

Briefing Notes on the false claims of wind technology

Introduction

When I first read about wind power, perhaps ten years ago, I thought that it was a tremendous breakthrough which might even get us away from the dreaded nuclear alternative to fossil fuels. The two "wonderful" aspects of wind power which sold the concept to me and, I suspect, to many more were, firstly that the wind is free and the electricity would therefore be very cheap, and, secondly that every MW of electricity generated by wind will save burning fossil fuels (coal, oil, gas) and in so doing cut down the emission of COs by some 2000 tonnes every year.

At first the installations were small, relatively harmless to the environment, and quite pretty to view from a distance. Fairly rapidly however the "wind farms " grew in size. The wind turbines got progressively larger and were grouped in greater and greater numbers. Soon there was talk of "towns the size of xyz" being supplied by a proposed wind farm development. In fact the Clyde Wind Turbine development, to which we are objecting claims to generate enough electricity to supply 440,000 homes."

At the same time, however, questions began to be asked by a few independently minded engineers and chemists, and the basic claims of the rapidly growing industry came under scrutiny. The result was that the more I learned about wind power, the fewer attractions it had, and long before I found myself fighting the Clyde Wind farm I had become completely disillusioned with the concept of Wind Power Technology as it is being currently developed. I was it seemed in good company. The learned bodies, (The Royal Academy of Engineers, and the Institutions of Electrical Engineers of Chemical Engineers and of Civil Engineers), invited by The Policy and Innovation Unit to submit inputs to the DTI's Energy Review in 2002, had responded that renewable electricity generation (largely wind) had many disadvantages and needed near 100% backup. It was also considered unlikely to meet the targets of COs displacement. Government treated this highest level professional advice with total contempt - it was not even mentioned in the Energy White Paper, which was the outcome of the review.

In the attached Notes on Myths I have endeavoured to present, honestly and without exaggeration, the serious arguments against wind power. These arguments are facts, facts which I have found it almost impossible to propagate. Facts which are being deliberately denied or hidden because there is a powerful industry involved supported by an environmental lobby which has clearly misunderstood the science and maths involved. These facts can be ignored for political or commercial reasons but they will not go away and a few years from now they will have to be faced. Unfortunately it will, by then, be too late to repair the damage to our ravaged countryside.

The facts which I have tried to emphasise are arguments against the pointless folly of the present policy, and are completely separate from the wider and more important arguments about the damage to the environment, the effect on our quality of life and the hideous legacy of ruined landscapes we will leave to our children and grandchildren. To my mind however they transcend these latter arguments because they show that the whole concept is based on false premises to which our leaders dare not admit.

The Myth about the amount of Power generated

Airtricity claim that the proposed Clyde Wind-turbine development will generate enough electricity to supply 440,000 homes. We beg to differ.

It is self evident that the supply of electricity, whether for use as light or power domestically or industrially, must be instantaneous and continuous. Wind power can guarantee neither of these requirements. When we switch on our light, television or computer we expect an instant response. Equally any industrial or commercial user expects and gets the same. A world in which we had to wait for the wind to blow before we could switch on would be a very inefficient place. By the same token the supply has to be continuous. Imagine a situation where,

suddenly and without warning, the lights flickered and went out, the television picture shrank to nothing and the computer crashed, all just because the wind dropped.

The installers of wind power design and erect wind turbines to have a specific output in terms of megawatts (MW)¹. In the case of the Clyde Installation this is 3.6 MW from each. The 173 wind turbines they propose will generate 622 MW, and they claim that this is enough to supply 440,000 homes.

We all know however that the wind does not blow either continuously or regularly and in fact the Department of Trade & Industry (DTI) use a figure of 28% in calculating the real yield or output of a wind turbine in an on-shore situation. This figure is based on statistics collected over the lives of the existing wind turbines and means that, on average, the wind is suitable to drive the turbine for 28% of the time. This figure has been confirmed by the experience of the Danish² Wind Power Industry. The rest of the time the wind is either non-existent or too light or too strong. Therefore the actual usable output from the Clyde scheme becomes 28% of 622 MW = 174 MW

Published figures from the same Government Department (DTI)³ indicate that the average home consumption of electricity in UK is 0.54 kWh per home. This means that the Clyde Installation would theoretically supply approximately 320,000 homes.

$$(174 \times 1,000)/0.54 = 322,933$$

So the 440,000 homes would appear to be an exaggeration.

It is also misleading because, as we have seen, when the wind was too light or too strong the output **could not supply any homes and this is 72% of the time**. It is obvious that the homes have to be linked to a conventional generation system to provide the power for that 72% . In truth a wind turbine installation cannot be said to supply homes at all in the sense that a conventional power station would. **Unfortunately wind farm propagandists and ill-informed journalists will continue to make these false claims.**

The accepted wisdom is that every kilowatt-hour (kWh) of wind generation will replace a kWh of conventional generation. However, as we have demonstrated above, because the wind generation output is not reliably continuous there has to be an alternative supply of non-wind conventional generation of virtually equal output to step in as soon as the wind drops. Unfortunately conventional generators cannot be turned on and off like a tap, but have to be kept running, on light load, ready to instantaneously take on the extra load. This means that they have to be kept running inefficiently, reducing the overall efficiency of the system, increasing the cost of the electricity generated and crucially increasing the emission of CO₂. Again facts which are never admitted by the proponents of wind farms or their tame journalists.

Notes 1. 1MW (megawatt) = 1000kW (kilowatts)

2. Statistics from Denmark which produces 13% of its electricity from wind power confirm the load factor of 0.28 (28%). We understand that Denmark has halted its subsidy for "wind farms" on the basis that their "wind farms" are "the greatest economic and environmental disaster for (their) country." These comments on instability come from the staff of Eitra, West Denmark's Transmission Authority

"The big unregulated environmentally friendly production of electricity by wind turbines and decentralised heat and power (CHP) plants puts the watch at Eitra's central control room in a situation that corresponds to having to manoeuvre a rapidly moving articulated lorry train without steering wheel, accelerator, gears or brakes. For many reasons such a nerve wracking operation cannot continue". (Per Andersen, Head of Information, Eitra)

3-Calculations from Annual Abstract of Statistics 2003 (AAS) and Social Trends 2003(ST)

AAS gives figures for UK annual electricity consumption (2001) categorised for domestic, industrial and other commercial users.

The domestic figure is 115336 GWh (10Wh=1,000 MWh)

Running consumption is therefore

$(115336 \text{ divided by } (365 \times 24)) = 13.7 \text{ GW}$

There are 24.4 million homes in UK (from ST)

So average consumption per home is

$13.7 \text{ GW divided by } 24.4 \text{ million} = 0.54 \text{ kW (GW/M=kW)}$

The Myth about the Economics of Wind Power

We are led to believe that wind power is cheap. It seems so obvious doesn't it? The wind is free and the turbines cost virtually nothing to run. The truth is the opposite.

The cost of generating electricity by conventional means, gas, oil or coal fired or nuclear, can be easily established. Using the usual yardsticks of cost of fuel, return on capital, amortisation, routine maintenance and a reasonable profit etc. a generating cost is relatively easily established. From this basic cost **the Generator** (the company which produces the electricity) charges a wholesale price to **the Retailer** (the company who supplies the electricity to the consumer). Currently this is of the order of 2.5p per kWh (unit).

Although in the case of a wind turbine the cost of fuel is zero this is largely irrelevant because in terms of £ per installed kilowatt the capital costs are enormous. For each unit comprising turbine (with ancillary gearboxes, feathering motors, transformers etc,) there has to be a tower, foundations, approach roads and a complex infrastructure. Consider a turbine rated at 1MW, the fact that it will only be effective for 28% (just over a quarter) of its life virtually multiplies the cost per useable kilowatt by 4. Because the initial cost per useable kilowatt is so high that, by any normal system of costing which takes into account the factors listed above for conventional generation, the cost of producing wind generated electricity would not pass any tests. The true cost can be shown to be such that no one in his right mind would invest a penny in the enterprise.

How then can it be viable?

The Government, committed to the reduction in greenhouse gas emissions by its endorsement of the Kyoto agreement, **has laid upon retailers an obligation to buy a proportion of their power from renewable (green) sources.** Since no retailer in his right mind would pay voluntarily twice as much (or more) just for the privilege of using wind power the government has devised two juicy carrots to encourage developers to invest in wind generation and enable them to make a very generous return on their investment. These carrots are in fact subsidies which are added to the notional cost of generation, which, as we have seen, is at present about 2.5p. Beware however - the word subsidy must never pass the lips of anyone in the industry.

Carrot No.1 is the **Renewable Obligation (RO)**. Carrot No.2 is the **Climate Change Levy (CCL)**. These are set at £30 per MWh and £4.30 per MWh respectively (or 3p and 0.43p per unit). So, **a retailer has to pay the generator for a unit of so called green energy the notional 2.5p plus 3p (RO) plus 0.43p (CCL) in short 5.93p.** It has been commented that at that price even wind power is economic. With a subsidy worth more than twice the commodity value this is not surprising.

It gets worse.

The Government has set targets. Every **retailer** must meet the Government target for purchasing a set amount of the electricity that they sell from a renewable source (wind, wave etc). Failure to do so incurs a penalty. **The retailers** can avoid the penalty either by buying so called green energy from a **generator** or by building their own renewable generation. To prove that they have bought green energy they get from **the generator a Renewable Obligation Certificate (ROC)** which is given by **OFGEM to Generators** for each MWh of renewable energy they produce. These **(ROCs)** have a nominal or face value of £30, as we have seen above. However, there is a market and the **ROCs** can be openly traded among the **retailers**. If the amount of renewable energy exceeds the Government target then the value of the **ROC** will fall below £30. Under present circumstances however, with the Government target for renewable energy set at 10% by 2010 and unlikely to be met, the traded price of a **ROC** has risen dramatically and is already approaching £50.(say £48) This means that the formula in the paragraph above becomes something like the following.

the notional 2.5p plus 4.8p(RO) plus 0.43p(CCL) or say 7.73p.

At the end of the year OFGEM recycles the total paid in penalties to the **retailers** who hold **ROCs**.

It is possible that if the Scottish Executive continue to set higher unattainable targets for renewable energy, the price of a **ROC** will go through the roof bringing higher and higher electricity prices to the consumer and bigger and bigger profits to the developers.

The aptly christened **ROCscam**, of course, gives the absolute lie to the wind industry's claim that wind power is cheap. Without the carrots it would be completely uneconomic and there would be no threat to ACE. Irrespective of what it costs them to produce they can charge for it according to the formula above. It is almost a licence to print money and as wind power increases as a proportion of the power we use it will have to be paid for by increased costs to the consumer.

There are already, in Scotland, many people who are unable to pay their fuel bills. The larger the percentage of electricity generated by wind the dearer all our electricity will become and the greater the percentage of Scots who will be unable to afford it.

The developer always offers a sweetener (bribe?) to the community affected by the development. The going rate at the time of writing is **£1,000 per installed Megawatt² (MW)** for communities which have to put up with wind power installations.

It is interesting to conjecture what this figure, which seems enormous, and is in fact £622,800 (173 turbine at 3.6 MW each) means relative to the potential earnings of the proposed Clyde development.

For every installed kilowatt (kW) the developer can expect to receive

$$(0.28) \times (7.73p \times 24 \times 365)/100 = \text{£}189.60$$

and therefore the anticipated annual income is £189.60 x 622,800 =£118,082,880

or £2.95 Billion over the 25 year life of the turbines

Notes. 1. & 2. 1 Megawatt (MW) =1,000 kilowatts (kW)

1 Megawatt hour (MWh) =- The energy released in one hour by one Megawatt of power

= 1,000 kilowatthours ((kWh) = 1 unit]

The Myth about CO2 displacement

The statement often made by the wind power industry that 1MW of wind turbine generation will displace 2000 tonnes ofCO₂; per annum from fossil fuel power stations is, to say the least, misleading.

This would be true if the wind turbine was replacing only power generated from coal. Because, however, with the run down of coal and the move to gas the average amount ofCO₂ emitted in the generation of **1MWh** has been reduced to 1030 tonnes²

This is almost exactly half of the saving claimed by the wind power lobby.

The New Electricity Tariff Agreement (**NETA**), introduced in 2001, calculates the price at which supply companies can purchase their electricity from National Grid **Transco** (NOT). Wind power installations are connected into local electricity networks (embedded) at lower voltages (less than 132 **kV**) than those at which the grid operates (132kV, 275kV and 400kV). Because of this the grid controllers are not aware when wind power comes on or goes off but only see a reduction or increase in the overall load.

We have seen already above, that wind power, being intermittent, requires almost 100% back up which causes unwanted **CO₂** emissions. Unfortunately there is a further complication making the emission problem worse. As their remit from **NETA** is to provide the cheapest available power **NGT** would, on

purely economic grounds, replace any shortfall with the cheapest power available. This, ironically, is **generally that supplied by coal fired stations with high CO₂ emissions**, thus completely cancelling out the saving in CO₂ emissions claimed for the wind generators. It is arguable that **NETA** has promoted more CO₂ emissions than wind has saved.

The myth is exploded, wind power will promote little or no reduction in CO₂ emissions

From Danish experience the actual CO₂ reduction benefit of wind is dissipated to around 50% of the theoretical saving⁵. As a result of the high percentage of wind power in their system the Danes are now experiencing instability in their network, and have had to admit that their overall **CO₂ emissions are now back to the pre-wind-power level**. It is also worth notice that Danish electricity is twice as expensive as ours. These are not of course facts that will be ventilated when opinion formers and legislators are invited to Denmark as guests of the Danish Wind Power industry and sponsored by **BWEA**. The Danes are very heavily committed to the manufacture of wind turbines for export. It is an extremely important component of their economy and the authorities will ensure that no undesirable facts are allowed to emerge to potential customers via politicians or journalists.

In any case any saving in CO₂ emissions to be achieved by the present policy are completely insignificant in global terms. To achieve any change in warming and sea level rise would require a complete cessation of all emission globally for 50 to 100 years⁶

Even if we were to achieve the impossible 10% reduction in CO₂ emissions from electricity generation it would have negligible impact. Because power generation accounts for only one third of total UK CO₂ emission we would be saving from the wind target something in the order of 3%. The UK provides less than 3% of global CO₂ emission so our wind power industry at best is likely to displace less than a thousandth part of world emission. This would have no measurable impact on atmospheric CO₂ concentration and certainly not influence climate change, even if CO₂ were the only "driver."

What is generally overlooked in this debate is that all the percentages used by the industry and in the argument above relate to emission but that the real objective must be a reduction in the huge atmospheric reservoir of CO₂. This reservoir is exposed to the CO₂ equilibrating effects of world total photosynthesis and respiration. These massively exceed fossil fuel emission in magnitude.

It is illustrative of the hypocrisy of the policy that the developing world, **aided by finance from our own Export Guarantee Department** is increasing its emissions enormously every few months by building coal fired power stations.

Notes. 1. 1 MW electrical energy generated from coal produces 0.84 tonnes of CO₂ per hour
 Multiplying 0.84 by 24 and 365 gives 7,358 tonnes of CO₂ per annum
 But because the wind is not continuous or constant the turbine will not displace this level of CO₂.

The DTI Digest UK Energy Statistics 2003 Table 4.7 gives an average factor of 28-29% for on shore wind turbines so the displacement of CO₂ becomes .28 X 7368 = 2060 tonnes, (t)

2. In 2002 the generating mix had become Nuclear 22% No CO₂ emission

Coal	32%	0.84 t/MWh/ annum emission
Gas	40%	0.374 t/MWh/annum mission
Other	6%	No CO ₂ emission

The weighted average for the above mix is 0.42 t/MWh/annum emission

This gives an emission of 0.42 x 24 x 365 = 3,680 tonnes of CO₂ per annum

From which using the load factor from 1. above the wind turbine can be shown to displace
 0.28x3,680= 1,030 tonnes

3. "embedded" ie connected to the network but at a distribution voltage. The connection would have no independent indication on the measuring instruments in the grid control room

4. David Milborrow, an independent renewable energy consultant stated (Renters July 15 2002)
 "The increase wipes out all the savings due to wind energy we currently have in the UK."
 National Grid Transco agrees that this is likely

5. Confirmed by I Chem E (2002) in response to the Policy and Innovation Unit's invitation to submit inputs to DTI Energy Review. Statistics from Denmark, which produces 13% of its electricity from wind power (20% in W Denmark) confirm the load factor of 0.28 (28%). Denmark halved its subsidy for wind generated electricity at New Year 2003 on the basis that their "wind farms" are " the greatest economic and environmental disaster for (their)

country" and there is unrest about subsidy in other "high wind power countries." Please see Note 2 of the Myth about the amount of power generated.

6. Total cessation of emissions now would achieve no change in "wanning" or "sea level rise" for 50 to 100 years. (Sir J. Hoighton, Welsh Assembly Renewable Energy Report (draft) 2002. Sir J was Chief Executive UK Met Office and previously co-Chair of IPCC's Scientific Working Group.
IPCC, Intergovernmental Panel for Climate Change

Summary

We feel in our three villages that we are facing the complete desecration of our beautiful landscape - a landscape so much appreciated that the road which runs through is designated Clyde Valley Tourist Route. What is worse however is that the desecration is in the name of something we don't want and can't use but are being conned into accepting.

Wind power is being sold to us as cheap, efficient and saving in CO2. There is adequate irrefutable proof that these claims are not true. Most of us accept the necessity to move away as rapidly as possible from an energy economy, which relies on the combustion of fossil fuels to generate the electricity on which our civilisation depends. We do not accept however that the way to do this is through wind power. If we are to make any significant improvement to the levels of CO2 emissions we must embark on a massive programme of energy conservation and a ruthless research programme to find means of reducing the amount of CO2 emissions from transport and process industries, coupled with serious investment into research into alternative renewable energy sources.

Before we ruin our landscape for years to come let us be clear what is driving this irresistible force. Firstly we have already exceeded the 8% emissions reduction under the Kyoto Protocol and our 12% commitment under a decision of the EU Council of 2002, so any suggestion that if we don't do more we would be failing to meet our international commitments is simply nonsense. This has to be considered in the same context as Finney's Folly, setting ludicrous targets for the reduction of emissions which if achievable would leave the power generation industry in a state of utter chaos and we begin to see where the irresistible force is coming from - from greed and ignorance.

The greed is on the part of the power companies and wind farm developers (sometimes the same body), who are taking advantage of the Renewables Obligation Certificates (ROCs) and the Climate Control Levy (CCL). These enable them to get more than twice the price for the electricity from the wind turbines than they could charge for conventionally generated power. The profits are enormous and the schemes are likened to a licence to print money. We are seeing more and more applications for bigger and bigger windfarms as the developers jostle to get on the ROC bandwaggon before it stops rolling. The ignorance is on the part of officials and journalists who accept without question the propaganda put out by the wind power industry.

There is fortunately, however, a change in the wind (no pun intended) and we are seeing now a more questioning attitude among some of the groups mentioned above. I am confident that within a few years the absolute folly of desecrating our landscapes will be recognised and a stop put to further developments. It would be ironic if the Clyde Wind Farm was the last to be allowed. We must try to put a stop to what has been described as the worst tragedy to Scotland since the Highland Clearances and the biggest scam since the South Sea Bubble, and stop it before it ruins the Clyde Valley.

Addendum

The above notes were prepared to inform the South Lanarkshire Councillors of the facts about wind turbines before they were called upon to decide on the Planning Application by [Airtricity](#) for a development of 173 3.6MW Wind Turbines on the hillsides overlooking the three villages of [Abington](#), [Crawford](#) and [Elvanfoot](#). Identical notes were also sent to all the members of the Scottish Parliament since the decision on the application, after its rejection by South Lanarkshire Council, will be taken by the Scottish Executive after a Public Inquiry.

There are two very large areas which the notes do not address but which must be addressed by the Royal Society in its inquiry. These are firstly the irreversible damage which will be visited upon the Scottish Environment, its beauty, its wildlife, its tourist industry and most importantly its rural population. It is to be hoped that experts in all these fields will be persuaded to come forward and make their submissions.

The second area to be addressed is research. This is diverse and must include research into viable alternatives to wind as a source of renewable energy, into better use of the existing fossil fuels and into sequestration.

There is potential for massive reductions in the emission of CO₂ in the burning of fossil fuels. Considerable work has already been done on this by firms like [Babcock](#) but if a fraction of the capital that is being wasted on installing wind turbines was applied to research in this field the savings in emissions and costs could be significant.

Some years ago we were told that we had coal supplies for four hundred years. If we were to develop the cleaning technology we could use these reserves and leave ourselves less reliant on importing oil and gas from increasingly unreliable sources. It is unlikely that it will be possible to clean 100% of the CO₂ from burning the coal but it would almost certainly provide a greater saving in emissions than could be obtained by building windmills. In addition Britain has, in its oil and gas fields, the facility to sequester all the CO₂ we are likely to produce while at the same time assisting in getting the most from partially depleted fields. It would seem to me that the sensible approach would be to follow this twin track approach of cleaning and sequestering and buy ourselves time until nuclear fusion can come to our rescue.

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