

# Solar Photovoltaic Electricity



Sunlight can be converted to electricity by a process called the photovoltaic (PV) effect. Solar cells are commonly used to power calculators, watches and battery chargers, you may have seen them on road signs and car-park ticket machines.

Originally developed for the space industry they have been expensive for general use, but with prices stabilising of late they are becoming a familiar installation on roof tops to produce domestic electricity demands.

PV solar cells are made of semi-conducting materials such as silicon. When sunlight is absorbed by these materials, solar energy causes electrons to flow through the material to produce electricity.

The basic PV building block is the photovoltaic "cell", it produces direct current (DC) electricity like a battery.

Groups of cells are connected to form a "module", which can be used on their own or connected together to form an "array". This can be as big or as small as your needs, budget or the area available.

As the UK electricity system is delivered at 230AC (alternating current) an electrical 'inverter' is required to convert DC electricity into AC electricity, so that it is compatible with electricity from the national grid.



PV arrays can consist of PV tiles or modules integral to the roof or surface mounted panels on frames raised above the existing tiled surface. They can be fixed on the roof or to the ground on 'A' frames, or can be mounted on motorized pedestals that track the sun, thus increasing the overall efficiency of the system.

Different PV modules generate different rates of power / m<sup>2</sup> and in most cases the area of a domestic roof is unlikely to be large enough to accommodate sufficient modules to provide the full demand of the property, but there will be times when there is a surplus generated, at times of low or zero demand for example.

When this occurs it could be stored in batteries for use later, which is common for houses off the national grid, or more typically it can be sold to the national grid at a minimum rate of 3p/kWh. Therefore the house system needs to be linked to the grid via a distribution board and have an import / export meter fitted.

Since April 2010 zero carbon electricity generation systems such as Solar PV can earn a Feed-In-Tariff (FIT) whether it is used at the house or produced for resale. A domestic sized system of up to 4kWp that should cost c.£13,500 (summer 2011) could realistically generate 3500-3750kWh and will receive FIT payments of 43.3p/kWh, (c.£1600/yr). If all this electricity is used at the home the savings realized would provide a combined financial benefit of c.£2,000/yr with a payback on investment time of less than 10 years.

All of our PV installations are custom designed for the specific installation and are carried out by fully accredited installation teams and products which offer 25 year warranties.

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