Germanischer Lloyd
beaufort 6
The GL Wind Newsletter for Customers and Business Partners

EDITION 1 · 2006

Guests bearing gifts from Taiwan: during their brief tour of Hamburg, Re-Mo Chang, Tsung-Wen Huang and Kuo-Feng Chen (left to right) from the Metal Industries Research & Development Center (MIRDC) visited the Managing Director of GL Wind, Christian Nath, and presented him with a golden dragon. The executives from Taiwan's "Wind Power Industries Promotion Project" informed themselves in depth about wind potential measurements and the certification possibilities for wind turbines

12 AND 13 SEPTEMBER IN HAMBURG

5th Offshore Wind Energy Conference

The successful cooperation between GL Wind and www.windmesse.de initiated last year is to continue. Together, the two partners are organizing the 5th Offshore Wind Energy Conference on 12 and 13 September 2006 in Hamburg. In the Hotel Hafen Hamburg, experts from operating companies, engineering offices, insurers, universities and research facilities will again be given the opportunity to discuss the technical aspects of wind energy. The planned topics range from the profitability and insurability of wind turbine generators and their power station properties to their grid connection compatibility. One of the thematic blocks is concerned with occupational health, fire safety and personal protection. Another important item on the agenda is the planned offshore test field in the immediate vicinity of the FINO 1 research platform about 45 kilometres north of Borkum. For last year's conference in June 2005, which was entitled "Profitability, availability, technology", over 170 specialists and experts from Germany and the neighbouring countries came together to discuss the technological, operative and statutory aspects of wind energy.

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Dates

MARCH

06–10.03.2006, London
World Maritime Technology Conference (WMTC)
Silke Schwartz will present a paper on 09.03.2006 from 12:20 to 12:45 p.m. on the "Certification of Ocean Current Turbines, the GL Wind Guideline"
www.wmtc2006.com

JUNE

04–09.06.2006, Hamburg
International Conference on Offshore Mechanics and Arctic Engineering (OMAE 2006)
Marcus Klose will speak on the "Interaction of Load Analysis and Structural Design of Offshore Wind Turbines"
www.asmeconferences.org/OMAE06

AUGUST

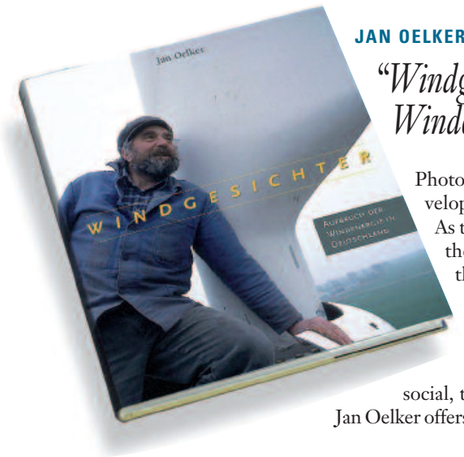
20–25.08.2006, Southampton
16th International Ship and Offshore Congress (ISSC) 2006
www.issc.ac

SEPTEMBER

12–13.09.2006, Hamburg
Offshore Wind Energy Conference of GL Wind
See adjacent article

JAN OELKER

"Windgesichter – Aufbruch der Windenergie in Deutschland"



Photographer Jan Oelker has been following the development of wind energy for over thirteen years. As the publisher of "Windgesichter", he captures the history of an unusual branch of industry through his generously sized pictures and detailed background information. In his portraits and essays, some of which are of a very personal nature, the book describes how the visions of a few ecologically motivated "lone wolves" grew to become a real business – thirty years of victories and setbacks, decades full of social, technical and political challenges. In helping his readers understand the boom in wind energy, Jan Oelker offers an unmatched peek behind the scenes (published by Sonnenbuch Verlag, 399 pages, 78.00 euros).

EUROPEAN WIND ENERGY CONFERENCE & EXHIBITION

The Strong Winds of Greece

Thanks to its geographical location, Greece is the land of wind energy par excellence: the wind potential over the Mediterranean Sea seems inexhaustible, a fact already known to the Greek gods of ancient times.

Aeolus, the wind god and keeper of the winds, usually held them captive in a cave on his island. When Odysseus endeavoured to return home by ship, Aeolus gave him a sack containing the unfavourable winds. Curious as to the contents, his men opened the sack, whereupon the ill winds blew the ship off course again.

"TODAY, WE ARE ABOUT to open the sack of Aeolus in the right way. At present, 465 MW of wind energy capacity is installed in Greece, with plans for up to 3,000 MW by 2010," is how Dimitrios Sariklis analyses the situation. Sariklis is Business Development Manager at Germanischer Lloyd Hellas. Choosing Athens as the venue for the European Wind Energy Conference & Exhibition (EWEC) is what he calls "the right sign at the right time". Greece is amongst the very first EU member states to have promoted regenerative energies. The aim is to generate about 20 percent of the nation's

Dear Readers,

The possibilities offered by renewable sources of energy are so varied that there is no single appropriate concept, writes the economist Hermann Scheer in his new book "A new policy for renewable energies". Nevertheless, there cannot be an endless number of approaches, because not all roads lead to Rome in practice. A case in point: from 27 February to 2 March, experts from all over the globe will be meeting in Athens for the European Wind Energy Conference & Exhibition (EWEC).

Christian Nath

Greece is the perfect example that proves Scheer's thesis. The country is blessed with enormous potential for renewable energies: the prevailing winds are so strong that they were anchored in Greek mythology over 2,500 years ago. The possibilities of harvesting wind energy here are as varied as Hermann Scheer proposes. Greece has 3,000 islands, some of which are still not connected to the power grid. Wind turbines promise a cost-effective and versatile source of energy and, above all, one which will increase the nation's degree of independence. And this is a general principle: the broad market priority of domestic resources for the production of energy is a fundamental prerequisite in securing the country's future – not only in Greece, but everywhere else too. What this means in respect of a new policy for renewable energies is spelt out by Hermann Scheer in the interview you will find on page 7 of this issue of beaufort 6. I believe you will find it most thought-provoking.

Yours sincerely,

Christian Nath
Managing Director, GL Wind

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PHOTOS: JAN OELKER (1), MICHAEL BOGUMIL (1) PHOTO: SONNENBUCH VERLAG

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electricity requirements from renewable energy sources within the space of four years. A law on feeding power from regenerative energy sources into the grid is already in force. Like its German counterpart, it prescribes the payment of fixed remuneration rates per kilowatt-hour – presently about seven cents for wind turbines connected to the national grid and 8.5 cents for projects on the islands. This promises a rich harvest in view of the enormous wind speeds, with good sites providing average annual speeds of eight metres a second at hub height. Hellenic companies such as Rokas and Terna Energy are therefore pushing the pace of development. "In principle," says Dimitrios Sariklis, "the entire Mediterranean market is of great interest." Only recently, WINDTEST conducted a successful campaign of wind potential measurements on Cyprus on behalf of the company Wincono International. The GL experts see the strategic potential for Greece as also lying in a combination of wind energy and desalination plants. A wind turbine located alongside and powering a desalination plant would be ideal for the many small Greek islands – very often, they do not have any sources of electrical power at all.

GREECE IS ONE OF THE FEW COUNTRIES worldwide to demand the strict type certification of wind turbines. However, a site-specific study need not be performed. The statutory approval regulations do not explicitly require a test as to whether, for example, a wind turbine designed for a speed of 8.5 m/s is also the unit best suited for that particular location. Furthermore, the increased risk of earthquakes in the Mediterranean region should be considered prior to the installation of a turbine, as defined in Chapter 4 of GL's Guideline for the Certification of Wind Turbines: "The investigation of the earthquake-generated loads is based on the combination of the wind loads and an earthquake acceleration with a recurrence period of 475 years." All of these topics will be discussed at length by the GL Wind engineers at EWEC 2006 (stand no. 364), together with the question as to why periodic monitoring by an independent expert is not prescribed by law in Greece. This is stipulated for a GL Wind certificate, and would surely also be of great benefit to the budding wind energy industry in Greece.

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GL Wind at EWEC 2006

Meet the Managing Directors of GL Wind, Christian Nath and Bodo Helm, as well as the Managing Director of WINDTEST, Volker Köhne, at stand no. 364.

Poster session on Tuesday, 28 February, at 2:00 and 3:30 p.m.:

- Kimon Argyriadis: "Research Platform FINO 1 – Some Measurement Results" (BL 3.418)
- Mike Wöbbeking: "IEC WT 01 – Developments of the Second Edition and Innovations in Certification of Wind Turbines" (BL 3.226)
- Frederike Reher: "Wind farm performance verification procedures" (BL 3.216)
- Detlef Kindler: "Use of inclination angle sensors mounted to cup anemometers for power performance tests acc. IEC 61400-12-1" (BL 3.218)

The octagonal Tower of the Winds is decorated with bas-reliefs representing the various wind gods

Tower of the Winds

Situated north of the Acropolis on the Roman Agora, the octagonal "Tower of the Winds" was erected in the 2nd century BC. Originally, it served as a water clock and sundial which helped the people of Athens to organize their daily routine. On each of the eight sides of the tower, there is a relief depicting one of the famous Greek wind gods. At the same time, each god represents a particular wind direction. Boreas – "coming from the mountain" – is the personification of the icy North wind which cut down the opposing fleet during the Greek-Persian war. The wind god Boreas is also the namesake for one of the strongest winds known today – the Bora, a cold downslope wind that sweeps over the Mediterranean at speeds of up to 200 km/h. The Tower of the Winds also pays tribute to the gods Kaikias (NE), Apeliotes (E), Eurus (SE), Notos (S), Lips (SW), Zephyros (W) and Skiros (NW).

This scene is still a dream of the future, but offshore wind turbines could also be erected in Greece soon

COMPANY PROFILE

The WINDTESTers

Anyone wishing to erect a wind turbine nowadays not only needs reliable data on the wind potential of the intended site, but also information on the power curve of the planned unit. Wind potential analyses and power curve measurements are essential for determining the profitability of a project.

While the annual average production of the units is calculated on the basis of the wind potential over many years, the power curve indicates the expected power output of a turbine for a range of wind volumes. Germany's most accomplished experts for such wind potential measurements work in Kaiser-Wilhelm-Koog, almost 20 kilometres away from the town of Brunsbüttel on the Elbe estuary. This is indeed a historic site for wind energy. Here stood, from 1983 to 1987, what was once the largest wind turbine in the world: the enormous GROWIAN, equipped with a two-bladed rotor 100 metres in diameter. Starting in 1988, Germany's first wind farm was set up in Kaiser-Wilhelm-Koog, comprising 20 units, with the founding of WINDTEST following soon afterwards, in 1989. The fledgling company began with two engineers and an office assistant; through steady growth, it now has 46 employees.

THE SIZE OF THE TURBINES has grown with the workforce. Whereas the first power curve measurements were performed on 800 W plants, the focus is now on 5 MW prototypes. In testing the wind, you have to be flexible in your approach and are on the road a lot, and it may also happen that Christmas Eve or New Year's Eve has to be spent working. Site assessments are conducted everywhere: in Germany, Denmark, Spain, Greece, Canada, the USA and Cyprus. Above all, the expertise of the WINDTESTers is especially in demand on the Asian market. Test measurements lasting two months have just been performed at a prototype recently set up at Urumqi in Xinjiang province in China, the contractual partner here being GOLDWIND Science & Technology Co., Ltd. In Korea, measurements are currently under way on a Unison KPB-750 D at the Yong Pyong site. Over the last 16 years, the WINDTEST staff has gained a wealth of experience, passing on their know-how through the advancement of existing technologies or through active participation in international research projects.

MEASUREMENTS OF THE POWER CURVE and the loads acting on the blade and drive train are amongst the services offered by WINDTEST as much as noise measurements and assessment of the electrical properties, such as the voltage dip response, harmonics and the reactive power behaviour. Further services include expert appraisals of the noise propagation and the shadow impact as well as the examination of an entire project (due diligence).

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http://wtk.windtest.com**

WINDTEST

WINDTEST operates on the basis of a quality management system and is accredited by the German Accreditation System for Testing (DAP) according to ISO 17025 under the number DAP-PL-1556.00. To further improve the quality of its measurements, the company is active as a founding member of the international MEASNET network. The measurements performed by WINDTEST comply with all the established quality standards (ISO 17025, MEASNET, FGW).

A management system conforming to OHSAS 18001:1999 is in place for work safety. The safety training provided to personnel includes a first-aid course, together with high-altitude rescue and offshore training. Advanced training and familiarization sessions in occupational safety are held at regular intervals.

Successful Monopile in the Irish Sea

"Thumbs up" for the world's first offshore project with seven impressive 3.6 MW turbines: without any doubt, the measurements at Arklow Bank Wind Farm were one of the highlights of the year for the WINDTEST staff. Both conventional load measurements (see also page 5) and investigations into the expansion behaviour of the monopile, located ten kilometres off the Irish city of Arklow (south of Dublin), had been under way since 2004. What made this project special was that, before the huge tube could be rammed 30 metres deep into the seabed, the structure had to be fitted with the necessary sensors by the manufacturer, General Electric. Mission accomplished. The strain gauges mounted at the level of the seabed were able to record the required data perfectly, and the monopile was certified as being particularly stable. The electricity generated by the seven plants and fed into the Irish grid now meets the annual power requirement of some 16,000 Irish households.

PHOTOS: WINDTEST (2) WITH FRIENDLY APPROVAL OF GENERAL ELECTRIC, REPOWER (1), VISUM (1)

The following parties hold a stake in **WINDTEST Kaiser-Wilhelm-Koog GmbH:** Germanischer Lloyd WindEnergie GmbH (70%), E.ON Hanse AG (25%) and the Municipality of Kaiser-Wilhelm-Koog (5%). **WINDTEST Ibérica:** In August 2003, GL Wind and WINDTEST Kaiser-Wilhelm-Koog GmbH established WINDTEST Ibérica S.L. (WTI) as a Spanish subsidiary. The company is based in Madrid and attends to the growth markets of Spain and Portugal.

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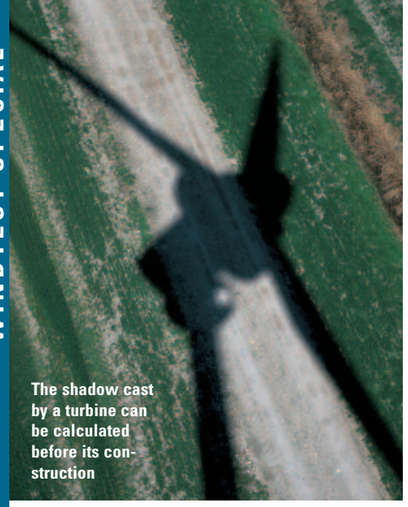
On top of the world: WINDTEST's Lutz Domnick working on a turbine (left). High-precision sensors are used to obtain load data and to record meteorological information at the measurement mast in the Irish Sea (right)



The shadow cast by a turbine can be calculated before its construction

RESEARCH & DEVELOPMENT

Outsmarting the Shadow

Marcus Hartmund was 30 years old in 1998 when, as a student of electrical engineering, he decided to lend the WINDTEST team a hand for half a year. Today, Hartmund is the Managing Director of his own company with seven employees: NorthTec GmbH in Schafflund, a regular cooperation partner of WINDTEST and the exclusive supplier of a shadow impact module that is unique worldwide.

In the early years of wind energy utilization, the periodic shadow cast – that is, the repetitive clouding of the sunlight by the rotor blades of a turbine – seldom caused any problems. The turbines were relatively small and so the shadows did not extend very far. With increasing hub height, however, the shadows became larger, the people living nearby submitted complaints, and the state environmental agencies were forced to intervene. Especially in rooms receiving light through only one window, the hard shadows pulsating at three times the rotor speed can cause disturbing fluctuations in brightness. Incidentally, shadow cast should not be confused with the so-called "disco effect": these flashes of light are caused by periodic reflections of sunlight off the rotor blades. Since this phenomenon depends on the gloss level of the rotor surface and on the reflectance of the paint coating, it is now possible to prevent it adequately. "However, the shadow cast during operation of a turbine is simply unavoidable," says Marcus Hartmund.

THE BASIC IDEA FOR A SHADOW IMPACT MODULE came from WINDTEST engineer Jörg Neubert, but Hartmund actually developed the hardware and software for the new unit. Calculating the shadow cast is a purely geometrical problem: if the sun, the rotor of the wind turbine and the point of immission, e.g. the window of a house, lie on a straight line, the sun is obstructed by the rotor of the turbine from the viewpoint of the immission object. If the sites, hub heights and rotor diameters of the turbines as well as the positions of the immission objects are known, then it is possible to compute where and how long a shadow will possibly be cast during the course of day. This results in the maximum shadow casting time per day; after adding up these values over a year, the maximum shadow cast per year is then obtained. Of course, this is a theoretical value, because this method assumes that the sky is always free of clouds. To determine the actual shadow impact, location-specific meteorological data, such as hours of sunlight per year and the wind direction distribution, are needed in addition. To achieve precise results, WINDTEST uses its own software to generate a shadow casting calendar for particular immission points. This calendar provides valuable information on the annual shadow casting period and the maximum daily period of the shadow. It should be noted that these computations are valid only for the calculated year, owing to the yearly displacement of solar time.

THE MAJOR ADVANTAGE OF HIS MODULE, says Marcus Hartmund, is that the actual shadow cast can easily be determined for the current date and time. The module is installed within a control cabinet in the tower base of the turbine, whereas the light sensor is usually affixed to the nacelle or on the tower exterior.

A special feature of the module is that it can monitor several plants simultaneously and can switch off up to twelve turbines when the limiting values are exceeded. What is more, the module can also be used to calculate the negative effects of existing wind turbines: if, for instance, there is an older wind farm in the immediate vicinity that is causing shadows at the same immission locations, a total of 50 units can be analysed for their shadow cast.

It has now become usual for shadow cast reports to be submitted during the building permission procedures for turbines in Germany; in general, the shadow cast at the immission points may exceed neither 30 minutes per calendar day nor 30 hours per calendar year. If either of these limiting values cannot be observed, the turbine must be switched off for the duration of the shadow cast.

Above all, Marcus Hartmund is pleased that a major argument against wind energy has been countered effectively. The shadow cast – in addition to noise impact – is regarded by many as a special nuisance caused by this form of renewable energy. With his module, says Hartmund, the plant operator can even reduce the actual values to below the legally stipulated limits at any time if so desired. There are even plants controlled by the NorthTec module that shut down the turbine due to the slightest amount of shadow. In addition to installations in Germany, the module is now also being used successfully in Holland and England.

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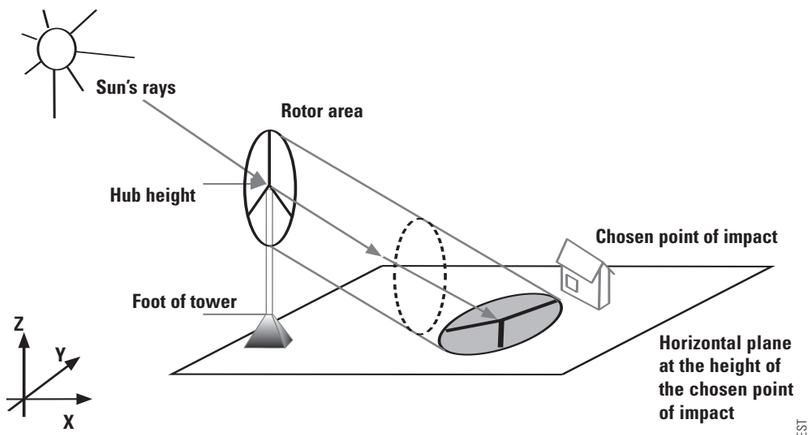

Shadow impact of a wind turbine

PHOTOS: WINDTEST (1), JAN OELKER (1), GRAPHIC WINDTEST

WINDTEST SPECIAL

When busy on a turbine, the engineers are so deeply involved in their work that they hardly notice their airy surroundings

CUSTOMER SERVICE

Acrobats on Rotor Blades

They clamber about on wind turbines that are higher than a thirty-story building. Armed with flashlights, they work on rotor blades with a swept area larger than a football field. These are the turbine load measurement experts.

The job description may sound harmless enough, but it calls for fearless engineers with the athletic ability to match their wind energy know-how: technicians with a good head for heights who are ready to install the load measurement sensors, usually strain gauges, at lofty heights of a hundred metres or more. "Just a matter of getting into a routine," WINDTEST engineer Hans-Peter Link says modestly. Like many other colleagues, he admits to having been a bit queasy at first, but says that you hardly notice the elevated situation after a while. It then does not matter in the slightest whether the plant is located in the Irish Sea or in the German uplands. The main thing is to have enough light inside the rotor blades – and the right spanner with you. The constant increase in rotor sizes, comprehensive optimization measures to reduce material thicknesses, and the use of new components make meticulous load measurements the decisive factor in safeguarding the reliable operation of a modern turbine. Besides meteorological measurements of the wind speed at hub height, the wind direction, the air pressure and the precipitation, WINDTEST conducts measurements on the rotor itself (blade bending moments in the flapwise and lead-lag directions as well as the rotor position) and at the main shaft (torsion and bending moments in two directions). Within the nacelle, the measurements generally involve registering the nacelle position. As regards the tower, the torsional moment near the head, and the bending moments in two directions at the base are recorded. Furthermore, load measurement according to the IEC TS 61400-13 standard also addresses the operating parameters, such as active power, equipment status and rotor speed. WINDTEST is able to make the raw data available to its customers in conditioned form without delay. Frequently, more than 100 sensors have to be installed by the testers. In 24-hour measurement mode, these sensors deliver the numbers which are then "crunched" by means of a software package developed and refined over many years by WINDTEST. With the aid of fieldbus technology, it is now even possible to log more than 100 channels at the same time, with a sampling rate of at least 25 Hz per channel. It would even be feasible to extend the sampling rate into the kilohertz range, for instance to document the high-frequency vibration at the shaft leading from the generator to the gearbox. In this way, all events occurring during turbine operation can be registered and archived as raw data for later assessment. The software calculates significant statistical parameters – such as mean value, minimum, maximum and standard deviation for each measurement channel – and stores all the data in parallel. This is a tremendous advantage for WINDTEST customers, because it ensures that unusual operating conditions can be detected rapidly.

"The main thing is to have enough light inside the rotor blades – and the right spanner with you."

For further information: Dipl.-Ing. Olaf Bruhn, WINDTEST Kaiser-Wilhelm-Koog GmbH, Phone +49 4856 901-26, olaf.bruhn@wtk.windtest.com

High grid stability is vital for industry and households alike

GRID STABILITY

Voltage Dip Test Equipment in Action

For years now, the manufacturers of turbines have been working to improve the grid compatibility of their plants. With great success. For example, today's turbines cause only ten per cent of the lamp brightness fluctuations – also known as the flicker value – experienced by electricity consumers in the mid-nineties.

In the course of these improvements, the operators of the transmission systems, especially the company E.ON Netz GmbH (ENE), have again raised the requirements for wind turbine generators. In general, the demands made of conventional power stations are now also to apply in the wind energy sector, particularly where the security of supply is concerned.

Above all, the grid codes have been thoroughly revised over the past two years. Previously, the approach was to shut down the turbine as quickly as possible in the event of grid disturbances – for example, voltage drops caused by a short circuit in the high-tension and extra high-tension network – but now the turbines must continue to support the grid. This reorientation must be seen in the light of the increasing significance of wind energy. Just how this must be effected in practice is regulated, though not uniformly, in the connection rules of the national and international grid operators.

THE ADVANCEMENT of grid connection technology necessitates far-ranging modifications to the electrical system of the wind turbines. To give the transmission system operators and manufacturers the requisite level of safety, the resourcefulness of the WINDTEST experts was called for: in cooperation with FGH (the Research Association for Electrical Installations and Power Economics) in Mannheim, a so-called "Low Voltage Fault Ride Through" (LVFRT) test was developed in which a voltage dip can be produced on the medium-high voltage side without affecting the plants of other grid operators. In this test, a short circuit emulator – dubbed the Voltage Dip Test Equipment – is connected between the grid and turbine. In this way, the WINDTESTers can determine whether the turbine remains on line during the disturbance, the nature of the reactive current fed in during the incident, and how much time elapsed after fault clearance until resumption of the rated output.

AT PRESENT, WINDTEST IS the sole provider of such tests in the German market. Work with the LVFRT tester usually takes three to four months, during which tests are performed with various voltage dips and times. Triple, double and single-phase voltage dips are generally applied during the measurements. To improve the grid compatibility, the rise in active power after the loss of voltage must be limited additionally, in order that operation can resume in a controlled manner after grid failure. Here too, WINDTEST offers tests with which the shutdown and reclosing of the system voltage can be implemented. Over the past one and a half years, WINDTEST has conducted over 1.000 free-field tests on six different turbine types and far more than 100 test-stand measurements on diverse types.

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Internships and Diploma Thesis Projects

WINDTEST regularly employs up to four students of engineering or related courses as interns. These internships run for 20 weeks as a rule, but 8-week periods are also possible in exceptional cases. Skills in computers and electronics are an advantage . A driving licence (the equivalent of German "class B", formerly "class 3", for motor cars) and a good head for heights are required. A good command of English is useful.

The interns are employed to support the engineers with the processing of orders, the installation of measurement equipment at the wind turbines, and with general operational tasks. The assignments may involve climbing up a wind turbine tower and taking trips to neighbouring countries, e.g. Denmark. Flexible working hours can be arranged.

Moreover, the students may be given the opportunity to write their diploma theses in cooperation with WINDTEST, especially if measurement technology is involved.

Please send your application with passport-size photo, CV and references to:
WINDTEST Kaiser-Wilhelm-Koog GmbH, Ms Dagmar Clausen, "Internship" or "Diploma Thesis", Sommerdeich 14b, 25709 Kaiser-Wilhelm-Koog, Germany

EXPERT INTERVIEW WITH HERMANN SCHEER

"Self-Deception in the Energy System"

"A new policy for renewable energies" is the title of the new book by Hermann Scheer, in which he calls for a radical departure from traditional energy policy. Only a rapid and complete shift to renewable energies and decentralized power supply systems can save the world from disaster – this is Scheer's main assertion. Reason aplenty for beaufort 6 to speak to Mr Scheer, who is a member of the German parliament.

BEAUFORT 6: You speak of the "self-deception" with which the conventional power supply system has been dressed up for the future. But if you look at the world today, surely this kind of self-deception is perfectly in vogue?
HERMANN SCHEER: The power supply industry is resisting the energy evolution – purely for reasons of self-preservation. The power utilities are fettered within their own corporate structures and, at the same time, they are keeping society in chains. Indeed, it would seem that the global power industry has all the world at its mercy.

Could you illustrate that with an example?
Then we cannot talk about the technology of energy, but rather about the sociology of energy. Without energy, nothing works any more – that is the starting point for any analysis. Nothing can be described without the corresponding energy base. It decides on an ecologically beneficial or harmful energy supply, on dependence or independence, and also on how economic development can be shaped. There is no energy provision system that stands apart from the energy source. For that reason, there can also be no technology that is neutral with regard to its underlying energy source.

"Unlike oil and gas, renewable energies are available everywhere and therefore result in a completely new kind of provision system."

You refer to nuclear energy and fossil fuel as being the greatest subsidy traps in the world's economic history, and claim that the conventional energy carriers are kept happy with 500 billion dollars of subsidies worldwide every year. How did you arrive at these billions?
Well, I extrapolated them from known data. Reputable analyses put the figure at 250 billion, but the fuel tax exemption for air traffic, for example, was not included. However, this exemption applies all over the world, and when you add it in, you get 500 billion dollars. This represents a "bulk discount" of immense magnitude. The greater the throughput, the more the entire system of long energy provision chains tends to profit – ranging from the few countries producing natural gas, coal, crude oil and uranium down to the energy consumers. And it is precisely this very important aspect that is missing in so many studies of energy economics.

So the idea of energy autonomy you propose is in direct opposition to these long power supply paths?
Yes, because the conventional energy regime is limited to only a few production points in the world, while the consumption takes place everywhere. And between the long energy chains, there are recurring conversion steps with substantial infrastructural implications. Many people now think you only need to keep this energy system going, then pass the renewable energies through it somehow. But this would not do justice to the possibilities offered by renewable energies. As I mentioned before, there is no neutrality to be found in the conventional energy provision system. The selection of energy source decides on the dependencies and independencies. Are development and production costs involved? Are transport technologies needed for the primary energy? How much do they cost? What means of transport are required to convey the primary energy to the consumer countries? What energy conversion techniques are needed to obtain a useful form of the energy? The energy system in question also moulds the relevant corporate structures: a medium-sized enterprise is simply in no position to supply oil or gas from the Caucasus region to Europe.

And why do renewable energies change the situation so fundamentally from the structural viewpoint?
Because, with renewable energies, we have a different sourcing situation and different conversion processes. The source is not concentrated in a few places around the world, but is available everywhere. You need not pay anything for the primary energy. Instead of a few gargantuan power stations, renewable energies give you small power stations that are widely scattered. Renewable energies result in a completely new kind of provision system. That, and nothing else, explains the resistance against renewable forms of energy. It has absolutely nothing to do with the costs that are supposedly too high – the cost issue is just a red herring.

What role does wind energy play in your scenario? In the offshore area, it is really being thwarted at every turn.
The development of offshore wind energy is an important supplement, but it's not what we should focus on. The land-based potential is of greater interest, because onshore plants with a greater hub height have about the same output capacity as offshore wind turbines. At the same time, onshore plants are much more cost-effective, thanks to the lower installation and maintenance expenditure and the reduced connection and transmission costs. What is more, they build up regional economic muscle and brighten the outlook for regional energy autonomy. Onshore units are favourable for medium-sized enterprises, whereas offshore plants would again be firmly in the grip of big business.

PHOTOS: JAN OELKER (2)

Brief Profile

Dr Hermann Scheer is a member of the German parliament for the SPD party, President of EUROSOLAR, and a winner of the Alternative Nobel Prize. His highly acclaimed book "Die Politiker" was published in 2003; "Energieautonomie – Eine neue Politik für erneuerbare Energien" (316 pages, 19.90 euros) was published by Verlag Antje Kunstmann, Munich, in 2005.
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