



## SOLAR PHOTOVOLTAIC (PV)

Solar PV systems simply convert sunlight into electricity. An array of solar panels are installed directly onto your roof and connected to your existing power supply. This electricity is fed straight into the power supply of the property.

You save on your electricity bills as the energy generated by the PV system is consumed by the household before drawing it from your electricity provider. Any excess is then automatically exported.

The main incentive, however, for installing PV now comes in the form of payback from the government for the power you generate.

The Feed-in Tariff scheme offers you a fixed rate, tax free income on all electricity your PV array produces. On top of that you are helping to stop climate change, reducing CO<sup>2</sup> emissions and your carbon footprint.



### Installation

As with all renewable energy technology Raine or Shine will find the best solution for your situation, ensuring that the planning and installation is performed to the highest of MCS standards.







We use large aluminium sections for the module frame, which provides excellent rigidity - much better than most of the well-known names in the industry.

These panels are suited to small scale, low voltage battery-based installations as well as larger grid-tie (grid-connect) systems. Raine or Shine is also able to provide charge controllers/regulators for PV systems, Grid tie inverters and mounting systems for PV.

Item No.	Specifications			Dimensions				
	Power Output (W)	Module Efficiency %	No. of Cells	Length (mm)	Width (mm)	Height (mm)	Weight (kg)	Area (m <sup>2</sup> )
YL180 P-23b	180	13.9	48	1310	990	50	15.4	1.3
YL210 Wp	210	12.9	60	1650	990	50	18.7	1.6
YL230 Wp	230	14.1	60	1650	990	50	18.7	1.6
YL280 Wp	280	14.4	72	1970	990	50	26	1.3

The table above details the sizes and specifications of each panel. All panels are Polycrystalline and operate between -45 & +85 °C

## Key Benefits

-  Lowers your energy bills and earns you income (tax-free for domestic properties)
-  Generates electricity throughout daylight hours
-  Maintenance free
-  Future proofs your electricity prices
-  Lowers carbon footprint, emissions and dependency on fossil fuels
-  Adds value to property. Tariffs can still be kept in your name and claimed if you move





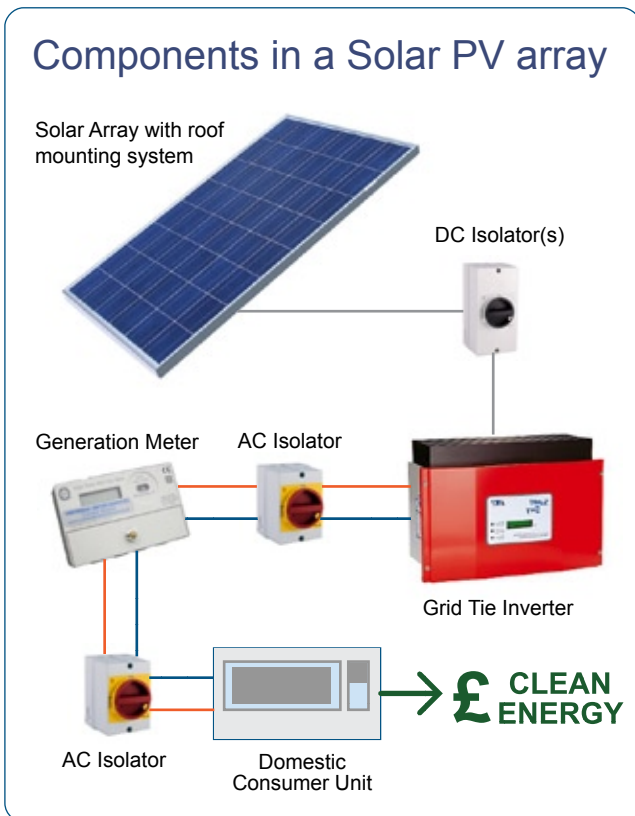
## Does PV technology need bright sunshine to work properly?

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.

## What happens in a power cut?

Grid connected PV systems in the UK automatically shut down when there is a power cut. This is a safety measure to prevent any electricity reaching the grid and causing damage or injury to those working to restore power.

## Components in a Solar PV array



## How Photovoltaics work.

Photovoltaics are solid-state semiconductor devices that convert light directly into electricity. A photovoltaic solar cell consists of layers of semiconductor materials with different electronic properties. In a typical crystalline silicon cell the bulk of the material is silicon doped with a small quantity of boron to give it positive or p-type character. A thin layer on the front of the cell is doped with phosphorus to give it a negative or n-type character.

The interface between these two layers contains an electric field and is called a junction. Light consists of particles called photons and when light hits the solar cell some of the photons are absorbed in the silicon. If the photons have enough energy they will be able to free electrons and the electric field at the junction will cause the electrons to move through the silicon atoms in the cell and into an external circuit as electrical current.

The photovoltaic process is completely solid-state and self-contained. They have no moving parts, produce no emissions and are simple to use alone or connected together into an array.

## Feed-in Tariff

The Feed-in Tariff (FITs) has been introduced by the Government to increase the level of renewable energy in the UK towards our target of 15% of total energy from renewables by 2020 (up from under 2% in 2009).

The above will be paid for 25 years from April 2010. They are tax-free for domestic properties and are indexed linked to the RPI (Retail Price Index) to protect them from inflation.

## How does the payback system work?

If at any time you are using less power than you are generating the system seamlessly directs your excess power back into the grid. Your PV system will incorporate a net metering system that measures units of production, units of power bought from the grid and units of power exported to the grid. It will automatically balance these figures so you will only pay for net consumption from the grid (what you have imported less what you have exported).

## Are there any planning issues?

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.

