

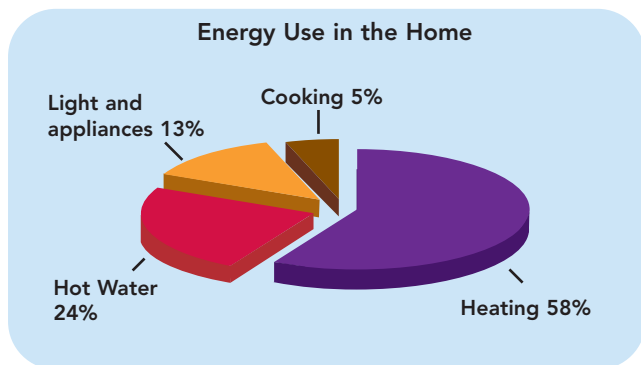


Solar water heating



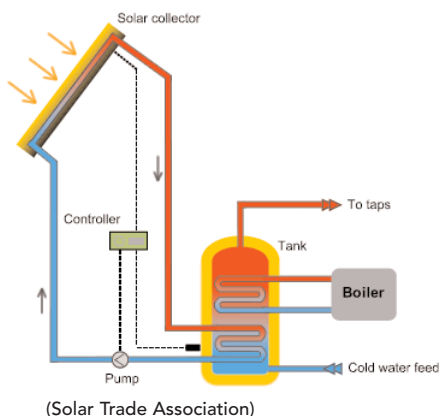
What is it?

Solar water heating uses heat from the sun to provide hot water. This form of energy is free and when used in a typical household could save between 12- 17% of annual fuel costs. There are over 80,000 systems in the UK making this the most popular renewable energy installation.



How does it work?

The process of solar water heating involves the absorption of the sun's radiation by collectors, via a fluid (usually water and/or antifreeze), and the transfer of the heat to a hot water storage tank. This is then made available through the building's hot water system.



There are two main types of solar collector for solar water heating: flat plate and evacuated tube collectors. Some flat panels are designed to be almost unnoticeable, by being flush to the roof whilst

evacuated tubes are more conspicuous. The tube collector is however, more advanced and more efficient but also more expensive. A third type, called unglazed collectors are cheaper and used for swimming pool systems.



4m² of flat plate collectors (Energy Saving Trust)

Most systems installed in the UK involve a closed loop arrangement where anti-freeze is pumped from the collector to the tank and heats the water indirectly through a heat exchange system (see diagram).

Other systems are "open" or direct. In this situation the water that is heated by the collector is pumped into the tank and then drawn through hot water taps when required. Direct systems don't lose as much energy in heat transfer but require plastic expandable pipes to combat freezing and will need a water softener in a hard water areas.



2m² of evacuated tube collectors

Solar panels work best when they are placed at an angle of 30-40° from horizontal and are facing due south. Evacuated tube systems have greater flexibility and can face south to west because of the greater surface area of their

collectors. Solar water heating systems also work in cloudy conditions.

Solar collectors can be fitted in conjunction with combination (combi) boilers to provide pre-heated water and thereby reduce the energy needed to bring the water to the required temperature. However, this requires slightly more expensive installations and space for a small 100 litre hot water cylinder.

Can I produce all my hot water with this technology?

No. A typical system will provide virtually all your hot water in the summer and about 50-70% of the year round demand. For example, a Dorset house with a south facing roof inclined at 30 degrees will receive between 1100-1200 kilowatt hours (kWh) of solar radiation per square metre per year. About 40-50% of this can be converted to hot water by a solar collector so a 4 m² array will produce around



1800 kWh of heat, which is equivalent to 60% of the domestic hot water needs. There is a big difference in the solar energy available throughout the year but as a rule a solar collector will provide 80-100% of the hot water during the height of summer and perhaps as little as 15% in the depth of winter.

Installations can also be used to provide space heating but this is only feasible in highly insulated eco-homes.

How much roof space is required?

A system will be sized according to the needs of the property, ranging from small domestic systems of 3-4m² to much larger installations for example in hotels. Swimming pool collector systems are typically about half the size of the pool surface area. Evacuated tubes produce more hot water than flat panels; typically 3m² of evacuated tubes produce the same amount of hot water as 4m² of flat panels.

How much maintenance is required?

You should check fairly regularly to see if any debris (such as leaves and bird droppings) has fallen on the collectors. The panels can be cleaned with soapy water and a soft bristled brush. You may need to replace the anti-freeze after about five years if present. Systems ought to be serviced every 2-3 years. This will include checking the pressure meters and the pump. The pump is the only moving part of a solar installation and it should be conveniently located to enable a replacement to be fitted in the event of a breakdown.

How much does it cost?

A typical flat-panel system for an average 4+ person property will cost around £4,000 whilst an evacuated tube system should cost around £5,500 fully installed. This would include the panel, a new tank, pump and controls. Some householders may prefer a DIY installation which can be done for around £1,500 but will require time to learn the skills needed. Dorset Agenda 21 has plans to establish a DIY solar club that can offer help and advice.

| Technology | | Installation | 2 m ² | 3 m ² | 4 m ² | 6 m ² |
|----------------|---------------|--------------|------------------|------------------|------------------|------------------|
| Flat plate | Closed | Installer | / | £3,150 | £4,200 | £5,000 |
| | | DIY | / | / | £1,500 | £2,500 |
| | Open (direct) | Installer | / | £3,400 | / | / |
| | | DIY | / | £2,500 | / | / |
| Evacuated tube | | Installer | £4,200 | £5,500 | / | / |
| | | DIY | £2,115 | / | / | / |

Prices quoted on the web (inc. VAT) from the following sources: www.solartwin.com, www.sustainabletechnology.uk.com, www.imaginationsolar.com, www.southernsolar.co.uk, www.diy.com

Can I get a grant?

As a householder you can apply for a £400 grant from the Low Carbon Buildings Programme. DIY installations are not eligible. 50% grants are available for community groups, social landlords, and local authorities for installing systems in social housing or public buildings. The installer and the product must be approved and a condition of the grant is that you must already have installed a basic level of energy efficiency measures including wall and loft insulation, adequate heating controls and low energy light bulbs.

What is the pay back?

The capital cost of a solar system is more expensive than an equivalent fossil fuel system but as solar energy is free your yearly fuel costs will be reduced. In certain situations it is possible to 'pay back' the extra cost of installation. A solar system that replaces an on peak electric water heating system will save a 4+ person home around £162 per year. This means it would take 9 years to pay back for a DIY installation, 17 years for flat panels and 31 years for evacuated tubes (with grants). However, these systems should work effectively for 35 years and the price of fossil fuel derived energy is also likely to increase, thereby reducing these paybacks.



2m² of evacuated tube collectors

Are there any planning issues?

Always check with your local authority, before installing a system. The visual impact of solar systems is an issue for listed buildings, in conservation areas and Areas of Outstanding Natural Beauty (AONBs).

Planning permission is required under current regulations if the system is planned for a front roof slope or visible from the public domain.

What is the potential for this technology in Dorset?

Dorset has an excellent solar energy resource and with many local installers is well positioned to harness this potential. From an economic perspective, solar water heating systems are currently most cost effective for installations on properties that are not connected to mains gas or new build housing developments. There are 6000 such houses in north and west Dorset. There is good potential for installation within the tourism sector which require high levels of hot water demand in summer. Examples include camp and caravan sites with shower blocks, hotels, guesthouses and swimming pools.



Pros and cons of solar water heating

Pros

- Mature industry with lots of local installers
- One of the cheapest renewable energy options
- Excellent savings in off gas areas
- Virtually no maintenance

Cons

- Water heating only
- Can be visually intrusive in certain circumstances
- Need space for a water tank
- Can integrate with combi boilers but this adds extra cost

Solar water heating installers operating in the South West

It is best to check that a product and installer are approved by the Low Carbon Buildings Programme or a member of the Solar Trade Association. Always get several quotes before committing to an installer.

| Company | Telephone | Web address |
|------------------------------------|---------------|--|
| Absolute Invincible Power (UK) Ltd | 01404 548896 | www.invinciblepower.co.uk |
| Ace Plumbing & Heating | 01747 858852 | N/A |
| Imagination Solar | 0845 458 3168 | www.imaginationsolar.com |
| Powertech Solar | 08707 300111 | www.solar.org.uk |
| Quality Solar Systems | 0800 9750795 | www.qualitysolarsystems.com |
| Sarum Solar Ltd | 0845 4080444 | www.sarumsolar.co.uk |
| Solar Install | 01202 330511 | www.solarinstall.co.uk |
| Southern Solar | 0845 4561706 | www.southernsolar.co.uk |
| Solar Twin | 0845 1300137 | www.solartwin.com |
| Wessex Solar Systems | 01202 517526 | N/A |

More information

| | | |
|----------------------------------|--------------|--|
| Solar Trade Association | 01908 442290 | www.greenenergy.org.uk/sta |
| Energy Saving Trust case studies | 0845 1207799 | www.est.org.uk/myhome |
| Renewable Energy Officer | 01305 228530 | k.lindegaard@dorsetcc.gov.uk |
| Low Carbon Buildings Programme | 0800 9150990 | www.lowcarbonbuildings.org.uk |
| Dorset Energy Advice Centre | 0800 512012 | www.deac.co.uk |
| Dorset Agenda 21 | 01305 213721 | www.dorsetagenda21.org.uk |