

# Blooming awful?

The UK, like its European counterparts is moving forward in its renewable energy policies. However, does it need to do some deadheading first?

*By Dan Lewis*

ENERGY CONSULTANT

READERS ARE NO DOUBT well versed in the often detrimental role that can be played by governments in electricity markets. But today's UK renewable energy has become a prize example of wrong headed policies. Riven with distortion and non-market aligned subsidy, a coalition of well-meaning politicians, powerful lobbies and growth hungry bureaucracies have severely curtailed the UK's renewable potential. Lacking faith in market economics they look to the European model of massive government subsidies and central planning, at the expense of local choice and price-lowering competition.

That matters because all the UK's political parties are committed to producing 10 per cent of the country's electricity from renewable resources – wind, solar, small hydro, biomass wave and tidal, by 2010. This has recently been raised to 15 per cent by 2015. But can it be done and crucially, with a change in government policy, can it be achieved at a lower price?

*Renewable energy in the UK today has become a prize example of wrong headed policies'*

## *Increase in renewables*

The increase in the renewable contribution from just under 3 per cent is huge. Today, to put this in context, annually, the UK consumes on average some 34 GW an hour equal to some 560 W per person – very low by international comparison. The average French customer needs 670 W, the American 1.2 kW and the highest of all, the average Norwegian, a massive 2.4 kW. But today's Briton only needs 180 W at home; the rest are consumed at the workplace. Allowing for consumption growth of 1 per cent a year, the ability to meet peak demand in winter of up to 53 GW without blackouts, the target is approximately an always available 6 GW. So, let's consider on a pure numbers basis, how do the different renewables compare?

Of all the renewables, wind offers the best value. Its true cost is hidden by subsidy, which in a level playing field it would not need. Although there have been many plausible aesthetic objections to windfarms, much can be done to change the framework of profit, ownership and planning to win local support. It's fascinating how in Denmark, cooperatives from local communities became shareowners in local windfarms. This was instrumental in windpowers



acceptance and high take up in Denmark. In the UK thus far, there's no question of profit sharing with local communities, or free electricity that could be written off against tax. Such measures would go a long way to removing local opposition. So using off-the-shelf prices, what does windpower cost?

Right now the cost per installed MW of capacity for land-based wind turbines is £650,000 (\$1.17 million). Only Combined Cycle Gas Turbines (CCGT) at £450,000 (\$813,000) cost less than this. 10 per cent of the UK's electricity from wind would cost £13 billion (\$23 billion) – 18 GW capacity due to 30–35 per cent load factor) and would require 36,000 acres of land. As a guide to windpower and land resources, wind turbines installed over 2 acres will provide a 90 per cent available single megawatt of wind power.

At sea, though, the cost is much higher, about £1 million (\$1.8 million) an installed MW. It costs more offshore because twice as much steel and concrete are required, and the machinery has to be fully enclosed to prevent saline corrosion. This can however be partly offset by the higher load factors achieved offshore – all of 40 per cent, due to higher and largely uninterrupted windspeeds.

### Costs of wind farms

One of the highest costs though for wind farm developers is in planning applications. These regularly have a failure rate of nine out of ten and can cost up to £1 million a time making failure a very expensive business. Also, sadly, wind farms in the UK are just not big enough to reap true economies of scale. At the moment the largest land-based wind farm at Powys in Wales is 33 MW and offshore, 60 MW at North Hoyle. They really need to be at least 10 times this size in order to negotiate better terms with wind turbine manufacturers, go directly to the capital markets and dramatically shorten payback periods. These payback periods are typically running at eight – 12 years, less than half the 15-year period of a Power Purchase Agreement – the electricity sales contract. Through the obstacles of the planning system, the UK government has actually helped to create many small wind farms that cannot exist without the Renewables Obligation. But a giant wind farm of the order of 500 MW, just might be cheaper than gas.

Most people view wind power in its industrial context and until now, small wind – the sub 50 KW market has been overlooked. Not for long. Unlike the industrial wind turbine market, Britain has some of the leading manufacturers of small wind turbines; Proven, Marlec, Gazelle and Iskra. And they are not so expensive. Excluding the subsidy, they come in at around £2,000 to £3,000 (approximately \$4,500) plus per installed kW. There is also a lot of progress being made on attaching small turbines to rooftops, hitherto thought impossible. Perhaps the most famous example will be the future Freedom Tower in New York, being built to replace the World Trade Centre. This building will be 80 per cent powered by a wind turbine placed and structurally attached to the top floors. This is where small turbines work best, at the work place. Unfortunately the UK's £10 million

(\$18 million) Clear Skies grant scheme is exclusively not for business, but for homes and communities where we only use one-third of our electricity.

### Farming today

Few people realise that in the 21st Century post-industrial UK, some 75 per cent of its land, 45 million acres, is still used for agricultural activity. Agriculture in fact, has the dubious distinction of being an even more heavily subsidised and distorted market than the UK's energy market. Clearly though, all is not well with the UK's perennially struggling farmers who nevertheless continue to produce 80 per cent of our food. That's why some see energy crops as their salvation, but mostly farmers are not among them.

Energy crops like miscanthus and willow can be grown quickly and harvested every 3 – five years. The UK government in the shape of DEFRA and the DTI offers bioenergy capital grants, short rotation coppice establishment grants, grants for office, legal and IT costs up to 50 per cent, grants of £900 to £1600 (\$1,600–\$2,900) per hectare, and don't forget, the Energy Crop Infrastructure Scheme – a quite staggering range of largesse. Yet in spite of all this government support, the total impact of short rotation coppice comes to just under 5,000 acres, perhaps about 5 MW.

## 'Government funding for energy crops in the UK has just not worked'

So government funding for energy crops has just not worked. It would take perhaps up to 6 million acres to create 6 GW of capacity or 10 per cent of the UK's surface area. Clearly, this is not happening. That's because for the existing biopower industry, there is already a lot of biomass out there like forest residue and straw to use as fuel, without growing it in the first place. A less costly and better solution would be for government to encourage a link up between Britain's ageing coal-fired power stations, to enable co-firing of biomass with coal. This has already worked very successfully in America and could do so here.

Bioenergy's star turn is with plants fired by poultry manure and landfill gas. This is because their fuel is distributed over a small area, saving transport costs. Moreover, companies like Fibrowatt have managed to export their technologies and know-how abroad.

### The hydro option

Hydroelectric dams are very reliable, but almost all the best sites are now taken, mostly in Scotland. With a lifetime of 200 years, hydroelectric dams will always make a return on the investment. So you could consider the cost already sunk. Refurbishment will be their best chance to increase output, usually by 10 per cent. Most of the UK's dams have machinery dating from the 1950s and 1960s, so they do need it. Yet the government has restricted the support for refurbishment to sub-20 MW

dams, which are alone entitled to ROCs. This is the wrong way round. If the priority is to increase renewable energy output, then one should start off by refurbishing your largest dams first.

Wave systems are still at the research and development stage, and will make no difference to 2010. It's very possible that situation may persist. A Severn tidal barrage would add huge capacity (8.6 GW) quite cheaply at £15 billion (\$27 billion), but initially may have to run at a high cost to shorten the payback period. One study calculated that in the first seven years, it would be necessary to charge £60 (\$108) per MWh and thereafter, £25 (\$45). Yet while the Severn Barrage proposal has been on the drawing board since 1923, environmental objections have waxed while its prospects have waned. For many though, it remains infinitely preferable to a nuclear replacement programme. As things stand however, the best chance for expanding water power is with offshore tidal stream turbines – 300 MW will be installed by 2010.

### Clouds over the sun

Solar is the clear loser. It currently costs six times more than wind and produces most of its electricity in summer when demand is low. UK electricity demand peaks in winter between 5 and 7 pm. For the UK, solar has the lowest availability at 17 per cent. That compares badly with wind at 70–95 per cent, hydro at 90 per cent plus and biomass at 90 per cent or more. Moreover, the solar equipment is not made here, but usually in Japan, which is not the most beguiling use of taxpayers' money. Besides, since the inauguration of the Solar Buzz index four years ago, the costs of solar panels have stopped falling. Solar power is an arch example of how the technologically feasible is assumed to be economically viable. But for all the output it can generate, and the scale of what it costs, the £20 million (\$36 million) Photovoltaic Major Demonstration Programme must deserve the white elephant award as one of the most wasteful subsidies in the history of UK energy policy.

### Conclusion

The numbers should be allowed to determine the renewable energy debate. The market-aligned ROC subsidy must be continued for want of anything better. But the 20 plus capital grant schemes which are supposed to promote green electricity are indefensible. Their only real purpose is to keep the seats warm of the bureaucrats that administer them. It is just nonsense to subsidise generation for homes and communities, in preference to the businesses where two-thirds of our electricity is needed. It's time for a green electricity policy that rejects bureaucratic preferences and fiscal punishment. Profit is a much better dynamic. That's why for the UK, cutting rather than raising taxes is the way to increase renewable capacity. The UK will continue needing more power, not less. The right competitive framework will ensure it is clean as well.

#### Biography

Dan Lewis is an energy consultant and author of *Recharging The Nation – the challenge and cost of increasing renewable electricity generation*, published by the Economic Research Council.