

Consumers Guide to Solar PV Installation



Solar Photovoltaic, also known as Solar PV, is widely regarded as the most effective renewable energy source in the domestic marketplace. Solar panels and related technologies have come on leaps and bounds over the last 10 years, meaning solar systems are now offering a greater benefit than they ever have before.

With consistent energy price increases and continued uncertainty over the landscape of the energy sector within the UK – solar panels have never been a more attractive investment.

To give you an insight and a helping hand into your renewable energy journey, we have crafted this guide to tell you everything you might need to know about your residential solar installation.

This guide will touch on the following

⚙️ *How a solar system works*

⚙️ *The components of a solar system*

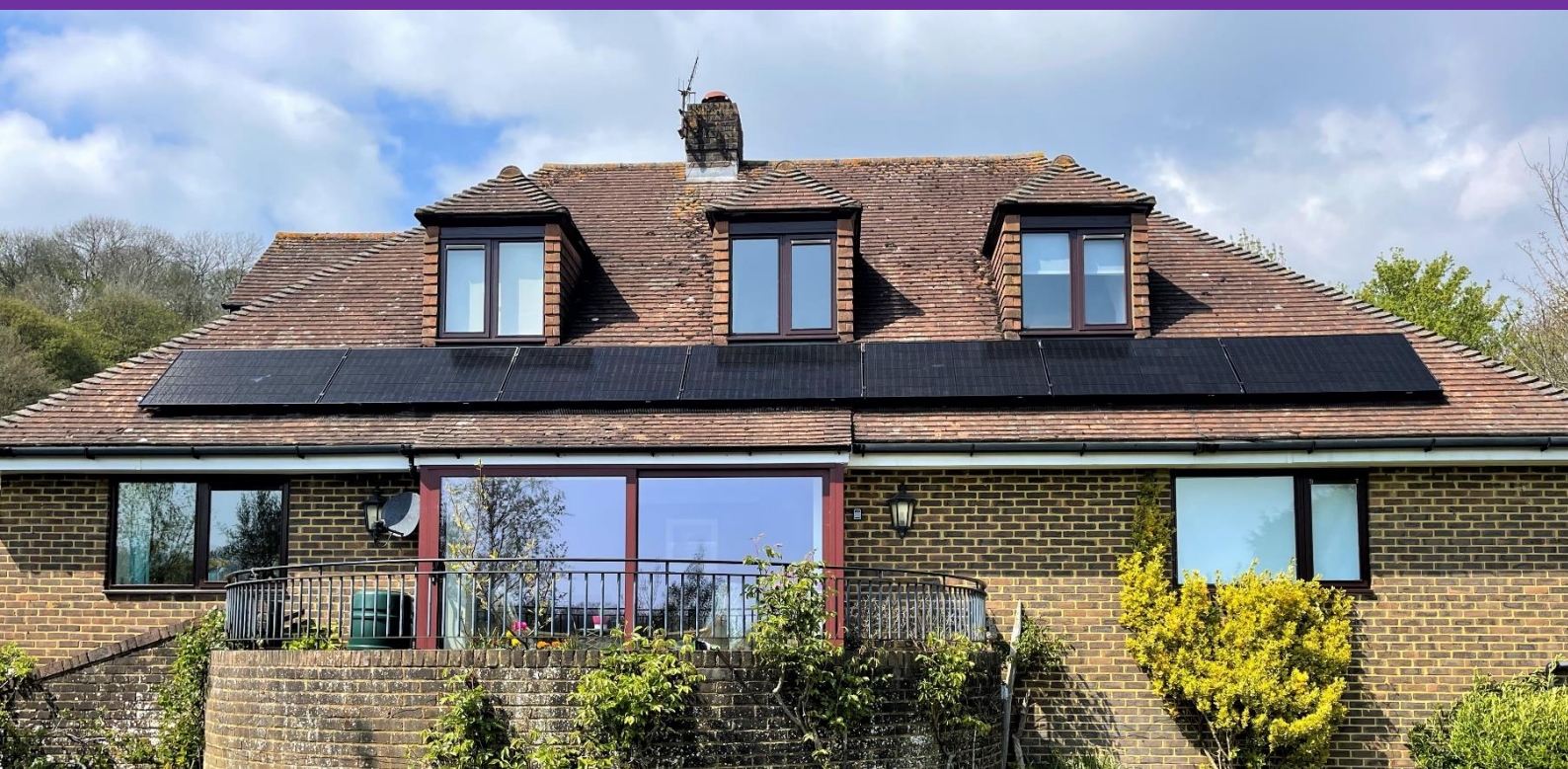
⚙️ *The installation process of a solar system*

⚙️ *How to make the best use of your solar system*

⚙️ *Performance estimates and savings opportunities*

⚙️ *Frequently asked questions*

⚙️ *Common issues & Resolutions*



How does a solar system work?

Although it may be obvious, solar photovoltaic cells harness the energy of the sun and convert it into electricity. Commonly referred to as Solar PV, groups of photovoltaic cells are soldered together to make solar panels which are then installed on roof tops, and provide clean energy for your home. Most solar panels are made from a thin layer of silicon (a semi-conducting material), a glass or plastic casing and are usually aluminum framed.

The panels on the roof feed into an inverter in your home, which “inverts” the DC (Direct Current - electricity that the panels produce) to usable AC (Alternating Current) electricity for your home and appliances. The inverter unit is most commonly installed in the loft, cupboard or garage and has a direct run to your property’s main electricity distribution board to give the solar a pathway to power your home.



When your solar power is produced, it will first be used to provide energy to anything that your home is using, fridges, freezers and other residual appliances will use a steady amount of power, your homes power consumption will be the priority for your solar energy. The same can be said for your higher usage appliances like washing machines, kettles and ovens.

Excess energy is generated when your solar power generation exceeds your homes consumption. Excess energy can go to a few places depending on the system you have installed:

- **Into your battery:** Excess solar power can fall into your battery storage unit if you have one installed, for use at a later time when there is not enough solar power available to cover domestic demand.
- **To your immersion heater:** If you have a diversion device like a Power Diverter or Solar iBoost, then excess solar power can be used to heat your immersion heater.
- **Back to the grid:** If your battery is full or your hot water tank is hot enough (or you do not have any of those devices), then your excess solar power will go back to the grid. You can get paid on the power that you export to the grid through certain types of smart energy tariffs.

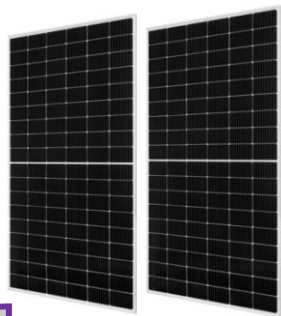
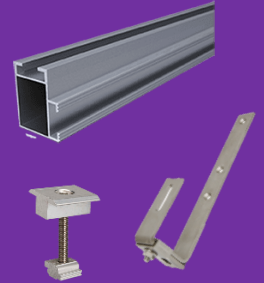
The Installation Process & Key Components

A solar panel installation is a technical and complex project for any property. There are a few common and key components that form the solar system you have on your property. It can be useful to know what these parts are and what they do, to give you a better understanding of how your system is working.

Roof & Mountings

Installing panels on rooftops means that we need equipment to mount them. Panels are installed on lines of metal rail which run the length of a given array. The rail is mounted to the roof surface by being attached to anchors that are bolted into the rafters of the roof, these anchors slip under the roof tiles and do not affect the structure or watertightness of the roof.

The panels are fastened and clamped down to the rail to fix them securely to the roof.



Solar Panels

Photovoltaic Panels provide energy by using light from the sun to stimulate electrons in the silicon layer into a mobile and higher energy state - thus the charges move and a current is generated. These are mounted onto a roof-face in the most suitable orientation to capture the most amount of sunlight.

A panels output is measured in Watts (w) – so a 390w panel is rated from the factory to produce 390 Watts worth of power within 1 hour of perfect solar conditions. A cluster/group of panels is commonly referred to as an array, or string.

Inverters

The inverter is the heart of your installation. Without it, the power that you generate from your panels, wouldn't be in any useable form for your home. Your panels have a DC cable run from the array into the inverter. Inverters are usually installed in the loft, cupboard or garage and there are different types of inverters for different compositions of systems. The inverter is responsible for managing the solar power that is produced by your panels, it is also what provides data for your monitoring app. Any fixes/servicing for your system is most likely going to be actioned through your inverter screen, this is also where settings and parameters are adjusted.



Battery Storage

Battery storage units are more popular and justifiable than ever before. Battery storage allows you to capture excess solar power and store it for use at another time when there is not enough solar generation to meet your home's consumption. A battery storage unit will have its own management inverter, this can be coupled within the solar inverter, or a standalone battery charger. This will manage the flow of power in and out of your battery. Battery units have the ability to have charging times set, which means consumers can take advantage of cheaper power on certain energy tariffs, charging the battery on a cheap rate for use at a later date.



Cabling, meters & extras

There are a number of supplementary cables, meters and extras that make up the composition of your system. Every solar system has a "generation meter" installed – this meter tallies up your systems generation since the day it was installed, it's a good way to see the total amount of power your system has generated.

Cables are obviously an integral part of a solar system; DC cables run power generated from the panels to the inverter. There are also communications cables that are placed on points of your homes electricity network to read and monitor power correctly for things like your monitoring software.



How to make the best use of your solar system

In order to receive the greatest benefit from your solar it is important to use as much of the electricity that you generate as possible. Whether that's turning on the washing machine during the peak of day or charging your phone up at night with the power stored in your batteries there are ways to make sure you get the most benefit out of the power you generate.

The key is to adapt your routine to use your high usage appliances when the sun is full and your solar is performing well. Turning on your washing machines, kettles, tumble dryers and electric heating during peak production hours means that you are powering them using free electricity. This will result in the biggest change in your electric bill and mean that you save the most amount of money on your electricity bills.

If you are out during the best production hours, it is a good idea to have a battery so that you can capture the solar energy for use at a later time.



Performance estimates and savings opportunities

When solar is installed, it is natural to wonder how much benefit you will receive from your system. Whether your reasons for going green are environmental or financial, it's always nice to know how much your solar could really be benefitting you.

There are different factors that contribute to your systems performance and ultimate financial benefit. Taking into account system size, orientation, pitch and shade factor mean we can provide accurate estimations on your systems performance. A layout of these estimates and figures would have been provided by the on-site surveyor.

Another way to receive financial benefit from your solar system is to sign up for an Export Tariff with your electricity provider. Tariff particulars can fluctuate but currently there is the opportunity to be paid on any excess solar power that is sent back to the grid. Contact your energy provider for information about their latest sets of tariffs!

Frequently Asked Questions

With a complex home addition like a solar PV system, it is only right for a homeowner to have questions about their system.

How can I tell how much power my solar panels are producing?

Systems are provided with a physical mounted meter which will tally up the total amount of solar power that your system has produced since it has been installed, this is commonly referred to as a generation meter.

Your monitoring app also will give you live readings on how much solar power your system is producing in that exact moment. These apps can also provide analysis and totals for your systems daily, monthly and yearly performance metrics.

Who is responsible for registering my system with the National Grid?

Every solar PV system needs to be registered with the national grid and local District Network Operator (DNO). Your installer is responsible for notifying the DNO of your solar PV installation.

You are provided with a DNO acceptance from the grid, which your installer passes onto you. This document is confirmation that the grid has accepted your application for solar panels and that the installation is correctly regulated.

Can my battery charge from the grid, if so, how?

Yes, most modern battery and inverter units have the ability to charge up from grid power. This is most commonly used when a homeowner has a cheap rate of electricity at certain times of the day and the owner can charge the battery using cheap electricity for use later on. To do this, we recommend contacting your inverter manufacturer who can walk you through the process of getting this set up.

Why does it look like I'm drawing from the grid and not my battery first?

Every home consumption fluctuates constantly throughout the day. Kettles, tumble dryers, lights and turning on the TV will all have an effect on the amount of power your home is consuming. There will be instances when your home will draw from the grid before your battery, this is a necessary feature of the battery management system and is designed this way to ensure the longevity of the battery life. If the battery kicked in exactly as and when it was needed, and there was no ramp up or down of power requirement, then the battery life would be considerably shortened. Subsequently, there may be times when it appears on your monitoring that the home is drawing power from the grid before the battery. This is perfectly normal to see, and you should see over time that the battery kicks in to supply the power.

Some Common Issues & How to Fix

With any appliance, there can be some hiccups, here's an idea of how to tackle some of the more common ones.

My solar monitoring has stopped working!

There's a number of reasons that your monitoring could have dropped down. Switching internet provider/your router, having a weak connection or something else could knock out you're monitoring. The best way to resolve this is to contact your installer, who should be able to provide a guide to reconnect your monitoring, alternatively you can contact your inverter manufacturer for support.

My solar or battery system has an alarm!

Solar and battery systems have alarm modes built in to protect the equipment from any damage. When you receive an alarm, it does not mean that something is broken, it just means something might need looking at or tweaking. The first thing to do in the case of any alarm is to conduct a full system reset, a procedure of which can be obtained from your installer. If any alarms persist, contact your installer for further assistance.

I think my solar tripped my fuse board!

This is not a common issue but has been known to happen in rare cases. If this happens at your property, please conduct a full system restart and notify your installer.

If this happens again, please contact your installer who will investigate the problem and give you course of action as appropriate.

I don't think my battery is charging or discharging!

If you think that somethings up with your battery charging or discharging, please call your installer. They may be able to read your monitoring information and explain to you what you might be seeing and why you are seeing.

Your installer will be able to tell you if anything is wrong with your system, and give you course of action as appropriate.

Did you know...?

Did you know, there are two main types of solar panels?

- Monocrystalline
- Polycrystalline

Both are made from silicon, but what sets them apart is the way in which the silicon is cut and treated. Monocrystalline cells are made from pure blocks of single piece silicon and are crafted in a more extensive manor. Monocrystalline panels are widely considered the more premium option within the solar market.

Did you know, PV cells do not require direct sunlight to work?

Although it is true yes, your panels will work best with a full beam of sun within a cloud free sky, electricity can still be generated on a cloudy day or if there is partial shade. This is because solar PV panels use particles of light, called photons, to generate electricity. Photons are present in direct and indirect sunlight, so solar panels can operate in both conditions.

Did you know, solar systems require little to no maintenance?

Solar panels are a very low maintenance appliance for your home. Once the installation has taken place and the system is set up for the customer, it can be left alone in the background producing solar power for your home. The only type of recommended maintenance is to have the panels cleaned with a telescopic pole and window cleaner every 12-18 months to minimize buildup of dirt on the panels. There is no servicing or maintenance requirements for any other parts of your solar system.

Did you know, inverters are rated in KW in accordance with the size of your solar install capacity?

Your installer will ensure that you are provided with an inverter that is sized correctly according to the system you have installed. This is important as you do not want to undersize the inverter so that it is constantly hitting maximum load, but also want to make sure that it is working within a suitable operating range. Always take your installers advice when it comes to correctly sizing an inverter.

Did you know, there are three main types of inverters?

- **PV/String inverter**, which is used to just manage and invert power for a standalone solar system.
- **Hybrid inverter**, which can manage power flow from a solar system and also act as a battery management/charging unit, all in one place.
- **Battery Inverter/Charger**, which are used for standalone battery installations, or certain scenarios of solar & storage installs, where a unique configuration of inverter set up is required.

Got a technical question?

Please email tsa@homesmartenergy.co.uk for support or call 01444 708252 to speak to a technical assistant.