Action Surrey
SURREY'S LOW CARBON COMMUNITY

Solar Photovoltaics

Price Guide

	2kWp (approx roof space 14m2)	3kWp (approx roof space 21m2)	4kWp (approx roof space 28m2)
Capital Cost	£4,500 - £5,000*	£5,000 - £5,500*	£5,500 - £7,000*
Annual generation	1,600 kWh/yr	2,400 kWh/yr	3,200 kWh/yr
Annual financial Benefit	£415/yr benefit	£620/yr benefit	£825/yr benefit
Annual CO_2 saving	820kgCO_2 saved/yr	1290kgCO_2 saved/yr	1720kgCO_2 saved/yr
Payback	~ 11 years	~ 8 years	~ 7 years

Generation Tariff is at 14.38p/kWh

Export Tariff to 4.77p/kWh.

http://www.solarguide.co.uk/solar-pv-calculator
http://www.energysavingtrust.org.uk/Generating-energy/Getting-money-back/Solar-Energy-Calculator

*south facing, for south east/west the expected annual yields will be slightly less. These figures are provided as a very rough guide and should not be taken as 'definitive'. Costs will fluctuate and depend on a number of variables including the panels you select. The financial benefit includes the generation tariff, export tariff (assumed at 50% of total generation) and electricity saved in bills. These figures are for the 'south' of the UK (below Sheffield).

What is Solar PV and how does it work?

Solar PV systems harness energy from the sun to generate electricity. Solar photovoltaic cells are made from semi-conductor material (silicon) and are incorporated within solar panels or modules which are installed at roof level.

When sunlight hits the silicon inside the panel, electrons are released generating a direct current. This is then converted into alternating current through an inverter which feeds into the grid or a set of batteries.

Types of PV Cell

There are 3 main types of solar cells used in photovoltaic systems.

1. Crystalline Cells

Crystalline cells are individual square cells that are wired together to form a solar PV panel.

- Monocrystalline Cells – are created from one large piece of silicon grown from a silicon crystal they are expensive to produce but have the highest conversion rate of sunlight to electricity (about 15-20%). Most quality PV panels use this type of silicon crystal.
- Polycrystalline cells – are created from a pieces of silicon made up of several smaller silicon crystals. These are usually cheaper than mono panels but are slightly less efficient (approx 13%)

2. Amorphous/thin film Cells

Amorphous cells/thin film cells consist of a single thin film of silicon laid onto metal sheeting. This type of cell is often found in smaller less-expensive appliances such as garden lights or pond pumps. These cells can be applied to curved surfaces and are better at absorbing diffuse sunlight than direct sunlight (unlike mono/poly crystalline cells which are the reverse) The performance of these cells in larger applications has been questioned.

3. Hybrid cells

Hybrid technology solar cells use a combination of monocrystalline and amorphous solar cells which can provide a higher efficiency than single monocrystalline cells and therefore require less roof space. They are however, more expensive.

An alternative to photovoltaic panels are **photovoltaic slates and tiles** which are interchangeable with ordinary roofing components. Photovoltaic cells can also be integrated into glazing, cladding, skylights, conservatory panels and external shading louvers. These are more suited to new-builds as they can replace roof tiles. They are (at present) about 2 times as expensive as panels that sit on top of the roof.

Is my house suitable and what should I consider before installation?

- Solar PV systems work best on **south east** to **south west** facing roofs of any building type;
- Solar panels should ideally be installed at **45 degrees** to capture maximum spring-summer-autumn sunlight;
- If you have **a flat roof**, a mounting system will be necessary to angle the panels in order to capture the sun; [1]
- A South-facing (SW/SE) roof or wall receiving direct sunlight for the main part of the day is necessary (as a rough guide, approximately 1kWp requires 6-8m2 or roof space;
- kWp – the 'p' stands for 'peak' which describes the maximum output of the solar panel system, or maximum electricity the system can produce at any one time under peak conditions;
- Check with your local council whether your house is a listed building or if you live in a conservation area;
- Shadows from trees, chimneys or neighbouring buildings could significantly reduce the amount of energy collected and therefore needs to be avoided;
- The roof structure will need to be assessed by a structural engineer to ensure that it can accommodate the load – the installation company should be able to do this;
- Space will be required for the installation of the inverter and control equipment, which is normally wall mounted adjacent to the electrical consumer unit. Ventilation should be provided around this equipment;
- Installation usually takes about 2-3 days

Is planning permission required?

Planning permission is, in the majority of domestic cases, not required for solar PV.
The Town and Country Planning (General Permitted Development) (England) Amendment Order 2009 grants the installation of solar PV and solar thermal systems on dwellings subject to certain conditions. The government's Planning Policy Statement 22 also states that PV installations should be treated as a permitted development and should therefore not require planning permission.

However, your local council's Planning Department should be consulted. If you live in a listed building or conservation area planning restrictions will apply and you will certainly need to contact the local Planning Department.

[1] An installer can advise on the most suitable system based on the age, condition and material of your roof. Planning permission will be required for this type of system.

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Types of solar PV systems

Grid connected – If a solar PV system is connected to the grid it can feed excess electricity into the national grid system. Domestic PV systems can generate income in this way. The disadvantage of this system is that electricity cannot be stored in batteries for use when there is insufficient sun

Off-grid with batteries – If a solar PV system is off-grid it uses batteries to store the energy that is generated by the sun which can be used at a later time. The disadvantage of an off-grid system is that a lot of other equipment is required such as batteries. Batteries also have their own environmental impacts.

Benefits

- Solar energy is pollution free
- Harness free solar energy
- Localised production of electricity improves the security of your energy supply
- Householders can sell their electricity generated by the PV system back to the grid
- A typical solar PV system can provide a household with 30-50% of its electricity needs
- Generate money from your solar panels

Financial saving

- £145 - £290 off your annual electricity bill[2]
- Total financial benefit including the FIT payments of £400 - £900 / year.

Are there grants available?

No. However, solar panels that generate electricity are eligible for the government's Feed-in Tariff. This will pay homeowners 14.38p/kWh electricity generated and 4.77p/kWh for extra energy exported.

If you would like further information on solar photovoltaic panels or like a recommended installer; please contact Action Surrey on 0800 783 2503 or visit www.actionsurrey.org

[2] Assumes a 2 - 4kWp system with 50-100% on-site consumption and an electricity price of 18p/kWh