

Energy on your doorstep

Rising fuel costs, uncertain supplies and growing concerns about damaging the planet mean we must urgently find alternative energy sources. The answer, says Margy Cockburn, may be staring you in the face



PHOTOGRAPHY: STEVE MORGAN

Now I know you shouldn't believe everything you hear, but these were eminent scientists speaking on Radio Four's breakfast programme: "It's not inconceivable that, in 30 years time, you'll be able to take a sail boat to the North Pole."

Even the toast crumbs reacted violently! Just think of the consequences on global weather patterns of losing the world's refrigerator. Imagine what tracts of land would morph into ocean floor if the icecap were to unleash its store of fresh water (one third of the world's total supply) and raise the sea level by 7 metres.

We obviously have a problem – actually two. Our demand for energy appears to be infinite, whilst our major sources are not. Our current, largely fossil fuel-based technologies involve spewing out tons of the gases that directly contribute to global warming and the spectre of flotilla holidays where Scott once trod.

Yet the solution is, quite literally, staring us

in the face; it's large, yellow, super-heated and has a great track record for reliability – the sun.

Sun sign

Think about it. The sun provides heat that can be captured directly as solar power. It constantly heats the air, the earth and its water and, with a bit of technical wizardry, that heat store can be moved to where we want it.

The heating and cooling of the earth creates the wind to turn turbines. The wind on the sea makes waves – an energy source that alone could supply mankind's electricity needs many times over. The sun causes water to evaporate and this obligingly falls on high places and rushes back to the sea giving us the possibility of hydro-electric power. The sun makes plants grow – sustainable, carbon-neutral biomass for heating. Even tidal power relies on the movement of another celestial body, the moon.

Sorted! If we had the political and consumer will, the prospect of a mass market would promote investment and research into energy technologies. That in turn would bring down the unit costs of those technologies and so create consumer demand which would feed back into the cycle and further reduce costs. Renewable, clean and cheap energy is there for the taking, limited only by man's determination and ingenuity in capturing, transforming and transporting it.

Admittedly, that is a tad over-simplified and human nature, vested interests, ignorance and economics complicate things a little (have a look Alan Knight's 'Big Idea' on page 34). Still, there is no doubt that what was once seen as part of the 'lunatic fringe' is now considered mainstream. Fuel costs, political uncertainty and concern for the planet have stimulated developments that mean buying 'green' power, producing your own, even becoming one of the growing

number of around 100,000 microgenerators who sell their excess to the National Grid, is within the grasp of every householder.

Buying 'Green'

Electricity comes either from coal, natural gas, nuclear or renewable sources. All electricity suppliers are required by government to source a small percentage of their electricity from renewables and many offer a 'green' tariff to their customers. The green tariff may cost a few pounds a quarter more than a standard tariff – though not always – and, depending on the company, the difference is used to support microgenerators or investment into renewable schemes.

Some companies, however, are substantially greener than others and, until now, there has been no way for consumers to check. The recent Fuel Mix Disclosure obligation has changed all that and each company now has to make public just where it gets its energy. Information for all UK domestic suppliers, a clear statement of just how much nuclear and other waste is generated during production and precisely how much carbon it dumps

into the atmosphere is available at www.electricityinfo.org/suppliers.php

The figures don't tell the whole story, as none of these calculations is straightforward. For example, the figures for carbon dioxide emissions are for emissions directly related to electricity generation and take no account of 'lifecycle' emissions – in other words, all the activities that surround the generation. Nuclear energy is seen by some as a 'clean' alternative, but there are obviously

environmental costs related to construction, mining and the processing of the uranium fuel. The nuclear waste figure doesn't include intermediate and low-level nuclear waste that may be less radioactive but is created in much larger volumes, is still dangerous and certainly represents a disposal problem. But it is definitely somewhere to start.

Follow the link to the green electricity marketplace (www.greenelectricity.org) and you can find details on the different tariffs on offer in your area, how much they cost and how green they are.

Two companies display 'recommended' icons on the 'green



electricity' site, awarded in the belief that signing up to them will make a positive contribution in promoting renewables in the UK.

One is Ecotricity Ltd, the first UK energy supplier to use some renewables at a cost that matches other suppliers. Its main thrust is to invest in new schemes and if you sign up to its green fund tariff, you will be supporting this investment.

But there is only one company, Good Energy Ltd, which offers a wholly green

power supply with 100% of its energy from renewables – the majority of suppliers hover in the 3 to 5% bracket. It's obviously impossible to say exactly where each electron that races into your house comes from, but the company is committed to buying exactly the same amount from renewable sources as it supplies to its customers. The cost per kilowatt is around 10% higher than average tariffs but the growing customer base suggests that not everyone counts costs only in terms of pounds and pence. Indeed, such has been the interest amongst its customers of going one step further and generating their own power, the company has

launched a microgenerator scheme: 'Home Generation'.

Juliet Davenport, Chief Executive at Good Energy and a member of OFGEM's (Office of Gas and Electricity Markets) Environmental and Advisory Group, explains her vision: "If everyone who gets into DIY or builds a new house puts in a system, in 15 years, 25% of the domestic market could produce their own power. That would have a big impact."

Home Generation is a scheme that supports homes and businesses that

install micro generation by paying them 4.5 pence per kW hour for every unit they produce. The generation is measured through the customer's existing meter, avoiding the need for costly export metering equipment.

Until there is a market with critical mass, the cost of home-generation will remain an option for long-term and environmental, rather than short-term gain. But demand is growing all the time and there are a number of grants available. ➔

Wind power

The UK has very high quality wind! A recently published report says that in the past 35 years there has never been a time when electricity could not be generated somewhere in the country. The chance of low wind speeds affecting 90 % of the country only occurs for one hour every five years and the chance that high wind speeds shut turbines down occurs only one hour in every ten years. Our European partners, who have exploited wind power for years, are bemused by our slow uptake.

Turbines have improved greatly and are quieter and more efficient than they have ever been. A free-standing turbine can produce 2.5 –

15 kW while a roof-top turbine can produce between 440W and 2 kW – that's around one quarter to one third of domestic energy needs.

The cost of a roof-top system is around £2-£3,500, with micro-systems for caravans around £1000. What's more, with the advent of vertical axis systems, they no longer need to look like a windmill on the roof but can even masquerade as moving art works in the garden (see www.windsides.com for some nifty examples).

The British Wind Energy Association on 020 7689 1960 or at www.bwea.com is happy to give advice and direct you to suppliers of various systems.



Wave Power

Britain has some of the most powerful waves in the world and new systems of harnessing this fantastic potential are developing all the time. The island of Islay boasts a Limpet system from Wavegen which uses an oscillating water column and several turbines that each power a 250kW generator. (For an animated explanation of how wave power works look at www.wavegen.co.uk).

This isn't an option for personal domestic use, but reports suggest that UK waves could produce almost double our total electricity consumption. The latest report from the Carbon Trust



claims that wave and tidal stream resources together could provide up to 20 per cent of the UK's current electricity

needs, given sufficient investment. And a start is certainly being made with the £15 million 'Wave Hub' project off the coast of Cornwall. It aims to create the world's first wave energy farm by building an electrical 'socket' on the seabed around 10 miles out to sea and connected to the National Grid via an underwater cable. Wave energy devices would be connected to the Wave Hub, allowing device manufacturers to carry out large-scale testing of their machines before going into commercial production.

Watch this space!

Air and ground source heat pumps



The earth absorbs 50% of solar energy and stays at around 50 – 70C with little variation. This free heat can be absorbed by sinking fluid filled loops vertically into the ground; if you have a garden the loops can be horizontal, if you have a pond or other water source you cut out excavation costs by coiling the loops at the bottom. Working in the same way as your refrigerator, an electric pump removes the stored energy and delivers it to wherever you want. Some heat pumps can be changed to a cooling system at the flick of a switch. It is a particularly efficient method of production with only one unit of energy used for every four units produced.

Air source heat pumps work the same way – using refrigerants that boil at minus temperatures means you can extract heat from the air even when it is freezing outside! The beauty of air source pumps is that they are pretty much 'plug and play', can be installed just about anywhere and cost around £5-6,000 fully installed for a three-bed semi. John Lightfoot, director at HeatKing is hopes shortly to be launching a pump that will be about the size of washing machine and completely dispense with exterior fittings making it particularly suitable for use in flats.

For an example of heat pumps on the market take a look at www.kensaengineering.com or www.heatking.co.uk. For a directory of suppliers go to www.heatpumpnet.org.uk.

Tidal Energy

King Canute was right – the tide stops for no man. Even allowing for the fact there are only certain places where tidal energy could be harnessed, government reports suggest a staggering 3000GW of tidal energy is there for the taking. No new-fangled idea this – tide mills actually pre-date windmills with the Domesday Book recording over 5,000 in operation.

Tidal power has the huge advantage of being entirely predictable, but there's no easy solution to capturing it on a large scale and construction costs alone make it a fairly expensive option. It may be that underwater turbines will provide a solution.

You can visit the only surviving tidal mill at Eling Tide Mill on the west side of Southampton Water. (Check out details at www.ellingtidemill.wanadoo.co.uk)

Biomass

Growing crops specifically to burn for fuel provides a carbon-neutral, though still comparatively expensive, source of energy on a national scale. Willow and other woods, olive oil residues, even palm kernels and straw can be burnt to release the stored solar energy. Heat logs or pellets made from surplus shavings and sawdust are efficient forms for wood and multifuel stoves or open fires in a domestic situation.

Hydro-electric power

There are currently many questions being asked about the 'green' credentials of large scale HEP. The ecological damage caused by major flooding when a 'reservoir' is created, the building of the dams themselves and the submerged rotting vegetation which emits methane (21 times stronger than carbon dioxide in the effect it has on global warming) have led to some to claim that hydro projects are net producers of greenhouse gases.

Small scale systems have none of these drawbacks –

they are a bit limited to those living close enough to a suitable water source, but it's great where it works. If you want to have a look at hydro-power in action you can visit the Glen Lyn hydro station in the centre of Lynmouth village, North Devon. Call Matthew Oxenham on 01598 753 207.

Also in Devon, Sonia Newton manages Sowton Mill on the River Teign. If you are interested in visiting the hydro scheme, the gardens or staying at the mill, call her on 01647 252263.



Solar Power

Even on cloudy days, there is enough light to make solar power useful in a number of ways. To make the most of this free energy, passive solar heating only requires a bit of forethought – how to position a building to catch maximum sunlight and incorporating sufficient thermal mass (material which will absorb, store and then release the heat when the temperature drops). The principle can also be used to good effect by adding a porch or conservatory to an existing house to create a thermal buffer zone that will cut energy needs considerably.

Photovoltaic cells (PV) work by converting sunlight directly into electricity using semi-conductor technology. The modules can either be panels placed on roofs, walls or free standing in the garden, or you can buy modules that look much the same as roof tiles so will blend in well with existing materials. The electricity produced can be stored in batteries or directly exported to the grid.

Solar panels contain water that is heated and then transported to the domestic hot water/heating system. On bright days it can often supply the total demand but even in mid-winter it can pre-heat water so the heating system just needs to top it up a few degrees so saving energy and money.

Links

For information on how just green the various UK domestic suppliers are,

go to: www.electricityinfo.org/suppliers.php

To find out which green tariffs are available in your area, and compare costs with,

go to: www.greenelectricity.org

Ecotricity 0800 0326 100 or go to ecotricity.co.uk

Good Energy 0845 456 1640 or

go to www.good-energy.co.uk.

For information on the various technologies and the grants available to help you install them,

contact: **The Energy Saving Trust:** 020 7222 0101

or go to www.est.org.uk

The Centre for Alternative Technology:

01654 705950 or go to www.cat.org.uk

British Wind Energy Association:

020 7689 1960 or go to www.bwea.com

The Carbon Trust Company:

0800 0852005 www.thecarbontrust.co.uk

The Green Energy website: www.nef.org.uk 

Producing our own feels great

Paul and Clare Sheridan say there's something really good about sitting at home in a warm house knowing that the roof is working to supply their energy

Paul and Clare Sheridan are proof perfect that you don't have to live in a detached, south facing, eco-house to join the growing band of 'microgenerators' - people who not only produce their own electricity, but sell their excess back to the National Grid.

Six years ago, on the roof of an ordinary house on an estate in Gloucestershire, the Sheridans put up their first solar system - a series of pipes on the roof that use the sunlight to heat the water for the house. That year it provided 70% of their total consumption. They were impressed and decided to go one stage further. Paul installed a small photovoltaic panel, connected it to a battery in the loft, used an inverter to convert its power to mains electricity, and used this energy to run the pump for the solar hot water system and, in the summer months, to plug in a computer or anything else he fancied.

Now he and Clare were really hooked. "We were really in the early days of solar systems and it was hard to get good information about them," says Paul. "A local Stroud charity - Energy 21 - helped



a lot and then we joined Stroud Solar Club who also helped with training and advice.

"We were already being supplied with electricity through Good Energy because we were aware of the environmental issues and wanted to use 100% renewable power. They then launched their Home Generation scheme. Perfect timing! They advised us about

systems and how to link the output to the National Grid without the need for expensive metering systems and guaranteed to pay us 4.5 pence for every unit we produced. So we joined up.

"Our house faces south-west so is not in the optimum position really, but water temperatures in the summer are often over 70C and, even in the middle of winter, we can get 50C although the air temperature is below freezing! On a clear winter's day we have recorded the PV system as generating 1.75 kW.

"We may not think we live in a particularly sunny place, but we've shown that solar really can work well in the English climate."

"A year after installing our PV system, our electricity bill was £2 a month!"