SOLAR ROOFS – AND MORE

As well as using less energy, you can quite easily 'go solar' to generate electricity or produce hot water. There are other technologies too (which are covered at the end of this section), but in town, solar is the most straightforward and simplest.

TWO KINDS OF SOLAR!!

There's a lot of loose talk about 'solar panels'! In case you are confused, there are two completely different types of solar that can be used on rooftops:

One kind – thermal – collects the sun's heat to produce hot water. (In sophisticated systems, it can provide central heating – but that's not very well developed in the UK as yet.)

The other kind – solar electricity, solar power, solar photovoltaics (or PV) – transforms daylight into an electrical current using a kind of semiconductor technology. (You've most likely been using a mini version of PV for years in your solar calculator, plus it's the source of power for all the satellites we depend on.)

So does PV work? Absolutely.

SOLAR THERMAL HOT WATER

With **solar hot water**, also known as solar thermal, the heat of the sun is used to heat the water in your hot water cylinder (it needs an extra-large, twin-coil cylinder – about 300 litres). A solar panel – specially designed to absorb the sun's heat – goes on the roof, connected to the hot water cylinder by very well insulated pipes. A heat transfer fluid is then pumped around the system. The fluid is heated as it passes through the solar panel; it then flows through one of the coils inside the hot water cylinder, where it heats up the water. Depending on the size of the system installed, and how many people are in the house, it can produce all the hot water you need for almost half the year, without needing to be topped up by gas or electricity.

From mid-September to mid-March (or thereabouts) – or during a prolonged dull spell in summer – the system won't normally get the water as hot as you'd want it for showering or washing. What it does do, though, is pre-heat the cylinder of water so there is less work for the boiler to do. (Typically, in winter, the solar will raise the temperature of water that comes in from the water main (at about 9 degrees), warming it to about 20 degrees, and the boiler will then heat this pre-warmed water.) The boiler and the solar system 'talk' to each other so that everything happens automatically.

The only caveat is that the cylinder etc. does require a bit more space than a normal hot water cylinder, which may not be available in your home, and – as with any plumbing - running the pipework can sometimes be disruptive (though it can go down the outside of the house).

TIPS: if you think you might want to install solar hot water at some stage, and are getting a new boiler, **do** check that it is compatible with solar (many are). **Don't** swap a hot water system with a cylinder to a combi-boiler (an instantaneous one). **Do** consider getting the solar pipes installed at the same time as doing any other similar, or disruptive work, to minimize disruption when your solar is installed. A good solar installer will advise on all this, and – if you are in a conservation area – on whether planning permission is needed in your case. These panels can be mounted on the surface of the roof or can be integrated – if you are thinking of re-doing the roof then it is well worth investigating integrated ones.

And it is possible to get Renewable Heat Incentive payments for the heat your system produces (see our section on Government Incentives and Finance).

SOLAR ELECTRICITY (PV)

With solar electricity it's the light of the sun that generates electricity. Unless it's extremely gloomy, during most daylight hours the roof produces more than enough (free!) electricity to power most of what's being used inside – though that depends on the size of the installation. If you turn on a power-hungry device such as the kettle or toaster, any 'extra' electricity required is automatically drawn in from the electric power grid – as it is during hours of darkness.

As you are buying much less electricity, bills fall considerably, plus (assuming you own the solar PV) you are paid for *all* the electricity you generate. For much of the time from March to October, the system should be producing excess electricity most of the day. This is automatically fed into the grid for use by someone else, and you are paid for the electricity you sell.

TIPS: Solar PV takes up very little space, and is easy to fit without disruption. A good solar installer will advise – if you are in a conservation area – on whether planning permission is needed in your case. Different types of PV panel, or module, are produced using different technologies – some end up black, others end up blue. The black – monocrystalline – will tend to stand out much less on slate roofs than the blue – polycrystalline – ones. These panels can be mounted on the surface of the roof or can be integrated – if you are thinking of re-doing the roof then it is well worth investigating integrated ones.

HOW SOLAR PV WORKS

Basically, a domestic solar PV system is a micro power station that generates electricity during daytime, simply because of daylight. When it's sunny, it produces much more than when it's dull. When it's dark, it switches itself off.

1. If a house has a solar PV installation on its roof, during most daylight hours the solar PV is producing enough power to cover all the background electricity (fridges and freezer etc) being used inside the house. If you turn on something power-hungry (such as the kettle, toaster, oven, etc.) any 'extra' electricity required at that moment is automatically drawn in from the electric power grid (sometimes no extra will be needed). Overall, you are **buying much less electricity**, so bills fall considerably.
2. The owner of the PV system also receives a **FIT generation tariff** and a **FIT export tariff** is paid. (See our section on Government Incentives and Finance for more details).
3. During sunny periods in winter, and for much of the time from March to October, the system will be producing excess electricity most of the day. This is automatically fed into the grid for use by someone else, and a FIT export tariff is paid. (Until your electricity provider

replaces your normal meter by a more sophisticated one, it is deemed that you use 50% of what you produce and export the remaining 50% and you are paid accordingly).

WHAT IS THE FINANCIAL BENEFIT?

Location, shading (from trees, chimneys, dormer windows) orientation will all determine the suitability of your rooftop and the size of system you could install. A typical urban domestic rooftop can accommodate a system sized between 2 kWp and 4 kWp *(what's kWp? It indicates the maximum amount of electric power that can be produced in any moment – a bit like the top speed of a car).*

A very rough and ready calculation for a house in this area with a 3 KWp installation on a south facing roof is a financial benefit of about £500 a year (income plus savings on the electricity bill). To do your own site-specific calculation and generate an on-line report, showing how much you could earn through Feed In Tariffs for solar pv, use the Energy Savings Trust solar energy calculator bit.ly/19HSBqV . This will still be pretty rough – if you are interested in taking it further, a solar installer will be able to provide a much more accurate assessment.

Check the section on Government Incentives and Finance for a link to see the latest FIT rates.

NON-SOLAR RENEWABLE OPTIONS

For generating electricity there are renewable options other than solar, such as micro wind turbines attached to a building, or a micro hydro turbine if you have a stream crossing your land. In urban settings these are much less likely than solar PV to offer a good solution.

For heating, there's the option of **biomass (wood) stoves** for individual rooms – usually running on logs or wood pellets. **Biomass (wood) boilers** are available for central heating systems. Biomass boilers, and the fuel, tend to be bulky and are generally more likely to be successful in rural areas – especially when they can replace an oil-fired central heating system. Technologically they can be very sophisticated, especially when run on wood pellets.

Heat pumps are another option: ground-source heat pumps extract heat from just below the surface of the earth (about 10 degrees C), and air-source heat pumps extract heat from the air outside. In both cases, electricity is then used to 'concentrate' that heat to a temperature high enough to heat the house. Typically, if you put in 1 kWh of electricity you get out 4 kWh of heat.

Do heat pumps count as renewable? *Kind of, and they can qualify for RHI payments*. Are they a good idea? *Sometimes*.

In buildings with a high level of insulation, and which need only a small amount of background heat, heat pumps can work well. In less efficient buildings heat pumps may lead to high dependence on electricity, and high bills. They are also likely to lead to higher CO_2 emissions (it's generally much more efficient to use gas in a top-of-the range gas boiler than in a power station). In brief, heat pumps MAY be a good option, but it's worth getting sound, objective advice first.