

Solar thermal



Solar water heating systems, or solar thermal systems, use energy from the sun to warm water for storage in a hot water cylinder or thermal store. Because the amount of available solar energy varies throughout the year, a solar water heating system won't provide 100% of the hot water required throughout the year. A separate system, usually your existing boiler or other water heating system, is used to make up the difference.

How do solar hot water heating systems work?

Solar water heating systems use panels or tubes, called solar collectors, to gather solar energy. The solar collectors convert the energy in sunlight into heat, which is transferred to liquid made up of water and glycol. This liquid is pumped round a circuit, which passes through the hot water cylinder.

There are three types of solar water heating collectors:

1. Evacuated tubes – a bank of glass tubes mounted on the roof tiles.
2. Flat plate collectors – fixed on the roof tiles or integrated into the roof.
3. Low temperature collectors such as solar matting – often fitted directly on the ground to provide heat for swimming pools.

What are the benefits of solar water heating?

- **Reduced energy bills.** Sunlight is free, so your hot water costs will be reduced.
- **Lower carbon footprint.** Solar water heating can reduce your carbon dioxide emissions by reducing the need to burn fossil fuels.

Is solar water heating right for your building?

To tell if solar water heating is right for you, there are a few key questions to consider:

Do you have a sunny place to put solar panels?

Solar hot water collectors are typically placed on south facing roofs, or somewhere between east to west (but not north facing).

Panels can be mounted on a frame on the ground or on a flat roof, though this will increase the cost. Solar water heating collectors can benefit from being mounted at a steeper angle than solar PV panels because they often over-produce in summer so can be optimised for winter performance without sacrificing annual output. This means they can be attached to walls rather than roofs, though usually on a frame to tilt them upwards slightly.

The amount of space you need depends on the amount of hot water you use. For a domestic scale system you might need around five square metres that receive direct sunlight for the main part of the day.

Do you have space for a larger hot water cylinder?

Energy is transferred from the sun to the water-glycol fluid used to heat water stored in a hot water cylinder. Inside the hot water cylinder, a base coil is connected to the solar collectors. Typically for small installations, one cylinder is used, with either an immersion heater or another coil connected to your boiler, near the top of the cylinder. This top immersion heater or coil will heat the water to a higher temperature when needed. If a dedicated solar hot water cylinder is not already installed, then you will usually need to replace the existing cylinder.

Instead of a single hot water cylinder with two coils, some installations use a dedicated cylinder with a solar heating coil in addition to the existing cylinder.

Is your current boiler compatible with solar water heating?

Conventional boilers and hot water cylinder systems are often compatible with solar water heating. However, if you have a combi boiler, this will mean a solar hot water cylinder must be added to the system, so you'll need to consider where this might be located in your building.

Will you need planning permission?

Most small-scale solar water heating systems do not require planning permission. However, exceptions apply, and you should check with your local planning office.

If your building is a listed building, or in a conservation area or national park, you may have more restrictions.

How to make the most of solar water heating

There are a few things you need to consider to get the most out of your solar water heating system.

It's important to make sure that your back-up heating system is set up to come on at the right time. Before you installed the solar panels, your boiler or immersion heater was probably set to give you a full tank of hot water in the morning. If you leave it like this, your system will always start the day with a hot tank and there'll be no water for the solar panels to heat during the day.

Your installer should advise you on how to set your hot water controls to get the most out of your new system, whatever time of day you use hot water.

Indicative costs and savings

Installation costs

The cost of installing a typical domestic-scale solar water heating system is around £6,000. Costs will depend on the type of solar water heating collectors you will choose, as well as the size of the system. While larger systems are more expensive the cost is unlikely to increase proportionately – a system that is twice the size may not cost twice as much. Retrofitting can be more expensive due to the additional complexity of installation. However, many solar thermal systems can be integrated into existing gas-boiler systems.

Savings

Solar hot water heating systems make more financial sense in commercial buildings when there is sufficiently high demand for hot water, such as in catering or swimming pools. Generally, solar hot water

is more economical in larger systems. Payback periods can be long but the lifetime of the equipment can be even longer.

It is often worth considering whether a solar PV system would be more effective than a solar water heating system, even if the solar electricity were used primarily to heat the water. The relative financial performance of the two technologies will have to be considered on a site by site basis and you should ask multiple installers for advice if you are unsure.

How long does it take to install commercial solar thermal systems?

For smaller systems, the installation can take only a few days. Bigger and more complicated installations can take longer than that.

Disruption during the installation

During installation there is likely to be a period when you do not have hot water, and a (usually) much shorter time when the water supply is disconnected completely.

Can I do this by myself?

Energy storage systems are not a technology that you can install by yourself. You will need to talk to an installer who will assess your needs and evaluate your building before proposing which system could be right for you. [Click here](#) to learn more about this.