Wind and the 10% Target

BWEA Briefing Sheet

Wind and the UK's 10% Target

The Energy White Paper - The Green Light for Renewables

In February 2003, the UK Government published its Energy White Paper[1] which laid out its new energy policy to create the low carbon economy of the future. Three key strategies were identified as the core of this new policy: tackling climate change, securing the UK's energy supplies once conventional fuels start to run out and updating the UK's ageing energy infrastructure. Foremost amongst these is recognition of the environmental consequences of our energy use and the need to address climate change.

The White Paper stated its goal of a 60% reduction in carbon emissions by 2050. This is a massive task, particularly given recent figures which show that carbon dioxide emissions are expected to rise again in the UK in 2005[2]. The Government has however put in place legislation to encourage the uptake of renewable energy technologies, recognising their role in reducing carbon dioxide (CO_2) emissions. The Renewables Obligation (RO) came into force in April 2002, requiring all electricity suppliers to source 10% of their supply from renewables by 2010[3]. In 2004, the Obligation was extended to 15% of electricity supply by 2015.

The publication of the White Paper and the introduction of the RO clearly state that renewable energy will be required to meet the challenges of present day and future energy policy. We need sustainable, clean and secure sources of electricity generation, all of which wind energy is ideally suited to provide.

The Role of Wind Energy in Meeting the 10% Target

Creating the low carbon economy of the future will need a mixture of renewable generation as well as energy efficiency measures; this is not an 'either or' option. Wind energy is the most technically and economically developed renewable technology and is therefore the one most capable of being delivered in the quantities required to ensure that the UK meets its targets, certainly in the short term to 2010.

Wind energy's key role in delivering the UK's renewables policy means that the sector is expected to supply three-quarters of the 10% by 2010 target, equivalent to some 8,000 megawatts (MW) of capacity. This is expected to be split roughly equally between developments onshore and offshore[4].

North Hoyle © npower renewables/Anthony Upton

Onshore, this equates to a further 1,500 new turbines, assuming an average size of 2 MW, in addition to the 1,414 turbines already installed. Fewer will be needed offshore, in the region of 1,300 turbines, as larger more powerful machines can be used. The latest turbines installed offshore in the UK are 3 MW and larger machines are being trialled. In both cases fewer numbers may be needed in reality given the continual advancement in wind turbine technology.

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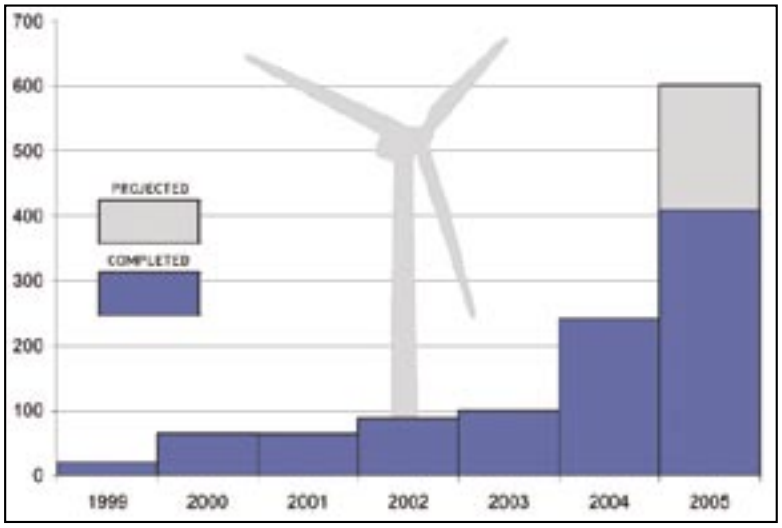
Wind Energy Today



Annual installation rate 1998-2005 © BWEA

The UK wind industry broke the gigawatt (GW) barrier in July 2005 and in October 2005, 113 wind energy projects totalling just under 1,300 MW were operating in the UK. The market is expected to see substantial growth over the next few years. The rate of planning application submissions was strong in 2004, a total of 53 wind farm applications were submitted. This trend has continued in 2005 with a further 57 applications by October 2005. PPS22, the Planning Policy Statement on renewable energy, published in July 2004, updated the 10-year old PPG22 and provides a concise planning framework for all renewable energy developments and encourages local authorities to take account of the positive benefits of renewables when considering applications.

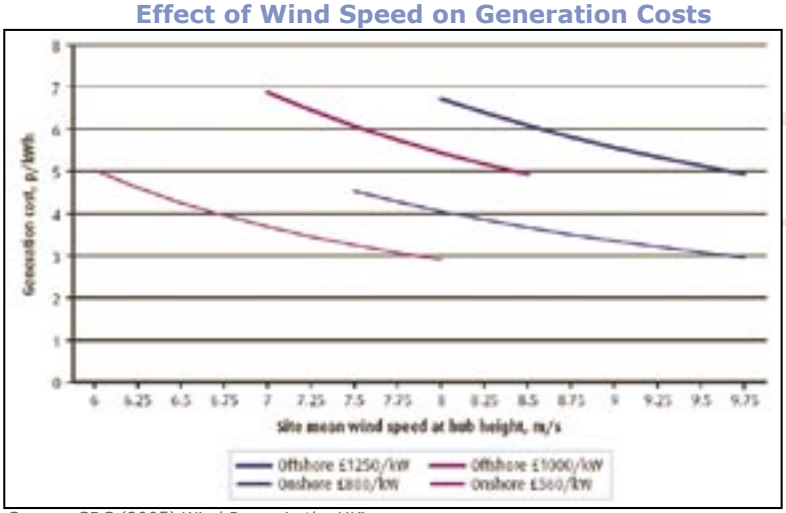
Breaking the gigawatt barrier comes in a record year of growth for the UK wind industry, with 19 new wind energy projects totalling some 500 MW[5] of capacity expected to be officially commissioned by the end of the year, taking UK wind generation to over 1% of UK electricity supply, and on track for expectations of the sector.

Key amongst this year's new build is Kentish Flats, the UK's fourth and biggest large-scale offshore wind farm with a total capacity of 90 MW. Onshore records were also broken on more than one occasion with the commissioning of the largest wind farm, first at Cefn Croes in mid-Wales which helped the UK industry break the 1 GW mark, and subsequently at ScottishPower's 97 MW Black Law, which is the biggest wind farm on or offshore operating in the UK. There are further 15 projects under construction which will be commissioned in 2006, adding a further 550 MW. By comparison the industry installed 11 projects totalling 240 MW in 2004, and during the 90s installed an average of just 50 MW a year.

How Much Does Wind Energy Cost?

The price of wind energy has fallen considerably over the last ten years and compares favourably with conventional energy generation.

Effect of Wind Speed on Generation Costs



Source: SDC (2005) Wind Power in the UK[6]

Power generation costs are determined by the installed costs of the plant (including interest during construction), operation and maintenance costs, fuel costs, energy productivity, cost of capital and the capital repayment period. In the case of wind energy, the fuel - the wind itself - is free. The available wind speed determines the final cost of wind energy from specific wind farms sites.

The table on the right, taken from the Sustainable Development Commission's report *Wind Power in the UK*, shows a summary outlining the average costs for wind power.

The average generation costs of onshore wind power are around 3.2 pence per kilowatt hour (p/kWh) and around 5.5 p/kWh for offshore[6]. Once the cost of carbon to the society and environment is included in electricity generation costs, the price of wind power will be even lower since wind energy is a clean and renewable source of electricity generation, producing no harmful emissions.

Summary of Wind Generation Costs

Source	Capital cost, £/kW	O&M, £/kW	Capacity Factor, %	Tdr %	Life	Gencost, p/kWh	Comments
Onshore							
NFFO5	-	-	-	8[a]	15	2.9	Average price
Oxera	605-800	15	30	?	20	3.1	
WPM	800	n.q.	36	6	15	3.3	'High' cost, 8.5 m/s site
	550	n.q.	27	6	15	3.0	'Low' cost, 7.2 m/s site
IEA/DK	585	16	27	5	20	2.65	
Offshore							
Oxera	1100-1430	35-42	35	n.q.	20	5.5	
WPM	1200	n.q.	38	6	15	5.7	'High' cost, 8.8 m/s site
	970	n.q.	31	6	15	4.9	'Low' cost, 7.8 m/s site
IEA/DK	1130	36	27	5	20	3.2	

n.q. Not Quoted

Source: SDC (2005) Wind Power in the UK[6]

Benefits of Wind Energy

Clean Electricity Generation

Wind energy is a clean, safe, easy to maintain and sustainable method of generating electricity. Every unit of electricity from a wind turbine displaces one that would otherwise be generated from fossil fuels, and thus prevents the emissions of several greenhouse gases, key contributors to climate change. At present, wind turbines in the UK prevent over 2.9 million tonnes of CO_2 emissions each year. A typical 2 MW wind turbine generates around 5.26 million units of electricity (kWh) each year. This is the same amount of power as would be used by over 1,120 homes each year.

Wind farms on average have a capacity factor of around 30% onshore, i.e. the average output from a 2 MW turbine is about 600 kW. This does not mean that they are idle for two thirds of the time. Far from it: wind turbines generate electricity for about 70-85% of the time, although not necessarily at full power. Nor does this mean that wind energy requires vast amounts of back-up. Studies have shown that a marginal amount, some 600 MW of additional capacity, would be needed for wind energy to meet 10% of the UK's electricity needs, and that the costs of this would be small, some 0.2 p/kWh[7]. The greatest need for back up on the UK system is to look after the unpredictability of us as consumers, and of guarding against failures of large thermal power stations or transmission cables and not the intermittency of wind energy.

© Vestas

The average wind farm in the UK will pay back the energy used in its manufacture within three to six months. This compares favourably with coal or nuclear power stations, and even more so if the cost of fuel is taken into account, or indeed the costs to the environment.

Industry and Jobs

Local energy generation also creates local jobs. The emphasis on local content means that a new wind farm can bring contracts worth several million pounds to companies in areas where wind energy is developed.

Wind power is the fastest growing energy sector in the world, creating jobs for each megawatt installed. The industry has enormous potential as a job creator in the manufacturing, construction and maintenance of Britain's new power stations. Already fabrication facilities have sprung up where old shipyards and steelworks have closed down, bringing hundreds of jobs to areas that most need them.

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To date, over 4,000 people are employed in the UK wind industry and this will increase as the industry grows, particularly in the offshore sector, which could create a further 20,000 jobs in Britain by 2020[8].

Households and Communities

Wind turbines come in all shapes and sizes, and are not only confined to 'wind farms on hill tops', but can be found at many different types of locations, ranging from remote rural homes to community projects, schools and hospitals, developments on industrial sites and even urban city centres.

Wind energy offers many benefits for households and communities who want to generate their own electricity. Financial help and information is available through schemes such as Clear Skies[9] (which will be replaced in April 2006) and the Scottish Community and Householder Renewables Initiative[10] while Defra's Rural Enterprise Scheme and the Agricultural Business Development Scheme in Scotland[11] are available to farmers and agricultural businesses.

© West Coast Energy

Rent payments and maintenance contracts for wind farms can represent an annual injection of hundreds of thousands of pounds into the local economy over a project lifetime of 20-25 years. Many wind farm developers also set up funds to assist clubs, schools and other initiatives in the area, including energy efficiency advice.

Wind power in the UK already generates enough clean electricity to power over 726 000 homes each year – more than enough to power a city the size of Leeds twice over - and with electricity to spare.

Wind energy has the potential to make a real contribution to the UK's renewable energy and climate change targets. By acting now, the UK is in a position to take advantage of a unique window of opportunity and become a world leader in the green industrial revolution, building the low-carbon economy of the future.

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4 DTI (2004), Results of Renewables Market Modelling, report by Oxera, www.dti.gov.uk/renewables/policy/oxeraresults.pdf

5 Latest project statistics can be found online at www.bwea.com/ukwed

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