

## Estimating PV panel systems (kWh/yr and costs)

Section M1 of Appendix M in *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2009) provides a procedure for estimating the electricity produced by a PV panel (collector) system in kWh/year using the formula:

$$0.8 \times \text{kWp} \times \text{S} \times \text{Z}_{\text{PV}}$$

where:

**kWp** is the peak power of a PV unit (i.e. for a PV panel system it is the number of panels multiplied by the peak power rating of each panel)

**S** is the annual solar radiation in kWh/m<sup>2</sup> from Table H2 which reflects orientation and tilt and is reproduced below (N.B. Table H2 provides typical UK figures but more precise figures for your location can be taken from the 2008 Solar Irradiation map of the UK (*Source: JRC, European Commission*) shown in the *Is your property suitable for PV electricity generation?* detailed information.

**Z<sub>PV</sub>** is the Overshading Factor from Table H4 shown earlier.

Tilt of collector	Orientation of collector				
	South	SE/SW	E/W	NE/NW	North
Horizontal 0°	961				
30°	1073	1027	913	785	730
45°	1054	997	854	686	640
60°	989	927	776	597	500
Vertical 90°	746	705	582	440	371

**Table H2: Annual Solar Radiation kWh/m<sup>2</sup>**

*Source: SAP 2009 published on behalf of DECC by The Building Research Establishment, Garston, Watford, WD25 9XX*

SAP 2009 can be downloaded from:

[http://www.bre.co.uk/filelibrary/SAP/2009/SAP-2009\\_9-90.pdf](http://www.bre.co.uk/filelibrary/SAP/2009/SAP-2009_9-90.pdf)

Clearly the available dimensions of the proposed location (for most people this will be their roof) will determine the maximum size of any PV panel system that can be accommodated. The minimum size will be perhaps be determined by what makes a justifiable (e.g. economic) case. Generally, the bigger the PV panel system that can be afforded the better from an economic viewpoint, i.e. the better is the financial case because more excess electricity is being fed into the National Grid.

The Energy Saving Trust is a consistently good source on information on all aspects of PV panels and their website is recommended <http://www.energysavingtrust.org.uk/Generate-your-own-energy/>

They have a section discussing different aspects of PV costs, see:

<http://www.energysavingtrust.org.uk/est/search?SearchText=PV+costs>

In December 2011 the Energy Saving Trust website stated that the average PV system is 2.9 kWp and will cost around £11,700 (including VAT at 5%) and that most domestic PV systems cost around £3,500 to £4,500 per kWp installed, though small systems cost proportionately more. Costs can vary substantially between installers, so it is important to get several quotes.

Given that there have been more than 50 recent *local* PV installations by numerous different contractors it seems desirable to at least consider using installers that have lots of satisfied local customers. If you have any difficulties identifying such installers please email [pv@transitionchepstow.org.uk](mailto:pv@transitionchepstow.org.uk)

Recent first hand local experience (prior to the 12 December 2011 new FIT rates) suggests that a 3.5kWp to 4kWp system should cost between £9,000 and £12,000 depending on factors like:

- Scaffolding requirements, e.g. a small scaffold tower for a simple system on a bungalow will be cheaper than a bespoke scaffold on a three storey house.
- Quality and type of panels, e.g. panels built into a roof are more expensive than those that sit on top.
- Space limitations, e.g. *tight* roof dimensions and a desire to maximise system kWp output tends to steer customers towards panels with higher efficiency ratings and these are usually the more expensive options.
- Complexity of layout, e.g. two unequal PV arrays on different buildings on a site (with different slopes & orientations) will be more expensive than a single array.
- Track record (e.g. experience, reputation) of installer, e.g. bigger, long established contractors generally charge more than smaller, newer installers.

It should be noted that there are many commercial websites which provide indicative system costs but that with many, if not most of them, you will first need to register your contact details. PV prices are confidently expected to continue falling during 2012.

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