SOLAR THERMAL – The most widely-used micro-renewable technology, this utilises the radiation from the sun to heat your water. A typical domestic solar hot-water system can provide about 50% to 70% of an average family's annual requirement, saving about 0.2 to 0.4 tonnes of CO_2 per year, depending on the fuel replaced. (Source: Micropower Council). You'll need 3 to 4 sq m of south-east to south-west facing roof that receives direct sunlight for most of the day. You may also need an additional water cylinder. Unlike renewable electricity, the government is yet to introduce any financial support for renewable heat. Good Energy has therefore introduced HotROCs, the UK's first Renewable Heat Incentive, a groundbreaking scheme that pays domestic solar generators for the heat energy they produce.

Small is beautiful

The challenges of climate change and energy security can sometimes seem too great for the UK to overcome. But big problems can be solved by small solutions. With the government poised to boost incentives for microgeneration, now's the time to start thinking about making your own energy. HUGO HOUSE of Good Energy wonders whether Microgeneration has finally come of age…

In the UK we're way behind Europe when it comes to renewable energy. As Peter Crossley's article later in this issue reveals, we've got 40% of Europe's wind resource but we're third bottom when it comes to the amount of renewable energy we generate (*source: European Commission*). With only 1.3% of the UK's energy currently coming from renewable sources, the government's target of 15% by 2020 seems a very long way off.

But things could be about to change. Recent changes to planning law mean that most forms of microgeneration, except small wind turbines and air-source heat pumps, no longer need planning permission. A Feed-in Tariff (an additional payment made to renewable-energy generators to boost the growth of the market, often cited as the reason for Germany's booming wind and solar industry) is also on its way, following a late amendment to the UK Energy Act. And, with the government announcing more money for green measures in the latest budget, including £45M for small-scale renewables likely to be delivered through the Low Carbon Buildings Programme, the future for microgeneration has never looked brighter.

The 2004 Energy Act defines microgeneration as up to 45kW of heat or up to 50kW of electricity. The average home is unlikely to need more than 15kW of capacity, be it heat or power – so what you don't use, you can sell. The number of customers prepared to pay a small premium for 100% clean energy is growing fast.

CHOOSING THE RIGHT TECHNOLOGY

Microgeneration is all about playing to your strengths. If you're lucky enough to have a river, stream or especially an old mill on your property you should think about micro hydro power. If you're on exposed, high ground, consider small-scale wind turbines. But if you're in a built-up area with no wind, discount a wind turbine early on. Small wind turbines get unjustly criticised for underperforming, but usually it's not the machinery that's the problem, it's the lack of wind. Solar energy probably has the broadest applications, whether for heat or power. Provided you have a south-facing roof, you're off to a good start and while the further south you are, the better your solar resource, you can still get a good yield from solar panels if you are in Scotland, for example.

To find out more about how to install your own microgeneration technology, and get paid for the electricity you generate, visit **www.goodenergyshop.co.uk**.
If you cannot generate your own electricity, but would like to support the pioneering community of independent green generators, sign up for Good Energy's renewable electricity at **www.goodenergy.co.uk**

HYDRO - Generating electricity from hydropower involves harnessing the kinetic energy in water being forced by gravity from a high place to a lower place. The technology has been around for centuries and many of the micro-hydro projects being installed today use existing infrastructure, for example a Victorian mill, adapted for modern electricity production. Building brand new weirs and mill races would often be too expensive to make micro-hydro projects viable, but if you've got the infrastructure in place, it's definitely worth considering.

It can often make sense to use more than one renewable technology in the same project. Richard and Melissa Kendall are currently refurbishing their 17th century mill house in Wiltshire to establish a carbon-neutral yoga and detox retreat there. The mill was converted to generate electricity in the 1920s and the Kendalls are using the original turbine and mill race alongside a new hydro generator with a 12kW output. They've also installed a biomass heating system – an 18kW Oefoken pellet boiler – which runs off pellets made from compressed sawdust and takes care of all their heating and hot water.

"The best thing about it is the functionality," says Richard. "You basically work out what internal temperature you want to achieve, then it measures the outside temperature and provides the warmth accordingly. Very, very simple and it works beautifully." With both systems in place, the Kendalls are successfully generating all their heat and power from renewable sources and getting paid by Good Energy for the surplus electricity that they export to the local electricity grid.

SMALL-SCALE WIND – Generating electricity with a wind turbine requires a strong clean wind resource – the right location is critical to make a turbine viable. It's only worth considering if your local annual average wind speed is five metres/second or more. Ideally your turbine should be high up (about nine metres above other obstructions) and away from buildings, trees or hills that could reduce wind speed or increase turbulence. You can find out your average wind speed by entering your postcode here: **www.bwea.com/noabl/**

SOLAR PV – This technology uses photovoltaic (PV) cells on a south-facing roof to convert radiation from the sun into electricity. It works on daylight, not direct sunshine so you can be generating electricity even on a cloudy day. A typical 2kWp (kilowatt peak) solar PV system in a good location in the UK will generate around 1,700kWh of electricity per year, approximately half the average household's electricity needs, saving almost a tonne of CO_2 a year.

PV can be applied at all scales but is an obvious choice for homeowners as, although expensive, it's easy to install. AJ Snell put in 2.5kW of PV at his home in Plymouth and generates over 2,300 units of electricity annually, getting 15 pence per unit including those he uses himself. With some further encouragement and incentives from the Government the reasons for not home generating will be fewer and fewer.

BIOMASS - Biomass is the burning of wood to make heat and power and is considered carbon neutral as the amount of CO_2 released when burned is equal to the amount absorbed when the tree grew. Provided our biomass resources (ie: woodland) are properly managed there's no net increase in CO_2.

Domestic biomass takes two forms: firstly, wood-burning stoves, with all the appeal of an open fire but much greater efficiency of 80-90%, because heat is not lost up the chimney. Secondly, biomass boilers that replace conventional gas or oil-fired boilers and deliver heat for hot water and central heating systems. They can be fuelled by woodchip, wood pellets or split logs. Chips and pellets can be fed in automatically, making life easier for the user. Biomass boilers are better suited for larger houses and increasingly are replacing oil-fired boilers in large properties off the gas grid.

Number Crunching:

Technology	Cost	Grant	Expected Annual Output	Value of Energy Generated	Annual Return	CO2 saved
10kW Fortis Wind Turbine (Eligible for Good Energy's SmartGen Scheme)	£34,000	£2,500	21,000kWh**	£3,517 (Assuming 50% of the power is exported and 50% is used on site)	11%	9 tonnes
6kW Proven Wind turbine (Eligible for Good Energy's HomeGen Scheme)	£24,000	£2,500	12,600kWh**	£2,772 (Assuming 50% of the power is used on site)	12.5%	5.3 tonnes
Sharp Solar PV 2.2kWp (Eligible for Good Energy's HomeGen Scheme)	£12,200	£2,500	1,800kWh	£405 (Assuming 50% of the power is used on site)	4%	750Kg
Schuco Solar Thermal panels (Eligible for Good Energy's HotROCs Scheme)	£3,750	£400	1,750kWh	£154	4.5%	360kg

All technologies listed above can be found at www.goodenergyshop.co.uk * For information on grants available, visit www.lowcarbonbuildings.org.uk **Based on a 24% load factor