WIND DIRECTIONS

THE EUROPEAN
WIND INDUSTRY
MAGAZINE

April 2010
Volume 29/Nº 2

EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

PEDRO MARÍN URIBE
Spanish Secretary of State for Energy

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INSIDE: ***Wind Directions*** **survey – win an iPod!**

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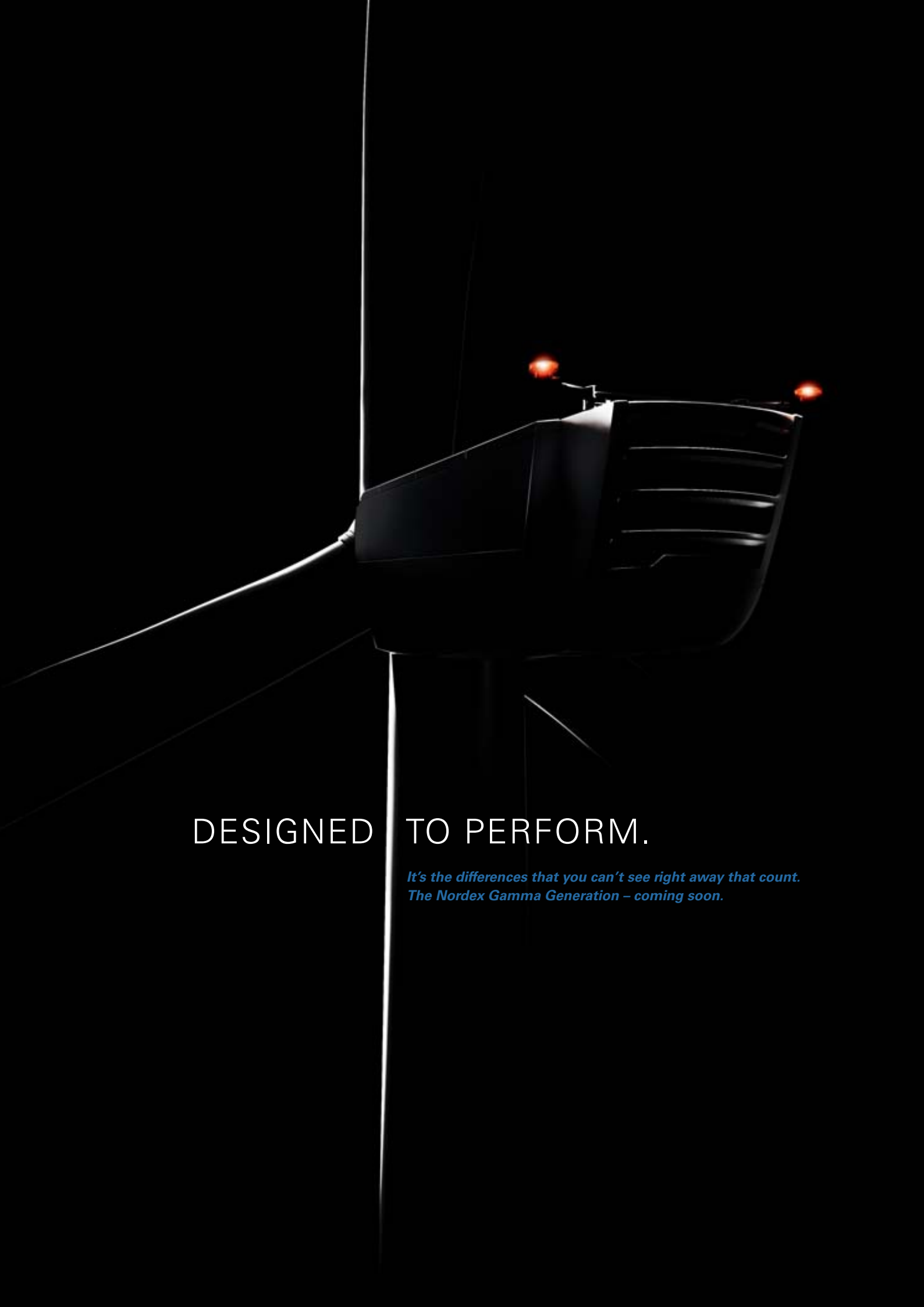

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The unstoppable industry

By Christian Kjaer
Chief Executive, EWEA

Like any successful industry, the wind sector never sleeps. Orders, applications, authorisations, production, delivery, construction, grid connections – the different processes go on, overlap, continue, slow down, speed up, are finished, and start again.

Despite this ongoing activity and expansion, for me perhaps the most exciting part of the wind energy year is the annual European Wind Energy Conference and Exhibition (EWEC). It is exciting to see a European city fill up with members of the industry as Marseille did in 2009 and Warsaw is doing in 2010.

Every year at EWEC, familiar faces mingle with unknown ones, speakers present fresh angles on issues we know well and introduce new topics to debate, old business ties are renewed and new contacts and deals made.

The gender balance

However, it is always slightly disappointing that amongst these faces at EWEC there are not more female ones. Wind has long been a men-heavy sector, as are other industries based on engineering and manufacturing. Although this has evolved in recent years – and certainly, the EWEA staff is 60% female! – it remains the case today. On page 30, *Wind Directions* investigates why this is.

One of the many advantages the wind industry offers is its richness in terms of jobs – 192,000 Europeans currently work in or are connected to the sector, and by 2020 this should go up to 446,000. There is currently a lack of qualified workers for the range of positions on offer from manufacturing and engineering to project management, and both women and men are needed to fill them.

To attract them, schools and universities need to promote the renewables sector as a career possibility, and public authorities and private companies must make joint efforts to provide training to allow workers to transfer from declining economic sectors to the wind power sector.

A refreshing campaign

Despite being male-dominated, EWEC 2010 looks to be one of the biggest and best events yet, with sessions touching on topics from policy and markets to finance to grids, and an exhibition space measuring over 5,000 square metres, that was sold out months ago. I am especially pleased that EWEC 2010 will be the platform for the launch of EWEA's new year-long campaign: A breath of fresh air.

Although from inside the industry it is easy to pick out the many benefits of wind – not just the jobs, but also the boost to energy security, the zero CO_2 emitted, the avoided fuel costs, that it lowers power prices, and the business opportunities it gives Europe as the technology leader – these messages need to be spread far and wide. The new 'A breath of fresh air' campaign aims to do just this.

Through its website – www.ewea.org/freshair and the new EWEA blog on http://blog.ewea.org, its peppermint breath freshener tablets, its leaflets and above all its interactive 'adopt a wind turbine' tool, the campaign will bring information on wind and its many advantages to decision-makers and citizens. For more on the campaign, see page 35.

The price is right

In fact, in this issue of *Wind Directions*, on page 18, we take a closer look at one of the least familiar on that list of wind energy benefits – wind's effect on power prices. New EWEA-commissioned research gathers together the most relevant previously published examples of the way wind energy, which has no fuel cost, pushes more expensive and polluting technologies out of the power mix and so brings the overall electricity price down. We will also be launching this research at EWEC 2010.

With all this to look forward to, I hope that those attending EWEC find it refreshing and stimulating, and that we can also take the time to pause – just for a moment – to celebrate the phenomenal growth and the multiple benefits of wind, the industry that never stops.

European wind energy continued its surging success in 2009

By Chris Rose

Annual EWEA statistics show how well the wind power industry and other renewables are growing while some more traditional sectors are in retreat.

Despite the worst recession in more than 65 years, the continued growth of wind power last year sparked such a bright light for the vitally important European energy portfolio that it can only be described as phenomenal.

Data compiled by EWEA and other sources shows that wind power installations accounted for a staggering 39% of new electricity-generating capacity in 2009. By way of comparison, wind's share of newly installed capacity a year earlier increased 35%.

The 10,163 MW of EU wind power capacity installed last year represents a 23% increase over 2008. It is also the second year in a row that more wind power was installed in the EU than any other generating technology.

Wind power's future continued to glow brightly on a number of other fronts. The wind capacity installed by the end of 2009 will in a normal year produce 163 TWh of electricity, meeting 4.8% of total EU power demand. According to the latest figure from Eurostat, final electricity consumption in the EU-27 was 3,372 TWh in 2007.

Not surprisingly, most of the new wind power capacity (9,581 MW) was realised through onshore installations while the remainder (582 MW) was derived from new offshore facilities. The onshore increase was 21% greater than 2008's while the new offshore installations jumped 56% compared to new installations the previous year.

The EWEA annual statistics also showed that EU wind power, though buffeted by exceedingly fragile money markets trying to ride out the severe economic downturn, still saw investments of €13 billion in wind farms in 2009, including €1.5 billion in the nascent offshore sector.

"This is a great result in a year that was far from easy," said Christian Kjaer, EWEA Chief Executive. "The figures confirm that wind power, together with other renewable energy technologies and a shift from coal to gas, is delivering massive European carbon reductions, while creating much needed economic activity and new jobs for Europe's citizens."

After wind, of all new EU electricity-generating capacity installed last year in addition, 25% or 6,630 MW came from gas while 17% or 4,600 MW was from solar photovoltaics.

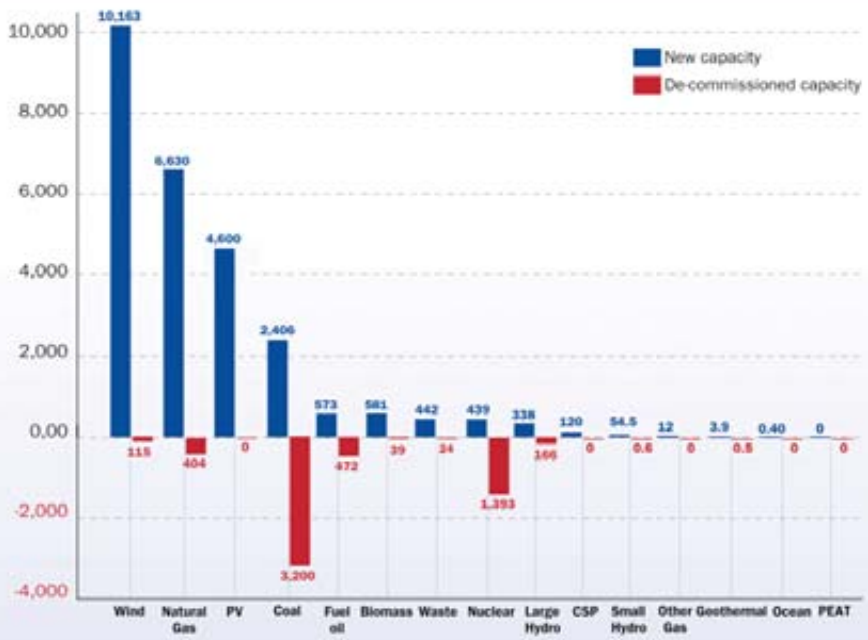
In addition, 2,406 MW (9%) of new coal was installed, 581 MW (2.2%) of biomass, 573 MW (2.2%) of fuel oil, 442 MW (1.7%) of waste, 439 MW (1.7%) of nuclear, 338 MW (1.3%) of large hydro, 120 MW (0.46%) of concentrated solar power, 55 MW (0.2%) of small hydro, 12 MW (0.04%) of other gas, 3.9 MW (0.01%) of geothermal, and 405 kW of ocean power.

Together, renewable energy technologies accounted for 62% of new European power-generating capacity in 2009, marking the second year in a row that renewable energies have accounted for the majority of new installations.

The EWEA report indicates that each year since 2008 renewable electricity generating technologies have accounted for more than 50% of new power installations – mostly wind power, but also solar PV, hydro power, and biomass. This trend has increased from just 14% of new installations in 1995, to the 61% last year.

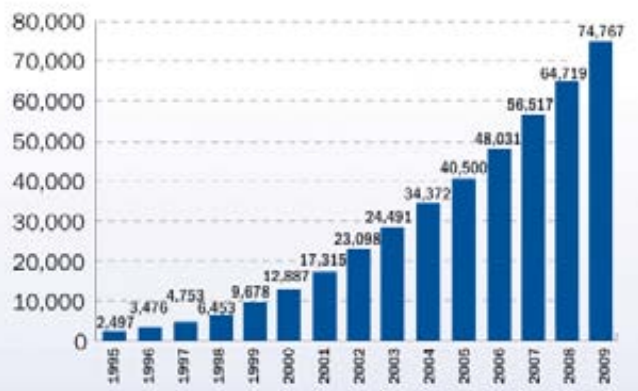
The data reveals that the power sector in Europe is still moving away

New installed and de-commissioned capacity in EU in 2009 (MW)



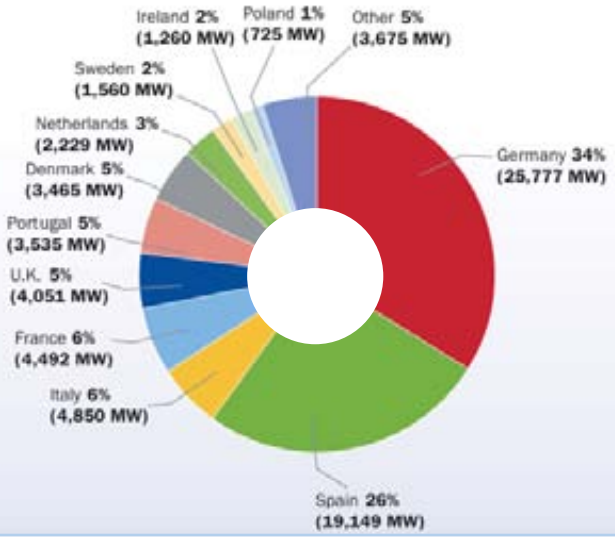
Source: EWEA, EPIA, ESTELA, EI-OEA and Platts Powervision

Cumulative wind power installation in EU (MW)



Source: EWEA

EU member state market shares for total installed capacity (2009). Total 74,767 MW



Source: EWEA

from coal, fuel oil and nuclear, as each of those power technologies continued decommissioning inefficient plants. For example, the coal sector decommissioned 3,200 MW, the nuclear sector decommissioned 1,393 MW, and the fuel oil sector decommissioned 472 MW.

In all, the EU's total installed power capacity increased last year 20,150 MW, to 820,606 MW, with wind power increasing its share of installed capacity to 74,767 MW (9.1%), up from 64,719 MW by the end of 2008.

Additionally, the data shows that annual installations of wind power have increased steadily over the last 15 years from 472 MW in 1994 to the 10,163 MW in 2009, an annual average market growth of 23%.

Overall, the statistics show that Germany remains the EU country with the largest total of installed capacity at 25,777 MW, followed by Spain (19,149 MW), Italy (4,850 MW), France (4,492 MW), and the UK (4,051 MW).

Yet the nations with largest share of new capacity installed in 2009 were Spain (24% or 2,459 MW), followed by Germany (19% or 1,917 MW), Italy (11% or 1,114 MW), France (11% or 1,088 MW) and the UK (10% or 1,077 MW).

While Europe's wind energy installations last year continued to be dominated by development in its mature markets, it is worth noting that Portugal (7% of new installations or 673 MW), Sweden (5% or 512 MW), Denmark (3% or 334 MW), and Ireland (2% or 233 MW) also performed strongly.

New power installations last year continued the trend in changes in EU net installed capacity for the various electricity generating technologies from 2000 to 2009. The net growth of natural gas (81 GW) and wind power (65.1 GW) came about at the expense of fuel oil (down 12.9 GW), coal (down 12 GW) and nuclear power (down 7.2 GW).

Jacopo Moccia, who compiles EWEA statistics, said there were several reasons that wind power did so well in the EU last year despite the ongoing economic downturn.

"Wind power is a proven technology," Moccia said. "Furthermore it is clean, has short lead times and no fluctuating fuel costs. If you add to that the strong political support for renewables in the EU, it is clearly seen as a safe investment with good potential returns. It is the ideal investment to ride through a crisis."

An EWEA regulatory affairs advisor, Moccia said that offshore wind, although still smaller in terms of onshore installations, had a very good year in 2009 and should expect an even better future.

"Offshore has started taking off as an industry in and of itself, and it should no longer been seen as an extension of onshore wind. Over the past years many countries, especially around the North Sea, have been laying the foundations for offshore wind development via ambitious policies," he said.

"We are now beginning to reap what has been sown, and forecasts for next year and beyond are even more exciting. We should expect offshore to keep growing at high rates, until by the second half of the 2020s the offshore industry should become bigger than the onshore one."

He also said the €13 billion in EU wind farm investments last year demonstrate how wind energy is an ideal industry to re-launch Europe's growth.

"Wind is bringing in investments and creating jobs whilst helping us to meet the energy and climate crises we face that could, in the future, cause Europe even greater financial woes than those we are living today."

Moccia, who described wind power as the power technology of choice, was asked why EU wind saw the largest growth of all generating technologies for the second year in a row, and what that accomplishment says about the old, more traditional energy technologies such as coal and oil.

"Today's energy mix is the result of technologies developed in the past. These technologies are not suited for the socio-economic and environmental challenges we are facing. This year 61% of all new electricity generating capacity was renewable, up from just 14% in 1995. We can truly talk of the de-carbonisation of Europe's energy mix, which also augurs well for Europe's future energy independence."

He also said that the continuing success of wind power can help policy makers working towards promoting emissions-free technologies and agreeing on a new and strengthened post-Kyoto pact to reduce greenhouse gas emissions caused by burning fossil fuels.

"Today, wind turbines produce almost 5% of the EU's electricity. By 2020 we expect them to meet up to 17% – the equivalent of 131 million average EU households and avoiding 333 million tonnes of CO_2 annually. By 2030, wind could be meeting up to 35% of the EU's electricity needs, equivalent to 241 million households and avoiding 600 million tonnes of CO_2 annually. I think these figures speak for themselves."

For more information: www.ewea.org

Wind energy continues to flex its growing power around the world

With its vast population and seemingly limitless thirst to acquire raw resources and additional energy sources for its emerging middle class, China was the world's biggest wind power market last year, almost doubling its installed generation capacity to 25 GW.

China's growth in wind power was so spectacular that it represented one-third of the world's new installed capacity in 2009 of 37.5 GW, according to the Global Wind Energy Council (GWEC).

Regardless of the severe global economic downturn caused by the worst recession since the 1930s, China installed 13 GW of new capacity in 2009, GWEC reported, noting the Asian nation's wind energy industry experienced another year of more than 100% growth.

GWEC also noted that cumulative world-wide wind power capacity installed by the end of 2009 totaled nearly 158 GW – a 31% increase from the year before.

"The continued rapid growth of wind power despite the financial crisis and economic downturn is testament to the inherent attractiveness of the technology, which is clean, reliable and quick to install," said Steve Sawyer, GWEC's Secretary General.

"Wind power has become the power technology of choice to a growing number of countries around the world," Sawyer said, adding wind energy's continued growth can be attributed to national energy policies and because many governments promoted renewable energy development in their economic recovery plans.

In addition to China, other Asian nations – India, Japan, South Korea and Taiwan – helped make Asia the world's largest wind power market last year, with more than 14 GW of new capacity.

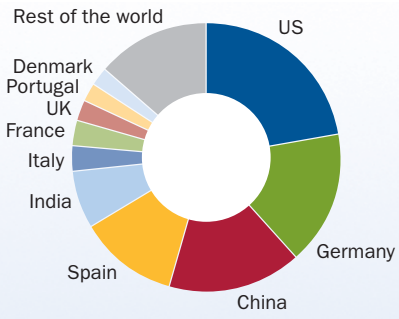
North America and Europe, each of which installed more than 10 GW of new wind capacity, also helped drive the global wind power success story in 2009.

The US wind energy industry experienced a 39% increase in new installed capacity last year, which brought its total capacity total to 35 GW. New wind power installations in the EU last year, which increased 23% over 2008, brought the region's total capacity to nearly 75 GW.

Global wind turbine installations in 2009 were worth about €45 billion, GWEC noted, adding about 500,000 people are now employed by the wind industry around the world.

The wind industry will also save about 204 million tonnes of CO_2 every year, GWEC reported.

Top 10 cumulative capacity December 2009 (MW)

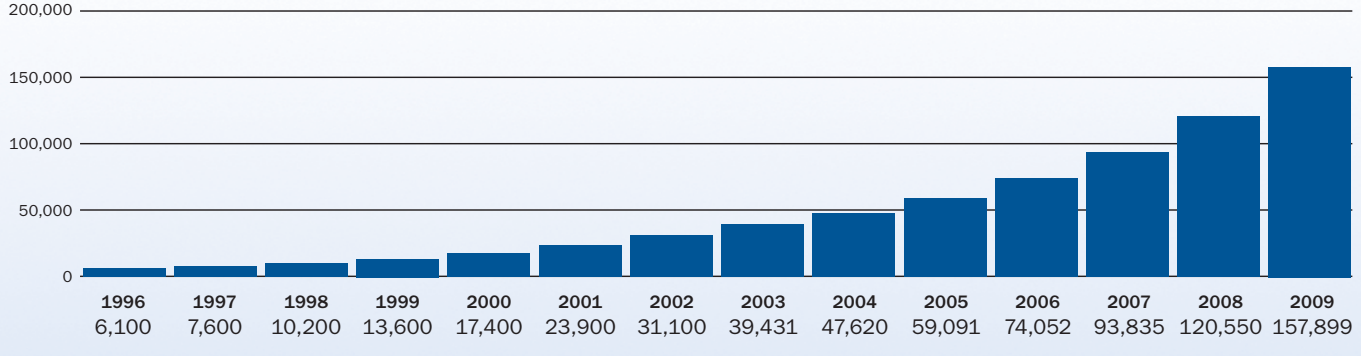


	MW	%
US	35,159	22.3
Germany	25,777	16.3
China	25,104	15.9
Spain	19,149	12.1
India	10,926	6.9
Italy	4,850	3.1
France	4,492	2.8
UK	4,051	2.6
Portugal	3,535	2.2
Denmark	3,465	2.2
Total top 10	**136,508**	**86.5**
Rest of the world	**21,391**	**13.5**
World total	**157,899**	**100**

Source: GWEC

Global cumulative installed wind capacity in MW (1996-2009)

Source: GWEC



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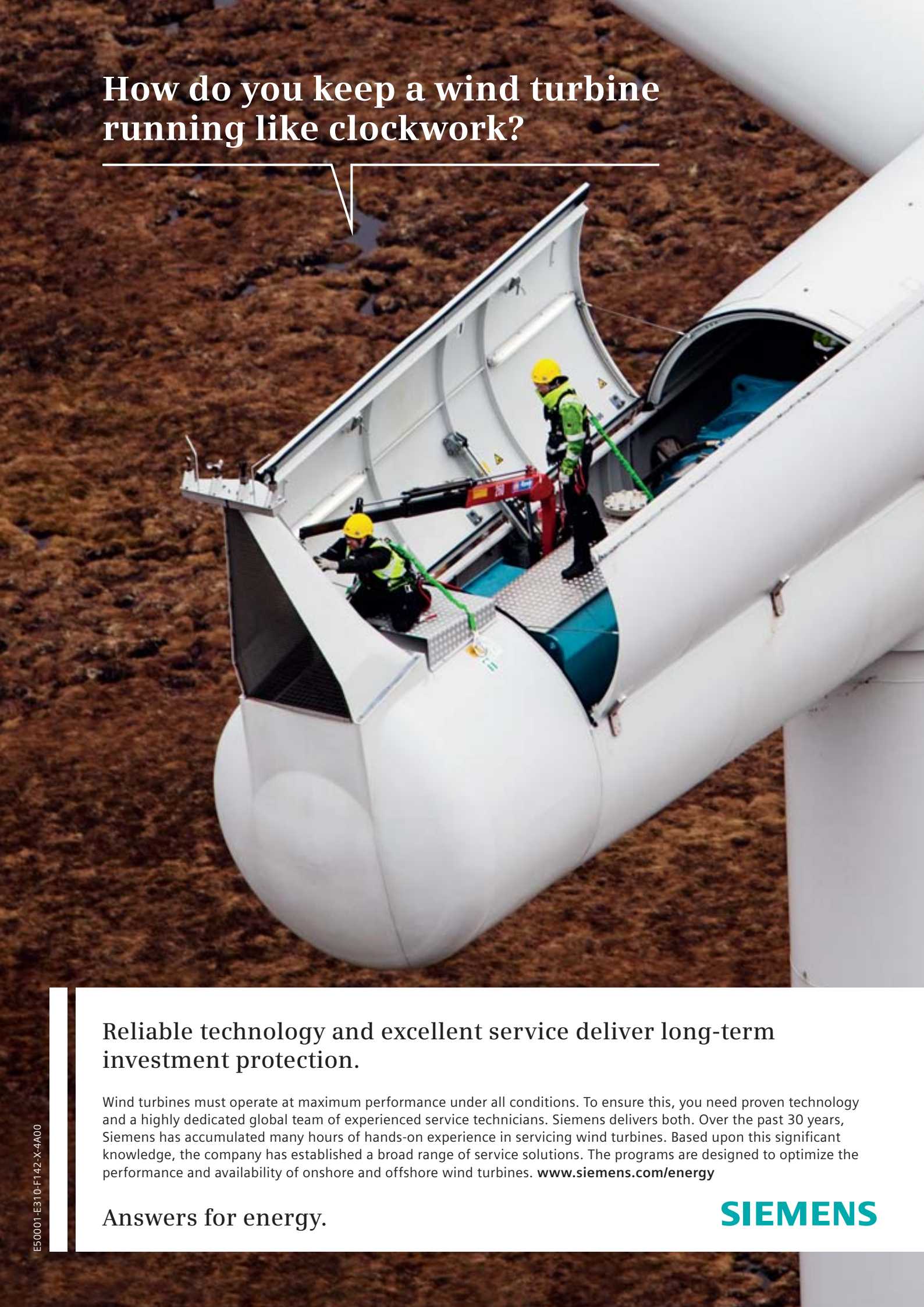

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Wind and shipyard industries call for investment in ships for offshore expansion

At a recent meeting, EWEA and the Community of European Shipyards' Association (CESA) called on the European Commission and the European Investment Bank (EIB) to support the building of new ships to serve the expanding offshore wind energy market over the coming years.

EWEA and CESA urge the European Commission to develop programmes and funding mechanisms, and the European Investment Bank to take the necessary measures to support the risk related to the necessary significant investments, to ensure that a sufficient number of installation vessels are available to the offshore wind industry. They also argue that the offshore wind power industry should be identified as a key industry in the EU's 2020 strategy for smart, green growth.

Investments in new ships totalling €2.4 billion are needed for the predicted growth of offshore wind. By 2020, the installation of thousands of offshore wind turbines, as well as the necessary substructures and cables, is foreseen.

"From 2020 we will see 40,000 MW per year built offshore" said Eddie O'Connor, founder and CEO of Mainstream Renewables. "This will require ten to twelve new heavy lift vessels, other vessels for transporting foundations, towers, nacelles and blading systems. New ports will have to be built across Europe."

"European shipyards provide the necessary engineering power to develop innovative solutions for dedicated offshore equipment" Reinhard Lüken, Secretary General of CESA said. "Together European industry holds unique capabilities to drive fast growth towards the green revolution of sustainable energy production."

"Offshore wind power provides the answer to Europe's energy and climate dilemma – exploiting an abundant energy resource which does not emit greenhouse gases, reduces dependence on increasingly costly fuel imports, creates thousands of jobs and provides large quantities of indigenous, affordable electricity," said Justin Wilkes, Policy Director of EWEA.

The offshore wind industry currently employs 19,000 people, a level which is expected to rise to 156,000 jobs by 2020.

The call was made at a meeting in Brussels chaired by O'Connor and Lüken bringing together the wind industry, the European shipyard industry and officials from the European Commission and European Investment Bank. It will be followed by further collaboration between the two associations and their members in order to support the European institutions in taking appropriate action.

Investment of €2.4 billion in new ships is needed for offshore wind growth Photo: Stiftung Offshore Windenergie/Detlef Gehring

A smarter power network

'Significant' grid upgrades are needed to take full advantage of wind power's continental character, EWEA stressed in its recently submitted response to a consultation by the EU energy regulators group, ERGEG.

The consultation focused on so-called 'smart' grids, which could deliver power from suppliers to consumers using technology which allows electrical appliances to be controlled to save energy, reduce cost and increase reliability and transparency. Smart grids would also make it easier to integrate variable and distributed sources of energy such as backyard wind turbines into the electricity supply enabling households to sell excess power back to the grid.

"It is very important that we ensure modern, smart, interconnected grids are put in place to allow more wind to come onto the system, which will bring about savings in operational costs of power generation, and improvements in network efficiency and security", said Paul Wilczek, EWEA's Regulatory Affairs Advisor.

For more information: www.energy-regulators.eu

Photo: EDP

EU money injects new life into electricity interconnection

The European Commission is allocating over €903 million to electricity interconnection projects as part of its broader European Economic Recovery Plan, injecting new impetus into long standing electricity grid development plans within the EU.

Nine projects received funding, including the vital France-Spain interconnection, which has been planned for a long time.

"Despite the importance of this connection, which will allow Spain to exchange more electricity with other European countries and ensure interconnectivity between continental Europe and the Iberian peninsula, the project has suffered continual setbacks since its conception in the 1980s," said Paul Wilczek, Regulatory Affairs Advisor for EWEA. "This funding is a great boost for the integration of wind power in Europe and will improve the operation of Europe's electricity markets and benefit consumers," he added.

Funds will also be allocated to a link between Sweden and the Baltic States, the Nordbalt line, as well as to reinforce an interconnection between Finland and Estonia, Estlink-2, amongst other transmission lines.

"If we want to fully exploit the potential of renewable energies, create a truly European power market, and keep electricity prices low for consumers, we need to connect the whole of Europe," Wilczek said. "These projects are a good start and the right way forward. Europe now needs to carry on developing the interconnectivity of its electricity grids," concluded Wilczek.

Offshore electricity grid needs a coordinated approach

An offshore North and Baltic Sea electricity grid could be in place within 10-15 years, but its development is being slowed by political and regulatory differences between countries bordering the North and Baltic Seas, according to a report published in March by the OffshoreGrid consortium.

The European Commission-funded consortium – made up of eight organisations* – stated that offshore wind farm developers, operators and traders see a harmonisation of electricity market and electricity transmission rules across Europe as essential for the future offshore grid.

"The problem is that regulatory frameworks for interconnectors and offshore transmission are very different between Member States," said Achim Woyte, Project Coordinator for OffshoreGrid.

Legal uncertainty and the risk of stranded investments are also hindering the development of an offshore grid. In most of the countries the regulatory framework does not clarify what support an offshore wind farm could be eligible for, if the farm is connected to several different countries.

Two factors – the EU's 2020 renewable energy 20% target and the urgent need for improving the security of Europe's electricity supply – are driving the development of an offshore grid, the report notes.

OffshoreGrid published three other reports: a list of planned and possible wind farm locations with predictions for their installed capacity by 2020 and 2030; a report on potential wind power output at offshore sites over one year; and a report on other marine orientated grid development scenarios up to 2030.

These reports are available at www.offshoregrid.eu. They will be presented at the annual European Wind Energy Conference and Exhibition (EWEC) in Warsaw, April 20-23, and at a stakeholder workshop which is set to take place in Scotland, June 2010.

* 3E, German Energy Agency, Institute for Renewable Energy / EC BREC IEO, Senergy Econnect, SINTEF, Energy Research, National Technical University of Athens, European Wind Energy Association, Forwind - Center for Wind Energy Research - University of Oldenburg.

Parliament and Council adopt proposal for increased low carbon funding

On 11 and 12 March the European Parliament and Energy ministers welcomed the European Commission communication published last October, which proposed extra research funding for energy, including €6 billion for wind energy research over ten years.

The Commission's communication, entitled "Investing in the Development of Low Carbon Technologies", was based on the Strategic Energy Technology (SET) Plan, which aims to develop low carbon industries like wind energy.

In its conclusions, the Parliament proposed an annual EU budget contribution of at least €2 billion to ensure the technologies are developed sufficiently.

Likewise, the Council suggested that "given the scale of the public and private funding required", an "increase in the proportion of public investment at EU level may be needed, which should therefore be given due consideration in the budget review".

Wind energy is developing fast across Europe, but more research funding is needed

Photo: Keenpress Publishing/Sisse Brimberg & Cotton Coulson

The European Council also stressed that the European Industrial Initiatives (EIIs) – including the wind initiative, which outlines priority research needed in the sector – should be launched "without delay and by 2011 at the latest".

EWEA strongly believes that more public and private money is needed on wind energy research to ensure the EU's renewables targets are met. Historically, only 1% of the EU research budget went to wind.

Wind bites

"International support for a supergrid is fantastic – it will secure plentiful, clean and reliable sources of energy such as offshore wind, and help slash carbon emissions. Now we need the funding and industrial strategy to put words into action."

Nick Rau, Friends of the Earth's energy campaigner

"The 32 GW of installed capacity proposed by the offshore wind energy developers for 2020 would supply a quarter of the UK's electricity needs. This means the UK will have a secure and low carbon electricity supply. In addition, the UK economy will benefit as offshore wind is a growth industry that will create new businesses and jobs as well as attracting inward investment."

Roger Bright CB, Chief Executive of The Crown Estate

"I would like to see a Europe that is the most climate-friendly region in the world."

Connie Hedegaard, European Commissioner-designate for climate change

"Climate change and our dependence on foreign oil are a threat to our national security... wind energy alone can bring tremendous benefits."

John Kerry, US Senator

"If Europe is able to develop a supergrid it will be a vital ingredient in the fight against climate change because it will allow large-scale integration of renewable electricity production."

Justin Wilkes, Policy Director, European Wind Energy Association

"The cabling of the North Sea is the European answer to the failed climate summit in Copenhagen."

Josef Auer, Energy Analyst at Deutsche Bank Research

"The global wind power market will grow from about 30 billion euros ($44.43 billion) annually today to more than 200 billion euros by 2030. We anticipate especially robust growth in the Asia-Pacific region."

Andreas Nauen, CEO, Siemens Wind Power

"Renewable energy can get us back on the path to economic growth: renewables can deliver more than two million jobs in the next decade."

Arthouros Zervos, President of the European Wind Energy Association

"The requirement is to phase out coal emissions, if we want to be fair to our children and grandchildren. We desperately need a nation to exert some leadership, adopting policies to move promptly in that direction."

Professor Jim Hansen, NASA climate scientist, welcoming E.ON's decision to postpone the building of its Kingsnorth coal plant in the UK

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EIB to increase wind investment

The European Investment Bank (EIB) spent €1,633 million on wind power in 2009, it announced recently. It also loaned €17 billion for projects contributing to the reduction of CO_2 emissions, which should go up to €20 billion in 2010, with a significant amount going to offshore wind projects, according to EIB vice-president Simon Brooks.

Last year's investment included €4.2 billion for renewables, with €1,284 million spent on projects in the wind sector and €399 million on manufacturing turbines and other wind infrastructure.

More information: www.eib.org

PORTUGAL

Modelling at Megajoule

A new branch of Portuguese energy consultancy Megajoule, opened at the beginning of 2010, will be dedicated to advanced wind modelling solutions, innovation and research. MEGAJOULE|Inovação will offer its services in Mesoscale Modelling and CFD simulations, and aim to develop new services and products for the wind energy market. It is currently working with academic institutions in order to do so.

For more information: www.megajoule.pt

SPAIN

Acciona to invest over €3 bn in wind in three years

Spanish industrial group Acciona will invest €3.9 bn on expanding its renewable energy capacity between 2010 and 2013, the company said recently, out of which 78% – over €3 bn – will go to wind. The company intends to add 2.4 GW of wind capacity.

The rest of the money will be divided between solar thermal – 20% of the total sum – and biomass facilities.

More information: www.acciona.es

Photo: Keenpress Publishing/Sisse Brimberg & Cotton Coulson

A weather alert system has been launched in the UK for the offshore sector

Photo: Keenpress Publishing/Sisse Brimberg & Cotton Coulson

New offshore wind division for Iberdrola

Spanish wind power developers Iberdrola Renovables have created a new offshore wind divison, which will develop around 10 GW of projects. The new division will be based in Iberdrola's UK offices, led by ScottishPower Renewables Director Keith Anderson, and made up of three departments; Operation and Maintenance, Business Development, and Commercial. Iberdrola is currently developing offshore projects in the UK, Spain and Germany.

More information: www.iberdrolarenovables.es

UK

Mitsubishi to invest £100 million in wind

Mitsubishi Power Systems Europe has signed a memorandum of understanding with the UK government agreeing to invest up to £100 million (€110 million) in an offshore wind turbine research project, which is set to create up to 200 jobs by 2014.

This project will be the first step towards the production of turbines for the next generation of offshore wind farms. Welcoming the announcement, British Wind Energy Association (BWEA) Chief Executive Maria McCaffery said:

"BWEA is delighted with today's announcement which underlines the keen interest of major international players in the UK wind energy programme. This tremendous commitment from Mitsubishi and the UK Government follows last week's major announcement of the start of the new Clipper Windpower factory in Newcastle upon Tyne, which will be home to the largest wind turbine blade in the world."

For more information: www.bwea.com; www.decc.gov.uk

New service provides O&M alerts for wind projects

The UK's Met Office has launched an operation and maintenance weather alert system designed specifically for the wind energy industry.

The service, known as 'Visual Eyes', includes site specific alerts for elements such as lightning strikes, mean wind speed and maximum wind gusts, temperature, rainfall and snow, and offers different versions of the service for both offshore and land based wind farms. Alerts can be anything from six hours to five days ahead.

Scottish Power Renewables are currently using Visual Eyes to help plan their operations and maintenance schedules.

For more information: www.metoffice.gov.uk

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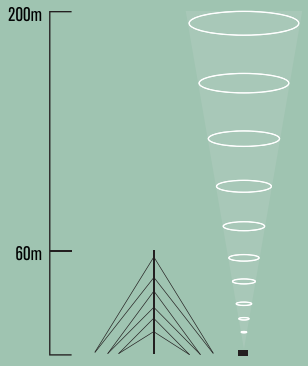

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Wind: lowering electricity prices

By Sarah Azau

Of the many often cited advantages of wind – it emits no CO_2, it creates jobs, it will never run out, it does not have to be imported – perhaps the least well-known is its effect on power bills.

EWEA information often contains the claim that wind energy "can help lower electricity prices," but what exactly does this mean? What does wind do to affect prices, and how?

"When we say wind lowers power prices, we are referring to the fact that – in a nutshell – when more of a less expensive power source like wind comes into the power supply, it pushes more costly sources out, and so brings down the overall spot market price," explains Nicolas Fichaux, EWEA's Head of Policy Analysis.

Up until a few years ago, wind was still a maturing technology and there hadn't been enough large-scale wind projects to get a clear picture of its impact on power prices. However, now that wind provides a large share of power in many areas, a study of the way it pushes more expensive technologies out of the power mix – known as the 'merit order effect' – can be carried out.

Accordingly, EWEA commissioned Pöyry to conduct a review of some of the studies published on the subject so far in order to get a broader overview of the phenomenon.

"We took 15 studies on the merit order effect from a range of different countries, all in Europe, that were published no later than 2005 and summarised their results. They all show that adding more wind can make the power price go down, according to one study by as much as €23 per MWh," explains Anne-Franziska Sinner, from consultants Pöyry, which carried out the review.

But how exactly does the effect work?

"In a normal power market, the spot price is determined when supply and demand are equal", explains Poul Erik Morthorst from the Risø DTU institute in Denmark. "On a typical supply and demand graph, this is where the two lines – one representing the power supply and one the demand – meet."

The supply curve on the graph is determined by the marginal cost – that is, the additional cost of producing one more unit of electricity – of the different power generating technologies, such as renewables, gas and coal, into the energy mix.

"Power-generating technologies that have a low marginal cost go into the power mix first and appear on the left of the graph, while technologies like combined heat and power have a higher marginal cost, and will appear to the right of wind on the curve, followed by condensing

"Wind reduces power market spot prices, and replaces CO_2 and fuel intensive production technologies, thus saving CO_2 emissions and fuel cost."

Not only do turbines reduce CO_2 and provide home-grown power to Europe, they also bring the electricity price down

Photo: Vestas

plants and gas turbines which have the highest marginal costs," says Morthorst.

Because renewable electricity has priority or guaranteed access to the electricity market (as stipulated in the 2009 Renewable Energy Directive) it must be purchased before other power sources. In parallel, price changes have very little impact on power demand, as even if prices go up we still use a similar amount of electricity. This is illustrated by the almost vertical line representing demand on the graph below.

Consequently, more wind coming onto the power market – onto the left hand-side of the supply curve – reduces the amount of the power demand remaining to be purchased on the spot market, and shifts the supply curve to the right. As the demand line roughly stays where it is, it intersects with a lower point in the supply curve and the power price goes down.

As a general rule, additional wind replaces coal during hours of low power demand and gas during hours of high demand, but "the overall amount the price goes down depends on the power mix in the country, and how much more expensive the fuels are that wind is replacing," says Sinner. "In our literature review, we had a range of effects, with power prices dropping between €3 and 23 for each MWh."

Morthorst found in his research on Denmark that, "In 2005-2008, the cost of power to the consumer (excluding transmission and distribution tariffs, taxes and VAT) would have been approximately 5-10% higher in Denmark if wind power had not contributed to power production".

He notes that while Danish power consumers pay a premium towards wind power, the merit order effect makes the cost lower.

The merit order effect also depends on the size of the market. In a larger power market, wind will have an impact on more consumers' power bills, but to a lesser extent than in a smaller market as the savings will be spread out.

So far, there is no formula or equation that can be applied to a power system to find out instantly what difference more wind will make, but Morthorst is certain that "in a country with a lot of wind power, customers will have lower electricity bills, relatively speaking, than in a country where there is little or none".

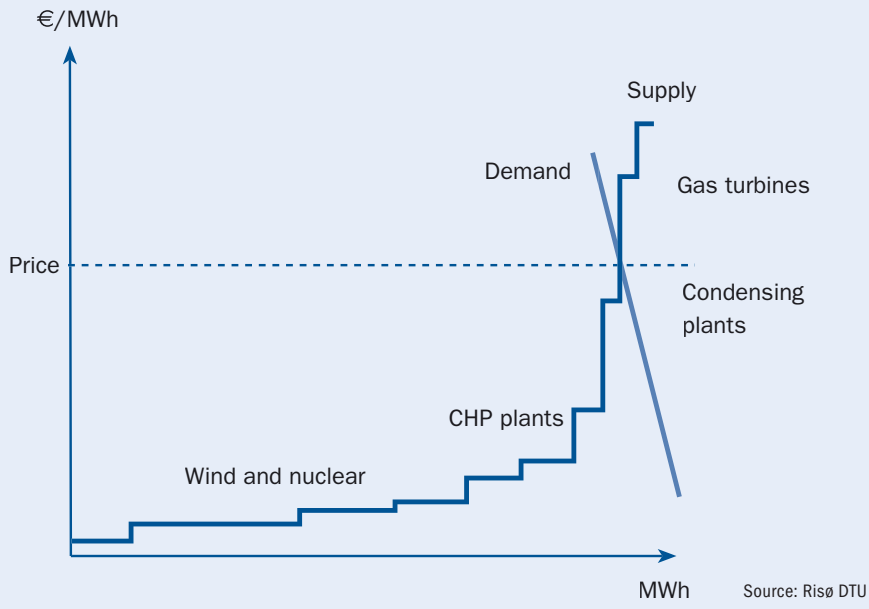
This is also shown by the new literature review.

"All of the studies we looked at show a downward movement of spot power prices due to increased wind power penetration, and sometimes due to wind, the spot price went down to zero," says Skinner.

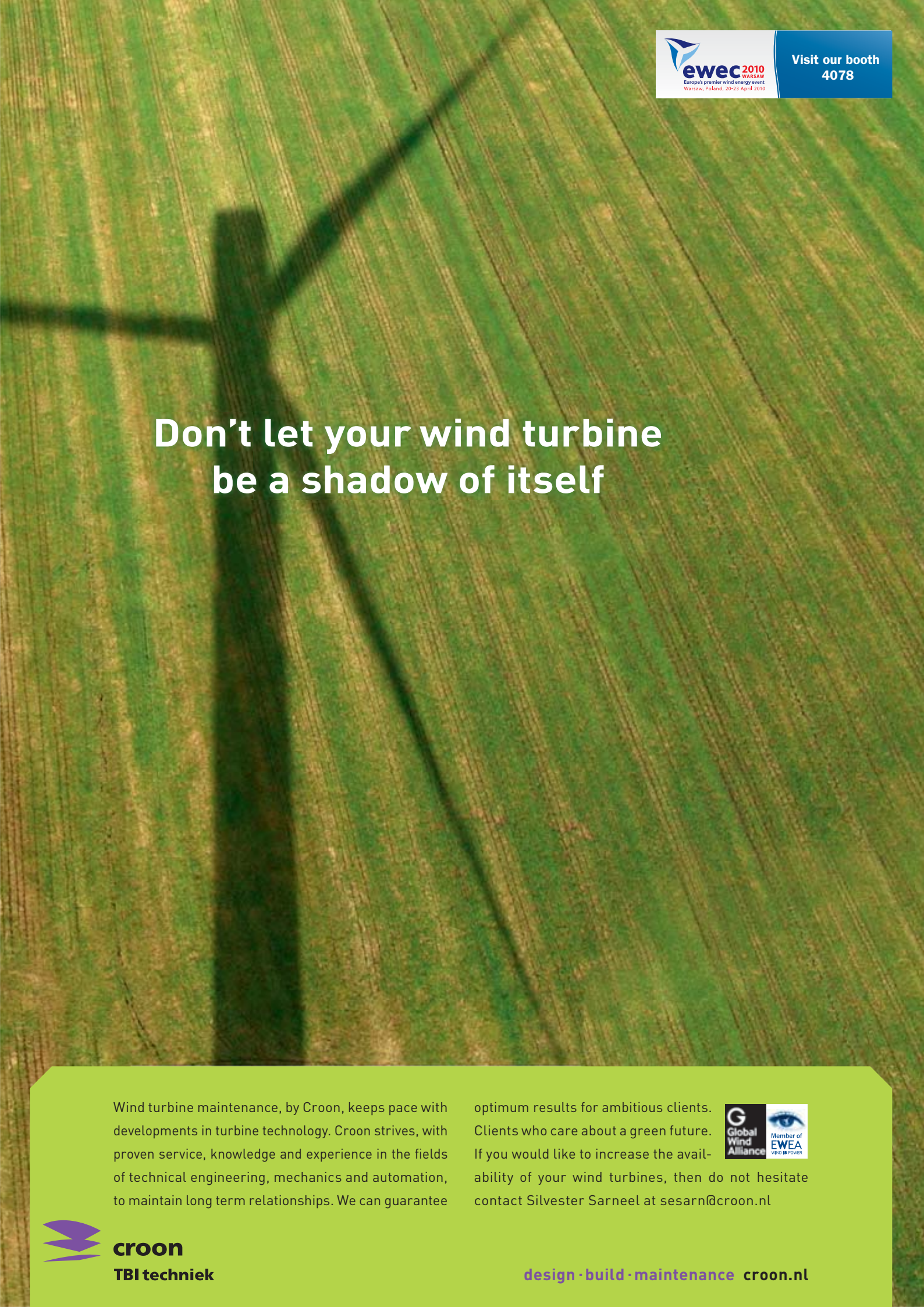
The trend seems clear from the studies so far, and could be consolidated by new, up-to-date research looking at merit order effects across Europe.

"From the literature, the merit-order effect is clear and proven. It means wind reduces power market spot prices, and replaces CO_2 and fuel intensive production technologies, thus saving CO_2 emissions and fuel cost," says Fichaux. "The remaining question concerns the merit order effect at European level, that is, how much the average European consumer will save in the coming years. EWEA will focus on this aspect in the coming months."

Supply and Demand Curve for the NordPool Power Exchange



Source: Risø DTU



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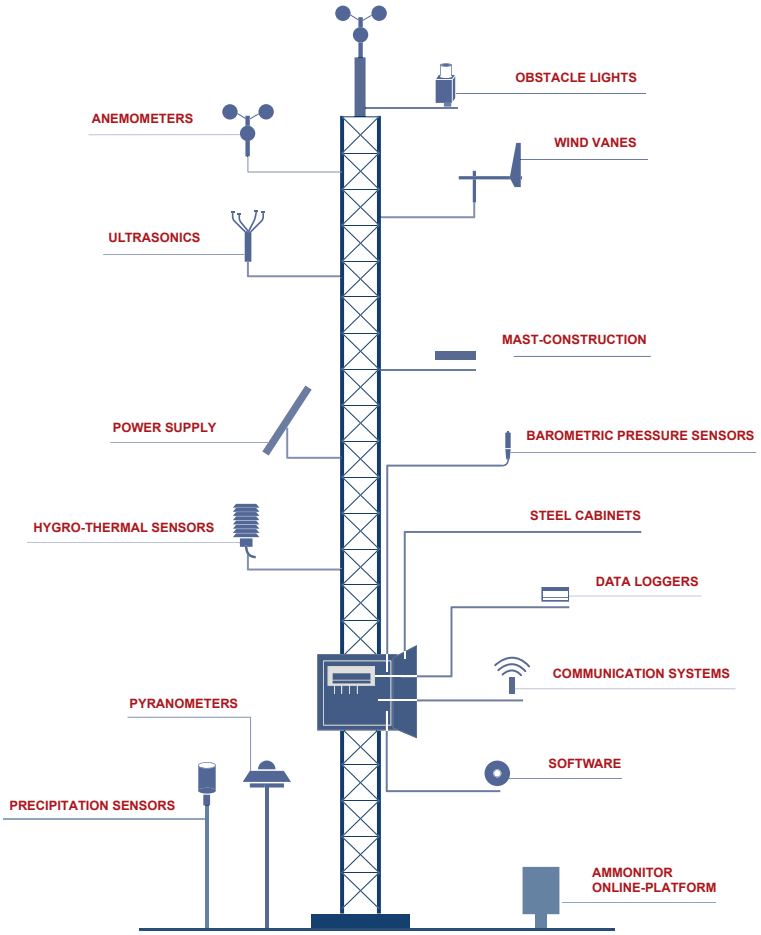

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Iconic wind turbine to help power a Canadian mountain

As Vancouver was strutting its stuff for the Winter Olympics, Chris Rose reports that wind industry representatives were putting the finishing touches on an unusual turbine high above the city.

Perched on the southern end of the Coast Mountains high above the city of Vancouver and its massive harbour that links western Canada with Asia is an inspiring sight that was shown off to the world watching the recent Winter Olympics.

In a first of its kind, the owners of the all-year-round Grouse Mountain Resorts decided years before the Olympics in February to tap into the growing green energy revolution by erecting a 1.5 MW turbine complete with a 20 storey high glass viewing platform capable of providing breathtaking 360 degree panoramas of alpine ridges, the mighty Pacific Ocean and the streets of Vancouver, which has repeatedly been named the most livable city in the world.

That this event occurred in the western Canadian province of British Columbia, which boasts untold levels of reasonably cheap hydro power from its many fast-flowing rivers channelling abundant snow melt and seemingly limitless rain to the ocean is all the more remarkable.

Yet the Eye of the Wind project makes a certain amount of sense considering that Grouse Mountain has already been carving out an image as an environmentally-friendly commercial tourist attraction for a long time. And, as if it were the icing on a cake, the new wind turbine, driven primarily by winds coming from the northwest, is expected to provide 25% of Grouse's total annual electricity needs, or the equivalent power used in 260 average Canadian homes.

"Vancouver now has a new icon. A beacon that will show the way into the future."

One thing the Eye of the Wind is not is boring. Indeed, at about 1,273 metres above sea level, perhaps the highest point of the local mountains looming over Vancouver, the turbine and its viewing platform can be seen from vast distances on all but the cloudiest days. Surrounded by steep ridges, snow-covered slopes and forests of cedar, fir, hemlock and spruce, the Leitwind LTW77 turbine manages to be both unexpectedly jarring and futuristically majestic at the same time.

Coffee shop discussions and media reports about the project indicate there is great interest in Metro Vancouver's first commercial wind turbine. It also didn't hurt the project's profile that the turbine was erected in time for story-hungry international journalists and camera operators arriving to cover the Winter Olympics.

This interest was not lost on B.C. Premier Gordon Campbell when the Eye of the Wind was inaugurated shortly before the Vancouver Olympics, which went on to earn a television audience measured in the billions, began.

"Wind power is an important part of building BC's clean energy future," Campbell, a promoter of a green revolution that reduces the carbon footprint in the atmosphere while creating new jobs, said in a news release. "Congratulations to Grouse Mountain for leading the way in adopting this clean source of power and showing the world the potential for wind energy in British Columbia."

Stuart McLaughlin, CEO and President of Grouse Mountain Resorts, said at the inauguration that the turbine will help the resort continue to balance ecological and economic responsibility in a transformative way.

"Our sustainability revolution began two decades ago and, since then, we have pursued alternative power sources to become more energy self-sufficient," McLaughlin said in the press release. "The Eye of the Wind will inspire visitors who ascend Vancouver's most celebrated

Number-crunching the Eye of the Wind

Tower

Overall height: 65 metres
Made of structural steel in three sections
Weight: 133,946 kg

Blades

Blade material: fibreglass reinforced polyester
Swept area of blades: 4,657 square metres
Blades: 5,530 kg each, 37.3 m long

ViewPOD™

Diameter: 7 metres
Height: 5.5 metres
Weight: 13,600 kg
Capacity: 36 people
Framework: Structural steel and glass
Glass: Tempered: 2.5 cm
Viewing area: 360 degrees (all points on the compass)

Lift

Capacity: 7 people per passage
Speed: 1.6 metres/second
Travel-time to top of tower: 25 seconds

Generation system

Output: 1.5 megawatts
Model: Leitwind LTW77
Cut-in wind speed at sea level: 2.7 metres/second
Cut-off wind speed at sea level: 25 metres/second
Output capacity per year: Enough energy to supply the needs of 400 homes.

Source: Grouse Mountain Resorts

The Eye of the Wind is nearly 1,300 metres above sea level
Photo: Leitwind

peak each year to return home to begin a quiet revolution of their own."

Helping Grouse develop the project was Italy's Leitwind Technology, which is part of the Leitner Technologies Group, a company involved with ropeways and snow groomers since 1888.

Leitwind CEO Anton Seeber said making the project become a reality required a cohesive team effort beginning with design, continuing through manufacturing and ending with installation on top of the mountain in autumn 2009.

"My gratitude goes to all the extraordinary people around the world who believed in this project and worked on it," Seeber said in the press release.

Located 20 minutes from downtown Vancouver, Grouse Mountain is said to be the area's most frequented commercial tourist attraction with more than 1.2 million visitors annually.

Getting to the new turbine from the resort car park takes 40 minutes, beginning with a 1.6 kilometre ride on North America's largest aerial tram to Alpine Station at 1,128 metres above sea level. Once there, a short walk uphill takes visitors to the Peak Chair, a lift that guides skiers, snowboarders and other visitors to even further heights. Another short walk is then needed get to the bottom of the new turbine, which has been erected on one of the few flat areas on the mountaintop.

According to Grouse Mountain, which is striving to become energy self sufficient and carbon neutral by 2020, the various elements of The Eye of the Wind were sourced from 10 countries spanning four continents.

Julia Kossowski, the wind turbine project manager for Grouse Mountain, said constructing the Eye of the Wind required overcoming formidable design and logistical challenges.

"There's the design side and the logistics side and both brought with them unique challenges that took extra time to resolve," said Kossowski.

Building the foundation was one of the early challenges and required a two metre high and eight metre wide reinforced concrete base with anchors embedded as deep as 15 metres into the bedrock.

The blades were carefully lifted by helicopter Photo: Grouse Mountain Resorts

Transporting the three 37.3 metre long LM Glasfiber blades from Denmark to the top of the mountain was perhaps the most complex part of the assembly. After being shipped by freighter to a dock southwest of Vancouver, the blades were barged to Indian Arm, a deep fjord near to Grouse. From there, a giant helicopter gingerly lifted the blades to the construction site.

Built in Washington State, just across the US-Canada border, the tower was comprised of three sections, each nearly 20 metres long and weighing up to 45,000 kilograms apiece. Special low-bed trailers were required to transport the tower sections along highways and local streets. The sections were then "navigated at a walking pace" up Grouse's 13 kilometre back road.

The customised "viewPOD" platform, a steel and glass capsule which is accessed by a seven-person elevator and holds up to 36 visitors, was built in France, put on a freighter to eastern Canada and hauled to the west coast by train. Located directly beneath the hub of the blades, the viewPOD, which has a glass floor, turns when the wind direction changes. Visitors to the viewPOD – a visit costs $70 Canadian (€50) – have been heard to say it is at first a somewhat disconcerting experience to see the huge blades moving quietly by the glass windows.

In all, 17 trucks were needed just to carry the massive construction crane used in the Eye of the Wind assembly. Not including the crane, close to 200 tonnes of material had to be transported to the building site.

"The Eye of the Wind is the only one of its kind in the world equipped with an elevator accessing a panoramic viewPOD, providing a close-up view of wind energy at work," the press release says, adding the new structure, "forever changes the face of alternative energy in British Columbia."

That may be a good thing considering that BC, blessed with ample hydro power, currently has only one operating wind farm. Located in northeastern part of the province, the Bear Mountain Wind Park became the first fully operational wind farm in BC last autumn. It is expected to provide up to 220 gigawatt hours of power to the BC Hydro grid, enough to power about 20,000 homes.

There is growing interest in developing wind power in the province. In December, NaiKun Wind Energy Group Inc. announced it had been granted an Environmental Assessment Certificate from the British Columbia Environmental Assessment Office for its 396 MW offshore wind energy project in northwest BC, paving the way for the construction of Canada's first offshore wind energy project.

According to Grouse Mountain, its new wind turbine is completely privately funded without any subsidies. "The result is an engineering marvel that will change the way visitors think about sustainability," said the release. "Vancouver now has a new icon. A beacon that will show the way into the future."

Kossowski said the turbine is symbolic of the mountain's philosophy, which aims to find a balance between ecological and economic needs. It is also, she added, an opportunity "for BC to see and learn more about wind power up close and personally."

As part of its overall strategy, Grouse notes that the Eye of the Wind project demonstrates some of the efficient renewable resources available to society today that can help make the world a better place for future generations.

"Is it possible?" a Grouse informational pamphlet asks. "As writer and cultural anthropologist Margaret Mead so famously said, 'Never doubt that a small group of thoughtful, committed people can change the world. Indeed it is the only thing that ever has'."

Partners of the Eye of the Wind

Company Name	Country	Contribution
Grouse Mountain Resorts	Canada	Host
Leitwind	Italy	Wind turbine supplier
Leitner Poma	USA	Electrical, internal tower components
TBailey, Katana Summit	USA	Tower manufacturer
Katana Summit	South Korea	Tower material supplier
Shriram Leitwind	India	Generator and electrical components
Sigma Composite	France	viewPOD
Kone	Finland	Elevator
LM Glasfiber	Denmark	Wind turbine blades
Leitner	Austria	Machine carrier and hub assembly

Source: Grouse Mountain Resorts

In 2010, *Wind Directions* is going back to basics. Each issue this year will take a closer look at one of the fundamentals of wind energy.

New wind turbine designs

By Elke Zander

Are floating turbines the future of offshore wind?
Photo: Siemens

In recent years, the way the largest conventional wind turbines are designed has been particularly affected by the emerging offshore market. Many of the most innovative wind energy systems proposed now target the offshore market.

It has long been acknowledged that some of the design elements of a wind turbine installed offshore are fundamentally different from those installed onshore. For instance, the non-turbine elements of an offshore project represent a much higher proportion of the capital cost, acceptable noise levels are higher offshore since there are no people living nearby, and higher levels of reliability are required as accessing the turbine for maintenance is more difficult and costly.

These differences have already influenced the design of wind turbines used offshore, and they are leading to the development of wind turbines specifically designed for offshore use. These turbines have features such as larger rotors and rated power, higher rotor tip speeds, sophisticated control strategies and electrical equipment designed to improve grid connection capability.

For more than ten years, in both the EU and the US, exploratory research has been carried out on floating offshore systems and the preliminary development of design tools for modelling a wind turbine system on a dynamically active support that is affected by waves. Until recently, such technology was considered far in the future. However, interest has accelerated and some demonstration projects have been announced, due to the interest in accessing resource areas that are in deep water yet often near the shore. But the technology could also lead to the development of standard equipment relatively independent of water depth and seabed conditions, easier installation and decommissioning and the possibility of system retrieval as a maintenance option.

"Offshore-specific turbines have features such as larger rotors and rated power, higher rotor tip speeds, sophisticated control strategies and electrical equipment designed to improve grid connection capability."

The first full-scale floating wind turbine pilot was erected by the Norwegian energy company StatoilHydro some 10 kilometres off the coast of Norway in 2009. The project is a pilot for the Hywind concept developed by Statoil which allows placing wind turbines to be placed at ocean depths of 120-170 metres. The turbine will be tested over a two-year period. The project uses a 2.3 MW Siemens turbine installed on a floating base of the kind previously used for production platforms and offshore loading. The floating structure is made of a steel cylinder filled with a ballast of water and rocks. It extends 100 metres beneath the sea's surface and is attached to the seabed by a three-point mooring spread.

Breaking down the barriers

Surprising results from new research on the obstacles to wind farm development across Europe.

By Sarah Azau

In many European countries developers could wait anything from a few months to over a decade to see their planned wind farm completed, and the most developed wind countries may be those where it takes the longest.

Those are some of the preliminary findings from the first ever EU investigation of the administrative and grid barriers to wind energy projects, in the form of an EU-funded project coordinated by EWEA.

"According to our results the average time from start to finish of a project in the EU – what we call the 'lead time' – is four years and seven months, including both the building consent and the grid connection", explains Dorina Iuga, Project Manager at EWEA. "However, there was a considerable range of times in several countries, with the shortest being three months and the longest, 13 years."

One of the most unexpected trends to emerge from the project so far is that the more mature wind countries often have longer lead times.

"The biggest surprise is Spain, which has the highest average lead times in Europe at over six years according to our results", says Sune Strøm, project partner from the Danish Wind Industry Association, whose task is to analyse the results on the administrative barriers. "On the other hand, less mature wind countries such as Finland, Austria and Romania have much lower averages".

What could be the reason for this seeming contradiction? Although the final analysis has not been completed at the time of writing, Strøm suggests the less mature countries had probably done background work for the projects in advance and could have got the support of their governments.

"It is also possible that in countries where there's high wind deployment, there are more project applications, which then create bottlenecks", muses Benjamin Pfluger from the Fraunhofer Institute, which designed the survey used in the project.

Surprisingly, project lead times are longest in Spain

Photo: Keenpress Publishing/Sisse Brimberg & Cotton Coulson

Emilien Simonot from Spain's Asociación Empresarial Eólica (AEE) is analysing the results on the grid barriers, and suggests that "Maybe there is too much demand in Spain for the same grid connection point, which slows things down".

All those involved in the project stress that these are for now only possible reasons for the findings, which are themselves a sample of all the wind farms in Europe.

The project itself, known as 'Wind Barriers', was based around a two-part questionnaire that was sent to developers around Europe, and could only be applied to projects that came online in 2007 and 2008. Each of the two parts - administrative barriers and grid barriers – contained several subheadings, or "indicators" that the project partners used to measure different aspects of the barriers.

Wendelin Macht from Fraunhofer was involved in computing the data. "The shared administrative and grid indicators were the lead times, the number of authorities or operators to deal with, the percentage of costs spent on the administrative or grid process and the perceived transparency of the process. For the administrative indicators we also added the perceived attitude of the authorities."

Alongside this was a more open question on what developers perceived the worst potential bottlenecks to be, in order to gather some qualitative data.

"In the end we managed to gather results from around 200 projects from the 22 different EU countries that installed wind capacity in 2008 – so everywhere except Malta, Luxembourg,Latvia, Slovenia and Cyprus", says Iuga. "For 12 of those 22, we have six projects or more, and our results come from projects worth over half of the total MW installed in 2008, which means they should be pretty representative".

The researchers found that sometimes the results turned common assumptions on their head. One example concerns renewable energy support systems.

EWEA

wind barriers

Intelligent Energy Europe

Description

The aim of the Wind Barriers project is to gather up-to-date and comprehensive information on the administrative and grid access barriers that obstruct the development of wind energy in Europe. The project will measure how long the administrative part of onshore and secondary offshore wind projects take in different countries, as well as the costs and difficulty involved, and the overall success rate. It will run until November 2010.

The first results of the project are being presented in more detail at EWEC 2010 at a side event where Polish representatives and consortium partners will present results from the first studies conducted by Fraunhofer ISI, the Danish Wind Industry Association (DWIA) and the Asociación Empresarial Eólica (AEE).

Practical information

Date: Side event at EWEC, Thursday 22 April
Title: Assessment of administrative and grid access barriers for wind development in Europe (Wind Barriers)
Time + place: Room D, 14:00–18:00

Grid access times in Europe vary from two months to four years
Photo: Getty Images

"Often people think that quota systems lead to complex administrative procedures and this is what could make them less effective than feed-in tariffs", explains Pfluger. "But Wind Barriers has found that in countries with quota systems - such as the UK and Italy – the administrative procedures were perceived as more straightforward than the average."

On the grids side, the complexity of the application procedures varies substantially from country to country.

"In Denmark, developers contact under five entities to get their grid connection, as the operators of the grid carry out part of the application process themselves", says Simonot. "But in Portugal, developers make all the applications, and they have to contact over 150 bodies". This appears to have an effect on the time it takes to obtain the access, with Denmark the quickest – two months on average, and Portugal one of the slowest, at nearly four years.

He suggests several reasons for these differences in timing, including the length of the grid connection line, the level of public support, and the number of different properties the line would have to pass through, and above all the available grid capacity.

"In countries like Poland and the Czech Republic, we see that insufficient grid capacity has actually prevented projects from going ahead".

The main bottlenecks were perceived by developers to be passing the Environmental Impact Assessment, spatial issues – that is, getting the land necessary – and problems with public opposition, which could also lead to law suits.

The results of the survey will be analysed and explained in further detail in an upcoming Wind Barriers report. They will be accompanied by recommendations on overcoming the different barriers at EU and national level.

The report should be launched in June so that the recommendations can be used in the National Renewable Energy Action Plans, to be handed in by 30 June 2010. Strøm already has ideas of what might be included in the recommendations.

He suggests that planning authorities should carry out long-term spatial planning that includes specified areas for wind farms. Similarly, having a one-stop shop rather than having to consult lots of different entities would streamline the process.

"There also needs to be public access to environmental studies covering wind turbines and their surroundings as well as shared experiences across the member states on good practice for the decision-making process, which could then lead to an optimised decision-making process being designed", he adds.

The research results are of course merely a sample, and Benjamin Pfluger sounds a note of caution when he stresses that other factors that potentially influence wind project lead times, such as capital availability, could also have been investigated, but were not part of the scope of the project. However, he and all the project partners are strongly enthusiastic about the quality of the results and how useful their findings will be.

"It is the most interesting project I've ever been involved in", concludes Pfluger. "The work we are doing is really relevant, as administrative and grid barriers can be a major problem in some countries".

It is clear that for the EU countries working towards meeting or surpassing their 2020 renewables targets, the more familiar they can be with obstacles that could delay the deployment of wind energy, the better.

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A closer look at **Lithuania...**

In 2010, *Wind Directions* will take a look at a selection of the developing wind energy markets with the most potential.

By Zoë Casey

Lithuania is on the verge of a second wind power boom. A relative late comer to the wind power scene, the country gained its first wind farms in 2006 with 42 MW installed over the course of that year. Growth then flattened out, with just a handful of MW added each year until 2009 when a remarkable 37 MW of additional wind power capacity came online.

Today, the total Lithuanian wind energy capacity stands at 91 MW. "This is an impressive rate of growth," Jacopo Moccia, Regulatory Affairs Advisor at EWEA said. According to EWEA's calculations, by 2020 the country could have up to 1,100 MW in place, which would mean approximately 85 MW of new capacity installed each year up until then.

With a wind power boom in sight, Lithuania is well on course to meet its 2020 renewable energy target – a 23% share of renewable energy in the overall mix. Right now wind power accounts for just under 2%, but this should rise to 13% by 2020. A government document forecasting the increase in renewable energy said: "In Lithuania, wind turbines are one of the fastest growing renewable energy technologies".

Not only is the government's drive to boost renewable energy spurred by EU targets, but also by Lithuania's dependence on Russian gas for its electricity and heating.

Up until the end of 2009, Lithuania was self-sufficient in energy with one nuclear power plant meeting about 70% of the country's electricity demand. However, the Ignalia plant was doomed since it was designed along lines very similar to those of the failed Chernobyl plant. In its 2004 European Union accession agreement, the Lithuanian government agreed to shut down the plant – and this happened at 11pm on 31 December 2009 – leaving an energy vacuum for Gazprom to fill.

Lithuania needs 23% renewables by 2020

Photo: Reporters/Laif

Lithuania's dependence on Russia is heightened by the fact that its electricity grid has little interconnection with other countries in central or northern Europe, making it, effectively and energy island.

From 2007, the government set out to incorporate renewable energies in its national energy strategy. National laws include a feed-in tariff of around €87 per MW. The country's wind farms are mostly situated near its Baltic coast, and in the southern region.

Although Lithuania's shores border one of the biggest prospective sources of energy in Europe – offshore wind power from the Baltic Sea – the country is yet to explore offshore wind. Before this can happen, new rules must be designed to support offshore wind power and new infrastructure must be built. With this untapped source of energy on its doorstep, the country's potential for wind power could rise considerably, starting from 2020 or 2030.

Lithuania – the wind energy facts

NATIONAL EU RENEWABLES TARGET	23% in 2020, up from 15% in 2008
CURRENT INSTALLED WIND ENERGY CAPACITY	91 MW
SUPPORT MECHANISM	Feed-in tariff

Where are the women in wind?

Mature and booming as it is, the European wind industry of 2010 remains overwhelmingly male. Chris Rose set out to investigate why this is, and what, if anything, needs to be done to rectify the balance.

At first glance, nothing seems amiss in the busy convention hall.

Throngs of motivated people are getting ready for the keynote speakers. There are handshakes, hellos and business cards. The agenda timetable is scrutinised.

The wind power conference seems like it will be another positive event. And yet, it takes a few minutes to realise something in the unfolding scene is slightly strange: it is overwhelmingly male.

The gender imbalance is underscored when the speakers – eight men and one woman – begin talking about how the wind power industry is trying to replace old, traditional power-generating players with new values for the 21st century.

Who among you has not let their eyes wander about a conference like the composite one just discussed and wondered why there aren't more women in attendance or on the podium? Wondered why it is mostly men who are the keepers of wisdom? Wondered why gender equality, such an ingrained legal and moral principle, has yet to make the same sort of inroads in the engineering- and technology-based wind power sector as it already has in law, medicine and the humanities?

In interviews for this article, several common threads became apparent. None of the female interview subjects complained about their jobs. None said they had experienced overt work-place sexism, discrimination or boorish behaviour because of their gender. All noted that the sector had been a good and nurturing fit for them.

Yet there was agreement that the low percentage of women in the sector was problematic. Their comments echoed a

Women working in the wind industry are still few and far between
Photo: Keenpress Publishing/Sisse Brimberg & Cotton Coulson

Are women's work choices still influenced by persisting gender stereotypes? Photo: AWEA

"Looking out across a room of around 50 people, I realise once again that the phrase 'good morning, ladies and gentlemen' is not appropriate".

2009 European Commission report on the necessity of attracting and retaining talented women in science and technology in order for our complex knowledge-based society to become "one of the motors driving the next stage of economic progress."

Patrizia Kokot, a researcher at the London School of Economics' Gender Institute, notes it is important to stress that overall, women have made phenomenal strides in accessing the labour market. Women's employment rate across the European Union, for example, rose by about 7% in the past decade.

"This is great, however, a sizeable gender pay gap and a glass ceiling persist rather stubbornly," said Kokot, who has been conducting research on women's career advancement to partnership in professional service firms in Germany and the United Kingdom. She notes that women's gender pay gap across the EU is still around 17% and has even increased in some countries over the past year.

Kokot said that one of the main problems for women at work remains the double burden of being the primary caregiver for children and frequently the elderly. Although men contribute more to the domestic needs of families than they used to, a higher percentage of women find themselves working longer days – both at their jobs and in their homes.

There are a few things companies can do to improve gender equality at work, Kokot said. Incorporating flexible working arrangements for both women and men to acknowledge childcare needs is one. Another is tackling benevolent workplace sexism, she noted. Mothers are often overlooked when it comes to assigning challenging projects as employers don't want to burden them, but at the same time, this means losing out on important opportunities.

Kokot pointed to one-on-one mentoring as a great way to help women navigate through their career paths because it provides guidance while also introducing them to a broader group of people. "Social capital is really important at work," she said. "The wider the network, the wider the opportunities."

Kokot recognised that women now equal or outnumber men in accessing higher education in various fields such as the arts and education, but are still a notable minority in fields such as maths, engineering and technology.

However, she said that is not because young women can't apply for programmes in those fields but because females are often constrained in their choices by persisting stereotypes of masculinity and femininity. This begins early in a child's schooling and influences his or her possible career choices when they attend university.

Kokot said society benefits from gender equality at work and in the private sphere. "It's now our right to be included in all areas," she said, but "it's also good for business ... It's a good idea to have a diversity of backgrounds to access a wide range of ideas and opinions at work."

Even if the wind power industry is male-dominated, she said, as a relatively young sector, there are opportunities in creating more gender-neutral guidelines and steering away from existing limitations found in some more traditional industries.

"I think [the wind power sector] is an interesting new industry where we can look at improving the way we work," Kokot said.

Kristen Graf is the executive director of Women of Wind Energy (WoWE), a New York City-based non-profit organisation that promotes the development and advancement of women.

The WoWE website notes the rapid growth of the wind industry holds great promise for careers for women.

"Historically, women have been underrepresented in the wind industry," the website notes. "This fact affects not only women in our field or contemplating it, but also the wind industry as a whole. How will wind energy reap the full advantage of women's talents, energy, and ideas?"

Graf, who has a background in engineering, knows well of the male-female equality divide.

She said more than 100 females came to WoWE's first annual luncheon in 2005. Last year that number had increased to over 400. Women in the organisation support and mentor each other as a way of building a more sympathetic community in the wind power industry, she said.

Research indicates that many women in lower level jobs that require science,

"Research indicates that many women in lower level jobs that require science, engineering and technology backgrounds leave their careers long before retirement."

Photo: Suzlon

engineering and technology backgrounds leave their careers long before retirement. There is an extraordinary drop-out rate for women, Graf points out, compared to men.

"A lot of careers are built around the life cycle of men," Graf says, while women wrestle more with family [and] work-place balance issues.

She said that by the time men are reaching for executive careers in their mid-30s to early 40s, many women are dealing with the needs of both young children as well as their jobs and simply don't have the extra time required for work-place advancement.

Graf added many women in the wind power culture, as in other science- and technology-based sectors, are likely to feel some sense of isolation or non-acceptance simply because they have so few female colleagues.

Barbara Savini has a PhD in aerospace engineering and currently works for Garrad Hassan and Partners in Bristol, where she is an engineer helping to design controllers for wind turbines.

A scheduled presenter at the European Wind Energy Conference (EWEC) 2010, which is taking place from 20 to 23 April in Warsaw, Savini said that during the four university years she studied wind power and the close to two years she has been in the industry she has not experienced any gender equality issues that have held her back.

Savini says she does not know what can be done to get far many more women involved in, and promoted in, the industry.

"Honestly I don't know. I think it also depends on the specific area in [the] wind power industry," Savini said. "For example, I work in a very technical area and the lack of women is also due to the fact that few women choose to get an engineering degree and apply then for a technical job."

Alanna Wall, another scheduled EWEC presenter, also has a PhD in aerospace engineering and works for Canada's Institute for Aerospace Research in Ottawa conducting wind tunnel experiments.

Wall isn't sure if there are fewer women in the wind power industry than in other male-heavy sectors.

"I'm not really sure it's different. Traditionally it's a male-dominated field," said Wall.

"I'm often in meetings where I'm the only woman. It happens often."

Wall says the lack of females in the industry has not hampered her in any way. She does add that the wind industry would benefit by having more balanced perspectives and voices that improved gender equality could provide.

Amy Parsons, a conference manager at EWEA, has witnessed the gender chasm so many times that she is no longer surprised.

"Looking out across a room of around 50 people, I realise once again that the phrase 'good morning, ladies and gentlemen' is not appropriate here," Parsons says. "The only woman in the room is me. So, I adjust my welcome, and make a joke of it to break the ice. That's not to say that our conference, or indeed our industry, is completely

Photo: EWEA

There are roles for men and women throughout the industry, from factory floor to project development

Photo: EWEA/Brolet

devoid of women – rather that they are a relatively rare breed."

What surprises Parsons is that females are so noticeably absent in an industry which prides itself on being progressive and innovative.

"Fossil fuel industries have always been overwhelmingly male, and it's probably not a model we should be emulating. If we can be groundbreaking and forward-thinking when it comes to our product, why not also break the mould in terms of who researches, produces and distributes it?"

Although she is relatively new to the wind industry, EWEA research officer Athanasia Arapogianni who comes from Greece also wonders why so few women gravitate to the sector.

A mechanical engineer, Arapogianni remembers that about 70% of the students in her first undergraduate maths class at the National Technical University of Athens were male. Again, during her master's course in renewable energy, approximately 70% of the students were men.

She has asked herself many times why so few women get involved in sectors like wind power that require handling, processing and producing technical and practical information.

"For me, the reason [goes] back to the past," Arapogianni who says.

"Historically women were excluded for many years from any scientific source of knowledge. Starting from religious reasons, women could not have access to any group or community which was involved in researching and producing new knowledge. The picture has changed obviously since many decades ago. Several women became famous for their contribution to the physical sciences. But even now, women are not equal as men in terms at least of quantity in this sector."

She says many women believe that they can't make it in an industry that requires an educational background in maths, sciences and technologies.

"For some weird reason, they think that it is impossible. Men are considered to have a more analytical way of thinking and acting ... but [that] does not mean that women can't do it."

Jan Blittersdorf has been the chief executive officer of NRG Systems, a successful Vermont company that manufactures wind measurement equipment, for the past five years.

Blittersdorf has often realised she was the only women present at a wind-power-related event. "That is the story of my life," she said. "It's not a complaint, but it's typical."

She said the lack of women in the wind sector is a problem that needs to be dealt with. "It definitely needs to be talked about," she said. "What would be nice is if the wind industry could be an example."

Blittersdorf said women have to be more assertive about acknowledging their own skills but systems also have to be established at wind power workplaces to recognise their efforts.

"I think the leadership is needed on the males' part to recruit and retain women," she added.

EWEA
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Give Europe a breath of fresh air

Europe possesses an energy source which could power it seven times over: the wind. European companies are world leaders in wind power, generating thousands of jobs. Wind energy reduces Europe's dependence, and spending, on imported fossil fuels. It lowers electricity prices and emits no CO_2.

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Give Europe a breath of fresh air by adopting a wind turbine at www.ewea.org/freshair

Breath of FRESH AIR
www.ewea.org/freshair

Giving Europe a breath of fresh air

Help spread the message of wind energy, adopt your own turbine and read the hottest new blog with the new EWEA campaign.

By Sarah Azau

Photo: BRIS/Francois Jerome

Those attending wind energy events in the next year, flicking through an EU news magazine or passing through Brussels airport in June may well be struck by unusual images of toothpaste and chewing gum accompanied by the slogan: Give Europe a breath of fresh air.

Despite their appearance, the images are not advertising dental hygiene but wind energy: they are part of EWEA's new campaign, which is being launched at EWEC 2010 in Warsaw and will run for a year.

Refreshingly true

"The messages of the new campaign focus on three key advantages of wind: its contribution to security of supply, a strong and sustainable economy and a cleaner environment", explains Julian Scola, EWEA's Communication Director. "The idea behind the adverts and the slogan is that the wind is literally, of course, fresh air, but that at the same time it can give the figurative, refreshing 'breath of fresh air' to a Europe overly depending on polluting fossil fuel imports from unstable third countries".

In fact, the breath freshener mints are not just images but also real, consumable products made especially for EWEA's campaign. EWEC 2010 participants will be the first to taste a 'Give Europe a breath of fresh air' mint, which are being distributed throughout the four-day event. They will also be able to send a postcard home with the campaign text and their own personalised message, paid for by EWEA.

"Through this campaign we want to spread the word that wind is Europe's main indigenous energy resource, with a huge potential, and that it offers energy independence and saves the cost of importing fossil fuels, as well as creating jobs and avoiding CO_2", says Elke Zander, EWEA's Campaign Officer. "But it's also about fun, and communicating about the benefits of wind in an entertaining and easy way. EWEA is well-known for producing excellent research and sound policy proposals - now we want to win the hearts as well as influence the minds of decision-makers."

The main hub for information on the campaign is the dedicated website, www.ewea.org/freshair, which contains all the facts on the advantages of wind.

The website is also where the main participatory campaign action can be found: adopting your very own turbine.

Online activities

"The idea of adopting a turbine is that you choose a real one wherever you like in Europe on an online map, and your name will be added to it so that visitors can see it belongs to you", says Zander. "You can then tell your friends which turbine you have adopted and they can 'become a fan' of it – the turbines with the most fans will be listed on the website, and when the campaign comes to a close in EWEC 2011 in Brussels, the adopters of the most popular turbines will win prize: probably a weekend away where they can visit a wind farm".

Throughout the year, EWEA will take a kiosk to various events allowing those attending to adopt a turbine and, by doing so, show their support for giving Europe a breath of fresh air.

Another new online tool is a video available on the campaign website that gives the main facts

"The idea behind the slogan is that the wind is literally, of course, fresh air, but that at the same time it can give the figurative, refreshing 'breath of fresh air' to a Europe overly depending on polluting fossil fuel imports from unstable third countries".

EWEA's campaign will help the public discover the workings of wind energy
Photo: EWEA

and figures on wind energy, as does a campaign leaflet that explains the messages.

"In order to appeal to those who are less familiar with wind energy, we have created a 'how a wind turbine works' activity on the website. It explains how the turbine works, what each part of it does, and allows you to change different elements, such as the length of the blade and the wind speed, to see how that affects the power produced", says Zander.

The campaign website is accompanied by a new EWEA blog on www.blog.ewea.org – probably the first-ever EU wind power blog – that gathers the latest news on the campaign, as well as containing the hottest news and analysis on wind energy.

"Not only does the blog contain the latest updates from the campaign and wind industry, it is also a place where readers can share their points of view with other wind power enthusiasts", explains Zoë Casey, EWEA's Communications Officer, who runs the blog.

"EWEA is well-known for producing excellent research and sound policy proposals – now we want to win the hearts as well as influence the minds of decision-makers."

An eventful year

Various different events are being organised that link to the campaign. The first of these is Global Wind Day on 15 June. Although EWEA's partners around the world will organise events in their own countries, EWEA will coordinate everything and will itself organise a turbine blade being put up on the Rond-Point Schuman in the heart of the European quarter, right next to the European Commission. Alongside this an exhibition of turbine components will take place in a close-by park.

In September, Brussels' car-choked streets are traditionally closed for a day to motor vehicles, and on and around that day EWEA will set up a display of photographer Mark Edwards' 'Hard Rain' photos on climate change around the world, accompanied by a panel explaining what wind can do to help the climate.

"The idea behind these two events is to bring the campaign to the heart of the EU, and make it as visible as possible to those working in the EU area of Brussels. Who could fail to be impressed by the sheer size of a wind turbine blade, and want to know more?" asks Scola.

Starting in early summer, four other rather different events will also take place throughout the year. These will be high-level meetings in Brussels based around one of four important topics related to wind energy: jobs, climate change, grids and security of supply.

Joining in

EWEA hopes that the simple, impacting messages of the campaign, and the various events being organised, and the different interactive tools will bring the message of wind energy to a wider range of people across Europe and beyond.

"EWEA has rightly been very focused on presenting the arguments to the decision-makers taking the vital energy decisions: now we have the chance to spread the word to a wider audience and in a rather different way," concludes Scola. "EWEA is doing a lot of work to make the campaign as visible and hard-hitting as possible, but of course strength lies in numbers. To that end, we are encouraging our members and supporters to get involved and promote the campaign message by visiting the website at www.ewea.org/freshair, linking to it from their own sites, reading the blog at www.blog.ewea.org and adopting a wind turbine."

Some EWEA members are already planning how they can support the campaign.

"RES is pleased to see a strong and positive message to promote the wind industry to decision-makers, media and the public", said Anna Stanford, Head of Communications at RES. "Our European businesses will be supporting the campaign and making full use of the materials on Global Wind Day and throughout the year."

"We will widely publicise the campaign throughout the usual channels such as newsletters, press releases, publications and a great presence in all its events", announced Sergio de Otto, Communication Director of the Asociación Empresarial Eólica in Spain. "We want to take that "breath of fresh air" to all corners to raise awareness among public opinion and policy makers about what wind energy already is in our country and how much it still has to contribute to build a new energy model."

"We can all help give Europe that much-needed breath of fresh air", agrees Scola. "With climate change, air pollution, our dangerous and expensive dependence on imported fossil fuels, and the economic crisis Europe certainly needs a breath of fresh and we all know wind power can offer it."

EWEC: new name, same premier quality

As from 2011, the annual European Wind Energy Conference (EWEC) will change its name to be the 'EWEA annual conference and exhibition' ('EWEA 2011').

"The reason behind the change is to align EWEA's events more closely with its identity as an association", explains Malgosia Bartosik, EWEA's Head of Conferences and Events. "This way, the world's premier wind energy event will be indelibly branded with EWEA's very distinctive identity".

The name change results in a slight change to the existing logo. The change is being officially launched at EWEC 2010 in Warsaw, and will be rolled out across all EWEA's events as from 2011.

For more on EWEA's upcoming events: www.ewec2011.info; www.offshorewind2011.info

EWEA 2011 BRUSSELS
EUROPE'S PREMIER WIND ENERGY EVENT

OFFSHORE 2011 AMSTERDAM
ORGANISED BY EWEA

Global Wind Day coming soon

With just two months to go, Global Wind Day 2010 is coming together. Many different activities – from wind farm open days to competitions and shows – are being planned all over the world, to spread the message of wind energy far and wide.

"The upcoming Wind Day looks to be the most exciting yet", said Elke Zander, EWEA's Campaigns Officer. "Anyone who wants to join in can check out the windy activity happening nearest them on the interactive website map – have a look at www.globalwindday.org!"

Global Wind Day is on 15 June, with events taking place on and either side of the official date.

Photo: EWEA

Grids 2010 exhibition sales open to members

GRIDS 2010 BERLIN
ORGANISED BY EWEA

The exhibition space for the Grids 2010 conference is now open to members only on a first-come, first-served basis on www.ewea.org/grids2010/exhibition.

The two-day event, to be held from 23-24 November in Berlin, will look at the issues surrounding the upgrading, extending and connecting of Europe's electricity grids.

Registration for Grids 2010 will open in May. The full conference programme, with details of all sessions and speakers, will be available on www.ewea.org/grids2010 by the end of June. Please note that there will not be a call for abstracts.

All-new EWEA Members' Lounge online

EWEA has relaunched its online pages reserved exclusively for members on www.ewea.org, making them easier to navigate, with even more specialist information on the wind industry and the latest EU policy news.

"The Members' Lounge has always been the first port of call for the extra information and extended service we provide only to members", explains Anna Hedrzak, EWEA's Head of Sales and Membership. "But we wanted to make it even more user-friendly and helpful, so we have refreshed the whole area to ensure our members have the best online experience possible".

The Lounge is now structured around the five key EWEA membership benefits – making the right connections, obtaining key information, getting massive discounts, improving your profile and visibility and influencing policy. It contains information on the EWEA working groups, presentations made by EWEA staff at different events, the latest members-only newsletters, plus photos and an explanation of the roles of the EWEA team and the members' directory.

For more information log onto the Members' Lounge on www.ewea.org.

2011 events: space selling quickly

Exhibition space is also selling out fast for the European Wind Energy Conference 2011 in Brussels, and the European Offshore Conference 2011, to be held in Amsterdam.

For more information on the exhibitions, or to book your stand, contact Sanna Heinonen, sh@ewea.org, tel: +32 2 400 1093. Sponsorship opportunities are also available at all three events: contact Christi Newman, cn@ewea.org, tel: +32 2 400 1056.

For more information on the events, see www.ewea.org/grids2010; www.ewec2011.info and www.offshorewind2011.info.

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THE RENEWABLE ENERGY WORLD NETWORK IS OWNED BY PENNWELL.

Zooming in on EWEC 2010

By Sarah Azau

The European Wind Energy Conference is a highlight of the wind energy year, where thousands of industry members, business people and decision-makers come together not only to discuss and debate the political, technical, scientific and financial issues surrounding wind energy, but also to renew old contacts, make new connections and take forward their business.

EWEC 2010 is kicking off in Warsaw on 20 April. As it opens, Sarah Azau takes a peek at what is in store.

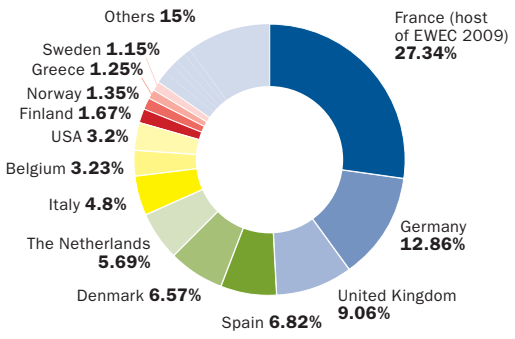
Dynamic debate

The issue set to spark lively debate at EWEC is: can wind power generate half of Europe's electricity by 2050? Climate policies – including financial and regulatory incentives, moving offshore wind to the industrial stage, the development of global markets for wind energy, rotor aerodynamics, wind resource assessment, are among the issues on the agenda at the EWEC 2010 conference.

Photo: EWEA

"With a raft of important initiatives that will shape the long term future of the industry – from ENTSO-E's 10 year development plan, to the European Commission's North Sea Grid Blueprint and the continued global climate negotiations – 2010 is another vital year for wind energy," said Christian Kjaer, EWEA Chief Executive.

EWEC 2009 participants – breakdown by country



EWEC goes east

For the first time this year, EWEC is being held in Eastern Europe.

"We are very pleased to bring EWEC to Poland, a country with huge wind energy potential and strong market growth", said Malgosia Bartosik, Head of Conferences and Events.

Jarosław Mroczek, President of the Board of the Polish Wind Energy Association (PWEA), added that, "PWEA will have the utmost pleasure in hosting the European wind industry during EWEC 2010. The selection of Poland as a host of the most important wind energy industry event is proof that the wind resources in this part of Europe are rich and attractive to the market players."

On 19 April, a 'Polish Day' was held, giving attendees the opportunity to participate in a number of sessions dedicated to the Polish wind energy market.

Photo: Warsaw Destination Alliance

"An important milestone for the development of wind energy is EWEC, organised by EWEA. In 2010, the event will be held in Poland, and will be a unique opportunity to exchange views and experiences related to the use of renewable energy sources, identify the obstacles currently facing the industry and develop solutions to overcome them."

Waldemar Pawlak,

Deputy Prime Minister, Minister of Economy, Poland.

Poland is one of the fastest growing newcomers to wind
Photo: Keenpress Publishing/Sisse Brimberg & Cotton Coulson

Wind energy in Poland

The total installed wind energy capacity in Poland reached 725 MW in 2009. Poland needs to source 15% of its energy from renewables by 2020 to meet its EU binding target.

The Polish Wind Energy Association estimates that onshore wind capacity may reach 2,000 MW by 2010, 5,000 MW by 2015 and 12,000 MW by 2020.

Photo: EWEA

Photo: EWEA

Mixing business and pleasure

EWEC is almost as well known for its range of social events as for its cutting-edge political and technical discussions. In Warsaw, EWEA members will have the chance to relax over a drink in the 13th century Royal Castle on Monday, while all conference participants are invited to try a top-quality Belgian Trappist beverage at the Beer Reception and discover the Palace of Culture and Science – Poland's tallest building – at the Conference Reception on Tuesday, and relax at the Exhibition Reception on Wednesday. Thursday's gala dinner at Warsaw's University of Technology will round off the week in true style.

Catch up with the latest news straight from EWEC 2010 on **www.blog.ewea.org**.

EWEC panels will look ahead

EWEC is a chance to take stock, and look at how far our industry has come. But it is also an opportune moment to look ahead, and discuss the direction in which we are heading, how we get there, and what this means for wind energy in the short, medium and long term.

Five panel sessions will bring experts together to examine the sector's prospects from varying perspectives.

Visionary minds – Tuesday, 20 April
Taking a running jump into the future, the vision panel, made up of CEOs of leading wind energy companies, will consider the shape of wind energy in 2050. Is providing 50% of Europe's electricity a feasible concept?

Financing the future – Wednesday, 21 April
This finance panel debate – including senior figures from banks and investment institutes – will ask tough questions about who will pay for the development of wind energy, and how.

Advancing technology – Wednesday, 21 April
The technology panellists, from industry and research bodies, will bring us to the year 2030, with a discussion of the technological innovations that should be supporting the expansion of wind energy.

Policy power – Thursday, 22 April
The National Renewable Energy Action Plans (NREAPs) will be at the forefront of this session, which will look at their implementation. What is needed to ensure that wind power is integrated on a large scale?

Routes for research – Thursday, 22 April
The first ever EWEC panel dedicated to discussing progress in the fields of science and research. It will focus on the European Wind Initiative, which will be launched in Spring 2010.

Number crunching

7,000 .....expected participants
5,800 .....m² of exhibition floorspace
500 .....oral and poster presentations
200+.....leading wind companies exhibiting
50.....sessions and side events
1.....must-attend event

"We hope that the decision to organise EWEC 2010 will be a catalyst for the dynamic development of this sector in our country. We are aware how much must be done in Poland for wind power to reach its deserved position."
Jarosław Mroczek, President of the Board, PWEA – the Polish Wind Energy Association

Direct drive options challenge gearboxes

By Crispin Aubrey

At the end of last year, near the Danish headquarters of Siemens Wind Power, a new prototype 3 MW turbine started to generate power. Its significance came from the fact that for the first time, the world's sixth largest turbine manufacturer had chosen to dispense with a gearbox. Could this represent a shift towards gearless direct drive technology across the wind industry?

The concept of direct drive is not new, but its attractions have been emphasised in recent years by two factors. One is the issue of gearbox reliability, with a number of prominent failures in one of the most expensive components in a wind turbine. The other is the development of new, cheaper and more efficient permanent magnet generators (PMGs), ideally suited to direct drive systems.

More than 85% of grid-integrated turbines currently sold worldwide still use a gearbox to convert the relatively slow rotational speed of the rotor into the high speed required to drive a generator and produce grid-compatible electricity. In a direct drive configuration, on the other hand, there is no gearbox and the rotor is directly connected to a low speed multi-pole generator which rotates at the same speed. These generators are traditionally heavy and bulky, hence the distinctive bulbous shape of the nacelle in turbines such as those produced by German manufacturer Enercon.

"It's a secure hard fact that if you don't have a component you don't have any maintenance or failures associated with it."

Enercon has employed direct drive technology virtually from the company's inception, and its turbines have been successfully installed around the world in their thousands. The company uses a traditional synchronous generator rather than a PMG, and has developed direct drive systems for models up to a capacity of 6 MW. But although a number of new entrants to the wind power market have attempted to follow a similar route, none have achieved anything approaching the same level of commercial success. Most of the other large turbine suppliers have stuck rigidly to the gearbox.

What has altered the direct drive landscape is the emergence of a new generation of permanent magnet generators, says Peter Jamieson, Principle Engineer at GL Garrad Hassan. High strength rare earth magnets used in PMGs have significantly reduced in price, he explains. This has helped make the PMG comparable in weight to, or lighter than, the Enercon type design, in which a wound rotor is excited to create a magnetic field.

PMGs also have the advantage that they operate more efficiently when the turbine is working at partial load. This is in addition to the underlying bonus of direct drive that it avoids the necessity of having a gearbox. "It's a secure hard fact that if you don't have a component you don't have any maintenance or failures associated with it," says Jamieson. This is particularly significant when turbines are placed far out at sea, where maintenance costs are higher.

All this has encouraged one of the largest new Chinese turbine manufacturers to follow the direct drive route. Using technology adopted from the German company Vensys, both of the large turbine models manufactured by Goldwind – of 1.2 and 1.5 MW capacity – use direct drive with PMGs. So will its 2.5 MW model when it reaches serial production. The company was the second largest supplier in China in 2008, and has just seen its first machines installed in the United States.

The major issue with direct drive continues to be the weight it will potentially add to the platform at the top of a turbine's tower – and the cost involved. "As a broad rule of thumb, manufacturers talk about an additional capital cost of about 10% for using direct drive," says Jamieson. "But there's a lot of development going on to produce lighter designs, some by more innovative structural solutions, some by different configurations of the electrical machinery."

This is where Siemens says it has made a breakthrough. "We have managed to solve the weight problem to such an extent that the nacelle of the new 3 MW DD has a lower weight than our standard 2.3 MW nacelle," says Henrik Stiesdal, Chief Technology Officer of Siemens Wind Power.

Siemens started seriously investigating direct drive options several years ago. "The obvious advantage is a simplified design," says Stiesdal.

Gearless wind turbines should reduce maintenance costs
Photo: Siemens

"With fewer moving parts direct drive technology has the potential to reduce maintenance costs, which could result in higher turbine availability.

"The main drawback of a classical geared turbine is the complexity of the gearbox - a typical gearbox for a large wind turbine has three phases, two planetary phases and one helical phase, with a total of 13 gears and pinions and 22 bearings. To ensure trouble-free performance for 20 years for such equipment, complex supporting systems are required, including a sophisticated oil conditioning system that maintains clean, cool and water-free lubrication at all times.

"Siemens has been producing geared wind turbines since 1980 (originally under the brand name Bonus) and despite occasional issues with gearboxes the company has always been happy with the technology. However, we also realised that for large wind turbines direct drive generators might in serial production become competitive with geared solutions. If this were to be the case then the simplicity and robustness of the direct drive technology would have a decisive advantage offshore."

By 2008 the company's engineers had come up with two alternative "proof-of-concept" 3.6 MW designs, using two different types of generator. Research on these designs has now been translated into the 3 MW DD commercial machine, scheduled to be launched on the market later this year. Siemens says that it opted for this size in the end because its development work showed that a direct drive concept would be commercially viable for the "high end, high volume" market, not just offshore. "We expect that the 3 MW DD turbine will prove competitive with our 2.3 MW volume turbine series using geared technology," says Stiesdal.

The new 3 MW design will therefore be available in both onshore and offshore versions. As importantly, according to Stiesdal, it will be competitive with other turbines on the market. If it does prove a success, this will add further weight to the forecast by Danish consultancy BTM Consult, in its latest supply chain report, that direct drive could increase its share of the market from the current 12-13% to 20% by 2013.

For more information: www.energy.siemens.com

Events

Windpower 2010 Conference & Exhibition
23-26 May 2010
Dallas, Texas, US
http://2010.windpowerexpo.org

Power-Gen Europe Conference and Exhibition
8-10 June 2010
Amsterdam, The Netherlands
www.powergeneurope.com/index.html

Global Wind Day
15 June 2010
Events all around the world
www.globalwindday.org

GRIDS 2010 BERLIN
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Berlin, Germany
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Spain flies high

Spain was one of the very first countries to develop wind energy in a big way, and is still going strong, installing more new wind capacity than any other EU member state in 2009. Spain also holds the EU Presidency until 30 June 2010. Sarah Azau spoke to Spain's Secretary of State for Energy, Pedro L. Marín Uribe.

Photo: Spanish Energy Ministry

Spain is holding the EU Presidency until July 2010, during which time the member states will submit the National Renewable Energy Action Plans outlining the steps they will take to meet their binding 2020 targets. In terms of renewable energy, what are Spain's plans for its time at the helm of the EU?

We hope that the EU's Energy Action Plan 2010-2014 will be adopted during the Spanish Presidency. This plan will include guidelines for European energy policy, with the promotion of renewable energy as one of the priorities. The next step in this direction will be the adoption by Member States of their renewable energy action plans outlining how they will meet their 2020 targets before 30 June 2010. The Spanish Presidency will promote the implementation of the 2009 Renewable Energy Directive legislation and encourage the exchange of ideas between member states with the aim of preparing these national plans through a meeting that will aim to analyse the flexibility mechanisms contained in the Directive, since the states reported in January whether they would meet, surpass or fall short of their 2020 targets.

"The commitment to a renewable energy share of 20% in 2020 will probably require over 40% of Spain's electricity to come from renewables."

It is likely that any political decision made in Copenhagen at the UN climate change conference in December to reach a legally-binding agreement on a new, strengthened post-Kyoto pact on dramatically reducing greenhouse gases may come to fruition during your presidency. What can Spain do to help speed up the process?

There has been a mixed reaction to the commitments made in Copenhagen, though I prefer to see the positive side of the summit, which got developing countries such as China, India and Brazil involved in the multilateral cooperation process in the fight against climate change. It is clear that some countries, including Spain, have more ambitious positions than others with respect to the degree of the commitments made. But sometimes it is necessary to take a small step first to make more sustained progress afterwards.

Since 2004, Spain's climate change policies have meant its CO_2 emissions have been reduced by 4.5% (whereas between 1996 to 2004 they grew by 36.6%), and this will help the Spanish presidency to coordinate a European position to improve on the recent agreements reached at the Copenhagen summit.

Spain needs to reach 20% renewable energy by 2020. At the end of 2008 it was at around 11%. How will the target be met?

The answer is clear: continuing with our current policies to promote renewable energy, energy conservation and efficiency, enabling us to act on both the numerator and the denominator of the ratio. In February we sent the Commission our forecast document for our renewable energy target – we hope to comfortably meet the target of 20% in 2020, and even get beyond it to 22.7%. In addition, we should beat all our indicative targets between now and then.

With Denmark and Germany, Spain was one of the wind energy pioneers and still is in many ways. Why do you think wind energy took off so strongly and quickly in Spain, and how have you been able to keep that momentum going?

The Spanish regulatory system, based on feed-in tariffs, has proven to be the best adapted to encourage renewable energy technologies. In "20 20 by 2020. Europe's climate change opportunity", the European Commission concluded that mechanisms like Spain's produce the best

Spain was one of the pioneers of wind energy.

Photo: Keenpress Publishing/ Sisse Brimberg & Cotton Coulson

results in both effectiveness (installing renewables) and efficiency (installing those renewables at the lowest costs).

I would also add, however, that the system did have some small imbalances that needed to be corrected. For example, as the end of the regulatory cycle approached, installations shot up. In 2003, 2004 and 2005, the amount of new wind power capacity installed was 1,300, 2,300 and 1,500 MW respectively. In 2006, 2007 and 2008, the same thing happened again: 1,600, 3,500 and 1,600 MW were installed in each respective year. These ups and downs are not good for the sector, causing a race to installations in the short term that could damage long-term prospects. For this reason, by Royal Decree Law 6/2009 we approved a 'preregistration allocation mechanism', that, following the recent cabinet decision to stagger when projects start operating, provides for the operation of 1,700 MW of wind energy per year until 2012 (slightly higher than the sector's average since its launch in 2000, which is 1,684 MW). This ensures stable development.

Several times during November 2009 more than 40% of Spain's electricity supply came from wind power. Why has Spain been so successful in integrating wind power onto its power grid and what can other EU nations learn from Spain's success in this regard?

Spain has a system operator, Red Electrica, which has managed to integrate wind and other renewable sources that are difficult to ramp up and down, such as photovoltaic, with very little impact on the system. Red Electrica's Renewables Control Centre (CECRE) is a pioneering facility that helps maximise the integration of renewable generation while ensuring the energy supply. Long-term infrastructure planning by the Energy Ministry is another instrument that has proved essential to achieving this goal.

"The Spanish Presidency will promote the implementation of the 2009 Renewable Energy Directive legislation and encourage the exchange of ideas between member states."

Looking ahead, there are new challenges that require further action. The commitment to a renewable energy share of 20% in 2020 will probably require over 40% of our electricity to come from renewables. To integrate this amount into the grid, it is necessary to promote new instruments, for example, international interconnections to enable the evacuation of surplus electricity if needed, smart grids, and saving and efficiency measures that help smooth out daily electricity demand. Furthermore, if electric vehicles are significantly developed in the coming years, they would also contribute to the

Photo: Keenpress Publishing/Sisse Brimberg & Cotton Coulson

smoothing out of power demand, and they could even act as storage units.

With 11% of its power provided by wind and 16,740 MW installed by the end of 2008, Spain still has the second highest installed capacity in the EU after Germany, but it doesn't yet have any offshore wind. Why is this, what stage is the offshore sector in your country at, and how do you see it developing?

Royal Decree 1028/2007 put in place the application and approval procedure for installing power generation facilities in Spain's territorial waters. It required a series of regulatory steps to be taken, and this has been achieved. In April 2009 the Environmental Strategy Study for the Spanish coast was approved. This established categories of maritime zones – zones suitable for offshore wind projects, suitable zones with environmental constraints or unsuitable zones.

"There has been a mixed reaction to the commitments made in Copenhagen, though I prefer to see the positive side, which got developing countries such as China, India and Brazil involved in the multilateral cooperation process in the fight against climate change."

Therefore, we are getting closer to having the necessary regulatory framework for the development of offshore wind farms.

In order for this to happen, it is necessary to have developer interest, study what's happened in other countries, and of course, respect the environmental particularities of the coastal areas. We expect all this to happen in the next few months.

In our updated report 'Pure Power' (launched end 2009), EWEA sets a target for Spain of 40,000-42,500 MW of wind power in 2020, up from 16,740 MW at the end of 2008. Is this target realistic, and what needs to be done to reach it?

The target of 40,000 MW in 2020, including offshore, is realistic, and it is the one we use in our own forecasts.

However, the most precise analysis of the forecasts will be in the next Renewable Energy Plan 2011-2020, which will be adopted before 30 June, and which will continue the efforts made in recent years, increasing the implementation of mature technologies and beginning to try out less developed ones. The Renewable Energy Plan will also incorporate flexibility mechanisms that allow the technology targets to be revised periodically in line with the evolution of the costs, thus providing development incentives to technology, and fostering healthy competition that will contribute to sustainability and cost containment as a whole.

What are the main obstacles to wind energy projects in Spain? What is being done to remove them?

The installation rate of recent years, particularly the acceleration that has taken place in the "regulatory closure" years, demonstrates that the obstacles to the installation of wind projects in Spain were not significant.

However, the authorities need greater flexibility so that there is better cooperation between them.

In this sense, the draft Sustainable Economy Act contains a mandate for simplifying administrative procedures which will result in a catalogue being drafted by the Ministry of Industry, Tourism and Trade which will contain the procedures and formalities to be followed for new renewable energy projects and highly efficient cogeneration in order to provide guidance to the relevant public authorities and developers.

On the other hand, I wish to highlight the creation of the Energy Sector Conference, as a coordinating body between the State and the Autonomous Communities in the preparation, development and implementation of state energy planning, which will allow the different administrative authorities to work in a more harmonised fashion.

"If I compare today's wind energy conferences with those of twenty years ago, women have entered the stage – not in overwhelming numbers, but their presence is much more noticeable."

It's a man's world

'It's a man's world', sang the late James Brown in the 1960s. In the song, Brown brags about cars, trains, electric light and boats as male inventions. But he admits "it wouldn't be nothing without a woman or a girl". Let's ignore the double negation in this sentence and suggest that the Godfather of Soul meant that women are needed to make this man's world livable.

If he had written the song a couple of decades later, James Brown might as well have picked wind turbines as examples. The phallic symbols in the countryside or the sea would perfectly fit a song like 'This is a man's world'.

Being an academic in physics, I personally got quite used to the relative absence of women in that part of my professional career. However this was fully compensated for by the other parts of my working life in which women were far more present – journalism, communication and consultancy.

But in wind energy women are still in the minority. I haven't investigated the question thoroughly, but I would even say they are less well represented in wind energy than in other scientific and technological parts of our community. I really don't have an explanation for this. I can only suggest it is a habit that a technology is crowded with men in its early stage of development.

Women give birth to babies, men to energy technologies. The first one is a law of nature; the second one, not necessarily. But there are possibly some similarities with another form of energy technology that was very promising back in the fifties: nuclear power. I am not that old yet, but from literature and from the people that were involved at the time, I have the impression that in its early years, the world of nuclear energy was a man's world as well. Later on more women appeared, as I experienced myself, working for an energy research institute from the 1980s onwards.

Did it make a difference? I think it did. Along with the enormous change of culture that happened between the 1950s and the 1980s, the character of the nuclear debate became less polarised, I would say. One explanation could be that in the fifties and sixties women could only be found at the outside of the nuclear site fence. As soon as female professionals entered nuclear arena, the debate calmed down. The picture of the male engineer who knew better for all mankind was at least softened a bit.

As a columnist I am allowed to write down my observations, without giving any proof. So I will not allow myself to elaborate on theories about how the gender imbalance in wind energy is caused by a difference in how the female and male brains work, which I don't find to be of particular interest.

Instead, I am more interested in the results. So let me finish with a small observation. If I compare today's wind energy conferences with the (smaller) ones twenty years ago, women have entered the stage - not in overwhelming numbers, but their presence is much more noticeable. That's a good thing, because, with James Brown, I think women make the world of wind energy a better place.

By Rolf de Vos
Journalist at Ecofys International
By invitation

Women are slowly becoming more present at wind energy events
Photo: EWEA

At present woman are especially prevalent in areas like finance, management, communication, marketing and consultancy. But engineering is no longer a male bastion either. In my view, it is a sign of the maturity of wind energy that women have become interested. And even beyond that: if we want wind energy to be of real importance to mankind, the involvement of women is desperately needed. No battle of the sexes is allowed here.

Wind energy goes prime-time

Jean-Charles Beaubois is head of weather forecasting at the RTBF – the Belgian national radio and television. Along with his team, he presents a televised update on renewable energy every Monday night after the 8pm news on TV channel "La Une". The report describes the amount of wind, solar and PV power provided in the previous week in Belgium. He told Sarah Azau his story.

"I've been presenting the weather on the RTBF for 12 years, and have been in charge of the weather programmes for just over a year.

"I have been interested in climate change for quite a long while. Around seven or eight years ago the European TV weather presenters were first alerted to the problem when scientists first began communicating more strongly on the subject.

"All the European TV weather presenters meet together once a year, so the whole thing accelerated very quickly. We and the other French-speaking countries tried to put in place a common structure to communicate and act on climate change together.

"For example, five years ago there was a counter on the number of people fighting climate change that the main French TV channel TF1 put in place with the Fondation Hulot, which we then also used in Belgium. What they did at TF1 and what we did at the RTBF was to count the number of people signing up to climate change measures online. You could sign up to different commitments, like "I will start using my bike for short distances" or "I will put in low energy lightbulbs".

"Today everyone knows climate change happens and so we have less basic communication on that to do, we need to find concrete actions to take.

Photo: Jean-Charles Beaubois

"Our latest initiative – the renewable energy updates on a Monday evening on the TV channel 'La Une', came about thanks to the Belgian renewable energy association APERE. They contacted us two years ago, saying "you're the only TV channel which communicates on air quality, do you want to do something with us on renewables?"

"So every Monday at 8pm we communicate on wind energy, PV and solar energy, and each time we have a particular focus on one of them. APERE gives us the figures and we display them graphically for the viewers. And soon they will also be available on our website.

"Developing the updates took a good year, because you can't talk to the public about kilowatts; it's not clear. You need to say, for example "this amount of electricity was provided by PV, and it was enough to power your fridge all week" – then people say great!

"For wind energy it's very simple – for example we say this week, 530,000 households' power has been provided by wind energy – and 530,000 households is the whole of the Brabant region of Belgium!

On the climate change issue, I'd say the public is split in two. There are those who are really believe in renewable energies and climate change and who do a lot… and others who are more and more sceptical – not about climate change, which they believe is happening – but about the climate change solutions on offer.

"Why are people sceptical? For example, because we impose a so-called "green tax" on them, but it doesn't make any visible difference, and so people feel it's just an excuse for taxing them a bit more. In Belgium the RECUPEL tax is the best example – when you buy a television, for example, X% goes to RECUPEL, and three-quarters of that just sits in a bank account and isn't used for anything.

Beaubois and his team report on the power provided by wind and renewables in Belgium Photo: EWEA/Raffaella Bianchin

"With the APERE figures we can say - look, those of you with PV panels, you were able to turn off your boilers from May to October last year, which was very sunny. At the beginning our bosses were scared that the weather on Mondays – when we do the renewable energy figures – would have a lower audience than on the other days, but it's not true – we have had very positive feedback.

"And there are some very effective actions going on, for example in the Belgian village of Couvin, where they built a wind turbine which belongs to the locals. We are in touch with them regularly, and they tell us this week we provided 100% of Couvain's power and also that of the three next-door villages. That's what I call a "concrete" solution, because people see it works.

"This year we are launching an EU-funded project based on this principle to the EU with APERE – five countries are involved so far: France, Slovenia, Italy, Portugal and Belgium – and maybe Hungary and Spain will join us. We are going to do something similar to what we do here – communicate renewable energy information on TV in the participating countries. We are aiming to get all 27 EU countries involved. All the figures relating to each country will be sent to the RTBF and we will centralise everything ourselves, and send out the figures again.

"While in general I don't take everything at face value, people like Claude Allègre, who questions climate change, make me furious. There are scientists who have a more logical attitude – at the moment I have the impression we listen only to the two extremes.

"I always like to quote a Quebecois colleague of mine who says: "In any case, whether we're right or wrong no-one can have a problem with us cleaning up all the rubbish we're leaving everywhere on our planet".

"Wind energy is fabulous. We cannot do with out it. Wind energy needs to increase even more in the next few years. Offshore wind energy could be a good solution.

"We also need to reduce our energy consumption intelligently. Asking people to stop watching TV will never work. But asking the makers of TVs to build them using a LED which uses 30% less power, and make the distributors only sell this type of screen – that can work.

"Take cars, for example. I can't use public transport to get to work because it takes me 1 hour 20 minutes. In the car it takes just 25 minutes – so of course I take the car. So lots of people can't just stop using their cars. But we can make sure the car industry only makes the top performing models. We see certain types of car which succeed in using much less electricity and produce much less CO_2 – why can't all of them be like that?

"We also need to reduce our energy consumption intelligently. Asking people to stop watching TV will never work. But asking the makers of TVs to build them using a LED which uses 30% less power, and make the distributors only sell this type of screen – that can work.

"Paris carried out a heat audit of its buildings – you can see all the buildings are all red because their heating goes into the street rather than the inside of the building. Now, we invest a lot on making the newer buildings more efficient – great – but we don't do anything on the old ones. We put double glazing in, but around the windows heat is being lost.

"Not enough research has been done on this – we can do so much more. The average power consumption is 3,500 kWh per year per household. We could easily reduce that by 2,200 just by switching to low energy light bulbs and using AAA standard electrical appliances. But these are 30-40% more expensive – so for the moment these things are for rich people.

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EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

Research and its role in wind energy

by Rebecca J. Barthelmie,
Professor at Indiana University, US

Photo: Rebecca J. Barthelmie

Once when you went to EWEC you only met scientists from universities and government agencies plus a few die-hard enthusiasts from small companies clinging on to a small market. How different times are now. EWEC is packed with literally thousands of industry representatives. Given the incredible success of wind energy – with a growing market share, record installations and a mature, proven technological base, it is reasonable to ask 'Why do we need a wind energy research community?'.

We need to maintain a research community that doesn't necessarily have to focus on short-term (bottom-line) objectives and doesn't have a stake in a particular industry project (software or hardware). Although wind farm owner/operators and turbine manufacturers are increasingly developing and using in-house research facilities, some projects are beyond the scope of individual industry partners. Examples include large projects requiring coordination of many partners, or research that requires an objective/unbiased comparison of methods or techniques. Some projects are simply too risky for industry to invest many years of personnel time and other projects have benefits that will only be realised in the very long term. The most successful projects to emerge from Europe over the last few years have been collaborations between industry and academics funded through the European Commission (EC). Examples of this are the projects focused on quantifying the mechanisms and improving modelling and measurements of wind turbine wakes starting with the ENDOW project and carried on through POW'WOW and UPWIND projects. These collaborations provided a platform for the evaluation and improvement of wake modelling in Europe and saw rapid progress in understanding wake behaviour and reducing power prediction error. It also provided a platform for the introduction and evaluation of the performance of computational fluid dynamics models offshore and in complex terrain. Other similar examples derive from the series of short-term forecasting projects funded by the EC.

"Clean coal and nuclear continue to secure public financing worth hundreds of millions of Euros. We within the wind energy community need to be active in ensuring our industry benefits from the same level of sustained research funding."

As we look forward towards realising the goals specified in the Directive on 20% renewable energy by 2020 across the European Union and the US's 20% wind by 2030, we need to identify major potential research bottlenecks through forums like the European Wind Energy Technology Platform (TPWind), activities such as the US Department of Energy 'research needs for wind energy' workshop and use them to energise national and international academic-industrial research efforts. Major long-term issues such as quantifying and predicting flow and boundary-layer dynamics in complex terrain requires teamwork to provide a strategy for improving both measurement and modelling capabilities. Indeed an effort comparable to the classic 'Kansas experiment' held in 1968 may be necessary to provide a synthesising mechanism to move forward aspects of boundary-layer meteorology and turbine-atmosphere interactions critical to successful development of increasingly large-scale wind turbine plants. Working with industry partners provides focus and short-term deadlines that have to be met ensuring research retains a fast pace while moving forward towards solutions to some of the less tractable problems. While industry can't be expected to provide funding for large-scale experiments or modeling comparisons it can be involved in the design and execution of such projects.

Fundamental and applied research are both vital for a successful industry. Clean coal and nuclear power continue to secure public financing counted in the hundreds of millions of Euros/dollars. We within the wind energy community need to be active in ensuring our industry benefits from the same level of sustained research funding. We need to work together to ensure that as wind energy continues to succeed, the technology and its application continue to advance and optimise. Wind energy is already successful and, like all technology, it needs continued research and development to ensure it continues to evolve to meet the 'grand energy challenge'.

Prof. Barthelmie is chairing the EWEC 2010 session on 'Wind characteristics and control', to be held from 16:00-17:30 on 22 April.

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