SERA
Labour
Environment
Campaign

Our Energy Future: The Role of Wind Power

Our Energy Future: The Role of Wind Power

Executive Summary

This briefing is intended to provide an objective assessment of the issues surrounding wind farm development. It is an information source for politicians and local councillors to ensure that the arguments for wind farm development are presented to the electorate in a balanced way emphasising the national and international importance of renewable energy sources.

The Prime Minister has stated that climate change will be one of the two key issues on the agenda for the UK Presidency of the G8. This and other clear signals from the Government demonstrate the importance placed on climate change.

In addition to the contribution to a reduction in CO_2 and other noxious particulate emissions renewable technologies will stimulate economic opportunities for UK industry and business. The global wind industry has an estimated annual turnover of £5.5 billion, 84% of which is based in Europe. Wind is the fastest growing energy source worldwide, and has been for over a decade with an annual growth rate of 30%.

With this in mind, the UK Government has established the Renewables Obligation, through which electricity supply companies are required to source a percentage of their electricity sales (increasing each year) from eligible sources. The Obligation is currently set at a requirement of 15.4% by 2015. The Government has also created an aspirational target of renewables providing 20% of our electricity needs by 2020.

The recent publication of the UK's review of the Climate Change Programme suggested that the Government would find it difficult to meet the 2010 target without a significant expansion of the renewable sector and a far greater uplift in energy efficiency initiatives.

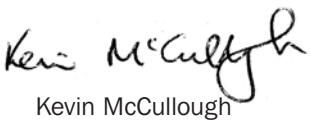
This document outlines the challenges the industry and Government must overcome to ensure that wind energy fulfils its potential to contribute towards the 2010 target and 2020 aspiration.

An ICM poll in September 2004 indicated that 80% of the population supports the development of wind farms. However, a vocal minority opposition voice is undermining wind farm development, and planning applications are being delayed and sometimes refused; thereby potentially jeopardising the UK in meeting the renewables target.

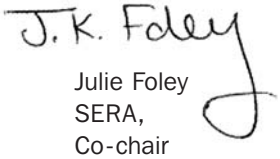
The development of wind energy on and offshore will significantly improve security of energy supply within the UK, support job creation and innovation, and reduce the demand for further nuclear development.

This briefing intends to address the concerns of the small minority of 'wind-farm sceptics', and in doing so to provide reasoned arguments for elected members to counter their concerns. SERA hopes this briefing proves to be a useful information resource and answers a number of common concerns experienced within your constituency or local authority.

Marcus Rand
BWEA,
Chief Executive



Kevin McCullough
Npower Renewables,
Managing Director



Julie Foley
SERA,
Co-chair

THE BRITISH WIND ENERGY ASSOCIATION

npower renewables

SERA

'Global warming is the most severe threat we face... more serious than terrorism'
Sir David King – Chief Scientific Adviser to the UK Government

The UK Context

The UK Government has stated that climate change will be one of two key issues when the UK hosts the G8 in July 2005. In addition the Government has announced an intention to start negotiations within EU during its presidency on aviation and the inclusion of the industry within the EU emissions trading scheme.

These signals from Government indicate the importance placed, in principle at least, on the need to tackle climate change. The purpose of this briefing is to inform readers of the role that renewable energy will need to play in meeting the climate change challenge and in particular, the significant role of wind power in delivering the UK renewable energy targets. Progressive national policies on climate change are essential in order to legitimise international leadership on this issue.

"What is now plain is that the emission of greenhouse gases, associated with industrialisation and strong economic growth from a world population that has increased six fold in 200 years, is causing global warming at a rate that began as significant, has become alarming and is simply unsustainable in the long-term."
Rt Hon Tony Blair, Prime Minister – September 2004

Following the 1997 Kyoto Protocol on climate change and subsequent European targets, the UK has a target to cut its greenhouse gas emissions by 12.5% below 1990 levels by 2008-2012. The Government has set itself a domestic goal to cut emissions by 20% below 1990 levels by 2010. Whilst the UK looks set to achieve its Kyoto target, the Government has recently stated that the domestic 20% reduction goal will not be achieved by 2010 unless urgent action is taken now. The 2003 Energy White Paper set out the Government's energy and climate change strategy for the future, and sets a goal of a 60% reduction in UK carbon emissions by 2050. If the 60% carbon reduction target is to be met, renewables will need to make a much greater contribution to electricity generation.

The UK Government has a target for 10% of electricity to be generated from renewables by 2010 and 15% by 2015. The main policy instrument towards achieving this is the Renewables Obligation (RO) on suppliers to provide 10.4% of their electricity requirements from renewable sources by 2010 and 15% by 2015 (the increase to 15% is still to be approved as a Parliamentary Order and the Obligation formally currently plateaus at 10.4%). The Energy White Paper reinforced the Government's commitment to the 10% target, and declared an "aspiration" towards a 20% by 2020 target.

The role of renewable energy

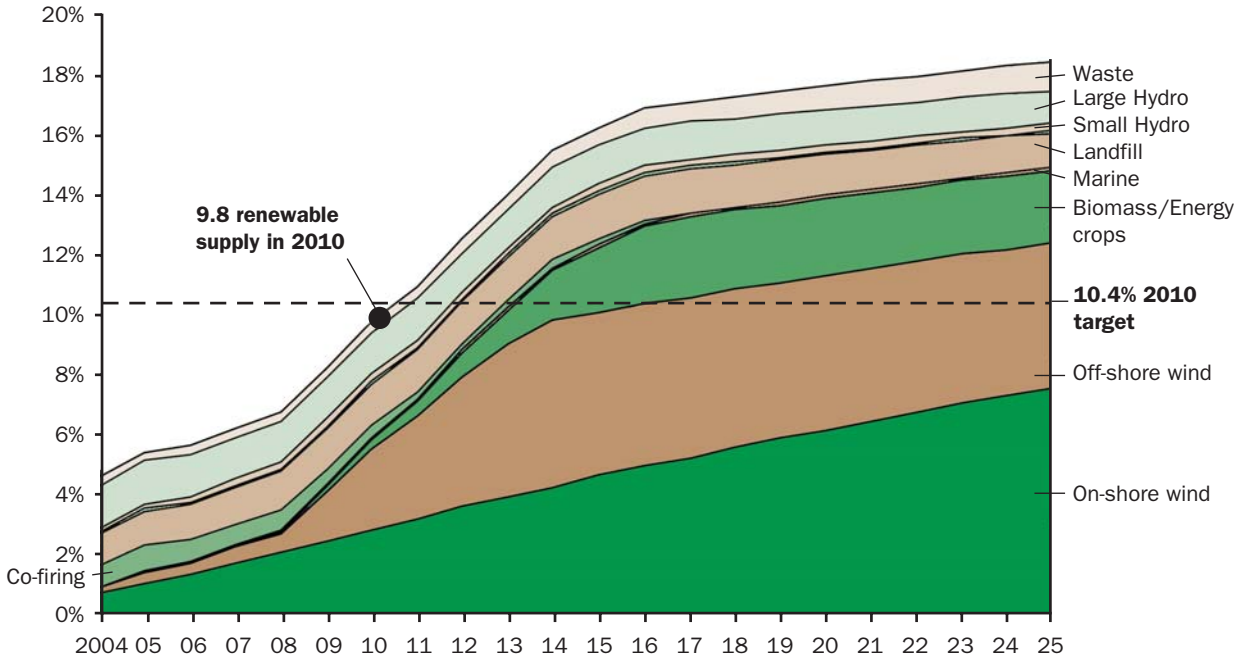
30% of carbon dioxide emissions come from electricity generation. The Government has a target that by 2010, 10% of electricity should come from renewable sources – i.e. if emissions from the electricity generation sector are reduced by 10% in meeting the 2010 target, then the total UK saving of emissions will be 3%. However, some generation (including renewables) produces virtually no CO_2 emissions whilst the most polluting stations emit twice the average amount (860kg CO_2 per Megawatt (m). It therefore follows that if in achieving the 10% target only the most polluting stations were replaced, the reduction in UK emissions could be as high as 6%. Therefore, achieving the 2010 target will deliver reductions of between 3-6% of UK total emissions, which is a major contribution to the Kyoto target of 12.5% reductions in UK emissions between 2008-2012, and the UK aspirational goal of a 20% reduction in emissions by 2010.

Our Energy Future: The Role of Wind Power

The built capacity of wind energy currently stands at 885MW – providing the equivalent electricity needs of approximately half a million homes. However wind energy is set to make a much greater contribution, with over 2000MW[1] of schemes under construction, or with planning approval waiting to be built, and over 5000MW awaiting planning determination. By 2010 it is recognised that wind must meet three-quarters of the government's 10% renewable energy target – providing 7.5% of the UK's total electricity supply. This equates to an installed capacity of approximately 4000MW onshore and 4000MW offshore, and represents an investment in the UK of £7 billion over the next six years.

***'But the plain fact is that without a substantial increase in onshore wind developments, the 10% target is unachievable'* – Mike O'Brien, speaking in the House of Commons, October 2004**

% of electricity supplied by renewables 15.4% Obligation in 2015



Source: Department for Trade and Industry

The renewable energy technologies

The Government has put in place £300 million of funding up to 2006, to include capital grants for near market technologies (solar PV, biomass, offshore wind), support for R&D (e.g. wave & tidal) and information dissemination projects. Following the 2004 Comprehensive Spending Review the Department of Trade and Industry (DTI) will continue existing levels of support to the development of renewable energy and will receive £60 million in each year up to 2007-08[2] to deliver projects identified under the Renewables Innovation Review. £20 million has also been allocated in each year towards future energy R&D, which will allow the DTI to fund fuel cells, cleaner fossil fuels, CO_2 capture and storage, and hydrogen research.

Biomass

Biomass is all plant and animal matter on the Earth's surface; it can be used to produce heat and electricity, using crops such as willow, miscanthus (a tall, woody grass) and woodfuel from forests. In 2003, the total biomass capacity was 735MW[3]. Development of some forms of biomass may be constrained by limited resources (e.g. landfill gas), while the economics of importing energy crop based solutions are unfavourable.

There is potential for energy crops to be grown within the UK and there has been increasing interest from both farmers, who see energy crops as a viable diversification prospect, and generators who can use the fuel to help reduce carbon dioxide emissions. The Renewables Obligation Order has recently been amended to extend to co-firing biomass which will help provide a stable market to encourage farmers to plant energy crops allowing the energy crop market to develop and mature. Co-firing biomass enables generators to earn Renewables Obligation Certificates (ROCs). At the moment the cost of biomass electricity is relatively high, however it is anticipated that energy crop and biomass conversion plant costs will fall, and the efficiency of plant will increase. A new Government appointed task force has been formed to stimulate biomass supply and demand. In addition the government has subsidised a £3.5 million Bio-Energy Infrastructure Scheme which offers grants to help harvest, store, process and supply biomass for energy production.

Marine: wave and tidal

This resource, in the form of waves and tidal currents, could meet a considerable proportion of UK demand for electricity, but constraints in technological development and accessibility have limited exploitation to date. Indeed only three full scale individual devices are currently operating in UK waters and only two of these are delivering power into the UK electricity grid. Marine technologies require political backing to provide the incentives for private investment and subsequent commercial development. Marine renewables have had £15 million of Government support since 1999. However in August 2004 the UK Government announced the release of £50 million support for the industry over the next three years to help developers who are moving from R&D into small scale project development. The UK is therefore well placed to develop an indigenous wave and tidal current industry. The industry and its investors will need confident signals that increased support will be available over the coming years.

Solar: Photovoltaics & solar thermal

Solar energy can be harnessed as solar PV, solar thermal and passive solar design (which is a proven design approach that can be cost-effective in terms of reduced energy costs for buildings). Current capacity for solar power in the UK stands at 4MW – largely from photovoltaic systems.

Solar Thermal

Solar panels (or "collectors") can be roof mounted to a variety of buildings to harness the sun's energy. The sun's heat warms water or another fluid, which passes through the panel. The fluid is then fed to a heat store (e.g. a hot water tank) and helps provide hot water or central heating for the building. Solar thermal will typically convert 40 to 50% of the solar energy falling on the solar collectors into useful heated water. The average property requires approximately 3,000 kilowatt hours (kWh) per year for domestic water heating. A well designed solar thermal system should contribute between 1,500 kWh and 2,000 kWh, which will be equivalent to 40 to 50% of a family household's water heating energy needs[4]. Typically solar thermal systems are priced in the range of £2,500 to £4,000 (depending on the size of house, type of collector, etc.). Funding from the Government's 'Clear Skies' renewable energy grants is available; householders can obtain £400 regardless of system size, whilst not-for-profit community organisations can receive up to £100,000. In Scotland, funding is available from the Scottish Households Community Renewable Initiative (SCRHI) for up to 30% of the installed cost of a renewable measure worth up to £4,000[5].

Solar PV

Photovoltaics (PV) is the production of solar electricity. When sunlight shines on a solar PV cell, an electric field across the junction between two layers of semi-conductor causes electricity to flow – the greater the intensity of light the greater the flow of electricity. Efficiency of solar is fairly low at only around 20% with a PV panel[6]; however efficiency for its own sake is less important as the fuel is free and limitless. PV technology is not currently competitive with conventional electricity and other renewables; power generated by a PV system typically costs around 60p-70p/kWh[6], although with increased efficiency of solar cells and mass production costs are coming down. PV arrays can be stand-alone and can vary from small systems of less than 1kW, to larger grid connected systems of over 20kW. A typical household 2 kWp system (around 20 m^2 of modules) would generate around 1500 kWh per year[7] (the average household consumption of electricity is approximately 4000-5000 kWh per

annum). The cost of this type of system comes to around £12,000 - £14,000[7]. A 50% grant can be obtained under the UK Photovoltaic Demonstration Programme. The UK government PV grants program (started in 2002) is providing £20 million in funding to support the development and installation of PV[8].

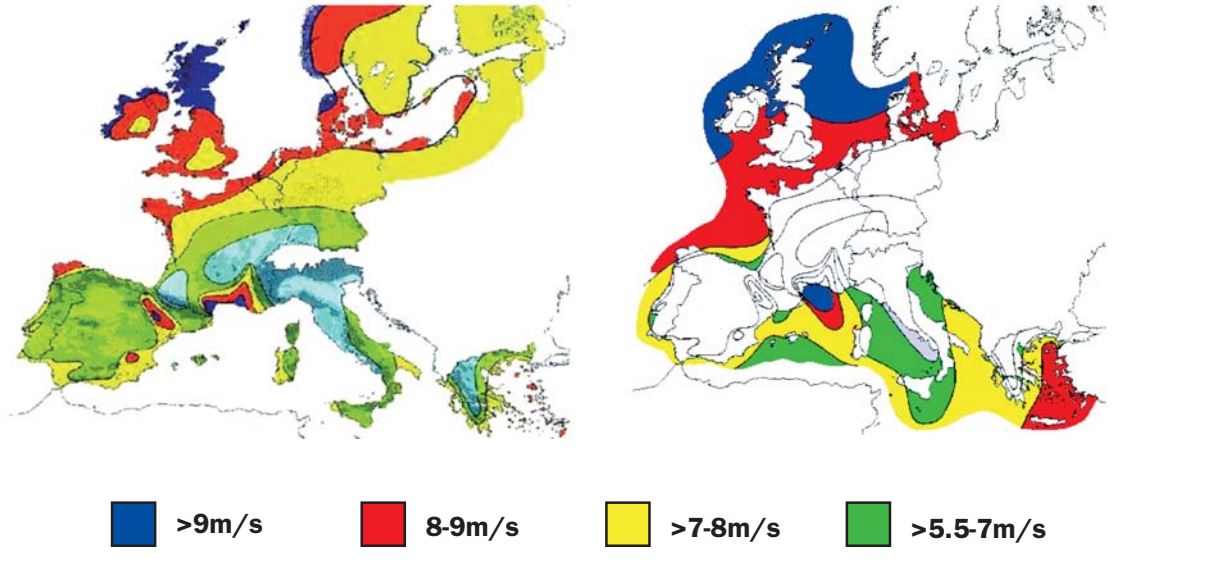
Wind energy

Wind turbines extract the kinetic energy of the wind to produce electricity, using a rotor fitted with aerodynamic blades. The hub is connected to a gearbox and generator, which are located inside the nacelle (the large part at the top of the tower where all the electrical components are located). Most wind turbines have three blades which face into the wind (upwind machines). The wind turns the blades round, this spins the shaft, which connects to a generator where the electricity is made.

Turbines can range in capacity from under 100 watts (w) to several megawatts (MW). Turbines of between 100 w – 10 kilowatts (kW) have rotor diameters of 5-10 metres and towers of 6-15 metres in height. Commercial scale electricity wind turbines typically range from 0.6MW-2.75MW and have rotor diameters of 44-80m, and hub heights of 40-80m. There has been a trend in recent years towards the use of larger turbines, at the upper end of this range, and commercial scale wind turbines are now capable of delivering large amounts of electricity at a competitive cost. Smaller onsite and building-mounted systems offer many benefits for households and communities who want to generate their own electricity. Financial help and information for small scale turbines is available through schemes such as Clear Skies[9] and the Scottish Community and Householder Renewables Initiative[10] as well as Defra's Rural Enterprise Scheme and the Agricultural Business Development Scheme in Scotland[11] available to farmers and agricultural businesses.

The UK is by far the windiest country in Europe, and wind energy is widely recognised as the most technologically and economically advanced of the renewables. Nevertheless, the UK trails behind countries such as Germany and Denmark. The installed capacity of wind energy by the end of 2004 is 885MW (1184 turbines), providing electricity for approximately half a million homes, and saving some 2 million tonnes of carbon dioxide emissions[12] each year. Onshore wind power already competes with the price of new conventional electricity generation (e.g. new coal and nuclear), even more so when the external costs of fossil fuel generation are taken into consideration[13]. Wind is expected to meet three quarters of the Government's 2010 renewable electricity target – amounting to approximately 4000MW onshore and 4000MW offshore installed capacity, or 7.5% of the nation's electricity needs – this represents an investment of £7 billion over

40% of European wind resource **...and even more off-shore**



the next six years. Beyond 2010 wind will continue to make a significant contribution, with other technologies such as wave & tidal power starting to reach commercial and economic viability.

Unlike the other renewable technologies, onshore wind energy currently receives no specific grants or capital support, and is already convergent with some forms of conventional electricity generation. The Renewables Obligation, which requires electricity suppliers to obtain a certain amount of electricity from renewable sources or pay a "buy-out price" to Ofgem, provides a market incentive for the uptake of renewable energy. The Renewables Obligation currently stands at 5.5% in 2005/2006, rising to a requirement of 10.4% by 2010.

2004 was a good year for wind energy, with a record 254MW of new capacity built, and 33 new projects totaling some 800MW consented through the planning system representing an approval rate of 80%. It has also been an eventful period with wind energy hitting the headlines and stimulating debate on the future of energy supply. However there is more work to do if this relatively new industry is to fulfil its potential and deliver the Government's 2010 renewable energy targets.

Why wind? The benefits of wind energy

- Wind energy is the only renewable energy technology currently ready to deliver on a siginficant scale
- Unlike many other renewable technologies, onshore wind already is comparable with the price of some conventionally generated electricity sources, even more so when the external costs are taken into consideration[14]
- Fabrication facilities have sprung up where old shipyards and steel works have closed down, bringing hundreds of jobs to areas that most need them
- New wind developments can bring contracts worth several million pounds to local companies. Rents and maintenance provide an annual injection of hundreds of thousands of pounds into the local economy over a project lifetime of 20 years. Many wind farm developers also set up funds or energy efficiency advice centres to assist community groups, schools and other initiatives in the area
- For many there is a sense of well being that comes with the sight of a wind farm, making people feel better about the area they are in, giving testimony – and satisfaction – that they are 'doing their bit' to help the environment
- 80% of the population support the expansion of wind power[15]
- Wind energy is the fastest growing energy sector. To date over 4000 people are employed in the wind industry and this is projected to increase as the industry grows. The DTI has estimated that Round Two of offshore wind developments alone could bring a further 20,000 jobs for Britain[16]
- Recent examples of industry growth in the UK include the Vestas (previously NEG Micon) manufacturing facility on the Isle of Wight which employs over 500 people, 420 of who live on the island, making this company one of the island's largest employers. In addition to manufacturing, various other sectors are involved in wind energy development, ranging from environmental consultancies, electrical and civil engineering to financial and legal services
- Wind is safe and is not likely to be subject to the threat of a terrorist attack
- The supply of wind is reliable. It is indiginous power, without the need to rely on fuels imported from potentially unstable regions, with the possibility of interruption of supply
- Wind power in the UK already generates enough energy to power about half a million homes. It is cheap, efficient and clean
- A wind turbine produces electricity 70-80% of the time
- A typical 1.8MW wind turbine generates enough electricity to meet the demands of more than a thousand homes over the course of a year
- Just one modern wind turbine will save over 4,000 tonnes of CO_2 emissions annually
- In the region of 3,500 additional wind turbines are needed for the UK to deliver 8% of electricity needs; 2,000 onshore and 1,500 offshore

Challenges for wind energy

Planning

One of the biggest challenges to development and investment remains planning, with difficulty in achieving consent, inconsistency in decision making and delays in the consenting process all creating real hurdles to the 2010 target. Concerted action will be required at all levels of government if these difficulties are to be overcome, and consistent growth in onshore wind capacity achieved. The vast majority of the public support wind energy[18], however at a local level, those opposed to wind energy development are more likely to come forward and make their voice heard. The subsequent political pressure and lobbying of councillors result in committee decisions that very often go against a recommendation of approval by the planning officer. Despite the positive policy background created by Planning Policy Statement 22 (PPS22), there is still a need to educate and change attitudes. In addition, there are still occasions where planning permission is refused on non-planning related issues – such as perceptions of efficiency, or unfounded health and noise fears.

Developers should – and do – play their part through mailing of information to local residents, public exhibitions of proposals, websites dedicated to proposed projects and extensive consultation. But this needs to be underpinned by planning authorities and government at all levels, since information from developers is sometimes viewed with scepticism.

Planning Policy

The UK government has recognised that the failure to secure planning permission has been a major obstacle to meeting renewable electricity targets.

Scotland has 25% of the european wind energy resource, 11% of electricity comes from hydro, and there is great potential for other renewable technologies such as biomass, solar and marine. National Planning Policy Guidance note 6 (NPPG6), the current planning policy for renewable energy in Scotland, was published in 2000[17], and has led the way as a positive and encouraging policy approach to renewables. NPPG6 is due to be further updated over the coming three years.

The Welsh Assembly has published the long awaited consultation draft Technical Advice Note 8 (TAN8) – the renewable energy planning policy for Wales[18]. TAN8 adopts a strategic approach to wind energy, with the identification of 7 areas for wind farm development, and an onshore wind energy target of 800MW.

The situation in Northern Ireland is somewhat different as planning decisions are made within the Planning Service – an agency within the Department of Environment. Local Authorities are consulted on applications, however decision making ultimately lies with the government. There is no specific renewable energy planning policy as such, however the document 'A Planning Strategy for Rural Northern Ireland'[19] does contain a section on renewable energy. This was published in 1993, and there is a possibility that a new Planning Policy Statement on renewable energy may be produced in line with the ongoing revision of the Northern Ireland Planning Strategy.

In England, 2004 saw the publication of the new Planning Policy Statement for renewables (PPS22[20]) in line with the Government's Energy Policy. PPS22 sets out key objectives and issues for consideration across a range of renewable technologies that will be fed down the chain to regional and local planning authorities. It requires local authorities to fully consider the benefits of renewable energy, and for the 9 English regions to establish regional renewable energy targets. A Companion Guide with best practice and technical information has been published to accompany PPS22[21].

BWEA has welcomed PPS22 as providing a positive and robust policy approach, however since its publication there has already been misinterpretation of the policy by anti-wind groups. In this regard, the following myths are addressed:

'PPS22 is policy just for wind energy' – PPS22 applies equally to all renewables and does not specifically single out wind energy or set targets for wind energy (unlike TAN8 in Wales).

'LPAs have no choice but to grant planning permission' – for example key principle 1 states 'RE should be capable of being accommodated' – however Principle 1 goes on to state '... where impacts can be addressed satisfactorily'. In other words, PPS22 requires a balance of considerations.

'PPS22 removes decision making from LPAs and is a 'green light' in favour of wind farm development' – in fact, whilst PPS22 is material to decisions on individual planning applications, the English planning system is 'plan led' – i.e. all planning decisions must be made in accordance with the local development plan unless material considerations indicate otherwise. In other words, it is for the local planning authority (LPA) to prepare its own particular policies within the local development plan, by which planning applications will be determined. The plan revision process is carried out autonomously by the LPA, with public consultation on the content of the plan. There is plenty of opportunity for the local population to comment on the plan – particularly in light of recent changes to the planning system (Planning & Compulsory Purchase Act 2004) which require LPAs to produce 'Statements of Community Involvement' with regard to the plan-making process.

Planning Delays

There is concern within the industry that the planning system is contributing to unnecessary delays in onshore wind energy developments. Wind farm determinations are taking increasingly longer at a time when an efficient decision making process is critical in order to meet renewable energy targets. If current planning delays are not addressed, the system faces the danger of a log jam of applications, and failure of meeting the 2010 target.

2004 has been a record year for delivering new generating capacity, however without a rapid delivery of new planning consents for subsequent years, this progress may slow down. For most projects, it should take the local planning authority no longer than 16 weeks to reach a decision (assuming that most applications will require an Environmental Impact Assesment (EIA)). However in England and Scotland the average wait is almost 1 year – realistically 18 months after Section 106/Section 75 agreements are taken into account, while in Wales it is over 2 years (almost 3 for final consent), and in Northern Ireland the average wait (which is not held back by Section 106 agreements) is almost 3 years[22]. Therefore applications are likely to actually take between 16 to 31 months for final consent, depending on country.

For Section 36 applications, applicable to projects over 50MW in capacity, in Scotland the average wait is in the region of 1.5 to 2 years. It is suggested that this could be tackled by increased funding for Scottish Executive recruitment and raising the importance of wind energy proposals with other stakeholders in order to achieve quicker response times.

In comparison to the nearest equivalent type of planning application, wind energy developments lag behind. For example ODPM statistics for 2002/03 show that for 'major developments' (those larger than 1 hectare if non-residential), 22% of applications were determined in 8 weeks, and 44% in 13 weeks. A similar analysis of wind farm data for England, Scotland, Wales and Northern Ireland shows that only 5% of applications are determined within 13 weeks.

Planning Delays Recommendations – What can be done:

Funding: Extra funding for council planning departments that have a large number of wind farm applications (i.e. for extra officers or training); this could include a dedicated officer for wind farm/renewable energy applications. This may be particularly relevant in Wales, within the identified strategic areas, as it is likely that many applications will come forward.

Training: Education and training for council members and officers and perhaps resources for community involvement/ awareness projects, or visits to existing wind farms for the local community, planners and council members.

Cumulative Impact: Cumulative impact/multiple applications is a key element in planning delays for some areas (notably parts of Scotland), where large numbers of applications are leading to a log jam, with LPAs uncertain how to deal with this issue, and lacking clear guidance. The same effect will be likely to occur in other areas with increasing numbers of applications. These must be considered case by case, only taking into account other proposals that have received permission or are in planning, not those that are at the pre-planning stage. For many reasons these projects could fail or could not even reach application stage. A possible solution is to identify further tools and a methodology for LPAs to assess cumulative impact.

Post Consent Delays

In addition to delays in achieving planning determination, there are numerous post-planning delays and barriers, such as finalising planning conditions and concluding grid connection. Post-consent barriers can add in excess of 2 years to the project duration. In particular, the length of time taken to finalise planning conditions has potential to be reduced, as most planning conditions for wind turbines are fairly standard, and the problem that arises is LPA uncertainty in dealing with an unfamiliar type of application. These issues are seriously delaying progress and LPAs would clearly benefit from tailored guidance in drafting conditions for the unique development of wind farms.

Public perception

Over the last decade, numerous independent surveys have consistently revealed strong public support of wind energy, with an average 70-80% in favour[18]. Independent surveys of people living near wind farms show that the majority of people support them once they are operational, but are apprehensive before construction[23]. Public support remains strong; however activities of anti-wind farm protestors perpetuates misinformation (and deliberately misinterprets available information), delays the planning process, disproportionately influences local councillors, and wastes resources of both developers and local authorities when applications are needlessly delayed or go to appeal. The wind energy industry welcomes an open debate, providing it is constructive and based on facts, not myths and misinformation.

Grid

A key strategic element in the successful penetration of wind power is its efficient integration into the UK electricity transmission and distribution grid network. The rapid increase in penetration of wind power production into the grid raises a number of issues relating to intermittency of supply and grid capacity. Most are matters of utility attitude rather than engineering imperative.

- The output from a wind farm fluctuates to a certain degree according to the weather
- Wind farms are often located at the end of the transmission and distribution networks. Most European grids have been designed for large-scale electricity generation from a relatively small number of large plants, sending power outwards towards the periphery, rather than in the opposite direction
- The technical characteristics of wind generation are different to those of conventional power stations, around which the existing systems have evolved

The variable production from wind generation poses no technical problems. The grid system is designed and operated to accommodate unpredictable variations in demand and the instantaneous loss of large generators. The measures currently in place for these are sufficient to allow significant levels of wind generation onto the system. At very high levels of renewable production, there will be a small increase in the cost of these measures.

The National Grid Company reported in the 2004 edition of its Seven Year Statement:

"... based on recent analysis of the incidence and variation of wind speed we have found that the expected intermittency of wind does not pose such a major problem for stability and we are confident that this can be adequately managed...

We believe that current levels of frequency response are sufficient even if the Government's 2010 goal of 10 per cent of electricity supplies sourced from renewable fuels were all to be met by, say, wind technologies. In any event, should more response and reserve services be required, then our ancillary service market arrangements should encourage their cost effective provision. We do not therefore foresee any significant technical problems arising from accommodating the Government's targets for renewables and CHP by 2010."

One of the major problems is that the current gird capacity is insufficient to deal with a large volume of new electricity generation. To accommodate the expected level of new generation will require upgrades to the grid system. Recent Ofgem initiatives provide for network companies to invest over £1 billion over the next few years (£500 million on connecting small scale generation, £560 million on large scale reinforcement of the transmission grid). However none of the expected large scale upgrades have yet entered the planning process whilst the system operator is forecasting that further upgrades will still be required if further new projects emerge as predicted. As a result it is possible that the grid reinforcements will prove to be too little too late: frustrating both the achievement of the 2010 target and delaying the emergence of renewable generation on a significant scale.

Aviation

Wind farm development is significantly hindered by the presence of aviation radar. The presence of 'clutter' and 'false tracks' appearing on a radar screen as a result of tall wind turbines with fast moving blades (200 mph at the tip) could potentially compromise aviation safety. The MOD has been engaging closely with the wind industry in an attempt to minimise the impact and provide accurate responses to applications for wind farms. Unfortunately, due to resource constraints the same priority is not evident from the civil sector.

The devolution of responsibility for safeguarding matters from the Civil Aviation Authority (CAA) to individual airports (whilst the CAA retains responsibility for certification of airports) has led to substantial difficulties, as airports must second-guess what the CAA may be prepared to accept when reviewing the certification of an airport. The situation is even more extreme when airports argue for protection against impacts on possible future expansion – which may constitute no more than vague aspirations. In this regard, there are at least two instances where airports are delaying wind farm developments on the grounds of potential effects on future radar installations, but where the airport's current activities will not be adversely affected.

Both industries continue to investigate technical solutions to the problem in order to allow wind turbines and aviation radar to coexist without compromising safety, but it is a long process. Both technical innovation for mitigation and commitment from the civil sector are the essential means to resolving this issue. A resolution which promises to release:

- over 4,000MW of wind capacity currently held up by aviation objections
- untold capacity from projects which have not progressed past the scoping stage
- untold capacity from vast areas sterilised areas from wind farm development due to prominent radar coverage
- pressure from areas where development interest is being focused due to the extent of radar coverage in the UK, in so doing providing a more even distribution of wind farm developments across the UK

Myth & facts

Tens and thousands of wind turbines will be cluttering the British landscape

Fact: Wind power is currently the most cost-effective of the renewable technologies to contribute to the 2010 target. Around 3,500 modern wind turbines are all that would be needed to deliver 8% of the UK electricity by 2010, roughly 2,000 onshore and 1,500 offshore.[24]

Wind farms won't help climate change

Fact: The UK currently emits 560 million tonnes of carbon dioxide (a major contributor to greenhouse gas emissions) every year. Power stations are one of the largest contributors, producing 170 million[25] tonnes of CO_2 each year. Just one modern wind turbine will save some 4,000 tonnes of CO_2 being released each year whilst helping to preserve our finite fossil fuel resources.

Building a wind farm takes more energy than it ever makes

Fact: The average wind farm will pay back the energy used in its manufacture within just 3-5 months of its operation[26], this compares favourably to coal or nuclear power stations, which take about six months. A modern wind turbine is designed to operate for 20 years, and at the end of its life the area can be restored at low financial and environmental cost. Wind energy is essentially a form of development which is reversible, unlike fossil fuel or nuclear power stations.

Wind farms are inefficient, they are only operational 30% Of the time

Fact: A modern wind turbine is operational 75-80% of the time, but will produce different amounts of electricity depending on the wind speed. Over the course of the year it will generate 30% of the theoretical maximum output. This is known as load factor. The load factor of conventional power stations is on average 50%.[27]

Myth: Wind energy needs back-up generation to work

Fact: All forms of power generation require back up and no energy technology can be relied upon 100%. The UK's transmission system already operates with enough back-up to manage the instantaneous loss of a large power station. Variations in the output from wind farms are barely noticeable over and above the normal fluctuation in supply and demand, seen when the nation's workforce goes home, or if lightning brings down a high-voltage transmission line. Therefore, wind energy presents no need for additional back-up.

Even for wind power to provide 10% of our nation's electricity needs, only a small amount of additional conventional back-up would be required, in the region of 300-500 MW. This would add only 0.2 pence per kilowatt hour to the generation cost of wind energy and would not in any way threaten the security of our grid[28]. In fact, this is unlikely to become a significant issue until wind generates over 20% of total electricity supply.

Myth: Installing wind farms will never shut down power stations

Fact: The simple fact is that power plants in the UK are being shut down, either through European legislation on emissions or decommissioning. We need to act now to find alternative power sources: wind is an abundant resource, it is indigenous to the UK and therefore has a vital role to play in the new energy portfolio mix.

Myth: Wind power is expensive

Fact: The cost of generating electricity from wind has fallen dramatically over the past few years. Between 1990 and 2002, world wind energy capacity doubled every three years and with every doubling prices fell by 15%[29]. Wind energy is competitive with new coal and new nuclear capacity, even before any environmental costs of fossil fuel and nuclear generation are taken into account[30]. The average cost of generating electricity from onshore wind is now around 3-4p per kilowatt hour, competitive with new coal (2.5-4.5p) and cheaper than new nuclear (4-7p)[31]. As gas prices increase and wind power costs fall – both of which are very likely – wind becomes even more competitive, so much so that some time after 2010 wind should challenge gas as the lowest cost power source. Furthermore, the wind is a free and widely available fuel source, therefore once the wind farm is in place, there are no fuel or waste related costs.

Myth: The UK should invest in other renewable energy technologies and energy efficiency instead of wind power

Fact: Wind energy's role in combating climate change is not a matter of either/or. The UK will need a mix of new and existing renewable energy technologies and energy efficiency measures, and as quickly as possible. Significant amounts of investment have been allocated for wave and tidal energy development, and these technologies, along with solar and biomass energy, will have an important role in the UK's future energy mix. However, wind energy is the most cost effective renewable energy technology available to generate clean electricity and help combat climate change. Furthermore, developing a strong wind industry will facilitate other renewable technologies which have not reached commercial viability yet, accumulating valuable experience in dealing with issues such as grid connection, supply chain and finance.

Myth: Wind farms should all be put out at sea

Fact: We will need a mix of both onshore and offshore wind energy to meet the UK's challenging targets on climate change. At present, onshore wind is more economical than development offshore. However, more offshore wind farms are now under construction, with the first of the large-scale projects operational at the end of 2003, and prices will fall as the industry gains more experience. Furthermore, offshore wind farms take longer to develop, as the sea is inherently a more hostile environment. To expect offshore to be the only form of wind generation allowed would therefore jeopardise our renewable energy targets and commitment to tackle climate change.

Myth: Wind farms are ugly and unpopular

Fact: Beauty is in the eye of the beholder, and whether you think a wind turbine is attractive or not will always be your personal opinion. However, studies regularly show that most people find turbines an interesting feature of the landscape[32]. On average 80% of the public support wind energy, less than 10% are against it, with the remainder undecided. Since the early 1990's surveys conducted near existing wind farms across the country have consistently found that most people are in favour of wind energy[33], with support increasing among those living closer to the wind farms.

Myth: Wind farms negatively affect tourism

Fact: There is no evidence to suggest this. The UK's first commercial wind farm at Delabole received 350,000 visitors in its first 10 years of operation; 10,000 visitors a year come to take the turbine tour at the Ecotech Centre in Swaffham, Norfolk. A MORI poll in Scotland showed that 80% of tourists would be interested in visiting a wind farm. Wind farm developers are often asked to provide visitor centres, viewing platforms and rights of way to their sites.

Myth: Wind farms harm property prices

Fact: There is currently no evidence in the UK showing that wind farms impact house prices[34]. Furthermore, there is evidence following a comprehensive study by the Scottish Executive that those living nearest to wind farms are their strongest advocates[35].

Myth: Wind farms kill birds

Fact: The RSPB stated in its 2004 information leaflet *Wind farms and birds*[36], that *"in the UK, we have not so far witnessed any major adverse effects on birds associated with wind farms"*. Wind farms are always subject to an Environmental Impact Assessment and BWEA members follow the industry's Best Practice Guidelines and work closely with organisations such as English Nature and the RSPB to ensure that wind farm design and layout does not interfere with sensitive species or wildlife designated sites. Moreover, a recent report published in the journal Nature confirmed that the greatest threat to bird populations in the UK is climate change[37].

Myth: Wind farms are dangerous to humans

Fact: Wind energy is a benign technology with no associated emissions, harmful pollutants or waste products. In over 25 years and with more than 68,000 machines installed around the world[38], no member of the public has ever been harmed by the normal operation of wind turbines. In response to recent unscientific accusations that wind turbines emit infrasound and cause associated health problems, Dr Geoff Leventhall,

Consultant in Noise Vibration and Acoustics and author of the Defra Report on Low Frequency Noise and its Effects[39], says: *"I can state quite categorically that there is no significant infrasound from current designs of wind turbines. To say that there is an infrasound problem is one of the hares which objectors to wind farms like to run. There will not be any effects from infrasound from the turbines."*

Myth: Wind farms are noisy
Fact: The evolution of wind turbine technology over the past decade has rendered mechanical noise from turbines almost undetectable with the main sound being the aerodynamic swoosh of the blades passing the tower. There are strict guidelines on wind turbines and noise emissions to ensure the protection of residential amenity. These are contained in the scientifically informed ETSU Working Group guidelines 1996[40] and must be followed by wind farm developers, as referenced in national planning policy for renewables[41]. The best advice for any doubter is to go and hear for yourself!

Conclusion

Any Government's renewable energy targets need to be set in the context of overall climate change and energy policy, taking into account wider issues including diversity, security of supply and the relative costs of alternative carbon reduction measures.

There is of course a need for a balanced generation mix and whilst it is clear that fossil fuels will be play a major role in the short to medium term, it also makes common sense that all potentially viable forms of renewable energy should be developed. The current mechanism for developing renewable energy in the UK is the Renewables Obligation which is effectively designed to bring on the cheapest and most commercially advanced first and that currently remains within the remit of wind power.

Wind power will play a critical part in the challenge of meeting our renewable energy targets for 2010, 2015 and beyond.

For further information visit:
www.sera.org.uk www.bwea.com www.npower-renewables.com www.dti.gov.uk/energy/renewables/

1. BWEA, December 2004, www.bwea.com/media/news/record2004.html
2. HM Treasury, July 2004, http://www.hm-treasury.gov.uk/spending_review/spend_sr04/press/spend_sr04_press24.cfm
3. DTI, 'Its Only Natural', http://www.dti.gov.uk/renewable/biomass_currentuptake.html
4. Solar Trade Association, http://www.greenenergy.org.uk/sta/solarenergy/types-cost.htm
5. Clear Skies, Grants and Technologies, http://www.clear-skies.org/households/GrantsAndTechnologies.aspx
6. DTI, 'Its Only Natural', http://www.dti.gov.uk/renewable/solar_currentuptake.html
7. PV-UK, http://www.pv-uk.org.uk/technology/generation.html
8. DTI, http://www.dti.gov.uk/energy/renewables/technologies/photovoltaics.shtml
9. Clear Skies, www.clear-skies.org
10. Scottish Community and Householder Renewables Initiative, www.est.org.uk/schri
11. Rural Enterprise Scheme, www.defra.gov.uk/erdp/schemes/res/default.htm
12. BWEA, Wind Farms of the UK, http://www.bwea.com/map/index.html
13. ExternE (2003) External Costs, Research results on socio-environmental damages due to electricity and transport, www.externe.info
14. ExternE (2003) External Costs, Research results on socio-environmental damages due to electricity and transport, www.externe.info

15. BWEA, November 2004, www.bwea.com/energy/attitudes.pdf
16. DTI Press Release, 14 July 2003, Hewitt Announces Biggest Ever Expansion in Renewable Energy
17. National Planning Policy Guideline NPPG6: Renewable Energy Developments, Scottish Executive, November 2003, www.scotland.gov.uk/library3/planning/nppg/nppg6-00.asp
18. Consultation on Draft Ministerial Interim Planning Policy Statement on Renwable Energy Draft Technical Advice Note 8; Renewable Energy, Welsh Assembly, July 2004, www.wales.gov.uk/subiplanning/content/tans/tan08/mipps-index-e.htm
19. A Planning Strategy for Rural Northern Ireland, DOE, September 1993, www.planningni.gov.uk/AreaPlans_Policy/Strategies/Strategy.htm
20. Planning Policy Statement 22: Renwable Energy, ODPM, August 2004, www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_030334.hcsp
21. Planning for Renewable Energy. A Companion Guide to PPS22, ODPM, December 2004, www/odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_033489.pdf
22. BWEA, August 2004, www.bwea.com/planning/planningdelays.pdf
23. see for example RBA Research for National Wind Power, April 2002, www.bwea.com/ref/surveys.html
24. The average modern wind turbine onshore has a rated capacity of 1.8MW, this wil progresss to 2MW in the near future. Offshore, turbines are currently being installed at a rated capacity of 3MW, and it is expected that this will rise to a typical 5MW rated machine by 2010.
25. DTI (2004) DUKES, Annex E – Energy and the Environment: www.dti.gov.uk/energy/inform/dukes/dukes2004/annexe.pdf
26. Milborrow, Dispelling the Myths of Energy Payback Time, as published in Windstats, Vol 11, no. 2, (Spring 1998)
27. DTI (2004) Digest of UK Energy Statistics. 2004, Table 5.10 Plants loads, demand and efficiency; www.dti.gov.uk/energy/inform/energy_stats/electricity/dukes5_10.xls
28. The Carbon Trust and DTI (2004), Renewables Network Impact Study and National Grid (2004), Seven Year Statement, available online at www.carbontrust.org.uk/carbontrust/about/publications/Renewables Network Impact Study Final.pdf and www.nationalgrid.com/uk/library/documents/sys_04/default.asp?sNode=SYS&action=&Exp=Y
29. Milborrow (2003), The Economics of Wind Energy, WREN International Seminar
30. ExternE (2003) External Costs, Research Results on Socio-Environmental Damages due to Electricity and Transport, available online at www.externe.info/externpr.pdf
31. Oxera (Feb 2004), Results of Renewables Market Modelling, www.dti.gov.uk/energy/renewables/policy/oxeraresults.pdf;
32. RBA (1998), Stroud District Residents Survey, RBA for Triodos Bank, The Gloucestershire Water & Energy Forum, BWEA and Western Windpower, www.bwea.com/ref/stroud.html
33. TNS (2003), Attitudes and Knowledge of Renewable Energy amongst the General Public, On behalf of: Department of Trade and Industry, Scottish Executive, National Assembly for Wales and Department of Enterprise, Trade and Investment Northern Ireland
34. Studies published in November 2004 by RICS and leading chartered surveyors Knight Frank show either no evidence to confirm empirically any impact, and that any effects observered have no lasting impact. See www.bwea.com/media/news/houseprices.html
35. Mori (2003), Public Attitudes to Windfarms a Survey of Local Residents in Scotland, Scottish Executive Social Research
36. RSPB (2004), Information leaflet on Wind Farms and Birds
37. Nature, Jan 2004, Extinction risk from climate change, Vol 427, pp145-148
38. EWEA: 68,000 turbines installed worldwide by the end of 2003
39. Defra (2003), A Review of Published Research on Low Frequency Noise and its Effects, Report for Defra by Dr Geoff Leventhall Assisted by Dr Peter Pelmear and Dr Stephen Benton. Available online at www.defra.gov.uk/environment/noise/lowfrequency/pdf/lowfreqnoise.pdf
40. The Working Group on Wind Turbine Noise, The Assessment and Rating of Noise from Wind Farms, September 1996. ETSU-R-97
41. Planning Policy Statement 22: Renewable Energy (PPS22): www.odpm.gov.uk

SERA – the Socialist Environment and Resources Association – is an independent environment group affiliated to the Labour Party. SERA works to integrate green thinking into Labour Party policies and believes that social and environmental concerns must be addressed together. SERA campaigns by organising events such as conferences and seminars, and publishes regular briefing papers and a magazine entitled 'New Ground.'

For more information about SERA contact:
11 Goodwin Street, London N4 3HQ; Tel: 020 7263 7389
E-mail: sera.office@btconnect.com or visit out website: www.serauk.org.uk