

### Sea Wind Europe Media Briefing

#### Offshore wind could power every home in Europe by 2020

Sea Wind Europe is a report commissioned by Greenpeace from respected international energy consultants Garrad Hassan. It concludes that almost a third of Europe's total electricity demand could be met solely from clean, renewable offshore wind power by 2020.<sup>1</sup> That's enough to supply electricity to every single one of the 150 million EU households. These conclusions confirm that the full range of renewable energy technologies combined with energy efficiency, offer clean, safe and effective solutions to both climate change and energy security, now.

#### In the process:

- Up to 3 million jobs would be created.
- A market for European industry worth hundreds of millions of Euros would be created.
- Declining industries and many deprived industrial regions would stand to benefit the most, with the manufacturing, steel and offshore engineering sectors heading the list.
- The electricity produced would be cheaper than nuclear power and coal.

The report recommends key policy measures that would be needed to achieve the development, starting with a clear statement of vision from the European Union through, for example, an ambitious EU renewable energy target for 2020.

Based on the report Greenpeace is calling for the European Member States to commit to setting a renewable energy target of at least 20% for 2020 at the June 2004 International Conference for Renewable Energies in Bonn.

Sea Wind Europe makes a critical assessment of a very large-scale vision for offshore wind in the 15 European Union<sup>2</sup> countries. Using maps the report shows what the scale of this development would look like in European waters. Sea Wind Europe assesses: the potential offshore wind resource; the rate of development required to build the large capacity desired by 2020; the capacity of the manufacturing industry to supply this; the practical challenges to be met - including where to site wind farms and transmission of the electricity; the potential costs; the relative price of the electricity; the attitude of the public; and crucially, the policy measures needed to ensure that it could happen.

Garrad Hassan<sup>3</sup> is a highly respected energy consultancy used by all major wind industry players worldwide and governments throughout Europe. Since 1984 Garrad Hassan (GH) has been providing independent expert advice on wind energy and operates through a network of offices in 20 countries. GH is wholly owned by its directors and has no equity stake in any wind turbine or wind farm - its advice is independent and impartial. Some 80% of GH turnover is generated outside the UK. In April 2000 GH won the Queen's Award for International Trade - an award given to companies with an exceptional export record.

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<sup>1</sup> Sea Wind Europe concludes that offshore wind could provide 720 Terawatt Hours per year (720,000,000,000 kilowatt hours (domestic units) per year) of electricity by 2020 with the right policy support. Current EU-15 demand is 2,521 Terawatt Hours per year, of this around 636 Terawatt hours is domestic electricity use.

<sup>2</sup> Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK.

<sup>3</sup> [www.garradhassan.com](http://www.garradhassan.com)

## What the report says

**Conclusion:** That large scale offshore wind development could be achieved with the right policy decisions and that enough capacity to supply almost a third of current EU demand could be possible. (Ch 10)

**Capacity:** The report assesses whether 240,000 Megawatts of wind turbine capacity could be achieved by 2020. This equates to around 50,000 of the biggest offshore wind turbines and would use a tiny fraction of the EU's seabed - just over 3%. With normal offshore wind operation and varying wind over the year<sup>4</sup>, this capacity would generate 720 Terawatt Hours of electricity. (Ch 3)

**Rates of installation:** This capacity is a challenge, but the report says it is comparable to the challenge of maintaining 'business as usual' and that the rates of installation needed to achieve the total by 2020 are not greater than installation and growth rates already achieved in the wind industry to date. (Ch 2)

**Manufacturing and industry:** Assessing all the industrial elements that go into manufacturing and installing wind farms the report concludes that manufacturers and materials suppliers would be able to gear up and deliver the components, materials and services needed for this development. It also finds that many regions and industrial sectors currently in decline in the EU would be given new markets and growth opportunities by the development. (Ch 5)

**Finance:** The report looks at the levels of investment needed to deliver capacity on this scale and concludes that they are comparable to planned energy sector investment under existing estimates. It outlines the investment barriers and makes clear suggestions as to how investment in offshore wind can be facilitated. (Ch 4)

**Costs:** Sea Wind Europe compares the cost of offshore wind with conventional power sources and looks at what economies will be possible during this scale of development. Examining the hidden costs of the alternatives, the report concludes that offshore wind will be cheaper than nuclear and coal; and if their hidden costs were factored in, could be a much more cost effective option than all conventional power. (Ch6)

**Practical issues:** The report assesses what this level of offshore wind capacity would mean for the electricity transmission grid - both in terms of the amount of power and its fluctuations with variable wind speeds. It also looks at the issues about sensitive site selection for offshore wind farms. In both cases the report concludes that these factors are not at all insurmountable in terms of practicality or cost. The report lays out clear policy measures that would ensure they are dealt with. (Ch3 and 7)

**Jobs and public attitudes:** Sea Wind Europe estimates the potential for job creation over the 17 year period of its considered development and concludes that up to 3 million jobs could be created over the period across Europe. Surveying a range of opinion polls and practical experience across Europe it finds that consistently 70-80% of people support the development of wind power and that the overwhelming public choice for the future is renewable energy.

**Actions:** Sea Wind Europe demonstrates not only that renewables can deliver on a huge scale and that offshore wind could, on its own, be a mainstay of the EU energy system, but also that this scale of development brings enormous economic and social benefits. To achieve this level of development would be challenging, but possible, and the key factor for success is policy. Sea Wind Europe therefore identifies the key policy steps that would lay the foundation for a successful offshore wind industry on this scale. There are extensive suggestions, but the key EU-led actions identified as essential are:

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<sup>4</sup> The 'capacity factor' - a measure of how much electricity is generated from a rated capacity of generator - for offshore wind is typically around 35%.

- An ambitious EU-wide renewable energy target for 2020, building on, formalising and strengthening the existing Renewables Directive.
- The direction of financial support to address market failures and support renewable energy, including Research, Design & Development support for the development and demonstration of offshore wind.
- Action to encourage financial institutions to invest in very large offshore wind projects, such as direction of investment or underwriting by government controlled banks and credit agencies like the European Investment Bank.
- An EU wide strategic approach to the development of electricity grid capacity, which anticipates the long-term requirements for offshore wind. Support, for example through the TENS programme, for the installation of offshore networks that will encourage optimal development of Europe's offshore wind resources.

### **Greenpeace Demands**

- **EU member states must set an ambitious Europe-wide renewable energy target at the forthcoming renewable energy conference in Bonn.**

It is vital that the European countries attending the International Conference for Renewable Energies, taking place in Bonn in June 2004, use this opportunity to take action against climate change by committing to a target of at least 20% of all energy to be supplied by renewable energy by 2020. Sea Wind Europe shows that this scale of ambition for renewables is both feasible and affordable.

- **Increased support from national governments into the research and development of offshore wind and all other renewable energy technologies**

The UK Government recently announced an extra subsidy of £48m for the pipe dream of nuclear fusion. This is the equal to the amount identified by Imperial College London that is needed to get less developed but equally important technologies such as wave and tidal power out of the test tank and into commercial deployment.

- **The re-direction of EU energy subsidies away from unsustainable energy sources such as coal, gas or nuclear power.**

The German Government provides the largest single EU energy subsidy of around 2.5 billion Euros each year to its outdated and dying coal industry, equalling 70,000 Euros per worker. The billions of Euros that still go to the ailing European nuclear industry do nothing to address the problem of nuclear waste and fail to confront the real solution; that nuclear and fossils must be left behind and replaced by environmentally sustainable energy sources that receive the necessary EU subsidy.

## Other Energy Issues

### Energy Security

The range of renewable energy technologies combined with better energy efficiency, offer an immediate, clean, safe and effective answer to both climate change and energy security. By their nature, renewable energy sources are both indigenous and limitless. They are not dependent on uncertain fuel supplies or fluctuating prices. They are completely safe and are by far the most resilient technologies in the face of the impacts of climate change.

As the expanding EU faces the twin threats of climate change and the need to guarantee energy security, it becomes increasingly clear that far reaching changes in the energy system are going to be necessary. Oil dependency and the tension that it has caused is well documented. Coal, a major part of the old European energy mix and the most polluting fuel of all, is unusable in a low carbon economy.

Advocates of nuclear power, aware of its unpopularity and unsolved problems, nevertheless hold it up as a low carbon option. But nuclear power has proved unreliable and expensive as well as dangerous; it is still unable to compete without huge subsidies. The threat of terrorism only compounds the risks. Nuclear power advocates say that we must expand its use despite the problems because renewable energy is unable to deliver on a large scale - that it cannot develop fast enough or be big enough to play a significant role in meeting Europe's energy demands. Sea Wind Europe shows this to be false.

### Bonn Renewable Energy Conference

At the Johannesburg World Summit on Sustainable Development in September 2002 many countries wanted to take firm action to promote the global development of renewable energy. Unfortunately the talks ended in compromise due to blocking efforts by the United States. In response to that failure, over 80 countries, led by the EU member states, formed The Coalition of the Willing. They made a commitment to drive renewable energy development forward. Since renamed as the Johannesburg Renewable Energy Coalition, the group will meet for the first time to take their commitment forward in Bonn on June 1-4.

Germany and France have already announced that they want to get a commitment from the European countries at Bonn to a 20% renewable energy target for 2020. Bonn will be the first intergovernmental conference dedicated specifically and solely to the promotion of the renewables worldwide.

<http://www.renewables2004.de/>

## European Electricity Statistics

**Total European electricity demand: 2,521 Terawatt Hours**

Current EU-15 demand is 2,521 Terawatt Hours (TWh) per year. This is equivalent to 2,521,000,000,000 Kilowatt Hours (kWh) a year. kWh are standard units of electricity like those measured by domestic meters.

The 2,521 TWh covers everything - household use, but also heavy industry, service industries and business use. Domestic use is about 1/3 of the total.

There are varying predictions of what total electricity demand will be in 2020. In Sea Wind Europe Garrad Hassan refer to the *European Union Energy Outlook to 2020*, produced for the EC. This predicts growth in demand over the coming decades. Greenpeace does not endorse this prediction. Energy efficiency is an essential aspect to future energy policy and a vital tool in tackling climate change. Greenpeace demands and expects that rigorous efficiency measures will be implemented, which will significantly reduce demand by 2020.

**Total European domestic electricity demand: 636 Terawatt Hours (TWh)**

**Total UK Electricity demand<sup>5</sup>: 394 TWh**

**Average domestic electricity use per EU household: Around 4000 Kilowatt hours (kWh) per year**

**Number of households in EU: Around 160 million**

**Amount of wind (onshore and offshore) currently installed across the EU<sup>6</sup>: 28,401 Megawatts (MW)**

**Top five EU countries at the end of 2003<sup>7</sup>:**

|              |           |
|--------------|-----------|
| Germany:     | 14,609 MW |
| Spain:       | 6,202 MW  |
| Denmark:     | 3,110 MW  |
| Netherlands: | 912 MW    |
| Italy:       | 904 MW    |

**Capacity of individual wind turbines:**

**Onshore:** older turbines are rated around 660 kW, but modern onshore turbines are more commonly in the range 1MW - 2MW.

**Offshore:** the earliest offshore wind farms have used 2MW turbines, but expectation for those under construction is that the range 3MW - 4.5MW will be more common, with 5MW widely expected to become the norm later on.

**Number of offshore wind farms installed across the EU<sup>8</sup>:**

There are around 15 offshore wind farms installed to date.

In the last three years much bigger offshore wind farms have been installed at between 40MW and 160MW: much larger than onshore wind farms. Typical plans for offshore wind

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<sup>5</sup> [http://www.dti.gov.uk/energy/inform/energy\\_stats/electricity/dukes5\\_2.xls](http://www.dti.gov.uk/energy/inform/energy_stats/electricity/dukes5_2.xls)

<sup>6</sup> Source: EWEA website: [www.ewea.org](http://www.ewea.org)

<sup>7</sup> see: [http://www.ewea.org/documents/europe\\_data\\_jan04\\_final.pdf](http://www.ewea.org/documents/europe_data_jan04_final.pdf)

<sup>8</sup> For example see: <http://www.windpower.org/en/pictures/offshore.htm>

farms in the next couple of years are hundreds of MW and in several cases over 1000MW each - equivalent to large conventional power stations<sup>9</sup>.

**The major offshore wind farms to date are<sup>10</sup>:**

|                              |   |
|------------------------------|---|
| North Hoyle <sup>11</sup> :  | UK - North Wales (30 Turbines, 60 MW)                 |
| Nysted:                      | Denmark - nr Lolland (72 Turbines, 158 MW)            |
| Horns Rev:                   | Denmark - west coast of Jutland (80 Turbines, 160 MW) |
| Scroby Sands <sup>12</sup> : | UK - Gt. Yarmouth (38 Turbines, 76 MW) - opens 2004   |
| Middelgrunden:               | Denmark - close to Copengagen (20 Turbines, 40MW)     |

**Number of people already employed in the wind industry in the UK<sup>13</sup>:**

4000 arising from onshore and offshore

The renewable energy industry as a whole employs around 8000 people in the UK today. A recent DTI study suggests the UK will gain 35,000 jobs from current government plans for renewables by 2020. The plan in Sea Wind Europe predicts between 1.6 and 3 million jobs created across the EU. For the UK it suggests plans twice as big as the existing UK renewables target - implying at least 70,000 jobs by 2020 and possibly many more if the UK secures a significant slice of the export market to other EU states.

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<sup>9</sup> see: <http://www.bwea.com/offshore>

<sup>10</sup> For example see: <http://www.windpower.org/en/pictures/offshore.htm>

<sup>11</sup> see: <http://www.natwindpower.co.uk/northhoyle/index.htm>

<sup>12</sup> see: [http://www.powergenplc.com/powergen\\_renewables/scroby\\_sands.asp](http://www.powergenplc.com/powergen_renewables/scroby_sands.asp)

<sup>13</sup> For both statistics see DTI report at:

<http://www.dti.gov.uk/energy/renewables/publications/pdfs/renewgapreport.pdf>

## Climate Change

**Sir David King:** "Climate change is the most severe problem that we are facing today - more serious even than the threat of terrorism."

**Dr John Houghton:** "The impacts of global warming are such that I have no hesitation in describing it as a 'weapon of mass destruction'. Like terrorism this weapon knows no boundaries. It can strike anywhere, in any form - a heat wave in one place, a drought or flood or a storm surge in another. Nor is this just a problem for the future...Global warming is already upon us."

The 1990s were the hottest decade ever recorded in the Northern Hemisphere, and 1998, 2001, 2002 and 2003 are the hottest years on record globally, with some of the highest temperatures ever recorded occurring during 2003<sup>14</sup>. In Europe, during 2003, heat waves, droughts and forest fires killed 20,000 people and caused €10 billion damage to agriculture alone. But climate change is not just about hotter weather. In 2002 Europe was suffering heavy flooding, and the 2003 heat waves gave way to typhoons and floods in Asia.

In 2003:

- In the US, there were 562 tornadoes during May, resulting in 41 deaths.<sup>15</sup>
- In India, at least 1500 people died as a result of record summer heat waves, which saw temperatures reach 49 degrees C<sup>16</sup>. In August, the worst monsoon floods in fifty years affected 600,000 people.<sup>17</sup>
- Forest fires hit Spain, France, Portugal, Canada, Russia, Poland and Bosnia.
- Drought devastated the year's harvest in Germany. Yet in August the previous year, 2002, southern parts of Germany were under water after the worst flooding for centuries.
- Heat waves were followed by severe flooding in Bangladesh, Sri Lanka, Nepal, Afghanistan, India, China and Pakistan.

Climate impacts caused by global warming are claiming 160,000 human lives around the world every year, through, for example, extreme weather, disease and malnutrition. The World Health Organisation and London School of Hygiene and Tropical Diseases predict this number could double by 2020.<sup>18</sup>

On 7<sup>th</sup> January 2004, in *Nature*, nineteen eminent biological scientists published the findings of a study concluding that global warming will 'commit to extinction' between 18% and 35% of all land based animal and plant species. This means that, by 2050, even under 'minimal climate warming scenarios' nearly one in five species will be wiped out<sup>19</sup>.

Climate change is a disaster for the economy too. In 2003 climate change related damages cost \$65 billion globally<sup>20</sup> including the \$10 billion in agricultural losses caused by the heat

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<sup>14</sup> CNN, *2003 called third hottest year on record*, 17 December 2003,

<http://www.cnn.com/2003/TECH/science/12/17/un.climate.ap/>

<sup>15</sup> World Meteorological Organisation press release, 2/7/03

<sup>16</sup> World Meteorological Organisation press release, 2/7/03

<sup>17</sup> The Guardian, *Global Warming may be speeding up, fears scientist*, 6/08/03

<sup>18</sup> As reported in, for example, *Environment News Service*, 1<sup>st</sup> October 2003, *Climate Change Already a Killer* <http://southasia.oneworld.net/article/view/69471/1/>

<sup>19</sup> BBCi, *Climate risk 'to million species'*, 7<sup>th</sup> January 2004,

<http://news.bbc.co.uk/2/hi/science/nature/3375447.stm> and *Nature*, 8<sup>th</sup> January 2004, *Extinction risk from climate change*, letter to *Nature*, [http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v427/n6970/full/nature02121\\_fs.html](http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v427/n6970/full/nature02121_fs.html)

<sup>20</sup> According to Swiss Re - as reported in (for example) *Business Insurance Daily News*, 16<sup>th</sup> December 2003, *Insured cat losses up sharply, reinsurers estimate*. <http://www.businessinsurance.com/cgi-bin/news.pl?newsId=3269>

wave in Europe. The reinsurance group Munich Re have studied costs of climate impacts over the period from the 1950's to the present say and found that the cost is doubling every decade. At that rate, the cost of damage caused by climate change will exceed global gross domestic product as early as 2065<sup>21</sup>.

Extreme weather events are predicted to become more common as climate change accelerates with continued warming. Some climate scientists are suggesting that the extremes already happening mean that climate change will be quicker and more severe than previously expected<sup>22</sup>.

The Intergovernmental Panel on Climate Change, Working Group 2 Found:

- The effects of climate change are expected to be greatest in developing countries in terms of loss of life and relative effect on investment and the economy.
- Impacts are likely to increase the disparity between developed and developing nations. The higher the temperatures the greater the disparity.
- The greatest impacts will be on those least able to protect themselves.

**ENDS**

To see the full version of Sea Wind Europe visit

<http://www.greenpeace.org.uk/seawindeurope.htm>

For more information contact Greenpeace Press Office on 020 7865 8255

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<sup>21</sup> Munich Re and Dlugolecki statements reported for example in Insurance Journal, 2<sup>nd</sup> December 2001, *The Global Picture: Debate Over Climate Change Continues to Storm*

<http://www.insurancejournal.com/magazines/west/2001/02/12/features/17826.htm>

<sup>22</sup> The Guardian, *Global Warming may be speeding up, fears scientist*, 6/08/03



