on the system's circulating pump. A mixture of antifreeze and water is then circulated through the collectors and the cylinder's heat exchanger, heating the cylinder in just the same way as a central heating boiler.

In the summer the water in the cylinder can reach a temperature of 80 deg C within half a day, and the insulation on the cylinder will keep the water warm for the next day. Typically the solar hot water system will reduce your domestic hot water bill by 50%.

Where to put an SHW system?

A house roof is ideal for installing an SHW system – there is plenty of ‘unused’ space, the visual intrusion is minimal, and direct exposure to sun light is the greatest. Roof conditions of course vary and several key factors should be taken into consideration when assessing the solar potential of your home:

- **Orientation** - SHW systems are most effective on roofs facing south, south-east and south-west (up to 95% efficient). In the UK, a north-facing SWH roof system will operate at about 60% efficiency
- **Tilt** – SHW systems can be installed on any flat-surface roof. Ideally the roof should be sloped to maximise exposure to solar radiation and to allow the rain to wash the dust off the collectors.
- **Available area:** SHW systems can take up from 1 m² to more typically 2-4 m²
- **Shadowing** – preferably the roof will not be shaded tall trees or neighbouring buildings

Types of solar collectors

There are two main types of solar collector conventionally used for domestic SHW systems:

- Evacuated tubes



- Flat plate collectors



Planning permission

SHW roofs do not usually require planning permission and typically fall within what is known as "permitted development rights". However, if you live in a house divided into flats or the building is listed or in a conservation area you should call your council to check on local policy.

What is the energy contribution of an SHW system?

For a family of four, a well designed Solar Hot Water system should contribute between 1,500kWh and 2,000kWh, which will be equivalent to 40% to 50% of the household's water heating energy needs. The value of this saving will depend on the type of energy displaced (natural gas or electricity).

Costs

The typical installation cost for a domestic flat plate collector system is £2,000 - £3,000. Evacuated tube systems will cost £3,500 - £4,500.

Grants

Currently, the Government offers straightforward grants for active solar heating installations through the Low Carbon Buildings Programme. The grant maximum is £400 regardless of size subject to an overall 30% limit (exclusive of VAT).

For more details visit: www.lowcarbonbuildings.org.uk or call 0800 915 0990. Typically the supplier/installer will help you with the grant application. Alternatively, The Oxford Solar Initiative will assist you with that – call 01865 252197

What are the benefits of an individual domestic Solar Hot Water system?

- Provides you with your own clean source of hot water that also helps reduce global warming
- Reduces your energy bills, since sunshine is free
- Increases the value of your property
- Extremely low maintenance, with a long functional lifetime of 20-30 years or more
- Silent in operation and visually unobtrusive
- Increases your awareness of energy use and encourages more energy efficient behaviour