



Solar Water Heating Basics

Let the erratic British sun provide half of your hot water!

Key Points

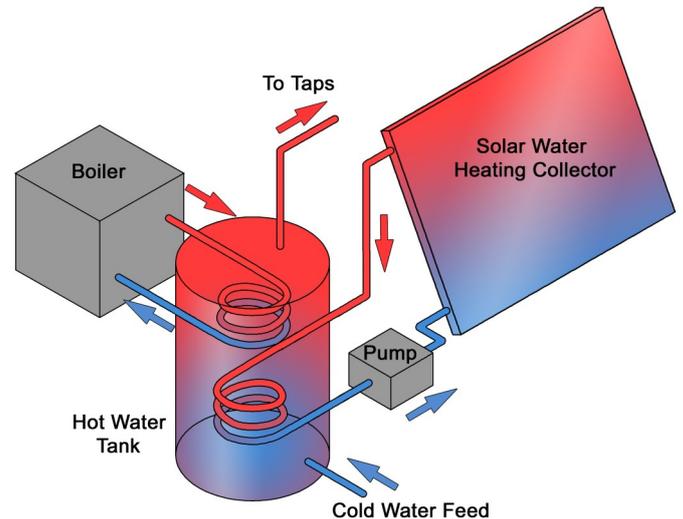
- Heats or pre-heats stored water
- Negligible greenhouse gas emissions and zero local pollution whilst in operation
- Works well on any south-east to south-west facing roof
- Can provide around 60% (sometimes more) of the annual hot water needs of an average household

How does it work?

Solar hot water panels are designed to absorb the sun's energy and transfer this to your water heating system. They are a simple idea made more efficient by using modern materials and technology to make sure that the panels trap as much of the sun's heat—and lose as little of this heat—as possible.

Solar panels **absorb radiant heat** from the sun, which warms up a special fluid passing through the panel in copper pipes. The warmed fluid is then pumped through a coil inside a hot water tank to heat the stored water.

The way in which solar water heating systems fit into a domestic heating system varies quite widely, due to the different types of boilers and heating systems in domestic properties. A common system would use a heat exchanger in the hot water tank (see diagram opposite).

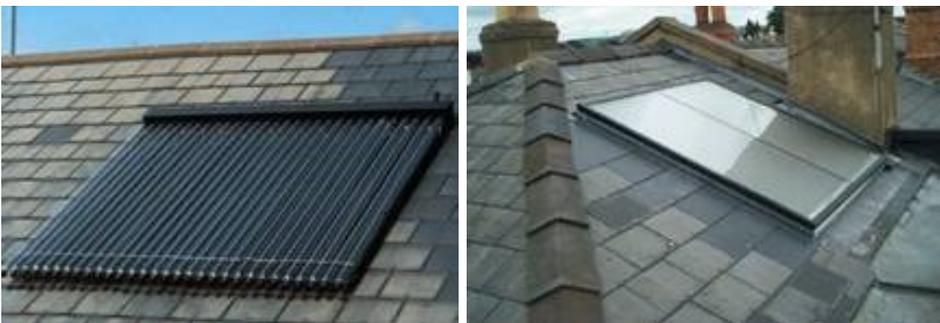


A solar thermal system can be integrated into common hot water systems, comprising a boiler and indirect cylinder

Why is it important?

Solar water heating is a simple way to harness energy from the sun, which reduces the pollution caused by fossil energy used for water heating. It is likely to become widespread in future, as the UK starts building more sustainable homes.

Solar water heating systems use only negligible energy to run a circulating pump and controller. Using a green electricity tariff reduces the impact even further. The systems produce zero local pollution during operation, and their manufacture has a low environmental impact compared to other industrial processes.



Two common types of solar collector: evacuated tubes (left) and flat plates (right)

What does it look like?

The panels are fitted onto the roof, and a typical home system might be **2-4m²** in size. There are two basic types for domestic water heating: one looks like a simple flat black panel (flat plate collectors) and has a similar appearance to a sky-light; the other is an array of glass tubes (evacuated tube collectors). The latter can be more efficient in diffuse winter sunlight, but costs more.

How much can it produce?

In the UK, solar water heating systems for the home are designed to work in conjunction with another water heating system, such as a gas, oil or biomass (wood) boiler.

An average home system might provide almost all of your hot water over the summer months, even on cloudy days. Through the rest of the year it will pre-heat the stored water to varying degrees, which will then be brought up to full temperature by the boiler or secondary heat source. On an overall year-round basis, most solar thermal systems should provide around **50-60%** of total hot water consumption.

Costs

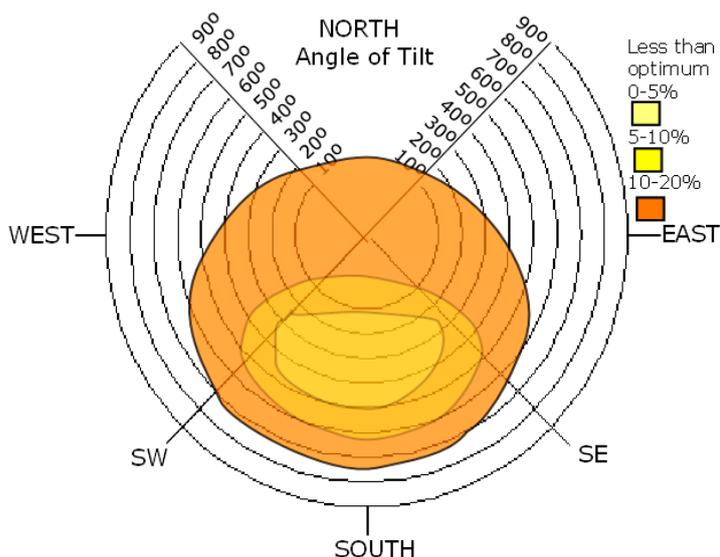
A typical solar water heating system costs about **£3,000-£5,000** to retrofit into an existing home. For self-installed systems, costs can fall to around £1,500-£2,000. Larger systems cost slightly less per unit of output.

The lifetime of the solar collectors is likely to be well over 20 years. Depending on the type of system and the fuel otherwise used for heating your water, most solar water heating systems will pay for themselves in fuel bill savings, over the lifetime of the collectors.

Solar thermal panels collect most heat during summer days. This also makes them particularly well-suited to heating outdoor pools, which are primarily used in summer. Swimming pools do not need high-temperature water, so purpose-designed panels can be simpler and cheaper, making the technology particularly cost effective.

Positioning

The appropriate position is on a **south-east to south-west** facing roof (though within about 15° of south is best, as shown). Panels reach maximum output on an elevation of about 40°, although between 15-60° is usually acceptable, so almost any well-oriented pitched roof can be used.



Solar capture variation with roof orientation and slope

Although solar energy may still work in the shade, output will be greatly reduced. You should ensure that the panels will not be overshadowed by trees or other buildings.

When planning to add solar water heating to your existing property, it is important to consider its integration with your current heating system—your installer can help with this. In particular, **combi boilers** are not directly compatible, since they have no storage tank. However, if the combi can accept a 'hot feed', it is usually possible to integrate a solar system, via a new single-coil cylinder that feeds the boiler with pre-heated water. For non-compatible combi boilers, specially-designed mixing valves are now on the market. These automatically regulate the boiler feed temperature, directing hot water from the cylinder either directly to the tap, or to the combi boiler for heating to full temperature.

Future directions

There is a major push towards building sustainable housing in the UK. By 2016, all new-builds may have to be 'zero carbon' under the Code for Sustainable Homes framework. Solar thermal is likely to become a very widespread technology, becoming virtually standard-fit on new designs. It is easy to incorporate during construction, and almost eliminates heat demand outside the heating season.



Solar collectors designed specifically for pools—simpler and cheaper (courtesy of US DoE)

Incentives

Solar thermal systems are supported under the Government's Renewable Heat Incentive (RHI).

The RHI itself pays a beneficial rate of **9.4 p/kWh** for each unit of 'green heat' generated by non-domestic solar thermal, and is similar to the Feed-In Tariffs already in place for renewable electricity generators. Payments have been running since late 2011 (see separate Non Domestic RHI fact sheet).

The Renewable Heat Incentive for domestic properties launched in April 2014. The tariffs are paid per-kWh, currently **19.2p/kWh** for solar thermal hot water (see separate Domestic RHI fact sheet).

Further Information

Microgeneration Certification Scheme

Find approved solar products and installers
www.microgenerationcertification.org

Ofgem—Domestic Renewable Heat Incentive

www.ofgem.gov.uk/domestic-rhi

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