



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. Ensure that you have, or change to, a supplier who will pay you for any surplus electricity you 'export' to the 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 watts (peak output) from a square metre of *pv* panel, so about 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 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 under 20 square metres on, or about 1400 – 1500 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 £600 and £750 per square metre installed (including the inverter required to change the panels' output from 12 volts D.C (Direct Current) to 230 volts A.C (Alternating Current), or about £5,500 to £6,500 per kilowatt peak.

For an in-roof system (where the solar panels themselves become the roof covering), expect to pay about £1000 per square metre, or about £9000 per kilowatt peak.

Can I get a grant?

Yes. The Low Carbon Buildings Programme (LCBP) currently offers grants for domestic installations. The LCBP free phone help-line is 0800 915 0990, and the web-site www.lowcarbonbuildings.org

For non-domestic installations contact Phase 2 of the Low Carbon Buildings Programme: 08704 23 23 13 or email info@lcbpphase2.org.uk

Local schemes offering further discounts may also exist. Contact your local Energy Efficiency Advice Centre on 0800 512012.

Each Megawatt-hour (1000 kilowatt-hours, or units of electricity) you generate in a year gives rise to a **Renewables Obligation Certificate, or ROC**. These are tradeable, and can be sold for around £45 at current prices.

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?

Not necessarily, 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 nick.parsons@syec.co.uk