

# Offshore Wind

## Background Briefing

### Global wind power potential

Despite the increasing frequency of very high energy gales, the power of the wind is hard to fully appreciate, probably because it seems to come out of 'thin air'. But a single modern wind turbine of 2MW power will produce as much electricity over a year as the electricity used by 1200 households<sup>i</sup>, and offshore wind turbines are set to be 3MW and even more powerful in future.

The combined global onshore and offshore wind resource that is technically recoverable is 53,000 Terawatt hours per year – about four times bigger than the world's entire electricity consumption in 1998.<sup>ii</sup>

A recent study for the International Energy Agency revealed that wind power is both technically and economically an attractive option to abate CO<sub>2</sub> emissions. It calculates that 4 billion tonnes of CO<sub>2</sub> per could be abated by wind power by 2020 at the highly competitive rate of \$20 per tonne of CO<sub>2</sub> year - equivalent to half current global power sector emissions<sup>iii</sup>. Wind power will be vital to achieve the replacement of fossil fuels by renewable energy that is essential if the planet's ecological and social systems are to survive.

### Scale of the UK offshore windpower resource

Britain has the best offshore wind resource in Europe. The UK offshore wind resource that is technically available is three times the total UK electricity consumption, and this will increase as technological advances are made.<sup>iv</sup> Offshore wind power has a very major part to play in meeting the UK's greenhouse gas emission reduction targets. The offshore wind sites just announced by the Crown Estate have the potential to prevent more than 4 million tonnes of CO<sub>2</sub> emissions<sup>v</sup>.

The power of the wind in British waters is awesome. A square with sides 77 miles long - a comparatively small area of the sea around Britain's shores - could produce as much power in a year as the whole of UK electricity demand.<sup>vi</sup> The British Wind Energy Association calculates that the first round of UK offshore wind sites could amount to 1600MW, four times the wind power capacity installed onshore, and will generate as much electricity each year as used by 1 million homes.

### Industrial and employment opportunity

Installation of wind power in hostile marine environments requires the wind industry to acquire a new set of skills. These skills and equipment closely match those that the offshore engineering industry has developed for oil and gas. This offers Britain, which has lost its once world-leading position in wind power expertise and technology to the Danes, the opportunity to achieve a leading position in the new era of offshore wind development.

The Office of Science and Technology have identified 10 priority technical areas where "the vast experience of the offshore hydrocarbon industry should be extremely useful to the emerging marine renewable energy industry".<sup>vii</sup> According to Scottish Secretary, Helen Liddell, "Offshore wind promises to contribute significantly to the expansion of renewable energy generation in the coming years and should present many opportunities for our offshore industry".<sup>viii</sup>

As well as requiring maritime engineering, the supply chain for an offshore wind turbine resembles a roll-call of the UK's traditional engineering strengths, many of which are concentrated in areas that have seen serious industrial decline.

Installing enough turbines to harness just 1% per year of the combined offshore wind potential of the 5 North Sea countries, UK, Germany, Netherlands, Denmark, would sustain 160,000 jobs.<sup>ix</sup> The size of the offshore wind developments just announced in the UK is estimated to have the potential to bring Britain at least 8000 jobs, reflecting a private sector investment of £1.6 billion.<sup>x</sup>

Wind power will nearly quadruple in the next five years according to a recent forecast by market analysts Dresdner Kleinwort Wasserstein.<sup>xi</sup> It is already a \$3.5 billion industry<sup>xii</sup> and is forecast to be worth \$150-400 billion by 2020<sup>xiii</sup>. Over the past six years the average growth in sales of wind turbines has been 40%.<sup>xiv</sup> Vestas, the world's largest maker of wind turbines have just announced 37% rise in turnover and 45% rise in profits,<sup>xv</sup> with returns on equity consistently in the 40% range annually<sup>xvi</sup>.

## **The race for the offshore wind market: other countries' plans and targets**

### **Denmark:**

Five 150MW offshore wind farms are in the pipeline to be built by 2008, amounting to 750MW in total. Construction of the first is planned for 2002. Last autumn Denmark built the world's largest offshore wind farm to date, 20 2MW turbines 2 kms offshore from Copenhagen, and also has two smaller offshore wind farms at Tuno Knob and Vindeby. The country has a longer term target for 4000MW by 2030, as part of a long term target to get 50% of their electricity from wind generation (40% offshore, 10% onshore).

### **Germany:**

1200MW has been proposed in one scheme alone, offshore of Helgoland. Other initial plans for large schemes include 200 turbines offshore from Borkum, 600 turbines off Oderbank, as well as 64 turbines near Lubecker Bucht and 20 turbines near Rostock. The total for all potential schemes could be up to 10,000MW.

### **Ireland:**

There is a well-advanced plan for 250MW off the coast of Dublin. Construction is likely to start within the next two years.

### **Sweden:**

The Swedish Government have just announced a 72MW scheme in Oresund. 5 offshore wind turbines have at Nassudden and 7 more just constructed at Utgrunden. Government reports have shown potential for upwards of 10-20 TWh/year (i.e. 3000MW+).

Netherlands: About half of the Dutch Government target for windpower is anticipated to be constructed offshore, amounting to about 1500MW by 2020.<sup>xvii</sup>

## **Achieving the Potential**

Greenpeace welcomes the announcement of offshore wind site allocations by Crown Estates and also welcomes the Government's recent announcements of grants for offshore wind projects that will help make these projects a price-competitive option for electricity supplies to meet their renewable energy obligation.

For Britain to reap the industrial benefits of the emergent market for offshore wind power it will be important to invest further Government effort and monetary support to ensure rapid fulfilment of the considerable potential of the offshore sites announced.

But now is also the time to take stock of the potential for the next, far bigger, stage of offshore wind power. Although the scale of the present round of sites is large in comparison with UK onshore installations to date, it is still small in comparison with what can and must be achieved in order to build the energy solution so urgently needed to address climate change. A suitable comparison would be to consider the amount of wind power that has already been installed on land in Germany: more than 6000MW at the end of 2000<sup>xviii</sup>. This gives an indication of the step-change that UK offshore wind power must make, both for the environment and for jobs and industry.

- **The UK is making a good start in offshore wind power. With the continued Government encouragement it could become the recognised industrial leader in offshore wind power.**
- **To reap the environmental and industrial benefits, UK offshore wind power needs to become ten times bigger than this first round.**
- **To support this challenge, the Government should budget £100 million per year for offshore wind power.**

For further information contact: Dr Ian Taylor, Scientific Political Adviser, Greenpeace UK, 020 7865 8247, [ian.taylor@uk.greenpeace.org](mailto:ian.taylor@uk.greenpeace.org), Canonbury Villas, London, N1 2PN

## Footnote: Birds and wind turbines

Contrary to some perceptions, evidence to date leads to the conclusion that well-sited and well-designed offshore wind farms do not cause many bird collisions.

For example, The 9 harbour-wall turbines at Blythe, which are the closest to offshore that have been studied in the UK, are in a busy bird area. Of the bird flights through the wind farm, only 1 in 10,000 have resulted in a collision. This translates to 1-2 collisions per year per turbine<sup>xix</sup>.

To put the issue into perspective, every year more than 10 million birds are killed by cars in the UK.<sup>xx</sup>

RSPB, WWF, CPRE, The Wildlife Trusts, Friends of the Earth, and Green Alliance are signatories with Greenpeace to a joint call on the Government to adopt a manifesto pledge to allocate £100 million per year to support offshore wind power.

L:\iant\renewables\OffWindBrief.doc

<sup>i</sup> [www.bwea.com](http://www.bwea.com)

<sup>ii</sup> *Wind Force 10*, a report based on analysis by BTM consult for European Wind Energy Association, Forum for Energy and Development, Greenpeace International, 52pp, 2001, p.3.

<sup>iii</sup> *The Potential of Wind Energy to Reduce CO<sub>2</sub> Emissions*, report to International Energy Agency Greenhouse Gas R&D Programme by Garrad Hassan and Partners, Ltd, Oct 2000

<sup>iv</sup> Figures from *Study of Offshore Wind in the EC*, Matties, H.G., et al., 1995, JOUR 0072, Verlag Naturliche Energie.

<sup>v</sup> British Wind Energy Association press release 5<sup>th</sup> April 2001

<sup>vi</sup> Based on: UK electricity consumption 330TWh, 3MW wind turbines av. spacing 600m, a conservative 30% capacity factor; personal communications National Wind Power.

<sup>vii</sup> The Marine Foresight Panel of the Office of Science and Technology, *Energies from the Sea*, April 1999, 29pp

<sup>viii</sup> Speech (as then energy minister) to the Northern Offshore Federation annual dinner, reported in Hart's European Offshore Petroleum Newsletter v.24, no.47, 1 December 1999

<sup>ix</sup> From Greenpeace briefing *North Sea Offshore Wind: a Powerhouse for Europe*, based on figures from *Wind Force 10* and Matties et al, *ibid*.

<sup>x</sup> British Wind Energy Association press release 5<sup>th</sup> April 2001

<sup>xi</sup> *Power Generation in the 21<sup>st</sup> Century, Part 2: Renewables Gaining Ground*, Dresdner Kleinwort Wasserstein, 18th January 2001, 172pp, p.36.

<sup>xii</sup> *Wind Force 10*, *ibid*, p.2.

<sup>xiii</sup> *Climate Change and Shareholder Value: Case Study of BP*, *ibid*, p.12.

<sup>xiv</sup> *Wind Force 10*, *ibid*, p.7.

<sup>xv</sup> *Vestas' Turbines Catch Fair Wind for Green Power*, Financial Times, March 29, 2001.

<sup>xvi</sup> *Climate Change and Shareholder Value: Case Study of BP*, report for Greenpeace by Innovest Strategic Value Advisors, Inc, March 2001, 15pp, p.12.

<sup>xvii</sup> Information from: [www.bwea.com](http://www.bwea.com); *Offshore Wind Energy: Building a New Industry for Britain*, A Report for Greenpeace by Border Wind, 25pp, June 1998, p.6-7; ENDS Environment Daily 23/03/2001 (Swedish Announcement); also Dresdner report *ibid*, p.136.

<sup>xviii</sup> Wind Directions, March 2001, p.5.

<sup>xix</sup> Percival, S., 1999, *Ornithological Impacts of Offshore Wind Farms*, Irish Sea Renewable Energy Resources Seminar Report, October 1999, 7pp.

<sup>xx</sup> The Mammal Society, estimated figure from ongoing National Survey of Wildlife Road Casualties, <http://www.abdn.ac.uk/mammal/roadkills.htm>