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Edition 1 • 2012

“Running smoothly!”

On site with our service team

Interview

Maria van der Hoeven,
Executive Director of the IEA

Special

Forest Sites

Technology and Innovation
Major V112 project –
Test passed with flying colors

Places and Markets
Wind energy picking up again in
Austria – 80 MW with WEB

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50 turbines in Romania –
more than a project

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Editorial



Dr. Wolfgang J. Schmitz

In 2012, there are a few new developments at Vestas Central Europe. As many of you know, Vestas recently underwent a comprehensive, company-wide restructuring process. The changes were made to strengthen our focus on customer needs and raise the company's profitability in the long term.

Organisational restructuring went hand-in-hand with some changes in staff. Hans-Jörn Rieks, who had been at the helm of the company for 13 years, has left Vestas. I have succeeded him as President of Vestas Central Europe. My name is Dr. Wolfgang J. Schmitz and I was previously in charge of Global Quality Management at the Vestas headquarters in Denmark.

The current edition of our customer magazine focuses on new markets in Africa (p. 18) and Eastern Europe (p. 22). An "older" market is picking up speed again: Austria (p. 16). We take a closer look at our high-performance V112-3.0 MW in different environments and markets: The first large-scale V112 project has commenced operation in Germany, (p.6), and the first V112-3.0 MW for Ukraine has been sold on what is a promising wind energy market with excellent wind resources (p. 7). Furthermore, we are proud to report that we recently sold another 30 of these turbines in Ukraine.

Forest sites are set to play an important role in the German market (p. 8), and we provide an insight into the everyday life of our service engineers (p. 12).

The former Dutch Minister of Economic Affairs, Maria van der Hoeven, is well-known at Vestas since she opened the Vestas office in Arnhem. Today, Maria van der Hoeven is the Executive Director of the International Energy Agency (IEA). win[d] asked her what role wind energy will play at the international level in the future (p. 4).

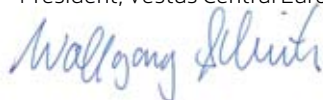
Last but not least, we are happy to announce that the German capital, Berlin, has a new landmark: A 44-metre blade has been installed in front of the German Museum of Technology (p. 26).

You will find us at the Hannover Messe, hall 27, stand L24.



If you'd like to get to know me in person, come and see me at the Hanover Fair at stand L24, hall 27. I look forward to meeting you there! If you have any further questions or comments in the meantime, please send an e-mail to our communications department at CEUCommunications@vestas.com. In the win[d] edition 2 • 2012, I will come back to your feedback and answer any of the questions that our readers may have in an interview.

Yours sincerely,
Dr. Wolfgang J. Schmitz
President, Vestas Central Europe



“Renewables are essential for a secure energy system.”

Maria van der Hoeven,
Executive Director of the International Energy Agency IEA

Maria van der Hoeven (born 1949) took over as Executive Director of the International Energy Agency in September 2011. Previously, she served as Minister of Economic Affairs of the Netherlands from 2007 to 2010. Before this, she was Dutch Minister of Education, Culture and Science for five years (2002-2007). Van der Hoeven is a member of the Christian Democratic Appeal (CDA) party in the Netherlands. She was originally trained as a teacher and worked in education and training for many years.

win[d]: Given that you are a Dutch citizen and that you served as Minister of Economic Affairs of the Netherlands, we take it that you have an affinity for wind energy. What role does wind energy currently play, and where will it stand in five years' time?

Van der Hoeven: Wind power is a particularly fast-growing energy technology, having shown average global annual growth rates of around 25 per cent in recent years. On the most favourable sites, on-shore wind power is now competitive with those newly built conventional power plants which follow stringent environmental regulations.

Wind power generated 432 TWh last year in the world, mostly on-shore, and our preliminary expectations are that by 2016 it may double to more than 900 TWh, of which around 7 to 8 per cent will come from off-shore.

“Grids, administration and public acceptance all need to be addressed.”

win[d]: You have recently called for an “urgent and radical change of policy direction” – otherwise the world would “lock itself into an insecure, inefficient and high-carbon energy system”. What has to be done?

Van der Hoeven: Our recent publication, *Deploying Renewables 2011*, assessed the effectiveness of renewable energy support policies in many countries and analysed both success stories and failures.

What investors need above all is transparency and confidence in the stability of the overall policy framework. Incentive schemes are important, but not sufficient. Non-market barriers such as access to grids, administrative hurdles and public acceptance issues, must all be addressed.

“Support policies need to be more targeted.”

Moreover, incentive policies should evolve over time to accompany cost reductions of renewable energy technologies. These evolutions must be as predictable as possible, and shield reasonable returns on investments.

Last but not least, policies must address early on the issue of system integration of variable renewable energy sources such as wind.

win[d]: With many countries worried about long-term debt, how do you see the issue of energy subsidies?

VanderHoeven: In general terms we believe that prices should tell the truth, i.e. they should reflect the true costs of provision, including the costs for society (incurred for example through environmental impacts). Our analyses show that most subsidies to fossil fuels, though usually intended to support low-income families, accrue in practice to the relatively wealthy. Therefore, such considerable amounts of money would be better spent on more targeted policies to support the poor and to promote equal opportunities for all children. That is particu-

larly true at a time when governments can ill-afford to bear the significant budget burden usually posed by fossil-fuel subsidies.

At the same time, the IEA believes that further growth of renewable energy is essential for a secure and sustainable energy system. Transitional economic incentives that decrease over time may be justified. They are sometimes needed to stimulate learning effects and to invest in the additional energy security and environmental benefits that may not otherwise be reflected in market incentives. Many such policies have started to deliver in this respect. That said, in several countries the design of support policies has not been ideal. Our *Deploying Renewables 2011* publication shows how they can be improved.

“Renewables will grow even if nuclear power expands.”

win[d]: In 2011, the German government decided to abandon its nuclear power programme. Italy voted against the government's plans to resume nuclear power generation. Belgium's political parties committed to closing the country's nuclear power reactors by 2015 under certain conditions. Will these decisions resonate internationally?

Van der Hoeven: There is little doubt that the Fukushima accident has damaged public confidence in the nuclear industry worldwide, not only in Germany and Italy but in several other countries both inside and outside the OECD. This was one reason why we developed a Low Nuclear Case in our *World Energy Outlook 2011*, to analyse the impacts of a hypothetical across-the-board nuclear slowdown. It shows that while such an event might create an opportunity for renewables, the obvious risk is that lower-than-expected nuclear development leads



“I am convinced that nuclear power will continue to play an important role in the overall energy mix.”

to greater fossil fuel use, and finally more greenhouse-gas emissions.

Let me emphasise, however, that we do not see nuclear energy to be competing with renewables. In our “450 Scenario” (which seeks to reduce greenhouse gasses to 450 ppm in accordance with climate change mitigation objectives), non-hydro renewables grow by a factor of 20, and represent the biggest contribution to incremental supply even with the significant expansion of nuclear. Given the scale of the challenge to curb fossil fuel emissions, there is a great scope for renewable energy supply growth to meet demand despite (or alongside) the expansion of nuclear power.

“Germany needs to consider local political concerns.”

win[d]: Germany’s radical change in energy policies has been perceived worldwide as an experiment. Do you think this will succeed?

Van der Hoeven: This was a sovereign political decision, and indeed Germany is a country whose public may be willing to accept higher energy costs to compensate for phasing out nuclear power. There are, however, other difficulties, such as building new high-voltage power lines to connect wind farms from the North to large consuming areas of Southern Germany. If politicians do not properly address such issues, including

local political concerns surrounding such infrastructure additions, deployment of renewables may be severely hampered. Also, while efficiency gains may help shield electricity price increases to a degree, we expect that such gains will carry their own costs and difficulties – particularly in a country which (to its credit) has already done so much to improve energy efficiency.

win[d]: Your organisation has called for 400 new nuclear power plants to be built by 2050. Which should be the main countries to host these plants?

Van der Hoeven: While a few countries have decided to phase out nuclear power or limit its growth, in other countries the growth of nuclear is set to continue, for example in China, Russia or Korea. Indeed, those countries, which we expect will count for the bulk of nuclear energy’s expansion globally, are broadly moving forward at a pace unchanged since Fukushima.

With regard to nuclear power generally, I am convinced that this technology will continue to play an important role in the overall energy mix. Countries will naturally make their own political and market decisions about the specific nature of that mix, but nuclear power has made an important contribution to energy security and sustainability worldwide – and will continue to do so. It represents a low-carbon energy source that will be key to achieving international climate

change mitigation goals in all of the IEA’s scenarios.

win[d]: What role do you see in the energy debate for wind energy companies and customers?

Van der Hoeven: Industry has a very important role to play in the energy policy debate writ large, and the IEA actively engages closely and regularly with the private sector – particularly through the Energy Business Council and the forthcoming Renewable Industry Advisory Board. We firmly believe that industry participation is crucial to designing policy that encourages a favorable environment for investment and competitiveness. ■

The International Energy Agency (IEA)

is an autonomous body within the Organisation for Economic Co-operation and Development (OECD), working to “... ensure reliable, affordable and clean energy ...” for its 28 member countries and beyond.

The organisation was originally formed in response to the 1973/4 oil crisis, and has since become one of the leading international organisations for the analysis of energy policy.

www.iea.org

Major V112 project in Groß Eilstorf

Test passed with flying colours!



The world's first commercial wind farm with the new V112-3.0 MW is now connected to the grid. This major undertaking involved combined efforts and pooled expertise. All specialist areas contributed here – from installation technicians to development engineers and from instructors through to managers. On 14 December 2011, one day before the target date, the first commercially operated wind farm with the new V112-3.0 MW turbine went into service in Groß Eilstorf in the German state of Lower Saxony. Previously, only prototypes had been in operation.

In total, 17 wind turbines with a combined capacity of 51 megawatts are now in service in the Heidekreis district, between Bremen and Hanover. Although this wind farm is quite large by German standards, it is actually nothing out of the ordinary from an international perspective – for example, Vestas is currently installing a wind farm with a total of 140 of these turbines in Macarthur, Australia.

A pioneering project

The work carried out in Groß Eilstorf between the end of August and mid-December 2011 ventured into new territory – quite literally, in fact! The foundations were poured using the anchor cage system, which is new to Germany, and the procedure was optimised. Individual turbine components were redesigned in specific areas. Another aim was to bring the highly complex interaction between various individual systems to perfection, such as the gearbox, the generator and the V112's particularly long rotor blades. What is more, work had to be carried out under severe time pressure and sometimes adverse weather conditions, including storms in November and December – this was indeed a pioneering project!

Highly complex interaction

One of the challenges was the fact that "a wind turbine operates with a total of 34,600 parameters for individual components in the computer programmes, which had to be reconfigured for the new wind turbine type," explains Hardy Reißmann, who

was involved as an instructor with the commissioning teams. "A tremendous amount of background knowledge about the interplay of various components is required here." Hardy Reißmann was able to share his expertise with the dozens of technicians who had travelled to Groß Eilstorf for training. They came mainly from regions where new V112 wind farms are to be installed: from the German states of Brandenburg, Mecklenburg-Western Pomerania, Bavaria and North Rhine-Westphalia, and from Denmark and Australia too! A number of Site Supervisors from Vestas Offshore also attended.

The range of personnel available made it possible to perform tasks in parallel: While new towers were being erected, work was progressing on the interiors of the turbines already in place, and others were already being commissioned. Additional cranes were ordered so as to make up for lost time caused by strong winds. "Cooperation between the teams worked very well. Everyone learned from everybody else," says Hardy Reißmann.

More yield – First V112 in Ukraine



Vestas Central Europe's first wind turbine in Ukraine is situated in Novorossiske close to the town of Kherson in the south of the country, just 400 metres from the Black Sea. With 11.3 euro cents per kilowatt hour, Ukraine has a relatively high feed-in tariff when compared with the rest of Europe.

It is therefore worthwhile investing in wind energy here – despite the fact that the financing remains very difficult. This is because Ukrainian banks are still not completely confident about wind energy and the local authority approval process is long and complicated. By constructing the wind turbine, the operator, Vindkraft Ukraine, wants to set a clear signal stating that it is worthwhile tapping into the Ukrainian wind resources.

Getting more yield out of the wind

“With the V112-3.0 MW, the customer has chosen Vestas' most powerful wind turbine. The longer blades considerably increase the wind yield. The V112-3.0 MW already guarantees maximum output with wind speeds of around 12 m/s at hub height, whereby the Novorossiske site offers very good wind conditions,” explains Daniel Doherr, the project manager responsible at Vestas Central Europe for the supply, construction and commissioning of the wind turbine in Southern Ukraine. The wind turbine, for which a service agreement has also been concluded, is equipped



with Vestas' Business SCADA system and has already been in operation since the middle of February.

Especially during the project's planning phase, we gathered experience with gaining customs clearance for importing the wind turbine and providing documents for the official permits. Technical coordination on site was also of particular importance, for example regarding the grid requirements associated with the introduction of the Vestas technology. Vestas Central Europe also provided advice in regard to the structural requirements for the foundations and the crane hardstandings. Although this first wind turbine was constructed with the help of international Vestas staff, Vestas plans to train local personnel for future projects.

Green energy for fresh vegetables

The operator, Vindkraft Ukraine, is connected to one of Ukraine's largest food producers, Chumak, which principally processes fresh vegetables from the region, in particular tomatoes, peppers and cucumbers. It is therefore appropriate for the V112-3.0 MW wind turbine to be located in an agricultural area and, among other things, to provide electricity for the food production cold storage at Chumak's headquarters. This is located in the town of Kakhovka, around 71 kilometres northeast of Kherson on the banks of the River Dnepr. Two other wind turbines are to be erected in Novorossiske by the end of 2012. ■

Development engineers on site

In addition, specialists from the development department in Denmark were present on site, with the aim of driving overall optimisation: Engineers who had worked on the development of the V112-3.0 MW were able to verify the performance of 'their' wind turbine in service and to arrange for fine-tuning where necessary.

“A task force that came from the parent company in Denmark and was set up specifically for V112 projects also provided support to us. This was a core team from various specialist departments such as Technology R&D, Towers and Nacelles,” says Kristian Ludmann, Vestas Construction Director for Germany and Switzerland. “There were occasions when we had between 40 and 60 staff on site, which is twice the usual number. Working together in interdisciplinary teams, they erected and commissioned the wind farm in the best possible manner.” So the test presented by this major V112 project was passed with flying colours! ■

V112 – Community wind farm in a Central Franconian forest



Deeply hidden in the forest, the towers of two V112-3.0 MW wind turbines rise up to a height of 119 metres, their rotors extending another 50 metres above the treetops. The Bettelhütlein forest region belongs to the Wilhelmsdorf community in Central Franconia, Bavaria. On the poor, sandy ground, about one kilometre from the edge of the forest, eleven million kilowatts of electricity are to be generated each year. This will be enough to supply all 1,400 residents in nearby Wilhelmsdorf. What is more, 145 of them are not just beneficiaries of the environmentally friendly energy, they also have shares in the community wind farm.

“Forest is not just forest,” says project manager Marcus Dornauer. “Here we have a purely commercial forest with 95 per cent pine and spruce. For me, oak groves, hundred-year-old beech woods and otherwise ecologically valuable forest areas are not suitable as locations,” says the declared

nuclear power opponent, who runs two garden centres. “This tree stand is at most 80 years old, species-poor and in ecological terms relatively uninteresting. Here in Central Franconia, at least thirty per cent of the entire forest area is covered with this kind of forest,” explains Dornauer. “In other words, there’s lots of room for possible wind turbine sites.”

1.5 hectares of reforestation

Marcus Dornauer, whose Wilhelmsdorf project is now the third of its kind he developed, sees only one disadvantage with forest locations: “The tree-free space needed for storage, crane construction and transport.” However, the trees that are cut down are entirely reforested, either partly on site or at another location – and as high quality mixed forest. 1.5 hectares of trees had to be cleared for the transport and construction of the wind turbines. Once the wind turbines had been erected, half of the trees were reforested on site, while a

tree stand equivalent to the other half now extends south of the forest.

40 per cent more yield

Following a detailed examination, the project developer opted for Vestas’ new V112-3.0 MW wind turbine. The additional yield obtained from 3 MW, the large rotor diameter and the supply times provided the final argument. “40 per cent more yield than with smaller wind turbines is impressive. Of course that also means correspondingly higher investment costs – but at the end of the day what matters is that the sums add up.”

The Wilhelmsdorf community wind farm was initially instigated by Mayor Werner Friedrich from the CSU party. A community wind farm developed by Dornauer in the neighbouring district of Hagenbüchach has been running since 2010 to everybody’s satisfaction, and Friedrich wanted something similar in Wilhelmsdorf.



Georg Becker-Birck, Vestas Sales Engineer
Forest sites are favourable

Cross-party agreement

"A community wind farm must work for everybody involved." And everyone recognised that very quickly in Wilhelmsdorf. The local council always offered unanimous and cross-party support for the project. The shareholders raised 3.3 million euros, a limited company (GmbH) was founded for the construction and organisation, as was a limited partnership for the shareholders. The wind farm is now owned by 145 citizens from the immediate neighbourhood, who achieve a return of investment of around six per cent.

A municipal utility company has also been brought on board as a strategic partner with a view to providing direct marketing and storage capacities in the future.

And Mayor Werner Friedrich can also look forward to more than 300,000€ of business tax revenues across the expected running period of 20 years.

Increasing trend in the south

Christoph Manseder, Vestas Sales Engineer for Southern and Western Germany, sees Wilhelmsdorf as the starting point for an entire region: "We're expecting rapid development in Southern Germany, which will get going in 2013/2014.

"Bavaria has undoubtedly the largest unused potential, but Baden-Württemberg also has a lot of catching up to do. The legal conditions are being created in both states to meet the highly ambitious expansion goals of the respective regional governments. Changes in the regional planning are also being worked on."

Bavaria, for example, plans to erect between 1,000 and 1,500 new wind turbines by 2021, while Baden-Württemberg wants to erect an average of 100 wind turbines a year by 2020. The further expansion in both federal states is certainly overdue if they are to reach their intended goals. ■

When it comes to selecting the right spot for a wind turbine, forest sites have several advantages over sites on open land. For example, wind turbines installed in commercial forests have a significantly lower impact on residents in terms of noise and shadows, as they are generally located at a distance from residential buildings. In addition, project developers can often avail of the good infrastructure offered by existing forest trails when implementing a project.

Relatively high towers must be used if wind energy is to be harnessed efficiently in commercial forests. Vestas supplies two models, the V90 and the new V112, with different tower heights.

Above the treetops

To achieve optimum results, the wind turbines must protrude well above the treetops. If the rotor is positioned at the appropriate height and wind conditions are the same, a forest site is just as favourable as an open site.

A V112-3.0 MW with a hub height of 140 metres can achieve the same yield that a 119 metres tower would achieve on open land with the same wind conditions. This is because the new V112, with its large swept area, can harness even more energy from the wind and is also excellently suited to forest areas with low winds.

Impact of turbulence

When a forest site is being planned, the turbulence that may be caused by the treetops must be taken into account. The loads acting on the wind turbine are increased by this effect. As a consequence of the high turbulence intensity in the surroundings, caused by the considerable roughness of the terrain, it is necessary to plan for a sufficiently large separation distance between the wind turbines.

V112 and area requirements

In the German state of Brandenburg, for example, the construction of a foundation

at a forest site is treated as a permanent forest conversion; equivalent areas then have to be afforested at another location. An area must be kept permanently clear for setting up a crane so that maintenance work can be carried out. The total area requirement for a V112 is around 7,200 m². In order to avoid having to clear even more forest area, additional storage areas can be minimised by just-in-time delivery of components. For example, Vestas installation technicians no longer temporarily store tower segments on site; instead, they remove the parts from the truck using a crane and install them directly. The rotor blades are assembled one-by-one on the hub, which also saves space.

Forest access routes

In total, 18 trucks are required to transport a crane to the site alone, and this demands a carefully coordinated delivery schedule. Access routes with a width of 4 metres and of 5.5 metres on curved sections are required in order to transport the V112. These routes must not have a slope greater than 8 per cent. A total weight of 141 tonnes has to be carried – not always an easy task on forest ground! By choosing routes intelligently in cooperation with the site owner, Vestas makes every effort to minimise construction work and to make the forester's job easier. Experience has shown that it is a good idea to create a map of approved routes together with the forester. As a result of this consultation, routes are designed in such a way that they can be used permanently for timber removal.

Close cooperation

This type of forest site can only be planned on paper to a limited degree. Intensive on-site assessments and planning with owners, foresters, the fire brigade, the police, local politicians and residents are also of vital importance. Vestas develops the best solutions for each specific site – in close cooperation with the local parties and project developers. ■

Wind energy in the Spreewald region

3.6 hectares are being reforested in the region

It's not her first wind farm, but it's her first in a forest! Gudrun Petrick, Project Developer and Managing Director of Planungsbüro Petrick GmbH & Co. KG, looks very satisfied. Since the end of 2011, the Biebersdorf wind farm at the edge of the Spreewald forest in the German state of Brandenburg has been in operation as planned. Everything is running smoothly. Local acceptance of the forest site is good. The wind is driving 14 new Vestas wind turbines. This first project by the owner, THÜGA Erneuerbare Energien, is proving a great success. The development of neighbouring project sites is also underway. Without a doubt, wind energy is booming in the Spreewald area.

Successful dialogue with local stakeholders

The project development phase, which began back in 2003 with the planning of the first wind farm in this region, has now come to fruition. Thirteen V90-2.0 MW wind turbines with a tower height of 125 metres have already been in operation in Briesensee since 2009. At the time, not all landowners and local politicians were convinced about wind energy – and especially not about forest sites. Gudrun Petrick and others involved in the project have been working for years on winning over the local population. "We have been very successful here in this regard," says Gudrun Petrick, looking back.

The third project in the area, the Biebersdorf wind farm with fourteen V90-2.0 MW wind turbines, each 125 metres high, has been in operation since the end of 2011. Right from the very beginning, the success of this expansion has been very dependent on a close cooperation with municipal authorities, citizens, local business, foresters, investors and hunters. "When women organise a project," says Gudrun Petrick somewhat in jest, "there are no problems getting everyone involved on board." No one heard from those who were originally opposed to wind energy anymore.

Gudrun Petrick herself is from Brandenburg and actually comes from nearby, so she is familiar with the mentality of people in the area. "There are seven women in our office. We spend a lot of time talking to local residents. Of course they can also be critical, and justifiably so. But in the end, we actually enjoy a lot of support, and people trust us. When the municipal administrator from Briesensee carried out a survey about the pros and cons of the expansion of the wind farm, the majority of the citizens were in favour. This was a major success for us." Three more V90-2.0 MW wind turbines are now being installed in Briesensee – in the forest.

70 bat houses

Gudrun Petrick studied biology and

then started her working career at the Hiddensee bird observatory. In her capacity as an ornithologist, she was asked to carry out assessments for wind farms. "At the time I was quite sceptical about wind energy – however, the realisation that birds can cope with situations in their natural habitats that are much more complicated than these large, imposing wind turbines eventually set my mind at ease."

In 1990, she started up her own planning agency in Brandenburg an der Havel before relocating to Potsdam in 1999. Her company has a branch office in Groß Leine, five kilometres from the Biebersdorf wind farm and in the same district.

As a biologist, Gudrun Petrick has one major advantage, namely credibility. After all, local residents repeatedly bring up one particular concern: Won't the animals in the forest suffer when wind turbines are erected? "Birds and bats mainly search for food close to the ground on forest trails and aisles, which is why they generally don't fly high enough to be threatened by the wind turbines. They have a well-developed radar system and quickly adapt to new flight paths. In general, forest inhabitants tend to stay in the interior of the forest and rarely go more than 60 metres above the tree-tops, so they are not affected by the turning of the rotor blades, which only begins at 80 metres. Ultimately, we don't know exactly how many bats were living in this area before the project was constructed." In order to strengthen the local bat population, 70 bat houses have now been installed in the area around the wind farm project. "We do this for every farm. This way, we can monitor how many bats are present in neighbouring habitats in the long term and see how the population develops," she adds.

To compensate for the forest clearance that was necessary, around 3.6 hectares in the region are being reforested with oak and pine trees, and with native bushes planted at the forest edges. This also includes the planting of a mixed orchard with 145 wild



Gudrun Petrick



fruit trees. The total cost of all compensation, replacement and conservation measures amounts to around 630,000 €.

Experience with forest locations

Biebersdorf is one of the first forest sites for wind energy in Brandenburg. Six of the 14 turbines are located in a private pine forest. "Thanks to the company's experience and engineering solutions, Vestas was able to master the particular challenges that forest sites pose to the teams with regard to logistics and installation." Gudrun Petrick praises the on-time delivery of components, the flexibility of the crawler crane, and also the fact that two or even three large cranes were on site at the same time.

Gudrun Petrick has been cooperating with Vestas for more than ten years now. "Our experience has always been positive. Vestas' 125-metre towers are ideal for sites with low winds and forests. Besides, the V90 has a relatively low area requirement of 0.4 to 0.6 hectares. These turbines offer the best investment cost to performance ratio."

The special foundations allow the wind turbines to protrude 3.40 metres higher into the sky than originally planned. "The ground water level around the Spreewald area is quite close to the surface. In order to avoid having the foundations submerged in the ground water, the surface underneath the foundations was compounded before they were put in place. This resulted in the compacted mounds of earth. We are also very satisfied with the service." The turbines are being serviced under a 15-year full maintenance contract.

THÜGA: 28 municipal companies

This is the first wind farm project for its owner, THÜGA Erneuerbare Energien GmbH & Co. KG, which is a joint venture between 28 municipal utility companies in the THÜGA Group. "In addition to the economic viability, our main concern about the project was the acceptance of the local population," explains Dr. Kay Dahlke, Managing Director of THÜGA. The com-

Biebersdorf wind farm

Wind turbines: 14 V90-2.0 MW
Gridstreamer™ wind turbines (SDL technology)
Height: 170 m in total,
Hub height: 125 m
Rotor diameter: 90 m
Sites: 8 WTGs on open land,
6 WTGs in a pine forest
Power: 28 MW, annual output of around 62.4 million kWh, supplies 15,600 households with electricity, avoids 50,000 t of CO₂ emissions

Expansion of the 63 MVA (Megavoltampere) Lübben-Nord transformer station in its final phase



pany plans to invest one billion euros in renewable energy sources in Germany by the end of 2020, with a focus on wind energy. THÜGA has a long-term interest in this investment, and local residents can see this in the fact that jobs are being created and secured. Since 2009, for instance, construction companies from the region have employed around 90 construction workers to improve the local infrastructure – for example, by building access routes that will also have to be maintained in the long term.

"These workers now have specialist experience and can also be employed in other areas where wind farms are being installed," says Gudrun Petrick.

In the neighbouring local authority, planning is underway for another wind farm with V112-3.0 MW wind turbines from Vestas. Gudrun Petrick is already looking forward to the new V112-3.0 MW: "A hub height of 140 metres! This will be an extremely efficient wind turbine." ■



“Check correct installation of tower vibration damping system. Execution according to the respective drawing relating to tower height and turbine type. Corrections must be documented and mailed to Vestas.” – Henning Schulz and Jürgen Lohmann are on the job, carrying out the half-yearly maintenance service on a V90-2.0 MW. The engineers are working their way through a 30-page checklist. Although, upon arrival, they are equipped with their maintenance catalogue and a vast amount of monitoring data, they never know what awaits them up in the nacelle.

At the Buchholz wind farm in Lower Saxony, three of the 18 turbines are rather slow today. Vestas maintenance teams are working out in the field, as the bi-annual check-up under a full-maintenance service contract is due. No specific malfunctions have been reported to Henning Schulz and Jürgen Lohmann. However, the team has been asked to pay special attention to tower vibrations.

Two out of 750

Yesterday, the two engineers picked up all equipment and materials from the decentralised depot and made the journey from Lüneburg. The service team will spend two working days on this assignment. As a rule, the two engineers work five days a week touring different sites, usually not too far from home but mostly too far to make it back in the evening. Henning Schulz, 45, is a qualified metalworker and mechanical technician. In April, industrial electronics engineer Jürgen Lohmann, 50, will have been with Vestas for 14 years. The two technicians are part of a team of 750 installation engineers at Vestas Central Europe that are on duty every day. Today, weather conditions are rough at minus 7 degrees. High above inside the nacelle, temperatures are a bit warmer – around 10 to 15 degrees. When the engineers venture outside onto the nacelle cover – for example, to check the anemometers – they will once again be exposed to the freezing cold. So they brought the necessary flexible clothing and full equipment – the service car has it all ready!

105 metres in 60 seconds

The team gets on with the preparations: The turbine is brought to a halt from below, data and settings are saved on the laptop and all meter readings are recorded. The wind farm operator is notified upon arrival and departure.

Tools and equipment bags are just about to be lifted by the crane. Henning Schulz has already ascended by elevator to carry out the necessary preparations, opens the hatch and lowers the cable winch for the equipment bags. Jürgen Lohmann is aligning the turbine from below – 90° off the wind. On their way up, the bags must not collide with the tower.

Henning Schulz looks down 105 meters at his doll-sized colleague. This is also the escape hatch in case of emergencies. A sophisticated emergency concept has been developed, and technicians undergo a special training course each year. Evacuation using the rope, for example, means getting out of the nacelle through the hatch and down the rope in 60 seconds.



“Running smoothly!”

On site with our Service team

Fortunately, an emergency has not yet occurred. “In the past, I never thought about it,” says Henning Schulz. “It was all an adventure to me. Today, I’m aware of the risks involved and I pay attention to every step of the way, every safety measure.” Helmets must be worn everywhere on the premises, safety belts are equipped with snap hooks for secure tying in extreme positions. Safety devices secure staff on the ladders, and safety glasses appropriate to the respective vision are worn, as well as kneepads, various gloves for different jobs and safety shoes, of course.

Almost like in a submarine

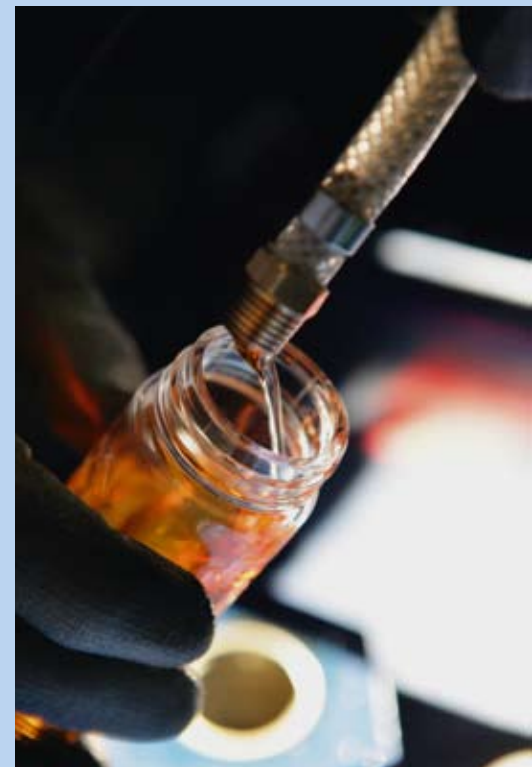
The coloured bags have now arrived in the nacelle. They contain, among other items, tool box, nitrogen cylinders, various measuring devices, automatic grease gun, grease, filters, hydraulic oils, cleaner, a torque wrench, anemometer and water – necessary especially in summer when it is hot up here. Today though, the engineers have brought hot tea. As a first step, they connect the service box enabling them to control the turbine from the nacelle. Next,

they arrest the brakes, adjust the blades, and take care of other issues – tooling takes time. Everything has to be in the right place to leave sufficient space for work and to allow both engineers to find the right tool at the right time. Colleagues who have worked on submarines report that the nacelle is just slightly bigger than the inside of a submarine.

The two old hands know every last detail about their turbines. The safety requirements have become second nature to them, too. Fitness and flexibility are necessary in the tight machine. The engineers are required to enter the nacelle on their stomachs under the gearbox and check oil pressure in the restricted space between the gearbox and the hub. Team spirit is another essential requirement: Service engineers need to be sure they can rely on each other – not only with regard to technical matters but also on the personal level. →



Jürgen Lohmann, industrial electronics engineer
top: Mechanical engineer Henning Schulz on the nacelle roof



On to the lab

Today, the maintenance programme begins with the lubrication of the main bearings connecting the gearbox and the rotor. The engineers insert 2.4 kg of grease and bleed the used excess grease. "Everything is running like clockwork," says Henning Schulz with a smile. "It's a satisfying feeling to identify and remove the fault that has caused the malfunction, and to get the turbine to run smoothly again," adds Jürgen Lohmann. Here too, everything is going according to plan and checklist.

Jürgen Lohmann checks the flow/pressure monitoring. This may not sound very spectacular; however, if anything fails to work at a certain pressure, oil pressure will plummet and the turbine will stop. Next, he extracts an oil sample in a glass, which is sent to the laboratory to check whether the golden liquid is still up to standard. The resulting analysis is also sent to the wind farm operator in case any corrections are necessary.

On top of the world

In full gear, Henning Schulz climbs on top of the nacelle. Temperatures are so low that he finds it hard to grip the screwdriver. Is the heater on the sensor working? It's quite an important aspect at these chilly temperatures. Are the wind direction and speed measurements correct? After all, the nacelle aligns itself according to the

wind direction and the blades angle themselves according to the measured wind speed. The busy engineer has no time for the fantastic view of the wind farm stretching all the way to the motorway. "However, sometimes, when the farm is shrouded in wafts of mist and all one can see are the rotors turning above the fog, that's an impressive sight," admits Jürgen Lohmann. He then turns his attention to the hydraulic station, where a small leakage has been detected, and removes it on the spot.

Next, the nitrogen cylinder is required. The pressure accumulator, designed to pitch the blades off the wind when necessary, contains nitrogen – and that needs to be refilled.

Not long after, Henning Schulz discovers a fault in one of the fan motors and replaces a relay as a precaution.

Inspecting the transformer room

The engineers also need to rely on their hearing. If a bearing in the generator or the gearbox makes a strange noise, a special team may have to be called in. Today though, everything sounds fine. A special task force is in charge of inspecting the elevator, belts and crane. This would take too much of the engineers' time on the current assignment. However, they are now inspecting the rotor blades through the

hatch, greasing the bearings and checking the mechanical parts. To finish off, they carry out an extra mission: the transformer inspection. This requires all machines in the nacelle to be shut off and disconnected.

All in all, maintenance covers two full days, including the cleaning of the turbine.

In the next six months, if everything goes well, the technical operations manager may come up once for a short inspection. Apart from that, the turbine is expected to run smoothly until its next maintenance.

There's always more to learn

Jürgen Lohmann and Henning Schulz are already on their way to the next job! This time, they're off to a troubleshooting mission to Beedenbostel, near Celle. "The proportional valve needs to be replaced. It represents the connection between electronics and hydraulics and controls the pitch cylinder, allowing the blades to turn," explains Jürgen Lohmann. So far so good! As of next Monday, he will explain these matters to young colleagues as part of their hands-on training course in Dahlenburg. There is always more to learn, not only for their young colleagues but also for Jürgen Lohmann and Henning Schulz themselves. "Of course we can do the V80 and V90 blindfolded, but now we're undergoing training for the new V112!" ■

Technician Pipeline

Germanischer Lloyd certifies Vestas training programme



At the training simulator in Husum

The Technician Pipeline is a global training programme developed by Vestas. It has been established with the aim of providing in-depth, multi-level training courses for Vestas staff in the fields of installation, commissioning and maintenance.

Depending on their qualifications and experience, service technicians are assigned to specific levels, where they receive the respective instruction and specialise in various fields.

The Technician Pipeline comprises:

Level D: Maintenance assistant (assists experienced installation engineer on site)

Level C: Maintenance manager, trained for a certain turbine type (e.g. V66-1.75 MW to V112-3.0 MW)

Level B: Installation engineers in the field of fault correction / repair. At this level, engineers receive training in troubleshooting certain controller types. Level B consists of a basic course focussing on a systematic fault detection approach and an advanced course focussing on the top 40 malfunctions of the respective turbine platform.

Level A: Specialist programme offering a selection of tailor-made courses (e.g. special grid streamer, software or analyzer training, dealing both with technical and operational aspects).

Furthermore, Vestas offers special courses within the different levels that qualify engineers in further fields, such as operating authorisation processes, rotor blade services, and safety team management.

Vestas Central Europe has also implemented this concept. With the new V112 being first introduced on the German market, it has been the first Business Unit to use a training simulator for this turbine type. With the exception of the gearbox, the simulator is capable of simulating all V112 systems – from pitch system, hydraulics and the new permanent magnetic generator to the controller and converter.

At the training centre in Husum, six technical instructors teach theory and ten field trainers oversee hands-on training on the turbines. Since the start of 2011, they have been offering new training courses for the V112 and all other available turbines. Around 90 engineers have already been trained for the new V112-3.0 MW at B-Level. A further 200 will follow this year. All in all, close to 1,000 participants have passed through the various training levels of the Technician Pipeline.

Vestas is the first wind energy company offering its staff a Germanischer Lloyd-certified training system. ■

Wind energy picking up again in Austria!

Three wind farms inaugurated in 2011
80 MW framework contract concluded with WEB

The new Green Electricity Act 2012 creates a solid basis for the further development of wind energy in Austria. The Act, which was passed in the middle of 2011, foresees the installation of an additional 2,000 megawatts of wind energy by 2020 in addition to the existing capacity of approximately 1,075 megawatts. According to the Austrian Wind Energy Association, IG Windkraft, this

will trigger an investment volume of 3.2 billion euros. Following the market stagnation in 2009 and 2010, this now provides the project development department at Vestas Austria with an opportunity to construct wind farms rapidly and reliably. Vestas Austria reported 107 megawatts of incoming orders at the end of 2011.

EVN Naturkraft orders V112

Following the lull in the market, Vestas was able to hand over the Tattendorf Wind Farm, which has eight V90-2.0 MW wind turbines, to EVN Naturkraft shortly before the end of 2011. EVN had already taken over the Markgrafneusiedl project, with nine V90-2.0 MW wind turbines, at the end of September. Both projects are located in Lower Austria, which next to Burgenland is the region in Austria with the best wind energy conditions and, consequently, with the most wind turbines. IG Windkraft estimates that the carbon emissions saved annually by the wind turbines is equivalent to that of around 350,000 cars a year. EVN Naturkraft has also ordered three of the new V112-3.0 MW wind turbines for a wind farm in the rural district of Deutsch-Wagram.

WEB's Höflein Wind Farm – a premiere for the MK7 version

Last autumn saw the official inauguration of WEB Windenergie AG's Höflein Wind Farm, which is also located in Lower Austria near the Parndorf Plain, one of the windiest regions in Central Europe. Although WEB began planning the project back in 2001, construction did not begin until autumn 2010 when Vestas installed the footings, which included the use of deep pile foundations. The turbines were erected in July



Construction of the Höflein Wind Farm



2011 and then commissioned in August. The wind farm comprises six V90-2.0 MW wind turbines with 105-metre hub heights. This is the first time that the MK7 version of the V90 has been erected in Austria. This wind turbine type is technically optimised and features a cooler in the form of a spoiler on the nacelle roof. The water cooler utilises the energy from the wind and therefore does not consume any internal power. Various access points in the nacelle have been designed in a user-friendly manner.

80 MW with WEB – and a new availability record

WEB Windenergie AG currently operates 153 wind turbines at 43 sites in Austria, Germany, the Czech Republic, Italy, France and – in the future – Canada. With around 3,360 mostly private shareholders, the company is Austria's largest community joint venture in the field of renewable energy.

WEB has now concluded a framework contract with Vestas Austria amounting to 80 megawatts, which covers its complete project pipeline for further projects in Austria and Germany until 2014. For Austria, this will include twenty of the new V112-3.0 MW and seven of the tried and tested V90-2.0MW wind turbines.

Referring to the contract, Dr Frank Dumeier, Technology and Operations Officer at WEB, says: "For us, it's not just the procurement costs for the wind turbines that matter but also, of course, the life-cycle costs. In 2010 we concluded a comprehensive service package with Vestas. This has already had a positive impact on our production results for 2011 – we were able to reduce the servicing and maintenance costs while simultaneously increasing the availability of the wind turbines. The 97.2 per cent overall availability is a new record for WEB that, in comparison with other companies in the sector, will surely

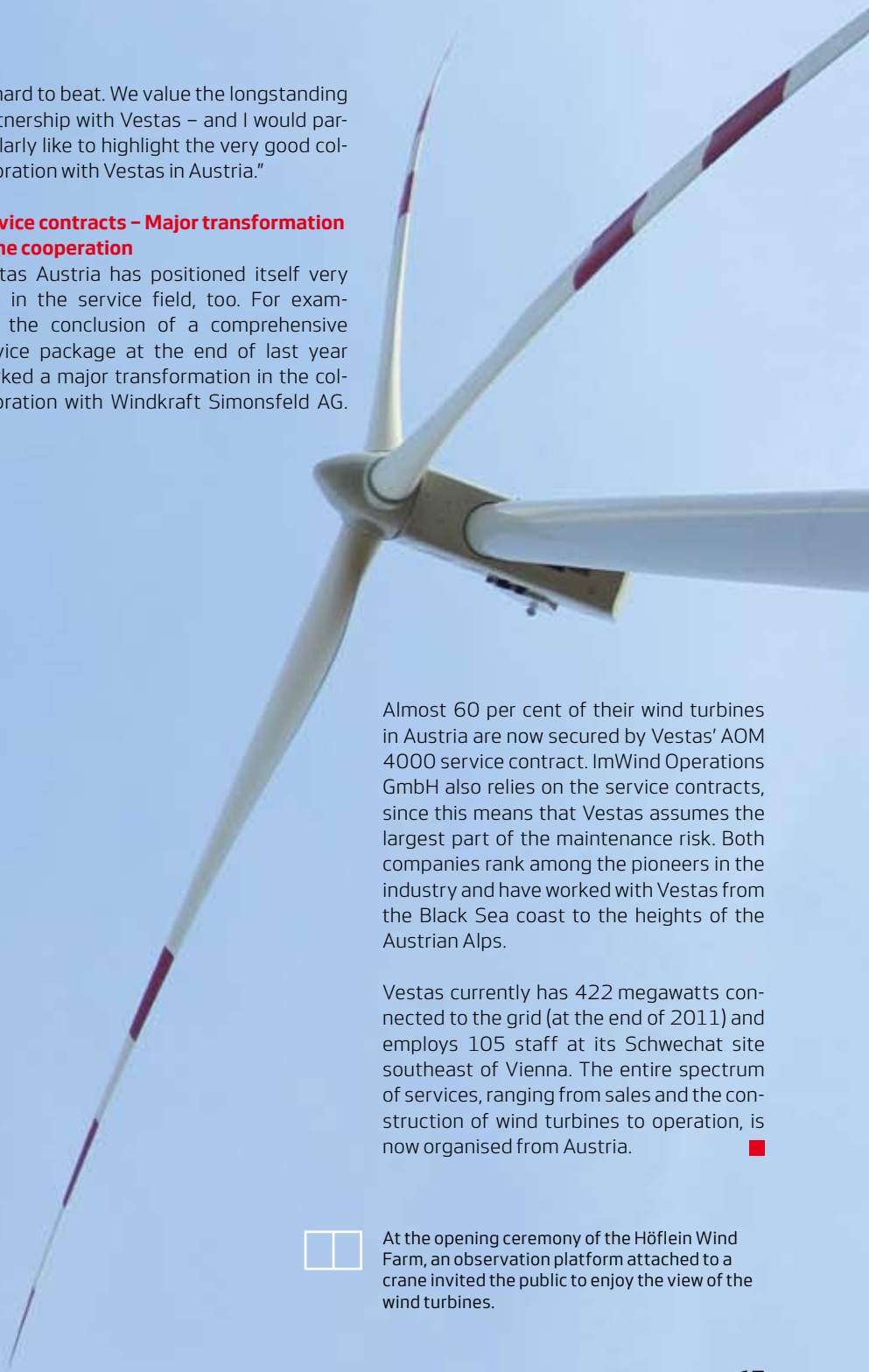
be hard to beat. We value the longstanding partnership with Vestas – and I would particularly like to highlight the very good collaboration with Vestas in Austria."

Service contracts – Major transformation in the cooperation

Vestas Austria has positioned itself very well in the service field, too. For example, the conclusion of a comprehensive service package at the end of last year marked a major transformation in the collaboration with Windkraft Simonsfeld AG.



Inauguration of the Höflein Wind Farm



Almost 60 per cent of their wind turbines in Austria are now secured by Vestas' AOM 4000 service contract. ImWind Operations GmbH also relies on the service contracts, since this means that Vestas assumes the largest part of the maintenance risk. Both companies rank among the pioneers in the industry and have worked with Vestas from the Black Sea coast to the heights of the Austrian Alps.

Vestas currently has 422 megawatts connected to the grid (at the end of 2011) and employs 105 staff at its Schwechat site southeast of Vienna. The entire spectrum of services, ranging from sales and the construction of wind turbines to operation, is now organised from Austria. ■



At the opening ceremony of the Höflein Wind Farm, an observation platform attached to a crane invited the public to enjoy the view of the wind turbines.

Vestas' WindTalks

Supporting emerging markets by sharing knowledge and experience

Vestas' brand says "Wind. It means the world to us." It emphasizes the idea that Vestas is an industry leader with a global outlook and global scope. With this in mind, Vestas Central Europe recently decided to more actively engage with its new and emerging markets in Africa, with the goal of helping these markets to find their ideal path to building a wind energy sector.

Because energy development in Africa to a large extent is driven by political institutions, the best approach for Vestas was to share its knowledge and experience to educate political and regulatory stakeholders and accelerate the development of wind energy in their country. To do this, Vestas created a new platform called WindTalks, a workshop where key decision-makers from government, utilities, energy regulators, developers and other energy stakeholders come together with wind experts from Vestas and other wind energy institutions to share their knowledge. The first workshop in Namibia showed that it's not only a subject of interest to those developing nations, also many developers in Europe are looking at projects in places like Africa – as there are good wind resources, growing energy demand and attractive financing available.

Namibia

The first WindTalks-Workshop (End 2011) in Windhoek, Namibia, was successfully presented to an audience of 50 key energy sector stakeholders. During the workshop, Vestas and its partner organisations (The United Nations Development Program and the Polytechnic of Namibia) spent an entire day in in-depth discussions, listening to attendees to better understand the current status of wind energy in Namibia and what support can be provided to overcome the challenges. At the WindTalks workshop, Vestas had an excellent line-up of speakers who presented on topics including regulatory frameworks, grid integration, financing, power purchase agreements and project development. There was a strong fo-



From left: Stephen Karekezi, Director of AFREPEN/FWD; Kasper Dalsten, Senior Specialist Government Relations, Vestas Mediterranean; Kudakwashe Ndhlukula, Coordinator of the Renewable Energy and Energy Efficiency Institute of the Polytechnic of Namibia.

cus on speeding up the pace of wind energy development in Namibia, which has good wind resources and a looming short-term energy supply shortage. A quick development is highly recommended. One of the most interesting presentations was from Carlo van Wageningen, the Chairman of the Lake Turkana Wind Power project in Kenya, who shared his experience of wind project development in Africa. The Namibian Minister of Mines and Energy and senior representatives from National Utility NamPower, and Namibia's national energy regulator, the Electricity Control Board also spoke. "We hope to learn from the international experience of Vestas and others invited today on how others have walked on a journey we are embarking on," said Namibian Minister of Mines and Energy Isak Katali.

"The workshop was effective in focusing attention on the current barriers to wind energy projects, and in looking

for next steps to address them – which Vestas will support where possible," said Malte Meyer, Director Government Relations, Vestas Central Europe, who developed the WindTalks concept. "WindTalks Namibia really helped government and the key energy institutions understand the role that wind energy can play in helping to fill an imminent energy supply shortage that Namibia will face at the end of next year," says Hans Vestergaard, Senior Vice President Sales, Vestas Central Europe.

COP 17

WindTalks Namibia confirmed that the next step should be to present a broader workshop with stakeholders from several African nations at COP 17 in Durban, South Africa in early December.

Shortly thereafter, the world – and especially the energy sector – watched as representatives from the world's governments

gathered at COP17 in Durban to try to negotiate an agreement to limit carbon emissions and manage global warming.

Expectations were low, and those expectations were, unfortunately, mostly met. Delegates agreed to extend the Kyoto protocol (scheduled to expire this year) for a second five-year commitment period, with final details still to be finalized later this year. There was also agreement to set up a process by which an emissions reduction

the many potential wind projects in emerging markets and developing countries. For such projects 2015 is not far away."

WindTalks Africa

Vestas was present in Durban to observe the negotiations and to raise the profile of wind energy as a solution to global warming and a way to achieve energy security. When Vestas announced its WindTalks Africa workshop at COP17, there was an enthusiastic response.

energy security and support their growing economies. Presentations followed by a representative from the South African Energy Ministry and from Jens Carsten Hansen, of Risø DTU National Laboratory for Sustainable Energy, on a very successful South African wind mapping project supported by the Danish Embassy and Risø DTU.

Sessions followed that focused on finding the right regulatory framework to develop



Namibian landscape

agreement will be reached by 2015, with implementation by 2020.

Within this context, did the outcome have any meaning for the renewable energy sector, and specifically for wind energy? Vestas' Senior Vice-President of Group Government Relations Peter C. Brun says the green climate fund – a multi-billion dollar fund to provide money for mitigation and adaptation projects in developing nations – is where there are more tangible possibilities.

"This Green Fund can still materialise as the big pot of gold at the end of the rainbow, which would benefit green investments and wind power projects. But no one realistically expects the fund as currently structured to generate the one hundred billion dollars a year of financing that was agreed to last year. Without a global agreement, it is even less likely that the substantial funding promised last year will materialise. So this is not for the short term, but Vestas will closely follow developments in the coming years as additional financing will be key to unlock

There was a strong interest in wind energy at COP17, thanks to the previous day's announcement by the South African Energy Minister on the winning bidders for the country's first round of renewable energy projects (see page 21: Process of wind energy in South Africa). Vestas is the preferred turbine supplier on two projects representing 138MW.

At the WindTalks Africa workshop at the COP17 conference the aim was driving greater interest in wind energy from governments. The hope was that by attracting interest from promising African countries that need strong support in kick-starting wind energy, Vestas would be able to bring targeted WindTalks workshops to those countries and offer much more practical support.

Done in partnership with the Danish Embassy in South Africa, the WindTalks Africa workshop kicked off with Hans Vestergaard making the case for wind energy as an appealing option for countries looking for a way to reduce carbon emissions, build

wind energy in Africa, grid integration and project financing models with partner organisations (the Namibian Renewable Energy and Energy Efficiency Institute and the African Energy Policy Research Network).

The WindTalks Africa workshop generated a great deal of interest in Vestas and wind energy and resulted in open requests from several African countries to do a customized WindTalks workshop. Compared to the relatively slow progress on the climate talks, many delegates were pleased to see that concrete efforts were being made to promote renewable energy for developing nations. "Interactions with various African governments have shown that their countries are getting ready to harvest their rich wind energy resources," states Malte Meyer. "But still, many local investment projects are blocked by regulatory, technical or finance hurdles. We will respond to the strong need for knowledge-sharing and technical assistance with a systematic roll-out of our WindTalks initiative across the continent." ■



South Africa: Local manufacturing, black ownership and job creation

State obligations made to competitive advantage

win[d] talked to James White, Sales Account Manager for Vestas Southern Africa, for insights into the promising South African Market.

win[d]: How does a European manufacturer of wind turbines like Vestas enter the South African Market?

James White: As a manufacturer in the renewable energy sector Vestas needs to consider one stakeholder only: the government. In the Republic of South Africa and indeed in all of Southern and Eastern Africa the governments are completely in control as to where the energy market is heading to. And they want the supporting industry to go in a certain direction. In South Africa this means 1,850 MW of wind energy in a short term period; in the long term, 9,200 MW (see page 21: Process of wind energy in South Africa).

In order to have your share of that market as a manufacturer, you need to play by the rules of the government and answer the

national priorities the government is trying to achieve. The main focus is on job creation and local manufacturing. So, element number one is local content. This single element will be the key deciding factor as to which wind turbine manufacturers will be successful in South Africa. Vestas is seriously considering how and what we can manufacture locally. Our focus is on building towers because South Africa is advanced in the competencies and resources required for tower manufacturing.

Specific South African issues constitute the other elements that you need to respond to, e.g. black ownership. Under BEE (Black Economic Empowerment) you need to maximize black ownership. However, the RFP regulations add certain mandatory commitments to this by saying potential turnkey contractors, such as Vestas, need to have a minimum of 8 per cent black ownership and target 20 per cent.

This was a challenge for Vestas, as it is publicly listed on the Copenhagen stock

exchange and is a wholly owned company. However, we decided to embrace this request with the Vestas Empowerment Trust, which is a broad based charitable trust that is focused on education, with an ownership of 20 per cent of our local entity Vestas Southern Africa.

The last element of job creation is specific to South Africa in the sense that when employing you need to consider race and



James White



target of 20 per cent), job creation and equitable employment (we shall also meet this target and try to employ as equitably as possible). In terms of the other two elements on the private side – being cheap and being reliable – Vestas is certainly not the cheapest turbine supplier out there. But we are one of the, if not the leading supplier in terms of reliability. From a safe investment point of view Vestas scores highly, and we are working hard to come down in terms of pricing. Vestas has also engaged in supporting knowledge-building of wind energy and industry development through interactions with various partners in South Africa and in the region – as we want to be seen as the best partner to support a healthy wind energy sector in South Africa over the long term.

social background in addition to your usual parameters. Local manufacturing, black ownership and job creation are the three main factors from the point of view of the public sector, and for any international company these elements might appear quite foreign.

From the point of view of the private sector you need to look at the costs and the reliability of your product to be competitive. Everyone is, of course, looking at the lowest costs per MW energy, and one needs to be reliable.

All in all we are looking at five key influences when you want to enter the SA market.

win[d]: How does Vestas position itself in this market?

James White: As to the way we position ourselves, Vestas has chosen to embrace those five elements to the degree we can: local content (local tower manufacturing), black ownership (we have reached the

Our credo: Let us embrace these five elements and turn them into a competitive advantage rather than resist and try to get round them.

win[d]: In terms of the commitment on the market, what does Vestas do?

James White: You need to be committed to this market to actually be able to respond to the list of requirements. The government doesn't want to see people who are just in here to flog equipment and leave. You need to demonstrate a degree of commitment through local content, job creation, black ownership. Those actions speak louder than words and demonstrate your long term commitment.

As we speak, Vestas is employing people, and we are moving into bigger offices. We decided to fully embrace black ownership and there will be no window-dressing. It will get the right amount of money, and it will be there to deliver on the national priorities of the government. ■

Process of wind energy in South Africa

South Africa has big plans for renewable energy. A total of 3,725 MW of renewable energies – of which 1,850 MW is wind energy – will be tendered through five windows as described under the Request for Proposal (RFP) issued last year by the Department of Energy (DOE). This is the first large state tender for renewable energy in South Africa.

The first round was concluded in December 2011 at the COP17 meeting in Durban, when the DOE released the names of who are the preferred bidders. 633.99 MW are awarded to eight wind energy projects. Vestas is in two of them. These projects now have a preferred bidder status. By the end of June they are required to close their projects with the banks, manufacturers etc., and then they can sign the Power Purchase Agreement (PPA) with national utility Eskom and the Direct Agreement with the DOE. Once this is done, the projects can begin construction, most probably in 2013. The second round of the tender has started with the submission date on March 5. According to the 2010 Integrated Resource Plan – which covers the next 20 years – 9,200 MW of wind energy shall be added over this period, starting with this tendering process. ■



50 turbines – more than a project

Pantelimon, Romania - Vestas' first full turnkey project in Eastern Europe



With the construction of the 150 megawatts wind farm in Pantelimon, Romania, Vestas Central Europe has created a new type of venture in Eastern Europe. At the wind farm, 50 V90-3.0 MW wind turbines with a height of 105 metres will be installed and put into operation by summer 2012. Together with the Monsson Group, a major Romanian wind energy developer and energy producer, Vestas has developed the first turnkey project in Eastern Europe of this size. Although already proven in other markets such as Germany and Bulgaria, and at a smaller scale, turnkey projects are a unique feature in Eastern Europe.

Due diligence research

Vestas Central Europe initially launched the project in 2008 as a standard sales project with a turbine supply and service agreement. However, in the years following the financial crisis, the project's size turned out to be challenging for investors in Romania. Together with the Monsson Group, Vestas

Central Europe therefore decided at the beginning of 2011 to investigate the potential for moving forward with the project in order to minimise the risks for potential investors and to attract more risk-adverse investors. In conjunction with Monsson and external specialists, a Vestas team carried out a range of technical, legal and financial studies on the due diligence for the Pantelimon project. Because of the complexity and high demands of the project, they analysed the individual conditions and demands for the construction and development in depth. This raised the quality of the sale and made it extremely transparent.

Seeing through the eyes of an investor

Based on this knowledge, Vestas Central Europe and Monsson then took the next step. They planned the wind farm as a full turnkey project with Vestas as the contractor. With the help of Vestas' team-selling approach, Vestas called on the expertise of its different departments and external experts to cover and coordinate all aspects

related to the construction agreements. It was crucial to examine the project in Pantelimon not as a supplier, but through the eyes of an investor, as Andreas Thomas, Senior Vice President Business Development at Vestas Central Europe explains: "We wanted to adapt the project more to market demands, which is why we incorporated the input from a lot of investor discussions into our decisions. At the end of this process, we were aware of the project quality when examining it from the investor's point of view."

Minimising the risk for the customer

As a turnkey project supplier, Vestas assumes the risk when constructing the Pantelimon wind farm and its infrastructure. This means that the client is exposed to almost no risks during the construction of the farm. The developer, Monsson obtained the necessary approvals while Vestas is responsible, amongst others, for the quality of the site roads, foundations, installation cranes and the electrical infrastructure.

All parties involved have to be coordinated and supervised by a project management team. Vestas is also in contact with and in charge of the subcontractors. These include the Austrian company Strabag, which carries out the main construction, site roads, crane platforms and foundations, and Schneider Electric and the Romanian company Energobit, which are responsible for the electrical systems, the internal collection and earthing systems as well as the connection station and underground



cabling. In this EPC project (Erection, Procurement, Construction), Vestas guarantees the safety and quality of the supervision for the whole project and will hand over the ready-to-operate wind farm to the client.

On the fringes of the Wallachian plain

The extensive wind farm, which covers an area about eight kilometres in diameter, is located near a group of villages in the south-eastern part of Romania. Called Pantelimon, this commune is a flat area on the fringes of the Wallachian plain in the Constanta region, 260 kilometres east of Bucharest. With an average wind speed of 7.4 metres per second it has excellent and constant wind conditions. To ensure a continuous supply of all necessary parts, a special storage facility was built on-site.

In Pantelimon, the internal cross-linking and the interfaces with the national grid are particularly complex. All turbines are interconnected via an internal 33-kV power

connection. The internal interconnection has to go through a transformer and a substation to join the national grid and its 110-kV transmission lines, which is situated approximately 13 kilometres away from the wind farm.

Joint construction work

Various Vestas departments worked together at the Pantelimon site. Project manager Georgi Strashimirov Todorov, for instance, comes from Vestas Bulgaria.



“Although this is the first time that we have dealt with a project as large as the Pantelimon wind farm, we have been able to draw on our experience in other regions with turnkey projects. Many parties are involved, and the Romanian legislation is complex. The deadlines have been tight, but so far we have been able to meet them,” he says. Also on site is Narcis Ion, the Romanian site manager responsible for the turbines – delivered from Vestas Germany – and their installation. Simon Groenkaer from Vestas Denmark is the site manager responsible for safety and for supervising the quality of the civil engineering works.

Shortly after the Pantelimon project was launched in mid-2011, Vestas Central Europe started negotiations about the take-over of the finished wind farm. By spring this year, the roads and foundations will be completed; five turbines are already installed. The final handover will take place in June and July 2012. The construction of the new wind farm will also benefit the en-

tire region: For instance, roads have been graded and surfaced with gravel. According to the Monsson Group, the different companies involved in the construction, security and maintenance of the site have created more than 200 new jobs – in an area with a high rate of unemployment.

Strategic partnership with the Monsson Group

Vestas Central Europe has signed a long-term strategic partnership agreement



to facilitate new joint projects with the Monsson Group. The company, which has already developed 2,400 megawatts of wind energy, has considerable experience in developing, constructing and operating wind farms for investors. The company underlines its excellent working relationship with Vestas. “The wind farm will be equipped with 50 Vestas V90-3.0 MW wind turbines, which have produced excellent results throughout many years of operation, with more than 7,400 MW installed in total. Vestas is and will continue to be a key strategic business partner for us,” declares Andrei Muntmark, Commercial Director at Monsson Group.

Pantelimon will not remain the only turnkey project in Eastern Europe in the future: “There is an increasing demand for turnkey projects, particularly in Eastern Europe, and with projects like this we will be able to adapt to the market demand,” emphasises Andreas Thomas. ■

Off-shore results on an on-shore site

“Noordpier Wind is one of the best sites in the Netherlands.”



Tata Steel's company premises in IJmuiden

Since November 2011, three eighty-metre-high Vestas V90-3.0 MW wind turbines have been gracing the Dutch coast near IJmuiden, around thirty kilometres west of Amsterdam. In a relatively short period of time, energy supplier Nuon and project developer Wind Groep Holland have managed to generate more energy from wind – thanks to the ‘Noordpier Wind’ repowering project.

Nuon has been managing a wind turbine site on this stretch of the North Holland coast just above IJmuiden since 1994. Back then, the company, a subsidiary of the Swedish energy company Vattenfall, erected five Micon wind turbines on the site. As a Project Manager at Nuon, Gijs Nijsten has been involved in the development of the Noordpier Wind farm. He believes that, alongside the generation of energy from solar power and hydropower, wind energy fits in perfectly with the aim of increasing sustainability: “We want to make a significant contribution to the generation of energy from renewable sources. In the area of wind energy in particular there is a great deal of potential. At the moment we own almost 250 wind turbines in The

Netherlands, providing a capacity of more than 300 MW.”

Quieter and more profitable

Besides Nuon, another party was also interested in the dune area along the Dutch North Sea coast: Wind Groep Holland. With more than thirty turbines, this project developer has been specialising in the operation of suitable wind sites for over ten years. In 2004 it was given permission by the Dutch government to use a stretch of land of around five hundred metres, next to Nuon’s site, for the purpose of erecting wind turbines. As the two parties had often collaborated in the past, they began working together on the preparations for repowering the wind farm. The old, thirty-metre-high turbines, with a total installed capacity of just over 1 MW, had seen better days. Technological advances now made it possible to generate energy more profitably – and more quietly.

Neighbourhood safety

Within a 50/50 partnership structure, the two organisations began working on the project, with Vestas quickly being called in to supply the turbines. The powerful V90 turbine seemed ideal to take full advantage of the very high average wind speeds of 9 metres per second on the Dutch coast. As it turned out, the original goal of erecting five of these turbines was not feasible, as neighbouring industry would have been inconvenienced excessively by the imposing structures. A permit for three turbines was, however, issued in 2009, although this was still under the condition that strict safety standards were employed. “At that time, only the V90 was suitable to be erected there,” says Nijsten. “Vestas was the only supplier then that had carbon blades,



Repowering in the dunes

which are relatively lightweight but offer excellent resilience to heavy loads and were therefore comfortably able to meet the safety requirements.” The distance to the surrounding industrial site is now 250 metres, meaning that the safety standards imposed have been met.

Delicate ecology

Although both Gijs Nijsten, Project Manager at Nuon, and Hans Schouten, Managing Director of Wind Groep Holland, found that the whole project ran quickly and easily, it was not entirely without obstacles. Protecting the delicate dune area was one such issue, of course, but careful management was also required to keep the road alongside the turbines accessible. Reyndersweg is the only access path to the beach and the sea at that point and therefore had to remain



accessible in case ships in the area got into difficulties. "There was a considerable impact on the construction process, as an area of dune had to be prepared – with permission from the authorities – for the construction cranes to be erected," explains Nijsten. "The community and the nearby beach cafés are benefiting from this now, thanks to the extra parking that has been created." In addition, the dune area also had to be scanned once again due to the possibility of ammunition from the Second World War being found there. It had to be searched layer by layer, but, partly thanks to the first inspection carried out in the 1990s, nothing substantial was found this time. "We did come across an old bunker, but as it was not in the way we left it there," recounts the Nuon manager, who managed the project on behalf of the collaborating parties.

Good returns at a low price

In the spring of 2011, building consortium Dura Vermeer began building the foundations for the three turbines. "We were not able to complete everything in one go," Schouten explains, "as this would have had an adverse impact on the special fauna found there. The sand lizard lays its eggs in that area at that time of year and our activities would have interfered with this process."

The three landmarks were finally in place in autumn and the builders are able to look back on the project with satisfaction. Schouten: "Naturally it was a shame that we were not able to erect five turbines, as this is one of the best sites in the Netherlands." Nijsten agrees: "You've got an off-shore situation on an on-shore site. We were able to save ourselves the high costs of an

off-shore site, while still benefiting from very strong winds, meaning that good returns can be achieved at a relatively low price."

Taking advantage of the strong winds

The Noordpier Wind farm is being managed by Wind Groep Holland. As it has an office in the area, it can get to the scene quickly in the event of a fault. The Managing Director Hans Schouten says, "personally, I get an immense kick out of the big turbines. We had so much wind in December, 25 metres per second, that, in line with protocol, the turbines automatically stopped and automatically started again when the wind speed dropped. Given the quality of the V90s, I expect that, with regular maintenance, the new turbines will generate good profits for the next fifteen years." ■

Rotor blade in the heart of Berlin



The new eye-catcher in front of the German Museum of Technology in Berlin is a 44 metre-long Vestas V90 rotor blade. This rotor blade is part of the “Windstärken” special exhibition, which deals with all aspects of the phenomenon of wind. The installation of the temporary foundation and the transport and erection of the rotor blade presented unique engineering and logistical challenges.

Vestas Blades Germany provided the rotor blade itself and the transport, while Notus energy Potsdam planned and coordinated this unusual project – including the foundation.

“We would never have succeeded in implementing this project without the outstanding teamwork and the exceptional dedication of all who were involved,” said Frank Weise, Managing Director and Vice President of Vestas Blades Deutschland GmbH, praising the close cooperation between the companies involved. The project with a volume of over 250,000 € was jointly implemented by the project sponsors.

Precision work

“A rotor blade of this size in the centre of Berlin, at an inclination of 70 degrees – this is a one-off,” said Gunnar Grawe, project manager at Notus, describing the challenges that had to be addressed. It was necessary to construct a foundation that

was transportable and could be disassembled again in order to preserve the dynamic, free-standing character of the rotor blade. The special foundation required extremely high-precision positioning. The steel structures had to be put in place on the prepared concrete foundation with a tolerance of just 1.50 cm. A lot of on-site coordination was necessary in order to install the rotor blade support structure with the required millimetre-level accuracy.

The relevant district authority in Berlin played its part, and the building permit was granted in a record time of just six weeks. The rotor blade was transported overnight from Lauchhammer to Berlin at the end of November 2011. Torben Rafn, driver for Vestas’ in-house transport service, had to call upon all his skill during the final leg into the city. “This part of the journey was spectacular, often clearing traffic lights and road signs with just a few centimetres to spare. This was a spectacle that Berliners certainly don’t get to see every day,” said museum curator Reiner Schipporeit enthusiastically about the project and the great interest shown by the public.

Perfection

The work of the two crane operators had to be perfectly coordinated, with one operator responsible for one of the upper support points and the other for one of the lower support points. “A rotor blade is usually sus-

pending under the cross beam and installed in a horizontal position,” explains Grawe. “If you tried to place it at an angle of 70 degrees, the rotor blade would slip out. Back in early 2011, we carried out trial lifts at the Vestas factory in Lauchhammer to find out which lifting equipment and support points were necessary.” Once the installation technicians had precisely positioned the rotor blade on the bolted flange and the highly pre-tensioned bolt connection had been put in place, the rotor blade was finally attached to the foundation.

This impressive piece of engineering can be viewed up until the end of February 2013. During this time, the “Windstärken” special exhibition in the German Museum of Technology in Berlin will be presenting the history of wind and its influence on nature, art and culture, right through to the idea of harnessing the power of the wind for energy supply.

German Museum of Technology

Trebbiner Strasse 9, 10363 Berlin
Germany | www.sdtb.de

Also involved in construction were:

IB Linke, IB Fröhling & Rathjen, Werner & Sy, Vermessungsbüro Krause, Schmees Bau and Schmees Anlagenbau, Adolf Cornels GmbH, Schwerlasttransporte Pusch and Bohlen & Doyen. ■

Imprint

win[d] Nr. 14 Edition 1 • 2012

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- TL Translationes, Berlin, Germany
- Esperanto WBT Arnhem, Netherlands

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back cover/Quiz: istockphoto/Craig Dingle

Printing

Ruksaldruck

Quiz

Answer to the last quiz and the winners from win[d] 13:

Each rotor blade on the new V164-7.0 MW offshore turbine is as long as nine double-decker buses lined up one after the other.

The iPod Shuffle/2 GB was won by:

- Tim Wochatz
Spremberg, Germany

A Soccer ball went to:

- USG Innotiv, Marianne Beumer
Arnhem, Netherlands
- Bus Handelsmij, Petra Schotman
Deventer, Netherlands
- Thomas Holdenried
Hannover, Germany
- Pflazwerke, Bastian Kreis
Ludwigshafen, Germany
- EDF-Luminus, Nicolas Bauer
Seraing, Belgium



View of the Berlin TV Tower, taking in the rotor blade installed at the German Museum of Technology, Berlin



win[d]
Get in touch with win[d]!
Tell us what you think:

Quiz

Bats quickly get used to taking new flight paths – even in forested areas with wind turbines. How do they orient themselves while flying?



- Ultrasound
- Infrasound
- Smoke signals

Please tick your answer on the card and send it to Vestas Central Europe by 28 May 2012 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] 1 • 2012. Many thanks.

See page 27 for the answer to the last competition question and the winners from win[d] 13.



Wind. It means the world to us.™

win[d] Navigator

**Major V112 project
Groß Eilstorf, Germany**



page 6

52° 49' N
09° 27' E

**Repowering project
Velsen/IJmuiden, Netherlands**



page 24

52° 27' N
04° 36' E

**Forest sites
Biebersdorf, Germany**



page 10

51° 59' N
13° 58' E

**Wind farm opening
Höflein, Austria**



page 16

48° 04' N
16° 47' E

**Forest sites
Wilhelmsdorf, Germany**



page 8

49° 34' N
10° 44' E

**Turnkey project | 50 x V90-3.0MW
Pantelimon, Romania**



page 22

44° 33' N
28° 20' E

**WindTalks in Africa
Windhoek, Namibia | Durban, South Africa**



page 18

22° 33' S
17° 05' E

Quiz
Please tick the right answer:

Ultrasound

Infrasound

Smoke signals

Company

Name

Street

Postcode, City

Email

Please send me win[d], Vestas Central Europe's magazine, from now on free of charge.

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