

Domestic-scale solar electricity

Power your home with free sunlight

The sun produces an abundant source of clean, renewable energy. This can be converted into electricity using solar photovoltaic panels, usually referred to as 'solar PV'.

Using solar panels to produce your own electricity will save you money on your electricity bills and provide a source of un-taxed income through payments from the feed-in tariff.

How does it work?

Solar PV systems turn light into electrical energy by using thin layers of a semiconductor material like silicon encased in glass. This is known as a solar cell. The electricity leaves the panel as direct current (DC) and passes through an **inverter** that converts it to 240V alternating current (AC) so that it can be used in your home. This electricity will power any appliances in your house that happen to be on – washing machine, TV and so on – while the surplus, if there is any, is exported to the electricity grid.

Understanding kWp and kWh

Solar electricity systems are rated in **kilowatts peak (kWp)**. This is the maximum rate at which the panels generate electricity however 1kWp will rarely, if ever generate 1KW power. The kWp of a solar array depends on the size and number of solar panels. Note that this peak performance is only achievable around noon on a clear sunny day on panels that face due south. The rest of the time the output from the panels will be lower. You can expect to annually generate between 700-1200 kWh per kWp installed.

The electrical energy produced by solar panels is measured in kilowatt hours (kWh) – the same unit that is shown on



Solar panels have become a familiar feature of the UK roofscape

Photo: iStock.com/Brett Charlton

your household electricity bill. The amount of electricity produced over the course of a year will be determined by the orientation of the system (i.e. which way the panels face), if there is any shading and how sunny the location is, and the size of the system in kWp. And it obviously varies a great deal from season to season.

Can solar PV work for you?

Before you invest in a solar electric system you need to check the following:

- Is the roof more or less south facing? Solar panels need maximum exposure to the sun, and this means facing between south east and south west.
- Will trees or buildings cast a shadow over the solar panels? If even a part of a panel is in the shade, the amount of electricity generated will be greatly reduced.
- Is your roof structurally sound? It will need to take the extra weight of the solar panels plus the fixing frames.

A decent PV system will provide around half of the average household's electricity needs, but there are two things you can do to really make the most of your solar panels. The first is to buy energy efficient appliances which use less



Solar panels come in three basic types, which vary in efficiency and cost

- 1) **Monocrystalline:** made of thin slices of silicon, cut from a single crystal
- 2) **Polycrystalline:** made from thin slices of silicon, cut from a block of crystals (left)
- 3) **Hybrid:** combining crystalline cells with a thin layer of silicon on a glass or metal base. This tends to be the most efficient type of solar cell



"A decent PV system will provide around half an average household's electricity needs"

electricity. The second is to run appliances like washing machines and dishwashers during the day when the electricity is free, though you'll probably need to stagger their use so they're not all on at once. Your PV system should include a display that shows how much electricity is currently being produced, so if you know the energy demand of your appliances, you can judge which ones can be operated for free at that moment.

➔ For the energy consumption of appliances see our 'What uses Watt?' factsheet, and see also 'Getting the most out of your solar panels'. Both leaflets are downloadable from www.cse.org.uk/loveyourhome

Income and savings

Once installed, you can register your solar PV system for the **feed-in tariff**. Under this scheme your fuel supplier will pay you for every kWh of electricity your system produces, regardless of whether you export it to the grid or use it yourself. For exported electricity you'll be paid 4.64p for a deemed amount (usually 50%). But you're better off using it yourself because the electricity you buy from your supplier costs you around 14p per kWh.

To be eligible for the feed-in tariff your solar panels and your installer must be registered with the Microgeneration Certification Scheme (www.microgenerationcertification.org). You should also check that your chosen installer has signed up to the Renewable Energy Consumer Code (www.recc.org.uk).

➔ For more details see our factsheet 'Feed-in tariffs: how they work', available at www.cse.org.uk/fits

Happy paying more for your electricity and gas than you need to? **Course not.** So here's how you can cut your bills:



Give your clothes a day in the sun (and your tumble drier a break). Clothes dried in fresh air feel great, and there are drying days in winter, too.



Catch 'em young. Encourage your children to switch off electric toys and lights that they're not using. They'll soon get the hang of saving energy.



Dodge the draught! Fit draught-excluders to your front door, letter box and key hole, and draw your curtains at dusk to keep the heat in.



Sleep tight. Make sure all the lights are turned off when you go to bed. If you want to light a child's room or a landing, use a low-wattage night light.

Costs

The cost of a solar PV system obviously depends on the size of the array, the type of cells you are using and how easy it is to install at a particular site. But a typical domestic solar array of 4kWp is likely to cost between £6,000 and £8,000. Most systems require little or no maintenance although it is worth checking once a year that the panels are not too dirty as this can reduce performance. The inverter may need to be replaced after around 10 years at a cost of about £1,000.

Planning permission

Solar arrays are classed as 'permitted developments' which means they don't need planning permission if they stick out 200 mm or less from your building and meet other basic requirements. Though it's still worth checking with your local planning department, especially if you live in a listed building, a conservation area, an area of outstanding natural beauty or a world heritage site.



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The Centre for Sustainable Energy is a national charity that helps people change the way they think and act on energy. Our Home Energy Team offers free advice on domestic energy use to householders in Bristol and Somerset (including the unitary authorities of North Somerset and Bath & North East Somerset).

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