

A buyer's guide to solar water heating





The Energy Saving Trust
can tell you about certified
installers in your area.
Call free on 0800 512 012.

What is solar energy?

The sun provides an abundant and free source of clean energy in the form of heat and light. Some of the heat energy provided by the sun can be harnessed to provide hot water in your home.

How does solar water heating work?

Energy from sunlight is absorbed by the solar panel and converts it to heat energy. This is then removed by a heat transfer liquid usually water or anti-freeze.

In most systems, a small pump is required to circulate the heat transfer fluid to where it is immediately needed, or to a store from which it can be used later. In the case of solar hot water systems, this is usually a hot water cylinder. A back-up heat source is required to

ensure that the water is heated to a sufficient temperature on days when light levels are limited. The water in the cylinder is then fed to your taps and showers to provide hot water for your home. There are many different types of solar water heating systems and your installer will be able to advise which is best for you.

What are the benefits of solar water heating?

There are numerous benefits to installing solar water heating:

- One of the cheapest and most established of all the renewable energy technologies
- Designed to work alongside the majority of heating systems
- Provides roughly half of your hot water requirements across the year and during the summer months they can contribute towards nearly all of your hot water needs. During the winter months you may need to top up the system with your primary heat source eg a boiler.

If you would like to know more about renewable technologies visit energysavingtrust.org.uk or call the Energy Saving Trust on 0800 512 012

Is solar water heating suitable for my home?

Solar water heating systems can be designed to fit into most existing heating systems. Typically, all that is required is a roof facing within 90° of south and a space for storing the hot water. A range of factors will affect what is best for your needs. Your installer should assess your situation and discuss with you the best option to meet your requirements.

A few points to consider before installing:

- Are there any energy efficiency measures that can be implemented, such as draught proofing, loft and cavity wall insulation? These simple measures will provide long term financial and carbon savings
- What is your primary heating system? We don't recommend installing a solar water heating system with an old inefficient boiler. You will save more money and energy if you fit a new condensing boiler with a solar water heating system. If you are unsure about the type and efficiency of your boiler you can visit sedbuk.com

Roof orientation

Unobstructed roofs facing south are ideal. Shadows from trees, chimney stacks and other buildings will reduce the amount of heat produced from your solar water heating system. The majority of roofs should have a suitable roof pitch, although for flat roofs angled mounting frame kits are available. However, this arrangement will make your installation more complex and probably more expensive. It is not advisable to install solar panels on a north east, north or north-west facing roof.

Space requirements

Roof space: typical hot water panels vary in size from around 2-4m², though some systems may be even larger depending on hot water demand.



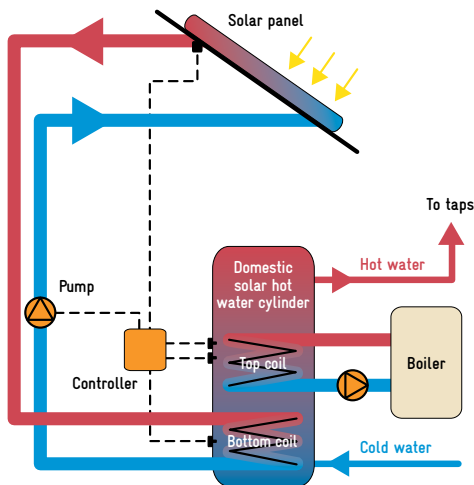
Evacuated tube solar panel



Flat plate solar panel

Internal space: Additional space may be required internally, either through a sufficiently sized replacement hot water tank, or a separate storage vessel alongside your current hot water cylinder.

Other factors affecting space requirements include: householder hot water use, the number of occupants and the expected performance from a system to meet overall hot water demand.



A typical solar hot water heating system

What are the key components of a solar water heating system?

There are a number of key components that make up a solar water heating system. The diagram above shows the main parts typically found in a solar water heating system.

Solar panels

Generally located on your roof, these capture the sun's energy converting it into domestic hot water. There are currently two main types of panels available on the market: flat plate and evacuated tube.

Flat plate panels: These consist of a glazed, flat, dark surfaced absorber plate, which can either contain metal (copper or aluminium) or rubber (silicon) tubing. The plate absorbs incoming solar heat energy and the casing minimises heat loss. A fluid is circulated through the tubing and this fluid heats up as it passes through the absorber plate. Water or anti-freeze can be used as the fluid, though this depends on the system and type of tubing used.

Evacuated tubes: These consist of parallel rows of transparent glass tubes which contain an absorber insulated by a partial vacuum. These can be more effective throughout the year than flat plate panels but tend to be more expensive.

Both system types are designed to be freeze tolerant and will therefore continue to function during the UK winter season.

Hot water cylinder: To make the most of the available solar energy you need a hot water cylinder to store the heat between the time it is collected and the time you use it. Generally this would be found in your airing cupboard.

The two most common types of hot water cylinder used for solar water heating are:

Twin coil cylinder – most common type used in the UK. Replaces a standard single coil cylinder with a twin coil cylinder, where one coil is located above the other.

Pre heat cylinder – Another option is to keep your original cylinder and have an additional single coil cylinder known as a pre heat cylinder. The water is heated with solar energy before it passes to your existing cylinder.

Other options include heat to base cylinders where both coils are contained at the bottom of the tank. You can also have a thermal store which can act as a 'thermal battery' for storing your hot water. This is often found when combining with another renewable technology such as a heat pump.

If necessary your boiler or immersion heater can be timed to top up the heat in the evening after the sun has gone down. The water can then be used later that evening or the following morning. If the hot water is heated by the boiler or immersion all day the solar panel will not be able to contribute very much heat.

Pump

The most common method to circulate solar heated transfer fluid from the panels to your hot water cylinder is with a pump. The power source of a pump is typically derived from the grid mains electricity but can also be powered by solar photovoltaic panels.

Flow and return pipe work

When you install a solar water heating system, there will be additional pipe work required to circulate the fluid to and from your solar panel. This is known as the flow and return pipe work. For the system to perform at its best, it is important that the pipe work is the shortest length possible and is well insulated.

System controls:

Your solar water heating system will have a number of temperature sensors which feed information back to a central control unit. The main control unit will serve a number of functions including:

- Letting the system know when to switch the pump on or off. The temperature of the solar panels will be compared with the temperature of the water in the storage cylinder(s). If the panel temperature exceeds the storage cylinder temperature by more than a set amount, the controller will switch the pump on.
- To notify the existing heating source (i.e. boiler) when to switch on if there is insufficient solar energy.
- Turning the pump off when the system is overheating.
- To inform you of the operational temperatures at various points in the system, for example in the solar storage cylinder and solar panels.
- To notify you of any system malfunctions.

There are also a number of ways in which the solar water heating system can be set up including circulation and pressure options for the fluid in the panels. Your installer can advise which is best for you.

Integrating with existing heating systems

If your home has a conventional boiler and a hot water cylinder: installing a solar system is usually just a case of fitting the panels to the roof with the associated pipe work and then replacing the existing hot water cylinder with a twin coil, thermal store or connecting a separate pre-heat tank to the existing cylinder.

If your home has a combi boiler or an electric water heater: your system may not be designed to receive heated hot water. However, some appliances may display a mark to indicate suitability for pre-heating, when internal components have been tested to a higher temperature. We would recommend that you check with your boiler manufacturer to see whether your hot water system is 'solar ready'.

Please note that there are a number of potential options to incorporate these types of hot water appliances with a solar water heating system. We therefore suggest you discuss possible configuration options with your installer. However, generally speaking solar water heating systems used in conjunction with instantaneous hot water appliances are not very common in the UK.

To find out more call
0800 512 012 or visit
energysavingtrust.org.uk

Costs and savings

Cost

The cost of a professionally installed solar water heating system can vary significantly. Typical installation costs are around £4,800 (including VAT), though it will depend on system size and type. To help offset capital costs the UK government is currently offering financial support through the Renewable Heat Premium Payment Scheme.

Renewable Heat Premium Payments

The Renewable Heat Premium Payment (RHPP) is a one-off fixed payment to householders installing renewable heat generating technologies, including solar water heating systems. This is available for installations that have been commissioned from 21st July 2011 onwards. For solar water heating systems, the Renewable Heat Premium Payment Scheme will reduce the initial installation cost by £300. RHPP is available on a first come first served basis, and is time limited, so visit energysavingtrust.org.uk/RHPP to find out more.

The Renewable Heat Incentive (RHI)

The UK government intends to introduce a domestic element to the Renewable Heat Incentive (RHI) in addition to RHPP, which is currently available for industrial, commercial and public sectors. Details of how the RHI will apply to RHPP participants will be published alongside details of the Government's 'Green Deal'. Both are expected to be introduced in late 2012. For further information please visit energysavingtrust.org.uk/RHI

Savings

As fuel prices increase so will the savings from using a solar water heating system. By generating your own clean energy you will help protect yourself from rising fuel costs. However, the overall financial benefits of a solar water heating system will depend on a number of factors including:

- what fuel is being displaced
- how much hot water is used in the home, when it is used and how much you depend upon the primary heat source (e.g. gas boiler)
- how much the system costs to install
- whether you are eligible for government incentives such as the Renewable Heat Premium Payment Scheme and Renewable Heat Incentive.

Annual financial and carbon savings for solar water heating

Fuel displaced	£ saved annually	CO ₂ saved annually (kg)
Gas	£55	230
Oil	£70	300
LPG	£105	270
Solid fuel (coal)	£60	500
Electricity	£80	510

For more information on the Renewable Heat Premium Payment Scheme, please visit energysavingtrust.org.uk/RHPP or phone 0800 512 012



Building control and planning

When installing a solar water heating system building regulations will apply. This is to ensure that your property can support additional load, both internally and on the roof. Before proceeding with the installation, you must check with your local authority building control officer that all proposed work is compliant with current building regulations unless your installer is qualified to self certificate the work. Please note that there may be additional costs associated with building control notification.

Changes to permitted development rights for domestic renewable technologies mean that most solar hot water installations do not require planning permission, so long as the panels do not protrude more than 200mm above your building roofline. Exceptions apply for installations on flat roofs, flats, listed buildings, buildings in conservation areas and world heritage sites. If you are at all uncertain you should check with your local authority planning team.

Practical considerations

Time taken to install - installing a solar water heating system may take anything from two

to five days to complete, dependent upon internal and external access to the property and your existing heating system.

Disruption to the home - when installing a system you should expect a certain degree of internal and external disruption to your home. For example, scaffolding will usually be required to install the solar panels on the roof.

Being without hot water - You should expect to be without hot water for a certain period of time, however, this is rarely more than one night.

Maintenance

To ensure that your system is operating effectively, there are a number of checks that you as a householder as well as your installer should make.

Once fitted your installer should leave written details of any maintenance checks that you can carry out from time to time, ensuring everything is working properly. A more detailed check by a professional installer should take place every three to seven years. Consult with your supplier for exact maintenance requirements before you commit to the installation.





What maintenance is required?

Anti freeze: In order to cope with the UK climate, many solar water heating systems are filled with antifreeze to protect the system during the winter months. The anti freeze usually needs to be changed every three to seven years. This usually costs around £100.

Pumps: The pump should be checked to see if it is working effectively. For a well maintained system, pumps can last for ten years plus and usually cost around £90 to replace.

What checks do I need to make to the system?

You can carry out the following checks on an annual basis, these include:

- **Checking system pressure:** for pressurised systems, you should check that the pressure has not dropped. This can simply be done by checking the pressure gauge.
- **Checking for damage to system:** check that there are no leaks or damage to insulation on the pipe work running to and from your solar panels. Check with your installer after any extreme weather that the panels remain securely fitted.
- **Controller inspection:** Check that there are no error messages or warning signs on the main system controller.

To find out more call
0800 512 012 or visit
energysavingtrust.org.uk

If I go on holiday do I need to do anything to the system?

Generally speaking, systems can be left for up to four weeks before any intervention may be required. Consult your installer on what to do if you know that you will be away for an extended period of time.

Avoidance of Legionella

Although there have been no recorded cases of health problems from solar water heating systems, storing water at 40-50°C (a typical temperature for water from solar system in the summer) can promote the growth of Legionella bacteria. This could create a health risk, particularly to the old or infirm. Because of this, solar systems must have an avoidance strategy for this problem.

Your installer should advise you on how best to bring your hot water storage up to sufficient temperature to kill Legionella bacteria.

Getting the most out of your system

- Make sure you use your heating controls to adjust your heating running times in accordance with your needs throughout the year.
- Make sure you use hot water later in the day (if possible), once the solar water heating system has had the chance to heat the water, for showering or washing the dishes. Only use back-up heating when you need it; ideally have it set to come on immediately before hot water use or at the end of the day.
- Consider fitting a mixer shower, with an eco shower head (and pump if necessary) instead of an electric shower. This will be just as efficient in water use, but will be able to use solar heated water instead of electric heating.
- Ensure that your hot water storage tank and pipes are adequately insulated to minimise any heat loss. Your installer should have notified you if any work needs to be done.
- Be careful not to waste water just because it's heated for free. Even before the water reaches your home it requires energy to clean and transport it.

How to find installers and products

When you buy a renewable energy technology, there are currently two industry led and Government approved schemes that you should check that your installer is a member of. They are the Microgeneration Certification Scheme (MCS), and Renewable Energy Association Ltd (REAL) Assurance scheme. The MCS scheme will cover any technical related issues while the REAL Assurance

Scheme covers all contractual related disputes, including deposit protection and workmanship guarantees.

In addition, MCS also certifies renewables products as does Solar Keymark so look out for either of these logos. We recommend getting at least three quotes from installers before proceeding with any work.

Microgeneration Certification Scheme

The Microgeneration Certification Scheme (or MCS), demonstrates that an installer can install to the highest quality every time, using MCS certified products that have met rigorous testing standards. All MCS approved products will come with a guarantee for a set period of time, which your MCS approved installer should clearly explain to you.

APPROVED INSTALLER



To check that your installer is MCS certified, you can search for them on the MCS website or call the Energy Saving Trust for free advice on **0800 512 012**.

For more information about the scheme, go to microgenerationcertification.org

Solar Key Mark

Supported by the European Solar Thermal Industry Federation, Solar Keymark certifies compliance of a product with the relevant European standards and is the official European benchmark for solar panels and systems.



Products and installers that have been certified under Solar Keymark or MCS will also be eligible for the Renewable Heat Premium Payment and future Renewable Heat Incentive.

REAL Assurance Scheme

All MCS-certified installers must belong to an Office of Fair Trading-backed

consumer code-of-conduct programme, and the REAL Assurance Scheme is currently the only one available. The scheme covers general business standards, such as protection against excessive deposit payments and workmanship warranties, which installers must always explain to consumers both in writing and verbally.

To check that your installer is a member of the REAL assurance scheme visit realassurance.org.uk or call REAL on **0207 981 0850**.



Deposit and Advance Payment Insurance Scheme

All REAL members must provide protection for deposits and advance payments they take from domestic consumers. REAL members have access to insurance known as the 'Deposit and Advance Payment Insurance Scheme'. The scheme is designed to provide protection for payments made before works have begun, just in case the company ceases to trade before they deliver the goods to you.

The Deposit and Advance Payment Insurance Scheme has been arranged between REAL and the insurance scheme administrator (QANW). You will not be asked to pay anything for the insurance cover, either to the REAL Assurance Scheme or to the company you're contracting with. The company can register your contract with the scheme administrator and you will receive an insurance policy by post.

For further information on this scheme please visit www.real.qanw.co.uk/consumer-faqs.php, or call **01292 268020**.

Workmanship Warranties

When you purchase a renewable energy technology, your MCS installer is obliged to provide a workmanship warranty for a minimum of one year. However, typically speaking many companies offer warranties for longer than this.

Members of the REAL Assurance Scheme are required to put in place arrangements to ensure that the warranty they provide will be honoured if the company ceases to exist during the warranty period. Under the Deposit and Advance Payment Insurance Scheme consumers are given the opportunity to purchase warranty insurance for an additional £35. This insurance provides protection should the company cease to trade and is valid for the period of the installer's original workmanship warranty.

If the installer company has not already provided an insurance backed warranty the Energy Saving Trust recommends that you pay this additional £35 for the workmanship warranty insurance.

For more information about this scheme visit real.qanw.co.uk/consumer-IBG-faqs.php, or call **01292 268020**.

What should I expect from my installer?

All MCS approved installers should be able to provide a detailed breakdown of the specification and costs of their proposed system. They should:

- visit in person and complete a technical survey before quotation
- explain how they have calculated the size of the system to be appropriate for your hot water usage



- provide an estimate of how much heat will be produced by any proposed system
- supply clear, easy to understand and detailed information and advice on how best to use the system and operating instructions
- explain how the system will be installed and if there will be any disruption to your property
- install and set controls and settings to ensure you get the most out of your solar water heating system
- provide clear and easy to understand information on product and workmanship warranties
- provide a full breakdown of costs in their quote and include the terms and conditions
- not ask for more than a 25% deposit. You also have the right to cancel the contract within 7 days with no penalty

To help you make an informed decision we suggest you get as much information as possible from product and installer brochures, which may include background information on performance testing.

Check list:

Before making the decision to go ahead and install a solar water heating system, we recommend that you use the following check list:

- I have checked roof orientation and any potential shading issues YES/NO
- I have considered my heating system and any compatibility issues if using a combination boiler YES/NO
- I have considered available space (internally/and on the roof) YES/NO
- I have considered my current fuel use YES/NO
- I have considered how I currently heat my hot water and where I use hot water in the home YES/NO
- I have received at least three quotes (however, do not compare installers on cost alone; the cheapest may not be the most appropriate option for you) YES/NO
- I have checked any proposed works with the local authority planning and building control teams YES/NO
- I have chosen an MCS certified installer that uses MCS certified or Solar Keymark certified products and is a member of the REAL assurance scheme YES/NO
- I have checked what warranties are on offer – both product and workmanship, including post installation services YES/NO
- I have checked that I have received a briefing from my installer on how to operate and perform basic maintenance checks YES/NO

How the Energy Saving Trust can help

The Energy Saving Trust is a non-profit organisation providing free, impartial advice to help you save energy and money and help fight climate change. To find out what you can do to generate your own energy visit energysavingtrust.org.uk or call us free on **0800 512 012**.

Our advisors will:

- Give you personalised advice on what's practical for your home.
- Put you in touch with local certified installers.
- Tell you about any offers available in your area.

All measure costs and savings are correct at time of printing. However financial savings will change as energy prices rise or fall. Please refer to our website for the most recent measure costs and savings.

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To start generating your own energy visit

Energy Saving Trust
energysavingtrust.org.uk

Microgeneration Certification Scheme
microgenerationcertification.org

REAL Assurance Scheme
realassurance.org.uk

Solar Key Mark
estif.org/solarkeymark/

