

What are Photovoltaics?

Photovoltaic cells (PVs) convert energy from sunlight into electricity. PVs are also able to convert ultra violet rays into electricity and therefore still operate when there isn't direct sunlight – but less efficiently. PV's are manufactured in a variety of forms - they can be installed as stand alone panels or form part of a roof itself with the PVs embedded in a tile "substitute". They also can be incorporated as transparent cells that can be used in windows (roof lights) and conservatories.

How does it work?

Each PV cell consists of two layers of semiconducting material (frequently silicon). The sunshine creates an electric field across the layers and thus electricity is produced. The greater the light the more power is produced. The power of a PV cell is measured in kilowatt peak (kWp) which is the amount of electricity the cell will produce in full sunlight.



Where will it work?

PVs can be mounted on roofs or on the ground within 90° of south. To achieve maximum panel potential, it wants to be south facing and tilted to an angle of around 35°. However a west facing panel may still achieve up to 86% potential if correctly installed. Clearly there needs to be no overshadowing by trees, properties etc. as this will reduce the potential efficiency of the panel. The panels are heavy and therefore roof structures must be strong enough or be strengthened to bear the additional weight. However tile substitute systems can be used to reduce the weight loading.

PV Farms

Ground installation of PV panels on a large scale can achieve economies through scale and lower installation costs. As such the commercial return can be greater. In the west country sites of up to 5MW are now being planned, although such economies can be achieved on considerably smaller sites. A 500kW installation might require some 4 acres of land, and brown field sites such as old airfields would provide ideal locations. Greenfield sites can also work with panels mounted some 2m off the ground providing a range of options for maintenance.

Power Generation

The amount of power produced depends on the kWp of the cell and the number of cells. The cells produce a DC current which is converted to AC via an inverter. Grid-tied inverters synchronize the electricity they produce with the grid's utility grade AC electricity, allowing the system to feed solar-made electricity to the utility grid

Regulations

The installation of PVs will have to comply with Building Regulations, and for those up to 50kW will have to be installed by an approved MCS installer. Above 50kW, access to FITs is obtained through Ofgem as for other similar sized renewable technologies. Planning permission will generally be required. (It is not normally needed for domestic installations but Listed Building Consent and or Conservation Area Consent will be required if applicable).

Income

Power generated can be used to offset electricity used on site and/or to export to the grid. A 100kW installation might generate 85MWh of electricity per annum, and its value will be determined by the proportion of power used on site and that exported. On the basis of 50% own consumption, the value of the electricity supplied would be approximately £5,000. The value of the Feed-in Tariff (see below) would be £26,690

Feed-in Tariffs

The introduction of FITs from 1st April 2010 provides a support structure for renewable power generation technology. In essence there are two payments, one for power generation (see table below) and the other a guaranteed export tariff i.e. a guaranteed payment for electricity transferred into the Grid at 3p/kWh. Tariffs are guaranteed for 25 years but for installations commissioned post March 2012, tariff levels will progressively reduce to reflect predicted increasing efficiencies and lower capital costs.

Table of generation tariffs for first year of FITs (2010-11) Technology	Scale	Initial tariff (p/kWh)
PV	<4kW (new build)	36.1
PV	<4kW (retrofit)	41.3
PV	4-10kW	36.1
PV	10-100kW	31.4
PV	>100kW-5MW	29.3
PV	Stand alone system	29.3

Capital Costs

Costs will vary with the scale of the installation. The principle cost are the panels themselves and there is a significant difference in the market depending on claimed quality and project volumes/scale. Installation costs will obviously vary depending on whether arrays are roof or ground mounted, and as with all generation grid connection costs can significantly affect the overall project cost. Schemes we are involved in are seeking to achieve pay back periods of less than 8 years.



Grants

For schemes as described above, there would be no grants available.

Partners

We are pleased to be working with a number of partners in respect of photovoltaics. We are therefore able with our partners able to offer a complete package including feasibility assessment, planning, installation and commissioning of panels.



Scoping **Feasibility** **Project Management** **Planning**
Environmental Compliance **Design** **Funding** **Delivery**

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