

# Wind power: your questions answered



**Friends of  
the Earth**



# Global warming: time for action

Climate change is the biggest and most urgent environmental threat we face. The greenhouse gases responsible are caused by human activity. The most important is carbon dioxide (CO<sub>2</sub>) which is produced when we burn fossil fuels such as coal, oil and gas for energy. Rising levels of CO<sub>2</sub> in the atmosphere are causing increases in global temperatures, leading to more severe weather patterns such as floods, droughts and storms, rising sea levels and threats to entire ecosystems. To avoid catastrophic climate change we must curb rising global emissions within the next 10 years. This means we need to switch to forms of energy that do not produce CO<sub>2</sub>.

In the UK around a third of our emissions of CO<sub>2</sub> come from power stations which are producing electricity. Other emissions from these stations pollute the air we breathe and contribute to acid rain which threatens wildlife. Our demand for energy is higher than ever. Even if we make massive improvements in energy efficiency, it's vital that we find cheap and clean ways of generating electricity to replace the polluting forms of energy we currently use.

**The time for action is now. We are already witnessing changes to our climate. We have to cut emissions of CO<sub>2</sub> to avert catastrophe. We can achieve this by harnessing the natural, clean and inexhaustible energy sources around us: the sun, wind and waves.**

Did you know



**Many environmental organisations recognise the importance of wind power as an essential component of our strategy to fight climate change, including English Nature, the RSPB and WWF.**

**The British Wind Energy Association (BWEA) has co-published a report with these organisations, *Wind Farm Development and Nature Conservation*, to provide guidance on designated areas and wind developments.**

**See the Wind Directory on page 19 for contact details.**



**Climate disasters like widespread flooding wreck lives and livelihoods, and the poorest suffer most.**

# Wind power as a source of renewable energy

Electricity generation from the wind is the best-developed of the newer renewable energy technologies and it is available now. Wind power relies on relatively simple mechanical processes, once built the running costs are very low, and it has benefited from recent technological advances in the aeronautics industry. The fuel is free and inexhaustible and there are no waste products. This means it can compete with the cost of energy based on conventional fossil fuels. And as fuel prices continue to rise, wind power can only become more competitive.

The UK has the greatest potential for wind power in Europe, but we have been slow to exploit it. Other European countries such as Germany and Denmark lead the way. Wind energy could be providing nearly 20 per cent of our electricity needs by 2020. As the UK is now a net importer of oil and gas, wind offers additional benefits in terms of secure energy supplies.

Friends of the Earth supports the development of wind power in the UK. We must invest in renewable energy like wind power to offset the threat of climate change and to help avoid new nuclear power stations, both of which threaten huge environmental problems for the generations that succeed us. We want to encourage wind farms which are appropriately sited, well designed and locally supported.

**Friends of the Earth believes the debate about wind power must be balanced and informed. This booklet answers some common questions about wind power and puts in perspective the arguments often used to oppose wind developments.**

Did you know



**There is no safe level of exposure to nuclear radiation. Highly-radioactive toxic waste from nuclear reactors will last for tens of thousands of years, and nobody knows how to store it safely. Nuclear power plants are also potentially catastrophic terrorist targets.**

**Friends of the Earth believes that nuclear power is not the solution to cutting CO<sub>2</sub> emissions. Nuclear power involves unacceptably high risks as well as huge costs. For more on this issue read our report: *Nuclear power, climate change & the Energy Review*. You can see this at [www.foe.co.uk/resource/briefings/nuclear\\_power.pdf](http://www.foe.co.uk/resource/briefings/nuclear_power.pdf)**

**As well as the urgent environmental need for clean energy, wind power has many social and economic benefits. Wind power creates new jobs, often in rural areas where unemployment can be high.**

**In the UK a single average-sized turbine of 1MW typically produces at least 2.5 million kilowatt hours of electricity per year. This is enough to meet the needs of almost 600 average households.**



# Your questions answered

## Will building wind farms help prevent global warming?

Carbon dioxide (CO<sub>2</sub>) is the most important of the greenhouse gases which are changing our climate. In the UK we currently emit around 600 million tonnes of CO<sub>2</sub> every year\*. If we are to avoid dangerous levels of climate change we must cut our CO<sub>2</sub> emissions by 80-90 per cent over the next 50 years. That means switching to forms of energy generation that do not produce CO<sub>2</sub>.

Wind power is a clean, renewable form of energy, which during operation produces no carbon dioxide. It also emits no sulphur dioxide, the cause of acid rain. While some emissions of these gases will take place during the design, manufacture, transport and erection of wind turbines, enough electricity is generated from a wind farm within a few months to compensate for these emissions. When wind farms are dismantled (usually after 20 years of operation) they leave no legacy of pollution for future generations.

## Can wind farms produce significant amounts of electricity?

Although there are vast quantities of wind energy available, harnessing the wind involves capturing energy that is relatively diffuse in the environment. Critics claim large, centralised power stations are more efficient, and that wind power will never be able to replace them.

While individual turbines may not contribute much on a national scale, collectively they can make a huge difference. The Department of Trade and Industry (DTI) calculates that onshore wind could theoretically meet 80 per cent of our current electricity demand, and that the offshore resource could supply 10 times this amount. More conservative estimates, taking into account factors such as land availability, suggest a practicable figure of 40 per cent of current electricity generation from on- and offshore wind.

Did you know



**Since electricity is consumed by millions of appliances spread all over the country it is actually much more efficient to generate electricity in the same dispersed way, cutting down on the energy lost when electricity is transmitted over long distances. So more, smaller sources of energy production can help us to use electricity more efficiently by producing it closer to where it is used.**

**\*Figures from Friends of the Earth and The Co-operative Bank's specially commissioned report *Living Within A Carbon Budget* by the Tyndall Centre for Climate Change. Or see the four page summary, *The Future Starts Here: the route to a low carbon economy*.**

Wind Prospect



## Isn't wind power expensive and heavily subsidised?

No. The cost of generating electricity from the wind has fallen dramatically over the past few years. Wind power can now produce electricity at a cheaper price than nuclear power in the UK. Energy from the wind will become even cheaper in the future as greater experience is gained in manufacturing and developing this relatively new technology.

When the full costs of the environmental damage caused by fossil fuels and nuclear power are taken into account, wind power is an even better buy. For example, it has been estimated that if the cost of environmental damage were included, the price of electricity from coal would be three times higher than electricity from the wind. The full costs of nuclear power, including dealing with highly-radioactive waste and decommissioning of old plants, are still not included in the price of electricity after decades of operating stations in the UK, and the nuclear industry is still dependent on massive Government subsidy.

The cost to the consumer of supporting the initial development of wind power in the UK has been very small. The Non-Fossil Fuel Levy, set up at the time of electricity privatisation, supported all non-fossil fuel sources of electricity: nuclear power and renewable energy. However, almost 90 per cent of that subsidy went to the nuclear industry. The Government has replaced this arrangement with the Renewables Obligation, which requires electricity suppliers to provide up to 20 per cent of their electricity from a variety of renewable sources by 2020. Latest estimates indicate that this obligation will result in a small increase in domestic customer prices of up to 4.5 per cent by 2010.

Did you know



**The UK is the windiest country in Europe but lags behind many of our European neighbours in developing this resource – by the end of 2006 we still had only 1,700 turbines with an installed capacity of 2,000 megawatts (MW). In comparison, Germany had around 10 times more – over 18 000 turbines, giving a total of 19,000MW capacity.**

**Germany also plans a massive increase over the next 25 years, with a target of one quarter of present electricity needs coming from wind power. Spain is another rapidly growing wind energy market with a total of over 10,000 MW of installed capacity.**

**Wind power generates over 16 per cent of electricity demand in Denmark, 8 per cent in Spain, and 5 per cent in Germany.**

## Is electricity from the wind reliable?

It is true that wind turbines only operate when the wind blows. However, the UK is the windiest country in Europe so we have a large resource waiting to be used. Less windy countries such as Germany are already meeting 5 per cent of their electricity needs from wind.

There is a lot of confusion about the reliability of different sources of electricity. No power stations are able to operate all the time without stopping. Many so-called reliable sources such as nuclear plants suffer from unexpected 'outages' when reactors must be shut down, often at short notice, for essential safety maintenance. Unreliability of this kind is far harder to deal with as the amounts of electricity involved are generally much higher. By comparison the variation in output from wind farms distributed around the country is scarcely noticeable. A great advantage of wind power is that the available wind resource is much greater during the colder months of the year, when energy demand is at its highest.

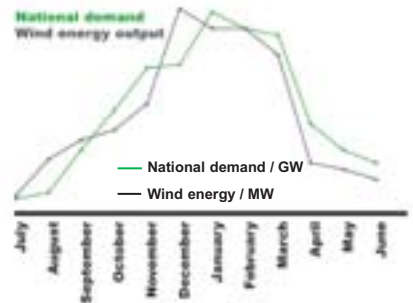
At present the National Grid can be operated effectively and economically with up to 20 per cent of the electricity capacity being provided by variable energy sources such as wind. At the levels being considered over the next few decades for wind energy production, such variability can easily be accommodated by the grid system. It is true that we could never rely on wind turbines alone to provide for all our electricity needs. But there are storage technologies we can use, such as pumped storage hydro power schemes (where water is pumped up-hill, thus acting like large batteries for the electricity system), as well as more flexible renewable technologies such as energy from bio-waste and energy crops.

Coupled with these sources, wind farms can replace a large portion of our existing nuclear and fossil-fired electricity generation without reducing the overall reliability of our electricity supplies.

Did you know



**Wind energy coincides well with periods of peak electricity demand. Demand often peaks on cold, windy winter days – just when wind turbines are at their most productive. The figure below shows how well wind energy is matched to demand in a typical year.**



**Patterns in national demand and wind energy output**

## **If we saved more energy, we wouldn't need wind power, would we?**

However much we improve the way we use energy, we are always going to have to generate electricity, and it is vital that we make more use of energy sources that are safe, clean, secure and renewable. Future predictions for transport indicate that we will become even more reliant on electricity, either as a direct source of power or as a means of producing hydrogen for fuel cells. Both energy efficiency and wind power have important roles to play in a sustainable energy policy of the future and have massive potential to help solve serious local, national and international environmental problems.

Friends of the Earth continues to campaign for greater investment in energy efficiency. For example, Friends of the Earth was one of the leading organisations campaigning in support of the Warm Homes and Energy Conservation Act 2000.

## **How much land do wind farms take up?**

A typical wind farm of about 20 turbines extends over an area of about one to two square kilometres. But only a small fraction of this land, about 1-2 per cent, is actually occupied by the turbines and access tracks. The bulk of the land is unaffected and can continue to be used for agriculture, grazing, etc. To produce 10 per cent of the UK's current electricity from the wind would use about 1 per cent of the total UK land area, with the turbines occupying only about 0.02 per cent. When the wind farm has finished generating, the turbines can be dismantled, and the land returned completely to its previous use.



## Why not site wind turbines offshore?

Wind turbines can be sited offshore, and Friends of the Earth agrees that offshore wind farms are a good idea. The UK now has four operational offshore wind farms, and another 27 projects are currently being considered for locations around the British coast. A plan to build the world's largest offshore wind farm, known as the London Array – which will see 271 turbines off the Kent/Essex coasts – could provide enough electricity to power 750,000 homes (equivalent to nearly 1 per cent of UK energy demand) and is due to open as early as 2010.

However, the urgent need to respond to climate change means that we will need to use as many renewable resources as quickly as possible, including both onshore and offshore wind. At present onshore wind is one of the most economically competitive of the renewable technologies. Due to the technical hurdles of offshore construction and connection to the National Grid, the cost of delivered energy from initial offshore wind farms is estimated to be at least 30 per cent higher than that from equivalent land-based turbines. There are also a number of other constraints on the development of offshore wind resources including a limited number of suitable locations, new consents procedures and objections from the Ministry of Defence, which are slowing progress of some of these sites.

The offshore wind resource is huge – the DTI estimates it could theoretically supply current electricity demand 10 times over, and will play an important role. However, onshore wind is currently the key technology if the UK renewable energy market is to be successful, and if the government's target of 10 per cent of electricity generation from renewable sources by 2010 is to be met.

Did you know



**Ambitious plans are afoot to build huge wind farms far offshore, connected to a Europe-wide electricity grid. The first such proposal located between the UK, Germany and the Netherlands could see 2000 turbines generating enough electricity for eight million homes.**

AMEC Border Wind



## Do wind farms create jobs?

The British Wind Energy Association (BWEA) has calculated that if 10 per cent of UK electricity were produced from wind energy, over 6,500 permanent jobs could be created in the manufacture of equipment, construction and day-to-day maintenance. Some of these jobs would be in rural areas where other employment opportunities are very limited. There are four manufacturing facilities assembling wind turbines or producing major components, and many others supplying materials and parts. The UK Government has signalled its support for the development of the wind turbine manufacturing industry, which will result in even more jobs. In addition, wind farms are often tourist attractions. For example, the large wind turbine at Swaffham in Norfolk, which incorporates a viewing gallery for the public, has proved to be a very popular tourist attraction with some 35,000 visitors per year.

Wind farm developments can provide an important source of income for local people, helping to regenerate areas and enabling farmers to diversify, aiding rural economies.

Did you know



**The Vestas blade manufacturing facility on the Isle of Wight has played a valuable role in creating additional local jobs and developing UK expertise.**



**The view from the public gallery, Swaffham wind turbine, Norfolk.**

## **Aren't wind farms unpopular?**

Many opinion polls show that the majority of people are in favour of wind power. A before and after study by the DTI at the UK's first wind farm at Delabole in Cornwall showed that 80 per cent of those asked felt that it made no difference to their daily life. Six months after construction, 84 per cent of those living nearby were found to either approve or strongly approve of wind power. A recent survey for the Countryside Council for Wales showed that between 74 and 83 per cent of people living near three Welsh wind farms found them acceptable developments, and 70 per cent said they would be happy to have more in the area. The Scottish Executive conducted a survey of residents near four wind farms, and 74 per cent said there was nothing they disliked about the farms while 67 per cent liked something about the farms.

Some residents may be apprehensive about any proposed local developments. When accurate information and knowledge is made available, experience shows that initial concerns are reduced and support for wind farm schemes increases. In the Scottish Executive survey, 40 per cent of respondents anticipated problems prior to the development, but only 9 per cent of respondents reported experiencing any problem once it was built. Independent surveys typically show that 90 per cent of people either support wind energy developments once they are in place, or are not concerned by them.

## Do wind turbines spoil the landscape?

Friends of the Earth believes the visual appearance of wind farms cannot be ignored. The number of turbines, their layout in the landscape and whether there are other wind farms nearby (producing a cumulative visual effect) should all be considered. Areas of Outstanding Natural Beauty (AONBs) or National Parks are unlikely to be appropriate for large wind farms.

This is a highly subjective issue. Being visible is not necessarily the same as being intrusive. While some people express concern about the effect wind turbines have on the beauty of our landscape, others see them as symbols of a better, less polluted future.

The landscape we inhabit is largely man-made and it evolves over time. In comparison to developments like quarries, power stations or open cast mining, wind farms have the advantage that they can be easily removed from the landscape at the end of their lives, leaving virtually no sign that they have been there. If we don't switch to cleaner forms of energy, climate change will severely and irrevocably alter much of our landscape and the animal and plant life it contains.

Friends of the Earth believes that each project should be considered on an individual basis by the relevant planning authority and judged against planning policies that promote both renewable energy and landscape value. Local authorities should assess the potential for renewable energy in their areas and help identify sites that are appropriate for development. All significant impacts should be considered within a project environmental assessment.

By consulting local people, avoiding the most sensitive areas, and careful siting, wind power companies can do much to ensure that turbines can be successfully integrated into our landscape.

Did you know



**The Planning Inspector for the Cemmaes wind farm in Wales described turbines as “elegantly designed, having clean lines with no extraneous features of visual clutter”. Visitors to wind farms have variously described them as visions of the future, relaxing to watch, elegant, majestic and utterly beautiful. Surveys in Scotland and Cornwall have found most people thought wind turbines did not spoil the scenery.**

Wind Prospect/Paul Carter



## Are wind turbines noisy?

Thanks to advances in wind turbine technology, well-designed, well-sited turbines can be quiet enough to cause no disturbance to people living just a few hundred metres away. At these distances, any noise they do make is usually drowned out by the natural noise of the wind itself in trees and vegetation. To protect nearby residents from any undue disturbance, proposals to install wind turbines are required to meet strict noise standards.

Having read exaggerated claims in the press, people visiting wind farms are often surprised at how quiet they actually are. The Scottish Executive public opinion survey is one of several demonstrating that concerns about noise are often unfounded. Before construction of the Scottish wind farms, 12 per cent of people living near the sites thought that the turbines would cause a noise nuisance, but after construction, when people had experience of the wind farm operating, only 1 per cent thought they were noisy.

Did you know



**Scare stories about wind power attract press coverage and are frequently raised by the anti-wind lobby, seeking to create concerns over turbine safety by highlighting events such as loss of blades due to lightning strikes, ice falling from blades, turbines catching fire, or even blowing over in high winds. Experience with tens of thousands of wind turbines throughout the world has shown that whilst all these events are theoretically possible, they are very rare, and the risk of them occurring on a well-designed scheme is extremely small.**



Wind Prospect/Paul Carter

## Do wind farms kill birds or harm wildlife?

Siting is a crucial issue. Developers should contact specialists such as the RSPB and conduct a thorough analysis of the risk to birdlife as part of the environmental assessment of wind farm proposals. The RSPB supports wind power, and has said that from its own studies at three wind farms in Wales, “the scale of bird strike does not seem to be of serious concern”, and that wind turbines will have little effect on birds outside their main migration routes.

Years of experience in other countries have highlighted a few specific problems where wind farms have been sited too close to high concentrations of migrant birds either feeding or roosting. When properly sited, wind turbines present no more danger to birds than other structures such as pylons or roads. Similarly, there is no evidence to suggest damage to other wildlife, or to agricultural livestock which often grazes right up to the bases of the turbine towers.

Friends of the Earth opposes development in protected areas such as Sites of Special Scientific Interest (SSSIs) unless it can be demonstrated that it will not cause damage to the special interest. However, SSSI designation does not constitute a blanket ban on development activities. In some cases the development may not cause significant impact. Friends of the Earth recommends a case-by-case approach, and caution where scientific evidence is weak. These sites and the species living there are at major risk from climate change, so cutting CO<sub>2</sub> emissions is vital for their long-term conservation.

Did you know



**A survey by the RSPB of Bryn Titli wind farm (near Rhayader in Wales) found no evidence of damage to local populations of red kites, buzzards, ravens, peregrines and red grouse.**

## **Do wind farms interfere with television reception?**

Wind farms can occasionally disrupt TV and radio signals, but any problems should be identified during the planning process and can be solved with suitable repeater equipment or TV aerial modifications. Planning authorities can ensure that developers undertake to provide the necessary equipment as part of the planning permission process.

## **Aren't wind developers giant companies simply making profits for their shareholders?**

Carefully developed wind power schemes can have many benefits, not just to the developer and owners, but to local communities, national energy security and global environmental protection. Friends of the Earth has been campaigning in support of a wider variety of wind projects, including small-scale and community-owned projects where local people receive a financial return from the sale of electricity, such as the Baywind cooperative in Cumbria. Such schemes are common in Denmark where around 70 per cent of turbines are owned locally.

The fact that wind farm owners make a profit from selling the electricity from wind farms is not a valid criticism of wind power. Companies need to make profits in order to remain viable and pay their employees. Friends of the Earth would rather companies invested in renewable energy than in the fossil fuel and nuclear industries. It is only through such investment that a healthy and successful renewable energy industry will flourish in the UK.

Did you know



**While the majority of wind farms are not community-owned, local communities will benefit from the job opportunities they create, and landowners will receive an income – this can be a lifeline for struggling farmers.**

**Wind developers often make financial contributions to local facilities that benefit a significant proportion of the local population.**

## Can I have a wind turbine on my home?

Individual householders can now generate electricity from the wind with the new range of micro wind turbines which are now entering the market. However, urban areas have much lower wind speeds than open countryside and a much greater degree of turbulence which significantly impacts their performance.

## Why is there so much opposition to wind farms?

Wind developments have their critics, and some of their concerns over early schemes were well-founded. However, many of the criticisms made about wind energy today are exaggerated or untrue, and reflect attempts by particular groups to discredit the technology, worry local communities and turn them against renewable energy schemes. Anti-wind groups have been particularly effective at using local media, and have been able to create emotive and divisive reaction in local communities, where sensible discussion of the issues is forgotten.

Country Guardian, the national campaign to oppose wind turbines is one of the most outspoken of anti-wind groups. As part of its argument against the need for wind power, the group questions whether action is needed to stop climate change.

Did you know



**In Cumbria some anti-wind groups claim that even wind farms sited offshore will deter tourists. You might think that BNFL's Sellafield site would hardly be a visitor draw, but it even has a visitor centre.**

# Wind power: clean, green energy

Friends of the Earth supports sensitively planned wind power developments. Without them we will continue to be reliant on fossil fuels and nuclear power, which carry the threats of radioactive pollution, acid rain and global warming for both this and future generations. With careful planning and consultation with local people, potentially negative wind farm effects such as noise and visual intrusion can be minimised for those who do not find wind farms attractive.

**Friends of the Earth is campaigning for a sustainable energy policy for the UK. This is an energy policy which moves away from nuclear power and fossil fuels, encourages higher levels of energy efficiency and promotes the increased use of a wide range of renewable technologies.**

**Wind developments both on- and offshore have an important part to play in delivering such a policy. They will help to achieve the key objectives of environmental protection, sustainable management of our natural resources and long-term energy security.**



**The Big Ask is Friends of the Earth's Climate Change Campaign. Launched in 2005, the campaign has enabled more than 100,000 people to contact their MPs to pledge their support for a Climate Change Bill. In November 2006 Government announced plans for a law to cut carbon emissions.**

**Contact Friends of the Earth for more information and how to get involved at [www.thebigask.com](http://www.thebigask.com) and sign up for Climate Online updates at [www.foe.co.uk/climateonline](http://www.foe.co.uk/climateonline)**

**Friends of the Earth is a founder member of Stop Climate Chaos, the UK's biggest coalition of organisations working on climate change. Find out more at [www.icount.org.uk](http://www.icount.org.uk)**

# Wind power directory

## **British Wind Energy Association (BWEA)**

Wind energy trade association with lots of information about wind schemes around the country.

[www.bwea.com](http://www.bwea.com)

Tel: 020 7689 1960

## **Centre for Alternative Technology (CAT)**

Practical information on wind, water and solar power and energy conservation.

[www.cat.org.uk](http://www.cat.org.uk)

Tel: 01654 705 950

## **Friends of the Earth Scotland**

Campaigning for environmental justice.

Lambs House

Burgess Street

Leith

Edinburgh

EH6 6RD

[www.foe-scotland.org.uk](http://www.foe-scotland.org.uk)

Tel: 0131 554 9977

## **Greenpeace**

Campaigning on climate change and promoting renewable energy.

[www.greenpeace.org.uk](http://www.greenpeace.org.uk)

Tel: 020 7865 8100

## **Natural England**

Statutory government agency working on wildlife and countryside issues.

[www.naturalengland.org.uk](http://www.naturalengland.org.uk)

Tel: 0845 6003078

## **Royal Society for the Protection of Birds (RSPB)**

Information on the impacts of wind farms on birds and the threats to birds and their habitats from climate change.

[www.rspb.org.uk](http://www.rspb.org.uk)

Tel: 01767 680551

## **WWF**

Campaigning for more renewable energy because of the threat climate change poses to the survival of species and habitats.

[www.wwf-uk.org](http://www.wwf-uk.org)

Tel: 01483 426444

## **Yes2Wind**

A website produced by Friends of the Earth, Greenpeace and WWF answering questions about wind energy and offering practical advice on how to support wind energy schemes.

[www.yes2wind.com](http://www.yes2wind.com)

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

## **Friends of the Earth is:**

- the UK's most influential national environmental campaigning organisation**
- the most extensive environmental network in the world, with almost 1 million supporters across five continents and 70 national organisations worldwide**
- a unique network of campaigning local groups, working in over 200 communities throughout England, Wales and Northern Ireland**
- dependent on individuals for over 90 per cent of its income.**

### **Friends of the Earth**

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