Use the power of the sun to cut your bills

You could cut your home's hot water bills by 50 per cent by installing solar panels. We test seven systems to find out which will reduce household bills the most

In a single hour the sun transmits more energy to the earth's surface than humankind uses in a year, but at present we don't make the most of this free and plentiful resource.

There are cheap and easy ways to capture the sun's energy, such as passive solar (see 'Jargon buster') which means designing or redesigning your home to make the most of the sun.

Many passive elements can be planned in when a new house is being built or an old one undergoes major refurbishment, but you can't alter the size of windows easily (or turn your house around), so you should also consider actively collecting the sun's energy and making use of it (a particularly tempting thought after a hot summer like the one we've just had).

Active solar power (see 'Jargon buster') means using a collector, usually a panel, to capture energy. There are two main types of active solar collectors and they're very different. Solar water heating, as the name suggests, heats water for use around your home. The panels you most commonly see on roofs around the UK are for heating water. Photovoltaics generate electricity from the sun's energy and are more expensive. You're more likely to see these on offices or new developments than on older homes at present.

Solar panels are going mainstream and are now available through branches of Currys

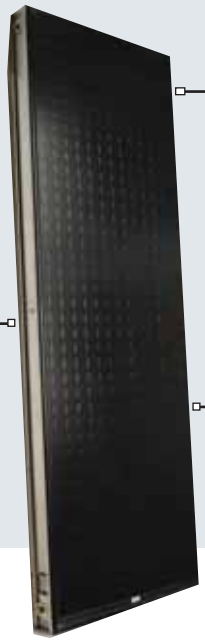
We've tested seven systems to help you pick the right one if you want to generate your own clean energy, but seek advice and consider all elements of a solar system before buying solar panels.

No longer the sole domain of specialist retailers, solar panels are going mainstream and photovoltaics are now available at branches of Currys. Alternatively, consult the Solar Trade Association (www.greenenergy.org.uk) to find local retailers.

What you should look for

PLANNING PERMISSION
Although not needed for all homes, planning permission is required in some cases. Check with your local planning office

INSTALLATION
Solar panels need to be fitted by a professional to qualify for a grant. DIY fitting is possible with some panels but only if you're an expert and can work safely on the roof



MAINTENANCE
Some of the makers of the panels we've tested say their products need regular checks of connections or a wipe of the panel glass with mild detergent. This is easier said than done when panels are up on your roof

TYPE
There are two main types of solar panel available – those which heat water (pictured here) and those which generate electricity (called photovoltaics)

Jargon buster

■ **PASSIVE SOLAR** This means capturing the sun's energy passively – for example, through large south facing windows – and then holding on to it for as long as possible by minimising heat loss.

■ **ACTIVE SOLAR** This involves using a collector – for example, a solar panel, to capture the sun's energy and employ it to heat water or convert it to electricity.

■ **SOLAR WATER HEATING** Here water is pumped through a solar panel and heated by solar energy. The heated water then flows through a heat exchanger, warming the water in your hot water cylinder.

■ **EVACUATED TUBES** A type of solar water heating panel, evacuated glass tubes collect the sun's energy and heat water running through a container at the top of the tubes. Water does not flow through the glass tubes.

■ **PHOTOVOLTAICS (PV) CELLS** These are thin layers of semi-conducting material (usually silicon). Electrical charges are generated when the silicon is exposed to light and these can be conducted away as a direct current. Multiple cells are joined together (usually behind glass) to form a complete photovoltaic panel.

■ **SOLAR TILES** These use the same technology as photovoltaic cells but are smaller and narrower than large PV panels and look like roof tiles.

PHOTOGRAPHY JOHN TRENHOLM

Which should you choose?

Best for solar water heating

CONSTRUCTION RESOURCES AZUR 6 If you want basic solar water heating panels, where water flows through the panel to be heated for showering and washing dishes, the Azur (2) is the best one we've tested. Each panel has just over one metre squared of collector, so you'll need two for a typical family home.

Best evacuated tube panel

THERMOMAX MS20

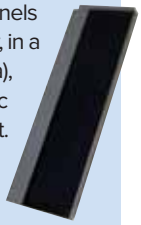
These evacuated tubes (3) – a type of solar water heating panel – perform well when the sun is shining and still generate some hot water even when the sky is overcast. Handily, if one of the tubes breaks (during a hail storm, for example), you can replace a single tube rather than having to replace the whole collector.

Best photovoltaics to generate electricity

SANYO HIP-200NHE1 The Sanyo (5) was the best of the photovoltaic panels we tested over the summer. While it excelled when the sun was out, like other photovoltaic panels, it struggled when the sky was overcast.

Best for sensitive locations

SOLAR CENTURY C21E If the way your panels look is critical (say, in a conservation area), these photovoltaic panels (7) are best. They are grey and will blend well with slate tiles; they are also self-cleaning, using the roof pitch and rain to remove dust.



SOLAR HEATING CUTS GAS USE BY 25 PER CENT

Roger Hicks
68, retired engineer
Roger Hicks had evacuated tube collectors (20 tubes) installed on his garage roof in January for £4,000 but got £400 back via a government grant. They generate enough hot water to supply his entire household when the sun shines. A well-insulated tank is a key part of Mr Hicks' system. His new cylinder is far better insulated than his previous one and in the winter this will help to conserve any heat generated. When the sun doesn't shine the tank holds heat previously generated for a day. After that, he uses his immersion heater. His boiler was switched off over the summer and his gas consumption for that quarter was 25 per cent lower than previous quarters when the boiler was in use.

TYPE OF PANEL	SPECIFICATION				TEST PERFORMANCE		OUR VERDICT
	APPROX SYSTEM PRICE (£)	SIZE (cm) HXWXD	WEIGHT (kg)	COLLECTOR AREA (m^2)	SUNNY DAY	CLOUDY DAY	
WATER HEATING: SOLAR PANELS							
1 CONSOLAR Plano 26	**2,000-3,000**	218x117x11	42	2.4	★★★★	★★	A letdown in overcast conditions
2 CONSTRUCTION RESOURCES Azur 6	**2,000-3,000**	159x93x11	39	1.3	★★★★	★★★★	The best solar water heating panel we tested
WATER HEATING: EVACUATED TUBES							
3 THERMOMAX MS20	**3,500-4,000**	142x213x12	45	2.8	★★★★	★★	A good performer when the sun is shining
PHOTOVOLTAICS: PANELS							
4 BP BP785	**from 6,000**	120x54x5	8	0.6	★★★	★	A letdown in overcast conditions
5 SANYO HIP-200NHE1	**from 6,000**	157x80x4	15	1.2	★★★★★	★	The best PV panel we tested, particularly in sun
6 SHARP NE-80E2E	**from 6,000**	120x53x4	9	0.6	★★★	★	A letdown in overcast conditions
PHOTOVOLTAICS: TILES							
7 SOLAR CENTURY C21e	**7,500**	122x42x2	11	0.3	★★★	★★	The second best PV panel we tested

USING THE TABLE
We tested several different types of solar panel from major manufacturers and specialist environmental retailers. We tested just the panel – efficiency will vary depending on the total system installed. The more stars the better.

Specification
Approximate system price We give the approximate price for the total system installed using the type of panel on test.
Collector area The area of the solar panel that can actively collect energy from the sun.

Test performance
Sunny/Cloudy day For solar water heating panels this reflects the increase in water temperature in the tank per metre squared of panel. For photovoltaics it reflects power generated (kW) per hour for each metre squared of panel.

Contacts

BP
020 7496 4000
www.bp.com

Consolar
0845 223 5440
www.consolar.co.uk

Construction Resources
020 7450 2211
www.constructionresources.com

Sanyo
01923 246363
www.sanyo. co.uk

Sharp 0800 262958
www.sharp.co.uk

Solar Century 020 7803 0100
www.solarcentury.com

Thermomax 01452 770629
www.greenshop.co.uk

Insulating your loft

You can cut your heating bills by up to £100 a year by insulating your loft

If your home isn't adequately insulated, power stations (which contribute to carbon emissions) are generating energy which is wasted – and you are throwing money away. Heat lost from your walls, loft and floor can account for up to 35, 25 and 15 per cent of your heating bill respectively. Of these, lofts are the easiest to insulate without major upheaval and you can save up to £100 a year on fuel bills by doing this. Even if you already have some insulation, topping it up can lead to further savings – 250mm is the current recommended thickness.

The common types of insulation – fibre glass and mineral wool – have been joined in recent years by environmental options such as sheep's wool and recycled paper. The latter was a star performer in our tests, offering great insulation at a decent price.

If your loft isn't insulated, you are throwing money away

79% Excel Warmcel 100 £6

PRICE FOR A THREE-BED HOUSE ROOF £326

Warmcel, which is made from recycled newspaper, is the second best insulator on test and one of the easiest to install – you simply pour it into the available space, breaking up any large bits with your hands. One bag fills one metre square of roof space.

WE LIKE Warmcel is environmentally friendly.

WHICH? BEST BUY

Amount in pack 1m² **Price per m²** £6 **Type** Loose fill **Materials** Recycled newspaper **Thicknesses available** N/A

75% Pavatex Pavatherm £7

WHICH? BEST BUY

PRICE FOR A THREE-BED HOUSE ROOF £373

Pavatex, which is made from wooden fibreboards, is the best insulator we've tested, but didn't get the highest overall test score because it is difficult to cut – you'll need a saw and protective clothing. Resistance to water is excellent, though.

WE FOUND The boards shred when cut, making the job dusty and messy.

Amount in pack 0.6m² **Price per m²** £12 **Type** Boards **Materials** Insulating fibre board **Thicknesses available** 60, 80 and 100mm

What you can save by insulating

A new layer of loft insulation could pay for itself in just two to three years

Figures from the Energy Saving Trust show that you can cut your heating bills by insulating your home and recoup the cost of the job before long, especially if you have little or no insulation at present.

Fit 250mm of insulation to an uninsulated loft and you could reduce your annual fuels bills by £80 to £100. The job could pay for itself in two or three years. Adding 200mm of insulation to an existing 50mm layer could cut bills by £20 to £30.

What you should look for

EASE OF CUTTING
Ease of cutting is key to installing insulation. Excel Warmcel 100 doesn't require cutting as it's made from loose material. Pavatex Pavatherm, on the other hand, is very rigid, making it difficult to cut

FIBRES AND DUST
Wear a face mask when cutting any insulation. In our test, Pavatex and Kingspan released the most fibres

TOOLS
You can cut most products we tested with a knife, but you'll need a saw to cut the Pavatex, Xtratherm and Kingspan Best Buys

Facts & scores

Extra hints and tips from our team of testers

Water resistance
If your loft does spring a leak, these Pavatex and Xtratherm Best Buys are best at resisting water.

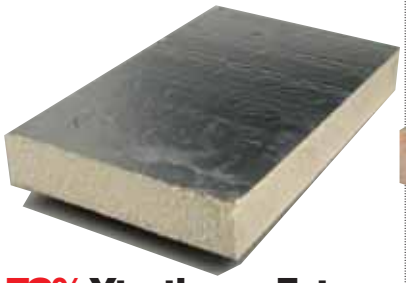
Buying British
If you want to buy British, the Thermafleece is made using wool from British hill sheep.

MODEL
1 **EXCEL** Warmcel 100
2 **PAVATEX** Pavatherm
3 **XTRATHERM** Extra Perfor
4 **KINGSPAN** Kooltherm K7
5 **KNAUF DIY** Space Blanket
6 **KNAUF DIY** Loft Insulation
7 **ISOVER** Spacesaver
8 **THERMAFLEECE**
9 **ROCKWOOL** Rockwool
10 **ISONAT** Batts

USING THE TABLE
We tested a range of loft insulation products. The more stars the better.

Specification
Price Prices are a guide to what you can expect to pay.

Test performance
Ease of cutting Considers tools needed, ease of cutting and any mess created. **Ease of fitting** Considers how easy the



73% Xtratherm Extra Performance £44

PRICE FOR A THREE-BED HOUSE ROOF £831

The most expensive product on test, Xtratherm is made from rigid board with foil on both sides and is a good insulator. It is easy to cut and trim with a saw but you'll need protective clothing, including gloves. It has excellent water-resistance.

WORTH KNOWING **It is very similar to Kingspan K7, another Best Buy.**

WHICH? BEST BUY

Amount in pack 2.9m² **Price per m²** £15 **Type** Boards **Materials** Rigid insulation board **Thicknesses available** 90mm

70% Kingspan Kooltherm K7 £15

PRICE FOR A THREE-BED HOUSE ROOF £270

This rigid insulation board, made from styrofoam between silver backings, was the heaviest product on test. It is a good insulator and is very easy to cut with a saw. It is very dusty – you'll need protective clothes, including a mask and gloves.

WHICH? BEST BUY

WORTH KNOWING **Instructions are not supplied.**

Amount in pack 2.9m² **Price per m²** £5 **Type** Boards **Materials** Rigid insulation board **Thicknesses available** Various, from 25mm

Kooltherm K7 is the heaviest product on test but is a good insulator

70% Knauf DIY Space Blanket £10

WHICH? BEST BUY

PRICE FOR A THREE-BED HOUSE ROOF £276

This glass mineral wool is wrapped in a plastic covering which the maker says is a fire retardant. It is sold in rolls and is very flexible and a good insulator. This was one of the easiest to install.

WE FOUND **The plastic surrounding the insulation can stretch and split.**

Amount in pack 2m² **Price per m²** £5 **Type** Roll **Materials** Glass mineral wool **Thicknesses available** 150 and 200mm

	SPECIFICATION			FEATURES			WHICH? TEST PERFORMANCE					SCORE %
	PRICE (£)	AMOUNT IN PACK (m²)	PRICE PER m² (£)	TYPE	MATERIALS	THICKNESSES AVAILABLE (mm)	INSULATING PROPERTIES	WATER RESISTANCE	FITTING ADVICE	EASE OF CUTTING	EASE OF FITTING	
	6	1.0	6	Loose fill	Recycled newspaper	n/a	★★★★	n/a	★	★★★★★	★★★★★	79
	7	0.6	12	Boards	Insulating fibreboard	60, 80, 100	★★★★★	★★★★★	n/a	★★	★★	75
mance	44	2.9	15	Boards	Rigid insulation board	90	★★★★	★★★★★	★	★★★★★	★★★★	73
	15	2.9	5	Boards	Rigid insulation board	Various, from 25	★★★★	★★★	n/a	★★★★★	★★★★	70
	10	2.0	5	Roll	Glass mineral wool	150, 200	★★★★	★★	★★★★★	★★★★★	★★★★★	70
	10	3.0	3	Roll	Mineral wool	100, 170	★★★	★	★★★★	★★★★★	★★★★★	65
	19	5.3	4	Roll	Mineral wool	100, 150, 170, 200	★★★	★	n/a	★★★★★	★★★★	57
	5	0.7	7	Batts	Sheep fleece	50, 75, 100	★★★	★★★	★	★★	★★★★	52
	38	5.8	7	Roll	Mineral wool	100, 150	★★	★★★★	★★	★★★★★	★★★★	50
	23	4.3	5	Batts	Hemp/recycled cotton	50, 75, 100	★★	★★	n/a	★★	★★★★	46

insulation is to handle, protection needed and any dust released.

Score

Ignores price and based on:
Insulating performance **70%**
Ease of fitting **30%**

Contacts

Excel 01685 845200
www.excelfibre.com

Isonat 01844 338338
www.natural-building.co.uk

Isover 020 7400 8800
www.saint-gobain.co.uk

Kingspan 0870 850 8555
www.insulation.kingspan.com

Knauf 01744 766666
www.knaufinsulation.co.uk
(0845 601 1763; www.space-blanket.co.uk for Space Blanket)

Pavatex 01844 338338
www.natural-building.co.uk

Rockwool
01656 862621
www.rockwool.co.uk

Thermafleece
01768 486285
www.secondnatureuk.com

Xtratherm
0871 222 1033
www.xtratherm.com

Best energy-saving gadgets

Want to buy yourself a gift that won't cost the earth – or simply keep tabs on how much energy you're burning? Read on

Solio solar charger £60

If you want one charger to keep your phone and MP3 player running when you're on holiday, try this little device. It produced good charging rates in bright sunlight and also worked in overcast conditions. See solio.com

OUR VERDICT One of the best solar chargers we've tested.

Scotty solar charger £35

This mobile phone charger can charge its own internal batteries or power an attached device in bright sunlight, so it's a good substitute for mains power. It comes with mobile phone adaptors for several phones. See maplin.co.uk

OUR VERDICT A handy gadget but power savings are small.

Intelligent mains panel £30

If you tend to turn off your PC but leave printer, monitor and scanner on, this useful device will cut fuel bills. It detects the power drop when you turn your PC off and shuts off everything else plugged into it. See greenshop.co.uk

OUR VERDICT A significant energy saver.

Electrisave £80

Electrisave detects and displays your home's electricity usage in kilowatts, tonnes of greenhouse gas emitted – and hard currency. It proved accurate in our tests. See electrisave.co.uk

OUR VERDICT A good product but may be beyond a competent DIYer to install.

Wind power

Domestic wind turbines are set for take-off in the UK

A small domestic wind turbine can provide up to 33 per cent of an average home's electricity needs and can pay for itself in as little as seven or eight years – much quicker than solar heating.

Two rooftop wind turbines are undergoing trials in the UK. The Windsave turbine developed by a Glaswegian entrepreneur will feature in *Which?* as soon as it goes on sale. We are also keeping an eye on the Swift turbine produced by another Scottish company, Renewable Devices. For details, see www.which.co.uk.

The rest of the gadgets on test

SOLTRONIX SOLAR AM/FM HEADPHONES
£22
These solar headphones with built-in radio clamp your ears too tightly to be comfortable. See carbonneutral.com/shop

WATER-POWERED CLOCK
£8
This is an eye-catching idea but clocks use so little energy in the first place that any energy saving it can offer is likely to be minimal. See tangogroup.net

SOLAR CAR BATTERY CHARGER
£23
This doesn't produce enough energy to fully charge a car battery. Most car batteries don't need trickle charging so we don't see the point. See naturalcollection.com

MEMBER BENEFIT

Switch with Which?

Insulating your loft could cut fuel bills by 35 per cent. Why not see how much you can save on your whole energy bill at the same time?

People switching their gas and electricity through **www.switchwithwhich.co.uk** saved on average £158[a] on their annual energy bills.

Switching is easy – it takes only ten minutes or so on the internet, then the energy company will take care of the rest of the switch for you. See how much you could save by logging on to our website: **www.switchwithwhich.co.uk**

a This figure is the average annual saving per household which switched using our website between 20 July 2005 and 7 February 2006

Government grants

Install a solar water-heating system and you may get a £400 grant from the Low Carbon Buildings Project, the government's grant programme for renewable energy, or up to 50 per cent off the price of a photovoltaic system. You'll need to buy a solar system approved by the government and use an accredited installer. See www.lowcarbonbuildings.org.uk. Grants are also available for insulation – see www.defra.gov.uk/environment/energy/hees. For advice on other grants, visit www.est.org.uk.