



Renewable Energy: The facts.

Solar Electricity: (*photovoltaics*, or 'pv')

How is solar electricity made?

Simply, light (*'photo'*) is used to make electricity (*'voltaic'*). The sun shining on to a *pv* panel drives electrons between two layers of silicon, creating an electric charge as it does so. There's nothing new about photovoltaics. The photovoltaic effect was noted by scientists in the 19th Century, but it took the space programmes of the 1950s, 1960s and 1970s to really drive forward the development of *pv*.

How could I use *pv* at home?

Solar electricity can be used on a small or a large scale. We probably all have something with a solar cell in it, from a calculator to a torch, from a radio to a garden fountain.

You can go one step up from that, and use a 'stand-alone' *pv* set-up, with a small *pv* panel, a voltage regulator and batteries to store the charge. This could be used, for example, to provide low-voltage lighting to a garage or shed without a mains electrical connection.

But what we are particularly interested in now is how to use solar electricity as a renewable alternative to electricity generated by fossil-fuel or nuclear power stations. For this we need a rather larger set-up, linked in to the National Electricity Grid. Quite how large depends on your budget and the area of roof or other surface that you have available.

What do I need in order to use *pv* at home?

Assuming you intend to mount the solar panels on your roof, then ideally you need a south-facing roof. You can go as far as South-East or south-West without losing too much efficiency.

Of course you do not have to mount the panels on the house roof. They could be on a garage roof or on a purpose-made frame in the garden. How about a solar pergola? Wherever you mount the panels, though, you need to ensure that they will not be overshadowed.

If your house already has a mains electricity connection, you can (with the permission of the electricity company) connect your *pv* into the National Grid. If you don't have a Grid connection, you'll need batteries to store the power in.

What will I get from a *pv* set-up?

Typically you should get about 110 - 140 watts (peak output) from a square metre of *pv* panel, so about 7-9 square metres will give a kilowatt (1000 watts) of peak power output. (*'Kilowatts peak'* or *'kWp'* is a measure of the maximum output you can expect under optimum conditions). You can expect to get about 750-800 kilowatt-hours (kWh) per kilowatt of panels installed. This is about a quarter of the electricity used by a typical household. If you completely covered the south-facing roof slope of a typical terraced house with *pv* panels, you could probably get just over 2 kilowatts on, or about 1500 – 1600 kilowatt-hours per year.

How much will it cost?

For an on-roof system (where the panels are fitted on top of the existing roof covering) expect to pay between £5,500 and £6,500 for one kilowatt peak.

For an in-roof system (where the solar panels themselves become the roof covering), expect to pay nearer £8,000 to £9,000 for one kilowatt peak.

In both cases, as the size of the array increases the price per kWp drops.

Can I get a grant?

Not since February 2010 (unless your Local Authority has any incentive scheme – check with your council's home energy department).

But you can get a Feed-in Tariff!

What is a feed-in tariff?

A feed-in tariff is an incentive scheme designed to encourage people to adopt renewable energy sources. The idea is that a fixed rate will be paid for a fixed term for energy generated on a small scale, such as solar panels on the roof of your home, even if you use the electricity yourself. Further payments will be made for energy exported to the national grid. These payments significantly reduce the payback period for domestic renewable energy sources. The scheme began on April 1st 2010. The Feed-in Tariffs for PV appear below::

The tariff levels for the electricity financial incentives (pence), calculated to offer between 5-8% return on initial investment in the technology are:					
Tariff levels for electricity financial incentives					
Technology	Scale	Tariff level for new installations in period (p/kWh) [NB tariffs will be inflated annually]			Tariff lifetime (years)
		Year 1: 1.04.10- 31.03.11	Year 2: 1.04.11- 31.02.12	Year 3: 1.04.12- 31.03.12	
PV	≤4 kW (new build)	36.1	36.1	33.0	25
PV	≤4 kW (retrofit)	41.3	41.3	37.8	25
PV	>4-10kW	36.1	36.1	33.0	25
PV	>10 - 100kW	31.4	31.4	28.7	25
PV	>100kW - 5MW	29.3	29.3	26.8	25
PV	Standalone system	29.3	29.3	26.8	25

Table courtesy of www.decc.gov.uk

How long will it last?

The pv panels will last in excess of 20 years. Check with the panel maker and with the inverter manufacturer for details of their guarantees.

Will I need planning permission?

Installation is generally allowed as 'Permitted Development', unless you live in a listed building or within a conservation area, but always check with your local planning office first! Retrospective planning permission can be hard to obtain!

For further advice on this and other renewable energy technologies contact SYEC on 0114 2584574, or info@syec.co.uk