

COMMUNICATION HUB FOR THE WIND ENERGY INDUSTRY

WindEnergy

NETWORK

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JACK-UP VESSELS

GIANTS OF THE DEEP

CABLE PROTECTION

VALUED HIDDEN ASSETS

COST OPTIMISATION

MANAGING COSTS LONG-TERM

OFFSHORE INTEGRATED GRIDS

NECESSARY NETWORK

HAND & POWER TOOLS

MAKING MAINTENANCE EASIER

MASCOT® MULTISAFE

WORKWEAR for all extremes



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CONTINUING CHANGE

In 2016 we made the decision to join both Wind Energy Network and Wave & Tidal Energy Network magazines together. We are very pleased that the feedback has been very positive.

COMMUNICATION

As our mantra is that we serve the industry as a 'communication hub' it is very pleasing that it is making it much easier for our readership to communicate across both industries.

MORE SUCCESS STORIES

We continue to hear of companies in either sector getting in touch with their counterparts after finding out what their respective companies offer. This means that collaborating companies continue to grow and prosper.

Products and services can be different in the two sectors however we have found that many companies offer a very similar product or at least can adapt equipment or their offering to suit a particular challenge encountered.

CONTINUING MAGAZINE FEATURE

We would like to continue to hear from any of the companies who have been collaborating across the sectors – we will then feature them in the magazine.

Please therefore get in touch – remember genuine editorial is featured completely free of charge, without any conditions attached.

Duncan McGillvray
Editor | Wind Energy Network



Fliss - Editorial



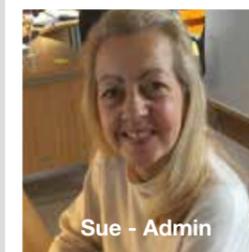
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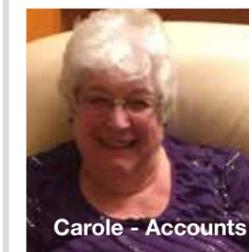
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60% modacrylic/39% cotton/1% carbon fibre, 310 g/m²

- Fluorescent and with vertical and chevroned crossed reflective strips. Dirt resistant. Anti-static, acid resistant and flame retardant. Protects from electric arcs and occasional welding arcs. Breathable, wind and waterproof. Taped seams. Lining of quilt. Detachable lined hood with adjustable drawstring. High collar. Fastening with storm flap and hidden press studs. Zipped pocket under storm flap. Strap for gas alarm. Chest pocket with zip. Chest pocket with flap and press stud. D-ring. Front pockets with zip. Formed cut sleeves. Extended back. Press stud adjustment at waist. Rib (hidden in storm flap) and press stud fastening at cuffs.

• Size: S-4XL
Arc Rating: ATPV = 24 cal/cm²



MASCOT® MULTISAFE Renens Winter Trousers 13892-217-17010

60% modacrylic/39% cotton/1% carbon fibre, 310 g/m²

- Fluorescent and with reflective tapes. Dirt resistant. Anti-static, acid resistant and flame retardant. Protects from electric arcs and occasional welding arcs. Breathable, wind and waterproof. Taped seams. Lining of quilt. The removable braces are made from strong elastic Belt loops. D-ring. The waistband is higher at the back, to better protect against the cold. Fly with zip. Front pockets. Back pockets with reinforcement, flap and hidden press studs. Thigh pocket with flap and hidden press studs. Phone thigh pocket. Reinforced ruler pocket. Adjustable knee pad pockets with flap and top access. Zip with storm flap on outside of legs.

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CATASTROPHIC EFFECTS OF NON-TESTING

The oil & gas industries have regular safety and integrity testing schedules for all working components but the wind industry continue to leave far too much to chance

That's the stark view of renewable engineering specialists, Prontoport, following an incident recently where a turbine blade detached in motion, crashing into the side of the tower structure and causing such damage that the whole turbine collapsed.

This is not an isolated incident and at least one other event where a blade has become detached has been reported previously in the UK, in addition to other known failures in European installations.

HARSH ENVIRONMENTS

In the harsh environments of most windfarms and with ageing kit, problems can only be expected to multiply, according to Prontoport.

Phillip Hodgson is an experienced turbine technician, carrying out a range of testing regimes for the company across the UK and Europe. He commented: "Typically, we may be invited to sample test 5 or 10% of existing turbines and only if significant defects are found, will the exercise be extended to cover the remaining installations."

"Yet even when an engineering report is produced, based on hard facts gained through ultrasonic NDT (non-destructive testing), often we find that companies still don't want to face up to the implications.

ASSOCIATED NECESSARY COSTS

Phillip continued: "Clearly there are costs associated with ongoing NDT but this is the only way to stop potentially catastrophic failures happening without warning. It's not enough to say that most windfarms are in remote locations and any damage would be contained, as failures of this magnitude pose danger to life of workers, livestock, visitors and anyone in the vicinity."

"It has been estimated that a blade, weighing up to 28,000kg, could travel as much as two miles if it sheared off in motion and at an appropriate trajectory. This does not bear thinking about and could result in hefty penalties if companies can be proven to have ignored essential maintenance.

"I personally believe that failure to test comes down mainly to cost. Companies are holding back and cutting back on reporting problems, which then don't receive adequate attention," he concluded.

PROACTIVE ACTION ESSENTIAL

During ultrasonic NDT, defect reports typically reveal serious, invisible faults in essential components and welds, particularly those supporting blades and towers where the greatest loads are carried. It may be down to inexperience in this relatively young industry that some companies remain slow to react when defects are found but the evidence available through NDT include objective echo-graphs with DAC (distance



amplitude correction) curves, showing the depth and sensitivity of problems. The evidence is therefore fairly unarguable.

ACTING ON EVIDENCE

Scott Telfer, MD of Prontoport added, "Many of our technicians are reporting that incidences where problems are reported are increasingly challenged or ignored. Even aside from the health and safety aspect, this makes no sense at all since the cost of replacing a turbine which has been damaged to the point of being unviable, massively outweighs the cost of regular testing."

"I also believe that the industry is sticking its head in the sand by not acknowledging that regular testing is an essential part of the health and safety process, in the way that it has become part of ongoing maintenance within other industries."

"The nightmare scenario is that we have to have a major accident or fatality for this to become law. At the moment, the industry has the opportunity to adopt a code of practice which would safeguard the integrity of each and every turbine, but it simply isn't happening in too many cases."

MOVING FORWARD

On the positive side, as the wind energy industry matures, more site and infrastructure sales are now taking place. Many of these require guarantees to be given before an exchange of ownership takes place. In turn, this requires testing and the full extent of hidden problems may become more documented and recognised as a result.

Prontoport, which provides engineering support, including service and maintenance at over half of the UK's on and offshore windfarm assets, argues however that the testing and maintenance regime should be established as a procedural requirement. Within the oil & gas industries, best practice requires components to be tested at regular, specified intervals and records kept accordingly.

"Until such practices are adopted by the wind energy sector also, we leave ourselves open not only to criticism but to avoidable catastrophe," Scott concluded.

COMPANY EXPERTISE AND SUPPORT

Prontoport provides a full range of engineering support services to over 50% of the UK's onshore and offshore wind energy assets. Based in Irvine, Ayrshire, the company also works across Europe and with most major players within the sector.

As experts in installation, servicing and maintenance, the company supplies expertise and offers training in a wide range of skills, including radiography; positive material identification; magnetic particle inspection; eddy current and dye penetrant testing for both new and in situ components.

Prontoport Ltd



PROGRESS AT DOGGER BANK

New General Manager for Forewind



Offshore wind consortium Forewind has appointed Trevor Baker as its new General Manager.

Forewind, owned by Innogy, SSE, Statoil and Statkraft, has development consent orders for 4.8GW of offshore wind development at Dogger Bank in the North Sea. The consents comprise four individual 1.2GW projects.

ROLE

Trevor's role will include the management and administration of activity related to those consents until operators for

the individual projects are appointed, as well as the decommissioning of the meteorological masts on the site.

PROFESSIONAL BACKGROUND

He comes from within Innogy and prior to joining Forewind was Development Manager for Galloper Windfarm, responsible for the delivery of environmental and consenting activities. Trevor joined Galloper from Triton Knoll Windfarm where he managed the preparation of the consent order application and led the project through the examination, successfully securing consent for up to 1200MW, which in 2014 was the world's largest offshore windfarm consent.

EDUCATIONAL BACKGROUND

He holds an honours degree in Marine and Freshwater Biology from the University of London and joined Innogy

“HE HOLDS AN HONOURS DEGREE IN MARINE AND FRESHWATER BIOLOGY FROM THE UNIVERSITY OF LONDON”

in 2011 after a career in environmental consultancy within a number of sectors, working across the UK and internationally.

Trevor Baker takes over from Tarald Gjerde who has returned to his parent company Statoil to head up its department for wind business development project execution.

Forewind

Ed's Note – The Dogger Bank project was first announced in 2009 and we introduced the venture in greater detail in early 2012. Since then we have further featured the project on another two occasions and will be focusing on this mammoth undertaking again later this year.



FOUR JACKETS FOR NISSUM BREDNING

The Joint Venture Navantia-Windar has been awarded by Siemens Wind Power to supply 3-legged jackets foundations and their corresponding piles for four SWT-7.0-154 offshore wind turbines. These structures are to be installed in a demo offshore windfarm located in the northwest part of Denmark, in a fjord close to the North Sea and close to the Thyborøn port.

PROJECT

Nissum Bredning (NBV) is an offshore wind project shared by Nissum Bredning Vindmøllelaug I/S (55%) and local utility Jysk Energi A/S (45%). The project is supported by the Danish Ministry of Energy and it is regarded as an excellent opportunity to test, in a controlled and small-scale environment, a number of new key technologies in the field of offshore wind.

This project will be executed in parallel to the construction of 42 jackets for East Anglia One at the Navantia Fene facility. Delivery of the last Nissum Bredning jackets is planned by mid 2017.

Navantia



PROVIDING WIND RESOURCE ASSESSMENT FOR BAY OF ST. BRIEUC SITE IN FRANCE

AXYS Technologies Inc (AXYS) announced recently that the FLIDAR WindSentinel buoy has been deployed in Brittany, France as part of the energy assessment for the Bay of Saint-Brieuc commercial offshore wind farm development managed by Ailes Marines. The system is equipped with dual LiDAR sensors to measure the wind resource and expected energy production at the offshore wind farm.

WORKING TOGETHER

“AXYS is delighted to work with Ailes Marines to support the development phase of this offshore wind farm in France.” Commented Terry Tarle, AXYS President & CEO. “This WindSentinel system, equipped with fully redundant LiDAR systems, enables us to meet the projects’ high data availability and reliability requirements and ensure project success.”

INNOVATIVE TECHNOLOGY AND PROVEN TRACK RECORD

“Ailes Marines selected the AXYS WindSentinel based on its innovative technology and proven track record of providing reliable data from offshore systems.” Added Ailes Marines Wind Engineer and Project Manager, Jerome Dumont. “We also consider that the high load capability of the WindSentinel is potentially advantageous in allowing accommodating various device options and redundancies in measurement systems (LiDAR, etc.). Thus it may help adapting to specific requirements of developers so as participate in reducing risk levels on data recovery during the Wind Assessment Campaign.”

COMPREHENSIVE DATA COLLECTION

The WindSentinel system will be deployed for a minimum of 12 months to gather comprehensive wind speed and wind direction data up to heights of 200m, along with metocean data including directional waves, ocean currents, tide, salinity, water temperature, atmospheric pressure and air temperature.

The WindSentinel is a rugged wind resource assessment system that uses LiDAR to accurately measure wind speed and wind direction offshore. With this deployment AXYS continues to grow its position as the world leader in offshore wind assessment, having supplied 18 commercial floating LiDAR systems around the world that have recorded more than 200 months (17 years) of offshore data.

AXYS Technologies Inc.



INTEGRATED PERSONNEL AND VESSEL TRACKING SOFTWARE FOR MERKUR OFFSHORE WINDFARM

SeaPlanner has been selected as the system to support construction of the Merkur Offshore Windfarm located off the coast of Germany.

The contract was awarded by the project's Principal Contractor, GeoSea NV and includes the provision of integrated personnel and vessel tracking software, access control hardware and installation and set-up of the marine co-ordination centre based in Eemshaven in the Netherlands.

LATEST UPGRADED TECHNOLOGY

GeoSea will benefit from some of SeaPlanner's latest upgraded technology which includes enhanced mapping functionality, integrated helicopter tracking and metocean data feeds.

Mick Cooper, Project Manager at SeaRoc Group commented: "We're delighted to have been awarded the contract and are excited to be implementing some of our new functionality on the Merkur project. Over the last year or so we've

been developing a number of partnerships in order to enhance the offering to our clients – we're delighted to be working with Oceanwise on this project where we will be integrating metocean feeds generated by their various data capture devices."

PROJECT DETAIL

Requirements for the project are to deploy, real-time, tracking of vessels and personnel within the development site – this will be provided by SeaPlanner's Operations Manager and Personnel Manager modules, as well as the Induction Manager module for the efficient and simple induction of all personnel.

PORTFOLIO

This contract extends SeaRoc Group's portfolio of work in Germany and Holland with previous projects including Dantysk (Vattenfall), Amrumbank (E.On), Sandbank (Vattenfall), Gemini (Van Oord) and Nordsee One.

“SET-UP OF THE MARINE CO-ORDINATION CENTRE BASED IN EEMSHAVEN IN THE NETHERLANDS”

The Merkur offshore windfarm project is located approximately 45km north of the islands of Borkum, Germany, in the North Sea. It will consist of 66 turbines and once complete will generate approximately 1,750GWh annually, enough clean energy to power around 500,000 homes.

SeaRoc Group



CONTROL ROOM SOFTWARE HITS THE MEDIUM WIND MARKET



Renewables tech venture Visualwind has teamed up with operations and maintenance specialists DC21 and Boston Renewables to launch a bespoke monitoring and control solution for Endurance E-series turbines. The service, known as WindSync for Endurance (WiSE) enables turbine owners and operators to monitor and control their turbines remotely and from site. WiSE is immediately available to customers of DC21 and Boston Renewables and will also be available to the wider market in early 2017.

UNCERTAINTY

Since the bankruptcy of Endurance Wind Power last month, farmers and operators of the UK's 900 Endurance turbines have faced uncertainty about how they will continue to monitor and control their turbines. Until now, monitoring and control of turbines has been

exclusively available through Endurance's Eric platform. But with Endurance in administration, the future of the Eric service is highly uncertain.

INDEPENDENT

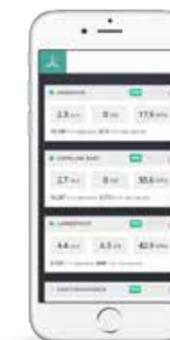
WindSync for Endurance runs independently of existing infrastructure. Users connect via a web browser to the WindSync cloud service which communicates to WindSync hardware installed in the turbine cabinet via a high availability VPN. Control access is also available from the base of the turbine. The platform includes all the key E-series functions such as unlock/locking of turbines, braking analysis, manual mode operation and clearing of alarms, but the user interface also brings big-data analysis tools from the world of big wind, notably, automated downtime analysis, performance and health analysis and advanced power curve analysis.

PRIORITY

Managing Director of Boston Renewables John Hudson said: "Our priority is ensuring that we continue to offer a first-class service for our turbine owners. A robust monitoring and control solution is a key part of this, alongside securing a robust spare part supply chain."

Business Manager Matthew Tidmarsh at DC21 added: "WindSync for Endurance enables us to monitor and control our turbines from anywhere regardless of what happens with Eric. We have been very impressed with the reliability of the VPN and for the first time we can provide in-depth performance analysis for our clients."

PRODUCE HISTORY



Operations Director Peter Longbottom explained how the product came about. "For some time, we have wanted to bring the benefits of WindSync to the medium wind market. When DC21 and Boston Renewables approached us earlier this year it was an

immediate fit and WindSync for Endurance was born. Their experience with Endurance turbines has been vital for shaping the detailed functionality of the service."

Visualwind

ABBNEY ROAD STUDIOS PLAY A DIFFERENT TUNE

Music recorded at Abbey Road Studios will now be powered by the wind and the sun, after the UK's leading music company, Universal Music, switched supply to green energy company Ecotricity.

Ecotricity will supply green electricity to four of Universal Music UK's key London locations, including its Kensington High Street HQ and Abbey Road studios, the oldest purpose built recording studio in the world.

CUTTING EMISSIONS

Dale Vince, founder of Ecotricity, said: "Powering a business with green energy is the biggest single step that any business can take to cut the emissions that cause air pollution and climate change."

"Simply by switching to green energy, Universal Music UK will reduce the environmental impact of their own operations – while also supporting Britain's energy independence and the green economy."

THREE-STAR CERTIFICATION

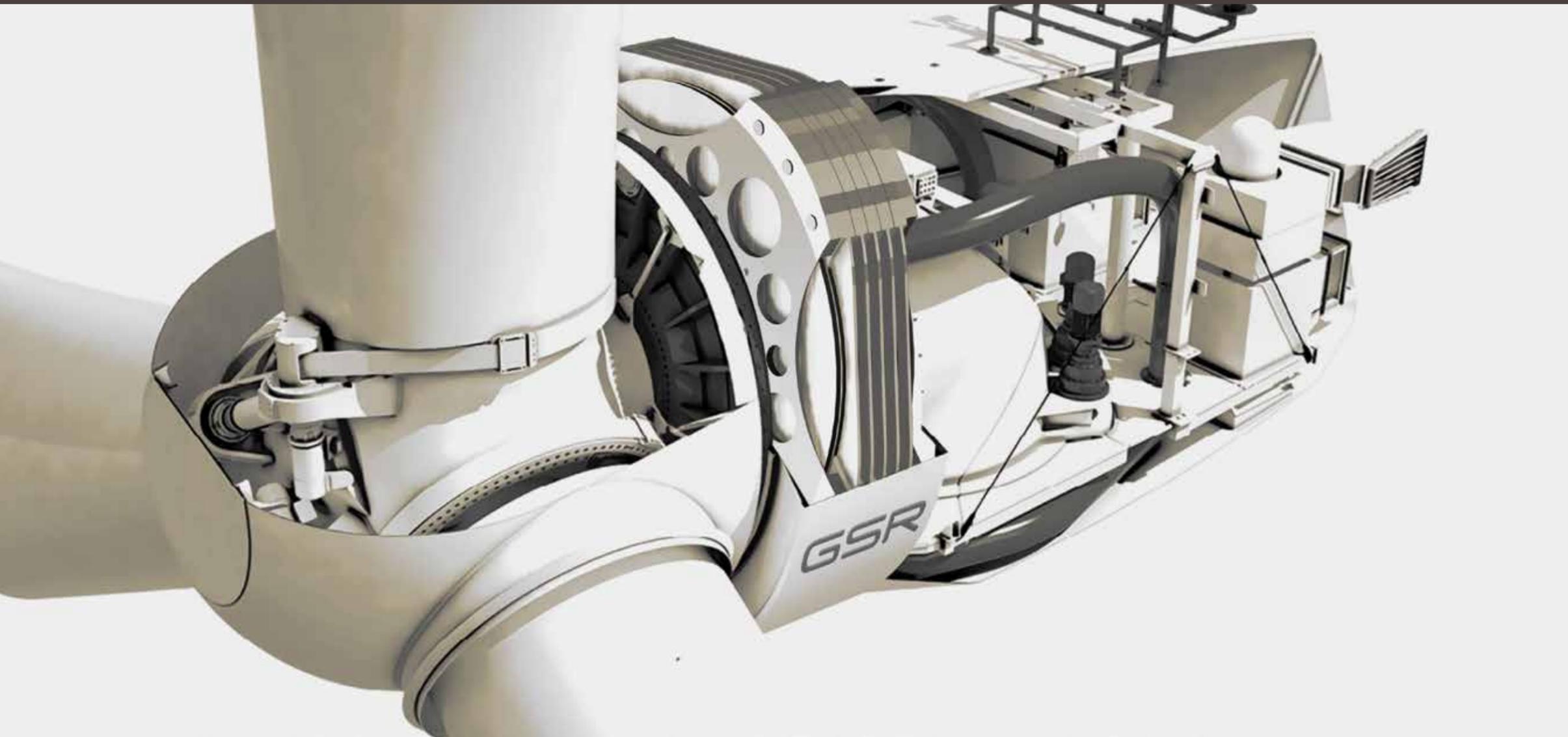
Universal Music UK recently achieved three-star certification under the Industry Green sustainability kitemark, awarded to creative organisations with a systematic, achievable and inspiring approach to environmental sustainability.

COMMITMENT

Universal Music UK COO, David Sharpe, said: "Universal is committed to sustainability, as are many of our artists, and we hope other organisations will follow our lead and take similar steps to power their operations with green energy."

Ecotricity





DEVELOPING PLANS FOR A MULTI-MW DD-PMG

A new ferrite DD-PMG

Essex based GreenSpur Renewables is a new entrant to the direct drive permanent magnet generator (DD-PMG) market. The company has patented a novel axial flux design that uses ferrite to create the magnetic field. It embodies a number of innovations that make it possible to assemble a ferrite only DD-PMG with a similar mass and space envelope to current rare earth offerings. LCOE savings have been estimated at 0.5% by BVG Associates and there is potential to go further as the design is optimised.

DEVELOPMENT STATUS

The design has been proven at prototype level. A 2kW unit was demonstrated at Global Offshore Wind in Manchester in June 2016, where it attracted significant market interest. A Finite Element Analysis (FEA) model was built by the University of Cambridge, which can accurately model mass, output and costs of multi-MW units. A 75kW unit has just been built with grant support from OrbisEnergy, the offshore renewables support hub based in Lowestoft. This unit is schedule for testing at the Offshore Renewable Energy (ORE) Catapult in February 2017.

PLANS FOR MULTI-MW UNITS

Building on the success of its initial units, GreenSpur formed a collaborative development group with the ORE Catapult and Warwick Manufacturing Group (WMG), part of the University of Warwick. The team at WMG were formerly at the University of Cambridge and developed GreenSpur's FEA model.

The collaborative group has been awarded £1.25m of grant funding from InnovateUK, which will be used to move the technology towards a fully optimised 1MW unit.

COMMERCIAL EXPLOITATION

The GreenSpur DD-PMG has been designed specifically for the offshore wind market. The company believes that its generator can help the market reach the point of 'subsidy free'. This will be key to opening up the global market, which could expand to £300bn by 2030.

“LCOE SAVINGS HAVE BEEN ESTIMATED AT 0.5% BY BVG ASSOCIATES AND THERE IS POTENTIAL TO GO FURTHER AS THE DESIGN IS OPTIMISED”

According to Hugh-Peter Kelly, one of the GreenSpur's founding directors: *“The use of ferrite offers two strategic advantages. Cost reduction as ferrite is 1/30th the cost by weight of the rare earth magnets used in existing DD-PMGs and market expansion as ferrite is abundant and unlike rare earth magnets poses no supply constraints to market development.”*

As it progresses towards multi-MW designs, the company is looking to establish relationships with leading suppliers that will guide designs suitable for volume manufacture.

GreenSpur Renewables



DIRECT DRIVE OFFSHORE WIND TURBINES GENERATE 2.5 TWH OF POWER

Siemens' direct drive offshore wind turbines have generated 2.5 terawatt hours (TWh) of electricity since the prototype 6MW direct drive turbine was installed at Høvsøre, Denmark in May 2011.

PERSPECTIVE

To put the amount of electricity produced by its direct drive offshore wind turbines into perspective, Siemens said that 2.5TWh of electricity is enough to meet the annual demand of all of the households in the city of Munich.

Since 2011, Siemens has installed and commissioned roughly 130 6MW direct drive turbines on windfarms across Europe.

CONTINUED GROWTH

The company installed two SWT-7.0-154 prototypes at the Østerild test site in Northwestern Denmark in February 2016.

The SWT-8.0-154 turbine was introduced to the market in July 2016, with the first prototype expected to be installed in early 2017.

EXPECTATIONS

By 2020, Siemens expects 1,000 offshore direct drive turbines will have been installed, increasing the combined energy produced by the platform by more than tenfold to 27TWh.

Siemens

“I'D ADVISE ANY SME WHO BELIEVES IT MIGHT HAVE A PROJECT THAT QUALIFIES FOR A SCORE GRANT TO PICK UP THE PHONE”

SCORE HITS £1½ MILLION MILESTONE

Companies working to make offshore renewables more cost-effective have won a total of £500,000 in grants from the £6million SCORE fund so far.

By mid-January 2017 £240,000 had been awarded to support companies build their businesses in the growing sector. Business advisors had provided 104 hours of business support to applicants and 44 SMEs had engaged in its programme.

COMPANIES WITH DIVERSE APPLICATIONS

SCORE project manager Rob Bush enthused: *"It has been wonderful engaging with so many companies with such diverse applications. It is incredible what inspiring work is being done in SMEs in the sector across the country. The team is excited to see the applications to come because they have been blown away by those so far."*

"I'd advise any SME who believes it might have a project that qualifies for a SCORE grant to pick up the phone and chat with the team. We are here to work with companies to make them successful if we can."

FUNDING DETAIL

SCORE - Supply Chain Innovation for Offshore Renewable Energy - grants are available to start-up and established companies for up to 40% of eligible costs or £50,000, whichever is the lower, with a minimum grant of £2,500. Companies can also access up to 12 hours of subsidised business support from regional enterprise agency Nwes to help grow and develop their business.

Based at the offshore renewables hub in Lowestoft, OrbisEnergy, the programme is delivered by enterprise specialists Nwes, energy industry experts Nautilus Associates and the national Offshore Renewable Energy Catapult centre.

CATAPULT SUPPORT

Successful applicants have access to the research and development facilities of Catapult and technical support from its experts.

The funding is designed to help companies in a wide range of areas, including research and development, collaboration with universities and research bodies, securing patents, acquiring specialist equipment or services and investigating the commercial viability of processes and technologies.

SCORE



CASE STUDY 1 – FERN COMMUNICATIONS

WINDFARM RADIO SYSTEM OFFERS HUGE SAVINGS

A new radio communications system to serve the East of England's growing offshore windfarm construction industry was developed with the help of a £50,000 SCORE grant.



Image – (credit TMS Media)

Fern Communications founders Clive and Jennifer Cushion with Technical Manager James Cleverley and the company's radio repeater equipment.



SSI Technician Medic Peter Lane

WaveCom, a custom-built two-way radio network to provide coverage along the east coast, is being developed by Fern Communications.

SYSTEM FOR GALLOPER

The Lowestoft-based company initially won the contract to provide a system for the Galloper Offshore Windfarm, located between 34km and 55km off Suffolk. Fern has further developed the concept to design a radio system than can be used by multiple operators and sub-contractors across a wider area. Fern Managing Director Jennifer Cushion

said: *“Our radio system will provide the east coast offshore renewables industry with huge efficiency savings. Instead of each company and subcontractor having to set up their own radio network, ours will be readily available and fully operational.*

HELPING COVER R&D COSTS

“But we could not have done it without the SCORE grant, which is helping us cover the research and development costs, months ahead of income coming on stream.”

The company has specialised in radio communication solutions since it was founded in 2002 by Jennifer and Clive Cushion. Some 70pc of its work is in the energy field where it has experience and expertise.

“There are geographical and technical challenges to providing radio coverage off the east coast. The flat coastal landscape provides few high vantage points to suitably locate antenna at the height needed to give the required offshore coverage,” explained Jennifer. *“Challenges relating to the availability of suitable broadband infrastructure also had to be overcome.*

SEAMLESS RADIO COMMUNICATIONS

“Our aim is to provide seamless radio communications coverage across ports and harbours, the offshore windfarm sites, transit routes and back to onshore or offshore marine co-ordination centres. Access to our system will be available to both fixed vessel and hand-portable radios.

TAILORED SYSTEMS FOR OFFSHORE WINDFARMS

“Our wide-area system, utilising multi-site radio repeaters linked by broadband and satellite, will provide operators and sub-contractors with secure, seamless and uninterrupted radio coverage for existing and future windfarms along the east coast, backed up with multi-level redundancy and secure voice and data logs. We will tailor the system to suit the geographical and technical requirements of each of our customers,” Jennifer concluded.

EQUIPMENT RENTED

WaveCom equipment will be rented from Fern Communications as and when required by customers reducing capital expenditure.

CASE STUDY 2 – SSI ENERGY

WINDFARM WORKERS WHO CAN ALSO SAVE LIVES

Paramedics who double as technicians are to be introduced to offshore windfarms to ensure casualties get expert medical help in the first ‘golden hour’.

Experienced life-savers are being trained for operational duties on remote turbines so they can carry out a combined maintenance and medical role with the help of a maximum £50,000 SCORE grant.

FULLY-EQUIPPED TECHNICIAN PARAMEDICS

The pioneering concept by SSI Energy means fully-equipped technician paramedics will be able to tackle medical emergencies such as strokes, heart and asthma attacks and anaphylactic shock, as well as the full range of traumatic emergencies including open fracture and falls from height.

At present the only medical cover is provided by fellow technicians who are required to undergo only the two-day GWO (Global Wind Organisation) first aid course, compared to the four years of paramedics.

EXPERT HELP IN THE ‘GOLDEN HOUR’

This service enables patients and casualties to get expert help in the first ‘golden hour’ which is vital to boosting chances of recovery, even more important now windfarms are being built further offshore.

SSI MEDIC SHOCKED TECHNICIAN BACK TO LIFE

Earlier this year SSI medic technician Peter Lane saved a colleague who was taken ill at a wind turbine training centre in Ireland. The medic spotted the symptoms, realised it was a heart attack, and drove him to a filling station seven miles away to rendezvous with an ambulance. The casualty twice went into cardiac arrest at the garage, but Peter had grabbed a defibrillator from the training centre, shocked him back to life and gave CPR resuscitation until the casualty was sufficiently stabilised to be able to be moved to hospital. The casualty has made a full recovery after having stents fitted to his heart.

TECHNICIAN MEDICS DIFFERENCE BETWEEN LIFE AND DEATH

SSI Managing Director Duncan Higham said the incident was the perfect example of the difference between life and death technician medics could have on offshore, and onshore windfarms.

Duncan explained: *“Windfarms are pretty safe but if someone gets hurt or taken ill it could be a long wait for a helicopter or lifeboat.*

“If the casualty had been up an 80m turbine offshore, with only a first aider on hand, he would have been unlikely to survive.”

SSI Energy



SSI Managing Director Duncan Higham



UNLOCK HIDDEN CASH WITH R&D TAX CREDITS

Many businesses operating in the wind energy industries push technological boundaries on a daily basis. Whether it is prototyping, development or experimentation with materials or physical production processes, there's a wide variety of disciplines involved in advancing wind energy science across all elements of the turbine lifecycle.

Even though renewable energy businesses are spending staggering amounts on developing new technologies, very few are actually claiming the hundreds of thousands of pounds in R&D tax relief that they are entitled to.

In the current economic climate, it's still surprising that more wind energy businesses don't explore all of the tax incentives available to help lighten the burden by either reducing tax payable and or if applicable, securing a tax repayment.

R&D TAX RELIEF

R&D tax relief is one of the government's most generous forms for tax relief. It's available to all kinds of businesses, and has proven very lucrative in the past for companies in the process & manufacturing sector. It's worth investigating too: for every £100 of qualifying R&D expenditure, relief is available at £26.00 for profit-making SMEs and £33.35 for loss-making SMEs.

While for large companies for every £100 of qualifying R&D expenditure, relief is available at £8.80.

DOES YOUR BUSINESS QUALIFY?

If your business spends money in paying qualified staff to attempt to solve what at first appears to be an un-solvable problem and as a result, you are improving a product/service, you could indeed be eligible for tax relief.

WHAT QUALIFIES IN WIND ENERGY PROJECTS?

Here are just a few examples of what can be claimed for, taken from the top performing renewable energy sectors as measured by how much they recovered in R&D tax credits from the government last year. The list is by no means exhaustive, but it does give you an idea of the types of work in your sector that could well be eligible for R&D tax credits.

- Meeting higher efficiency targets (the amount of power wind turbines can safely produce at a particular wind speed) and superior reliability of electricity generation
- Improving durability and robustness through minimising or eliminating premature component failure (caused by the high number of load cycles and operating conditions) and minimising wear associated with loads and vibrations. This applies to the gearbox, the drive train and bearings, the hydraulic system, the mechanical braking system, the electronic controls, etc
- Advancing the design of the rotor blades for improved reliability, structural resistance, aerodynamic properties and noise-related performance
- Reducing environmental issues affecting local wildlife

If these conditions apply to your project, congratulations! You can claim R&D tax relief on its day-to-day costs and expenditure, including things like staff, subcontractors, materials, software and utilities.

THINGS TO WATCH OUT FOR WHEN MAKING A CLAIM

One of the problems involving claims for R&D tax relief is separating the routine parts of a project from the non-routine, especially when dealing with large, high-value, complex 'first-in-class' items.

HMRC recognises that 'first in-class' items can entail a significant level of innovation and that the production of such an item can involve one or two R&D projects. However, HMRC doesn't expect the entire build cost of the item to qualify for R&D tax relief.

It's very important that companies identify and assess which parts of the 'first-in-class' items contribute towards eligible expenditure. That's why it's always wise to seek professional advice before undertaking a claim.

Involving specialist advisers, such as Jumpstart, also helps you to submit your claim in the most efficient way possible, since you'll benefit from the streamlined processes and years of experience they've built up submitting thousands of R&D tax credit claims successfully.

With support from the right specialist advisers, you'll be able to...

- Demonstrate which of your activities qualify under the scheme
- Open up a new revenue stream to fund further R&D projects
- Learn how to make the best use of the scheme going forward

JUMPSTART CAN HELP

Jumpstart is a leading R&D tax relief specialist, guiding companies through the complexities of submitting claims to HMRC.

The company's large team of technical analysts have specific scientific and technical backgrounds and years of industrial experience which have resulted in an extremely high success rate in securing R&D tax relief for our clients.

Jumpstart are not just talking about a few pounds and pence. Since inception 9 years ago, they have identified and documented over £417 million of eligible spend and realised £84 million benefit for their clients. All on a no-win, no-fee basis. And right now, they're submitting an average of 500 claims per year to HMRC.

R&D TAX RELIEF SCHEME – LOOK INTO IT... DON'T IGNORE IT!

If there's one thing that the wind energy sector as a whole should know about the R&D tax relief scheme, it's this: look into it. Don't ignore it, thinking it's not for you – you may end up being pleasantly surprised.

Jumpstart

“R&D TAX RELIEF IS ONE OF THE GOVERNMENT'S MOST GENEROUS FORMS FOR TAX RELIEF”





ACCURATELY FORECASTING O&M COSTS

O&M costs for windfarms are difficult to predict and can vary significantly between windfarms and turbine technologies. O&M cost is by far the least predictable factor in a windfarm's operating expenditure (OPEX) and investors are demanding more accurate predictions.

WHAT DRIVES UNCERTAINTY IN O&M COST?

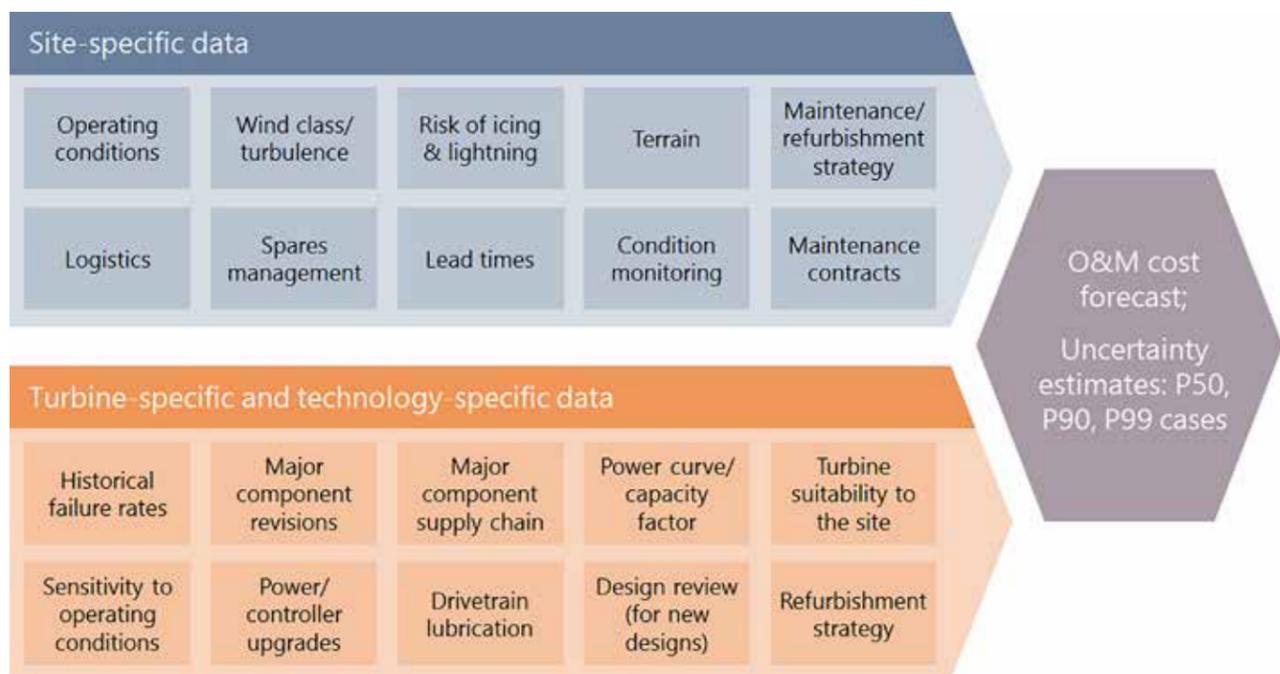
Windfarm O&M cost is primarily made up of scheduled (planned) and unscheduled (unplanned) maintenance. The main source of uncertainty is unscheduled maintenance and the biggest driver behind this is what we call 'technology risk'.

This can stem from a new turbine type that is relatively unproven, an existing turbine type running a new gearbox variant, blades from a new supplier or a new control algorithm that has been rolled out by the OEM. The accuracy of an O&M cost forecast is critical to meeting the long term financial goals for a project.

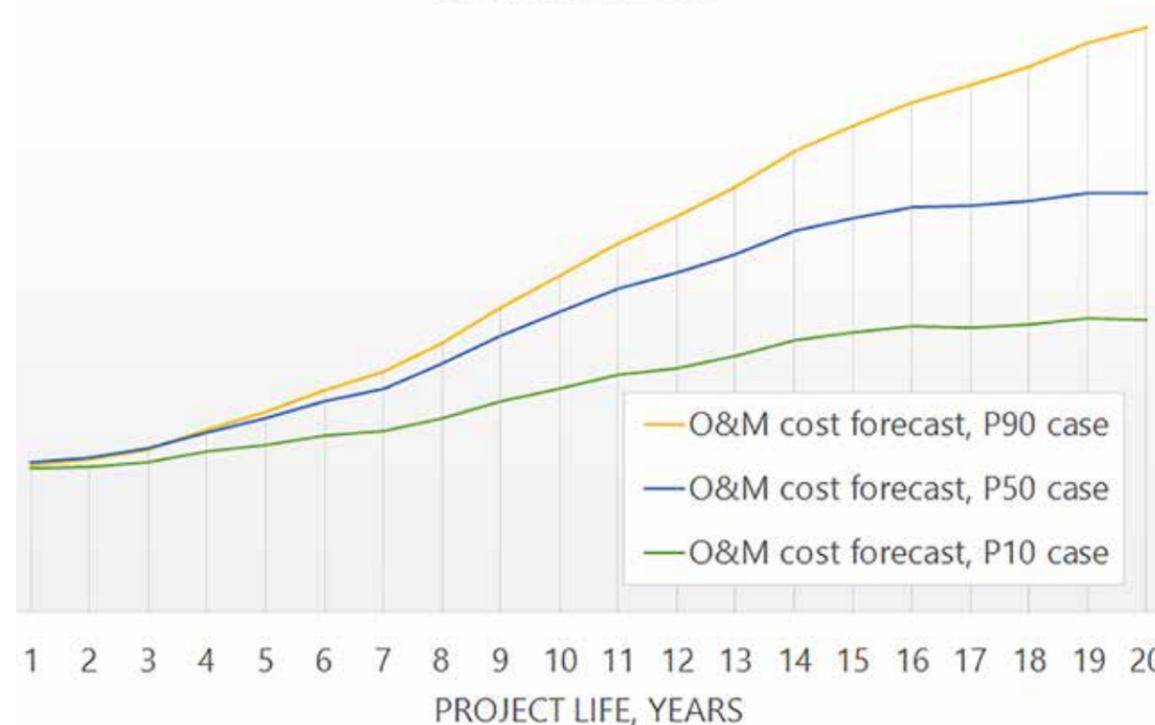
SOME SOLUTIONS FOR AVOIDING COMMON PITFALLS INCLUDE...

- **Utilise historical failure data** – by keeping turbine information and reliability data in a large database, failure statistics can be quickly constructed for any turbine type, right down to subcomponent level. Romax InSight uses a vast historical database compiled from many years of past projects.
- **The forecast must be site-specific** – no two windfarms are the same. Factors such as turbulence, terrain, proximity to ridges or forests, the risk of icing or lightning and the suitability of the turbine to the site all play a part in O&M cost predictions.

- **Logistics matter** – if a site is located a long way from other windfarms, the lead time for large cranes can be long and the costs for mobilising the crane can be very high.
- **There is no substitute for experience** – talk to the site managers; read operational reports; interview technicians. People on site almost always know which turbines are problematic, even if they might not have the relevant expertise to diagnose the problem.
- **Evaluate your supply chain** – some turbine OEMs have gone out of business, been bought up or reduced their support for older models.
- **Predictive maintenance matters** – analysis has shown that moving to predictive or planned maintenance rather than a reactive strategy can save up to 40% in O&M costs. In practice, this can be delivered through better use of condition monitoring, particularly for older/smaller machines with no CMS, predictive tools such as component life models, along with better management of data relating to reliability, inspection and servicing using software such as Romax InSight's Fleet Monitor and Field Pro.



O&M cost forecast



WHAT NEXT?

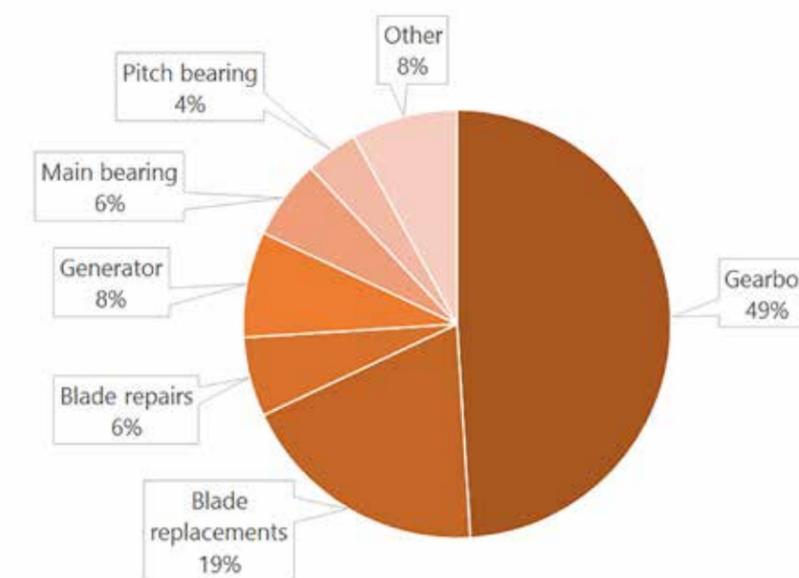
With a comprehensive O&M cost forecast in place, an owner or investor can use it as a powerful tool for planning future strategy.

FOR EXAMPLE, LOOKING AT MORE DETAIL AT THE GEARBOX, COMPLEX QUESTIONS CAN BE ANSWERED...

- What is the cost saving if I run a programme to exchange my failing gearboxes with upgraded versions?
- What if I suffer a serial defect? (The nightmare scenario for any windfarm owner!)
- What if I switch to an alternative gearbox supplier?
- Should I pre-emptively swap out aging gearboxes with one crane operation or call out a crane reactively for each gearbox failure?
- How will the predicted gearbox failures affect availability?
- If I install CMS on the drivetrain, what is the potential cost saving vs. cost of hardware and monitoring?

The current state of the art for O&M cost and OPEX forecasting varies greatly and most owners/investors are not equipped to answer questions like these. Owners

Example breakdown of unscheduled O&M costs



need to ensure that availability predictions are based on accurate failure data from the O&M cost forecast then, during the operational phase, use the forecast as a 'live' tool for planning O&M strategy and driving cost reductions.

Dr John Coultate
Head of Engineering Development
Romax InSight

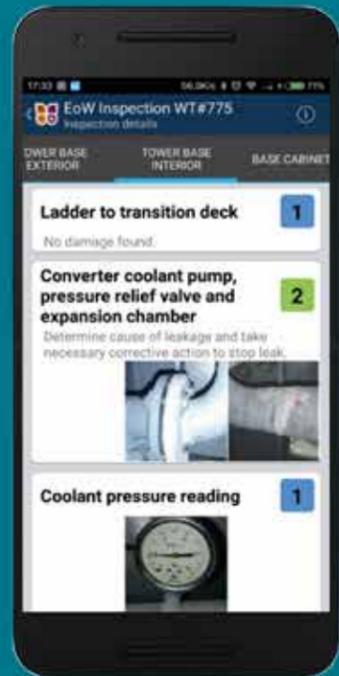




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TREASURY SOFTENS THE DEBT TAX BLOW TO INFRASTRUCTURE

The UK government has confirmed, in documents published recently, that a wide range of infrastructure assets will be partly excluded from new rules limiting tax relief on interest payments that come into effect on 1 April 2017.



Broadly, the new rules will limit the tax relief that groups can claim for their net UK interest expense related to shareholder and bank debt to 30% of their annual EBITDA. The Treasury estimates that the reform, which is linked to the OECD's Base Erosion and Profit Shifting (BEPS) initiative, will increase tax revenues by GBP 1bn each year.

However, it is expected that many companies across the renewables and utility sectors will still be able to deduct most of their third party debt interest from their tax liabilities under a proposed exemption for 'public benefit infrastructure' assets.

CONSULTATION PROCESS

There was significant feedback during the consultation process that the scope of the proposed exemption was too narrow and this led the government to announce a broadening of the definition of the exemption. However, draft legislation defining precisely which companies will be able to opt for the exemption is still to be published at the time of writing (expected end of January 2017).

What is clear from government comments however, is that the exemption will only relate to third party debt interest. The majority of respondents to the consultation felt that not including shareholder or related party debt interest would impact returns on some existing projects by between 5% and 10% which could damage investor confidence, with a potential lower investment or higher risk premiums for UK projects in the future.

ADDRESSING CONCERNS

In an attempt to address these concerns for existing projects where the additional tax expense was not factored into original funding models, the government has announced that there is the possibility of 'grandfathering' shareholder or related party loans agreed prior to the publication of the May 2016 consultation document.

This is welcome news for many existing projects but there is still a concern that the exclusion of this debt from the exemption will create a funding source bias, distorting competition between third party and related party debt providers. Furthermore, it has been announced that 'grandfathering' will only be available where 80% of the company's expected qualifying income has been materially fixed for at least 10 years by long-term contracts with, or procured by, public bodies or their wholly owned subsidiaries. It is not clear whether 'grandfathering' can apply to renewables projects – would a ROC Contract, Contract for Differences, FIT contract, generation license etc count as a long term contract for these purposes? We await the further details to clarify the position.

SIGNIFICANT AND COMPLICATED CHANGE

All in all, the rules represent a very significant and complicated change in the way tax relief is obtained for debt funding and need to be carefully considered. Even groups whose net interest expense falls below the de minimis level (the first £2m of interest each year can benefit from tax relief in full regardless of its nature) will face more onerous tax compliance requirements.

We strongly recommend that groups in the renewables and similar sectors assess the potential applicability of the exemption as soon as further details are published. It is also possible that there will be a further short consultation phase and we would encourage groups to actively participate by providing feedback if this is the case.

PwC



DIVERSIFICATION INTO OFFSHORE WIND

Fletcher Offshore is well known as a platform supply vessel operator, having worked in the North Sea for over 20 years.

With experience carrying out ROV operations and boulder clearance for the renewables industry, Keith Fletcher, Managing Director, saw an opportunity for expansion.

The diversification process sees Colin Millum, (who designed and manufactured leading ROVs and propulsion systems during his reign at Sub-Atlantic), brought in to head up the technical team, amongst other new recruits.

ONE-STOP-SHOP SERVICE

The company provides a one-stop-shop service for sea-bed preparation including survey and boulder clearance, UXO identification and de-risk and cable intervention. Working for a major power company on a wind turbine project in the English Channel recently, they successfully cleared 9,000 boulders from the cable path in a very short time frame.

NEW BUSINESS MODEL

Fletcher have a new business model which will make dramatic savings for the industry.

Savings will be made by...

- Using their own low-cost dynamically positioned platform supply vessels rather than expensive diver/ROV vessels

- The company has created its own ROV – The Zodiac TT, which does a number of tasks including surveying the sea bed, clearing it and then protecting the cables which have been laid. This method is also environmentally friendly compared to other dredging methods

- One company doing all of these tasks means there's no middle man, and they are ready to mobilise quickly

NOVEL METHOD

Keith Fletcher, commented: *"The novel method of combining our own dynamically positioned supply vessel with our own technology for sea bed preparation offers the industry much needed efficiencies and genuine cost reduction."*

Mike Porter, Operations Director, added: *"Fletcher will be employing people traditionally working in oil & gas, giving them an opportunity to transfer to renewables. We are building the UK's ability to service windfarm contracts across offshore Europe. Renewables is an exciting new part of Aberdeen and the UK's future as an Energy hub."*

Fletcher Offshore



UNCHARTED WATERS – PROTECTING ASSETS POST-WARRANTY

With the UK offshore wind industry maturing, the challenges presented by Windfarm operation & maintenance (O&M) are rising. The UK offshore wind O&M services market is expected to grow to almost £2 billion by 2025 and by 2020 there will be up to 4,000 wind turbines and 50 offshore substations requiring O&M. This brings technical, commercial and safety risks, particularly as windfarms come out of standard warranty periods.

The industry's priorities for offshore wind O&M development should include improvements in asset management strategies through addressing these barriers.

IN THE CONTRACT

The range of contractual and technical arrangements for wind sector O&M is wide-ranging and complex. A key challenge for many owners, looking to operate and maintain plant post warranty, is to know what to look for in a construction-biased contract. The focus should be on solutions that are safe but also cost effective. Unfortunately, the complexity of contractual arrangements can work against this, creating potential barriers to plant integrity, safety and reliability.

When a site is under construction, little focus can be given to the scope of work for contracted parties during O&M. So, the primary loser here is often the asset

owner. ARMSA Consulting ("ARMSA"), a multi-disciplinary professional services firm, has experienced several on and offshore cases where the O&M service provider has taken a limited view of its role so on the health and safety side, there can be significant ramifications.

STRUCTURED PLANNING

When ARMSA audit O&M performance the first inquiry is generally for sight of the inventory of critical plant items. This enables plant identification, assessment of risks and development of a maintenance strategy. While assets are still under warranty, project owners may not have access to all plant related information, such as design standards. *"The OEM tends to hold on to design of equipment and information relating to that – it's their intellectual property – and this has not been resolved in the market at the moment,"* commented Rakesh Maharaj, ARMSA's Director. *"But, at the very least, they should provide sufficient information on plant hazards and associated safety related systems and safety critical devices because those hazards need to be managed."*

BUILDING COMPETENCE

One critical gap is that non-OEM service providers sometimes lack technical competence, so they fail to ask the right questions. This can lead to the quality of

data that is captured being insufficient to develop and improve ongoing operations and maintenance strategies.

CREDIBLE PRINCIPLES

If asset owners fail to take basic steps early on, it can lead to safety and reliability problems in the future as well as spiralling costs. To meet operational challenges all parties involved need to look more closely at how they plan and manage O&M responsibilities. In transitioning into post-warranty period, windfarm owners need to be confident their O&M provider can deliver robust asset management strategies. As in the absence of a more structured approach the safety and reliability of the assets could be at risk.

ASSET MANAGEMENT CERTIFICATE PROGRAMME

To help industry address these challenges, ARMSA invested in the development of an Asset Management Certificate programme designed specifically for the Wind Energy sector. The programme enables delegates to take specific steps in improving their asset management strategies.

Rakesh Maharaj
Director
ARMSA Consulting

MAINTAINING RELIABILITY AND COST EFFECTIVENESS

In today's industrial world, machines need to run more efficiently and operate more smoothly with no unforeseen breakdown outages.

Owners need to have high percentage uptime and reliability maintained at a premium. With ever diminishing Cap Ex budgets this high performance demand placed on the operating machine sees a basic requirement for a low cost yet very intelligent monitoring and decision making system that monitors and then evaluates the machine's vital operational statistics.

DATA PARAMETERS

A few parameters may be...

- Machine oil level, quality, moisture content and viscosity changes
- Wear metal particles in the oil showing mechanical wear in gears and bearings
- Temperature of a bearing through deterioration
- Vibration levels abnormal

All the above example data parameters are measured in real time and from these and over a period, the system is able to perform predictive calculations, allowing the user to make informed decisions to keep the machine operating just so and have the required replacement parts ready when needed.

ACCURATE AND EASY FORMAT

The system needs to ensure that the critical operating data is fed back to the operator in an accurate yet easy to use format to allow optimised maintenance operations and provide its own overall performance assessment. The cost of a part repair or replacement up tower would be clearly preferred to the gearbox being removed and repaired off site or indeed replaced. M-HAS monitoring system when installed and optimised will give the operator huge reduction in repair and service costs and less downtime and loss of generation.

MACHINE HEALTH ASSESSMENT SYSTEM

This Machine Health Assessment System would see the system processor cleverly assess the machine's own permissible



operating baseline and see where parameters deviate from this. It would therein assess its own condition or health statement and determine a possible time to failure or remaining useful life. From data acquired, software 'rules' are performed on variables (perhaps oil pressures, temperatures etc.) calculated that when combined over a period of time is powerful in their 'data fused' statement.

The system provides an output display of accurate runtime predictive data and therein allows informed human financial and business O&M decisions to be made to...

- Minimise unforeseen operational downtime
- Plan for outage requirements
- Budget or plan for the diagnosed issue and expense

Glasgow based components and consumables supplier, Renewable Parts Ltd, believe in supplying more than just parts. By providing a total supply solution, Renewable Parts can help to ensure the highest levels of turbine availability at low and in some cases, completely predictable cost.

TURNER M-HAS
MACHINE HEALTH ASSESSMENT SYSTEM



AVOIDING DISRUPTION AND THEREFORE REDUCING COSTS

Renewable Parts Limited believes that procuring an optimised condition monitoring system is critical to operators' ability to reduce cost and avoid disruption. However finding the right balance of capability and cost can be challenging.

James Barry, CEO at Renewable Parts Ltd, commented: *"The Turner M-HAS condition monitoring equipment strikes the right balance between 'functionality' and 'cost' for operators that do not wish to pay for capability they will never use. Their six month pilot scheme offered free of charge by Turners is a great market development. It's an innovative and cost effective approach for companies who wish to limit upfront capital expenditure and pay as they go."*

Turner Wind



ACHIEVING PRECISION PERFORMANCE MONITORING

Solving a problem for the wind industry – making power curves more user friendly

Determining the true performance of each windfarm turbine is extremely difficult if not impossible. Performance measurements in windfarms are often limited to single turbines (WTGs) with free wind sectors, defined flat areas and using dedicated met masts. Although LIDARs have the potential to replace met masts they are similarly constrained.

Hence the only wind measurement source available on each WTG is the nacelle anemometry; providing neither meaningful nor trustworthy input for a performance measurement. Here the patented spinner anemometer technology iSpin can change the game and provide more transparency and insights in WTG performance.

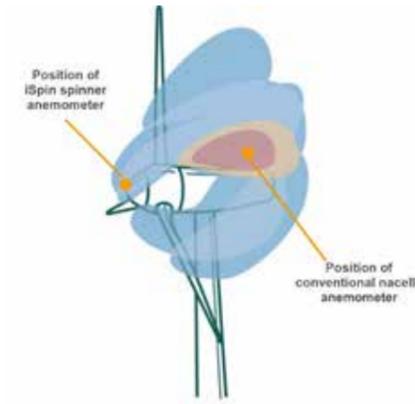


Figure 1: Wind measurement systems

FOR EXAMPLE – ISPIN...

- Allows usage of 360° inflow data even in wake of other WTGs or behind obstacles
- Measurements do not rely on transfer functions taken on an unrepresentative prototype site
- Allows valid comparisons between WTGs of the same model across different windfarms in differing terrains

This enables an holistic overview of the performance of individual WTGs, the windfarm and a fleet.

“GENERATING IMPROVED RETURNS FOR THE WHOLE WIND INDUSTRY”

THE NEED TO KNOW

Customers and manufacturers (OEMs) need to know how efficiently a WTG converts energy from given wind conditions. This power performance characteristic expressed as electrical power (output) versus horizontal wind speed (input) is called a power curve. Verifying that a new WTG operates according to the OEMs' power curve specification is surprisingly difficult using conventional technology.

Often either no verification is conducted or measurements are performed only at dedicated turbines, nearest a reference met mast. The results from the limited verification process then are assumed representative not only for the individual WTG, but for all WTGs of the evaluated windfarm.

Monitoring that WTGs continue to perform within specification is again surprisingly difficult using conventional technology because of the imprecision of the wind speed measurement system.

A SOLUTION ... THE ISPIN GUARDIAN APPROACH

Following IEC 61400-12 standards for performance measurement, using an accredited 3rd party consultant and processes shown below, a WTG model performance characteristic including a tolerance band can be generated which, after some plausibility checks, can be used for fleet wise evaluation of the WTG performance.

Creating such performance transparency and reducing measurement uncertainties in this way could influence OEM performance warranties and has the potential to allow financiers and insurers to reduce risk premiums in their business calculations; generating improved returns for the whole wind industry....all from a simple improvement in measuring the wind!

Quantity	Conventional nacelle anemometry	iSpin
Wind speed	Transfer Function ("TF") sensitive to different inflow conditions	TF shows robustness even in wake and across different terrain
Turbulence intensity	No possibility to measure	Key capability of iSpin
Flow inclination	No possibility to measure	Key capability of iSpin
Yaw misalignment	Indirect measurement, very sensitive to measurement position	Key capability of iSpin

Table 1: Measurement capability of nacelle anemometer and spinner anemometer iSpinDue to its unique position and measurement principle in front of the rotor it is possible to overcome many of the limitations of conventional nacelle anemometry.

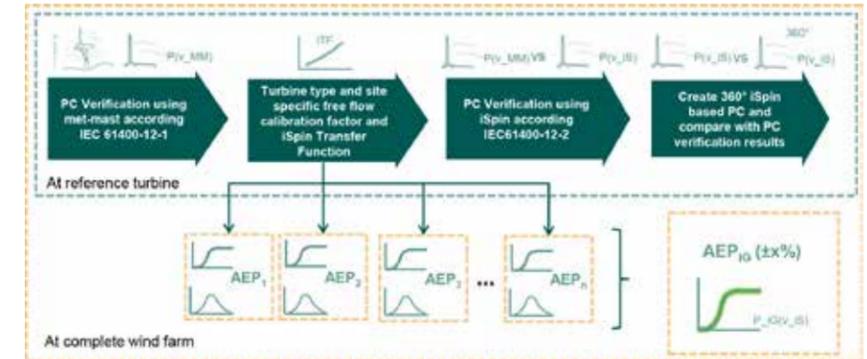


Figure 2: Process flow for iSpin Guardian approach

Warranties	Offered today	Technically possible
Scope	Single power curve	Single power curve Windfarm power curve Minimum variance among WTGs Maximum power curve degradation
Time	Campaign, e.g. after commissioning	WTG life time
Verification	1 or 2 WTGs with met mast (sample) Only WTGs with free wind sector Only simple or semi-complex terrain	All WTGs in windfarm

Table 2: Performance transparency and effect on warranties

ISPIN GUARDIAN...

- Comparable precision power curves on all turbines in your windfarm at any time during its life; from commissioning, warranted verification and throughout operation
- Low-cost performance management and optimisation of your windfarm
- Quickly detect changes in the performance of your turbines compared to...
- Warranted Power Curves (IEC compliance)
- Average performance for the turbine type (in your windfarm or benchmarked against other windfarms)
- Others in the windfarm (underperformers)
- Time (power curve degradation or improvement)
- Reliably detect underperformers—don't waste resources on false positives (from inaccurate wind measurements)
- Eliminate yaw misalignment and other damaging wind conditions

Nigel Parlor
UK, Ireland & Benelux Business Manager
ROMO Wind



SCORE Grants for innovation in offshore renewable energy

£6million grant programme, part funded by the European Regional Development Fund.

For development of innovative technologies and solutions in offshore renewable energy.

Grants available from **£2,500** to **£50,000** for up to 40% of eligible costs.

Companies must be based in England, with the 'economic benefits' being primarily in Cambridgeshire, Essex, Norfolk and Suffolk.

You should have fewer than **250 employees**. Less than **€50million** in assets.



WE SCORE

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ENSURING ADEQUATE PROTECTION FOR OFFSHORE CABLES

Cable failure is regarded as one of the principal operation and maintenance issues for operational offshore windfarms.

While the importance of ensuring the stability of wind turbine foundations through the laboratory-testing of new and existing designs is becoming well-recognised, the stability of cables for in-field transmission and power export is often a secondary consideration.

However, providing adequate protection for offshore cables, whether through sufficient burial or physical protection is complicated further by other considerations such as the thermal properties of the soil and the impact on cable overheating.

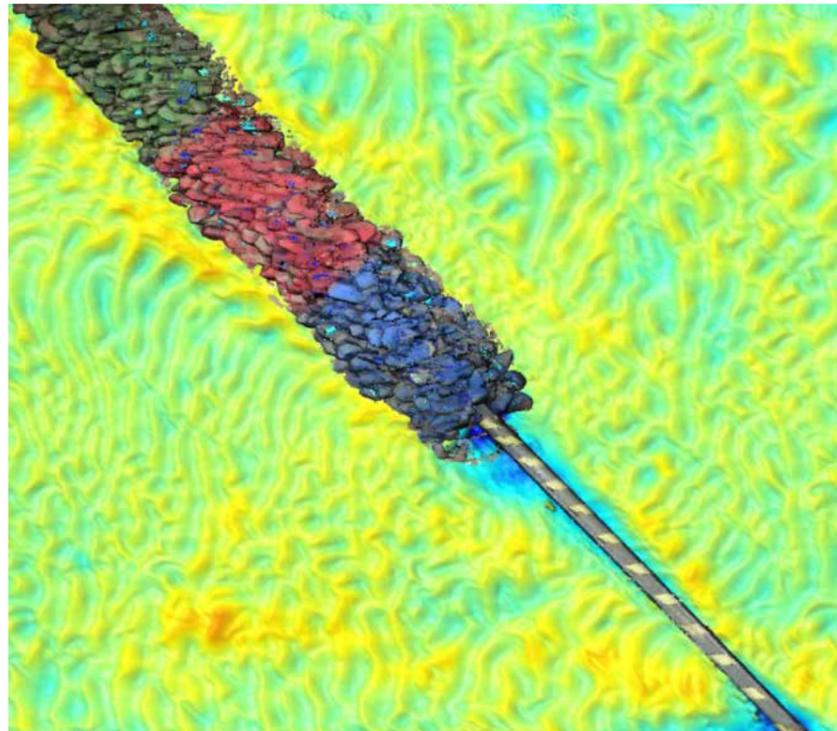
PHYSICAL PROTECTION

If physical protection is required, ensuring its performance is able to meet the various bed level changes that may be encountered over a cable's lifetime requires a risk-based approach that considers the environmental drivers that will impact on the stability (e.g. soil properties, general bathymetric change, local scour, hydrodynamic forcing and cable integrity).

Whilst it is preferable to develop designs that meet the stability requirements for the installed cables at the construction phase, where cabling stability issues have arisen subsequently, for example at offshore substations after a period of operation, it is important to provide an effective solution which can be retrofitted to solve the specific scour problems, and to provide remediation measures that future-proof against further erosion.

FAST FLOW FACILITY

HR Wallingford is internationally recognised as an authority on seabed processes, with an active programme of research in the prediction and analysis of scour around marine structures, with world class modelling facilities, including the Fast Flow Facility. This, together



with advanced computational fluid dynamics models, provides a controlled environment in which to evaluate and select the best-performing scour protection systems for a specific site and the conditions in which it operates.

PROVEN EXPERTISE

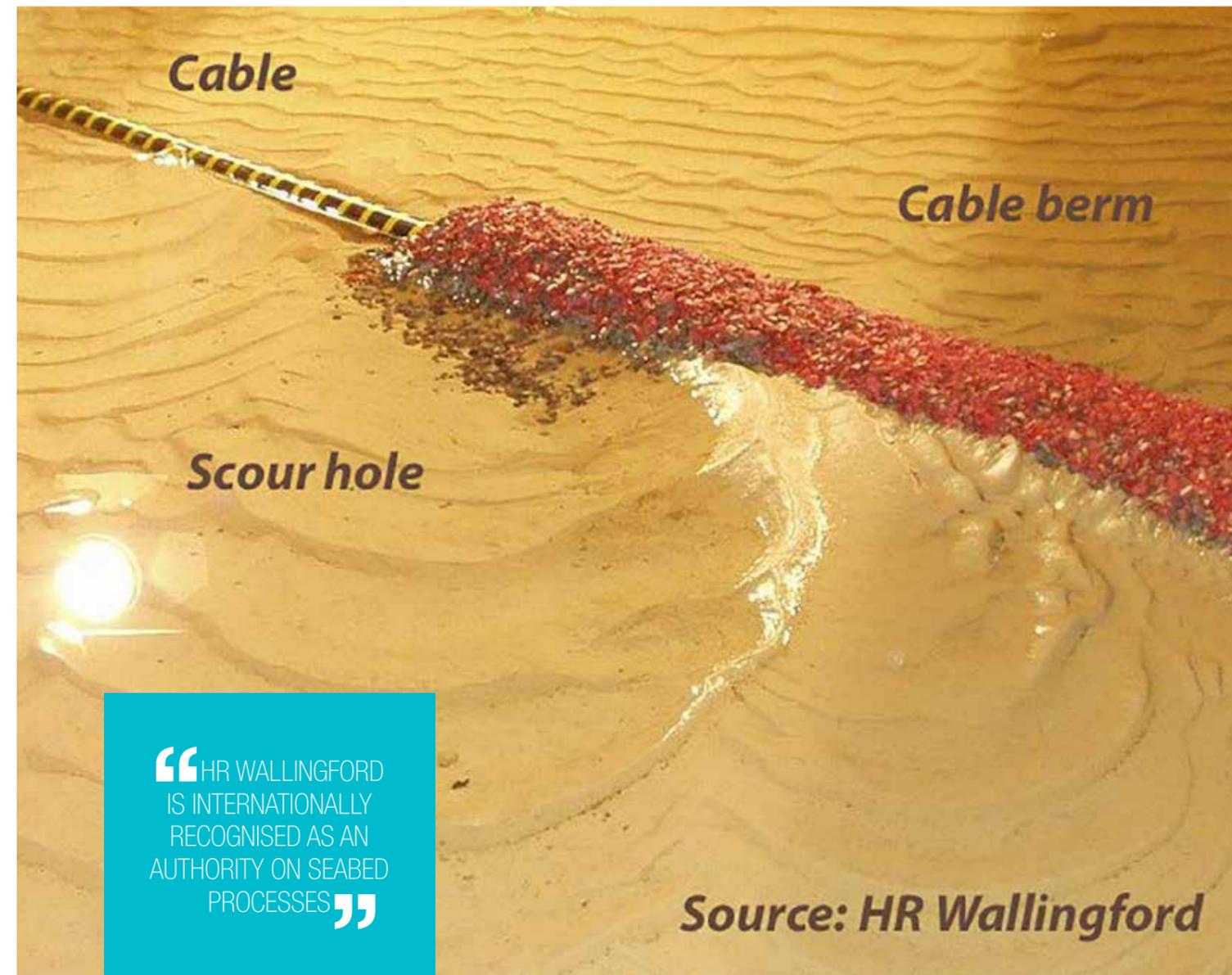
HR Wallingford has proven expertise in developing solutions to mitigate scour problems for foundations and cables. This includes working out the best way to deal with cables at substations, wind turbine foundations, other subsea infrastructure and in engineering studies which help to avoid scour problems around cabling before they arise.

As an example of some of the issues experienced at offshore wind turbine foundations, local scour at the foundation

structures can lead to the exposure of previously buried cables, increasing the risk of cable fatigue through hydrodynamic loading and possible vortex-induced vibrations (VIV), and ultimate failure. Although the immediate risk to the cable may be relatively low, the longer term risk with respect to cable integrity can be high, particularly if the exposed cable span becomes large.

SCOUR PROTECTION PLACEMENT

Even in cases where cables have been protected through the placement of scour protection, large-scale seabed changes and local scouring can lead to the undermining and collapse of the protection measures and in the case of mattresses, can result in 'washing lining', adding significantly to the risk of cable failure.



“HR WALLINGFORD IS INTERNATIONALLY RECOGNISED AS AN AUTHORITY ON SEABED PROCESSES”

Source: HR Wallingford

Further, in the case of rock armour-based solutions, the implementation of standard designs can result in cable damage or inadvertently create increased disturbance to the flow and significant secondary scouring, leading to the exposure of cables and failure of the rock protection.

OTHER RISK AREAS

Other areas of potential high risk occur at locations where cables are crossing other previously installed seabed infrastructure, such as other submarine cables. Whilst poor design of protection measures for cable-crossing locations can result in some of the issues previously mentioned, careful consideration during the route selection stage can potentially avoid some of these problems by choosing,

for example, to cross at a point where the cable can be aligned along the flow direction, rather than perpendicular to it. As more seabed located infrastructure is installed, the requirement to manage potential risks will increase.

JOINED-UP APPROACH

Richard Whitehouse, Chief Technical Director, HR Wallingford, says: *“It is important to have a joined-up approach to the design of both foundation and cable systems, rather than dealing with these as two separate packages. This ensures that appropriate remedial solutions are designed where problems have occurred, and ensures the correct evaluation of scour risk for new developments is made, to pre-empt possible problems before they arise.”*

MARINE SCOUR COURSE

The company has developed a new two-day Marine Scour Course which introduces analysis procedures for assessing risk at marine structures, as well as the appropriate use of scour countermeasures, through a combination of theory, practical sessions and classroom discussions. Two of the sessions will focus on pipelines and cables specifically.

HR Wallingford Ltd



SCAN/CLICK
MORE INFO



SCAN/CLICK
TRAINING

OPTIMISING INTER-ARRAY CABLE PROTECTION

In the dynamic and often harsh offshore environment, windfarm developers need certainty that their inter-array cables can withstand the elements to safely transmit power to shore.

These cables typically have a layer of steel armour to protect their internal components, but sometimes additional protection is needed to safeguard against failure in unforgiving environments. Especially as environmental loading is much stronger in shallower waters, where windfarms are typically built.

SOLUTION CURRENTS & HURRICANES!

For example, the weather is particularly harsh in the North Sea. In Australia, developers have to battle strong 'Solution Currents' and the fledging offshore sector in the United States will need to ensure cables are strong enough to withstand hurricanes!

So, how can developers protect cables cost-effectively to ensure that the captured energy is safely transmitted to shore?

THERE ARE THREE MAIN PROTECTION METHODS DEVELOPERS CAN EMPLOY...

1. Bend stiffeners: Manage the stiffness transition of a cable from the monopile. Bend stiffeners do this by adding local stiffness to limit the bending stresses and curvature. Ideal for dynamic installations, bend stiffeners prevent structural damage from over bending.
2. Bend restrictors: Used to protect cables from over bending and buckling during their installation or operation phase. Bend restrictors reduce point loading at the termination to an acceptable level.
3. Bespoke cable protection systems: Unique cable protection systems built with the individual windfarm in mind. Bespoke cable protection systems can comprise bend stiffeners and restrictors of polymer and metallic elements, to shield the cable from abrasion and impact loading.



FEED ANALYSIS

Developers can optimise their cable protection methodology long before installation through front end engineering and design (FEED) analysis. Technical experts like JDR can review the specified design and installation plan for the site to determine a cost-effective and risk-appropriate solution. The benefits of up front analysis, including dynamic analysis, will increase as windfarms move to deeper water, through improved configuration of cable protection solutions.

As the sector advances, developers need certainty that the power they produce is safely and reliably transmitted to shore. With a range of options available, it's important to understand the benefits and risks of each to make an informed decision. Ultimately, the choice of cable protection is developer-driven. However, careful consideration of the site-specific offshore conditions can ensure optimal cable systems.

JDR Cables



£1.5BILLION NORTH SEA WINDFARM PROJECT

Roxtec has secured a major contract to deliver its innovative safety seal solutions to an ambitious £1.5billion offshore windfarm project in the North Sea.

UK Managing Director Graham O'Hare said the firm will deliver cable transit systems which are a key safety component to safeguard workers, structures and equipment on a substation platform being created as part of the Dudgeon Offshore Windfarm.

LOCATION

The deal will see a wide range of sealing solutions used on the platform, which will sit 20 miles offshore near the seaside town of Cromer in North Norfolk.

The cable sealing systems will meet the long-term lifecycle of the 402MW windfarm whose turbines will provide power to 410,000 UK homes and which is set to be commissioned during 2017.

INDUSTRY LEADER

Graham commented: "We have been chosen for this ambitious renewable energy project because we are industry leaders in sealing solutions for the renewables sector. We have been involved in cable sealing projects across more than 40 offshore windfarms in Europe.

"The Dudgeon windfarm project will see the delivery of customised bulkhead and deck seals. Roxtec's expert team has also been actively involved in the design of the platform seals, harnessing more than 15 years' experience in offshore industries.

FLEXIBILITY

"Our seals are designed to be flexible with easy maintenance access and spare capacity for upgrades. They are both easy to install and inspect. This proved another positive factor when it came to winning this contract. Our team is further providing training as part of the deal." Graham added.

Roxtec's sealing solutions are used for different applications in wind projects, from control cabinets to generators and converters. They offer protection against fire, gas, water pressure and corrosion and provide cable retention.



SAFETY SOLUTIONS

"Specific safety solutions for the Dudgeon windfarm project include delivering A0/A60 bespoke seals for HV and MV applications on the substation platform. We will seal array cables to MV switchgear and cables from MV switchgear to transformer input. Additional products will be used on the platform's cables linking its transformer to its Gas Insulated Switchgear (GIS) and on export-to-shore cables.

"Sealing cables is an important safety factor and Roxtec has specialist knowledge in this sector, this is why we have devised an accredited technical CPD seminar covering the importance of sealing cables offshore. This is based upon industry standards and our own practical experience," Graham concluded.

Roxtec



PROJECT COLLABORATION FIRST

Tekmar Energy, the market leading specialists in cable protection systems (CPS) for Offshore Windfarms has recently been awarded a contract with Tideway B.V to supply 150 of its patented TekLink CPS on the prestigious Merkur Offshore Windfarm project in Germany.

This will now be the 47th offshore windfarm project Tekmar has supplied, taking the total number of produced cable protection systems to well over 5,000 units.

NEW STATE OF THE ART PRODUCTION FACILITY

The supply for the contract will be executed in Tekmar's new state of the art production facility in the North East of England and manufacturing is expected to be completed early next year for offshore installation starting in 2017.

James Ritchie, CEO at Tekmar said: *"We are extremely pleased Tideway have selected to use the TekLink Cable Protection System for this project and it further demonstrates their confidence in our product and team. This project will be utilising the 7th generation CPS which has recently been harmonised to accelerate offshore installation works and approved by DNV".*

MARKET LEADER

With more than 30 years' experience, Tekmar is the market leader in the design, manufacture and supply of subsea cable, umbilical and flexible protection systems for the renewable energy and oil & gas industry.

Tekmar



PROTECTING WINDFARM ASSETS

Protecting valuable cables and maintaining constant connectivity to important windfarm assets is a top priority across the offshore renewables industry.

The cost of service interruption from cable damage at an offshore windfarm can rise into the tens of millions per month, making the initial cable installation and protection process an essential and critically important task.

EXTERNAL AGGRESSION

Over 80% of all offshore power cable faults are caused by 'external aggression,' principally from fishing and ship anchors that are prevalent in the shallower waters where the majority

of established windfarms are located. Proper planning and initial route engineering, based on in-depth survey data, is the first line of defence to ensure that the cable route is carefully selected to avoid hazards, difficult terrain and busy shipping routes to name a few.

Route clearance can mitigate risk from unexploded ordnances and techniques such as cable armouring and mattressing can minimise damage caused by abrasion or entanglement. It is only through adequate burial that cable can be placed out of reach of such interaction, however.

ADDITIONAL SERVICES

In addition to delivering the services mentioned above, Global Marine, in conjunction with its affiliate, CWind, also works to effectively manage the cable pull-in process ahead of cable lay and burial to safely and effectively secure the connection between

towers. The cable protection system installation process can be tested prior to installation at CWind's demonstration site in Barrow to help ensure seamless delivery out in the field. The shore based Transition Piece can be configured to accept various systems to ensure full functionality and engagement along with the correct tower pull-in techniques and methodology.

The effectiveness of these systems have been proven with over 400 cable pull-ins successfully completed at seven offshore windfarms to date including Gode Wind and Gwynt y Môr.

WEALTH OF EXPERIENCE

Installing, protecting and maintaining cable on the seabed has been Global Marine's business for over 165 years. The company's wealth of experience has been gained through successful installations and maintenance worldwide across all possible seabed conditions, terrains and ocean currents.

RECORD BREAKER

When installing the Pulau-Ketam power cable in Malaysia, Global Marine buried the cable to a record-breaking depth of 13.8m below the seabed, and during the installation of the Svalbard system inside the Arctic Circle, the company delivered the world's deepest water ploughing at 1,700m; both requiring precise execution, the right tools for the job and a commitment to ensuring the cable's longevity.

Global Marine Systems



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TRIANEL WINDPARK BORKUM II CONTRACT AWARD

Seaway Heavy Lifting has been awarded a contract by Trianel Windkraftwerk Borkum II GmbH & Co. KG. The scope of work consists of the engineering, procurement, construction and installation (EPCI) of the turbine foundations for the Trianel Windpark Borkum II windfarm on the German continental shelf. The award is still subject to financial close of the full project which is expected in the first half of 2017.

LOCATION

The Trianel Windpark Borkum II windfarm is located 45 km North of Borkum Island in the German bight. The 203 Megawatt offshore windfarm comprises 32 wind turbines of 6,3 MW each. Each foundation consists of a mono pile and a transition piece.

Project management and engineering has already started at the company's offices in Hamburg and Zoetermeer.

“WE ARE PROUD THAT TRIANEL WINDPARK BORKUM II HAS CHOSEN SEAWAY HEAVY LIFTING”

FABRICATION AND INSTALLATION

Fabrication will take place in 2017 and 2018, while offshore installation activities will be executed in 2018 using Seaway Heavy Lifting's heavy lift vessel, Stanislav Yudin. This vessel provides significant lift and installation capabilities ideally suited to the challenges of installing windfarm foundations.

MAJOR STEP FORWARD

Jan Willem van der Graaf, CEO of Seaway Heavy Lifting, commented that: *“The Borkum II project is Seaway Heavy Lifting's second EPCI project and is a major step forward in achieving our ambition to be a leading EPCI contractor in the offshore renewables industry. We are proud that Trianel Windpark Borkum II has chosen Seaway Heavy Lifting for this project. We see the award as a sign of confidence in Seaway Heavy Lifting's ability to deliver.”*

Seaway Heavy Lifting

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EVOLVING THE INDUSTRIAL REVOLUTION

The power to connect in the 21st Century

In 1885, Queen Victoria famously sent the first transatlantic telegram to US President James Buchanan via subsea cable. Seventy-four years earlier, the first ever power-transmitting underwater cable had been installed in the Isar River in Bavaria. These two events, bookending a century of engineering firsts and industrial innovation, are the foundation of the subsea cable industry.

Today, that industry runs a global network of subsea infrastructure and power cables that stretches over half a million miles, keeping the lights on and enabling global communications. For example, the world's longest subsea interconnector cable now runs over 590 kilometres (km) between the Netherlands and Norway.

UK NETWORK

The UK already has four subsea cable interconnectors linking it to France, the Netherlands, and Ireland, with several more proposed or under development, including an ambitious subsea cable to link the UK and Iceland. Now at the feasibility stage, once installed it could deliver the first geothermal electricity to the UK – with social and economic benefits for both countries.

For the past 50 years, JDR has been at the heart of this essential industry, leading the way in the design and manufacture of subsea cables. Its subsea production umbilicals, including electrical, hydraulic and fibre optic designs, provide vital connections to offshore installations around the world, delivering power and control functions that support the production of oil & gas from the seabed.

BESPOKE POWER CABLES

The company's bespoke power cables also have the power to connect the offshore wind and marine energy industries. Custom designed cables transfer electrical energy from offshore wind turbines, tidal energy devices, or

wave energy converters to the shore, bringing cleaner, sustainable energy supply to communities across Europe.

Offshore renewables are an increasingly important part of the energy mix – and offer exciting opportunities for the UK and much of mainland Europe. Estimates suggest that tidal energy could hold 50% of the continent's total energy resource. Wave energy has the potential to deliver between 10 and 20% of the world's energy needs – four times more than the total installed nuclear capacity.

RELIABILITY AN ESSENTIAL FACTOR

Reliable cabling that connects tidal generators or wave energy converters back to the grid are an essential factor for realising this opportunity. JDR is therefore directing significant research and development effort to optimise the development of specialist cables for the wave & tidal industry, offering enhanced seabed stability in high tidal currents.

NEW 'WET DESIGN' 66KV CABLE

One of the first outcomes from renewed focus on innovation is a new 'wet design' 66kV cable, whose development, high-voltage and full-scale wet-age testing, cable splicing, joints and connectors were all fully qualified and type-tested in 2016.

The new 66kV cabling steps up the voltage from the 33kV intra-array standard cable voltage capacity and enables power to be transmitted to and from larger turbines that are installed further offshore. This is essential as the wind industry starts to look beyond shallower waters to build its next generation of windfarms.

FLOATING OFFSHORE WINDFARMS

Another advantage of JDR's 'wet design' 66kV cable innovation is that it is ideally suited for dynamic floating offshore wind applications. The design offers significant weight and endurance benefits over



conventional cables at this voltage level, which previously have incorporated a metallic barrier layer such as lead sheath extrusion. With leading developers already seeking to harness energy using floating offshore wind from Europe, the US and Japan, 66kV will be a key enabler to maximise energy generated from floating applications.

66kV technology can also be used to deliver more power to subsea oil & gas production and processing equipment. For

example, cables operating at 66kV can allow more power to be transmitted from the shore to a distribution hub, including a subsea transformer that can distribute power out to the 6.6 or 11kV subsea infrastructure on the seabed. Equipment such as pumps, compressors, and other processing equipment operating at these lower voltages are being used by operators to enhance oil & gas recovery and extend offshore field lifetimes.

HUB-STYLE POWER DISTRIBUTION

We are already seeing some examples of a hub-style power distribution design off the coast of Cornwall in the UK. An 'export' power cable runs underneath the beach at the village of St Ives and 25km out into the Bristol Channel to a hub where a number of smaller cables split off to connect different wave energy devices, test them and transmit power back to the grid.

Elsewhere, the company is working with DONG Energy on Hornsea Project One which, on completion, will be the world's largest offshore windfarm and the first to exceed 1 GW capacity. Located 120km off the Yorkshire coast, Hornsea Project One will meet the electricity needs of well over 1 million UK homes, supported by 242km of array cables designed and manufactured by JDR.

COLLABORATION

In collaboration with offshore cable installation specialist VBMS (part of Boskalis), JDR is also contracted to supply 20km of 66kV intra-array and export cables to Vattenfall's European Offshore Wind Deployment Centre (EOWDC). Located in Aberdeen Bay, the 92.4MW, 11-turbine development is Scotland's largest offshore wind test and demonstration facility.

A WORLDWIDE TRANSFORMATION

When Queen Victoria sent her telegram, her reign had already seen mechanics, economies, cities and lives transformed first by steam power and then by electricity generated from fossil fuels. Today, subsea cables are playing a vital role in our future offshore energy infrastructure, whether they are used for the development of competitive, clean and sustainable energy sources, or enabling more efficient production of oil & gas from reserves deep beneath the seabed.

The subsea cable innovations emerging now will be the vital connections that transform the world once more.

JDR Cables



MORE INFO

PLAY VIDEO



“JDR CONTRACTED KURO DRAGON TO PRODUCE AN ANIMATION THAT COULD BE USED IN CLIENT MEETINGS, PRESENTATIONS AND AT EXHIBITIONS”

EMPOWERING BUSINESS THROUGH ANIMATION – A CASE STUDY

A world-class provider of subsea technology, JDR are an innovative company with a focus on building strong client partnerships and connecting the offshore energy industry.

Kuro Dragon are an industry-renowned studio focused on telling inspirational and empowering stories through animation. The two companies have collaborated over the last 12 months to help JDR enrich their business and engage to a wider audience.

COMPANY APPROACH

JDR contracted Kuro Dragon to produce an animation that could be used in client meetings, presentations and exhibitions. They wanted to showcase the benefits of their new Reeler Mark II, but also explain how JDR works as a business in a way that was beneficial and for their clients.

Kuro Dragon combined their experience in both the creative and technical sector by creating a unique 2D style for the animation.

Tom Nightingale, Strategy and Marketing Manager at JDR explained their relationship:



“With new technology and products constantly being developed within the energy industry, it’s vitally important you can demonstrate your unique selling points to your potential clients. We are a forward thinking company who believe in visual storytelling as a means to talk about our products. Kuro Dragon understands how to portray our complex engineering products and services, which is vital when we’re trying to secure contracts and attract new business.”

VISUALISATION

JDR also commissioned Kuro Dragon to produce a visualisation of their new Horizontal Helical Layup Machine. This 3D animation helps showcase JDR’s new capability to manufacture complex steel tube umbilicals and subsea power cables.

Stuart Howard, Founder at Kuro Dragon comments on their partnership: “It’s been a pleasure to work with Tom over the last three years. He understands the range of benefits that animation can bring to a business. Most recently, we’ve been working on a bespoke 2D animation explaining the renewable aspect of JDR services which we’re excited to be releasing in the coming months.”

Kuro Dragon

 SCAN/CLICK MORE INFO	 SCAN/CLICK PLAY VIDEO	 SCAN/CLICK PLAY VIDEO
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A ROUTE TO LOWERING SUBSEA ARRAY CABLE LIFETIME COST

Offshore windfarms are getting bigger. Over 100 wind turbines in an array are now common, with applications in place for even larger installations.

The power output from each turbine is also increasing, meaning that the 1GW offshore windfarm is not far away.

These are large steps forward towards meeting the UK’s renewable energy generation targets. However, larger windfarms bring greater cost, both in terms of initial outlay (CAPEX) and through operation and maintenance (OPEX).

CABLE ROUTING

Cable routing to connect each of the turbines to the offshore substation (OSS) is becoming more complex. There are many variables to consider, each with potentially huge impacts on the overall lifetime cost of the cables for the windfarm. Minimising CAPEX is an obvious target, but recent work carried out by Jee Ltd has highlighted some of the savings that can be made throughout the life of the installation by investigating options with a slightly higher CAPEX, giving a lower OPEX and greater ROI overall.

OPTIMISATION TOOL

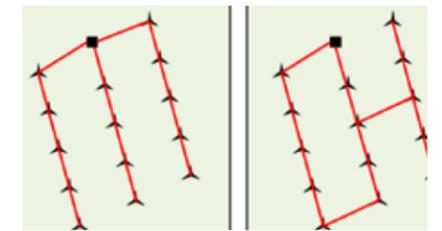
Jee has developed a subsea cable routing optimisation tool which considers

inputs such as cable rating, route configuration (loop, string, branch or combination), mean time between failure (MTBF) and mean time to repair (MTTR), soil conditions such as sandwaves and conductivity, and general unit costs and durations for installation.

The company is able to input the proposed route path and the tool can determine the initial CAPEX required, the cost of losses due to cable failure and repair (including loss of revenue), and finally the cost due to operational losses, i.e. cable inefficiencies. Selecting the appropriate cable size for the configuration is key in order to balance the cost to procure against the sum of the losses. The tool can compare route configurations and help determine a lowest lifetime cost, including the effect of net present value (NPV).

CASE STUDY

Jee was approached by Scottish Power Renewables to determine the optimised routing solution for their 102 turbine offshore windfarm East Anglia ONE and worked closely with Scottish Power Renewables, using industry best practice and workshops to engage all stakeholders.



The company was provided with the turbine layout, seabed characteristics, turbine utilisation and the cable specifications. From this, looped, string and branched cable configurations were investigated, varying key inputs such as cable size, burial depth and connectivity. The seabed surveys indicated the presence of wrecks (and therefore potential war graves), areas of metallic debris, thought to be potentially unexploded ordnance (UXO) and reefs of Sabellaria (a marine worm). These obstacles were avoided while keeping overall cable lengths short.

The tool was used to present a number of routing options to Scottish Power Renewables, showing that an overall optimised lifetime cost could be achieved by considering options with higher CAPEX but far lower OPEX. It showed Scottish Power Renewables how looping (meaning the cable route starts and ends at the OSS) compares with branching (two cables terminating at one turbine) and simple string options.

The company was also able to present the predicted maintenance costs by forecasting areas of exposure from mobile sandwaves, and the effect of varying parameters such as MTBF, considering that this value is largely subjective but can have a great impact on the results. The cost-benefits of adding cable redundancy to the system to minimise downtime was also investigated.

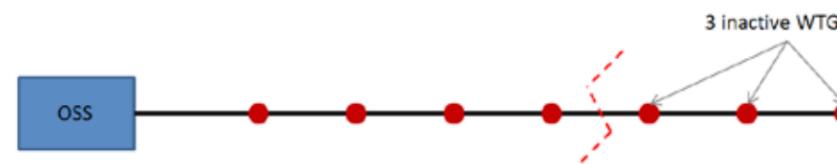
OPTION PRESENTATION

Ultimately, Jee found an optimised routing solution and presented options for alternatives which Scottish Power Renewables could explore in-house with their own commercially sensitive data.

The company’s renewables expertise includes route planning, cable protection design (CPS), HDD/landfall engineering, on-bottom stability, cable installation analysis, integrity management and decommissioning plans.

Jee Limited

 SCAN/CLICK MORE INFO	 SCAN/CLICK TRAINING	 SCAN/CLICK WHITE PAPER
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BALANCING SUPPLY AND DEMAND

The creation of a common energy production supply capability with integrated grids to balance supply and demand across various countries has been facilitated for some time by interconnectors between countries and continents.



One of the questions arising from Brexit is the impact upon this initiative and the extent to which the concept of a common energy market will survive.

EU ENERGY POLICY

EU energy policy is currently being implemented by the Commission's Third Energy Package (2009) and its 2015 Energy Union Package. The framework has five elements, namely, energy security; a fully integrated European energy market; energy efficiency; carbon reduction and research, innovation and competitiveness.

The impact of withdrawal depends on what future relationship the UK forms with the EU. Given the increasing multi-national nature of energy markets and companies, withdrawal from the EU will probably

not affect the direction of travel towards a more integrated energy economy, although differences in approach may emerge. Energy projects are typically capital intensive and, following the Brexit vote, investor confidence and access to finance will be key issues for the industry in the coming years.

DIRECTIVES

The EU Large Combustion Plants Directive (2001/80/EC-LCPD) and its successor, the Industrial Emissions Directive (2010/75/EU-IED), require new power plants to comply with stricter emission limits, while older plants have had to close or clean up by 2015 under LCPD (or by 2023 for IED). The directives are transposed into UK law via the Environment Permit Regulations. The closure of plants coincides with warnings from Ofgem on the UK's decreasing capacity margins and has implications for UK energy security, as generating plants come to the end of their life under the Directives.

Power stations are due for imminent closure in many member states, however, since coal is currently attractive, new coal fired plants are under construction, albeit with associated carbon reduction technology, which increases the cost.

The UK's existing renewables targets are set by the 2009 Renewables Directive.

An EU exit would not remove the legally binding UK climate targets under the

Climate Change Act 2008 but it would increase the focus on all aspects of UK based generation, especially if Brexit resulted in poorer security of supply through decreased inter connectivity to Europe, reduced harmonisation of EU energy markets or less investment into the UK by multi-national companies.

BREXIT'S IMPACT

Brexit will also affect the UK's international climate targets under the United Nations Conference on Climate Change. Currently the UK negotiates as part of the EU block and has internally set targets together with those of other member states aimed to meet the EU's overall target. An EU withdrawal would have to address that lack of UK specific targets.

One currently unresolved question is how Brexit will affect the UK's ratification of the Paris Agreement which the UK signed in April 2016.

The government has been at the forefront of efforts to liberalise and develop cross border energy markets and is likely to continue to do so following this policy. However, no matter how the UK's exit from the EU is negotiated and structured, in order to increase inter connectivity with continental Europe, co-operation with the EU internal energy market will be necessary.

If the UK was permitted to participate in the Energy Union following Brexit it

would, irrespective of the Brexit model, need to negotiate an appropriate partnership with the EU and adopt and comply with the relevant EU legislation.

THIRD ENERGY PACKAGE

The Third Energy Package is a package of EU legislation that aims to liberalise European gas and electricity markets. Given the UK's liberalised energy policy it is likely to continue to implement - and be supportive of - many of its aspects.

If the UK remains part of the EEA the EU state aid rules would continue to apply to energy infrastructure and support schemes in identical forms, since the EEA Agreement contains a similar prohibition against granting financial assistance in a way that distorts competition and inter-state trade within the EEA.

In whatever form Brexit takes the UK's climate change goals are unlikely to change as they are established at a national level under the Climate Change Act 2008. However, there will still be important issues to settle. For example, at an international level the UK's emission reduction commitment would need to be disentangled from the EU target under the United National Framework Convention on Climate Change and the recent Paris Agreement.

EU EMISSION TRADING SYSTEMS

An important question is whether the UK will still be able to participate in the EU Emission Trading Systems. If it does not, then transitional and linking arrangements would be required, which is something of particular importance for companies holding a surplus of allowances.

Unless it uses the EEA and EFTA Membership Brexit Model once it exits the EU, the UK would be released from its renewable energy targets under the Renewable Energy Directive (2009/208/EC) and from EU state restrictions, potentially giving the government more freedom both in the design and phasing out of renewable energy support schemes.

Under the Industrial Emissions Directive 2010 (2010/76/EU), operators of specified industrial combustion plants are required to hold environmental permits that are granted subject to conditions seeking to control and gradually reduce emissions and discharges into the environment and the generation of waste. These have effects on coal powered plants and many older gas plants which are expected to close by 2023, as they have selected a limited life derogation and can operate without abatement of equipment until the end of 2023.

It remains to be seen what model the UK adopts following Brexit; how it will take that forward; the impact that it will have on the concept of a single energy market and the security and stability which that market is intended to bring.

Martin Collingwood
Andrew Jackson Solicitors



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TECHNICAL TRAINING

We hope you enjoy this feature and take this opportunity to thank our many contributors.

Training is an extremely important area upon which the industry depends so much so that we devoted a considerable amount to the subject in a past edition. You will find here a large feature on Training & Development following various discussions with our decision making readership when visiting industry relevant exhibitions and conferences.

Please find the time to visit issue 28 where you will find the information detailed below...

To give the feature structure there are five separate sections covering...

- Health & Safety
- Technical
- Qualifications
- Competence Management
- Whitby & Scarborough Spotlight

TRAINING & DEVELOPMENT MATRIX

You will also find online this previous edition a useful matrix which lists companies and organisations who operate within and serve the needs of the industry.



Duncan McGilvray
Editor
Wind Energy Network



DELIVERING TRAINING IN A RAPIDLY GROWING INDUSTRY

Over the past decade the wind industry's technical training requirements have changed considerably. The extent of this is not only reflected in changes to existing course requirements but also by the introduction of new standards which technicians and companies must adhere to in order to work on offshore wind turbines.

As a response to the change in requirements 3sun Group's training division 3sun Academy have expanded their course offerings and facilities to ensure that all 3sun Group technicians and external clients experience the highest standard of training.

GLOBAL TRAINING STANDARDS

One example of a change in requirements which is now occurring in the industry is the upcoming introduction of the GWO Basic Maintenance Training (BMT) standards covering Electrical, Mechanical and Hydraulics skills. The objective of this Standard is to develop common industry training and Best Practice standards for the basic technical and safety skills required for the service and maintenance of wind turbine generators across Europe and the globe.

On successful completion of an audit scheduled for the end of February 2017 3sun Academy will be perfectly placed to assist GWO member organisations who have expert technicians working on their wind turbines and are required to have a valid GWO BMT certificate from 1st November 2017.

The capability of delivering the GWO BMT adds to 3sun Academy's current capabilities to deliver the 5 GWO Basic Safety Training modules, which include, Working at Height, First Aid, Fire Awareness, Manual Handling, Sea Survival and the respective refreshers.



“THE OBJECTIVE OF THIS STANDARD IS TO DEVELOP COMMON INDUSTRY TRAINING AND BEST PRACTICE STANDARDS”

FACILITIES

In order to effectively deliver these courses, 3sun Academy have established a range of facilities such as their 22 metre high training tower, Compact Crane and Confined Space training facilities. This is as well as a valuable partnership with Lowestoft College that boasts a state of the art environmental tank offering wind, rain, wave and day & night scenarios to enhance the Sea Survival packages.

3sun Group



EXPERIENCED PROVIDERS

Accompanying the above, 3sun Academy are experienced providers of a wide variety of H&S, technical, plant, vocational and industry specific bespoke training packages. These include but are not limited to ECITB CCNSG Safety Passport, IRATA Rope Access all levels as well as Small Bore Tubing and Hydraulics technical courses.



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ONE-STOP-SHOP

In the heart of the Energy Estuary, the collaboration between HOTA and HFR Solutions, two major local training providers based within the Humber region, has over the last few years provided a one-stop-shop for the full GWO/RUK training package for the Renewable Industry.

HISTORY

Established in 1987, HOTA a Limited Company with Charity status was initially set up to provide the necessary skills for the oil & gas/Maritime sectors, it was a natural progression for the company to enter into the renewable industry, ensuring the workforce has the necessary practical training and knowledge to safeguard them within their dangerous working environment.

COLLABORATION

The close working relationship between HOTA and Humberside Fire Brigade began in 1988 and in 2015 a formal partnership was established. The partnership has enabled them to offer the full suite of training that meets the standards of the Global Wind Organisation (GWO) and RenewableUK (RUK) in First Aid, Fire Awareness, Manual Handling, Marine Safety and Working at Height. This is a major advantage for companies within the sector and their supply chain to train their workforce in 1 location saving them both time and money.

The company also offers the full suite of STCW10 courses for the maritime sector which compliments the GWO/RUK Training Courses.



SAVING TIME AND MONEY

HOTA's, General Manager Karen Shepherd said: *"The partnership is working brilliantly being able to offer all five courses as a one-stop-shop is ideal, it saves our customers both money and time. It was an excellent opportunity for two highly professional local companies to collaborate and offer their expertise from the relevant industries to the renewable industry with first class nationally approved training providers and facilities."*

NATURAL FIT

Nick Granger, Director at HFR Solutions said: *"This is a really exciting partnership as it incorporates the established training facilities at HOTA in Hull with the new training facilities of HFR Solutions in Hessle. The partnership is a natural fit as we are both highly local experienced training providers."*

HOTA



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INDUSTRY SPECIFIC SEMINARS

Firms operating in the wind industry are being offered an insight into 'best practice' for sealing cables within offshore substations through a specially designed seminar.



The Continuing Professional Development (CPD) seminars are being led by global cable seal manufacturer Roxtec for engineers involved in the design, fabrication or maintenance of offshore substations.

The seminar will also be relevant to offshore windfarm owners/developers, as cable seals are an important detail that sometimes can be overlooked.

LESSONS LEARNED

Roxtec UK marine and offshore director John Kayes says lessons can be learnt from the many offshore assets around the Humber region and broader UK North Sea that were built in the 1970s and 80s which have since undergone upgrades. He says operators can suddenly find their asset is not protected as intended against fire, gas and water according to the regulations.

DEMAND

John commented: *"Our cable and pipe seals are used widely across the oil & gas and European offshore wind industries, so we're very familiar with the needs of the offshore sector. There is considerable demand from operators to improve safety on their assets, and this has led us to inspect some 50,000 multi-cable transits in the last 12 months."*

"The reason effective cable sealing is so important is because owners and developers must prove they are maintaining performance and meeting safety requirements from the classification societies governing the territory. Many classification societies are now already calling for frequent transit inspections."

INDUSTRY RELEVANCE

"Roxtec currently runs a total of ten accredited CPD seminars but our 'Best Practice for Sealing Cables in Offshore Substations' seminar is highly relevant for those working in the Humber offshore market. The course covers a broad number of areas concerning cable sealing in offshore substation environments. This includes benefits of adequate sealing, including cables passing through bulkheads and decks, as well as the impact of hazards such as fire from A and H class."

"Further attention will be devoted to the design and installation of substation seals to meet the client's specific requirements through clear design and specification. We will isolate different types of low voltage and high voltage cables and explain how they are best sealed. In addition, we look at how to effectively seal HV & MV busducts and cables connecting transformers to GIS and MV switchgear," John continued.

News of the seminar comes shortly after Roxtec launched a new company called Roxtec Services targeting North Sea marine and offshore markets. The company has been developed following sustained demand for safety inspection on naval ships, drilling rigs, FPSOs (Floating Production Storage and Offloading anchored vessels) and oil & gas offshore assets. It will offer three main services to clients: inspection services, maintenance and supervision.

TRANSFERRING UNIQUE KNOWLEDGE

"We believe CPD courses are a terrific way to transfer the unique knowledge and experience we have accumulated in practice over many years. We see CPD as a commitment to life-long learning, allowing professionals to build on their skills and expertise. Effective knowledge transfer is an essential part of industry evolution, helping raising standards and increase overall productivity."

"In terms of delivery a Roxtec representative can present the seminar at any company office, allowing several members of staff to develop their knowledge and gain a CPD point, minimising both down time and travel costs," John concluded.

Roxtec

HEALTH, SAFETY AND ENVIRONMENTAL AWARENESS

Leading independent UK ecology consultants Thomson Ecology have become one of only a handful of accredited ROLO trainers based in the South East. The ROLO (Register of Land-Based Operatives) Health Safety and Environmental Awareness Course has been designed to raise the standards of health and safety and reduce the risks and accidents throughout land-based sectors.

All Thomson Ecology staff are now routinely ROLO trained. In fact, if you come from a land-based industry, such as ecology, landscape maintenance or construction, it is mandatory that you have passed ROLO in order to get a CSCS card.

VARIED AND INTERESTING

A team from Thomson Habitats and Thomson Ecology worked with Carillion Utilities on the Dudgeon onshore cable route, the longest in the UK - at 47km. The team of ROLO-trained staff were involved in a variety of tasks including...

- Walkover surveys and ecological gap analysis for bats, trees and water voles
- dedicated mapping services and the use of Thomson Ecology's bespoke interactive Mapping service, TIM, to collate and share ecological project data
- Ecological assistance and advice throughout the project duration
- Clearance of hedgerows down to ground level along the entirety of the cable route, over a five week period
- Water vole mitigation works on ten ditches across the cable route, using the displacement methodology
- Extensive great crested newt (GCN) trapping and translocation for 19 metapopulations across 55km of GCN fencing
- Provision of watching briefs for ditch fluming and field access works over an eight week period



“DESIGNED TO RAISE THE STANDARDS OF HEALTH AND SAFETY AND REDUCE THE RISKS AND ACCIDENTS”

VITAL IMPORTANCE

Estelle Spencer, who administers the ROLO scheme for Thomson Ecology, said: *“The ROLO scheme is vitally important for ecology industry professionals and many related industries and is designed to ensure that the environments in which we operate are safe. The Dudgeon Windfarm case study is an excellent example of the sort of skills and tasks that ROLO is designed to test. The courses are all run from our head office in Guildford, Surrey and we can provide location-based training if we have a sufficient group of people involved.”*

Thomson Ecology

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FIRST LONG-TERM OFFSHORE WINDFARM SUPPORT BASE IN ABERDEEN HARBOUR

Vattenfall, developer of EOWDC, has signed leases totalling 24 years with Aberdeen Harbour Board, becoming the first offshore wind operator to invest long term in the port's facilities and will move in during 2017.

The company is set to establish its construction team's base within the Regent Centre early in the year and also move into a warehouse unit at Commercial Quay.

FACILITIES

The facilities will support the construction, commissioning, operation and maintenance (O&M), and eventual decommissioning phases of Vattenfall's more than £300million European Offshore Wind Deployment Centre (EOWDC) off the Aberdeen coast.

A team of up to 10 personnel, including skilled offshore wind technicians, will be based at the facilities during the lifetime of the project. The warehouse will undergo a substantial retrofit and the company anticipates moving into the new facilities within Q2 of 2017.

LONG-TERM CENTRE

Adam Ezzamel, project director for the EOWDC at Vattenfall, said: "Establishing a long-term centre of operations in Aberdeen has been fundamental to our project plans. We are pleased to have found a suitable location so near to the windfarm with the support of Aberdeen Harbour Board.

"Aberdeen Harbour is a natural fit for our operations while the EOWDC is a flagship project for the region and its Energetica corridor. As a hub of innovation, the project will reinforce the North-east's global energy status by leading the industry drive towards generating clean and competitive wind energy power."

INDUSTRY SUPPORT

Chief executive at Aberdeen Harbour Board, Colin Parker, commented: "Whilst Aberdeen Harbour has supported both onshore and offshore renewables projects many times in the past, we very much welcome this long-term commitment to the port by Vattenfall.

"We believe that our location and modern facilities are ideal to support this work and this agreement typifies our continued strategy for diversification of harbour activity, to the benefit of the Region."

TURBINE SUPPLIER

MHI Vestas offshore wind, will provide a full service agreement for at least the first five years of operations, working together with Vattenfall from the O&M base at Aberdeen Harbour.

STABLE PROJECT BASE

Flemming Ougaard, chief operating officer, operations at MHI Vestas Offshore Wind, commented: "Vattenfall's long term commitment to Aberdeen Harbour provides both our construction and operation and maintenance teams with a stable base for the project. The port facilities are first class and provide great access to the site."

LONG-TERM PARTNER

Aberdeen City Council's Aberdeen Renewable Energy Group (AREG) has been a long-term partner of the EOWDC.

Chair of AREG and Aberdeen City Councillor, Jean Morrison, commented:

“THE WAREHOUSE WILL UNDERGO A SUBSTANTIAL RETROFIT AND THE COMPANY ANTICIPATES MOVING INTO THE NEW FACILITIES WITHIN Q2 OF 2017”

"We welcome that Vattenfall is to be the first offshore wind operator to invest long term in Aberdeen Harbour's facilities, as it is a firm commitment to the city and its role as the Energy Capital of Europe.

"The EOWDC is an important part of the city's future of diversifying our energy industry, accessing new international markets, reducing the cost of offshore wind projects, and creating and safeguarding jobs. Aberdeen City Council, through AREG, welcomes Vattenfall's commitment to the future of Aberdeen and our ambitions for our energy industry."

LARGEST OFFSHORE WIND TEST AND DEMONSTRATION FACILITY

The EOWDC is Scotland's largest offshore wind test and demonstration facility. It is being developed by Vattenfall-owned Aberdeen Offshore Windfarm Limited.

Construction onshore of the innovative 92.4MW, 11-turbine offshore wind scheme started in late 2016 with first power expected to generate in summer 2018.

Vattenfall



Adam Ezzamel (left), project director for the EOWDC at Vattenfall, and Colin Parker, chief executive at Aberdeen Harbour Board.



Chief executive at Aberdeen Harbour Board, Colin Parker (left), and Adam Ezzamel, project director for the EOWDC at Vattenfall.

CONTRIBUTE TO THE NEXT EDITION OF WIND ENERGY NETWORK MAGAZINE

WindEnergy
NETWORK

We would like to invite you to contribute to the next edition of WindEnergy Network magazine. We don't charge for editorial as it brings our 6,600 senior decision making readers interesting and thought provoking stories from experts like yourselves in the industry. Editorial forms a great way for your company to get some publicity too. The following are the options for involvement:

- **UNSOLICITED PRESS RELEASE** – we get literally hundreds of these general editorials. As we can only fit editorial into the features we are running and prefer items written for us, the chances of this appearing is slim.
- **350 WORD EDITORIAL** - contribution to one of our Forthcoming Features plus high res image – good chance of being included. No charge for this at all.
- **EDITORIAL WITH INTERACTIVE LINKS** - We add up to three links at the end of your 350 word editorial to bring additional information relevant to our readership in the wind industry – such as fuller, much longer article/brochure/tech spec/video/links to your website etc. Guaranteed to appear as they make the magazine more interesting for our readers. Cost for this £330 + vat per edition.
- **SPONSORSHIP OF A FEATURE** - High impact with the opening double page of the feature – 850 word editorial. We also add your branding to each page of the feature in the header bar. More information about sponsorship on the next page.
- We also run **STAND-ALONE ARTICLES** and conduct interviews too. These are all by arrangement and normally as part of a marketing plan.

EDITORIAL DEADLINE 5TH MARCH

PLEASE SEND YOUR EDITORIAL TO SUE@GREENENERGYPUBLISHING.CO.UK

OR TELEPHONE 01765 644224 TO DISCUSS

Features for the rest of the year can be seen here



FEATURES TO APPEAR IN THE MARCH EDITION – ISSUE 37

1. **HEALTH & SAFETY IN-DEPTH FOCUS – DIVIDED INTO THE FOLLOWING SECTIONS:**
TRAINING
EQUIPMENT/WORKWEAR
PROFESSIONAL SERVICES/CONSULTANTS****
COMPLIANCE
2. **INNOVATIONS ******
3. **OILS & LUBRICATION ******
4. **PORT SERVICES FOR THE WIND INDUSTRY ******
5. **WIND MONITORING ******
6. **RE-POWERING ******
7. **OFFSHORE WIND ENERGY 2017 PREVIEW**
8. **DECOMMISSIONING**
9. **SECURITY SYSTEMS ******
10. **REAL TIME DATA**
11. **KEEPING COMMERCIAL VESSELS RUNNING ******
12. **CABLE INSTALLATION**
13. **OFFSHORE ACCOMMODATION ******

Those features with **** are still available to sponsor if you would like to take the lead.

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We believe that the way to get the best results is by having a marketing mix, combining editorial and advertising. Choose from one of the packages below.

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CONTINUING SUCCESSFUL DELIVERY IN THE OFFSHORE WIND SECTOR

Safeguarding assets from the consequences of explosion and radiant heat hazards has always been important in the renewable energy sector and as the industry continues to move into more challenging environments, selecting the right protection to preserve equipment and look after personnel has never been more important.

EXPERIENCE

With over 46 years' experience in providing world class solutions for fire, blast and radiant heat protection, Mech-Tool Engineering Ltd (MTE) is well-known for its specialist skills and expertise in delivering full turnkey dependable solutions. As the MTE business looks to conclude its contract on one of the offshore wind industries most talked about projects since the completion of its onshore ground works in 2014 – Galloper – the pedigree of the MTE business in the design, manufacture and supply of high integrity protection systems to the renewable energy sector is now firmly established.

PROJECT PORTFOLIO

Predicted to generate power for up to 336,000 households, the Galloper Offshore Windfarm – located off the coast of Suffolk - is an extension of the existing Greater Gabbard Windfarm, currently being developed as its own separate

entity. Add Galloper to MTE's already impressive portfolio of offshore wind projects, including Thanet, Sheringham Shoal and Dudgeon, it is understandable why the company has developed a strong competitive advantage in this sector.

With industry leading products including the internal and external firewalls and louvres deployed on the Galloper project – all of which boast capabilities including approved certification from A0 to H120 fire ratings, Jetfire ratings up to J60, Lloyds Register Approval and proven weight savings – the company has well and truly established its proven performance in this safety critical environment.

FUTURE EXPECTATIONS

As the business looks to the future of offshore wind and the distinct shift towards an OTM model – a stripped down, lightweight transformer unit that could cut the cost of high-voltage alternating current substations (HVAC) by as much as 40% - MTE is already

well positioned to build on its wealth of experience delivering substation solutions as the industry transitions to this cost-efficient model.

Headquartered in the UK, with offices and facilities worldwide including Korea, UAE, Asia and North America, the company is continually demonstrating its ability to meet the challenges of ever riskier projects through its provision of its world-renowned protection systems.

Mech-Tool Engineering Ltd



Mech-Tool Engineering, a market leader in the design and build of fire and blast protection and modular solutions to the renewable energy market.

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THE MAINTENANCE JIGSAW

Do you have a piece missing?

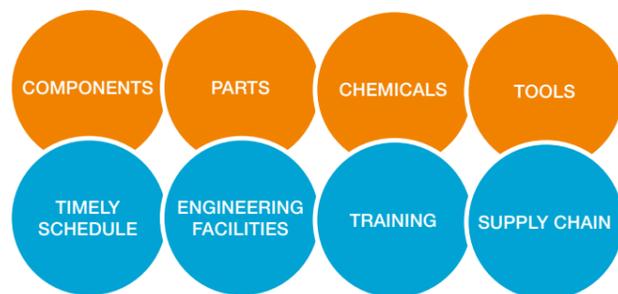
Maintenance: whether it is at the dizzying heights of a power generation asset in the North Sea, in a factory processing food items, or in an advanced automotive production line, it always has a number of commonalities and challenges to the modern professional engineer. These shared experiences allow a natural cross-over of tried-and-tested knowledge between those employed to keep the equipment working despite everything that operators, the weather and increasingly narrow life-cycle tolerances demand.

'Maintenance', as a broad term or its equally well-known 'MRO' abbreviation typically focuses on lubricants and greases. Lubricants are just one aspect of the maintenance process: so why, when it comes to maintenance and maintenance chemicals, lubricants are usually the only chemical type talked about?

It's probably a historical preoccupation with lubricants keeping the wheels of industry turning that has been reinforced in the media over the years, but to talk of maintenance chemical and lubrication as interchangeable and inevitably linked terms does not show the complete maintenance chemical situation.

THE MAINTENANCE JIGSAW – NOT JUST CHEMICALS & OILS...

Typical Maintenance Inputs



A typical 'MRO' or 'maintenance' operation involves many components, each equally as important as the others to ensure a reliable, productive and efficient inter-maintenance-cycle operation. No one wants unexpected down-time.

Whether it is 'invisibles' such as...

- training,
- timely schedules/planning,
- and service agreements;

Or physical ones...

- Tools
- Components & parts
- Chemicals



Each combines with the others to deliver a service greater than the sum of its parts. Should one piece be missing, sub-standard, or overlooked, then it is often the case that the trinity of 'reliability, efficiency, productivity' is compromised resulting in increased maintenance frequency or breakdown.

THE MAINTENANCE JIGSAW – CLEANING & INSPECTION VITAL BEFORE LUBRICATION:

To say that lubrication is the primary focus of the chemical constituent of a maintenance process is not incorrect as often a squirt of grease or top-up of oil is all that is required to complete the works order, but should more extensive servicing be called for it will require some component or part of equipment to be taken apart, inspected, and replaced in order to identify if it is the cause of (or likely to cause) problems.

This is where the maintenance chemical options open up revealing the true extent of the choice: cleaners/degreasers, lubricants, anti-corrosion, metal cutting, welding, wipes and more.

Typical Maintenance Inputs



Cleaners and degreasers are designed as a critical first stage of the servicing process, ensuring that all lubricant, grime and dirt contamination is removed allowing the clean surfaces to be inspected without the risk of dirt obscuring faults, getting into close-tolerance gaps and preventing recontamination during re-lubrication and assembly. So a maintenance schedule needs to start and finish with cleaning to ensure a thorough job.



TYPICAL OFFSHORE 'MRO CHEMICAL TOOLKIT' ...

Function	Product Recommendation	Link
Solvent Degreaser	Ambersil Amberklene FE10	http://bit.ly/2jXz5qL
Water-Based Degreaser	Ambersil Water-Based Degreaser	http://bit.ly/XAhr1N
Contact Cleaner	Ambersil Ambertron	http://bit.ly/2jXzN7u
Moisture Seal For Electronics	Ambersil AMS4 Silicone Grease	http://bit.ly/2kmNZXU
Silicone Grease (Elastomeric Bearings/Rubber Seals)	Ambergrease SIL	http://bit.ly/2jm9hTZ
Anti-Seize Treatment	Ambersil Assembly Paste FG	http://bit.ly/2jsikQI
General Lubricant & Protective	Ambersil 40+	http://bit.ly/VHtm7
Seized Fastener Release	Penetrating Oil	http://bit.ly/2jY4CU
Fastener Marking (Quality Control)	Marker Pens	http://bit.ly/Ypce6Y
Anti-Corrosion	Galva Colour	http://bit.ly/2ko2kzg
Hand Wipes	Ambersil Tough Wipes	http://bit.ly/2j9gUcY
Blade Paint (Repair Touch-Up)	Ambersil Acrylic Paint	http://bit.ly/2iZVow3

KEY FACT

Lubricants and greases degrade with use and time, the rate at which depends on a great number of variables. Should re-lubrication be carried out without inspection, contamination and old lubricant may mix with the new resulting in inefficient operation or premature failure. It is good working practice to

completely degrease and clean in these situations to avoid unplanned down-time and inefficient operation, particularly if the asset is sited remotely or offshore.

The technology behind cleaning chemicals is complex: through the manipulation of chemical formulations specific, cleaning properties can be displayed: fast evaporation, foaming action, grease removal, dry deposit removal, material compatibility, and so on. Typically solvent and citrus based cleaners are better at removing greases and heavy/light oils, with water based products able to remove drier or staining materials.

TAKING MATERIAL COMPATIBILITY INTO ACCOUNT

A poor quality cleaner or the wrong cleaner is sometimes selected, whether it is due to perceived cost savings or simply using the same cleaner as always, in either case more product will be used as cleaning efficiency is reduced, but the real cost is more easily seen in lost time; waiting for the chemicals to remove the grime. With lower quality/imported products, the active ingredients may be present in reduced quantities than in 'market leaders', such as Ambersil.

Ambersil offers one of the most comprehensive range of industrial cleaners and degreasers available in the UK, backed up by lubricants, anti-corrosion products, metal cutting oils, welding aids, paints and more; which are all available nationwide through key distribution partners. The comprehensive MRO range enable engineers and



buyers a single source supply where cost savings may be had without compromising on premium quality and top-line performance.

Many products are specified to military, aerospace and industrial standards including NSF food industry registered products.

Ambersil



GROWING DEMAND FOR ACCURATE TIGHTENING

There is a growing demand, much of it motivated by performance and health and safety, for accurate tightening of nuts and bolts throughout industry.

This relates to turbine manufacturing and subsequent maintenance applications. To satisfy this demand requires reliable and capable torque tools, both hand tools and power tools.

Norbar Torque Tools Ltd is the world's leading torque specialist, a third generation family business which designs and manufactures torque tools for tightening nuts and bolts accurately.

HISTORY

Incorporated in 1943, the 'North Bar Tool Company' became the first company in Britain to commercially manufacture torque wrenches. The initial demand was driven by the need for the gasket-less cylinder head of the Rolls Royce Merlin engine to be accurately tightened.

GLOBAL REACH

Today, the company's products and services are used across the globe in such diverse industries as Wind Energy, Manufacturing, Sub-Sea, Aerospace, Energy, Mining and Oil & Gas. Norbar has distributors in over 75 countries as well as accredited calibration laboratories across four continents.

EXCEEDING INTERNATIONAL STANDARDS

All torque wrenches are designed and manufactured to exceed international standards for accuracy. The range of products covers torque values from 0.3N-m to 2000N-m. The Norbar HandTorque range is the most comprehensive range of multipliers available.

Standard products are available up to 47,500 N-m (35,000 lbf-ft) and 'specials' to 300,000 N-m (220,000 lbf-ft). A multiplication accuracy of ±4%, throughout the operating range, eliminates the uncertainty of high torque tightening.



“NORBAR TORQUE TOOLS LTD IS THE WORLD'S LEADING TORQUE SPECIALIST”

PRODUCT SPECIFICATIONS

Powered torque multipliers comprise pneumatic and electronic products. The former extends up to a torque of 300,000 N-m and the latter to 6,000 N-m. All Norbar's powered multipliers are quiet – less than 85 dB(A), user friendly and with vibration well below the 2.5m/s² so there are no restrictions on how long the user can operate the tools.

ENGINEERING TO ORDER

All products are manufactured at the modern factory and head office in Banbury, Oxfordshire, UK. There are applications when a standard product will not suffice. In such instances The Engineer to Order division will undertake the design and manufacture of special equipment against agreed customer specifications for hand tools and power tools.

Norbar



SPECIALIST BESPOKE TOOL CASES

Full protection against the rigours of handling and transportation to remote installations by boat or helicopter ensures that equipment arrives complete and in working order, significantly reducing the risk of downtime caused by damaged equipment and additional costs of shipping out replacements.

Peli cases are waterproof (certified to IP67) and offer superior protection against the severe weather conditions experienced while working on offshore installations.

CUSTOM FOAM

Custom foam offers additional protection within a case. The foam is extremely durable and is designed to suit the needs of each kit. Individual pockets are precision cut to hold each component securely and has the added benefit that every item is in place prior to transportation and accounted for after each use.

PROTECTOR TOOL CHEST

The 0450 tool chest combines the flexibility of seven removable drawers to store a comprehensive tool kit with the renowned protection of a Peli Protector Case. Adding custom foam will organise and protect each tool with dual colour foam providing tool control.

The tool chest has dual automatic pressure equalisation valves to ensure ease of opening after transportation by air, a retractable handle and wheels for enhanced mobility, and the neoprene 'O-ring' seal provides the essential protection against water and dust ingress.

PROTECTOR TOOL CASE

The 1460 tool case is a compact tool case offering the same level of protection as the larger tool chest. The case has two fold out handles either side for ease of handling when fully loaded and a handle on the top to help manoeuvre the case where access is restricted.

The 1460 case opens through 180° providing a flat, stable work surface. Three tool trays keep everything organised with ease of access to the contents.



GUARANTEE

Peli UK, with 25 years' experience working with the offshore industry, supplies watertight, crush and corrosion-proof cases to transport and protect essential equipment in this very demanding environment. The Peli range of cases and torches carry a "You break it, we replace it" lifetime guarantee.

Peli Products (UK) Ltd





“THIS IS A VERY EXCITING TIME FOR TORQUE SOLUTIONS AND WE HOPE TO MAKE FURTHER ANNOUNCEMENTS RELATING TO NEW PRODUCTS IN THE COMING MONTHS”

PRODUCT RANGE EXPANSION

Torque Solutions, the Hydraulic Bolting specialist based in Sheffield, South Yorkshire, recently announced the expansion of their product range to incorporate Chicago Pneumatic Industrial Tools.

SPECIALIST SUPPLIERS

The company has for many years been the specialist suppliers of Titan Technologies Hydraulic Bolting Tools particularly within the renewable energy sector. Titan Technologies was acquired by Chicago Pneumatic in November 2015 and is now fully incorporated in the CP range.

FACILITIES

Commenting on the acquisition, Managing Director Peter Allsopp commented:

“The acquisition of Titan by Chicago Pneumatic has allowed Torque Solutions to expand the portfolio of products and services we offer to our customers.”

Peter continued: *“Recently we have invested in a purpose-built workshop, calibration facility and office complex adjacent to our present unit in Sheffield. We have expanded this workshop to facilitate the increase in business and to be able to incorporate the CP products for service and repair. This is a very exciting time for Torque Solutions and we hope to make further announcements relating to new products in the coming months.”*

PRODUCTS AND SERVICES

Chicago Pneumatic has a complete range to offer the market. The CP8828 and CP8848 Battery range of Impact Wrenches, in $\frac{3}{8}$ " and $\frac{1}{2}$ " Square Drive versions, has a capacity of 1050Nm (775ft-lbs), these tools have the durability and reliability necessary for the demands of the Industry.

The CP 8548 $\frac{1}{2}$ " Reversible Hammer Battery drill from Chicago Pneumatic comes complete with a keyless $\frac{1}{2}$ " capacity chuck, 20V Lithium-ion battery which provides twice the runtime of conventional batteries. The tool has a drilling torque which delivers 82Nms and a 2-speed metal gearbox with options for hammer action, screwdriver and drilling.

The Chicago Pneumatic Range of Hand Torque Wrenches is ergonomic and durable and is available in square drive versions from $\frac{1}{4}$ " to 1" with torque ranges from 5-1000Nms (3-750 ft-lbs). The robust ratchet head come complete with quick socket release and the accuracy of the range is -4% in accordance with EN ISO 6789-2003.

Other tools within the Chicago Pneumatic range for more specialised applications include Air operated ATEX Impact wrenches, pistol grip nutrunners, angle grinders, sanders, needle scalers, chipping hammers and drills including Morse taper and $\frac{5}{8}$ " chuck capacity.

Torque Solutions Ltd

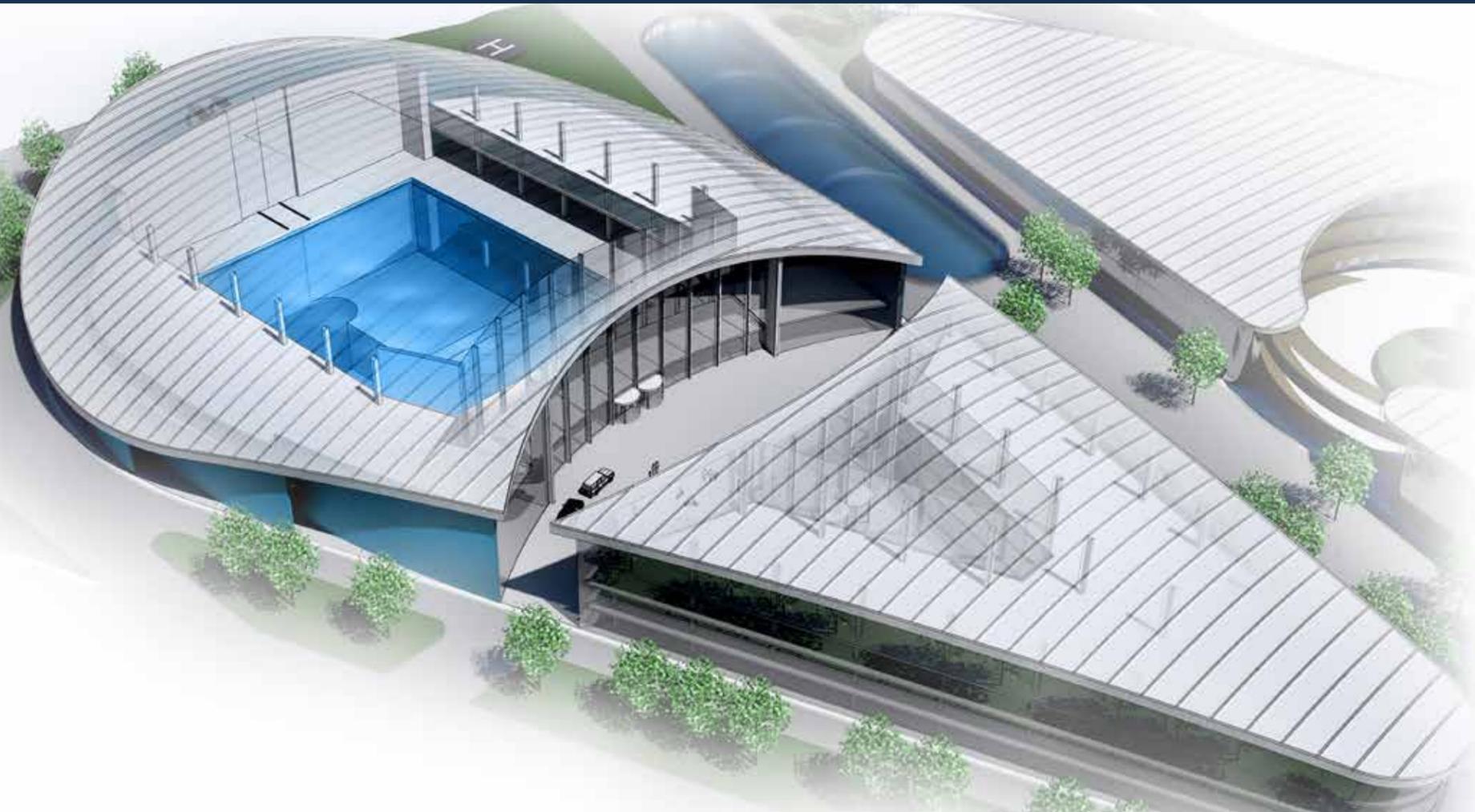


Supplying Bolting Solutions to the Renewable Energy Sector

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SUPPORTING INNOVATION AND COST REDUCTION IN OFFSHORE RENEWABLES

Architect designs of Blue Abyss, the multi-million pound subsea, space and life science training, research and testing centre, have been revealed. Behind the exciting facility's sweeping design is eminent architect Robin Partington, whose work has shaped the greatest changes on London's skyline.

£65MILLION +

Mr Partington led the design team of London's Gherkin for Foster & Partners, working alongside prolific architect Sir Norman Foster for 17 years, the high rise residential Strata Tower and is currently working on Westminster's only skyscraper for the future, the 42-floor 1 Merchant Square in Paddington, now nicknamed the 'Cucumber', with his 50-strong team at Robin Partington & Partners (RPP).

Estimated to cost more than £65million, Blue Abyss is planned for completion and to be fully operational by the end of next year.

WORLD'S BIGGEST TRAINING POOL TARGETS OFFSHORE RENEWABLES

It will contain the world's biggest training pool. At 50 metres deep with 41,000m³ volume complete with hyperbaric and hypobaric chambers, it will be capable of simulating challenging offshore environments. It will be used for training and testing for submersibles, drones and commercial diving.

With its poolside crane and opening roof, that allows up to 100-tonnes of equipment to be lifted and submerged into the pool, the expert team behind the facility is targeting the offshore renewables and oil and gas sectors as

potential clients for training and testing for commercial diving, submersibles and drones.

With its dramatic glass-fronted façade, the pool lies at the heart of this unique building.

DEEP-SEA TRAINING AND TESTING

Its large lay-down areas, crane and associated handling and storage around the pool facility provides scope for multiple forms of deep sea training and testing. Blue Abyss' Kuehnegger Human Performance Centre for human life science sector clients and its microgravity suite for human spaceflight, will also be housed in the building

HARMONY BETWEEN SEA AND SPACE

Mr Partington created Blue Abyss in a sweeping design with gentle curves and tail to reflect a "perfect harmony between sea and space." Its shape resembles a horseshoe crab and a speeding comet created "to wrap around the people it serves". He added "Understanding how the different aspects of Blue Abyss work together and the problems you have to solve is very important, and helps to drive a design solution that makes the most efficient and effective use of space."

HELPS COST-REDUCTION AND INNOVATION IN RENEWABLES

The team behind Blue Abyss is currently in talks with the offshore wind and oil & gas industries about how Blue Abyss facilities could support and accelerate innovation in the industry and help it to meet the demands for cost reduction across the sector and its use by the supply chain

The East of England, and the UK has become a world leader for offshore

wind with its strong and growing supply chain of companies, and are close to the facility's planned site in Essex.

REPLICATING OFFSHORE TIDAL, WAVE AND CURRENT CONDITIONS

Blue Abyss will be able to replicate the challenges of tidal, wave and current conditions in the Southern North Sea in a safe and controlled environment, offering multiple opportunities for simulation, cable connection training, submersibles training and testing for offshore wind installation, oil & gas work scopes, decommissioning solutions, deep sea diving and even drone training.

IMPROVES COMPETITIVENESS

Celia Anderson, of the Blue Abyss team, is talking with the supply chain companies about their needs to, improve their offer to the industry, improve their competitiveness in an increasingly competitive market and develop equipment and skills within Blue Abyss.

Such a facility in the East of England would cut costs for companies currently using deep pool and tank facilities in Fort William and on the south coast, she said.

HUGE POTENTIAL TO SUPPORT INNOVATION

Celia expanded: "There is huge pressure on offshore wind to bring down its costs and the companies involved are looking

at every way to achieve that. Having a facility like Blue Abyss within easy travel distance of the east coast, with its huge potential to support innovation, fits into achieving these targets.

"Our clients can simulate the ROV installation of J tubes and connecting cables, changing bearings at the base of a turbine tower...the list is endless."

SUBSEA EQUIPMENT, DIVER DECOMPRESSION AND DRY DIVES

The contained and controlled environment with pressure testing, is an ideal environment for research and development for subsea equipment, diver decompression and dry dives, she said.

Perfect conditions would also be offered for the testing of the likes of acoustic baffles or new equipment required to support activities in the deeper waters.

120-BED HOTEL

Blue Abyss would also offer a conference amphitheatre and training rooms, a 120-bed hotel with large central community area and on-site parking at the University of Essex's Knowledge Gateway Innovation Park.

The team is in the final stages of securing funding before seeking full planning consent for the site.

Blue Abyss

INSTALLATION WORKS ON OFFSHORE WINDFARMS

In the last 15 years, MPI Offshore has established itself as a pioneer and one of the few market leaders when it comes to wind turbine installation vessels.

However, in the last 15 years, the market has changed significantly requiring fewer interfaces, bespoke engineering services, greater performance responsibilities and a comprehensive service from start to finish. That being said, this article will highlight two of MPI's recent projects in which the sister-vessels MPI Adventure and MPI Discovery played a vital role.

SANDBANK

The first project is the 288MW offshore windfarm Sandbank which consists of 72 Siemens SWT-4.0-130 offshore wind turbines (WTGs), foundations, inter-array cables and an offshore substation. The windfarm is located in the German Bight, within the German Exclusive Economic Zone (EEZ), close to the German-Danish border. The offshore installation site is located approximately 100km West-Northwest of the island of Sylt and approximately 105km off the harbour of Esbjerg, Denmark.

Before commencing the actual WTG installation works, MPI Adventure was used as a walk-to-work and accommodation vessel for the substation commissioning team. The substation itself is located right in the middle of the offshore windfarm and will connect the 72 WTGs to the Sylwin 1 Converter station which delivers the electricity to the German grid. The contract to assist with the commissioning of the substation gave the involved offshore teams the opportunity to get acquainted. The advantage of this became clear by the time the WTG installation works started.

Since July 2016, the Port of Esbjerg was used to load the installation vessel with six WTGs per cycle (towers, nacelles and

blades). Later that month, Sandbank's first WTG was installed. Over the course of the following 6 months, the remaining WTGs were installed with a distance between each of the turbines of approximately 1,000m. Transit from Esbjerg to the offshore windfarm took approximately six hours and in favourable weather conditions a full WTG (tower, nacelle & blades) was erected per day. The final turbine was installed by the end of January 2017, some three months ahead of schedule.

UNPRECEDENTED LEVEL OF COOPERATION

MPI Managing Director, Peter Robinson, commented, *"This project was delivered with an unprecedented level of cooperation between developer, turbine supplier and turbine installation vessel owners. Both the onshore and offshore teams involved in this sound working relationship can walk away very proud of their efforts."*

Along with the supply of the vessel, MPI was responsible for the design, engineering and manufacturing of the sea fastenings which were used during the transportation and installation of all the above mentioned turbines. Once the offshore windfarm is fully commissioned, it will be able to generate green electricity for more than 400,000 households.

RAMPION

The second project to be highlighted is Rampion Offshore Wind (ROW). This project is broken up in two sections relating to the installation of the foundations and the offshore wind turbines.

FOUNDATION INSTALLATION

In 2015, MPI was contracted by Rampion Offshore Wind (ROW) to provide the project management and engineering services associated with foundation mobilisation, load out, installation and demobilisation using its vessel MPI Discovery. The Rampion Offshore Windfarm (400MW) is situated off the South coast of England and consists of 116 WTGs supported by traditional monopile and transition piece foundations.

The engineering services commenced in the spring of 2015, developing innovative designs for transverse monopile sea fastening grillages and a complex upending hinge for varying sizes of monopiles up to 6.5m diameter and 850te in weight. Innovation included a unique saddle design which adapted for multiple sizes of monopiles and provided the necessary transverse restraint to meet the most onerous sailing criteria.

MPI Discovery was mobilised in December 2015 and commenced foundation installation in the Rampion field on January 16th 2016. Installation progressed until the commencement of the no-piling period on 15th April to 30th June 2016. During this first phase of works, 18 foundations were installed.

In parallel, MPI was also contracted to provide the project management and engineering services for a second vessel (Pacific Orca) which was due to commence foundation installation from 1st July 2016 as part of a 2 vessel installation strategy implemented by ROW. The vessel was mobilised in June 2016 in Teesside and commenced installation in the field in July 2016. The deck layout and

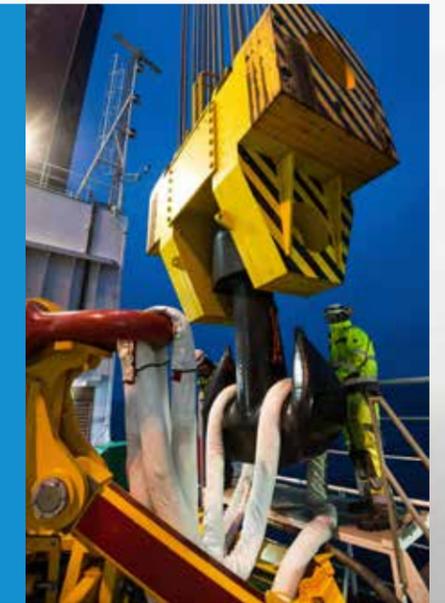
installation concept mirrored the MPI Discovery arrangements.

From 1st July until 12th November 2016 both vessels combined to achieve a remarkable installation rate to achieve completion of all remaining foundations (98No.) with MPI Discovery achieving 51 of these. This impressive installation rate was achieved through detailed planning, innovative designs and a proactive, collaborative approach with the client and other key stakeholders.

WTG INSTALLATION

In the spring of 2016, MPI was awarded the contract to provide project management and engineering services associated with

“THIS PROJECT WAS DELIVERED WITH AN UNPRECEDENTED LEVEL OF COOPERATION”



the WTG mobilisation, load out, installation and demobilisation using its vessel MPI Discovery. The turbines are Vestas V112 3.45MW machines.

The engineering works were completed in the Summer of 2016, the sea fastening grillages manufactured in Autumn and the vessel mobilised in December 2016. The installation of WTG's is due to commence in the next couple of weeks.

In addition to the above scope MPI has also been contracted by ROW to provide the sister-vessel MPI Adventure to work in parallel with MPI Discovery including all project management and engineering services.

MPI Offshore





INSTALLATION OF THE FIRST TURBINE ON DUDGEON OFFSHORE WINDFARM

The first turbine out of the 67 Siemens 6MW turbines was installed safely on 7 January 2017 by the experienced crew on board A2Sea's installation vessel Sea Challenger at the new Dudgeon Offshore Windfarm for Statoil, Masdar and Statkraft.

GREEN PORT HULL FIRST

During the coming months, the vessel will install the turbines being shipped from Green Port Hull in the UK. This is the first time, the Port of Hull will be used as a load out port for an offshore wind project.

VESSEL VERSATILITY

Since 1 September 2016, the vessel has been used for offshore accommodation during completion and commissioning of the offshore substation. The vessel was jacked up to 20m above sea level and had accommodation for 80 persons including the A2SEA crew.

During this period the vessel has gained good knowledge of the site and built up a very good working relationship with both Siemens and Statoil.

TEAMWORK

CEO at A2SEA, Jens Frederik Hansen is very satisfied with the dedicated and professional performance by the crew both onshore and offshore: *"We have wide experience in handling the Siemens 6MW turbines, but it cannot be done without good team work. It is a great pleasure to once again work together with Siemens, but also our renewed cooperation and partnership with Statoil, which started on their first offshore wind project Sheringham Shoal and now continues on the Dudgeon project."*

LOCATION

The Dudgeon Offshore Windfarm is owned by Statoil (35%), Masdar (35%) and Statkraft (30%) and is situated 32 km off the coast of the seaside town of Cromer in North Norfolk in the UK.

When fully commissioned in 2017, the Dudgeon Offshore Windfarm will provide well over 400,000 households with renewable power.

A2Sea



VESSEL INSPECTIONS

Specialist Marine Consultants started conducting vessel inspections in the offshore industry 10 years ago and in that time the company has inspected over 1500 vessels worldwide including Europe, America, Australia, China, Brazil and Asia. Just last year alone they inspected nearly 200 vessels and is now one of the leading vessel inspection companies in Europe.

ACCREDITATION & EXPERIENCE

All SMC inspectors are AVI accredited with over 20 years' experience within the offshore industry and are experienced in the use of eCMID. As of January 2018 only validated AVI's will be able to use the eCMID database and thereby conduct these IMCA CMID and MISW inspections. With the large pool of inspectors that the company has, they can respond globally at short notice to meet client's needs.

COMMITMENT

SMC's Vessel Inspection Coordinator Kerry Hunter said *"It has been one of the best years we have had with vessel inspections and with our committed team who are available at short notice, this makes achieving our goals far easier."*

APPRECIATION

"We would like to take this opportunity to thank all our customers past and present for your continued support and we look forward to working with you all in 2017."

Specialist Marine Consultants

SINGLE CONTRACT BESPOKE SOLUTIONS

Fred. Olsen Windcarrier offers wide ranging, flexible and bespoke solutions through a single contract.

As well as having two supreme and flexible jack-up installation vessels in Brave Tern and Bold Tern, the company provides specialist engineering and project management expertise, around 600 of the industry's most experienced technicians through related company Global Wind Service, a fleet of high performance service vessels and a reputation for getting the job done safely, efficiently and reliably.

HISTORY

Built on 169 years of offshore and marine experience, Fred. Olsen Windcarrier was established in 2008 and took delivery of the two self-propelled jack-up vessels 4 years ago.

Both Tern vessels underwent upgrades during 2016. The upgrades included extending the jacking legs by 14m, making the legs 92.4m long. The cranes were prepared for a boom extension

of up to 20m. This included both an insert piece for the crane boom and an extension of the A-frame. The lifting height is now 120m from the main deck.

BLOCK ISLAND OFFSHORE WINDFARM

One of the top highlights to date has been the installation on the Block Island Offshore Windfarm – the first offshore windfarm to ever be installed in U.S. waters. The company's scope of work included the transportation of 5 GE nacelles across the Atlantic and installation of the complete Haliade 150-6MW turbines at Block Island.

They worked closely with American companies to deliver the project, in particular with U.S. flagged feeder barges for the transportation of towers and blades from shore. The project was safely completed in just over 70 days, ahead of schedule.

FAST TRACK PROJECTS

Fred. Olsen Windcarrier has also undertaken several short o&m fast track projects across numerous locations in Germany and the UK, with project assignment to execution within a short timeframe. These projects were carried out smoothly and efficiently.

During the Global Tech I project, Fred. Olsen Windcarrier made a record performance in the transportation and installation of 8 turbines in 1 week, including 10 hours transfer time each way to the windfarm. The flexibility of the vessels was key to achieving this operational target.

Fred. Olsen Windcarrier



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