

FAQ - SOLAR PV

What is PV?

The photovoltaic (PV) process converts sunlight, the most abundant energy source on the planet directly into electricity. The equipment required for this process has no moving parts and as a result requires minimal maintenance. In addition, the electricity is generated with no emissions and no noise.

A PV cell consists of two or more thin layers of semiconducting material, most commonly silicon. When the cell is exposed to light, electrical charges are generated and this can be conducted away by metal contacts as direct current (DC).

The electrical output from a single cell is small, therefore multiple cells are connected together to provide a more useful output. Cells connected in this way are encapsulated (usually behind glass) to form a weatherproof module or panel.

Multiple modules can likewise be connected together in order to provide sufficient power for common electrical appliances.

How long has Solar PV technology been around?

In 1838 the photoelectric effect was discovered by physicist Edmund Becquerel although it wasn't until the 1950's that the technology was developed enough to produce efficient working cells. During the 50's and 60's Solar PV was put on satellites and sent into orbit but it was still too expensive for general use. The next few decades brought better technology with lower prices and Solar PV was installed in world-wide remote villages to provide electricity for where there was no supply. Grid-connected Solar PV has had a massive growth since 1990's in the more developed countries of the world.

Are photovoltaic panels expensive?

Over the last 20 years the price of PV modules have fallen dramatically, from around £15 per Wp in 1980 to current prices of around £3.50 per Wp. That means that a single module, typically generating 60W of power under standard test conditions, now costs around £200

Solar PV is still a more expensive technology than most other forms of renewable energy, but it has many advantages over other systems.

Doesn't PV technology need bright sunshine to work properly?

The electrical output of a PV cell is dependent upon the intensity of the light to which it is exposed. So PV cells will tend to generate more electricity on bright days than when skies are overcast. However, photovoltaics do not need to be in direct sunlight to work, so even on overcast days a PV cell will be generating some electricity.

Is PV suitable for use in the UK?

In the UK, we get 60% of the sunlight received at the equator - so there is still a lot of potential energy available! PV has been used in the UK over the last 20 years or more for many applications, particularly in remote areas where grid connection is impractical, such as weather monitoring stations, marine navigation aids, etc.

Over the last few years PV technology has also started to be introduced into urban areas, incorporated into the roofs and facades of homes, offices and factories.

A modest sized domestic grid connect system will provide a substantial portion of a households electricity needs for over 6 months of the year and installations on commercial buildings are particularly suitable, meeting the daytime demands of an office. Over 1.5 MW of building integrated PV is already installed in the UK.

What applications are there for PV?

PV technology has many applications in the UK, both for stand-alone systems and for integration onto buildings. PV has been used for many years in the UK in applications such as monitoring stations, radio repeater stations, telephone kiosks and street lighting to name just a few examples. There is also a substantial market for PV technology in the leisure industry, with battery chargers for boats and caravans, as well as for powering garden equipment such as solar fountains.

In more recent years in the UK, PV has become more widely used in urban areas, where it can be integrated into new buildings or mounted onto existing buildings. This is a rapidly growing market in the UK and throughout Europe. PV technology is ideally suited to the urban environment, providing pollution and noise free electricity without using extra space.

PV technology is also widely used in the developing world. The technology is particularly suited here, where electricity grids are unreliable or non-existent, with remote locations often making PV power supply the most economic option. In addition, many developing countries have a high level of solar radiation levels year round.

How long will a system last?

The average lifetime of a PV module can be in excess of 20 years, crystalline silicon modules in particular have a very long life span. In addition, they require very little maintenance. Other system components will have a varied lifespan, for example batteries in stand-alone systems can last between 2 and 15 years depending on type.

How much will I need to power my home?

A typical domestic system of 1.5 kW in the UK would produce around a third of the annual demand of an average family household (taking the average demand to be around 10 kWh per day). However, calculating the system size depends on many factors, for example whether the system is grid connected, energy demand of the household etc.

What is the efficiency of the Solar panels?

There are different types of solar panel technology and the size of available roof space, angle to the sun, pitch of the roof and budget will have an effect of how much solar electricity you can produce. Below is an overview of the different solar panel technology.

<u>Technology</u>	<u>Characteristics</u>	<u>Appearance</u>
Monocrystalline	High efficiency and fairly expensive. Prefers high-light conditions. Power output c780 units/kWp/year Power density = 120 Wp/m ²	Charcoal or dark blue
Polycrystalline (‘multicrystalline’ or ‘thickfilm’)	Lower efficiency and less expensive. Prefers high-light conditions. Power output c720 units/kWp/year Power density = 120 Wp/m ²	Shiny and spangly blue
Amorphous (‘thinflim’)	Loves low light conditions and cheap but you need a very big area to put it on. Power output c900 units/kWp/year Power density = 62 Wp/m ²	Dark brown or dark blue
Hybrid	Combines monocrystalline and	Charcoal

	<p>amorphous technology. High efficiency in both high and low-light conditions. Power output c900 units/kWp/year Power density = 156 Wp/m²</p>	
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How much Power can I expect to get from my PVs?

Typically a 1kWp array will produce 750kWh/year.

Why are PVs rated in Wp rather than watts?

Wp means peak Watts. In other words, a 100Wp panel will produce a maximum of 100W in peak conditions (1kW/m² solar irradiation) - this is equivalent to a bright sunny midsummer day in the UK

How can I connect my system to the grid?

You will need to use a grid-tie inverter. If you wish to get paid for the electricity you produce, you will need to ensure a G83-certified inverter is used. However, many people use non-G83 certified inverters, and simply do not bother with an export account. In many cases the household will always be consuming more electricity than that being fed into the grid, therefore, the net effect is zero export

Is it true that I can get my electricity meter to spin backwards?

Not usually, nor is it legal to do this. The very old meters may cause this to happen, but most have a ratchet-type mechanism to prevent this from occurring.

How much will I get paid for the electricity I feed into the grid?

If you shop around you can expect 8-10p per kWh plus another 4p/kWh for the ROC entitlement, although the necessary paperwork may not warrant the effort for the ROC payment.

Why install a PV system?

There are many reasons to install a PV system:

- It is the most practical and economically viable option for many applications in remote areas.
- It is completely pollution free. Installing a small domestic system of around 1.5 kW would provide around 1000 kWh of electricity every year, this would save around half a tonne of CO₂ annually.
- PV can be integrated into the fabric of a building.
- Electricity can be supplied at the point of use.
- The system will run silently.
- There is very little maintenance required for a PV system.
- After the initial installation costs, there are no further fuel costs.
- PV systems are modular, and can be added to at any time

Are there any planning issues?

One of the conditions of the grant scheme is that you have received planning consent from your local council - please note, this is different from planning permission. For the majority of homeowners the addition of solar PV panels fall within 'permitted development rights', which means that the panels will be more or less flush with the roof.

If your property is in a conservation area, Area of Outstanding Natural Beauty or is a listed building you may need to apply for full planning permission.

We recommend checking with your local council to see what their stance is on solar PV panels, although most people install PVs without doing this.