A COOL LOOK AT WIND'S PRETENSIONS:
Why exaggerated claims by the UK wind energy industry are increasingly backfiring, and some suggestions on what to do about them.

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Adam Shaw: "Briefly then, in 'The Guardian' this morning there is a report that the amount of power generated from renewables, far from actually going up to meet any of its targets, is down 7½ per cent in the first quarter of this year. It is going the wrong way."

Maria McCaffery [Chief Executive, RenewableUK formerly

British Wind Energy Association]: "You know this is a direct consequence of global warming so the answer of course is more wind."

Adam Shaw: "Okay, thank you Maria McCaffery."

BWEA CLAIM: 10% OF THE UK'S ELECTRICITY GENERATION WILL COME FROM RENEWABLE SOURCES BY 2010, OF WHICH WIND WILL PROVIDE 80%.

FACTS:

1) **In 2009/2010 renewable energy sources provided 5.74% of UK electricity generation.**
2) **In 2009/2010 wind energy provided 2.5% of UK electricity generation.**
3) **Wind energy provided 37% of UK electricity generation from renewable sources in 2009.**

BWEA/RenewableUK: "ADDITIONAL WIND TURBINES ARE ALL THAT WOULD BE NEEDED TO DELIVER 8% OF THE UK'S ELECTRICITY BY 2010." "HERE IN THE UK, WE ARE LUCKY ENOUGH TO HAVE GOOD WINDS ON AND OFF SHORE." "THE UK IS THE WINDIEST COUNTRY IN EUROPE, SO MUCH SO THAT WE COULD POWER OUR COUNTRY SEVERAL TIMES OVER USING THE FREE FUEL."

FACTS:

1. **The European wind resource atlas produced by the Risø National Laboratory shows that over much of Central England the mean wind speed at 50 metres above ground level is under 5 m/s in 'sheltered terrain' and under 6.5 m/s in 'open plain'. This contrasts with over 6 m/s, and over 7.5 m/s, respectively, in Scotland.**
2. **"The energy produced by a wind turbine depends on the strength of the wind to which it is exposed. The simplest indicator of the wind resource available at a given location is the annual mean wind speed at the site (usually given at the hub height of the turbine). A machine located on a site which has an annual mean wind speed of 6 m/s will typically produce only half as much energy as the same machine on a site where the annual wind speed is 8 m/s."**

"Planning for Renewable Energy: A Companion Guide to PPS 22"

page 164.

BWEA/RenewableUK: "Blowing away the myths": Criticised a report by the Renewable Energy Foundation because it "makes much of the fact that a recent estimate of the capacity factor of wind in Germany in 2003 was 15% and that the average capacity factor in the UK was 24%. It fails to acknowledge that average wind speeds in Germany are significantly lower than those in the UK."

FACTS:

- **As the Risø National Laboratory's wind speed atlas unequivocally shows, almost all of Northern Germany and all of Central Germany have mean wind speeds within the same low range as 'Central England', and in Southern Germany mean wind speeds are even lower.**
- **M. Hulme and E. Barrow: "Climates of the British Isles", Routledge, 1997 confirms this picture in its Chapter 11. But why doesn't the wind energy industry point out the important variations within the UK?**

FURTHER QUESTIONS ON THE UK'S WIND RESOURCE

Graham Sinden claimed that: "Calm conditions never extend across the entire UK. On average there is around one hour per year when over 90% of the UK experiences low wind speed conditions. Low wind speed conditions extending across 90% or more of the UK during winter occur around one hour every five years." [Based on study of 64 Met Office stations over 34 years.] His findings are frequently quoted by the industry.

How come, then, that Professor David MacKay found that in the winter of 2006/7 there were 17 days when output from UK wind turbines was less than 10% of total capacity; on five days below 5%; and on one day only 2%.

In 'Energy Policy', November 2008 (p. 4120), it was pointed out that during October, 2007, there were 11 days when calm conditions were recorded at 90% or more of the 64 Met Office sites. Further investigation of the historic data has been called for as a result.

BWEA/RenewableUK: in their 'MYTH' NUMBER 4:

"Over the course of a year, turbines will typically generate about 30% of the theoretical maximum output. This is known as its capacity factor."

"The capacity factor of wind varies according to the site and the type of turbines, but it is generally around 30%."

The Companion Guide to PPS 22 even claimed (who wrote that bit?):

"Capacity factors in the UK may generally fall anywhere between 20% and 50%, with 30% being typical in the UK." (p.165)

FACTS:

- **Of all the onshore wind energy developments in England operating throughout the year 2007, fewer than 15% achieved a capacity factor of 30% or more. In the windy year 2008 18.75% achieved a capacity factor of 30% or more. In 2009 the figure was down to 7.6%**
- **In most recent years the mean capacity factor achieved in England for onshore wind energy developments has been under 23%; in 2009 it was 21.16%.**
- **The problem is that too many wind energy developments are being permitted where there is too little wind – because the subsidy and planning systems encourage this.**
- **In recent years capacity factors in England have ranged from 4% to 40%.**

BWEA (RenewableUK): August 30, 2007 –
"UK wind resources 'best in Europe'. Trade body slams claims as 'nonsense' and 'bizarre pseudo science'. BWEA criticised 'ill informed and disingenuous' claims. BWEA Chief Executive rebutted claims as 'bizarre pseudo science.'" "These claims are ill informed and disingenuous. There is no robust scientific base for these assertions."

FACTS:

1. **The 'claims' were a list of capacity factors achieved by onshore wind energy developments in Eastern England and the East Midlands, taken from Ofgem data, which were in turn provided by the developers themselves. They covered the year 2006 and 21 developments.**
2. **Only 2 developments achieved a capacity factor of 30% or more (despite claims that 30% is "typical"). The mean capacity figure achieved was under 23%. Two developments achieved a capacity factor under 10%.**
3. **In the year 2007 the mean capacity factor achieved by developments in the area was again under 23% , but this rose to 26% in the windy year 2008 before falling back again to 21.9% in 2009.**
4. **As the BWEA/RenewableUK explain on their website: "The concept of capacity factor deals with the day to day productivity of electricity generating plant."**
5. **The claims were, of course, well-informed, robust, scientific, candid and sincere, and based entirely upon data provided by the wind energy operators themselves to Ofgem. Why pervert the truth?**

THE MOST RECENT PERFORMANCE DATA FOR ENGLAND'S ONSHORE WIND ENERGY DEVELOPMENTS (2009)

Of 105 onshore wind energy developments in England operating for the full calendar year:

Average capacity factor achieved -	**21.16%**	
Number achieving a 30% capacity factor or more -	**8**	**(7.6%)***
Number achieving under 25% -	**74**	**(70.5%)**
Number achieving under 20% -	**36**	**(34.3%)**
Number achieving under 10% -	**8**	**(7.6%)**

* *The highest capacity factor achieved was at Workington (32.0%)*

BWEA/RenewableUK: "The meaning of efficiency is a redundant concept to apply to wind energy, where the fuel is free."

Adam Bruce (as BWEA Chairman): "The Renewable Obligation is not a subsidy. One of my ambitions as your Chairman is to outlaw all references to the RO as a subsidy."

Maria McCaffery: "There is no Government subsidy for building wind farms."

FACTS:

1. **Domestic and business electricity customers subsidise onshore wind energy developments in three ways: through Renewable Obligation Certificates; through support of the Climate Change Levy and its avoidance; and through 'the balancing mechanism'. The average price of ROCs (1 per MWh for onshore wind; 2 for offshore) at the auction on June 24, 2010, was £49.16p per MWh. The Climate Change Levy is currently £4.70p per MWh. Scottish Power, for example, has been paid £180 per MWh under the 'balancing mechanism'.**
2. **Ofgem have reported: "The subsidy generates returns for investors that are greatly in excess of the economic cost of generation it helps to finance. The achievements cost business and domestic consumers much more than other carbon abatement measures. The resulting investment in renewable capacity has been in a relatively limited range of lower cost technologies, some of which could be considered mature technologies that do not require support at current wholesale prices. Higher-cost less mature technologies have not been developed by the scheme." Report Ref. 11/07, page 8.**

WHAT DO THE SUBSIDIES COST UK ELECTRICITY CUSTOMERS per annum per turbine? (excluding the 'balancing mechanism')

	Capacity factor assumed (%)			
	20%	25%	30%	35%
Installed Capacity of turbine				
2 MW	£188,725	£235,907	£283,088	£330,270
2.5 MW	£235,907	£294,884	£353,860	£412,837

* Based on average ROC auction price at June 24, 2010 (£49.16p per MWh) and Climate Change Levy at £4.70p.

Cost per household in subsidy alone? The case of Rushy Mead.

- PfR (and Entec on their behalf) assume each proposed 2.5 MW turbine would achieve a capacity factor of 25%, and therefore expect to receive in subsidy from electricity customers alone £294,884 per turbine, per year.
- PfR project that their proposed scheme would serve the needs of about 5,800 households using 4,700 kWh electricity per year.
- Therefore the cost to each household served in subsidy alone, per turbine, per year, is estimated by the developer to be £253, or roughly £50 per person. For four turbines the developer's own figures suggest they seek in subsidy from us electricity users £1.18 million per year (for an assumed 25 years).

SO WHAT IS THE MEAN WIND SPEED AT RUSHY MEAD? [at 45 metres above ground level, according to the government's wind speed database]

Mean wind speeds for square kilometre of Grid square SU 76 69 (in m/sec.)

6.2	6.0	6.1
6.1	6.0	6.1
6.0	6.0	6.1

Implications: This is not a windy site; capacity factors achieved will be under 25% in most years; there are many far better sites where greater electricity generation and carbon emissions would be achieved; this proposal undermines efforts of the industry and Government to achieve targets cost effectively and quickly.

Other Irritants

Onshore wind energy developments have other irritating features which should be more openly acknowledged, and compensated for when present:

- **adverse impacts on residential property prices (the Oxford Brookes study of two locations in Cornwall – St. Breock and St. Eval, the latter close to the Bears Down development and focus of Dr. Amanda Harry's work on sleep disturbance - was deeply flawed). The RICS members' survey in 2004 is more credible. Dr. John Etherington cites falls of 25% and 33%. My own limited research suggests about 15%. PfR's website misleads on this topic.**
- **sleep disturbance arising from 'fluctuating swish' (see reviews by Dr. Christopher Hanning and Dr. Amanda Harry). PfR's website is not up-to-date.**
- **visual, and cumulative visual, impacts.**
- **distraction of passing motorists and possible accidents from various causes.**
- **but, above all, the now widespread practice of seeking planning permission to place wind energy developments where mean wind speeds are low, capacity factors can be expected to be poor, electricity generated modest, households provided for modest (though at projected costs per household in excess of £250 per year for 25 years), and carbon emissions avoidance sub-optimal.**
- **If allowed to persist, this practice will further exacerbate supply chain difficulties for developers wishing to place wind turbines in areas (on and off-shore) where mean wind speeds are relatively high – by causing delays and additional costs for the turbines and ancillary equipment.**

BWEA/RenewableUK complain: The UK planning system causes long delays for wind energy developments. Does it?

The time taken for wind energy planning decisions in Europe is on average 42 months. In the UK it is 27 months. [Source: European Wind Energy Association, April, 2010.]

"Data from a range of sources suggests that the difficulties involved in the planning process in the UK may be overemphasised. The average planning time for a wind farm in the UK is approx. 2 years. The planning process takes a similar period of time in Germany, and significantly longer in Spain where the average is 3 years. The length of planning process in these countries does not appear to have constrained growth to the same extent as the UK… Comparing countries, the process is regarded as slightly more risky in Denmark than in the UK. Despite this, we observe that deployment in Denmark has been significantly higher than in the UK." Lucy Butler & Karsten Neuhoff, 'Renewable Energy' 33 (8), p. 1860. Also M.A. Uyterlinde et al., 2003.

KEY PLANNING CRITERIA

[PPS 22 is the main Planning Policy Statement for renewable energy]

- **PPS 22: Key Principle 1 (i) – test environmental, economic, and social impacts and claims.**
- **PPS 22: Key Principle 1 (i) – Planning authorities should recognise the full range of renewable energy sources, their differing characteristics, LOCATIONAL REQUIREMENTS …**
- **PPS 22: Key Principle 1 (iv) – test wider environmental and economic benefits claimed against negative features (such as exaggerated claims, and intensified 'supply chain problems').**
- **PPS 22: Key Principle 1 (v): without making *a priori* assumptions test suitability of proposed site in relation to mean wind speeds, likely capacity factor to be achieved, electricity generated, households provided for (at annual cost usually exceeding £250 per household just in subsidy).**
- **PPS 22: Key Principle 1 (vii): planning authorities should seek to promote knowledge of and greater acceptance by the public of prospective renewable energy developments THAT ARE APPROPRIATELY LOCATED.**
- **PPS 22: Key Principle 1 (viii): challenge exaggerated claims that developer has "demonstrated any environmental, economic and social benefits".**

OTHER KEY PLANNING CRITERIA

- **PPS 1: Sustainable development is the core principle underpinning planning … the simple idea of ensuring a better life for everyone, now and for future generations.**
- **The various aims set out in paragraphs 4 and 5 of PPS 1 are not served by placing wind turbines where mean wind speeds are relatively low, capacity factors achieved would be unsatisfactory, electricity generation from renewable energy sources not optimised nor carbon emissions maximised.**
- **The Supplement to PPS 1 (on Planning and Climate Change) is not well served by placing turbines where mean wind speeds are low.**
- **PPSs 5 (re:historic environment) 7 (re: sustainable development in rural areas); and 12 (re: local spatial planning) can be resorted to as well in some cases.**

What is to be done to advance wind turbine developments in relatively high mean wind speed areas?

Although the variability of wind speeds throughout the UK presents problems for electricity generation and carbon emissions avoidance, wind energy is a potentially valuable resource. However, needless antagonism is aroused by pressures (driven by subsidies available) to place wind turbines where there is little wind, in areas of high population density (where impacts on residential property prices and sleep patterns can be severe), and where their contribution to electricity generation and carbon emissions avoidance is bound to be modest. The situation is not helped by exaggerated and misleading claims from the industry.

Steps are therefore required to stop wind energy developments (and their proposal, because of the drain on planning and other third party resources) in relatively low mean wind speed areas. For example, almost all of 'Central England' should be deemed a 'wind turbine free' area. To this end the following recommendations are made:

Recommendations

1. Taking the industry's (unwarranted) claim that achievement of a 30% capacity factor is "typical", only pay the full subsidy to those developments where the capacity factor achieved in the calendar year is 30% or more. A cut-off point of 20% below which no subsidy is payable, with a gradation between 20% and 30%, is proposed.
2. Delete Key Guideline 1(v) from PPS 22, which states: "Regional planning bodies and local planning authorities should not make assumptions about the technical and commercial feasibility of renewable energy projects (e.g. identifying generalised locations for development based on mean wind speeds)." These authorities should be required to rule that, where mean wind speeds are below 7 m/s at 45 metres above ground level, as stated in the government's wind speed database, then no wind energy proposals will be contemplated. This would save considerable costs and upset, allowing sharper focus on accelerating developments where mean wind speeds are higher.
3. Refuse permission for the placing of any wind turbine, higher than 25 metres to blade tip, closer than 1.5 kms. from the nearest residential property unless the property owner has previously agreed compensation with the developer.