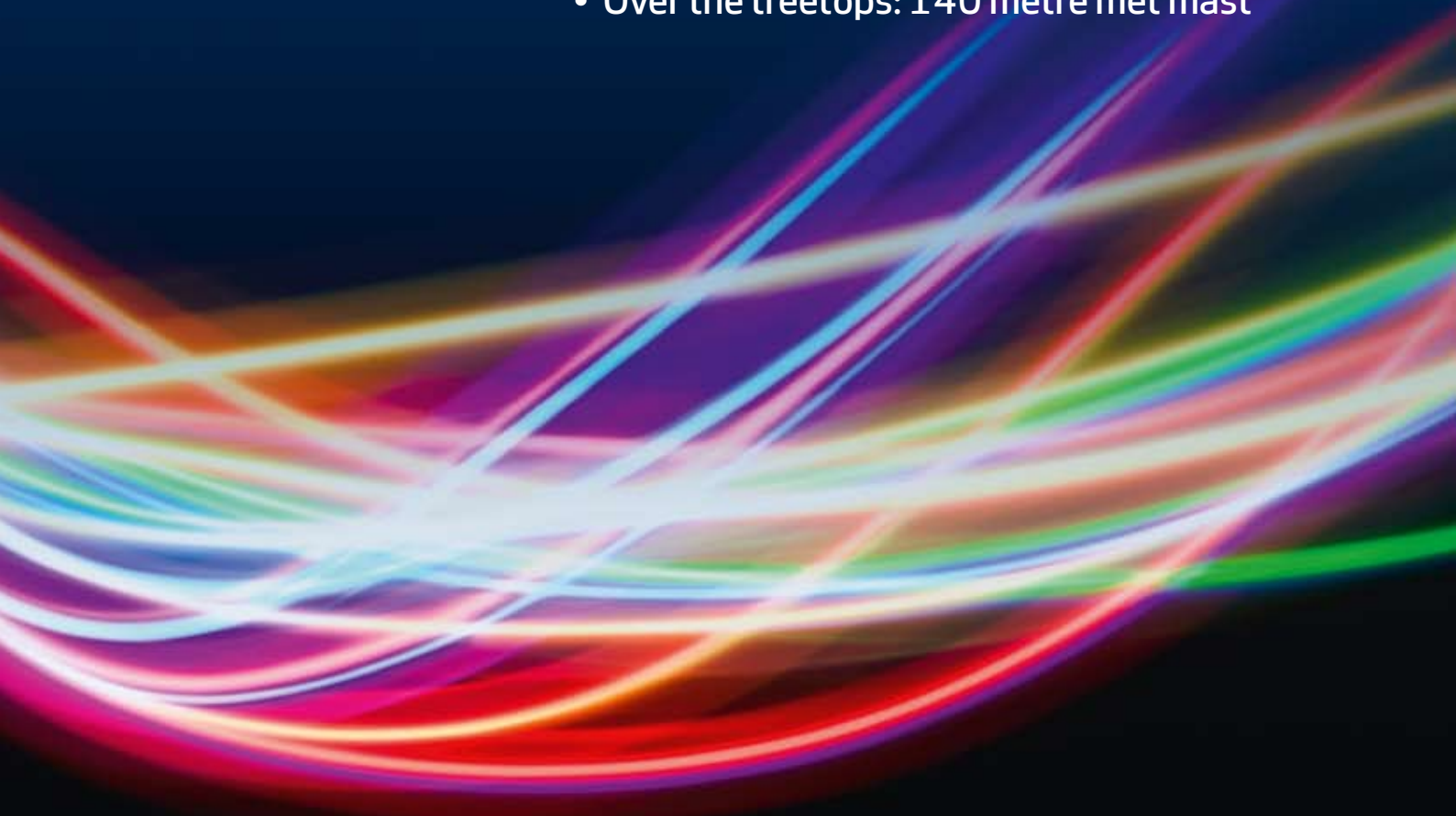


win[d]

No. 13 • October 2011

Deep change in energy policy

- The Lord of the Grids: Matthias Kurth
- 7 megawatts of offshore power
- Over the treetops: 140 metre met mast



Places and Markets

Eastern Europe: Complex markets, international investors

Technology and Innovation

WindFloat: floating semi-submersible for the deep sea

Projects and Partners

The Tsitsikamma wind farm and development project

Vestas®



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Results of our win[d] reader survey:

Earlier this year, to ensure we are continually improving win[d] magazine, we asked our readers to give us their opinion of the content, look and structure of this magazine.

The results? Readers consider win[d] to be a well-structured magazine with well-written articles and useful illustrations. Nevertheless, some readers say that there is too great a focus on Vestas, and that it could contain more technical information. Readers are also keen to know about new markets, interesting partners and proven suppliers. More than half of those questioned spend between 15 and 60 minutes reading win[d] and then pass it on to their colleagues. The print version is particularly valued, as it conveys a high quality and can be read while travelling.

We wish to make win[d] more relevant and meaningful to you, so we are therefore reflecting on the detailed findings of the survey in order to make improvements.

In the meantime, we hope that this edition of win[d] magazine reflects your demands to hear from experts from business, politics and culture in order to also gain an external perspective (see this edition's Interview). In addition, to satisfy those readers who want to know about wind turbine technologies and technical solutions to problems, we have interviewed our expert Peter Stenvald Madsen, Director in Product Management, Vestas Technology R&D, on the technical aspects of the V164-7.0 MW offshore turbine.

We hope that the ongoing enhancements to the magazine accord with your wishes and we continue to look forward to your feedback.

Thank you very much for taking part in the survey!

Editorial

Will the energy revolution in Germany become a model for success? Some people are already in a celebratory mood: Nuclear power – no thank you; renewables – yes please. Others foresee power cuts, air polluting coal-fired power stations and the potential for a decline of a highly industrialised country.

Any celebrations should certainly be tempered by a note of caution: The renewable energy sector, of which wind energy forms a large part, will not be able to sit back and take things easy. Rather, we believe that we now need to take the actions necessary to build up renewables on a massive scale, and this requires the full backing of all decision-makers and citizens.

Vestas has long been prepared for the German and European energy revolution. The new V112 wind turbine, which has just begun mass production (page 13), and the planning for the new V164-7.0 MW offshore generation (page 7) enables us to not only respond but also to create new impetus for the successful implementation of an international energy revolution – both onshore and offshore.

Germany continues to take a leading role in renewables as before, especially with regard to the expansion of new networks and storage systems. We have therefore interviewed the President of the German Federal Network Agency, Matthias Kurth, who has now been appointed by the German government with the demanding task of driving forward the expansion of the electrical grid in as short a time as possible (page 4).

We have also reported on the expansion of wind energy on location in Brandenburg, where we have constructed a 140-metre-high wind met mast that supplies reliable data for utilising wind above the treetops (page 22). After all, new sites such as forested areas will have to be found for the energy revolution.

But what about energy revolutions emerging in other countries? Can Eastern Europe achieve the EU expansion goals for renewable energy (page 16)? When will things get going in other countries like Ukraine (page 15)? What developments are happening in South Africa (page 24)? Is the international community finally waking up to the need for renewables?

Exciting times, which is why we have entirely devoted the latest issue of win[d] to the energy revolution.

Hans Jörn Rieks

President, Vestas Central Europe



Hans Jörn Rieks

The Lord of the grids

Matthias Kurth – President of the German Federal Network Agency

Matthias Kurth (born 1952 in Heidelberg, Germany) was elected President of the German Network Agency for Electricity, Gas, Telecommunications, Post and Railways (previously the Regulatory Authority for Telecommunications and Post) in 2001. From 1978 onwards, the graduate lawyer was a judge at the Darmstadt regional court. He worked as a lawyer from 1980 to 1994, and was Secretary of State in the Hessen Economy Ministry (for the Social Democratic Party, SPD) from 1994 to 1999. Mr. Kurth is a member of the Independent Regulators Group (IRG) and the European Regulators Group (ERG). As part of energy regulation, he is also a member of the Council of European Energy Regulators (CEER) and the European Regulators Group for Electricity and Gas (EREG).

win[d]: Mr. Kurth, the aim of the Federal Network Agency is to guarantee a reliable, inexpensive, consumer-friendly, efficient, environmentally compatible supply of electricity to the public. How difficult is this task at the moment?

Matthias Kurth: It goes without saying that the change in energy policy is a great challenge. Germany has now set the most ambitious goals of any country – 35 per cent of our energy should be generated from renewable sources within ten years, which corresponds to double the overall use of renewables at present. And it doesn't stop there – some are already talking about a 50 per cent renewable energy share within 20 years and even an 80 per cent share within 30 years. No other country on earth has such plans. It is then up to us to promote the necessary expansion of the power grids. Electricity will be partially generated from solar and biomass sources, but it will primarily be produced by wind power – our main driving force.

win[d]: How rapidly will this expansion take place?

Matthias Kurth: The most important wind energy areas are located in northern Germany. Even today, surplus energy is sometimes produced there – on windy days more electricity is generated than can be used locally. We then need to bring the power to where it is needed, such as the

south of the country. This will be even more important when the nuclear power plants in the south are decommissioned. To do this, we need an efficient and powerful electricity grid. However, the current grids are in no way suitable, and are overloaded even now. For this reason, the German Parliament and Federal Council have agreed upon a rapid expansion of the grid, with a maximum period of five years between initial discussions and implementation. Previously, we had a planning time alone of over 10 years, which is now no longer viable. We want to double the share of renewable energy, which should make it clear to us all that the expansion of the grid is of vital importance.

win[d]: Following the adoption of the German “Energy Package” and the law on accelerated expansion of the electricity grid, how do you see the exact tasks of the Federal Network Agency at present?

Matthias Kurth: Our mandate is to evaluate whether the grid expansion is necessary from an energy efficiency point of view, and to take on the planning tasks. The Federal Network Agency is to submit a national requirements plan within the next two years, in which the capacities needed will be defined. The technology used will also be a topic of discussion. A subsequent national planning scheme will then specify where the grids should run and how the cables will be laid. The legislators have already realised that the planning process can only be accelerated when it is handled from beginning to end by a single authority. This process would be hindered if responsibilities were split up.

“I expect this all to be feasible within ten years.”

win[d]: Do you think that these ambitious goals are realistic?

Matthias Kurth: The goal issued by the government is to double the share of renewable energy in power generation by 2020. We now need to explore different scenarios with all stakeholders – the federal states will also want to assign additional priority areas as part of this. State funding conditions will also play an important role. After all, the Re-

newable Energy Sources Act (EEG) has just been reviewed. It's up to investors to invest – this is not a matter for the state. Planning authorities are only responsible for the allocation of areas and the relevant approval procedures – everything needs to be synchronised. Nonetheless, Germany has led the way here in the past, especially when handling renewable energy. I expect this all to be feasible within ten years. Germany will surely retain its leading role.

“We are launching an intensive campaign for increased acceptance.”

win[d]: Do you already have an idea as to the scale of the grid expansion scheme?

Matthias Kurth: I don't want to specify a scale at this point – in fact, I couldn't! The conditions and forecasts for the next ten years have changed significantly just a few weeks ago. Therefore, we should leave this aspect open at present. First of all, we want to evaluate the different scenarios and then discuss them with all market participants and interested members of the public. Themes here include the expected power consumption in the next ten or twenty years and the share of renewables. All serious assumptions made up to now were gathered before these new decisions were made. We are now ready to start, and are also launching an intensive campaign for increased acceptance of the grid expansion.

If we want to maintain credibility, then it is absolutely necessary to start a dialogue and meet people where they currently find themselves. Unfortunately, many people still doubt the necessity of grid expansion. For many, the solution appears to be decentralisation. The concept here is to find local solutions with everyone dealing with their own needs, leading to the possibility of fewer grids as a result. However, in my opinion this is a fundamental mistake, and one which needs to be discussed.

win[d]: Why is this a mistake?

Matthias Kurth: It goes without saying that there will be a great deal of decentralised power generation – this is not in doubt. However, even if more decentralised on-shore wind energy is now produced in the



south, a lot more offshore and onshore wind power is still generated in the north of the country. It would be fatal if grids were not in place to deal with these capacities. We would then have to limit the production from wind turbines in the north, despite the electricity being required across the country – this is something that nobody can seriously want. At present, 13 billion euros in funding is paid out annually for renewables – should we then accept that electricity from wind power cannot be moved from A to B, or cannot be stored in large quantities? This makes no sense as an overall concept. We need to transport the power to where it is required, or to where it can be stored. To do this, we need efficient and powerful grids.

“Surplus wind power must be transported to Norway or the Alps.”

win[d]: That takes us to the storage possibilities. What is being planned here?

Matthias Kurth: To give one example, we’re planning to lay lines towards Norway in order to use hydropower from there as a reserve storage. We are integrating electricity supplies in Europe, meaning we can also combine the hydropower from Alpine countries with wind power, for example. However, pumped-storage reservoirs require mountains. Surplus wind power must then be transported to Norway or the Alps. To do this, we need an electricity grid. We need coordination between wind energy, hydropower and solar energy across Europe. This requires integrated grids that cannot be achieved with decentralised concepts alone.

win[d]: How exactly is cooperation across Europe being made?

Matthias Kurth: We work closely with the European Regulators Group (ERG). We have involved our colleagues in the process in order to clarify the effects of the German energy concept, which will of course also be felt in neighbouring countries. We are campaigning for cooperation and acceptance throughout Europe.

After all, the concept also has advantages for other European countries. Critical discussions on nuclear energy are not just a topic in Germany. Countries such as Austria and Italy neither have nor want nuclear power plants, whilst Switzerland does not want to build any new ones. Let us not pretend that such discussions are not being made in other countries. If the German concept is successful – which we all hope it will be – then it could also be adopted as a model in other industrialised countries, and not just those in Europe.

win[d]: Despite all this optimism, is there also a note of caution?

Matthias Kurth: Of course. We have to emphasise that the change in energy policy and the necessary grid expansion is by no means an automatically guaranteed success. We also have to build further conventional power plants – renewable energy alone will not be enough. Germany is an industrialised country and requires a reliable supply of electricity in times when wind and solar power are not sufficient (such as in winter). That’s when the energy demand is highest, all across Europe.

Additionally, we are still perceived as an exporter of electricity to some countries, which is no longer the case. Many countries have relied on the availability of imported power from Germany. Therefore, it is also important that we replace our decommissioned nuclear power plants, which were responsible for generating 20 gigawatts of the total electricity available for both Germany and the rest of Europe. To do this, we also require conventional power plants.

win[d]: Mr. Kurth, you are not only the primary regulator of electricity grids and gas networks, but also of telecommunication, postal and rail networks. Which network occupies most of your time at present?

“Modernisation of our infrastructure is required in all networks.”

Matthias Kurth: As a network agency, we have an invaluable advantage – we don’t just think in terms of specific sectors, but across networks. Modernisation of our infrastructure is required in all networks. The topics of today are intelligent networks, smart grids and smart metering. We require more IT and communication technology to realise this, not to mention more control and regulation technology. These are all aspects which require a broadband, fibre-optic network. We are therefore greatly in favour of networks being laid together – especially distribution networks.

Excavation costs remain the most expensive part of network expansion in Germany. When expanding broadband networks, they make up 80 per cent of the total costs. The German economy would have a great cost advantage if we were to lay electric, gas, broadband, fibre-optic and other supply lines together – especially in urban areas. As you can see, we do not just focus on one sector. Instead, we think of the infrastructure as a whole. Germany must become the country of modern infrastructure. All infrastructures require a significant innovation boost – not just the electricity grid.

win[d]: Mr. Kurth, many thanks for your time. ■

By Malte Meyer, Government Relations, Vestas Central Europe

The German energy revolution and the wind market

Does the rushed-though policy u-turn hold what it promises?



Germany is the first major industrialised country to abandon its ever-unpopular nuclear programme; all remaining nuclear power stations shall be gradually phased out by 2022. This will turn the country from a net electricity exporter to an importer. Extensive investments in renewables – and particularly in wind energy – will be necessary to replace the decommissioned power plants.

However, earlier drafts of the Renewable Energy Sources Act (EEG), which was revised as part of the Energy Package, initially included provisions that would have had exactly the opposite effect.

Onshore Wind: Averting the worst

For onshore wind energy, it was intended to cut or revise three critical points: First, the complete axing of the system service bonus (SDL) for new wind turbines from January 2012; second, a doubling of the annual degression of feed-in-tariffs from one to two per cent, and, third, a restriction of the repowering bonus to old wind turbines that are between 14 and 17 years old. Combined, these three regulations would have caused tariff cuts of up to eleven per cent for specific projects, and more than 1,000 MW of projects would have been at risk.

These three points were only defused after an intensive three-month campaign with numerous letters, telephone calls and meetings with ministers, for which Vestas gave its full support in close coordination with customers, associations and other partners. In return for keeping and even lengthening the system service bonus to the full amount, a compromise of a 1.5 per cent degression of feed-in-tariffs was agreed. This means that continuity is ensured with the EEG remuneration for onshore wind energy until the end of 2015.

Offshore Wind: No major step forward

In the offshore wind sector, the changes – although undoubtedly an improvement on the previous provisions – have also failed to live up to expectations. For in-

stance, the often-quoted increase in the offshore remuneration is just a pricing-in of the sprinter bonus, which was previously limited to 2015: Instead of 13 plus 2 ct/kWh, the initial remuneration is now 15 ct/kWh. Although it is now possible to have this amount paid out across just eight years instead of twelve (so-called optional compression), the intended profit effect is partly neutralised, since legislators decided to discount the remuneration volume altogether.

However, at least the KfW loan programme – amounting to five billion euros for the first ten offshore wind farms – ought to help contribute to the long-awaited acceleration of this segment. (KfW banking group is a German government-owned development bank, based in Frankfurt)

Conclusion: Additional stimulus required

Even if the Renewable Energy Sources Act ensures continuity in the still-dominant onshore sector, additional stimulus for growth is required in order to achieve the desired acceleration in the expansion. In the longer term, an even more targeted promotion of the onshore expansion is certainly desirable. However, the German wind market could easily increase its recent expansion rate of approximately 1,500 MW a year to considerably more than 2,500 MW during the next few years already if the diverse planning and approval hurdles are rigorously dismantled.

Insufficient land allocation, increasingly laborious approval and review processes, height restrictions as well as grid bottlenecks and power cut-offs are considerably hampering the market potential. The industry should therefore push to ensure that the initial approaches adopted in the Energy Package, such as speeding up grid expansion, are implemented in practice as quickly as possible. In future, a particular focus must therefore be on the federal state and local polices, which we want to address together with our partners. ■

The German Energy Package

Feed-in provisions in the amended EEG (applicable from 1 January 2012):

- Initial onshore remuneration: 89.3 €/MWh; basic remuneration: 48.7 €/MWh
- Annual onshore degression: 1.5 per cent (from 2013)
- System service bonus (SDL) of 4.8 €/MWh extended until the end of 2014
- Repowering bonus of 5.0 €/MWh for old wind turbines installed before 2002
- Initial offshore remuneration now 150 €/MWh due to unlimited integration of the sprinter bonus; basic remuneration 35 €/MWh
- Annual offshore degression: 7 per cent (from 2018)
- Optional compression of the initial offshore remuneration to 8 years, each with 190 €/MWh (instead of the normal 12 years, each with 150 €/MWh)

The Energy Package also includes:

- Nuclear Act: gradual phasing out of all nuclear power plants by 2022
- Grid Expansion Acceleration Act: grid expansion accelerated through national planning scheme, quicker local authority decisions and expropriations, underground cabling at the 110kV level
- Act to promote climate protection in the development of cities and municipalities: simplification of construction and planning provisions to accelerate the allocation of development sites for wind energy and repowering projects
- Energy Industry Act: Grid connection costs for offshore wind farms shall be paid for by grid operators for an unlimited period (previously limited to 2015); master plan for an offshore grid
- Marine Facilities Ordinance: Bundling of all approval procedures with the German Maritime and Hydrographic Agency (BSH)

The power of the giant – V164-7.0 MW breaks records



The offshore wind energy market is developing rapidly, as strong sea winds promise immeasurable energy yields. Due to the larger costs involved, however, the industry needs high-efficiency turbines with low investment risks. With this in mind, Vestas has developed a dedicated offshore turbine of gigantic dimensions that will break new ground – its rotor blades are longer than 9 double-decker buses in a row.

Anders Söe-Jensen, President Vestas Offshore, is very happy with this development. "The V164-7.0 MW is attracting a great deal of attention. Since presenting the new turbine in London at the end of March 2011, we have had nothing but positive feedback from customers, banks, politicians and the market alike, be it on the subject of the market launch, technical solutions or performance."

Giant in the sea – efficient and productive

The V164-7.0 MW does indeed break all previous records. At seven megawatts, the giant in the sea generates double the output of Vestas' most powerful existing turbine. One single wind turbine is sufficient to provide environmentally-friendly electricity for as many as 6,500 households.

One thing that is of vital importance for the offshore industry: Substantially lower energy costs are guaranteed by the size and efficiency of the turbine, allowing power to be produced at lower prices.

This is mainly due to the rotor blades which, at 80 metres, are by far the longest blades made by any manufacturer. Together with the turbine tower, the total height stretches skywards up to 187 metres (30 metres higher than the Cologne Cathedral). The colossal rotor diameter of 164 metres covers a swept area of over 21,000 square metres – the equivalent of three football pitches. This is the key to the lower energy costs.

Furthermore, the rotor/generator ratio has been optimised by including factors such as wind speed, water depths, size of the wind farm, grid capacity and type of foundation.

Experts were astonished to see that the Vestas engineers had decided in favour of a medium-speed compact gearbox. "This is proven technology we know we can rely on," says Peter Stenvald Madsen, Director in Product Management, Vestas Technology R&D (see interview page 11).

Low risk, high returns

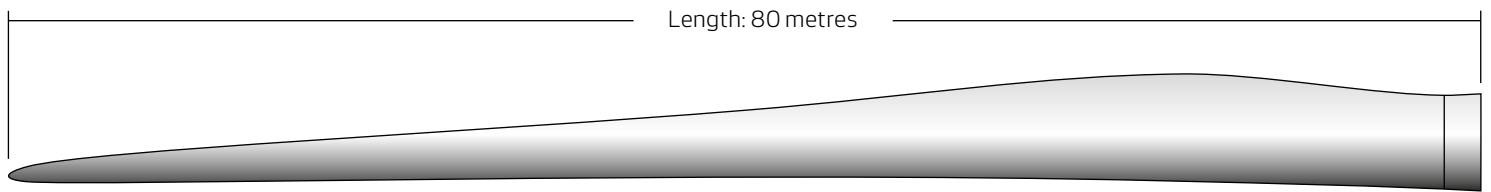
It is this proven V164 technology that allows Vestas to limit the risk of downtime. Lower downtimes mean higher returns. As a trailblazer in the offshore wind energy sector (43 per cent of all offshore turbines worldwide, or a total of 580 systems, are Vestas turbines), the company has a wealth of experience even if this is the first turbine dedicated exclusively to maritime use.

The V164's high level of efficiency also ensures that the investment risk is low since fewer turbines are required to generate the same output. This also means that fewer foundations have to be anchored in the seabed and fewer grid connections need to be established, which in turn reduces operating and maintenance costs.

This is why according to the business managers, the V164-7.0 MW, with a service life of 25 years, guarantees maximum returns on capital. →

V164-7.0 MW – low investment risk

Rotor blade of the V164-7.0MW



Designed to handle the rough North Sea

Vestas developed the V164 to meet the rapidly growing demand for offshore wind turbines in the North Sea.

The UK, for example, is planning to build huge wind farms in nine different zones off its coast by 2020 (Round 3 projects). This is to raise the total installed capacity of the UK offshore turbines to 32 gigawatts, covering one quarter to one third of the UK electricity demand.

“At present, the UK is by far the most important offshore market worldwide,” says Anders Söe-Jensen. Other countries are expected to follow this ambitious example.

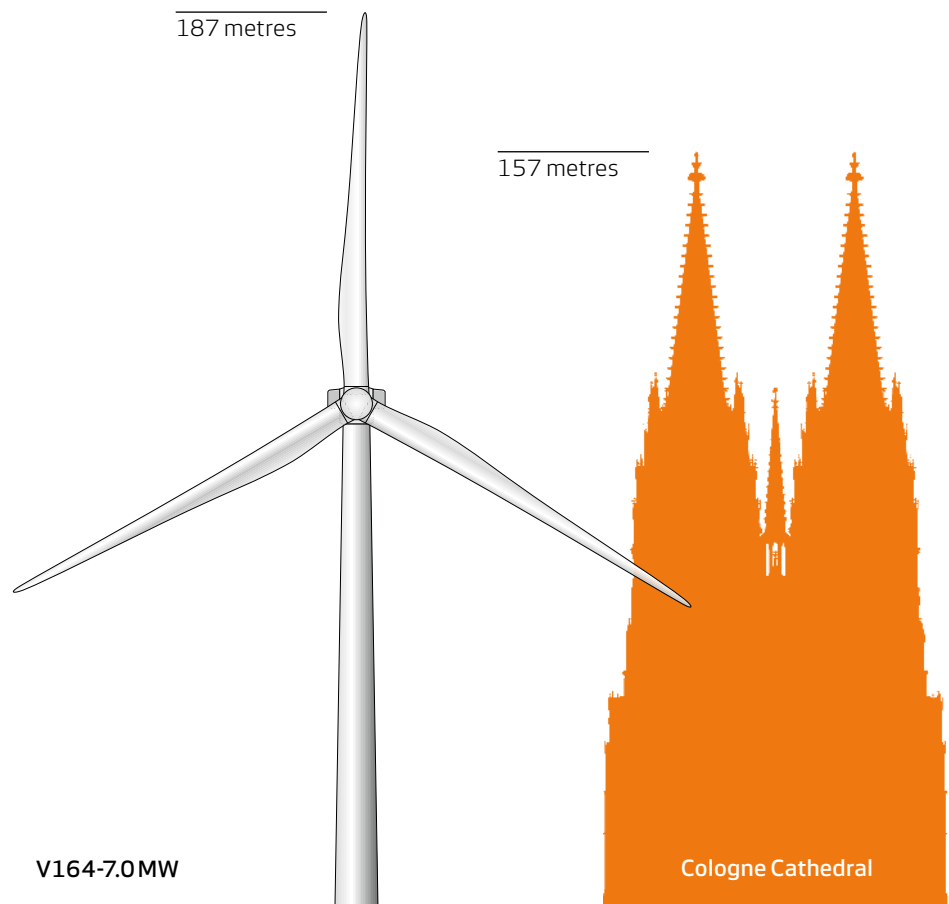
Technology centre for rotor blades

Establishing its newest and biggest rotor blade research and development centre on the Isle of Wight in the UK was therefore a logical step for Vestas. Among other tasks, this centre is responsible for prototyping and testing the V164 rotor blades, a job which required new halls to cope with the colossal dimensions involved: one for testing and one for the construction of prototypes.

At the end of June, 120 engineers and technicians commenced working at the new site.



Vestas Research and Development Centre for Rotor Blades | Isle of Wight



From the specially constructed 100-metre berthing wall at the research centre, the prototypes will be shipped to Southampton harbour, initially using Vestas' own barges, which are aptly referred to as 'Blade Runners'. "Once our UK manufacturing plant is up and running, we will employ different logistics solutions," says Rob Sauven, Managing Director, Vestas Technology UK Ltd. "The transport issue requires in-depth planning, both onshore and offshore. Our solutions were incorporated in the development of the V164-7.0MW at a very early stage." "With this research and development site and the development of the V164-7.0MW turbine, Vestas is taking a pioneering role as regards investment in the next offshore generation, and the company is showing its willingness to invest in the UK offshore market," says Rob Sauven.

Manufacturing plant the size of 93 football fields

Vestas intends to manufacture the V164 rotor blades in the UK. A new manufacturing plant will have to be built to accommodate their colossal length.

For this purpose, Vestas has secured first option on an approximately 70-hectare piece of land (equivalent to 93 football fields) at the Port of Sheerness on the Isle of Sheppey at the UK's south-eastern coast.

"If the UK market develops as expected and sufficient orders come in, Vestas is prepared to make a massive investment in Sheerness," says Anders Söe-Jensen. The fully integrated manufacturing plant would not only produce the rotor blades but also assemble the nacelles and store the towers. From the adjoining harbour, the individual turbine parts can be transported by sea to the offshore wind farms. This could lead to the creation of more than 2,000 direct and indirect jobs.

"The UK government has professed great interest in this project," explains Söe-Jensen. However, Vestas' commitment is conditional on market stability and regulatory planning reliability for its customers. "This includes a long-term stable political framework and public investment to minimize the risk," says Söe-Jensen. "A manufacturing site of such gigantic dimensions requires substantial infrastructure investment and at Vestas we don't jump head first into that kind of investment without first seeing a sound business case."

"Final examination" involving the customers

Prior to the manufacturing stage, all V164 components and modules, as well as the entire system, will be thoroughly checked. At Vestas' state-of-the-art test centres,

they will be put through extensive test programmes.

This process also involves the customers. All the way through the V164-7.0MW development phase, experienced offshore wind farm operators have been invited to provide input to it in order to ensure that the development of the turbine is based on customer needs and expectations.

This also means that customers are much more closely involved than ever before and are looking over Vestas' shoulder to gain needed insight.

"We want customers to see for themselves that they are choosing the right technical solution," says Anders Söe-Jensen. ■

Testing the V164-7.0 MW

Denmark-based DONG Energy, the market leader in the field of large offshore farm construction, has announced plans to install one or two turbines in one of its test fields for research and demonstration purposes. It has also announced a V164-7.0MW design review, in which the wind turbine will be put through its paces once more. Comprehensive and systematic testing will be conducted to assess whether all quality requirements have been met, whether there

are still potential problems and which solutions can be developed to solve them.

Belwind, the Belgian wind farm developer, has also offered to test the turbine: The company plans to install a V164-7.0MW prototype on the Bligh Bank wind farm off the Belgian coast, where a total of 55 Vestas V90-3.0MW turbines are generating 165 megawatts of electricity in an initial phase.

Work on installation of the first V164 prototype is expected to begin at the end of 2012. Serial production is to commence in 2015. ■



Rotor diameter is the key

Interview with Peter Stenvald Madsen

Director in Product Management, Vestas Technology R&D

win[d]: The V164-7.0 MW is the first turbine Vestas has developed specifically for the offshore sector. Why is it coming out now?

Madsen: We are introducing the V164-7.0 MW at this particular time to meet the requirements of the offshore market, which are set to grow substantially in the future. Having been introduced now, the turbine can be included in the plans under the UK's 'Round 3' projects (see article) as well as in projects on other offshore markets.

win[d]: How does the V164 raise returns on investment?

Madsen: As one of the main results of our analysis we have found that the key factor in reducing energy costs consists of the swept area covered by the rotor, i.e. in the rotor diameter.

The long rotor blades lead to a significant reduction of the energy cost portions associated with the foundations, electrical infrastructure, installation and, in particular, operation and maintenance.

win[d]: What are the other main innovations aside from the record-breaking size of the rotor diameter?

Madsen: The V164-7.0 MW offers new technical solutions, for example in the development of the control system, which draws on experience gathered in the aviation industry.

The V164-7.0 MW is largely based on proven technology. It was our main objective to achieve low energy costs while guaranteeing high operating efficiency. In the early development phases, we put a lot of

energy into working out a way to achieve this objective.

One of the main drivers of certainty in financial planning is the turbine's reliability. While the turbines themselves account for 30 per cent of the costs associated with an offshore wind farm, they must generate 100 per cent of the cash flow. One way to achieve a high degree of reliability is to base the development of turbines on solutions that have proven to be reliable in the past and to build innovations on these solutions.

One feature that has not had much focus so far is that the V164-7.0 MW will be available with up to 66 kV output voltage level. This will allow developers and customers to further optimize the inter array electrical infrastructure of their offshore wind power plants. The voltage level in existing offshore wind power plants is typically 33 kV.

win[d]: The turbine's medium speed, geared drive system came as a surprise for many experts. Why did you decide to keep the gear instead of switching to a direct drive concept?

Madsen: In our opinion, the question should rather be: Why should we consider change away from a concept that we know is working? Today, gearboxes actually only account for a relatively modest fraction of turbine downtime and Vestas has over the recent years succeeded in continuously lowering the Lost Production Factor (LPF) from our fleet of turbines.

We have actually unsuccessfully struggled to find documentation or evidence that could support the assumption that direct



drive solutions provide higher reliability than well-designed geared drive train solutions.

In the process towards selecting the overall size and design concepts of the V164, Vestas actually designed a number of turbine concepts both with various geared and non-geared drive train concepts. We thoroughly modelled the business case of various offshore wind farms and the cost drivers of the entire power plant, including the life time operation and maintenance.

At a certain stage in the design process we thoroughly assessed the benefits and disadvantages of these concepts and then selected the drive train which provided the lowest cost of energy and highest business case certainty for our customers and for Vestas. The assessment included calculations of offshore power plant capex (capital expenditure) and opex (operating expenditure) for the various concepts and under various site conditions.

The key outcome from this thorough analytical process was the selection of the medium speed drive train for the V164. ■



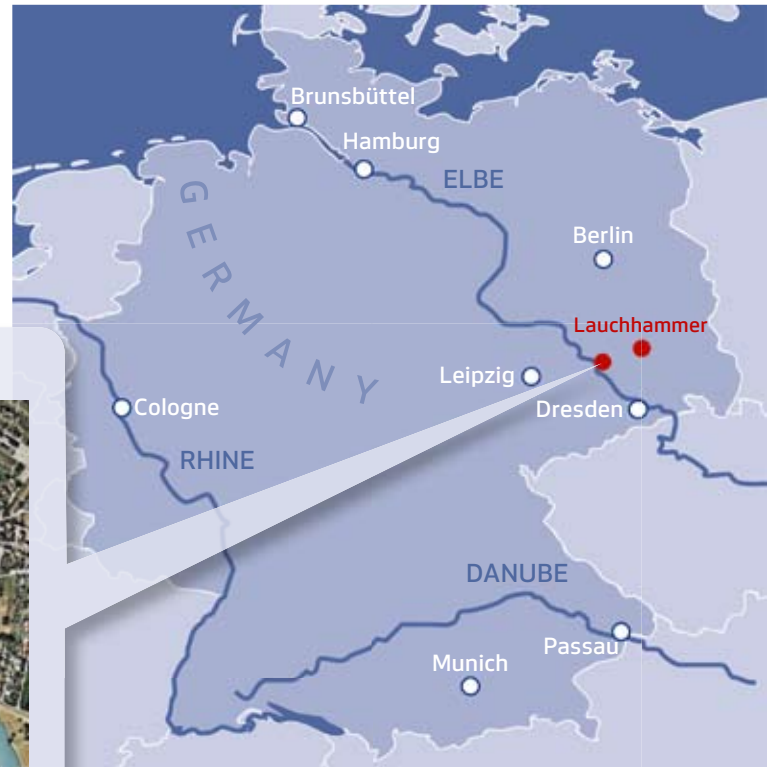
WindFloat

Floating semisubmersible for the deep sea

As yet they are something of a rarity: Floating wind turbines on the open sea. However, the winds blowing over the open sea are substantially stronger than those over coastal waters, which is why Vestas is now starting to research this concept.

Together with WindPlus (a joint venture of the EDP Group and its partners, among them Principle Power), an offshore project is being constructed on a floating semisubmersible platform off the Portuguese coast. By the end of the year, Vestas will deliver and install a V80-2.0MW turbine, which is to be operated and tested for a minimum of one year.

The semisubmersible, referred to as 'Wind-Float', was designed specifically for large wind turbines. It consists of three pillars forming a triangular shape, which are anchored to the seabed with ropes. They reduce the movement caused by wind and waves and hence the vibration of the turbine, facilitating the installation of wind energy turbines in previously inaccessible locations – in water depths of over 50 metres. ■



Inland port Mühlberg/Elbe



New inland port facility for transporting rotor blades

A highly efficient wind turbine such as the new V112-3.0 MW is not just a technical accomplishment. It is also the result of complex logistics and infrastructure measures, such as the development of the Mühlberg/Elbe inland port facility in Brandenburg. After all, what use is a cutting-edge 55-metre-long turbine blade if you can't easily transport it from the factory to the customer?

For this reason, the V112's blade, which is now being mass-produced at Vestas' manufacturing facility in Lauchhammer, Germany, was designed right from the beginning to be transportable, with a maximum chord of four metres. The use of special transport frames ensures a high packing density. That means that with the new transport equipment Vestas is able to transport more blades than before. However, the logistical planning does not stop here: Many measures involving many staff must be continually implemented to transporting the blades from the factory to the intended site.

20 per cent savings

The fact that inland waterway shipments on rivers such as the Elbe, Danube and Rhine are economically worthwhile had already been verified during the pilot phases and test runs conducted by Vestas since 2006. It costs 20 per cent less to transport each blade by barge than it does to transport it by truck. In the past, blades were shipped via the port of Dresden in eastern Germany in order to reach the seaports at Brunsbüttel and Hamburg via the Elbe river. The blades were transported from the factory to Dresden on the motorway.

Vestas Lauchhammer has been supporting efforts to develop the decommissioned Mühlberg gravel port for years, and, at the end of 2011, the Mühlberg/Elbe cargo handling facility will finally be ready for an integrated transport chain starting from Lauchhammer.

Although Mühlberg and Dresden are both around 50 kilometres from Lauchhammer,

the Mühlberg port can be accessed from Brandenburg state territory, which makes it easier to obtain permits, and the port can be reached via main roads that do not go through built-up areas.

Optimal addition

"The cargo handling facility in Mühlberg provides us with an optimal addition to our existing transport routes," says Frank Weise, Vice President of Vestas Blades and the Lauchhammer Factory Manager. "We are already looking to ship the major V112-3.0 MW order for the Macarthur wind farm in Australia via Mühlberg. The entire order volume amounts to 140 V112 wind turbines – in other words 420 blades – which could in part be shipped via Mühlberg." For inland waterway shipments towards the Elbe estuary, Mühlberg has the advantage of being especially suitable because it has the shortest stream course and a shipping lane with the fewest obstacles. →



▲ Just in time for Global Wind Day in June 2011 and together with all 544 employees, Vestas celebrated the completion of the first 55-metre blade to come off the new production line at its plant in Lauchhammer in Brandenburg. Series production was ramped up in summer.

With the Mühlberg and Dresden ports, Vestas therefore remains flexible, with alternatives available when bottlenecks occur, and is able to further develop its proven inland waterway concept. This will ensure an environmentally and citizen-friendly form of transport that is both quick and cost-effective. This provides a secure option given the 400 to 500 blades scheduled to be produced each year.

Development for the entire region

Vestas will not be the only user of the port facilities. Other companies have also announced their interest, including Elbekies GmbH and a manufacturer of tower components for wind turbines.

The main elements of the construction phase include strengthening the sheet piling wall as well as the installation of two heavy-duty slabs, the reconfiguration of the access roads and the creation of a cargo storage and handling area. "With these measures, the town of Mühlberg on the Elbe is therefore taking on responsibility for the economic development of the entire region," explains Mayor Hannelore Brendel. Inland waterway shipments represent a genuine alternative to roads, particularly with large-capacity and heavy goods transport.

Via the Elbe and Danube in all directions

Inland water vessels offer many possibilities for supplying Vestas' target markets in Scandinavia, the UK or further overseas, as well as in the Black Sea region and Russia – and not just via the Elbe. Together with the Potsdam-based logistics company Glahr & Co., Vestas is currently developing barge concepts using motorless barges that travel via the Danube towards Eastern Europe (shipments from Lauchhammer are first transported by lorry to Passau), via the Elbe (Mühlberg and Dresden) to the North Sea ports of Hamburg and Brunsbüttel, and via the Rhine towards France. "The connections to the motorway and shipping network have been considerably expanded during the last few years. We are therefore perfectly positioned for the newly ramped up V112 production," says Florian Fritz, Head of Purchasing and Logistics, Vestas Lauchhammer.

The tests results and forecasts for Vestas and the new inland port at Mühlberg will first be confirmed in the second quarter of 2012, when the integrated transport chain has established itself and the first push-towed barges, loaded with 24 blades each, have made their way to the seaports. ■

Towers in Ukraine

Vestas signs Memorandum of Understanding with Ukrainian steel manufacturer Yuzhmash

The potential of Ukraine's wind energy sector is highly promising, amounting to up to 16,000 MW by 2030. The southern part of the country is particularly windy, along the Black Sea coast near the port of Odessa, and the area surrounding the cities of Mikolaev and Kherson. Very good wind conditions also prevail in the Crimean Peninsula and along the Dnieper River near the city of Zaporizhia, as well as in the eastern part of the country around the city of Donetsk.

"Ukraine is one of the markets offering excellent prospects for development," explains Andreas Thomas, Senior Vice President of Business Development at Vestas Central Europe: "The policymakers have stipulated a lucrative feed-in tariff of 11.3 euro cents per kilowatt-hour, and with the V112-3.0 MW, Vestas has a wind turbine that perfectly matches the wind conditions prevailing there."

Technology transfers and new towers

Vestas took the first step to developing this potential in the spring. After a first agreement was signed in April, the next steps were taken in June of this year. At the Danish-Ukrainian Business Forum, which was held during the visit to Ukraine by Crown Prince Frederik of Denmark at the beginning of June, a Memorandum of Understanding was signed between Vestas Towers and the Ukrainian company Yuzhmash. Yuzhmash, a major state-owned steel supplier, was selected to qualify to become a supplier of wind turbine towers for Vestas Central Europe and their customers. Andreas Thomas: "Signing the Memorandum represents an important and major step towards developing further business there. We want to invest in the Ukrainian market in the long term."

Vestas Towers will support Yuzhmash by sharing skills and experience, including providing technology transfers and staff training. "Yuzhmash was selected because its existing organisation can handle developing their tower manufacturing com-



Signing of the Memorandum of Understanding, pictured from left to right: Andreas Thomas, Henrik Olesen, Lykke Friis, Sergiy Borodin (Assistant General Director, Yuzhmash), Yuriy Paschenko (Deputy General Director, Yuzhmash), Vadym Tochenyi (Head of Renewable Energy at the State Agency of Ukraine for National Projects)

petencies and facility modifications," explains Henrik Olesen, Senior Vice President Finance at Vestas Towers. "The company has experience in handling international contracts and ensures punctual delivery to a very high quality." During the first years of production, Vestas is initially planning to have 100 to 150 towers built each year, and depending on the performance, the number could go up between 200 and 300. The first wind turbine tower is set to be built as soon as in the middle of 2012.

Better utilisation through improved regulatory framework

The future utilisation of wind energy in Ukraine was the topic of a round table discussion, which Vestas organised during the Business Forum. Under the chair of Danish Energy Minister Lykke Friis, high-ranking political decision-makers, representatives from the Ukrainian ministries, parliamentary commissions, the National Energy Agency, regulative bodies, the Ukrainian Chamber of Commerce and the Ukrainian Wind Energy Association discussed, together with representatives from

Ukrainian companies and Vestas, how the country can leverage the maximum benefits from developing wind energy.

Vestas representatives Andreas Thomas and Henrik Olesen, as well as Energy Minister Lykke Friis, emphasised the importance of streamlining domestic regulations. Andreas Thomas said: "In order to give the Ukrainian wind industry a decisive boost, it's important that the regulatory framework continues to be completed – driven by the large ambitions of the government. Ukraine needs to provide a positive investment climate. Transparency is vitally important for the security of investors and the bankability of projects. This is the key to long-term investments." Vestas is now planning to strengthen the collaboration with Ukraine at the government level with help of Vestas Government Relations Department, which is already active there, and the Ukrainian Energy Minister will be invited to visit Vestas' Technology R&D Centre in Aarhus. ■

Eastern Europe: Complex markets, international investors

Mikael Rönholm-Nielsen

Vice President Sales Austria/Eastern Europe



Diversity is the keyword for Mikael Rönholm-Nielsen, who has been the Vice President Sales for Austria/Eastern Europe at Vestas Central Europe since April. He is now responsible for Austria, the Czech Republic, Slovakia, and the Balkan markets, which comprise Bulgaria, Romania, Slovenia, Croatia, Serbia and Hungary. As a sales specialist, it is particularly the diversity of the different markets in Eastern Europe that appeals to him.

More global, more international

"We're talking about a large number of individual countries with different cultures, legislation and languages," explains Rönholm-Nielsen. "In addition, the different countries are at different levels in terms of renewables and, in particular, wind energy. In my daily work I enjoy this rich variety with a very wide range of customers and projects in various development phases and sizes. What's more, the ongoing market reorganisations and adjustments – particularly in view of the legislative changes regarding energy policy, the legal framework conditions and the different feed-in tariff regu-

lations – form a complex and demanding environment."

Compared with Denmark and Germany, where mainly domestic investors are active, the customer structure in Eastern Europe is considerably more diverse. "In Eastern Europe we're dealing with domestic investors and project developers, with Russian oil corporations and Italian power utilities, as well as with Australian capital funds and Turkish infrastructure companies; our customers there are more global and international."

Experience as a wind farm developer

Rönholm-Nielsen is already an old hand in the wind energy business. He entered the business immediately upon graduating from Herning Institute of Business in International Marketing in 1993. At that time he was often in Germany with installation teams dealing with servicing and project planning, and learnt about the challenges of constructing wind turbines from the bottom up. He started at Vestas in 1997, where he joined the Sales division. From 2003 to 2008, Rönholm-Nielsen was also Vice President Sales & Marketing at Vestas Central Europe.

The 42-year-old Dane worked for several years in wind farm development in Germany, France, Romania and Bulgaria. This experience has enabled him to understand the customer's perspective from a holistic point of view, since he is familiar with all aspects of the project development process from the idea to the realisation: "When you plan a wind farm as a customer, a wide spectrum of factors have to be taken into account across the entire lifecycle of the project. This extends from the financing and choice of location to the grid require-

ments and legal framework. I worked for two years for a Vestas customer. That helps me, of course, to understand the bases for developing wind energy projects from the point of view of the customer." It goes without saying that Rönholm-Nielsen wants to implement this deeper insight in his sales organisation.

Focussing on the entire value chain

His multidisciplinary experience has enabled Rönholm-Nielsen to gain not only a comprehensive insight into the sales sector but an overview of the entire value chain, including the production planning and budget. This enables him to better understand the requirements and approaches in other specialist areas. In addition, the Team Selling concept also promotes greater collaboration between sales and other departments at Vestas in order to produce the most suitable offer for customers, given the ever-increasing complexity of projects.

Team Selling concept

In the Team Selling concept, the sales process is divided into different phases. It begins with the initial evaluation and preparation work, after which the requirements are determined and an offer is drawn up. It is then negotiated and contracts are concluded. The process ends with the handover and evaluation, as Rönholm-Nielsen explains: "Right from the beginning and during the entire procedure, we ensure that all relevant internal and external departments and resources are involved, such as financing, logistics, supplies, technical support, installation and the legal and service departments, and that they correspondingly contribute to a successful project development."

In this way, the schedule, deadlines and deliveries can be agreed upon with the



customer at a very early stage in the process, and mutual responsibilities can be determined. Exact timing is essential, because many activities are closely linked with one another. This also ensures quicker execution. As the contact partner for the customers, a sales team brings in qualified experts from various disciplines into the process in order to suitably handle the complex project management tasks.

"In addition, this procedure enables maximum customer focus and takes into account the reality of the local business environment. Particularly in new markets such as in Eastern Europe, it is very important that we support our customers in every possible way – from inspecting potential sites to reviewing the service options.

"Products such as the V90-2.0 MW Grid-Streamer™ are particularly interesting for Eastern Europe and Austria. In future, the V100-1.8/2.0MW GridStreamer™ and V112-3.0MW will also move into the spotlight because they were developed for low-wind sites, such as exist in Austrian and Eastern Europe," says Rönholm-Nielsen. →



Construction of wind farm in Kavarna, Bulgaria ▶

Market Eastern Europe



Vienna, Bucharest, Sofia

Important for the sales division, according to Rönholm-Nielsen, is to establish contact with the customer and begin the process as early as possible. A close, long-term strategic collaboration enables projects to be optimised jointly since, as Rönholm-Nielsen has experienced himself, the project development involves high risks and costs for the customer that tie in equity and cash flows. Security in shaping the project in the long term helps the customer to determine a business case, secure early profits and ensure that the project is competitive, calculable and bankable. That's why he feels it is important to provide the customer with the necessary support right from the beginning and during the entire sales process.

"I believe that having a local presence is particularly decisive. Being established on the spot, with three offices in Vienna, Bucharest and Sofia, enables us to better understand the customers and their working environment. That's why it's an important part of the sales strategy to further develop local Vestas organisations in Eastern European countries."

Energy revolution in Eastern Europe?

Mikael Rönholm-Nielsen is convinced that Eastern Europe will play an important role for the future growth of wind energy in Europe: "Several markets in Eastern Europe have experienced significant growth in recent years and I'm convinced that further markets will experience the same development." For him, the key to utilising this potential consists of long-term national regulations that provide the industry with the necessary planning security.

Mikael Rönholm-Nielsen believes that the political climate in the individual countries offers good prerequisites, particularly following the nuclear disaster in Japan: "I think that the terrible accident in Fukushima has made everyone think again about the consequences of nuclear power generation – whether in Eastern Europe, Austria, Asia or South America. By taking the lead in phasing out nuclear energy, Germany has shown that there really are alternatives such as wind energy – which generate clean energy without producing hazardous waste as a toxic legacy for future generations." ■

Energy strategy as best sustainable defence

Dutch Ministry of Defence on green drive

The masts painted in camouflage colours may not really fit in with the zoning plan around Coevorden, but the first wind farm in the province of Drenthe will be realised in October. What's so special about the project is that the three light grey V90-3.0 MW models are located at the site of the client the Dutch Ministry of Defence. A unique operation in various shades of green.

At the former NATO site near the German border, two of the three foundations are already complete. The third is located just outside the complex on the land of a neighbouring farmer. "This makes the best use of the wind," says Martin van Bolhuis, Agreements consultant for the Ministry of Defence, who together with Property Project Manager Folkert Mijlof has been busy for some time now realizing the plan. Both Ministry of Defence workers show with fitting pride the concrete castings where the 105-metre high masts will soon rest.

"What's so special about this project is that we at the Ministry of Defence have arranged just about everything ourselves, with the exception of placing the foundation and turbines," says van Bolhuis. "The contracting out, permit requests, cabling, infrastructure and the contracts with an energy supplier have been done by the Ministry of Defence. After all, we have a great deal of knowledge and expertise, so why shouldn't we make use of this?"

Rising electricity prices

Access to expertise and experience in large-scale building projects was certainly

an advantage, but the reason behind this initiative is the aim to deal with energy in a more sustainable manner. The rising electricity prices led the Ministry of Defence to examine the possibility of generating some of its required electricity in a cost-effective manner. A pleasant consequence of this turned out to be the benefits of a greener image. Mijlof mentions another argument: "The Ministry of Defence is an operation that works under difficult circumstances, such as currently in Afghanistan. During these sorts of operations we are completely self-supporting, also when it comes to power supply. Generating power is therefore an important factor in our operations."

Making sustainability visible

The foundation was laid with the environmental policy of the Ministry of Defence in the mid 1990s. Linked to this is the national government's aim to use 100 per cent green electricity by 2012, and a budget to implement environmental projects. Initially this was used for purchasing, for example, solar panels, but due to the long payback time this produced too little sustainable energy. The wish arose to realise more cost-effective, sustainable and visible energy projects. Mijlof: "The idea was that the Ministry of Defence staff and visitors to the military site would see for themselves how serious the Ministry of Defence is taking sustainable energy. And wind generators are certainly clearly visible," he says explaining how this all came about.

In 2001 with new, concrete agreements the national government, provincial authorities and city councils endeavoured to increase



On the left: Folkert Mijlof, on the right: Martin van Bolhuis; on the Area of the Ministry of Defence in Coevorden, Netherlands

the energy production by wind turbines in the Netherlands up to 1500 MW by 2010. In the so-called BLOW agreement the Ministry of Defence set down its intention to cooperate with the placing of 20 MW of turbines on Ministry of Defence property. The naval base in Den Helder has since been supplied with such a turbine through an external party, but for the army the wind farm near Coevorden is an exclusive Ministry of Defence innovation. Wanting to qualify somewhat the association between military green and sustainable green Mijlof explains: "I prefer to refer to our participation as a joint venture, as the divisions Air Force, Navy and Military Police, the Material Organisation and the Support Commands also participate in the project as a whole." →



Smoothly run project

According to van Bolhuis the wind chart showed that the vast area around the military depot would not get in the way of efficiency improvements. Good conditions therefore, which are also symbolised by the fluttering red-white-and blue flag at the gates of the barracks. With the expert help of KEMA consultancy bureau, the Ministry of Defence chose Vestas from among the tenders and then the V90 models. Amongst all the tendering parties Vestas turned out to be the one with the most cost-efficient tender; with the best revenue to costs ratio. The plan involved first five turbines which were to produce a total of 15 MW power. But that was changed to three turbines. Both the German government and the province of Drenthe had considerable objections concerning the pollution of the skyline and disruption to bird migration. Mijlof can live with these objections. "Apart from that the project, in part thanks to the smoothly working wind turbines of the council and provincial authorities, has run very smoothly".

Payback within eight years

Although the project is ongoing, at the end of the 1990s the Ministry of Defence carried out internal discussions on whether the Ministry of Defence should concern itself with generating energy. What's more, the financial picture was unclear for a long time due to the lack of certainty regarding contributions, including those of the neighbouring Ministry of Economic Affairs, Agriculture and Innovation. Influenced by the National Government Aims Sustainable Energy and the financial benefits that could be earned back, the approval finally came. And now, well over 10 years later, the fruits can finally be plucked. The project is experiencing its high point in a year in which the Ministry of Defence is being required by government policy to reorganise itself.

"The turbines certainly provide a positive contribution to this," guarantees van Bolhuis. "The total electricity production of the three Coevorden turbines will soon be around 4.5 per cent of the electricity consumption of the Ministry of Defence. After the reorganisation that has recently been announced, whereby 12,000 jobs will be cut, this will increase to approximately 5.5 per cent. Thanks to a financial contribution from the Ministry of Economic Affairs, Agriculture and Innovation, the payback time of the turbines is expected to be eight years. After that period the energy bills of the Ministry of Defence will be lower."

Control over one's own energy production

The generation of our green energy is therefore forthcoming and the sale has also been arranged. "The cables have already been laid," says Mijlof. "For the time being we supply the power to the grid whereby the electricity supply company reimburses the Ministry of Defence for a certain amount. When the electricity contract is renewed we will decide upon the most economical option. The Ministry of Defence will, however, retain control over it. Each day in Den Helder we monitor the power generated."

Now that the three colossuses mark out both the Ministry of Defence's complex and a new energy awareness, it is a good time for those involved to look back. Mijlof: "It was quite an experience being involved in this. I think that we at the Ministry of Defence can be proud. First of all, we realised all the facilities largely ourselves. But above all, with this project we have made a fine contribution to the development of sustainable energy in the Netherlands." Whether the experience gained lends itself to the realisation of another wind farm, the men could not say. Only time will tell. →



Foundation for a V90-3.0 MW turbine in Coevorden



Axel Jacobs, engineer from ABT consultancy

Green construction makes money

There is a green aura not only around the Dutch Ministry of Defence and the philosophy behind the turbines, the construction of the 'Coevorden' foundations also has a sturdy sustainable character.

The Arnhem consultancy firm ABT, active in wind energy projects for thirty years, took care of the soil survey and design. "Although the product is a collection of concrete and masts, we distinguish ourselves from many of the competition in our customised approach to each project," says engineer Axel Jacobs from ABT, who looks back in satisfaction on the collaboration with Vestas and the Ministry of Defence. "It is also our aim to design an apparently small part of the project as sustainably as possible. We were free in our approach of this. The engineering costs of the various models are perhaps somewhat high, but we save on the construction costs."

The turbines in Coevorden for example required 25 per cent less concrete and reinforcement steel than a standard construction. This is in part thanks to the firm and therefore favourable sandy soil – in contrast to the usual Dutch clay and peaty soil.

The significant reduction of concrete and concrete composition ensures not only for considerable savings of costs of a ton per turbine but also for a large decrease in CO₂ emissions. According to Jacobs this other approach does not in any way lead to a less strong construction. "Using unique and ingenious 3-D models we are able to simulate the reality very accurately. We are well aware of the risks, and therefore first apply any new technology to smaller turbines and other structures. We are constantly innovating: We are for example now looking elsewhere into the applications of steel fibre concrete – even more durable." ■

Over the treetops ...



Unusual projects require unusual measures when it comes to the planning and preparation. The Jerischke wind farm in the southern Brandenburg district of Neisse-Malxetal – developed by Vestas customer OSTWIND – is one such project, with Vestas' V112-3.0MW turbines going to new heights.

OSTWIND spokesman Christoph Markl-Meider describes the project: "With an overall area of 400 hectares and with 27 Vestas wind turbines from the new 3 MW class, the Jerischke wind farm will be one of the largest projects ever realised by OSTWIND in Germany. The electrical energy generated there in an environmentally and climate-friendly manner will be enough to meet the power requirements of around 50,000 households – that's equivalent to a small town!"

Precise data at a height of 140 metres

A particular feature of this project is not just its size and height – the wind turbines will have a hub height of 140 metres each – but also the site itself. The Jerischke wind farm will be located close to the Polish border in a young pine plantation used for forestry purposes. Until now, very little research has been conducted on such forest sites in terms of their wind conditions and, although there are forecast trends and references, they have to be specified for the individual location. For this reason, the wind regime prevailing at the site will be additionally verified using a 140 metre-high wind met mast.

Installed by helicopter

The mast was manufactured by the Swedish company Telecon and erected on behalf of OSTWIND and Vestas in a forest firebreak, in a spectacular operation that took place in spring 2011. Long before the slender, 140 metre-high lattice tower could be guyed into position with seven ropes, the measurement project had to be planned with absolute precision. This is because the measurement data, which is accurate to several decimal points, has to precisely determine the yields.

Installing a met mast of this size requires considerable timing and planning: All materials have to arrive at the site in good time and all specialists have to be fully focussed when the helicopter pilot hovers overhead with the upper mast section.

Turbulence, air pressure and icing

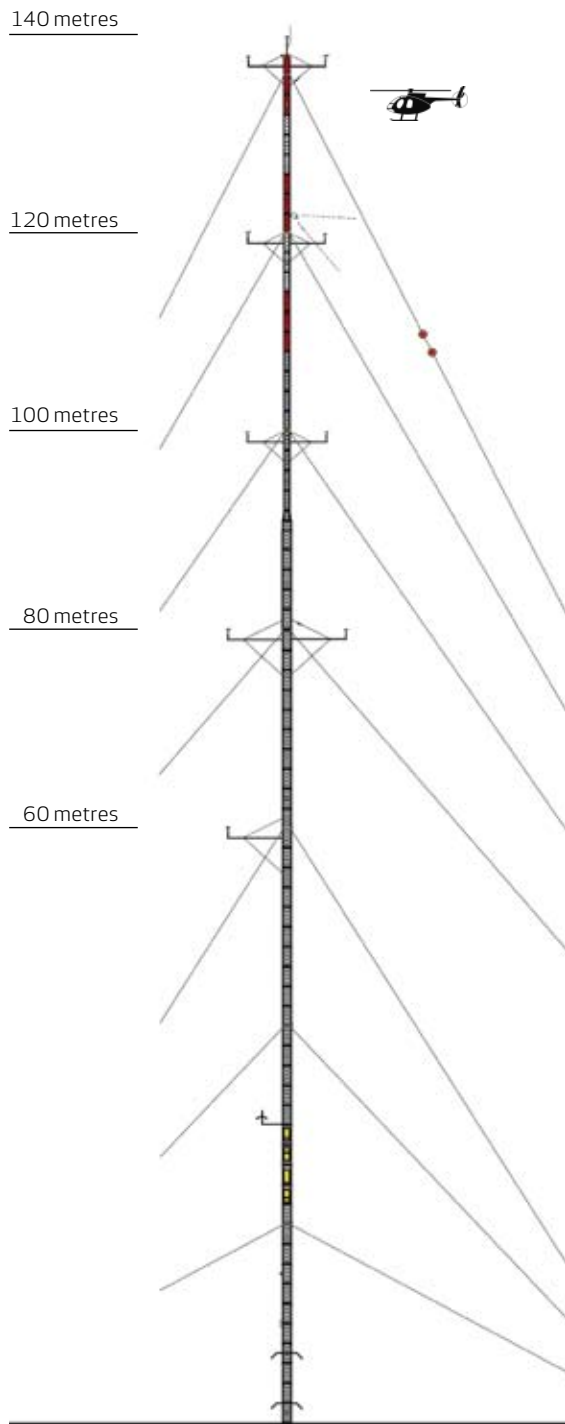
The aim of the measurement campaign is to determine not only the wind speed at the measurement height but also the turbulence distribution above the forest canopy below. For this purpose, the steel lattice tower is equipped with a range of different measurement instruments. For example, anemometers and wind vanes are fixed to the mast and the temperature and air pressure are also measured – at six different heights: 60m, 80m, 100m, 120m, 138m and 140m. In addition, a camera has been installed to obtain precise information on the icing of the measurement instruments. The equipment works independently and is powered via solar panels.

Since the building permit for the wind met mast will remain valid for two years, the measurements will also take this long. To collect data across all seasons is important since different flow conditions might prevail in winter than in summer. Level differences, tree growth and short-term climate phenomena also have to be taken into account. After all, at a height of 140 metres the airflow is considerably smoother than, for example, at 90 metres. The wind also blows considerably stronger and guarantees higher yields.

Early cooperation

Annelie Vollmering, a planning engineer at Vestas, will be evaluating the data for the company. "Higher hub heights, but in particular forest locations, provide a new challenge for the expert appraisers. In Germany it is usual to refer to data from already existing wind farms. However, this approach is difficult with forest sites since the wind conditions at standard sites are difficult to transfer to forest locations. Measured values therefore provide an enormous advantage for these sites." Vollmering checks and uses the data for internal site safety calculations. "Wind measurements certainly make sense with such investments. They are absolutely reliable, so that sound yield forecasts can be produced."

The early cooperation with trusted partners such as OSTWIND has therefore proved to be a win-win situation for all those involved. Alexander Siepelmeyer, head of the Vestas office in Berlin: "We've been working with



OSTWIND for more than ten years. And of course that extends far beyond just selling wind turbines. When designing a new wind farm, we already get together during the initial planning phase and decide together how such a project can be implemented most effectively."

With the Jerischke project, there were two particular reasons why OSTWIND chose the global market leader Vestas as a partner: "Firstly, because the new wind turbines meet all the requirements needed to achieve the maximum possible electricity yields at the selected inland site," says Gisela Wendling-Lenz, manager at the

OSTWIND Group. "Secondly, with each of our projects we try to realise a considerable amount of added value at the regional level. Vestas has its own plant for manufacturing rotor blades for the V112 in Lauchhammer in southern Brandenburg, which is located in the immediate vicinity of the Jerischke site."

Findings for future forest sites

The obtained measurement data is site-specific. "However, using this information we also hope to be able to draw conclusions on the general wind conditions above forests," explains manager Ulrich Lenz, "since forest sites will play an increasingly

important role in future, particularly in southern Germany, for example in Bavaria and Baden-Württemberg." The technical development of wind turbines has made this possible. 140-metre hub heights allow the almost constant wind flows to be used that prevail at greater heights and above 'rougher' surfaces, such as occur above forests.

"This wind met mast won't be the only one," announced Lenz. "We'll be erecting further ones to enable us to provide meaningful wind forecasts for the relevant locations in Germany." ■

The Tsitsikamma wind farm and development project

Mcebisi Msizi and Mark Scheepers from Watt Energy in South Africa



South Africa is on the verge of a renewable energy revolution. The rolling blackouts introduced by the state-owned energy supplier, ESKOM, which holds a virtual monopoly, as well as its major hikes in electricity prices, are accelerating a rethinking process in the country.

The government is now requesting bids for up to 1,850 MW of wind energy through a tendering programme – the result of detailed negotiations between the National Energy Regulator for South Africa (NERSA) and the Departments of Energy and Finance. After a long wait, the tenders were finally published on 3 August 2011; the first selected bidders shall be announced on 25 November.

The renewable companies are therefore eagerly awaiting the start signal like racehorses jostling on the starting line. “We’re ready,” says Mcebisi ‘Mike’ Msizi, summarising the years of preparation carried out by his company, Watt Energy, which is based in Port Elizabeth. Msizi will probably be the manager of one of the first wind farms in South Africa. His commitment to renewable energy is more than just a business. For him, the wind farm project in Wittekleibosch in the Tsitsikamma region southwest of Port Elizabeth is principally a development project for the people who live there – people who were forcibly resettled under the apartheid regime and who have now returned to their homelands.

A true entrepreneur

“We have land that we use for dairy farming,” says Mcebisi Msizi in explaining his motivation. “However, the income obtained from this agricultural use is insufficient for developing our community. That’s why we’re looking for other alternatives.”

Mcebisi Msizi is a true entrepreneur. His career began as the owner of a small corner shop in Port Elizabeth. Thanks to his business sense, he soon became one of the largest beverage suppliers in the townships surrounding the port city.

Tsitsikamma, a wonderful coastal reserve on the road towards the world famous Garden Route, is his home. This is where he grew up and this is where his family lives – “his people”. It is also a very windy area. The idea for a wind farm crystallised during the first large-scale power cuts introduced by ESKOM.

“During the power cuts two years ago, we realised just how dependent our region is on coal-fired power stations that produce electricity almost 1,300 kilometres away. That cannot be a sensible solution for the future, particularly when you consider that coal will one day be exhausted as an energy source.”

Watt Energy and the Danes

Together with his partner Mark Scheepers, Msizi founded Watt Energy. At the same time, Msizi’s community founded the

Eastern Cape Wind Development Association (ECWDA), a non-profit organisation aimed at developing a wind farm. This was carried out with the help of the Danish development aid organisation, DANIDA.

But how did the Danes suddenly enter the picture? “Well, I lived there for several years in exile. That was during the time when we were fighting here for the end of the apartheid system. I saw wind turbines for the first time in Denmark.”

So the entrepreneur turned up at the door of the Danish Embassy, explained his wind concept and asked for help. Ambassador Dan Frederiks was thrilled. Thanks to his support, Msizi and Scheepers were able to get the project up and running.

This is also how Vestas came into play, as one of the companies that signed the agreement with ECWDA and Watt Energy. “They have been involved since the project started”, says Msizi. The two companies have a good working relationship which they want to continue to build on. “The Danes are market leaders in this technology,” adds Mark Scheepers. “And I feel happy about producing wind energy, since it’s a clean technology without risks.”

So how many watts does Watt Energy expect to produce? “In our EIA appraisal, which is the legally prescribed environmental impact assessment report, we’re assuming up to 100 megawatts,” explains Scheepers.



Excellent data for the wind farm

"We've been measuring the wind at a height of 60 metres for more than a year. In addition we have two other 80-metre masts and a 50-metre mast, with which we have been taking measurements for the last three years. We have an enormous amount of excellent data for our wind farm."

Full of enthusiasm, Scheepers goes on to report about the current state of the project: "The infrastructure is in place, there's a financial feasibility study and the transport logistics has all been sorted out. We're currently concentrating on detailed geotechnical studies as well as on the negotiations with ESKOM regarding the connections to their mains grid."

But do wind turbines work?

However, getting there was a long, hard slog. A particular challenge was to convince the people in his local community of wind power. Mcebisi Msizi: "When I first explained that we wanted to produce electricity with the wind, some people suggested that I ought to get my head examined. It was very difficult for the people to understand and accept the concept of wind energy. That's why we from ECWDA hired a bus and took the grandmothers and grandfathers along with the women, men and children to Cape Town to visit ESKOM's wind turbine demonstration facility. We held workshops and later also visited the Vestas turbine in Coega. Today I can say that we have many ambassadors in our community who can tell their friends and colleagues what they have seen

and that wind turbines really do work."

"Projects that claim to be able to produce electricity independently of ESKOM are often met with disbelief in this country," explains Mark Scheepers. "People look round and say: 'Can't you see that we don't have any electricity here? How are you going to produce your own power without a grid connection?'" In the Eastern Cape Province, only 30 per cent of the inhabitants have access to the grid.

"This concept confuses people," says Msizi. "Many in South Africa believe that the electricity has to be supplied by ESKOM, as if that were a constitutional right."

Education in the schools

According to Msizi, this has something to do with the South African mentality. "We make ourselves too dependent on what the government provides. That's why I am convinced that we must continue our educational campaign in order to help people understand that alternative energy sources and producers are doing the right thing." Watt Energy and ECWDA will be explaining the story behind the wind farm in Tsitsikamma at schools throughout the Eastern Cape Province.

How do locals benefit from the project in concrete terms? "The advantages are enormous," emphasises Mcebisi Msizi. "Our motto is: Communal investments must begin before the first wind turbine is in place. We're currently supporting the local school. We're providing funds for a computer

teacher; we have furnished classrooms and provided them with electricity, and built toilets and sewer pipes. Our partner Exxaro (one of the largest coal mining companies in South Africa) is investigating a bus for the school children from the remote farms. We have plans to build a clinic and more." They therefore expect help from all partner companies in supporting the local community development initiatives.

"The CSI project is very important to us," emphasises Mark Scheepers. Corporate Social Investment (CSI) refers to the legal requirement of large companies to develop formerly disadvantaged communities. "We don't just talk, we act. That's another approach European investors will probably not be very comfortable with, seeing that you give before you receive something. But I also think that our European partners will accept that."

www.wattenergy.co.za



Plaque commemorating the project inauguration



In countries like Germany, wind turbines are becoming interesting for tourists as part of the cultural landscape. Now, for the first time, the travel guide 'Baedeker Deutschland – Erneuerbare Energien entdecken' (Baedeker Germany – Discover Renewable Energy) offers tips for local excursions. Divided according to the federal states, more than 160 climate-friendly destinations such as biosphere houses, hydroelectric power plants, solar-powered cloisters and wind farms are presented. These include sites with Vestas wind turbines such as the Morbach Energy Landscape in Rhineland-Palatinate and the Energy Trail at the Dobberkau wind farm in Saxony-Anhalt.

Energy trail

With an installed wind power capacity of 3,509 MW (2010), the Federal State of Saxony-Anhalt generates more than half of its net electricity requirements from wind energy and is thus ranked third nationally. The route to the Dobberkau-Arensberg-Büste Energy Trail takes you through the Altmark agricultural region. The village railway station of Hohenwulsch can be easily reached via the Stendal-Uelzen railway line. From here it is just three kilometres by road in the direction of Dobberkau to get to the wind farm with its Energy Trail.

Power for 21,000 households

The circular route through fields and arable land takes you past the wind turbines. The fourteen Vestas V90 wind turbines at Dobberkau, which each have a rated output of 2 MW, have been supplying around 21,000 households with electricity since 2007. Information panels positioned along the trail explain the use of wind energy, biomass, hydropower and solar energy.



TIP: A day out to the Dobberkau wind farm

There is also information on the historical background of these new energy sources. The utilisation of wind energy began with sailing ships and windmills for producing grain – the nearby Mühlenberg (Mill Hill) still provides testimony to this use.

Thrilled by the benefits

When the decision to construct the wind turbines was made by the District Council, the direction was clear for Mayor Dieter Wein: "We agreed because we wanted to do something positive for the owners and the community, and because renewables represent the direction we want to be taking in the next few years." The landowners agreed to the project. "They were thrilled by the benefits. After all, only a small part of the land was taken away."

Deer, owls and bats

The necessary interventions in the landscape were compensated for with tree planting and the transformation of former agricultural land into grassland and wetlands. This work includes regular maintenance of the pollarded willow trees, which provide the habitat for owls and bats. Nature is noticeably present here, and you might see hares and deer. "It was initially feared that there might be fewer wild animals if the wind turbines were present," recalls Wein, "but that has proved to be unfounded."

Looking to the future

The Mayor wants to send out a signal with the Energy Trail: "Our region in the

Stendal Rural District was once associated with the nuclear power station near Arneburg, which was built by the former East German government. It's still being hotly debated whether to build a coal-fired power plant there. For this reason, it is very important that this Energy Trail provides information on the importance of wind energy for the future of our people. We want to document and publicise this."

Undiscovered by tourists

The Energy Trail forms part of a Nature Trail, which includes the Hohenwulsch nature centre. The charismatic variety of fields, wooded areas and wetlands makes the Bismark Altmark municipality a worthwhile destination for excursions. Dobberkau itself is a roadside village with a fieldstone church that is typical of the Altmark region, and is still largely undiscovered by tourists. Cycle paths and walking trails invite you to explore the region.



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Quiz

Answer to the last quiz and the winners from win[d] 12:

The strongest natural winds are known as jet streams. They reach wind speeds of 650 km/h at altitudes of several kilometres.

The iPod Shuffle/2 GB was won by:

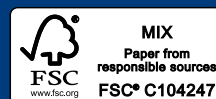
- Igor Ivankovic/HEP-OPS
Zagreb/Croatia

A Soccer ball went to:

- Matthias Nebel/Kiel/Germany
- Malte Peter/Evonik Energy Services
Essen/ Germany
- Julia Weißner/Malchin/Germany
- Nis-Peter Christiansen/ Drei Harden
Risum-Lindholm/Germany
- Wolfgang Mommsen/Nord-Ostsee-
Sparkasse/Husum/ Germany



The Wind Pavilion in Crimea, Ukraine





Each rotor blade on the new V164-7.0 MW offshore turbine is as long as...

- the height of the leaning tower of Pisa
- nine double-decker buses lined up one after the other
- the shortest sprint distance at the Summer Olympic Games

Please tick your answer on the card and send it to Vestas Central Europe by 30 November 2011, fax it to +49 (0) 40 46778 5333, or email your answer to wind@vestas.com.

Correct answers will be entered for a draw to win an iPod Shuffle/ 2 GB and five Soccer balls. Please also let us know what you think of win[d] 13. Many thanks.

See page 27 for the answer to the last competition question and the winners from win[d] 12.



Wind. It means the world to us.™

win[d] Navigator



Vestas Research and Development Centre, Isle of Wight, United Kingdom



page 7
50° 45' N
01° 17' W

Inland port Mühlberg/Elbe, Germany



page 13
51° 25' N
13° 12' E

Dutch Ministry of Defence Coevorden, Netherlands



page 19
52° 40' N
06° 45' E

140 metre wind met mast Brandenburg, Germany



page 22
51° 38' N
14° 36' E

Memorandum of Understanding with Yuzhmash, Ukraine



page 15
50° 27' N
30° 30' E

Watt Energy Tsitsikamma, South Africa



page 24
32° 13' S
26° 46' E

Please tick the right answer:

- the height of the leaning tower of Pisa
- nine double-decker buses lined up one after the other
- the shortest sprint distance at the Summer Olympic Games

Company

Name

Street

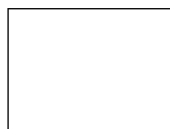
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