

# A buyer's guide to photovoltaics

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All costs and savings are correct at time of printing. However financial savings will change as fuel prices rise or fall.



## What are photovoltaics?

The sun provides an abundant, free source of clean energy that provides natural light and warmth. Affordable Solar Energy use the latest technology to directly convert sunlight into electricity using our advanced photovoltaic (PV) panels.

If you have looked at a range of renewable energy technologies and are thinking about installing solar photovoltaics (PV) to generate electricity - this guide is for you. You can also get free, impartial and expert advice from Affordable Solar Energy on

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## How does PV work?

Solar photovoltaic (PV) systems convert light into electrical power using a thin layer of semi-conducting material, usually silicon, encased between sheets of glass or plastic.

They range in size from a few CM<sup>2</sup> - for example, on calculators and watches - to systems of hundreds of square metres made from interconnected modules that form an array. They have no moving parts and most importantly they emit no carbon dioxide as they generate electricity, unlike fossil fuel power stations.

When exposed to sunlight the 'semi-conducting' materials cause electrons in the materials' atoms to be knocked loose. These electrons flow through the material to produce an electric current known as direct current (DC). This direct current is carried through wiring to an inverter which converts the current to alternating current (AC) so it can be connected to your home's main electricity distribution board. This wiring can often be fed through existing cable routes with minimal disruption to your home's fittings or decoration.

## What are the key benefits of PV?

### Effortless integration

PV can be easily incorporated into most houses.

For existing properties the most cost-effective option is to use standard PV modules in a frame bolted to an existing pitched roof or a tilted frame on a flat roof. In this arrangement the panels slightly protrude from the roof tiles but are still in keeping with the shape of the house. We can also build purpose built pergolas in your garden if roof space is not adequate. Our consultants will be happy to discuss your requirements.



### Versatility

As PV is made up of modules of approximately 1 m x 1 m, an array (the full PV installation) can be designed to accommodate virtually any size and shape. PV can also be mounted vertically and horizontally allowing the system to form part of the wall and roof structures in new properties although performance can be reduced with these orientations.

### Fit and forget

Very little maintenance is required if a well designed PV system is installed properly. Equipment should operate silently and automatically. Tilting modules that are in line with the roof have the additional benefit of being cleaned by rainfall to ensure optimal performance.

## Is PV suitable for my home?

Solar photovoltaic systems can be bolted onto an existing roof provided it is strong enough to take the additional weight of the panels. Affordable Solar Energy will advise you on this but also consider:

### Permissions

In England, changes to permitted development rights for domestic renewable technologies mean that most solar installations don't require planning permission, as long as they respect certain size criteria.

Exceptions apply for installations on Listed Buildings and some properties where permitted development rights have been withdrawn or restricted, buildings in Conservation Areas and World Heritage Sites. We will, of course, give you advice on the requirements and deal with any

application on your behalf.

Affordable Solar Energy will always check this out in advance for you as getting planning permission after the event can be difficult and expensive. Make sure you inform your building insurance company of your installation as they may need to note it as a material fact on your policy. This shouldn't increase your premiums but check first with your insurance company.

### Orientation

Your roof should ideally face south at a pitched angle of 30-40° from the horizontal to give the best overall annual performance. However, east or west facing roofs can provide up to 85 per cent of this optimal performance.



Installation is not recommended on roofs facing north.

### Shape of roof area

PV arrays are made up of modules of about 1 M<sup>2</sup> which allows most available roof shapes to be accommodated.

As a general guide a roof area of around 20M<sup>2</sup> would be sufficient to deliver around 50 per cent of a typical household's electricity requirements.

### Shading

Any shading on a single module will affect the performance of the whole array as all the modules are connected. A system can tolerate some shading early or late in the day without much reduction of overall output but it should not be shaded between 10am and 4pm. Nearby trees, chimneys, TV aerials and vent pipes are all common causes of shading and should be accounted for before any installation. Affordable Solar Energy will advise you as to the suitability of your system



**ENERGY SAVING TIP**  
Using energy saving lightbulbs, Energy Saving Recommended appliances and not leaving electrical equipment on standby will reduce your electricity consumption. Using less energy means you can be more self sufficient with your PV system.

## Types of PV

There are 3 main types of PV each of which, have different characteristics, costs and benefits.

### Monocrystalline cells:

This single crystal cylindrical ingot is cut into thin slices between 0.2 and 0.3mm thick- this is the basis of a solar PV cell. The edges are cut off to give a hexagonal shape so more can be fitted onto the module. Affordable Solar Energy only use this type of PV cell as they offer the best return on Investment available.



### Polycrystalline cells:

Polycrystalline silicon is also produced from a molten and highly pure molten silicon, but using a casting process. The typical blue appearance is due to the application of an anti-reflective layer. The thickness of this layer determines the colour - blue has the best optical qualities.



### Amorphous or thin-film technology:

Amorphous silicon is non-crystalline silicon. are found in pocket calculators etc. The layer of semi-conductor material is very thin which means that considerably less raw material is necessary in their production compared with crystalline silicon PV production. Thin film technology is used in building products with integrated PV such as slates and tiles.



**Affordable Solar Energy only installs top brand solar products to maximise the return on your investment**



## Connecting to the grid

In accordance with G83/1 regulations, electrical grid connection requires approval from the distribution network operator (DNO) - an organisation responsible for maintaining the local electricity grids. In order to comply you simply send copies of the commissioning form, the inverter certificate and the electrical design to the local DNO once your system is installed. Affordable Solar Energy will assist you with this and provide a template of the letter required

Connection to the national grid is not as complicated as you might expect and our customer services team will be able to assist with this for you.

## Connection equipment

A basic grid-connected PV system requires no batteries. If the grid fails however - for example in a severe storm - grid-connected inverters automatically switch off to protect any engineers working on the lines to repair them.

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0800 988 9861 or visit  
[www.affordablesolarenergy.co.uk](http://www.affordablesolarenergy.co.uk)

## Feed In Tariffs (F.I.T.'s)

The government has now introduced a big financial incentive to anyone installing PV solar panels. The Feed in Tariff (FIT) or Clean Energy Cash Back Scheme as it is also known, is a financial support measure aimed at increasing the uptake of small-scale renewable generation to help deliver the UK's 2020 renewable energy targets.

This scheme promises to reward investors in 3 ways.

Firstly, the scheme is committed to paying you for each unit of electricity that your system generates. This rate is fixed at 41.3p per kilowatt/hour (kWh) and is designed to increase in line with inflation for the next 25 years meaning your rate will never devalue.

Secondly, each unit of excess electricity that your system generates is eligible for the export tariff which pays an extra 3p per kWh for electricity you export to the grid making a total payment of 44.3p per kWh.

Finally, you make real savings on your electricity bills by generating your own energy resulting in lower bills.

The Clean Energy Cash Back Scheme has been championed as a TAX FREE investment which can yield an accumulative return of 7-10% which far outperforms any investment opportunities available through financial institutions.

An Affordable Solar Energy consultant will be happy to discuss any queries you may have about this scheme.

## Costs

Do not simply focus on the suggested system capacity as this is probably not the best way to compare performance or cost-effectiveness.

Affordable Solar Energy includes EVERYTHING that is required for a fully functional PV system.

With a lot of other companies some things are often excluded from an initial estimate including:

- scaffolding (if required)
- making good any internal works to install wiring

- connection agreement with the DNO
- Full technical survey
- Health & safety risk assessment
- P.V. System design
- AC connection work (this requires a fully qualified electrician)
- a display meter.

All the above services are required so if they are excluded from other companies quotes, you will need to obtain separate estimates or make your own arrangements. It is important to bear this in mind when comparing quotations.



## Maintenance

Photovoltaic systems should be a 'fit and forget' technology, with the array requiring very little maintenance. You can expect them to operate for 25 years or more before they need replacing.

Once fitted, Affordable Solar Energy will leave written details of any maintenance checks that you should carry out from time to time to ensure everything is working properly. This will include details of the main inverter fault signals and key troubleshooting guidance. Of course we will demonstrate this to you at the point of handover.



In areas that experience high levels of dust and grime such as city or industrial locations your PV array may need additional cleaning from time to time as rainfall may not be sufficient.

## Local impact

PV systems have very little impact on the local environment. They are generally unobtrusive and silent to run. Although usually visible, they are not unattractive.

## Warranties

System warranties may vary: manufacturer's performance warranties on modern PV modules last up to 25 years. Inverter warranties are up to five years. Installer warranties may be five years although two years is a minimum to cover the installation. Affordable Solar Energy Systems have an additional 10 year warranty provided by REIGA an industry backed warranty scheme. We will provide you with further details on request.



10 year guarantee on renewable energy installations

## How to find an installer

Affordable Solar Energy only use experienced installers certified under the Microgeneration Certification Scheme. We have some of the best quality control systems in the industry to ensure a perfect installation at all times.

All of our products are also approved by the Microgeneration Certification Scheme and unlike many installers our policy is always to install the system that is not necessarily the cheapest but systems that are manufactured to the highest standards to ensure that you have the durability and performance over the life time of your installation.

We have many customers that recommend others because of our insistence of a high quality installation combined with the highest quality products.

## Affordable Solar Energy can design & supply complete Thermal & PV systems to meet your requirements

