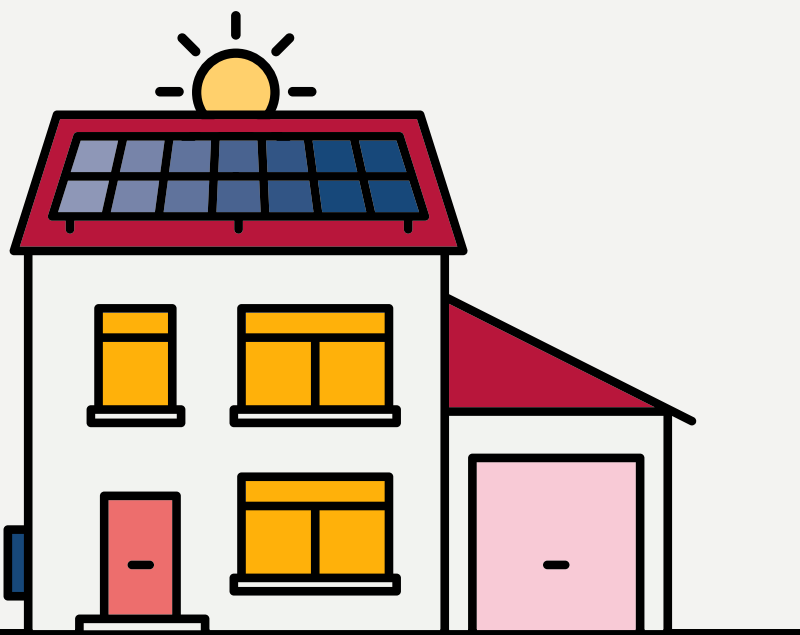
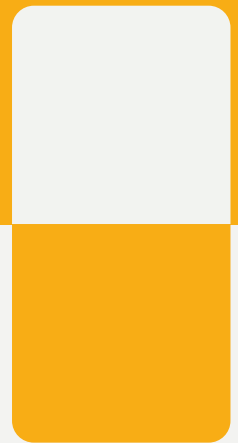


Guide

All you need to know about powering
your home with solar panels

Solar panels a bright idea



Contents

Introduction	3
How solar panels work	4
Are solar panels right for me?	6
Costs and savings	8
Installers	10
Maximising potential	12

Your guide to solar panels

Curious about powering your home with solar panels but not sure if they are worth the investment? We've got you covered. Let us walk you through everything you need to know about solar panels including how the technology works, typical costs and savings, and how to find an installer you can trust.

With advice from our energy experts, this guide will help you decide if solar panels are right for you. We'll also help you work out how to get the most out of your solar electricity.

Why choose solar panels?

- **Cut your electricity bills**

Many of us are looking for ways to save on energy bills and by using the sun's free energy, solar panels can help achieve this. Once you've covered the upfront cost of installing solar panels you can enjoy cheaper bills for years to come.

- **Reduce your carbon footprint**

By harnessing low carbon solar electricity, a typical home solar panel system could save around 800kg of carbon a year depending on where you live in the UK. This makes solar a great way to cut your carbon footprint and improve your home's energy efficiency rating.



159k

UK Government estimates new solar installations more than doubled in 2022/23 with a total of 159,390 systems installed.

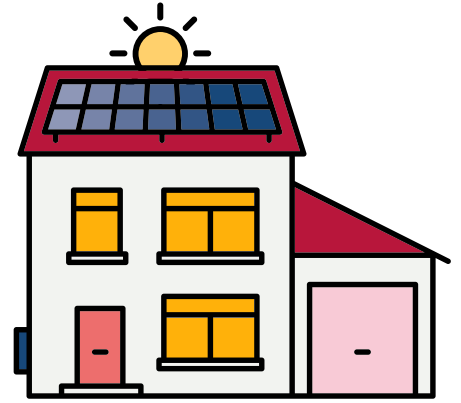
- **Simple installation and little maintenance**

Most home solar panel systems are installed within two or three days and should last for up to 25 years without needing much maintenance.

- **Get payments for extra energy you generate**

It's likely there will be times when the electricity you generate is more than you can use, so the surplus will be exported to the grid. You can be paid for the electricity you send to the grid through a Smart Export Guarantee (SEG) tariff or another export tariff. To qualify, the work must be carried out by an MCS certified installer and have an MCS certificate. We'll tell you how to find a certified installer later on in this guide. Generating your own electricity can help protect you from turbulent electricity prices.

How do solar panels work?



Solar panels capture the sun's energy and convert it into electricity which you can use in your home.

Solar photovoltaic (PV) systems are made up of several panels. Each panel has many cells made from layers of semi-conducting material, usually silicon. When light shines on material, it creates a flow of electricity. Solar panels don't need direct sunlight and can work on cloudy days, but they'll generate more electricity in strong sunlight.

A typical solar PV system is made up of around 10 panels, which each generate around 355W of power in strong sunlight. The panels generate direct current (DC) electricity, and then a device called an inverter converts this to alternating current (AC) electricity. This is the kind of electricity that is used in your home for appliances, sockets and lighting.

Kilowatts explained

Throughout this guide, we'll talk about the amount of power being generated by solar panels or being used in a home. Here are some quick definitions to help you.

Term	Definition
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Kilowatts (kW) and Watts (W)	This is a measure of power. We'll use this when talking about the amount of electricity being generated at a specific point in time.
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Kilowatt hour (kWh)	This is a measure of energy. We'll use this when talking about the total amount of energy generated or used over a period of time. For example, a typical household uses 2,900kWh of electricity a year.
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Kilowatt peak (kWp)	This is the maximum power generated by a solar panel in ideal conditions. It's a standardised unit of measurement that makes it easier to compare different manufacturers and designs of solar panels. Installers will use kWp to estimate the performance of a solar system, and you can use it to compare different designs.
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Using solar for heating and hot water

This guide focuses on solar panel systems, which generate electricity to power your lights, sockets and appliances but there are also other solar systems that you can use to heat your home and your water. Here are your options:

- **Solar heating**, or solar thermal systems, use solar energy to heat water that's stored in a hot water cylinder or thermal store. In summer, this could provide around 90% of your hot water, dropping to around 25% in winter.
- **Solar assisted heat pumps** combine a heat pump with a solar collector, which is a series of panels that convert sunlight into heat. These systems take heat from the air and sunlight, and this can be used to provide hot water for your home.

If you have solar PV, you can also install a diverter to power the immersion heater in your hot water tank.



90%

Solar heating can provide 90% of your hot water in summer.



Are solar panels right for me?

There are a few things to consider when deciding if solar panels are right for your home.

Do I have enough space?

Solar panels can be designed to fit the space you have, accommodating for chimneys and unusual roof shapes. The average 3.5kWp solar PV system will take up around 20m² of roof space, which is the same as about two car parking spaces.

A south facing roof is ideal for generating the most electricity from the sun, but panels facing east or west can also work well. North facing roofs aren't recommended.

Consider whether your roof is shaded by any nearby buildings, trees or chimneys, as these will reduce the performance of your system. Limiting the impact of shading will be a key concern for your installer.

Sometimes shading is unavoidable and, in this case, your installer may advise a solar PV system with an optimiser to minimise the impact of shading.



If you don't have enough sloping roof space, you could install solar panels on a section of flat roof. Our energy expert Laura did this. Although her 1.5kWp solar system is smaller than average, it still generates around a third of her household's energy consumption and has made a big difference to her carbon footprint.

[Read Laura's story to find out more.](#)

Do I need permission to install solar PV?

Solar PV is considered 'permitted development', meaning most homes won't need planning permission. It's always best to check with your local planning office for guidance on this though, as some exceptions apply, for example, if you live in a listed building, conservation area or national park.

Your installer will need to notify the relevant Distribution Network Operator (DNO) about your installation. This is done either before or after a process known as commissioning, which involves a series of inspections, tests and adjustments to your installation. Commissioning makes sure that all components are properly installed and functioning correctly, and you will receive a commissioning certificate once this is complete. Your installer can give you more advice.

Your DNO is the company responsible for the infrastructure that brings electricity to your home. It's also responsible for any electricity that you don't use in your home, and this is the electricity that is exported to the grid. It is important that DNOs are aware of the location and number of solar panels being installed so they can safely maintain the electricity network.

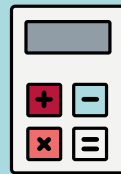
You should also check with your home insurance provider to make sure your policy covers your solar PV system or to make any adjustments needed. It's good to get confirmation of this in writing.

Can I use most of the electricity I generate?

The typical 3.5kWp system could generate over 3,000kWh a year. That's more than a typical household would use in the same timeframe (around 2,900kWh). However, most households export a lot of this electricity back to the grid, because they don't necessarily use enough electricity at the time it's being generated.

For example, lots of electricity is generated during the day, but if you're out at work, there won't be much electricity being used in your home.

Check out our [solar PV page](#) for estimates of how much power you can generate in different areas of the UK and how much of that electricity you're likely to use, based on how often you're usually at home.



To see if solar panels are right for you, try our [online solar calculator](#). Pop in a few details about your home and routine to find out about the costs, savings and benefits of adding solar panels to your home.

Costs and savings for your solar system

Wondering whether solar panels are worth the money? The costs and savings depend on where you live, the size of the system you need, and how much electricity you use at home during the day.

As a guide, you can expect to pay around £7,000 for a typical 3.5kWp system. This cost includes:

- The inverter, generation meter, panel-mounting system and wiring.
- The cost of labour for supplying, installing, connecting and registering the system.
- Scaffolding, which is needed for most roof-mounted systems.

Get paid for the extra energy you generate

Any energy you generate and don't use will be exported to the grid for others to use. You can be paid for this electricity through signing up for a Smart Export Guarantee (SEG) tariff.

There are two main types of SEG tariffs. A flat rate tariff pays you an agreed rate no matter when you export electricity, whereas a variable rate tariff will change depending on the wholesale price of electricity at the time that you export it.

The wholesale price fluctuates based on electricity demand, so if you're on a variable rate, you could be paid more when demand is higher. It's worth shopping around for the best SEG tariff and reviewing options regularly. You don't need to go with the same company that supplies your electricity, although some companies will offer you an export tariff when signing up. Make sure you check the terms and conditions.

There are also other export tariffs that are not strictly SEG tariffs as they come with other conditions, such as asking you to also buy your electricity from that supplier. However, many of these offer higher rates, so they're worth reviewing whether they could work for you. As with a SEG tariff, it's important to read the terms and conditions before signing up.

See how much you could save

The amount of electricity your system will generate varies depending on where you live. The more of this electricity you use, the more you'll save on your bills. Most households use about 15-25% of the energy they generate, but this can change depending on the number of people at home during the day and whether:

- you work from home
- you have an electric vehicle
- you use electricity for cooking
- you use electricity to heat your home or hot water.

Financials

The table below shows potential annual savings for different parts of the UK, depending on how much you're at home during the day. The savings assume you have a SEG tariff of 5.5p/kWh and pay an electricity tariff of 30.0p/kWh, based on Ofgem's Price Cap valid from 1 July 2023.

Area of UK	Home all day	Home in in mornings	Home in in afternoons	Out all day until 4pm	Out all day until 6pm
London	£565	£490	£460	£385	£350
Aberystwyth	£530	£460	£430	£355	£325
Manchester	£520	£450	£425	£350	£320
Stirling	£495	£425	£405	£325	£300
Belfast*	£530	£460	£430	£355	£325

*In Northern Ireland, these savings assume you have a ROCs (Renewable Obligation Certificates) tariff of 5.45p/kWh and electricity tariff of 16.4p/kWh. Tariffs correct from 1 July 2023.

Check out our [solar panels webpage](#) to see savings without SEG, payback times, and savings with a PV diverter.



For tailored advice on the costs, savings and benefits of solar for you, try our [solar energy calculator](#).



Choosing the right installer

If you've decided solar panels are right for you, you'll want to find an installer you can trust to do the job. Your installer should be able to advise you on the most appropriate size and model of system to suit your home and your energy needs.

Here's our advice on what to look for

Find a certified installer

We recommend you look for an installer who is certified through the Microgeneration Certification Scheme (MCS). You can search for a certified installer in your local area using the [find a contractor](#) tool on the MCS website.

Also check whether your installer is listed on the [Competent Persons Register](#). This allows installers to self-certify that their work complies with building regulations. It also means they can give you a certificate of compliance when the work is done, so you don't need to submit a building notice.



Get a quote

It's worth getting quotes from at least three installers to compare. Avoid installers with heavy handed sales techniques, including pressure to sign up on the day or high prices with large discounts for signing on the spot.

The cheapest installer may not necessarily be the best for you – we recommend checking your quotes cover:

- **Project management**

Will the installer project manage the whole job, or will you need to arrange and pay for other trades like electricians, scaffolders, plumbers or groundworkers?

- **Commissioning**

Does the quote cover the cost of commissioning the system? All certified installers must commission systems once fully installed to make sure they're fit for purpose.

- **Payment terms**

What payment options are available. Your deposit shouldn't be more than 25 per cent of the full cost. You should check that this will be protected with insurance.

- **Product specification**

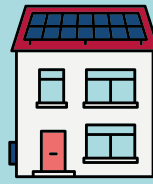
The specifics of the system, including size, estimated electricity generation, efficiency values and maintenance cycles.

Check the maintenance requirements

Solar PV systems don't need much maintenance, but you should get your installer to confirm the exact maintenance needed for your system before agreeing the work. Once the work is complete, they should provide written details of any maintenance you need to do to make sure everything is working properly, including details of the main inverter fault signals and common troubleshooting guidance.

Get to know your system and the amount of electricity it generates, and get to know the weather. This will help you understand what to expect and to know when something is wrong. The inverters on some systems have online monitoring functions and can alert you by email if the system fails.

It's worth asking your installer whether they offer an extended warranty for the inverter. The inverter is likely to need replacing during the lifetime of your solar system, at a cost of around £800 depending on the size and manufacturer of your system. Most inverters have a standard five-year warranty. This can often be extended to 15 years, but this extension may cost almost as much as a replacement inverter, so consider it carefully.



25%

Your deposit shouldn't be more than 25 per cent of the full cost.

“

The installation process was straightforward. I used a local accredited firm and before installation had my south facing pitched roof retilled so there would be no bother with roof problems during the life of the 12 panels proposed.

”

Neal McCay

Getting the most out of your solar panels

By making the most of the energy generated by your solar PV system, you can save more money on your bills because you'll need to import less energy from the grid. There are a few ways you can do this.

Use more electricity during the day

Your solar PV system will generate electricity during daylight hours, so it's a good idea to run your electrical appliances during the day if you can.

Reducing your overall energy use can help reduce the amount of energy you need to import from the grid, saving you money on your bills. Simple things like switching your appliances off standby and drying clothes outside in warmer weather can make a big difference – check out our [quick tips to save energy](#) for more ideas.

Terry and Chris have solar panels and use a plug-in power meter to monitor how much electricity their appliances use. This helped them identify and make changes to their energy use, such as unplugging appliances they weren't using. They reckon this helped them cut their energy use by about 10%.

[Read Terry and Chris's story to find out more.](#)

Combine solar with other technology

Heating and hot water

Solar PV can be combined with other renewable technologies for heating and hot water. Your solar panels could power a [heat pump](#) or run the pump of a [solar hot water system](#), or several of these systems could feed into a [thermal store](#).

You could also install a PV diverter. This uses excess solar energy to power the immersion heater in your hot water tank, storing hot water for you to use later. This is a low maintenance and fairly low cost option – a PV diverter costs around £800 and can be installed at the same time as your solar system.

“

As a result of advice from Energy Saving Trust, we have also recently installed a device that diverts excess generated electricity to our hot water tank via the immersion heater. In the first year of installation, this device captured 1,400kWh of free generated electricity which wouldn't have been used otherwise.

”

Ian

Battery storage

A battery can store surplus energy for later, so you can use it when your solar panels aren't generating enough. This means you can use more of the free electricity generated by your solar panels, rather than importing electricity from the grid.

Currently, you could expect to pay between £5,000 and £8,000 for a domestic sized battery, which in many cases wouldn't lead to a return on investment in terms of energy bill savings alone. However, some households are reporting greater savings by signing up to dynamic time of use tariffs.

Whether you have a battery or not, you'll save the most by using as much of your electricity while your solar system is generating it. Technology is improving, so battery storage is likely to become a more viable option for more households in the future.

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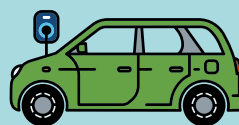
Since installing our solar PV and Tesla Powerwall battery, we have experienced a couple of mains outages. On both occasions the Powerwall 2 switching system took over provision of the house power supply without even any interruption to the television programme we were watching! As soon as mains power was restored the system switched back equally smoothly.

”

Les Clarke

Switch to an electric car

Did you know your solar panels could charge your electric car, meaning you drive on free, zero carbon energy? With this, you could reduce dependence on public car charging or importing electricity from the grid to charge your car. How much you could save depends on your car's battery capacity, how far you drive and the output of your solar panels.



Matt, one of our energy experts, installed solar panels and swapped his petrol car for an electric vehicle. He charges his car using the zero carbon electricity generated by his solar system, using an app to keep track of how much energy is generated and used. This has helped Matt and his family to adjust their habits to use as much solar energy as possible.

[Read Matt's story](#) to find out more.

Energy Saving Trust is an independent organisation dedicated to promoting energy efficiency, low carbon transport and sustainable energy use. We aim to address the climate emergency and deliver the wider benefits of clean energy as we transition to net zero. We empower householders to make better choices, deliver transformative programmes for governments and support businesses with strategy, research and assurance – enabling everyone to play their part in building a sustainable future.