

WINDFORCE 2012 Bremen

wab windenergie
agentur

8. WAB Offshore Conference **26-28 June**
NEW! International Trade Fair **26-29 June**

Conference Report

800 participants from twelve countries
400 at the Maritime Wind Dinner
58 speakers in nine theme sessions

With the kind support of

ALSTOM

General Cable

Partial Sponsorship

AMBAU

EUROCOPTER
AN EADS COMPANY

HGO Energy
Power of Performance

MAINSTREAM
RENEWABLE
POWER

pwc

WeserWind GmbH
Offshore Construction Georgsmarienhütte

Media partners

DIE WELT

energiemarkt medien
ENERGIE & MANAGEMENT **power** news.org

RECHARGE THE OFFSHORE ENERGY JOURNAL

Schiff & Hafen
Ship · Offshore
OFFSHORE MARITIME JOURNALS

**SONNE
WIND &
WÄRME**

**WIND
POWER**
MONTHLY



Federal Ministry
of Economics
and Technology

Patron of the WINDFORCE:
German Minister of Economics
and Technology Dr Philipp Rösler

Bremerhaven
Bremen

www.windforce2012.com

Off to a great start

Germany's first trade fair for the offshore wind energy industry made an impressive start in Bremen. For the WINDFORCE 2012 event, WAB combined its internationally well-established conference with a trade show. The central theme was grid connection offshore.



With 268 exhibitors from Germany and abroad, 6,000 visitors to the fair, and 800 conference participants, numbers for this premiere spoke for themselves. "We clearly exceeded our goals and proved that the offshore industry in Germany and abroad has a lot to offer", said Ronny Meyer, managing director of WAB. His estimation was also reflected on the faces of satisfied exhibitors and conference visitors alike. The conference and the fair did not compete with each other in attracting interest – both were well-attended and busy. The core issue of grid connection dominated the conference. Grid connection also concerns the converter stations built to convert electricity from at least two connected wind farms and transmit it to shore as high-voltage direct current (HVDC).



Maritime Wind Dinner, ABC peninsula, Bremerhaven



The DolWin Alpha converter station platform under construction at the Heerema shipyard in the Netherlands. Source: TenneT

Barriers to grid connection

In Germany, building these platforms and connecting them to the grid were originally estimated to take 30 months. Indeed, as a specification set by Germany's Federal Network Agency, this time frame is legally binding for transmission system operators (TSOs). They must comply with this deadline for grid connection to ensure that offshore wind farms are eligible for subsidies. But in fact, the German industry now has to take construction times of at least 40 to 50 months into account and is currently facing a deficit in orders. This is jeopardising the existence of businesses because a lack of standards, and the complexity of HVDC converters, extend



Ronny Meyer, WAB

far beyond the scope of the original time frame. As a direct consequence, projects are being delayed that have multimillion-euro investments behind them. "There have always been problems. But this situation is new because businesses have already invested in production plants and personnel. This affects the creation of added value along the coasts but also in all of Germany. At the forefront is the industry in North Rhine-Westphalia, for example", said Meyer in explaining the situation.

Two other obstacles are financing and liability. Liability is of great concern to potential investors who want to invest in wind farms or grid connections. It is not clear yet who bears the risk if export cables or transformer substations fail for extended periods of time. But this is essential for interested backers to know before they can invest in TenneT. Responsible for grid connection in the North Sea, TSO TenneT is suffering from a lack of capital and has already invested six billion euros in the commissioning of grid connections. Its turnover in 2011 was 1.5 billion euros.

Guest from Scotland

In his humorous way, Fergus Ewing, guest speaker and Scotland's minister for energy, invited German companies to Scotland if their troubles continued. "For a long time we didn't recognize the opportunities offered by our poor weather. Scotland has similar goals, striving for 10 gigawatts and 28,000 new jobs by 2020, and we want to switch 100 percent to renewable energies. Many German businesses and skilled workers are already in Scotland. With an infrastructure plan for renewables and a government fund of 70 million pounds, we are able to help companies. Samsung, Mitsubishi and Gamesa have already promised to set up industrial locations here", said Ewing.



Fergus Ewing, Scottish Government's Minister for Energy, Enterprise and Tourism

Purposefulness of politics

Bremen's environment senator, Dr Joachim Lohse, took up the theme. "I see many similarities in Scotland's sense of purpose for developing strategies together. There, policies reinforce

Dr Joachim Lohse, Senator for Environment, Construction and Transport in the City of Bremen



each other", said Lohse. He called for the same enthusiasm in Germany. "The government said it would resolve the issue of liability with legislation by the summer break. Added to that, grid expansion has to keep pace with growth in renewable energies, not the other way around. That's why we need to have tested by the fall whether network companies can manage. If not, we have to take other routes", said Lohse.

Delays threaten business

Thorsten Schwarz, managing director of Norddeutsche Seekabelwerke (NSW) General Cable Group, also drew attention to the sensitivity of the subject. NSW was one of the two major sponsors of the conference, next to Alstom Grid. He made it clear that "delays pose a big threat to companies". He believed there was overcapacity in cable production in the wrong place, namely on land. Added to that, the uncertain political framework did not currently give investors reason to invest in cable manufacturing. Focusing exclusively on the offshore cable market had its risks. "It's a very volatile market. Siemens parted ways with its cable division ten years ago for lack of demand", he said, warning of the need for more reliable business conditions.



Thorsten Schwarz, Norddeutsche Seekabelwerke NSW

Reliable timetables are needed



Reinhard Bahrke, Alstom Grid

Reinhard Bahrke from Alstom Grid also emphasised that the cable business needed reliable timetables from the government to run its operations. The French group is already involved in building eight internal substations for wind farms. Next to Siemens and ABB it is also ready to install HVDC transmission networks for offshore wind farms. "The grid connection of offshore wind farms is an important mainstay of our business", he said.

Panel discussion

Grid connection for offshore wind energy –
Where are we now, what is the right way ahead, what action should we take?



Resolution of liability issue is needed

The panel discussion got right down to the topics of liability and delays in grid connection. Stefan Thiele of TenneT made it very clear “that the financing of connections is an urgent issue, but before that the question of liability needs to be resolved”. He called on the German government to no longer hesitate in getting involved with developing the grid infrastructure so vitally important to the industry.



The state is responsible for grid infrastructure

“In the past, networks were privatised and sold for example to TenneT, the Dutch state group. Now we are facing an entirely new situation in which the state is responsible for grid infrastructure and must take on this role”, said Jörg Kuhbier, chairman of the German Offshore Wind Energy Foundation. Kuhbier had a clear view on the liability issue too. “Resolution is crucial and dare not become a wasted effort. Investors and TSOs will have to adjust and cover their risks with insurance if need be.” He made it clear that “potential major losses will have to be borne by the electricity consumer.”

No resolution on liability means no new decisions on investments

The industry is also applying pressure to the government. “If the liability issue is not resolved before the summer break, we will be the first business to stop taking decisions on new investments”, said Stefan Thiele of EnBW Erneuerbare Energien.

Competition in Europe for capital and customers

Uwe Gierer, director of sales for Alstom’s offshore wind division, also used plain language. “There is competition for capital and customers. There is the risk that investors will decide for the UK and against Germany.”

System change urged for grid infrastructure

Lower Saxony’s environment minister, Dr Stefan Birkner, pointed out that there was no lack of political will and that much had already been achieved with Germany’s 2012 Renewable Energy Law (EEG). But he was critical of his FDP party colleagues in Berlin. “In Germany, investments are not being made in network infrastructure. That’s why we have to think about a grid company with the participation of the federal government and the TSOs. This is actually written into the coalition agreement between the CDU/CSU and FDP parties, but it’s no longer being discussed.”



Stefan Thiele, EnBW
Erneuerbare Energien

He also urged making the so-called system change. Behind this was the industry's call for grid connections being commissioned and installed regardless of the level of completion of individual wind farm projects. So far, the rules set out in the Federal Network Agency's position paper were based more on ad hoc decisions than on anything systematic. A project's

level of completion was the criterium for when a call for tenders could be made, and this was determined two times a year on reporting dates. The system change would mean that investments in infrastructure could be made successively.



Resolution of liability issues in August 2012

Hans-Joachim Otto, parliamentary state secretary in the German ministry of economics, did however bring the message with him that "the federal government wants to resolve the issue of liability with legislation scheduled for August 2012."



Parliamentary State Secretary
Hans-Joachim Otto

Conference

The two-day conference also focused on export cables and array cabling.

SESSION A – OFFSHORE GRID I

New design for inter-array cabling

Breanne Gellatly of England's Carbon Trust Initiative presented a design study for inter-array cabling in which voltage is not 33 but 66 kV. In a first step, this design would be applicable to all wind farms. "Although it would increase costs by 12 percent, it would also double the capacity."

In terms of investments and operating costs, there would be less power loss and the number of substations at large wind farms could be reduced. It would also be possible to integrate high voltage in the towers of wind turbines," she explained.

One drawback however is that cable with a transmission voltage of 66kV is not yet available. But given that experts estimate that Round III in the UK will create demand for 6,000 kilometres of cable, the problem of shortage may be relative. "A number of investors are interested in the design. But it will take time before it is completed. Therefore, it may be a solution only in the medium term", said Gellatly.

New underwater robot for cable laying

NSW is also very familiar with inter-array cabling and has already worked on several projects using its own equipment. Together with an English company, it developed a remotely operated vehicle (ROV) using tried-and-tested technology. These automatic underwater devices are already standard in the oil and gas industry. The SeaRex robot is expected to be used commercially to lay cable from September 2012. A major advantage is its great maneuverability during installation in a wind farm; large cable-laying vessels are more restricted in movement.

With a capacity of two times 400 kV, the robot can handle up to 1,000 metres an hour and is the most powerful of its kind on the market. "This device can lay both three-phase current and HVDC cables. In a soft sea floor, a jetting procedure excavates and backfills trenches, allowing cables to be installed in one operating sequence.

In a hard or stony sea floor, the ROV works with a plough and is equipped



Tom Schmitz,
Norddeutsche Seekabelwerke NSW

protection zones for cable routes, and cable protection systems should be well-planned", he said.

Protection systems for cable connections

One of the leading providers of such protection systems is Tekmar Energy Ltd, which has already installed 1,000 protection systems at 18 offshore wind farms. These protection systems consist essentially of a casing which is pulled over the cable, preventing damage to the section of cable between the sea floor and the turbine's foundation. One part is made of durable polyurethane and serves as a bend stiffener on the foundation. The other part close to the sea floor consists of a lightweight cast. The novelty of the design is that Tekmar has developed a system which makes a J-tube on a monopile unnecessary. Instead, the cable is drawn into the protection system and then pulled in through an opening in the monopile with a winch, and secured. When this work is done, a seal is used at the point at which the cable enters the monopile. It is pushed apart hydraulically and holds the cable in place. Active and passive bend restrictors are used to make sure the protection stays properly positioned and remains flexible under pressure from waves and currents. "The system has a design life of at least 25 years and protects cables from scouring by waves and currents. It can be installed without diving opera-

with a tool that cuts through stones lying in the way", said project director Tom Schmitz, explaining the technical innovations. Depending on the task and the type of sea floor, trenches could be significantly more than three metres deep. Since damage to cables could affect intra-array cabling, Schmitz urged for closer cooperation with all stakeholders. "For cable ducts in the turbine's foundation (J-tube), due to the bending radius we need to know from the start how cables will reach the structure. In addition, the wind farm's design should identify



James Ritchie, Tekmar Energy, UK

tions and can also allow for the replacement of cables", said James Ritchie. For him the benefits of protective systems are obvious. "The cables make up only eight percent of the total investment, but 80 percent of all insurance enquiries refer to these systems", he said. There are also advantages for not needing the J-tube. "The cost of a special seal on a monopile is about EUR 65,000. In the other type with a J-tube, this figure comes to EUR 102,000.

Guidelines for installing scour protection are missing

Proper protection often includes measures to prevent scouring occurring at foundations. Stones are the material of choice to prevent currents from washing out and carrying away sediment and sand from under the steel structures. But it is no trivial job to systematically pile them up when working from the surface of the sea. The Dutch company Dredging International, which belongs to the DEME Group, found a solution rather by chance. "For a project in Canada we developed a downpipe with a diameter of 1.2 metres in order to specifically position stones from a ship at great depth. This idea is very good for the scour protection of foundations and works up to depths of 50 metres. If stones are sunk from a dredger, waves and currents will let them fall anywhere", said Martijn Hovestad, speaking from experience. In this regard, there are no authoritative guidelines yet on how scour protection should be best installed. Right now the trend is to sink large stones. These are not only expensive – they also pose the risk that cables will be damaged. "It is cheaper to use small stones and observe whether layers that have been set down change or even migrate", said Hovestad. He urgently recommended that scour protection should cover an area with a radius four times the pipe diameter of the monopile.



Martijn Hovestad,
DEME Group, Belgien

Marine warranty surveyors (MWS) are needed



Ralf Skowronnek, Marsh

Ralf Skowronnek from insurance broker Marsh confirmed that precision work was important for the entire process. Statistics showed that 100 cases of damage offshore, with a volume of 100 million pounds, were reported to insurance companies between 2003 and 2011. Forty cases were related to cable damage. The highest single amount ran to 5 million euros. Although cable damage is declining, “losses can be significantly higher if, for example, losses in yield continue

over longer periods of time. Very often the damage is caused by incorrect installation during the cable-laying procedure, or by pulling cables too hard when they are inserted into J-tubes, or by construction vessels that lower one leg onto a cable. But some mistakes already happen during production. That’s something insurance companies no longer want to pay for,” said Skowronnek. A well-known response of the insurance industry to the cost of damage is to increase the price of insurance policies and the customer’s cost share. The other measure is to commission independent experts to oversee a project. The post of a marine warranty surveyor (MWS) should already feature in the call for tenders. “Without the MWS, insurance companies should no longer provide coverage. The MWS influences the course of work and is an added protection”, he said.

SESSION B – INSURANCE

Insurers calls for clear standards and more know-how



Martin Benatar, Benatar & Co.

Weather risks, contract penalties, and power output guarantees were “hot potatoes” tossed back and forth between stakeholders. For insurers, this meant high risk at relatively low premium payments, said Martin Benatar, managing consultant for Benatar & Co.

Inclement weather conditions, new technologies, and problems with the grid connection – these high risks for damage to offshore wind farms mean that the insurability of projects plays a major role for investors, owners and operators. Dr Patrick Wendisch, managing director of Nordwest Assekuranzmakler, brought this to the point, saying that “no risk with guaranteed high returns” was simply the wishful thinking of investors.

Weather risks, contract penalties, and power output guarantees were “hot

Offshore grid structure must be untangled and strengthened



Frank Thyrolf, German Insurance Association (GDV)

Overall, the grid structure must be untangled and strengthened, Thyrolf said. It would be conceivable to develop partly redundant solutions such as meshing, or to connect the network to neighbouring countries.

Weather conditions at sea are a major risk factor. If storms damage many turbines at the same time, insurers can encounter a bottleneck. This accumulation risk increases with each additional offshore wind farm to be insured. “Besides the threat it poses to the security of energy supply, extreme offshore loss accumulation due to capacity shortage would endanger long-term insurability on insurance markets”, said Frank Thyrolf of the German Insurance Association. A major risk factor for the operational phase results from connecting several wind farms to a cluster transformer.

Crew experience is existential



Niels Kragelund, Codan Insurance

Even during the construction phase, extreme weather conditions at sea and poor planning can lead to high costs for insurers. Because special ships are expensive and not enough of them are available, the time slot for installation work is often kept as short as possible and poor weather conditions drastically shorten it even more. Niels Kragelund, general manager of Codan Insurance said that one major reason for damage occurring, for example during cable laying, was that subcontractors lacked experience and crews were negligent due to tight schedules. "Experience, knowledge and understanding among all the stakeholders involved is existential", said Kragelund. He added that the scope of the marine warranty surveyor's work needed to be clearly identified.

Development of guidelines for risk management is needed

Insurers call for clear definitions and standardisation when it comes to technology and installation techniques. To make new technologies more calculable for insurers, the offshore wind industry needs binding specifications. The Offshore Code of Practice (OCoP), now being drafted and revised by more than 50 experts, is expected to set up guidelines for risk management in the construction of offshore wind farms. This initiative is supported by the European Wind Turbine Committee (EWTC) and the German Offshore Wind Energy Foundation. The goal is to make the risks involved in building offshore wind farms insurable in the long term, said Harald Dimpflmaier from Global Engineering, SwissRe.



Harald Dimpflmaier, SwissRe

Cost optimisation for offshore wind energy projects

The goal should be to optimise costs for offshore wind energy projects on a sustained basis. "They are still just too high", said Mr Kragelund. Primary insurers and reinsurers currently have enough coverage capacity, but a major event could curb an insurer's appetite for taking risks, said Mr Thyrolf.

Development of new financing opportunities

Martin Benatar sees opportunities to develop new capacity for financing offshore wind energy projects in the area of institutional investment and pension funds. However, these aim to a greater extent to transfer the risks involved in weather and maintenance to third parties. "To approach pension funds, we have to see if there are wind energy derivatives."

Separate risk category for sustainable investment

The insurers themselves are among investors in the offshore business. But many companies are now cautious. To create better conditions for investment, Mr Thyrolf called for a separate risk category for sustainable investment, with low but adequate capital requirements. He also said that simultaneous investment in power grids and offshore wind farms needs to be allowed by law.

▶ **SAVE THE DATES!**

WINDFORCE 2013
Bremerhaven

9th WAB Offshore Conference **4-6 June**

WINDFORCE 2014
Bremen

10th WAB Offshore Conference **17-19 June**
International Trade Fair **17-20 June**

WINDFORCE 2015
Bremerhaven

11th WAB Offshore Conference **9-11 June**

WINDFORCE 2016
Bremen

12th WAB Offshore Conference **7-9 June**
International Trade Fair **7-10 June**

SESSION C – PILE-DRIVING NOISE PROTECTION

Protecting marine mammals

The session on noise protection was well attended. Presentations emphasised the protection of marine mammals – especially porpoises – from the noise of pile-driving. The energy input during the pile-driving of a monopile is enormous, with the first ramming reaching up to 1,500 times the acceleration of free fall. Underwater sound is carried for many kilometres. This has highly negative impact, with marine mammals being driven away, or suffering from communication disorders and injuries to their hearing, and even death if they are nearby.

Reducing noise is possible

Fabian Wilke, senior manager at RWE Offshore Logistics, first spoke about permissible noise limits. At a distance of 750 metres from the ramming, the sound exposure level (SEL) may not be higher than 160 dBSEL, and the sound pressure level (SPL) may not exceed 190 dB SPL. These values are based on several studies of porpoises. Limits apply however only in German waters, he stated clearly.



Fabian Wilke,
RWE Offshore Logistics

“The UK does not use any noise control at all.” In Denmark, marine mammals are scared off by the use of increasingly unpleasant noises before pile-driving begins. Basically there are two different types of protection systems. Impedance systems reflect soundwaves at layer boundaries. Scattering systems dissipate the released energy. Of the five systems that were intensively tested, the small bubble curtain was recommended as the most successful solution. Its use does however depend on environmental conditions, waves and currents. He concluded that “a reduction of 10 - 15 dBSEL is definitely possible”.

No abnormal behaviour of animals at a distance of eight kilometres

The work of ramming monopiles at the Bard Offshore I project proved that noise reduction is absolutely essential. The wind farm had an older approval license which recommended the limit of 160 dBSEL although it did not legally require it. Dr Susanne Schorcht, responsible at Bard for approval procedures, reported that at a distance of 750 metres, the decibel level was 179 dBSEL, far beyond the recommended limit. At the same time, biologists were able to observe the behaviour of porpoises. In the zone extending from 750 to 2,000 metres from the monopile, the animals completely disappeared. It was only at a distance of eight kilometres that animals no longer exhibited abnormal behaviour.



Dr Susanne Schorcht,
Bard Engineering

Limit compliance with the large bubble curtain

Pile diameter is increasing. Where once five metres was the standard, today it is already a diameter of six or seven metres that the industry is calling for. Michael Bellmann from the University of Oldenburg pointed out that as pile diameter increased, so does sound pressure during ramming. He expected that a diameter of eight meters would generate a sound exposure level of 180 dBSEL and a peak level of 210 dBSEL. Tests at the Borkum West offshore wind farm have shown that permissible limits can be complied with by using a large bubble curtain with a small hole size and short spacing between the holes.



Dr Michael Bellmann,
Universität Oldenburg

New system tested for noise reduction

Kurt Thomson, technical director of the Danish company Lo-Noise ApS, spoke about the successful application of an entirely different system. Located in Aarhus, the company works with a dewatered cofferdam. This is a steel tube which entirely surrounds the pile to be rammed. The space between the pile and the cofferdam is filled with air; in Lo-Noise ApS' test set-up, the gap measured 28 centimetres. During the first test, they were able to achieve a noise reduction of 23 dBSEL and later even 25 dBSEL. Thomson explained that the advantage of the system was its long life. "The cofferdam is a passive system and can be used for 20 years or longer. Our expertise lies in the construction of the seal."

Improvements are needed in the licensing process

Vattenfall project director Holger Grubel spoke about his experience with noise protection systems while constructing the Dan Tysk offshore wind farm. He pointed out that there was currently no system that could claim to be called 'state of the art' in this technology. "No subcontractor can guarantee compliance with the limit of 160 dBSEL at a distance of 750 metres", he said. He saw a need for improving the licensing process and believed that the specifications set by licensing authorities were not clear enough.



Holger Grubel,
Vattenfall Europe Windkraft

SESSION D – OFFSHORE GRID II

System change is needed for grid connection



Achim Berge, wpd offshore
solutions

In the panel on export cables, Achim Berge of wpd offshore took up the issue of political will concerning grid connection. For him, the system negotiated in 2009 between the wind industry and TSOs is at its end. "There is nothing left to optimise because it simply doesn't fit", he said. The TSOs were originally given 30 months time for grid connection if operators in return could show they had met all conditions such as fixed contracts for ordered components. Significant penalties were agreed on in the event a wind farm operator-to-be backed out and the TSO was left sitting on the grid connection. "This has a certain amount of humour because even now there are sensitive penalties involved because the TSO TenneT can't keep up and contracts have to be dissolved or postponed", Berge said. Although no one had made claims on TenneT for damages so far, it would be sure to come.

For standard project financing, the Offshore Wind Energy Foundation put the figure for damages in one year at 30 to 250 million euros. In the end, the wind farm operators concerned had to pay storage costs for finished components, cancel or renegotiate contracts, and make adjustments in construction schedules and shipping capacity. Between 90 and 120 million euros of additional liquidity were also needed to service interest and principal. "Fixed contracts and financing were completed. Now costs are still ongoing. This also affects banks and insurance companies and leads to a loss of image," explained Achim Berge, calling for the system change. "Grid connection is a state responsibility."

High voltages for large amounts of power

ABB deploys high voltages in HVDC cable. It has built the first HVDC connection between the mainland and an offshore wind farm, Borwin Alpha. The 400-megawatt connection has a voltage of 150kV.



Borwin alpha, ABB

For the project to follow, Borwin Beta, ABB was able to more than double the voltage to 320 kV. "We need high voltages to transport large amounts of power and minimise losses. With three-phase connections, hardly any energy would arrive due to the great distance", said Axel Widmark of ABB. HVDC lines can't transmit more than 320 kV because the HVDC technology (voltage source converter – VSC) used specifically for that purpose is presently limited to exactly that value.

Stock sourcing of spare cable is essential

Axel Widmark warned of the importance of having a supply of spare cable and being able to act quickly in the event of damage to export cables. "The NorNed I line between the Netherlands and Norway failed from 18 April to 4 June 2011 due to a defect, and 200 metres of cable had to be replaced. The excavating alone took 36 days", said Widmark.



Axel Widmark, ABB

The challenge of grid connection



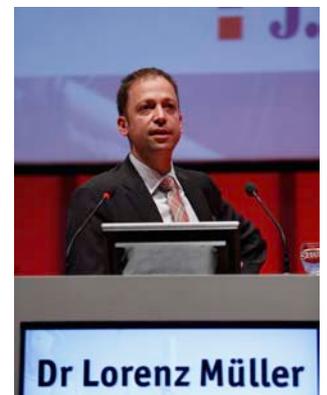
*Guido Kumbartzky,
Typhoon Offshore, Netherlands*

Guido Kumbartzky is more concerned about excavation. He works for the Dutch company Typhoon Offshore, which bought up the Bard projects sited in the Netherlands. He said that connecting two times 300 megawatts to the mainland sounded like a real adventure. In spite of the distance of 110 kilometres involved, Typhoon intended to use 220 kV three-phase cables instead of HVDC lines. The two wind farms will be interconnected and power transmitted via two routes. To reach the Dutch shore, engineering must accomplish two feats. The

first will be to tunnel under a gas pipeline in a vertical drilling process and build 12 cable crossings. Then engineers will have to deal with enormous sediment shifts off Eemshaven, which have added up to an impressive six million cubic metres in the past 25 years. This means that export cables will have to be laid at a depth of up to 10 metres under sediment in some places. To make sure that losses are not too high and that cables don't overheat in the depths, Typhoon will commission the production of cables with varying diameters. Oord is already the general contractor, but a cable manufacturer is still being sought. "It is certainly a challenge, but it can be done", Kumbartzky said.

Only three-phase electricity from the Baltic Sea

50Hertz, the TSO responsible for grid connection in the Baltic Sea, does not intend to engage in the HVDC 'adventure', but is relying on three-phase transmission from the start. There are currently 21 applications pending for offshore wind farms with five gigawatts of capacity in the Baltic. "We have made all the calculations in studies and will connect the wind farms to the mainland and to each other with 220 kV three-phase current. This is technically feasible. One factor was the costs, another the availability of HVDC technology",



Dr Lorenz Müller, 50Hertz

explained Lorenz Müller, head of offshore projects for 50 Hertz. Preparations for intermeshing have already begun. The reactors on the transformer station platform of the Baltic I offshore wind farm were replaced so that they can be connected through an additional cable to the Baltic II station. Another idea is expected to contribute to cutting costs. "We will not build our own transformer stations at sea but use those of the operators and regulate this in contracts", he said. Müller made it clear that the TSO was up to the task in the Baltic. "We have set up the financing for it with our business partners."

The problem of starting up substation platforms

Dr Falk Lüddecke from Technologiekontor Bremerhaven and Sven Höpfner from Alstom Grid spoke about the risks involved with substation platforms apart from those caused by delays. They had dealt with the shipping of components to installation sites, and with the maintenance of equipment, which called for the protection of sensitive equipment such as transformers. These are protected with special systems for safely withstanding transport and installation. It is still unclear how the start-up of a facility and the pulling in of export cable will work from case to case. "Typically, entries are still welded shut. It is possible to take personnel along and set them down from helicopters, or find ways for workers to enter the facility. But these aspects haven't been completely finalised with insurers yet", said Höpfner. He was also concerned about taking the replacement of components into account while planning, and installing hatches that transformers and reactors can pass through. "Changes to a design can always be made later, but that can create problems with certification", warned Höpfner.



Dr Falk Lüddecke, tkb - Technologiekontor Bremerhaven,
Sven Höpfner, Alstom Grid

Reliable replacement part management is essential

Dr Lüddecke also spoke about the reliable management of replacement parts. "Everything that is not made by hand should be in stock. A replacement for expensive power transformers may be shared by several operators", he said.

SESSION E – OFFSHORE FINANCING



Projects are still high-risk investments

The European Union has set high goals for developing offshore wind energy. But these goals can be reached only if investors and lenders are willing to make the billion-euro investments needed. Jérôme Guillet, managing director of Green Giraffe Energy Bankers, pointed out that bank interest in projects on the high seas was there, and that many banks today saw investment in offshore wind as a strategic decision. But projects were still high-risk endeavours that were making potential investors and lenders hesitant.

Jérôme Guillet, Green Giraffe Energy Bankers

Maximum transparency of project processes



Brad McAboy, UniCredit

arrangements, where a contractor is responsible for one subsection and the respective installation, is an improvement on the current multi-contract structure, said Brad McAboy, director of UniCredit Bank.

To whet the rather moderate financing appetite of banks, there must be maximum transparency on project processes. A critical point here is the multiple contract structure of the offshore wind energy industry, which holds numerous interface risks for investors and lenders. EPC contracts, bundling all the risks with a general contractor, would be ideal for investors. But they are currently not feasible for offshore wind projects because of their complexity and because projects involve high risks. EPCI contract

Reliable due diligence is important

For banks it is important to be involved at an early stage in contract negotiations, Mr Guillet emphasised. Financing options were available if the conditions set by banks were met, including reliable due diligence. The farther a project has advanced, the higher the cost of eliminating any mistakes, said Oliver Spalthoff, managing partner of Deutsche Offshore Consult. If checking were done early when cost overruns might be expected due to delays in the entire process, for example regarding the weather time slot, contracts could still be optimised. "Here a single delay can lead to an overall delay of months", said Dr Helmut Klug, general manager of GL Garrad Hassan.



Dr Helmut Klug, GL Garrad Hassan

Legal situation in the EEZ is not explicit

Even the legal situation in the exclusive economic zone (EEZ) calls for detailed attention on the part of lenders because it not clear whether German law is applicable in the EEZ, said Mr McAboy. To maintain security with assets, he recommended the creation of an assets company as a subsidiary of the project company.

Wind farm projects at sea a topic of interest for many

The big energy companies continue to be major players in the offshore wind industry, but they cannot manage the financing of projects alone. Small and medium-size energy utilities are entering the offshore industry, albeit hesitantly. Although wind farm projects at sea are a topic of interest "for all, even down to the very small ones", said Dr Petr Svoboda, senior consultant at BET Büro für Energiewirtschaft und technische Planung, he does not assume that all small and medium-size utilities will actually enter the offshore wind business.



Dr Petr Svoboda,
BET Büro für Energiewirtschaft
und technische Planung

Traditional financing sources are not sufficient for reaching the EU goal

Financing offshore projects alone through the company balance sheet is also not possible for major energy suppliers – and it is not a model for the future if the industry intends to keep growing. "Overall, traditional sources of financing are not sufficient for reaching the EU goal", said Dr Gunar Hering, principal at the Boston Consulting Group. Energy suppliers and commercial banks together could provide only about 58 percent of the investment needed. Hering sees new investors in insurance and pension funds in particular. He believes the 40-gigawatt offshore wind capacity



set as a target by the EU will not be financeable by 2020, but could be achieved by 2023. This means new investors should be brought on board as early as possible.

*Dr Gunar Hering,
Boston Consulting Group*



SESSION F – OFFSHORE LOGISTICS

For a long time, project developers asked whether the components of their wind farms would hold up technically and prove the reliability expected of them. Only later did the question arise of how the components of an offshore wind farm, some of them weighing several hundred tons, would get to the site in the first place. On Thursday, the second day of the conference, experts in logistics met to speak about this problem.

35,000 ships obliged to report in the North Sea in 2011



Klaus Frerichs, Waterways and Shipping Directorate (WSD) Northwest

Klaus Frerichs, president of the Waterways and Shipping Directorate Northwest, explained the duties of this German federal administrative body regarding the North and Baltic seas. Next to the daily routine of monitoring maritime traffic, it is special shipping that challenges Frerichs and his staff. They must write up the regulations and conditions according to which special ship traffic has to be integrated with normal traffic. Very wide and very slow transports must obtain maritime police authorisation. It is not obligatory to report the

shipping of parts of wind turbines if general navigation rules are observed. In 2011, some 35,000 vessels in the North Sea alone were obliged to report to the directorate.

Customs issue not clearly resolved

“Customs is important”, Andreas Wellbrock, managing director of WindEnergy Logistics, BLG Logistics Group, told his audience. Many a listener must certainly have inwardly shaken his or her head at this point because few would have given any thought to this aspect. In fact, the issue of customs is not clearly resolved and has only now become relevant because German offshore wind farm projects lie beyond customs boundaries. Customs must also be taken into account when spare parts are being exported or imported. Wellbrock also spoke about the standardisation of logistics services. “This issue hasn’t been tackled consistently because we haven’t yet gone into the serial production of tripods, for instance.”



Andreas Wellbrock, WindEnergy Logistics, BLG Logistics Group

Taking a proactive approach – long-term planning and chartering is essential



*Dirk Dollmann,
EnBW Erneuerbare Energien*

Dirk Dollmann, team manager at EnBW, spoke about planning from the perspective of an energy supplier that has committed itself to developing 3,000 MW of renewable energies by 2020. Dollmann described the logistical challenges posed by the Baltic 1 project in the Baltic Sea, where 89 different vessels were deployed, sometimes up to 21 at the same time. Some 2,500 ship movements took 612 installers out to their jobs. With a sailing time alone of 2.5 hours for a single tour, technicians' working time was severely limited. Dollmann urged

his listeners to be proactive with planning and chartering vessels well in advance.

Process management



*Roger Heidmann,
Logistik Service Agentur*

Roger Heidmann from the Logistik Service Agentur expanded on this theme. His business is a consultancy agency which advises project developers and operators on the cost-efficient use of resources. He stated explicitly that the company is not a service provider. "We manage the processes", he said, describing his business model in a nutshell.

Customs – a legal vacuum



Robert Instinsky, Kühne & Nagel

Conference participants were able to benefit from the experience of one of the largest logistics firms involved. Robert Instinsky, manager of offshore logistics at Kühne & Nagel, saw logistics as the most important factor for the economic success of offshore wind farms. He also criticised the unresolved customs issue. There is no way around customs, Instinsky explained, but even customs experts don't know what the right way is supposed to look like. "We're moving in a legal vacuum", he said. After all,

a wind turbine has 7,000 parts that may need to be replaced or returned to the site in case they are repaired on shore.

First: prepare onshore; second: use short weather windows too



*Service technicians at Bard Offshore 1, transferring with the Natalia Bekker
SWATH tender*

Concluding the first day of the conference, Michael Finner, managing director of Bard Logistik, provided insight into the complex installation of the first Bard wind farm, Bard Offshore 1. A total of four installer vessels or jack-up platforms are in action, supported by eleven tugboats and six pontoons for component deliveries. Technicians are brought to the site by helicopter. Supply and personnel transfer is done there with two vessels which each have an Ampelmann access bridge. Finner summed up his most important experiences in two sentences. First, everything that can be done on shore, should be done onshore. Second, use short weather windows too and keep components ready for that.

The german network for the offshore wind energy industry



BECOME A WAB MEMBER
and benefit from the advantages
of a strong industry network with
more than 350 german members

WAB
Barkhausenstr. 2
27568 Bremerhaven
Germany

Berlin Office:
Schiffbauerdamm 19
10117 Berlin
Germany

www.wab.net

SESSION G – OFFSHORE SPECIAL SHIPS

Definitions for installer vessels presented to the IMO



Wolfgang Hintzsche, German Shipowners' Association (VDR)

The ship market is also taking action. The German Shipowners' Association (VDR) has made a strong push towards standardisation and submitted proposals to the International Maritime Organization (IMO) which would allow the number of passengers that can be carried on service vessels to increase from the current maximum of 12 persons. "Ships have to be used around the world and have uniform safety standards. So far there are no definitions for service ships or jack-up vessels", explained Wolfgang Hintzsche, director at the association.

To change this situation, a working group comprising the VDR and the German Shipbuilding and Ocean Industries Association (VSM) submitted definitions for installer vessels to the IMO. These are to establish an international standard. The associations are also putting on pressure regarding service ships since these vessels are allowed to have no more than 12 persons on board. Otherwise they are classified as passenger ships and have to meet several requirements. "Converting ships to meet these requirements would add on costs of 40 percent. We are urging the IMO to describe service technicians not as passengers but as specialists. In the United States, and in the oil and gas industry, having 30 persons on board is standard", said Hintzsche.

Exemptions are needed for the interim

For this reason, the IMO should devise a new definition for employees involved in constructing a wind farm or providing services. Because this may take time, the German ministry for transportation is being asked to issue exemptions for German waters.

New installation vessel for offshore wind energy

HGO InfraSea Solutions is pleased with its innovative idea to commission a battleship. This special ship is booked for the installation of Globel Tech I. To take components off the quay in Bremerhaven, the vessel must be jacked up with a safety clearance of 24 metres to the quay's sheet pile wall. Otherwise, the enormous pressure of up to 14,000 tons per leg could damage the wall. "It was good that construction engineers prevailed and the ship has a 1,500-ton crane. Otherwise it would have been almost impossible to load components on board", said managing director Carsten Heymann. To install 950-ton tripods at the construction site, the crane has to distribute the load across 35 metres.



Dr Carsten Heymann, HGO InfraSea Solutions

The objective – access to turbines when significant wave height is up to two metres



Ken Soerensen, Siemens Energy Service Wind Offshore

Siemens Windpower is relying on new types of ships and an English access system for its business in the maintenance and service of wind farms far from the coast. This combination should make it possible to access a turbine when significant wave height is up to two metres. "So far, technicians wait in port about half the time because they can't go out on the North Sea. If we succeed in achieving safe access when significant wave height is two metres, the probability of accessing turbines from a ship increases by 20 percent", said Ken Soerensen, head of Siemens Energy Service Wind Offshore.

The target – large wind turbines with little downtime

The stated strategy is to build large wind turbines that have little downtime in order to make wind energy cheaper and optimise maintenance costs. Siemens wants to achieve this with new ships running at more than 30 knots per hour, and it wants to use expensive helicopters only for unplanned operations. To approach this goal, Siemens has tested several commercial access systems at sea. After two series of tests in spring this year, the solution offered by English company Osbit Power Ltd was the favourite. Called Maxaccess, this system is mounted on the bow and weighs only 1.5 tons. It has an extendable ladder with a basket and a hydraulic clamping device. The system is extended directly to a wind turbine and the device clamps its jaws, like a hydraulic screw clamp, around the vertical pipe next to the ladder on the transition piece (between foundation and tower). Then the access ladder with the basket is adjusted and a green light signals to the technicians that they can climb over to the turbine. Safe access at significant wave heights of 1.9 metres has already been tried and tested. "The system allows us to safely access the turbine even under difficult conditions. We will do further testing and talk to our customers. We are focusing on them and want to create added value", said Soerensen. He estimated that Siemens' own fleet would nearly double each year.

The market for service and maintenance ships has been swept clean

Siemens is relying on the right strategy by using its own ships. In an analysis of the German ship market, shipbroker Phillippe Schönefeld of German Renewable Shipbrokers has found that only 20 ships are suitable for service and maintenance, averaging an impressive 33 years of age. "Because 20 to 30 ships are needed just for one wind farm, the market has been swept clean. We have a bottleneck in the North Sea", he said. There are two possible solutions. Either companies build their own vessels or they employ experts early on who stay on the lookout for available ships around the world and charter them. "It makes sense to build ships only if they are used at full capacity for 200 days a year", he advised. The situation is more relaxed for installer ships, regarded for years as the bottleneck. By 2014, 36 ships will be available, of which 18 are suitable for use at the water depths of German projects. Schönefeld even expected there would be overcapacity until 2014. "The delays in grid connection are affecting installer ships too. For new ships, charter rates have fallen to between 125,000 and 165,000 euros. When the problem gets resolved, we could quickly experience bottlenecks again."



*Phillippe Schönefeld,
German Renewable Shipbrokers*

SESSION H – HEALTH, SAFETY AND ENVIRONMENTAL PROTECTION (HSE)

Reliable rescue service tops the agenda

Another issue is debated hotly in the industry – health, safety and environmental protection (HSE). In particular, three fatal accidents at Bard Offshore I and Alpha Ventus have raised awareness of the need for reliable rescue services, now at the top of the agenda.

Minimum requirements for a standardised HSE system in Europe

This is of concern primarily at the management level, however, where awareness of HSE is very pronounced. Employee awareness of safety is higher than it used to be, but must continue to develop more, said Dr Axel Birk from REpower Systems. International projects pose a particular challenge because legal systems, regulations and mentalities sometimes greatly differ. The problem with multinational involvement in European offshore projects can be seen at the Ormonde offshore wind farm, said Birk.

"The farm was and still is being built, maintained and operated by Irish, British and German technicians, so we have to deal with a variety of norms, regulations and guidelines for HSE." The aim, Birk continued, has to be to standardise the minimum requirements for a European-wide HSE system.



Dr Axel Birk, REpower Systems

DGzRS emergency control centre for offshore wind energy planned



Udo Helge Fox, German Maritime Search and Rescue Service (DGzRS)

Udo Helge Fox, executive director of the German Maritime Search and Rescue Service (DGzRS), delineated the ways his organisation intended to participate in the establishment of reliable rescue services. To start, the DGzRS has begun the provisional operation of an emergency control centre, and founded the Maritime Emergency Management Agency. The emergency control centre will accept emergency calls, coordinate emergency measures, and in the event of a complex emergency situation, alert state agencies and operators' central control stations, and continuously

update all concerned. The DGzRS and operators are together funding the emergency control centre. Fox pointed out that the control centre could be fully operational by the end of 2013 once legal and financial requirements were resolved.

Reliable rescue service is the responsibility of operators

Dr Matthias Ruppert, director of medicine for ADAC Air Rescue, spoke about the automobile club's helicopter operations. "Some missions are really difficult because complicated diseases or injuries are compounded", said Ruppert in describing the demands on helicopter emergency medical services (HEMS). A heart attack can cause someone to fall from a ladder, or a fall injury can lead to hypothermia. "The probability that HEMS doctors are dealing with severely injured patients is ten times higher than in land-based

emergency response", said Ruppert. The automobile club works together with Wiking Helicopter Service. Wiking has set up special teams that train for missions at sea. Ruppert pointed out again that the rescue system, or better said, reliable rescue service was not the responsibility of ADAC or Wiking, but of the offshore wind farm operators themselves.



Dr Matthias Ruppert, ADAC Air Rescue

Plans for an offshore coordination office are presented

Carsten Wibel introduced the plan of the Bugsier-, Reederei- und Bergungs-Gesellschaft for an offshore vessel control centre. Its functions are expected to include maritime surveillance and vessel coordination in wind farms, as well as personnel tracking and the coordination of personnel and material logistics, the provision of vessels and aircraft, the handling of port services, and the support of emergency personnel in the event of accidents or the acute illness of personnel at offshore wind farms.



Carsten Wibel, Bugsier-, Reederei- und Bergungs-Gesellschaft

A limited number of offshore divers

Justus Kellner, an offshore wind consultant at GL Garrad Hassan, closed the day at the conference speaking about diving at German offshore construction sites. He discussed the substantial regulations in place and pointed out that the number of experienced offshore divers was limited. Here the offshore wind industry competed heavily with the oil and gas industry.



Justus Kellner, GL Garrad Hassan

SESSION I – OFFSHORE JOB QUALIFICATION

Offshore wind energy needs experts



*Dr. Thomas Ull,
PricewaterhouseCoopers*

The growing offshore wind industry needs not only turbines, foundations and power grids – it also needs people who are able to cope with the challenges posed by the industry. “Offshore wind energy is creating revenue and jobs”, said Dr Thomas Ull, senior manager at PricewaterhouseCoopers (PwC), highlighting the results of a study PwC conducted together with WAB.

New vocations and courses of study are essential



*Stefan Hicke,
Deutsche WindGuard Offshore*

There should be several responses to the high demand for skilled workers, said Stefan Hicke, senior project manager at Deutsche WindGuard Offshore. Right now it is important to see to the skills training of newcomers in particular. In the long term, new occupations and courses of study need to be developed. One step in this direction is the newly developed skilled job of “service technician for onshore and offshore technology”, for which vocational schools in the Wesermarsch district intend to offer regular courses of training.

Offshore wind energy – value creation in Germany

Offshore wind energy is an all-German issue. Although the major players in project planning are in the north, the state of North Rhine-Westphalia is the leader for value creation in turbine manufacturing. Even Bavaria and Baden-Württemberg in southern Germany have a large share of sales. Value creation in the offshore wind industry is dominated by middle-sized companies. “There are many, many players, not just a few big ones. Especially when it comes to transporting turbines out to sea”, said Ull. The construction of turbines will be the largest revenue generator and employer in future as well. Next to that, operations and maintenance is becoming an important mainstay in the offshore wind industry. Here demand is expected to double in the next ten years.

No standard curriculum

There are several academic courses of study focusing on wind energy, but the situation is confusing for interested students, said Moses Kärn, coordinator for professional training and continuing studies at ForWind. Although there are many local programmes, there is no uniform curriculum. Next to traditional courses of study, universities are also offering cooperative work-study programmes such as the Offshore Wind Studies programme to be launched by ForWind and WAB in 2013. The goal of the nine-month programme is to intensively upgrade technicians’ skills for the industry in a short time, said Kärn.



Moses Kärn, ForWind

Offshore worker training programme



Dirk Schreiber, Michael Berges, Hochtief Solutions

Rapid and yet sustainable qualification – that is a guiding principle for Hochtief as well. “As a business, we are interested in covering the entire supply chain – with our own employees”, said Dirk Schreiber, QHSE manager at Hochtief. To qualify newly hired staff for work at Global Tech 1, the company developed its seven-week Offshore Worker programme.

International teams

DONG Energy also relies on its own qualification strategy in developing its offshore wind division. New staff are involved in the operations of the business during a phased, seven-month programme. DONG assembles international teams for its offshore projects that work together for the duration of the project. In this way, the company can employ the best people for each project, explained Christoph Mertens, head of project execution.

Standards are essential for defining competence

How do you measure the competence of employees? We need clear standards for defining competency, said Greg Croft, business development manager of Petrofac Training in the UK. So far, the offshore wind industry has not succeeded in defining qualification profiles which could be tested and verified. This would be a challenge for the future.



Greg Croft, Petrofac Training



Reception at Domshof, Bremen



Maritime Wind Dinner, ABC peninsula, Bremerhaven

Writers: Ann-Kathrin Marr, Torsten Thomas and Björn Iken — **Editor:** Steffen Schleicher, conference manager and head of offshore projects, WAB