May 2008

Cyfeillion y Ddaear Cymru

Friends of the Earth Cymru

Wind Power: 20 Myths Blown Away

Wind energy is one of the cleanest, safest and most cost-effective forms of energy available.

Yet wind turbines face opposition from a vocal minority who raise all sorts of arguments against them.

The arguments against wind power are generally little more than myths. Friends of the Earth Cymru believes that, in view of the increasing urgency of tackling climate change, decisions on potential wind turbines in Wales should be made on the basis of facts and informed debate, not myth and misinformation.

Friends of the Earth Cymru inspires solutions to environmental problems, which make life better for people.

Friends of the Earth Cymru:

- **is dedicated to protecting the environment and promoting a sustainable future for Wales**
- **is part of the UK's most influential environmental campaigning organisation**
- **is part of the most extensive environmental network in the world, with over 60 national organisations across five continents**
- **supports a unique network of campaigning local groups, working in communities across Wales**
- **is dependent upon individuals for over 90 per cent of its income.**

To join or make a donation call us on 0800 581 051

Friends of the Earth Cymru, 33 Castle Arcade Balcony, Cardiff CF10 1BY
Tel 029 2022 9577 Fax 029 2022 8775 Email cymru@foe.co.uk Website www.foecymru.co.uk

Introduction 3

MYTH 1: Wind energy produces little power 4

MYTH 2: Wind turbines consume more energy than they generate 4

MYTH 3: Wind is intermittent and requires backup from polluting power station 4

MYTH 4: Wind energy is inefficient 5

MYTH 5: When the wind stops blowing the lights will go out 5

MYTH 6: Installing wind farms will not shut down conventional power stations 6

MYTH 7: Wind is being promoted at the expense of other renewable 6

MYTH 8: Wind power is expensive 6

MYTH 9: Wind turbines are taking over the countryside 7

MYTH 10: Wind farms are unpopular 7

MYTH 11: Wind farms deter tourists 7

MYTH 12: Wind turbines are noisy 8

MYTH 13: Wind turbines kill birds 7

MYTH 14: Wind energy is heavily subsidised 8

MYTH 15: We oppose wind but other renewable are fine 9

MYTH 16: Wind turbines can harm humans by catching fire or exploding 9

MYTH 17: Wind farms harm property prices 9

MYTH 18: Wind farms harm radio and tv reception 10

MYTH 19: Wind energy has failed in denmark and germany 10

MYTH 20: We need more energy conservation not wind energy 10

Notes 11

Introduction

Our dependence on oil, coal and gas to meet most of our energy needs is stirring up a host of problems.

As demand for oil increases, particularly from industrialising countries such as China and India, energy prices are rocketing. As the British coal industry has shrunk and supplies of North Sea oil and gas go into decline, we are becoming more dependent on other countries for our fuel, often in politically volatile regions such as the Middle East.

The whole process of extracting, refining, transporting and burning these fuels is damaging. Coal mining, in Wales and around the world, has left its imprint on many communities that have suffered death and ill-health on a substantial scale. More recently, the emergence of opencast mining is scarring landscapes and raising concerns about adverse impacts on human health and the environment.

Oil refining on the shores of Milford Haven alone emits over three million tonnes of carbon dioxide a year, and thousands of tonnes of other pollutants. The damage these pollutants impose on the natural environment has been well documented, as has their harmful impact on human health.

But it is the growing realisation of the immensity of the threat posed by climate change that, more than anything else, is forcing a complete rethink on energy policy. Emissions from burning fossil fuels are estimated to be responsible for around three quarters of man-made climate change.

In Wales, power stations are the largest single source of climate changing emissions, contributing around a third of the total. A switch from fossil fuels to renewable energy sources and improved energy efficiency offers a real opportunity to avoid catastrophe.

Wind energy is one of the cleanest, safest and most cost-effective forms of energy available. The fuel is free and will never run out, and there are no waste products or pollution produced. It is technologically the most advanced of the renewable energy options available and can deliver much-needed cuts in CO^2 emissions now.

In a world that is increasingly threatened by climate change, insecure energy supplies, peak oil and rising energy prices, wind power has much to offer. Yet wind faces opposition from a vocal minority who raise all sorts of arguments against it. A closer look at these arguments shows that they have little merit.

MYTH 1: Wind energy produces little power

- A single 1.8 MW (megawatt or 1 million Watts) wind turbine can produce enough electricity for 1,000 homes. In May 2008, there were 1988 wind turbines in the UK generating the electricity needed for 1,379,127 homes.[1] Wind farms in Wales have a capacity of just over 300MW onshore and 60MW offshore[2]. These generate enough electricity for 210,000 homes in Wales[3]. The average annual electricity consumption in a home is 4,700 kilo watt hours (kWh) a year.

- Friends of the Earth Cymru has calculated that present proposals for on-shore and off-shore wind farms could generate as much as 24% of Wales' electricity demand by 2012.[4] Globally, wind power capacity grew by 28% in 2007 to reach an estimated 95 GW (gigawatts or 1,000MW)[5].

- The UK government has announced a scoping study for up to 33GW of offshore wind farms which could supply the annual consumption of nearly all 25 million UK homes[6]. Between 20 and 30GW could be built by 2020.

MYTH 2: Wind turbines consume more energy in their manufacture than they generate

- It has been estimated that the average UK onshore wind farm will pay back the energy used in its manufacture within around 6 months[7]. A Danish study has estimated that the energy payback for an offshore wind farm was 9 months[8].

- Throughout its working life, a wind turbine can produce eighty times the amount of energy needed to make it[9]. And most of the metal work can be recycled.

- A modern wind turbine is designed to operate for 20 years and, unlike coal or nuclear power stations, can be quickly dismantled and the area restored at low financial and environmental cost. Only the concrete bases below ground level would remain.

MYTH 3: Wind is intermittent and therefore wind farms require back-up from polluting power stations

- The UK's transmission system already operates with a significant amount of back-up in order to manage the instantaneous loss of power from large power stations. Coal, gas and nuclear plants can and do suffer from unexpected 'outages' when they must be shut down, often at short notice and sometimes for long periods. This is much more difficult to deal with than the variability of wind power, as they operate on a much larger scale. Back-up is also constantly required to cover for other variations in output, such as surges in demand at meal times and during breaks in popular TV programmes, a

lightning striking on a high-voltage power line, and transformer failures. At present levels, variations in the output from wind farms are barely noticeable over and above the normal fluctuations in supply and demand.

- Accommodating significant amounts of wind capacity on the electricity system is not likely to pose any major operational challenge. This view has been confirmed by the National Grid Company and by a comprehensive report commissioned by the Carbon Trust[10].

- There would be a slight increase in cost as a result of the small amount of back-up required for wind. According to a review of studies carried out by the Sustainable Development Commission, the additional cost of providing 20% of electricity from wind energy by 2020 would be just 0.17p/kWh[11].

MYTH 4: Wind energy is inefficient

- Wind turbines in the UK generate, on average, 27%[12] of their theoretical maximum output, as compared to 53%[13] for conventional power stations. This is known as its load (or capacity) factor and is sometimes confused with the amount of time a wind turbine operates for. A typical wind turbine in the UK will, in fact, generate some electricity for 80 to 85% of the time[14].

- An orchard only produces apples for a short period in the year but is, nevertheless, immensely valuable.

- Load factor is also sometimes confused with the efficiency of a wind turbine. The efficiency of a conventional generator is the delivered energy expressed as a percentage of the total energy input. As the fuel source, wind, is limitless and free and does not emit pollutants or greenhouse gases, the traditional concept of 'efficiency' is far less relevant. Efficiency is important if the fuel is expensive. Coal and gas power stations are about 36% and 55% efficient respectively.

MYTH 5: When the wind stops the lights will go out

- Wind power delivers around two and a half times as much electricity during periods of high electricity demand, such as in the winter, as during periods of low demand[15].

- Low wind speeds affecting 90% or more of the UK occur in around 1 hour in every five years during winter. The chance of wind turbines shutting down due to high wind speeds is rare – high winds affecting 40% or more of the UK would occur in around one hour every 10 years.[16]

- Nobody is saying that all our electricity should come from wind energy. It is, though, the UK's greatest renewable energy resource and, as such, can make a significant, valuable and clean contribution to overall electricity supply.

MYTH 6: Installing wind farms will not shut down conventional power stations

- Power stations are being shut down because they are failing to meet EU pollution control standards or through old age.

- Wind energy reduces the time fossil fuel power stations are operating and, thereby, their emissions.

- The development of wind power supplying 10% of UK electricity would enable around 3GW of conventional plant to be closed[17].

MYTH 7: Wind is being promoted at the expense of other renewable

- Wind power is being developed because it is the most advanced and cost-effective form of renewable technology, which can be installed immediately to help cut carbon emissions. Other forms of renewable energy are receiving millions of pounds towards their development costs[18]. In addition, the Energy White Paper has proposed that marine renewable receive double the ROCs (Renewable Obligation Certificates) that onshore wind energy receives.

- The generation of electricity from most other renewable energy sources is more costly than onshore wind. 'The Renewable Energy Route Map for Wales' consultation document lists renewable energy costs, as calculated by Ernst and Young for the DBERR. These indicate that onshore wind energy can be around a third of the cost of wave and tidal energy and a tenth of the cost of solar photovoltaic.

- An exception could be tidal lagoons. A company proposing a lagoon scheme in Swansea Bay has stated that it could privately fund the scheme without grant aid.

MYTH 8: Wind power is expensive

- The Sustainable Development Commission estimated that, in 2005, generating cost of onshore wind is 3.2p/kWh with offshore at around 5.5p/kWh compared to a wholesale electricity price of around 3.0p/kWh[19].

- The Cabinet Office's Energy Review (February 2002) stated, on page 194, that "onshore wind is likely to become the cheapest of all generating technologies within 20 years – with a typical range of 1.5-2.5p/kWh". With fossil fuel prices rising, wind energy is likely to become even more competitive.

- The burning of fossil fuels should include 'external' costs, such as those associated with environmental and health damage. The EU's EXTERNE report in 2001, for instance, concluded that the price of electricity generated

from coal and oil would have to be doubled if it were to include the costs of damage to the environment and health[20]. Similarly, the UK Government estimates that each tonne of CO2 causes £26.50 worth of damage[21]. As Wales emitted 41.7 million tonnes of CO2 in 2005[22], this caused over £1 billion worth of damage.

MYTH 9: Wind turbines are taking over the countryside

- As a result of the TAN 8 planning policy, future wind farms in Wales will be mostly restricted to seven special areas (Strategic Search Areas). These areas amount to 140km^2 or just 0.68 per cent of the land area of Wales[23].

- The Sustainable Development Commission study concluded that "there are far fewer landscape and environmental impacts associated with wind turbines when compared to the alternatives – and most of the impacts can be reversed quickly"[24].

- Climate change is set to severely and irrevocably alter the landscape and ecosystem we live in, including the animal and plant life it contains. The visual impact of wind farms on our landscape must be considered in the context of the radical impact climate change will impose.

MYTH 10: Wind farms are unpopular

- Whether you think a wind farm is attractive or not is a personal opinion. Some like them while others dislike them. Opinion polls indicate that most people like them or are not bothered by them.

- The Sustainable Development Commission assessed more than 50 public opinion surveys carried out since 1991 and found that 80% of people were in favour of wind farms and 20% against[25].

MYTH 11: Wind farms deter tourists

- A survey by the University of the West of England into the impact of a wind farm in Devon on tourists concluded that "wind farms are a positive draw for tourists and most tourists would not boycott areas of natural beauty just because a wind farm was positioned nearby"[26].

- A survey by MORI at five locations in Scotland concluded "that the wind farms are not seen as having a detrimental effect on their visit and would not deter tourists from visiting the area in the future."[27]

MYTH 12: Wind turbines are noisy

- Turbine design has improved substantially as the technology has advanced, with the noise from moving parts progressively reduced. It is perfectly possible

to stand underneath a turbine and have a normal conversation without raised voices.[28]

- A comprehensive study by Salford University assessed 133 operational wind farms. It concluded that there were four instances where noise appeared to be an issue but that complaints had subsided in three of these cases. The one remaining complaint, in a new installation, was being investigated.[29]

- The author of the Defra Report on Low Frequency Noise and its Effects (2003) says: "*I can state quite categorically that there is no significant infrasound from current designs of wind turbines".*[30]

MYTH 13: Wind turbines kill birds

- The RSPB supports the Government's target to source 15% of electricity from renewable energy sources by 2015 because it views climate change as the most serious long-term threat to wildlife. It regards wind power as having "the greatest potential to make a significant difference in the UK in the coming decade". It states, "the available evidence suggests that appropriately positioned wind farms do not pose a significant risk to birds".[31]

- A study by the Environmental Research Institute, published in the Royal Society's journal Biology Letters in June 2005, of an offshore wind farm in Denmark concluded that less than 1% of migratory birds were in danger of colliding with wind turbines.[32]

- There is some evidence, however, that in Spain and the USA poorly sited wind farms have caused problems for birds as a result of disturbance, habitat loss/damage or collision with turbines. This can be avoided by the appropriate siting of wind farms.

- It is estimated that, every year, more than 10 million birds are killed by cars in the UK.[33]

MYTH 14: Wind energy is heavily subsidised

- Onshore wind does not receive government subsidies. Renewable electricity output, from whatever technology, receives a Renewable Obligation payment in acknowledgement of its clean, low carbon output which is paid via consumer bills

- Opponents of wind energy seem far less concerned about the larger subsidies given to fossil fuels. According to the New Economics Foundation report, 'Up In Smoke' (2004), industrialised countries (OECD) provided a subsidy of $73 billion a year to their fossil fuel industries in the 1990s, with a further $162 billion subsidising fossil fuels in non-OECD countries.

- Nuclear power has received huge subsidies over the years and now British taxpayers have to fork out over £70 billion to decommission existing nuclear power stations and deal with toxic wastes. [34]

MYTH 15: We oppose wind but other renewable are fine

- Wind energy is the UK's biggest renewable energy resource by some margin. To ignore wind energy and only progress other renewable would result in higher electricity costs and different but significant environmental impacts.

- A public opinion poll conducted by the renowned Tyndall Centre for Climate Change at Manchester University found that eight times more people were in favour of wind turbines than were in favour of a biomass proposal in Devon. The biomass generator would have gasified crops, such as willow, in a CHP (combined heat and power) system that would have provided electricity for 46,000 homes.[35]

- This example reflects much of what we have witnessed in Wales with objections being raised against proposals for energy generation from wood-fuelled schemes, energy crops, hydro-electric schemes on rivers, solar panels in building conservation areas and off-shore tidal schemes.

MYTH 16: Wind turbines can harm humans by, for instance, catching fire or exploding

- No member of the public has ever been injured during the normal operation of a wind turbine, with over 25 years operating experience and with more than 70,000 machines installed around the world.[36] By comparison, in the USA alone, particle pollution from power plants leads to over 30,000 deaths each year.[37]

MYTH 17: Wind farms harm property prices

- A report by the Royal Institute of Chartered Surveyors and the Oxford Brookes University (May 2007) found no clear relationship between property prices and the proximity of wind farms.[38] The authors have stated, "despite initial evidence that there was an effect, when investigated more closely, there were generally other factors which were more significant than the presence of a wind farm". [39]

- In an NWP commissioned survey, conducted by Robertson Bell Associates (RBA), of residents who were able to see the Taff Ely Wind Farm in South Wales from their home, more than three in four (78%) said that the wind farm had had no effect on house prices, with a further 15% saying 'don't know'. As many residents said house prices had increased a little because of the wind farm (3%) as said they have decreased a little (3%).[40]

MYTH 18: Wind farms harm radio and TV reception

- Wind turbines can interfere with radio signals and effect TV reception and telecommunications systems. However, a number of solutions are available to counter any negative effects and these should be identified early so that mitigation measures are included in the consents process.[41]

MYTH 19: Wind energy has failed in Denmark and Germany

- Wind power in Germany, Denmark, Spain and other countries has been an economic and environmental success. Germany currently has over 20,000 onshore turbines (ten times more than the UK) and employs 250,000 people in renewable energy (compared to 7,000 in the UK).[42]

- The share of renewable in the electricity sector in Germany will increase from the current level of around 12% to 25-30% by 2020. In particular, there will be a massive expansion of offshore wind energy.[43]

- Current Danish energy policy states, "wind power technology plays a crucial role in current renewable energy supplies, and is undergoing constant development. Thus there are many indications that wind power will continue to make a very important contribution to Danish energy supplies."[44]

MYTH 20: We need more energy conservation not wind energy

- We need both. Renewables and efficiency measures are complimentary. A wind farm can supply more homes and people if efficiency measures are installed. All energy solutions have some deficiencies, including efficiency which can suffer a 'rebound effect'. Consumers save on fuel bills but then some people are more likely to spend more on turning the heating up or buying more appliances, thus negating some of the benefits.

- The crises of climate change demands that we deploy as many solutions as possible and as soon as possible to cut emissions of climate-changing gases.

NOTES

1. BWEA website
2. Written answer at the Welsh Assembly from the Minister for the Environment, Sustainability and Housing, Jane Davidson, January 2008.
3. 360MW gives an average output of 123MW generating 0.987TWh/yr which is enough electricity for 210,000 homes
4. The calculations are as follows:

   "Wales electricity demand = 24 TWhrs/yr
   Onshore wind capacity = 300 MW (already built) plus 700 MW additional target by 2010. At 30% load factor, 1,000MW = 300 MW average annual output
   Offshore wind capacity = North Hoyle 60 MW, plus Rhyl Flats 90 MW, plus Scarweather 100 MW, and Gwynt y Mor 750 MW = 1,000 MW in total. At 35% load factor = 350 MW average annual output
   In all, this would be 650 MW average annual output from both onshore and offshore wind farms.
   In one year, 650 MW average would generate 0.650 x 8.76 = 5.69 TWhrs/yr. This equates to nearly 24% of current demand in Wales, or nearly 26% if electrical efficiency improvements reduced electricity demand by around 10% by 2012. This would supply 700,000 to 800,000 people in Wales, or about a quarter of the Welsh population of Wales by 2012."

5. 'Renewables 2007 Global Status Report' by the Worldwatch Institute (March 2008)
6. BBC News website 9th December 2007
7. 'Dispelling the Myth of Energy Payback Time' by David Milborrow as published in Windstats, vol 11. No 2, Spring 1998
8. Quoted in 'Wind Power in the UK' by the Sustainable Development Commission, Section 3.2
9. Boyle,G. (2004) Renewable Energy: Power for a Sustainable Future, page 270, (2nd Ed.) Oxford University Press.
10. 'Wind Power in the UK' (page 24) by the Sustainable Development Commission (May 2005)
11. 'Wind Power in the UK' by the Sustainable Development Commission, page 27
12. Digest of UK Energy Statistics 2007, Table 7.4
13. As above, Table 5.10
14. 'Wind Power and the UK Resource' (page 6) by the Oxford University Environmental Change Unit
15. As above, page 1
16. As above
17. As above
18. A presentation at the National Assembly Sustainable Energy Group (NASEG) meeting in Cardiff on July 3rd 2007, listed a number of grants assisting marine renewable developments. These included £26m for R&D from the DTI between 2000 and 2005 and £50m under the Marine Renewables Deployment Fund announced in August 2004.
19. 'Wind Power in the UK' (Chapter 4, page 27), Sustainable Development Commission (May 2005)

20. Environment Daily, July 23rd, 2001. Studies made in twelve EU countries showed that electricity generation from hard coal, lignite and oil had an average external cost of 5.7 cents (euro) per kWh as against an average generating cost of around 4 cents. If generated from gas it would be 30% more.
21. Environmental Data Services (ENDS) Report, January 2008, page 30.
22. 'Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2005' by AEA for DEFRA, The Scottish Executive, The Welsh Assembly Government and the Northern Ireland Department of Environment.
23. Facilitating Planning For Renewable Energy in Wales: Meeting The Target' by Ove Arup & Partners Ltd (June 2005) on behalf of the Welsh Assembly Government.
24. 'Wind Power in the UK' (page 52), Sustainable Development Commission (2005)
25. 'Wind Power: your questions answered', Sustainable Development Commission (2005)
26. Bristol UWE (2007) Wind farms are good for tourism, University of the West of England, http://info.uwe.ac.uk/news/UWENews/article.asp?item=977
27. MORI Scotland 'Tourist Attitudes Towards Wind Farms' (2002) for the Scottish Renewables Forum and the BWEA
28. 'Wind power in the UK' (Chapter 8), Sustainable Development Commission
29. University of Salford, Research into Aerodynamic Modulation of Wind Turbine Noise (August 2007) See: http://www.berr.gov.uk/files/file40570.pdf
30. Dr Geoff Leventhall, Consultant in Noise, Vibration and Acoustics and author of the DEFRA report on low frequency noise quoted in the BWEA paper 'Low Frequency Noise and Wind Turbines'
31. RSPB briefing paper, 'Wind Farms' (2005)
32. 'Wind farms pose low risk to birds', by Richard Black, BBC News website June 8th 2005 http://news.bbc.co.uk/1/hi/sci/tech/4072756.stm
33. Yes2Wind website - http://www.yes2wind.com/birds_debunk.html
34. BBC News website reporting a Nuclear Decommissioning Authority announcement on March 31st 2006
35. Details of the report, 'Winkleigh Parish Opinion on the Proposed WINBEG Biomass Gasifier' (2004), can be found here: http://www.supergen-bioenergy.net/?sid=252&pgid=284
36. BWEA website
37. Clean Air Task Force, 'Death, Disease and Dirty Power: Mortality and Health Disease Due to Air Pollution from Power Plants.' October 2000. Available at http://www.cleartheair.org/fact/mortality/mortalitylowres.pdf
38. 'What is the impact of wind farms on house prices?' by Peter Dent and Dr Sally Sims of Oxford Brookes University (2007).
39. Royal Institute of Chartered Surveyors press release March 23rd 2007
40. Yes2wind website: http://www.yes2wind.com/42_faq.html
41. 'Wind Power in the UK' by the Sustainable Development Commission, chapter 11.
42. Friends of the Earth press release April 30th 2008
43. 'Costs and benefits of the German government's energy and climate package', the Federal Environment Ministry, Berlin, October 2007, page 4.
44. 'Energy Policy Statement 2007', section 4, Danish Energy Authority