

# Germanischer Lloyd beaufort 6

The GL Wind Newsletter for Customers and Business Partners

## Dates

### SEPTEMBER

20–24.09.2005, Husum  
**HUSUMwind Exhibition & Conference**  
Joint pavilion in Hall 1, Stand No. C14  
www.husum-wind.de

### OCTOBER

18–19.10.2005, Hamburg  
**2nd Seminar on the Project Certification of Wind Turbines**  
Registration: Jutta Wacker, Tel. +49 40 31106-1144  
jutta.wacker@gl-group.com

26–28.10.2005, Copenhagen  
**Copenhagen Offshore Wind International Conference & Exhibition**  
Joint pavilion, Stand No. 021A  
http://offshore.windpower.org

FEBRUARY/MARCH 2006  
27.02–02.03.2006, Athens  
**European Wind Energy Conference**  
Joint pavilion, Stand No. 364  
www.ewec.info

according to Grid Codes (NAR)” as well as further information can be obtained from:

**Germanischer Lloyd WindEnergie GmbH, Tobias Gehlhaar, Phone +49 40 31106-7577, tobias.gehlhaar@gl-group.com.**

### PERSONNEL NEWS

#### Management Extended



**Bodo Helm**

With effect from September, Dipl.-Ing. Bodo Helm has been appointed as a new member of management. Together with Christian Nath, he will continue the worldwide expansion of GL Wind. As a mechanical engineer, Bodo Helm has been familiar with his new employer since his time as a student: his diploma thesis involved the development of computational software for the laying of offshore pipelines. During his time as project manager in the design and development department of a foundry, Bodo Helm also had dealings with Germanischer Lloyd. He compiled the test documents and the associated calculations for the type testing of a rotor hub.



The “power station properties” known for e.g. coal-fired power stations are now also being requested for wind turbines

### NEW SERVICE

#### Accreditation for the Certification of Grid Connection Compatibility

The requirements for the grid connection compatibility of wind turbines recently underwent a radical change. For example, where previously the wind turbines were immediately cut off in the event of grid faults, the grid operator can now – according to the latest Grid Codes (NAR) – demand that the turbine operators continue to support the grid if there is a risk of grid failure, i.e. that they must feed in power even at a fraction of the normal voltage. The “power station properties” known for e.g. coal-fired power stations are thus also being requested for wind turbines by the transmission system operators. As a result, most manufacturers of wind turbi-

nes are equipping their plants so that they meet the new requirements for grid connection compatibility. As these changes represent a great challenge to the electrical systems of a wind turbine, they must be supported by adequate technical expertise. For the first time, the German Accreditation Council (DAR) has accredited GL Wind for the issuance of certificates on the grid connection compatibility of wind turbines according to the Grid Codes; these certificates are then entitled to bear the DAR logo. As an entity established jointly by the Federal Republic, the federal states and German industry, DAR is responsible for the coordination of activities taking place within Germany in the field of accreditation and approval of certification and monitoring bodies. The GL Wind technical note on the certification procedure for the “Grid Connection Compatibility of Wind Turbines

gy utilities, universities and engineering consultancies met in Hamburg’s Übersee-Club at the end of August. The main goals of this non-partisan association are to reduce the negative attitudes towards renewable energies by providing objective information, to underline the importance of wind power in the energy mix, to formulate the North German interests in blazing a new trail for industrial and labour policy in a sustained and decisive manner.

The Executive Board of WEZ Hanse consists of five members: Dr Klaus Rave (Member of the Management, Investitionsbank Schleswig-Holstein) as the representative for banks and underwriters, Dr Uwe Kolks (E.ON Hanse) for the energy utilities, Matthias Schubert (Member of the Executive Board at Repower Systems AG) representing the interests of the manufacturers, Prof. Dr-Ing. Jürgen Grabe (Technical University of Hamburg-Harburg) as the representative for research and development, and Dr-Ing. Torsten Faber (Germanischer Lloyd WindEnergie GmbH) as the representative of the engineering consultancies.



#### Wind Energy Circle Hanse – a Network is Born

About a hundred companies active in the wind sector are located in the greater Hamburg area. With the aim of preserving the high level of added value in North Germany for both the national and international production of wind turbines, wind energy in the Hamburg region has just been given an effective forum. For the foundation of “WindEnergieZirkel Hanse” (WEZ Hanse), representatives of banks, insurance companies, project developers, manufacturers, ener-

### CURRENT RESEARCH Wind measurement by laser BIRD PROTECTION AND WIND ENERGY Solutions needed



## Offshore Foundation for Wind Energy

The future of wind energy lies at sea. To keep the expansion of wind energy in Germany going at the current high speed, it is essential that suitable offshore sites be developed on a continuous basis.

The wind energy potential lying dormant in the North Sea and Baltic is enormous. Since 1993, it has been known that offshore wind energy can supply twice the total electricity demand of the EU. Germanischer Lloyd was one of the participants in the EU report entitled “Study of Offshore Wind Energy in the EC”. However, instead of leading to a rapid development of this potential, the activities planned by the German offshore wind programmes have ground to a halt. Much is planned and a fair amount is approved, but bureaucratic hurdles ensure that projects are not realized very quickly. One thing is clear: only the rapid implementation of an offshore test field can secure and extend the technological lead enjoyed by German manufacturers of large wind turbines. A decisive step has now been taken with the establishment of the “Foundation of the German Industry for the Utilization of and Research into Wind Energy at Sea”, which was publicly presented in Berlin on 6 September as a non-profit organization. As the President of this “Offshore Foundation”, Bremen’s Senator for Construction, Environment and Transport, Jens Eckhoff, emphasized that other countries had long since recognized

the opportunities and possibilities offered by wind energy as a motor for economic growth. Germany, in contrast, is running the risk of letting its resources lie fallow.

**THE SHORT-TERM** goal of the foundation is to develop the first offshore wind farm off the North Sea coast. To this end, the rights will be secured for the approval of an offshore wind farm planned at the Borkum West site. The foundation will then lease the site to operating companies so that they can conduct research into the potential of innovative 5-megawatt technologies under offshore conditions within a reasonable period of time. The foundation’s board of directors is made up of Dr Knud Rehfeldt, Managing Director of Deutsche WindGuard GmbH, Jürgen Thiele, Managing Partner of the engineering firm KGW Schweriner Maschinenbau GmbH and President of the Schwerin Chamber of Industry and Commerce, and Jörg Kuhbier, a lawyer and former senator in Hamburg. Germanischer Lloyd WindEnergie GmbH holds an interest in the Offshore Foundation and will provide substantial support for its activities in future.

### Dear Readers,

The name of our newsletter has generated a number of questions. What actually is Beaufort? Or who was Beaufort? And just why is the GL Wind newsletter called “beaufort 6”? Here we certainly owe you some answers. Sir

Francis Beaufort was a British admiral who lived from 1774 to 1857 and went to sea at the tender age of thirteen. When he turned sixteen, he started keeping meteorological notes and, in 1806, developed a wind scale during a stormy voyage on the “Woolwich”. Dissatisfied with the imprecise expressions used at the time for describing the weather, such as “moderate wind” or “increasing cloudiness”, he drew up his own scale, comprising twelve clearly-defined states. For his system, he considered the reactions of the ship’s sails to the various levels of wind force. Since then, zero has stood for a calm sea and twelve for a hurricane. So why beaufort 6? Well, that’s the wind force at which most turbines reach the optimum operating state and achieve their rated output. In the meantime, more exact methods than the observation of ship sails have been developed, the latest being “light detection and ranging”. You can read about “lidar” in more detail on page three.



**Christian Nath**

Yours sincerely,

Christian Nath  
Managing Director, GL Wind

● SUBSCRIPTION SERVICE beaufort 6 can be ordered free of charge from pr@gl-group.com ●

**IMPRINT** beaufort 6, Issue No. 2/2005, September 2005 **Frequency** Quarterly in German and English **Published by** Germanischer Lloyd Aktiengesellschaft, Hamburg **Editor-in-chief** Dr Olaf Mager, Germanischer Lloyd AG, Press and Information **Contributions by** Dr. Olaf Mager, Christian Goldenboog, Stefanie Normann **Translations by** Eugen Klausner, Ritterhude **Concept and production** Gordon Schacht, Elbchaussee 19, 22765 Hamburg, Germany **Reprints** © Germanischer Lloyd Aktiengesellschaft 2005. Reprinting permitted – copy requested. All information is correct to the best of our knowledge, but is subject to change. Enquiries to: Germanischer Lloyd AG, Press and Information, Vorsetzen 35, 20459 Hamburg, Germany, Phone +49 40 36149-4509, Fax +49 40 36149-250, e-mail: pr@gl-group.com

# Lidar: a New Era in Wind Measurement

“Light detection and ranging” (lidar), a method related to radar (“radio detection and ranging”) for the exact measurement of atmospheric parameters, is now being applied in the field of wind energy for the first time.

A lidar system emits laser pulses into the atmosphere with the aim of subsequently analysing the intensity and wavelength of the light that is scattered back. Because the laser beam interacts with constituents of the air, solid particles and liquids containing gases in finely dispersed form – aerosols – can be detected and their size can be computed. Until now, the lidar technique has been used primarily for weather research and in environmental protection. This new remote sensing technology makes it possible to measure not only the humidity, air pressure and temperatures at great heights, but also the concentrations of certain airborne pollutants, such as ozone, nitrogen oxides, sulphur dioxide and hydrocarbons. Lidar devices are especially useful in aviation, for instance in determining the cloud bases – in this way, important data can be obtained for the take-off and landing of both fixed-wing craft and helicopters. What is more, the lidar technique is applied in the monitoring of emissions and compliance with the statutory limits at factories.

**THE BRITISH MANUFACTURER** QinetiQ has now developed the first series device with which even the speed of airborne particles can be measured from the ground. This is a remarkable innovation in measurement technology, says Detlef Kindler, graduate oceanographer responsible for the lidar trials at WINDTEST Kaiser-Wilhelm-Koog GmbH: “In principle, the Doppler shift of the backscattered signal allows us to calculate the three-dimensional air movement, namely at the height at which the laser is focused.”

**AT PRESENT, THE INITIAL** tests with the QinetiQ unit are being conducted in Brunsbüttel, where the first 5-megawatt wind turbine is being operated by Repower. Two and half rotor diameters away from this installation, there is a measurement mast on which, at heights of 30, 60, 90 and 120 metres, a conventional cup anemometer is being used to measure both wind speed and direction. The lidar is located 70 metres away from the mast; this unit is also taking measurements at heights of 30, 60, 90 and 120 metres, and additionally at 150 metres. “Since we have a direct comparison for four altitudes,” says Kindler, “we can analyse how precisely the two measurements correlate.”



It looks more like a lunar probe, but it really could become the new standard for wind measurement technology. Comprehensive tests of the wind lidar unit are already under way

However, the two methods are based on different measurement approaches: whereas lidar scans the air movement with its laser beam, the anemometer concentrates at a point at a certain height. For this reason, the raw data cannot be compared directly, but must be averaged out over 10-minute periods. It is only on this basis that the “WINDTESTers” can obtain figures to determine the mean values, minima, maxima and the standard deviations of the wind speeds.

Before practical applications are possible, lidar must stand up to direct comparison with the cup anemometers, because the conventional devices still define the generally accepted standard for wind measurements. This is why, as Detlef Kindler points out, his task is not to check the precision of a new technology, but to assess its technical availability and the data quality for individual measurements. For example, anemometers are able to function independently of extreme differences in temperature – an important feature yet to be demonstrated by lidar. Only then will WINDTEST be able to issue a certificate to the manufacturer with a clear conscience.

**THE FIRST IMPLEMENTATION** of wind lidar will be within the scope of DOWNVIInD, Europe’s largest research and development project in the sector of renewable energies: 30 kilometres off the east coast of Scotland, near the Beatrice oil field, two 5 MW turbines by Repower are to be erected in water over 40 metres deep during autumn next year. Instead of a costly measurement mast, a lidar unit will be installed. Development organizations and institutes from all over Europe, including Germanischer Lloyd WindEnergie GmbH, are participating in DOWNVIInD.

**THE ONSHORE TEST** in Brunsbüttel is expected to come to an end early in December, after which the lidar unit will be installed on the research platform FINO 1, situated 45 kilometres north of Borkum. Detlef Kindler regards this as the real endurance test. The plan envisages a test period of six months, during which the relevant comparative measurements will be performed in relation to the anemometer on FINO 1 measurement mast. An atmosphere of anticipation can be sensed at WINDTEST: after all, lidar could be ushering in a whole new era in wind measurement technology.

PHOTOS: GERMANISCHER LLOYD (2), ZEPH

Protection of nature and animals is an integral part of modern ethical standards



## EXPERT INTERVIEW

# Bird Protection and Wind Energy – Can They Come Together?

There is little to say against wind energy. It is clean, creates new jobs and does not consume billions in subsidies, as coal-fired and atomic power stations do. And yet there are critics who, apart from the aesthetic drawbacks, see a grave danger for the birds: acting as huge “bird blenders”, the giant rotor blades of the turbines are responsible for avian mass murder.

We spoke to Dr Ommo Hüppop from the Institute of Avian Research “Vogelwarte Helgoland” about the information available to date on the delicate relationship between birds and what are claimed to be their most serious enemies, the rotor blades.

### BEAUFORT 6: How many birds fly over the Baltic and North Seas every year?

DR. HÜPPOP: Only a very coarse guesstimate is possible: we believe the number ranges from several tens to a hundred million birds per migration period.

### With such figures, we hardly dare to ask how you arrived at these statistics in the first place.

We estimate the total numbers from the breeding populations. Bird migration routes in Central Europe generally run from northeast to southwest, with the return journey being taken in spring. For just one species like the song thrush, there may be from two and a half to almost five million breeding pairs in Scandinavia. So we can extrapolate these figures: if each pair raises three chicks to leave the nest, we then have 12.5 to 25 million individuals.

**And now the construction of wind turbines in the German Bight represents the greatest encroachment of technology into the marine environment of**

### the area. Can you, as an ornithologist, still sleep soundly at night?

Allow me to answer you with another question: New Orleans, forest fires in Portugal, flooding in the Alps – are these not further signs of the dramatic changes in climate we are currently suffering? On Helgoland too, we are noticing this climatic change, because the birds tend to pass through much earlier in spring than was the case only a few decades ago. So you can see that climate protection is becoming a very important matter; we have to move away from combustion-based power stations, and away from nuclear power, because they will not solve the pressing energy problems, as has been demonstrated time and time again. In the final analysis, all forms of power generation have some drawbacks, and nobody denies that collisions between birds and wind turbines are indeed taking place.

### But are there no ways of equipping the installations so that the birds are prevented from colliding against them?

Unfortunately, both the ornithological associations and the state nature conservation agencies have completely neglected to investigate this in the necessary detail on land. There are some ideas, ranging from acoustic to light deterrents,

but there are still no really viable concepts for bird protection. Urgent action is needed to reduce the avian mortality rate: an adaptive lighting concept or temporary shutdowns during high-risk migration nights would be feasible possibilities. After all, there is a big difference between jumping into a rotating fan or a stationary one.

### Switching off the turbines on days of mass migration?

Yes. Collisions are very rare events; on average, only a few birds collide per year and plant. What effectively happens is that there are no accidents for a long time, until a sudden spell of bad weather during an otherwise fair migratory night tends to disorient the birds, causing them to fly towards lights. The good news is that we are now able to forecast these phases quite accurately.

### What types of birds are most prone to flying against turbines?

The collisions at all the structures erected in the flying routes generally reflect the spectrum of species: Common species are usually also the most affected by man-made structures, and night fliers more strongly than those migrating by day. From examinations on land, however, we know that wind turbines are also very dangerous for some diurnal species that circle about when looking for prey, such as the sea eagle and red kite. In this connection, it should be pointed out that there is a particular onus on the Federal Republic of Germany to preserve both of these species.

### How can avian mortalities be measured in practice?

It is really very difficult to record the collision rates in a properly methodical way, all the more so because these are irregular and sporadic events that may claim many victims at a time. Another aspect is that investigations have as yet only been performed for a few species, for example the eider duck, and it would be naïve to assume that these are representative of all types of birds. Thus far, no studies have been conducted on the migration of small species.

### Why, Dr Hüppop, should we humans take any interest at all in the wellbeing of birds?

Firstly, because we are obliged to do so by law, through the Federal Nature Conservation Law and diverse international conventions on the protection of these species. Secondly, we belong to a nation that views the protection of nature and animals as forming an integral part of its ethical standards.

## Brief Profile

Dr Ommo Hüppop is a biologist who obtained his doctorate in Hamburg on the energy balance of herring gulls. Since 1988, he has been the head of the island station operated by the Institute of Avian Research “Vogelwarte Helgoland” and project manager of the ecological support project FINOBIRD, which is based on the research platform FINO 1. His work is concentrated on bird migration, marine and coastal avian ecology as well as studies on the anthropogenic effects on birds.



Dr Ommo Hüppop