

# INNOVATION

UK Success Stories  
Powered by ORE Catapult

**CATAPULT**  
Offshore Renewable Energy

We work with  
**Innovate UK**

CONTENTS

2 Foreword

4 Our Impact In 2017 / 2018

6 Robotics & AI:  
Rovco, Octue, Perceptual  
Robotics, Modus & Osbit

10 UK Manufacturing Opportunity:  
JDR Cables, Nova Innovation,  
GreenSpur, FS Found, Tekmar,  
Buoyant Works, Magnomatics

16 Technology Transfer:  
ACT Blade, ATAM, GyroMetric  
Systems, ODB

20 Driving Safety & improving O&M:  
Limpet Technology

22 Collaborating to Improve  
Productivity:  
Our Research Programme,  
XL Blade, Atlantis Resources,  
Operations & Maintenance Centre  
of Excellence, SPOWTT,  
SPARTA /WEBS, Offshore Wind  
Innovation Hub



Andrew Jamieson,  
Chief Executive,  
Offshore Renewable  
Energy Catapult

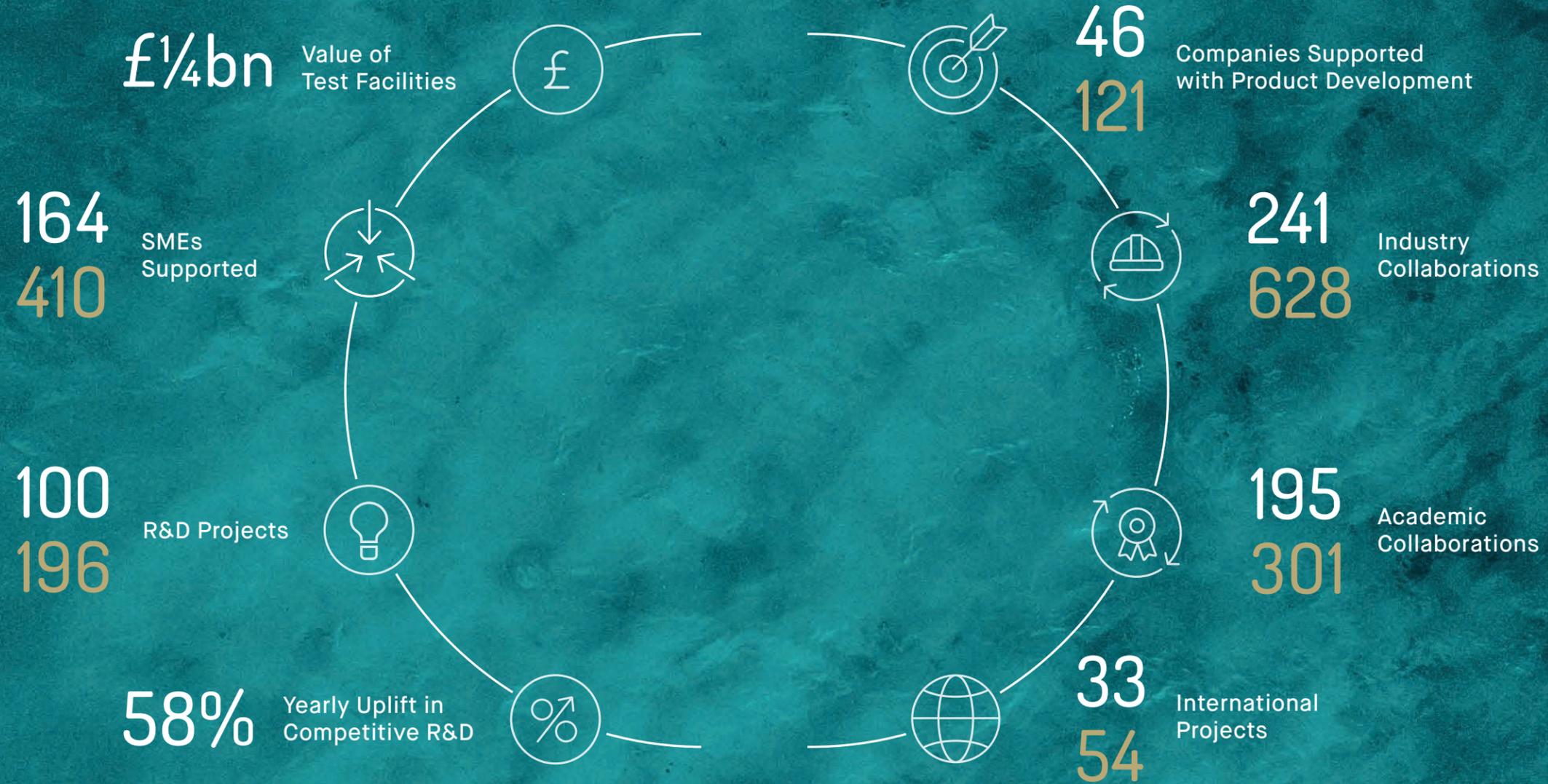
I am extremely pleased with the significant progress made by the UK's offshore renewables industry in this last year. We have witnessed some truly watershed moments in its continuing development.

In offshore wind, costs continue to fall dramatically. We are now seeing strike prices as low as £57.50/MWh – smashing the target of reaching £100/MWh by 2020. The industry unveiled ambitious plans as part of its proposed Sector Deal to Government to deliver 30GW of offshore wind by 2030 – stimulating £48bn in UK infrastructure investment, supporting 27,000 skilled jobs, reducing electricity costs to consumers by £2.4 billion, and seeking to drive a five-fold increase in exports.

Momentum is also building in the UK's wave and tidal industries, with a recent Catapult report showing that the marine industries can meet the UK Government's "Triple Test" for emerging technology support – achieving maximum carbon reduction, showing a clear cost reduction pathway, and demonstrating that the UK can be a world-leader in a global market.

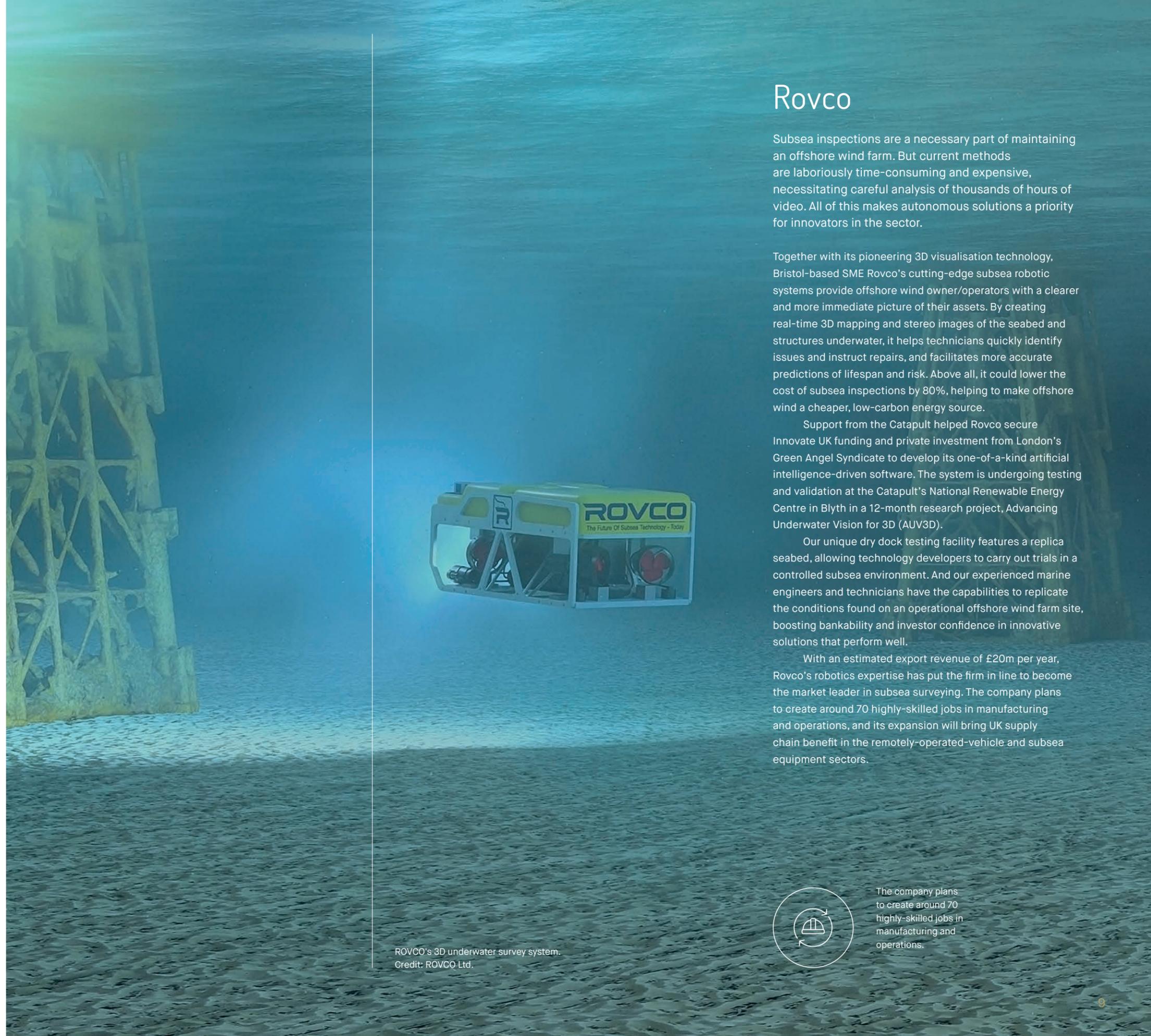
Innovation, underpinned by a strong UK supply chain, is key to ensuring that offshore wind, wave and tidal play a key role in the UK's future energy mix. ORE Catapult's mission is to reduce the cost of clean energy and grow UK businesses through technology innovation in offshore renewables. Working with industry, government and academia, we provide leadership on the innovation priorities for the sector and support industry through testing, demonstration, validation, and research and development activities. Through our partnerships with global OEMs and utilities, we enable success for UK innovators: working with them to develop and de-risk new products and services, or identifying technology transfer opportunities from other industries into offshore renewables.

In this document, I am pleased to be able to profile some of the leading UK companies and innovative projects we are working with that are proving to be game-changing for the offshore renewable energy industry. They are excellent examples of innovation progress in the sector, and are testament to the success of the Catapult's core mission to support high-growth SMEs to drive the UK economy.



○ 2017/2018 Figures  
○ Figures since 2013

Introducing robotics and artificial intelligence applications into offshore renewables is set to revolutionise how we generate power – with UK innovators among those leading the way to cheaper, cleaner energy for all. The UK has the opportunity to take a real lead in the development of a robotics sector designed specifically for offshore renewables, creating many high-value technical jobs to meet the design, construction and maintenance requirements of these devices.



## Rovco

Subsea inspections are a necessary part of maintaining an offshore wind farm. But current methods are laboriously time-consuming and expensive, necessitating careful analysis of thousands of hours of video. All of this makes autonomous solutions a priority for innovators in the sector.

Together with its pioneering 3D visualisation technology, Bristol-based SME Rovco's cutting-edge subsea robotic systems provide offshore wind owner/operators with a clearer and more immediate picture of their assets. By creating real-time 3D mapping and stereo images of the seabed and structures underwater, it helps technicians quickly identify issues and instruct repairs, and facilitates more accurate predictions of lifespan and risk. Above all, it could lower the cost of subsea inspections by 80%, helping to make offshore wind a cheaper, low-carbon energy source.

Support from the Catapult helped Rovco secure Innovate UK funding and private investment from London's Green Angel Syndicate to develop its one-of-a-kind artificial intelligence-driven software. The system is undergoing testing and validation at the Catapult's National Renewable Energy Centre in Blyth in a 12-month research project, Advancing Underwater Vision for 3D (AUV3D).

Our unique dry dock testing facility features a replica seabed, allowing technology developers to carry out trials in a controlled subsea environment. And our experienced marine engineers and technicians have the capabilities to replicate the conditions found on an operational offshore wind farm site, boosting bankability and investor confidence in innovative solutions that perform well.

With an estimated export revenue of £20m per year, Rovco's robotics expertise has put the firm in line to become the market leader in subsea surveying. The company plans to create around 70 highly-skilled jobs in manufacturing and operations, and its expansion will bring UK supply chain benefit in the remotely-operated-vehicle and subsea equipment sectors.

ROVCO's 3D underwater survey system.  
Credit: ROVCO Ltd.



The company plans to create around 70 highly-skilled jobs in manufacturing and operations.



Octue's software could reduce LCoE by 2.4% when applied across a whole wind farm.

## Octue

The proliferation of digital twinning – creating dynamic software models of physical structures – is ushering in a new era in which sensor data and artificial intelligence are allowing engineers and technicians to better predict how their assets respond to real-world conditions.

The Cambridge-based SME Octue Ltd specialises in building wind farm digital twins, helping owner/operators improve control strategies. That provides a competitive advantage by increasing the structural lifetime of the wind farm's components: blades, for example, benefit from reduced loads and undergo less stress over their lifespan.

The Catapult collaborated with Octue on the Innovate UK-funded Simulation to enable Asset Life Extension of wind turbines (SALE) project, which aimed to demonstrate the ability of the company's flow characterisation methodology and simulation tool.

It enabled Octue to validate its software – which, through lower maintenance, reduced failures, and increased production, could reduce the levelised cost of energy (LCoE) by 2.4% when applied across a whole wind farm.

“Collaborating with the Catapult provided a sounding board for ideas as well as high-calibre test facilities. The support has been nothing short of transformational for Octue.”

Tom Clark, Technical Director, Octue

ORE Catapult's Levenmouth 7MW demonstration offshore wind turbine

## Modus & Osbit

The cost of surveying the seabed and inspecting subsea cables and foundations represents a major challenge for the offshore wind industry. Inspections and surveys using vessels, technicians and divers are expensive and potentially dangerous, creating a significant market opportunity for disruptive solutions that are cheaper and less risky.

Subsea specialist Modus Seabed Intervention, in partnership with Osbit Ltd, is developing a novel AUV docking station that will enable autonomous underwater vehicles (AUVs) to remain at offshore wind farm sites without a support vessel, in a move that could shave £1.1billion from the operating cost of Europe's offshore wind farms.

The Catapult is working with Modus as part of the Autonomous Vehicle for the Inspection of offshore wind farm Subsea Infrastructure (AVISIoN) project, which will enable further development, testing and demonstrations of Modus' existing Hybrid AUV capability, and docking station. Offshore wind farm developers innogy, EDF Energy and E.ON are also supporting the project, with innogy agreeing to carry out commercial trials at the Gwynt y Môr offshore wind farm.

## Perceptual Robotics

Perceptual Robotics, based in Bristol, is an SME specialising in intelligent algorithms for automating Unmanned Aerial Vehicles (UAVs). Its Dhalion system is a UAV with 3D tracking that uses AI and situational awareness to access turbine blades in hazardous conditions. At the push of a button, the system can autonomously inspect a wind turbine in minutes to collect data on blade issues such as lightning strikes, cracks, erosion and delamination – a significant improvement on current inspection methods, which can take hours to gather data.

With access to offshore wind farms a key commercialisation hurdle, Perceptual is working alongside the Catapult to test and validate the technology by operating it in real-world environments on the 7MW Levenmouth Demonstration Turbine. The project will evolve Perceptual's onshore turbine inspection system and make it suitable for use offshore. It's estimated that the fully-autonomous system could, if applied across Europe's current 16GW offshore wind fleet, offer lifetime savings of almost £1bn for the sector, through lowering of operational expenditure and maximising operational life and economic returns.



Potential savings of £1.1billion from the operating cost of Europe's offshore wind farms.

Indigenous manufacturing is reflective of a strong and growing domestic supply chain, not only supporting the needs of UK infrastructure but also well placed to capitalise on global export opportunities. These companies and projects are trailblazing technology development and manufacture right here in the UK.



Image courtesy of JDR Cables



JDR Cables has supplied 155km of 66kV cables to Scottish Power Renewables' €100m East Anglia One wind farm.

## JDR Cables

To bring its pioneering 66kV technology to market, subsea cable manufacturer JDR Cables chose ORE Catapult to provide electrical testing throughout its development, qualification and type testing programme.

As a long-term test partner of JDR, we developed a bespoke facility to validate and de-risk the new cables, giving the Hartlepool-based firm the confidence that its first-of-its-kind technology can withstand the higher loads and harsh conditions offshore.

After the unveiling of the new cables in July 2016, what happened next was unprecedented. JDR was awarded its first 66 kV array cable contract in December that year, to manufacture over 20km of cable for the 90+MW European Offshore Wind Deployment Centre in Aberdeen Bay. April 2017 saw further success for the cable maker, with a contract to supply 155km of 66kV cables at ScottishPower Renewables' €100m East Anglia One.

The benefits – in reducing costs, in UK supply chain content, and in creating jobs – have already been enormous, and haven't yet been fully realised. This is a UK-forged success story that has the potential to keep getting bigger.

"To bring its pioneering 66kV technology to market, subsea cable manufacturer JDR Cables chose ORE Catapult to provide electrical testing throughout its development, qualification and type testing programme."

Jeremy Featherstone, Product Development Director, JDR Cable Systems

## Nova Innovation

The tidal stream industry has made significant progress in the past decade. Recent research points to its potential to boost the UK's economy by £1.4bn, adding 4000 jobs and supporting coastal communities in need of economic regeneration. But developers are still proving their technology, and there remains work to be done before the sector becomes fully cost-competitive with other forms of renewables generation.

Nova Innovation is one of the firms leading the charge for tidal energy. The game-changing Edinburgh firm scored a world-first in 2016 with its three-turbine Shetland Array, a project delivered with 80% Scottish supply chain content, and is now the lead partner in the £20.2m European project Enabling Future Arrays in Tidal (EnFAIT).

As well as adding another three turbines to the Shetland Array, making it the largest tidal array in the world, EnFAIT will reposition the turbines to explore the optimum layout for the array to operate most efficiently. The Catapult's role involves the use of industry-leading computer modelling software to demonstrate that the project could reduce the cost of tidal energy by 40% – work that paves the way for rapid development in the sector.



GreenSpur's generator undergoing testing on our 1MW facility



GreenSpur's technology could lead to the creation of over 3,000 new jobs in the UK.

## GreenSpur

Today's generation of multi-megawatt wind turbines are increasingly using direct drive generators to produce electricity. However, these generators use large volumes of rare earth magnets, which are scarce, expensive and sourced almost exclusively from China.

GreenSpur Renewables was established to develop and commercialise a new direct drive generator that exclusively uses ferrite – an abundant material around forty times cheaper than rare earth – as an alternative. GreenSpur's concept removes the price and supply risks of using rare earth magnets, and presents enormous opportunities for UK-based manufacturing and its associated supply chain.

After helping the company secure Innovate UK funding to scale up its pioneering generator, the Catapult worked with the Essex-based SME to successfully test its 75kW prototype generator at the National Renewable Energy Centre in 2017. If scaled up to the 2-3GW level, the technology could lead to the creation of over 3,000 new jobs in the UK. This is a revolutionary UK technology with the potential to have a global impact.

## FS Found

As part of the Demowind-funded FS Found project, the Catapult partnered with Blyth Offshore Demonstrator, EDF Energy R&D UK Centre and BAM Wind Energy JV to demonstrate and validate revolutionary "float-and-submerge" gravity-based foundations (GBFs) at the Blyth Offshore Demonstrator Wind Farm.

GBFs have the potential to impact positively upon the development of offshore wind farms in water depths of more than 35m, and lower the cost of offshore wind energy. It's the first full-scale wind farm to deploy GBFs, and two of the wind farm's five foundations have been fitted with a ground-breaking sensor system designed by the Catapult.

The Catapult's role in the project is two-fold. Firstly, we'll be analysing the performance of the foundations in the field. Secondly, the project will determine how to carry out prognostics and diagnostics on this kind of foundation in the future. The data and understanding derived will be vital in improving design optimisation and reducing costs, helping to make GBFs commercially viable as a foundation solution.



Image courtesy of EDF Energy Renewables

## Tekmar

Subsea cables work in punishing conditions far offshore, and require rigorous testing to ensure they can remain operational for their entire lifespan – which is expected to be around 25-40 years. The market-leading cable protection specialist Tekmar Energy designs, manufactures and supplies a range of umbilicals and flexible systems that provides significant lifetime savings for offshore wind owner/operators.

The Catapult's world-leading facilities enabled Tekmar to conduct five weeks of product testing, demonstration trials, and testing of installation techniques on the County Durham-based company's TekLink® cable protection and TekTube® J-tube replacement systems.

Less than three months after completion of the trials, Tekmar was awarded a major contract by offshore cable installation contractor VBMS to supply its newly-launched TekTube® to the Westermeerwind offshore wind farm in the Netherlands. And in May 2018, the firm won two major orders supporting Van Oord on the Deutsche Bucht and BorWin 3 farms – helped, in part, due to the "unique industrial advantage" provided by the Catapult's "high-quality" facilities.



## Buoyant Works

We're helping Cornwall-based Buoyant Works, developer of a protective sheaf for foundation landing piles, redesign the accessibility of offshore wind turbines.

A separate sheaf designed to fit around the wind turbine landing piles, WindShield's high-grip outer surface and impact-absorbing structure enables the safe movement of engineers from crew transfer vessels. As well as increasing safety, once installed, WindShield can extend the life of turbine landing piles by reducing impact loads through a compressible internal structure. It can also extend the operational window of vessels, thanks to increased grip and a more stable connection – increasing the number of potential access days. The sheaf also acts as protection against common wear, corrosion and impact damage on the landing piles, significantly reducing maintenance requirements and associated costs for windfarm managers.

Currently in the prototype testing phase, the Catapult – through its strategic partnership with Marine-i – is providing support in development planning, product development and marketing of WindShield, and will facilitate industry trials prior to market launch in March 2019.

## Magnomatics

Led by Sheffield-based SME Magnomatics, the Compact High-Efficiency Generator (CHEG) project is an EU DemoWind-funded collaborative programme aimed at driving down costs and increasing generator efficiency in large offshore wind turbines.

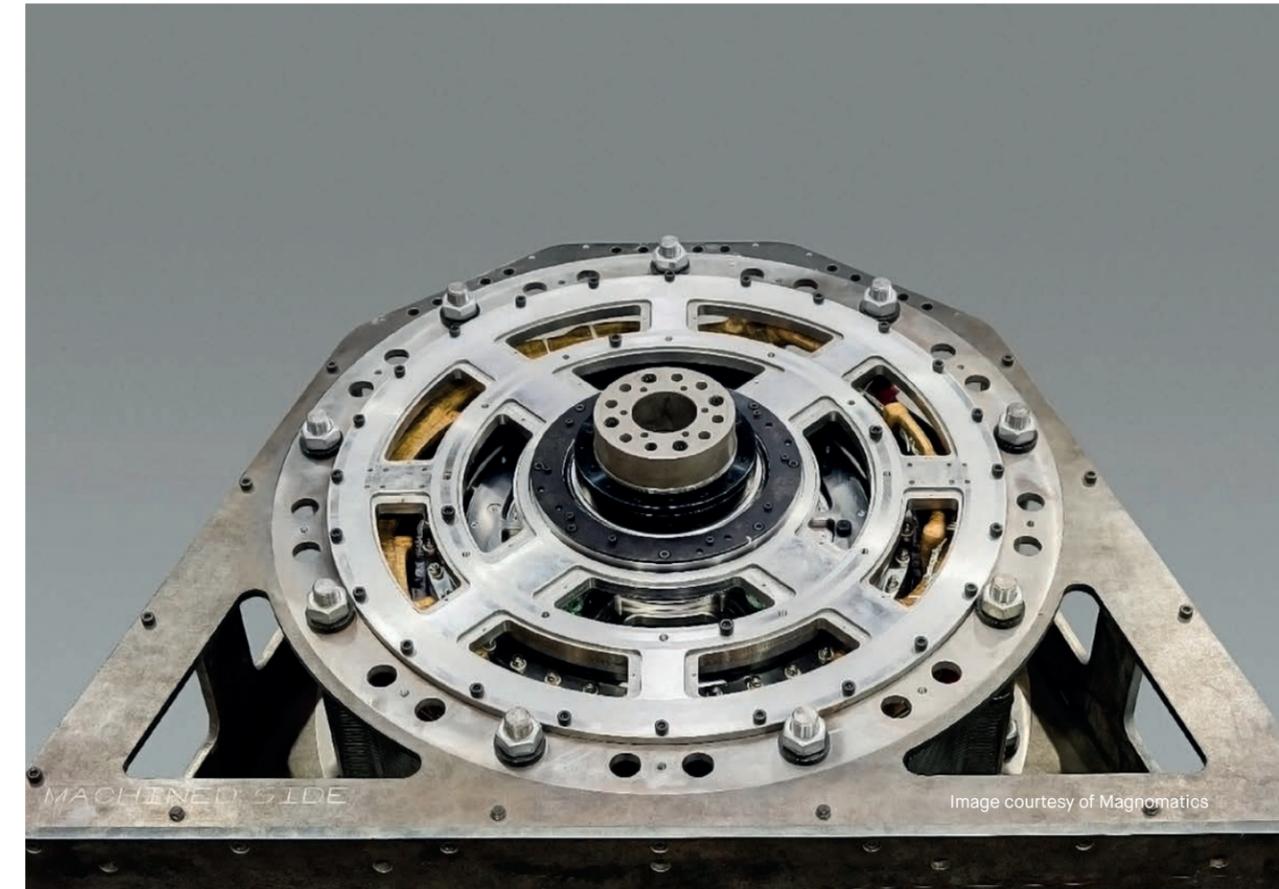


Potential 2.9% reduction in the cost of energy.

The project will deliver a 500kW pseudo direct drive (PDD) generator based around Magnomatics' innovative magnetic gear technology, which replaces the traditional turbine generator and gearbox with a single, magnetically-g geared permanent magnet generator. As gearboxes are one of the most common sources of component failure in offshore wind, PDD technology could have significant advantages in terms of reliability and lower maintenance costs when scaled up to the size of current offshore wind turbines.

The Catapult's research team has played a key role in the development, specification and concept model review of the generator, while our testing team are developing a rigorous programme to prove and demonstrate the prototype's feasibility in our 3MW powertrain test facility.

The project team has established a potential 2.9% reduction in the cost of energy through using the system – which, along with lower maintenance costs, makes the switch to PDD generators an attractive prospect.



Transferring technology and knowledge from other sectors has been a key enabler of the success of the UK's offshore renewables sector. Innovation isn't always about developing new products and services – these companies and projects are exemplars of how to repurpose old dogs for new tricks.

## ACT Blade

In 2014, Dr Sabrina Malpede spotted an opportunity to adapt her company's award-winning sail technology for wind turbine blades. After successfully responding to a Catapult Innovation Challenge, a feasibility study identified that a blade constructed using Dr Malpede's textile technology could be 50% lighter than a conventional fibreglass blade.

This game-changing insight led to the formation of ACT Blade Ltd, a new company spun out to exploit SMAR Azure's lightweight sails for competition boats. Early analysis suggests the textile blade could produce energy gains of 9.3% and a levelised cost of energy (LCoE) reduction of 8.7%, making it among the most exciting innovations in the history of renewable energy.

"Thanks to the support we received from the Catapult to secure Innovate UK funding, a small section of the world's first textile blade has been produced and is now being tested," says Dr. Malpede. The coming together of ACT Blade's technology and the Catapult's renewables expertise has created something truly groundbreaking, and is setting the stage for a step change in the future of offshore wind.



ACT Blade's textile technology could be 50% lighter than a conventional fibreglass blade.



Dr Sabrina Malpede,  
CEO, ACT Blade

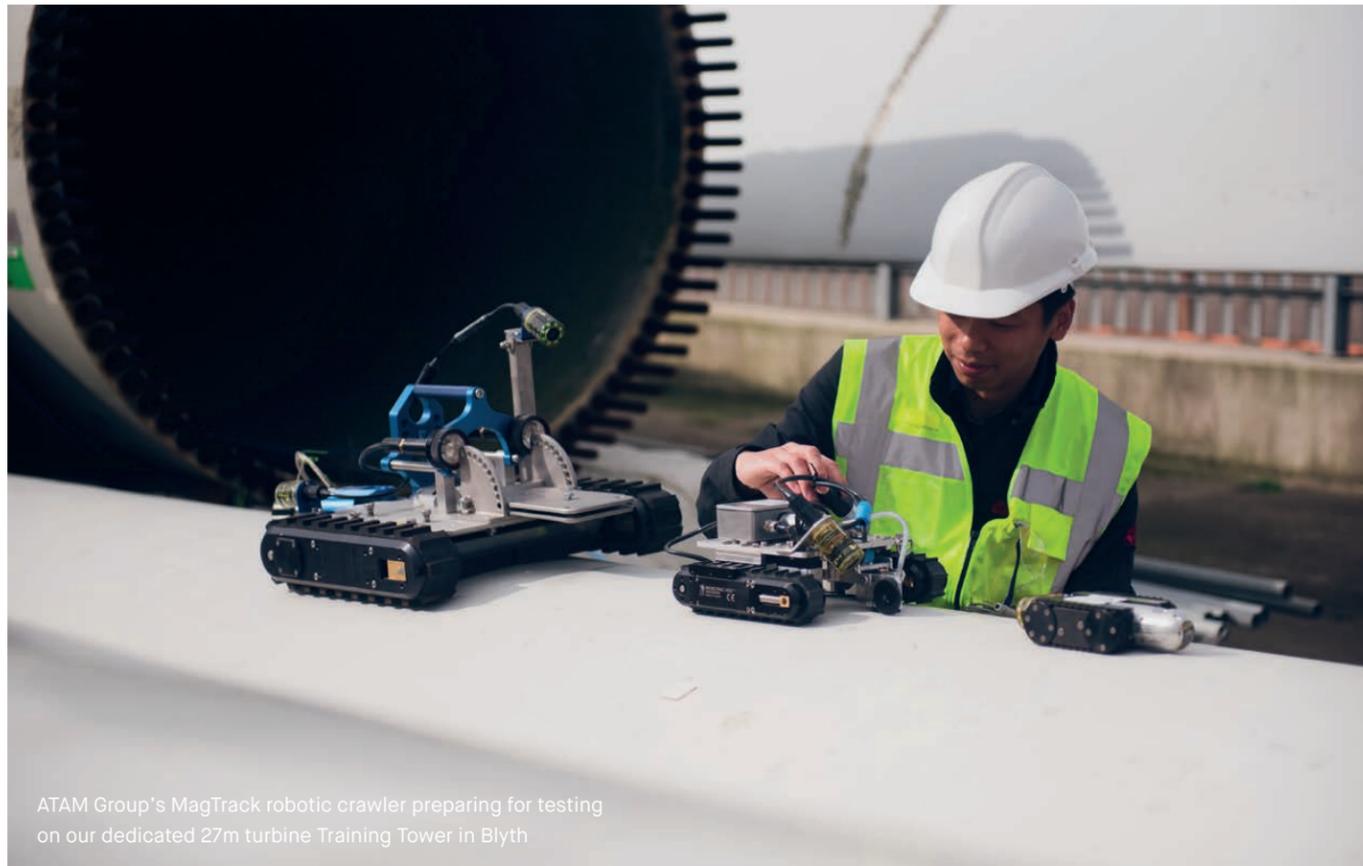


# ATAM Group

Remotely-operated vehicles (ROVs) like oil and gas specialists ATAM Group's MagTrack robotic crawler represent a breakthrough in autonomous offshore wind technology. The MagTrack uses magnets to grip and climb the turbine's tower, beaming back images of its blades using an inbuilt high definition camera.

The dedicated 27m turbine Training Tower at the Catapult's National Renewable Energy Centre in Blyth provided a perfect platform for ATAM to test MagTrack's effectiveness in conditions similar to those experienced on an offshore wind turbine. Engineers from the Catapult witnessed the test and supported ATAM with independent advice, making a number of recommendations to help the Great Yarmouth-based firm deploy proof of concept and de-risk the ROV as a solution for the offshore wind industry.

And in forthcoming tests, the Catapult will help investigate the feasibility of adapting ATAM MagTrack to crawl inside turbine blades and also deploy its available non-destructive testing tools from the magnetic platform, an innovation which has the potential to yield enormous benefits in terms of cost and technician safety.



ATAM Group's MagTrack robotic crawler preparing for testing on our dedicated 27m turbine Training Tower in Blyth



O&M makes up 20% of offshore wind lifetime costs. Innovations like the ATAM MagTrack will help reduce downtime losses and increase power generated, making significant savings.

# GyroMetric Systems

The smallest crack or defect in a generator's drivetrain can have catastrophic consequences. As such, spotting indicators of faults and stopping them before they happen has become a key battleground in enhancing the efficiency and availability of offshore wind farms.

Nottingham-based GyroMetric Systems, a well-established name in the maritime sector, has overcome the problems associated with monitoring the health of large-scale rotating systems with its innovative digital system. It developed an "incremental motion encoder", which uses artificial intelligence techniques and alerts turbine operators to faults in the drivetrain – allowing for repairs before problems worsen.

The Catapult provided the renewables industry expertise to help Gyrometric transfer their technology from the maritime sector into renewables, and our drivetrain experts hooked the system up to our world-leading 15MW powertrain test facility. Testing showed that the new technology can measure shaft behaviour more accurately, improving design optimisation and reducing material costs using the collected data – providing a competitive advantage for wind farm Owner/Operators.

Since testing started, GyroMetric attracted a significant investment, providing a boost for both the company and the UK's growing offshore wind supply chain.



The Sheffield-based company secured £200k funding from Innovate UK to further develop its solution.

# ODB

Protecting turbine blades from leading edge erosion is a key area of research and innovation for the offshore wind sector. With the market for cutting-edge erosion solutions estimated to be worth around £1.2bn for UK businesses over the next decade, the Catapult is working to support the supply chain and manufacturers to develop and commercialise new products and services to exploit this significant opportunity.

An innovative metallic alloy protection system by aerospace firm Doncasters Bramah is one of seven new technologies under development as part of the EU Demowind-funded Offshore Demonstration Blade (ODB) project. The Catapult's engineering expertise and world-leading test facilities have helped the Sheffield-based company secure £200k funding from Innovate UK to further develop its solution, with plans to retrofit the system to the 7MW Levenmouth Demonstration Turbine.

Doncasters Bramah has now entered a two-year collaborative project with the Catapult and specialist design company Performance Engineered Solutions to build on these positive results and develop an optimised leading edge protection system which can then be demonstrated to offshore wind turbine manufacturers.

Unscheduled O&M activities on offshore wind installations account for almost a quarter of the lifetime cost of an offshore farm, so small improvements in the way we operate and maintain them can result in huge cost savings, as well as improvements in productivity and the health and well-being of workers.

## Limpet Technology

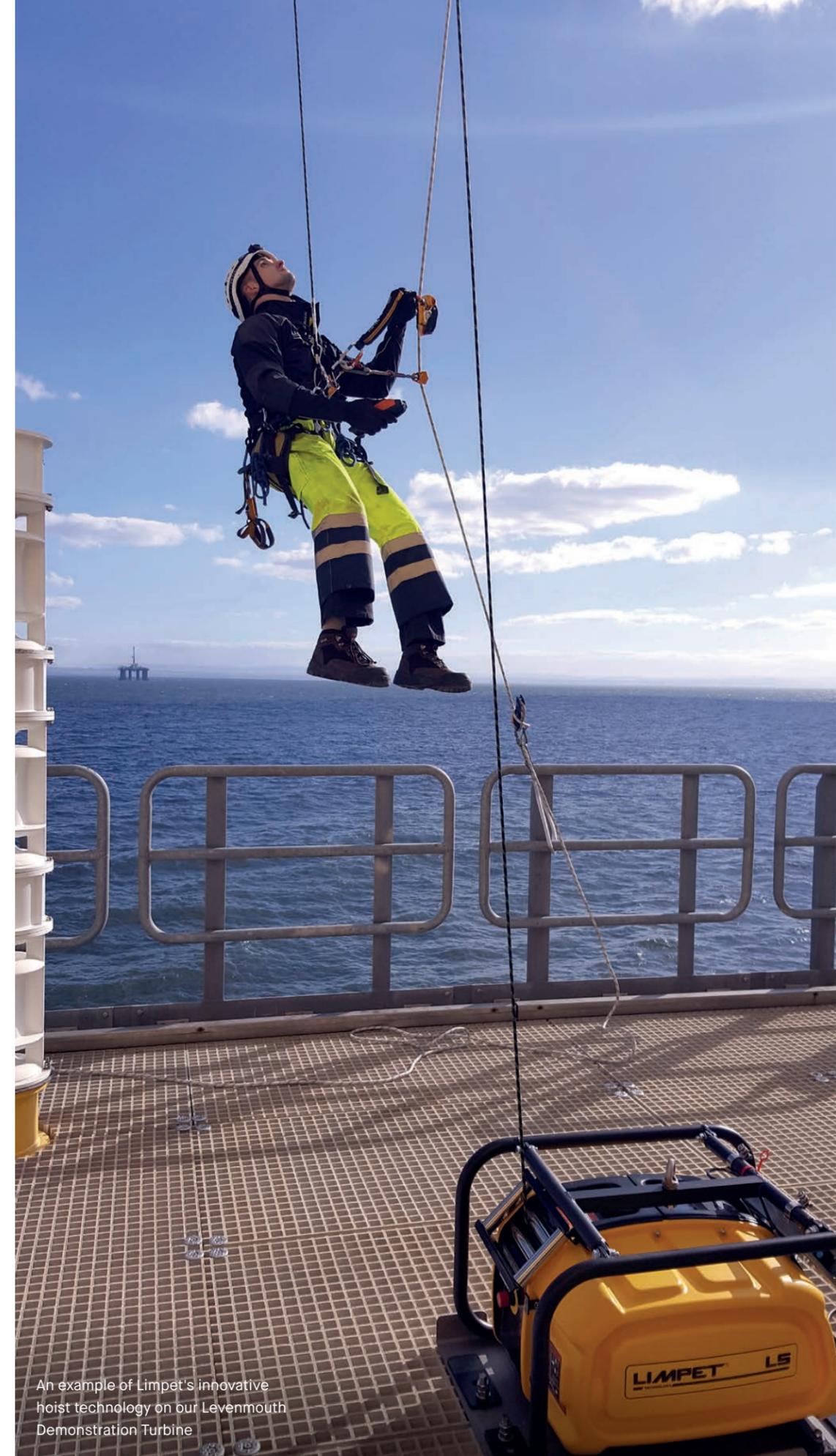
Keeping the blades of an offshore wind farm turning requires regular visits from maintenance technicians. But getting onto and off the turbines from a boat is among the most stressful and dangerous parts of the job and, when waves are higher than 1.5 metres, transfers are considered too risky. Failed transfers and lost energy production are hugely expensive for operators, and this problem is set to become worse as the industry pushes into sites that are further from shore.

The Edinburgh-based SME Limpet Technology is developing a game-changing offshore personnel transfer system aimed at alleviating this problem. This dynamic hoist and fall arrest system uses in-built lasers to track the vessel's deck, adjusting the height of the hoist in real time. This compensates for the motion of the vessel and allows the technician to clip in and transfer onto the turbine more easily. The system aims to increase access to far offshore turbines from 50% of the year to 80%.

Trials at the 7MW Levenmouth Demonstration Turbine have been invaluable to Limpet's research and development programme – so much so that the company has moved its manufacturing base to be closer to the turbine, creating skilled jobs where they are most needed, and the system is now being installed and tested on a real-world wind farm.



The system could potentially increase access to far offshore turbines from 50% of the year to 80%.



An example of Limpet's innovative hoist technology on our Levenmouth Demonstration Turbine

Improvements in offshore renewables productivity and performance can boost the UK economy and lead to significant job creation. These are excellent examples of academic and industrial partnerships that are improving the operating performance of the industry's current fleet, and demonstrating best practice in leveraging the sector's expertise.

## Our Research Programme

Translating world-class academic research into tangible industry impact is a fundamental role of the Catapult network.

The UK has a world-leading academic community in offshore renewable energy, making up a vital part of the country's knowledge base. Our deep-rooted partnerships with leading universities are key to our continued development of cutting-edge research and development opportunities.

Some of the Catapult's boldest plans lie in the new Research Hub network we are creating. We launched the Wind Blade Research Hub to develop larger, more efficient wind turbine blades that harness more energy from the wind and chose the University of Bristol – world-leading experts in the use of composite materials – to be our partner. The Catapult is planning to establish further strategic partnerships with leading universities in the areas of electrical infrastructure and drive trains.

The Hubs will be supported by students, researchers and lecturers working alongside our in-house research team – combining unique industrial expertise with academic clout to create a formidable research powerhouse. The new hubs will see up to £5 million of targeted research funding for offshore renewables, on top of the £2.3 million already committed for blades. It sets the blueprint for further academic partnerships that will drive the offshore wind research agenda for years to come.

Using our connections to link organisations to deep expertise within academia is another way that the Catapult provides support and guidance to UK innovators. Our Operation & Performance engineers helped Great Yarmouth's Masterfilter to develop a test programme at the University of Strathclyde to help commercialise its oil filtration technology, while our Dual Axis Blade Testing project began as a co-funded PhD with Durham University before becoming a core Catapult research programme.

We use our strategic relationship with the University of Hull, through the UK's Operations and Maintenance Centre of Excellence, to bring together offshore wind owners, supply chain, industry leaders, regulators and academia to drive solution-focussed innovation and improvements in O&M. And the Catapult has partnered with prestigious UK universities on several projects: Hull on the SPOWTT project, Edinburgh on EnFAIT, Strathclyde on TLP Wind. We also work with international centres of research, such as Denmark's DTU.



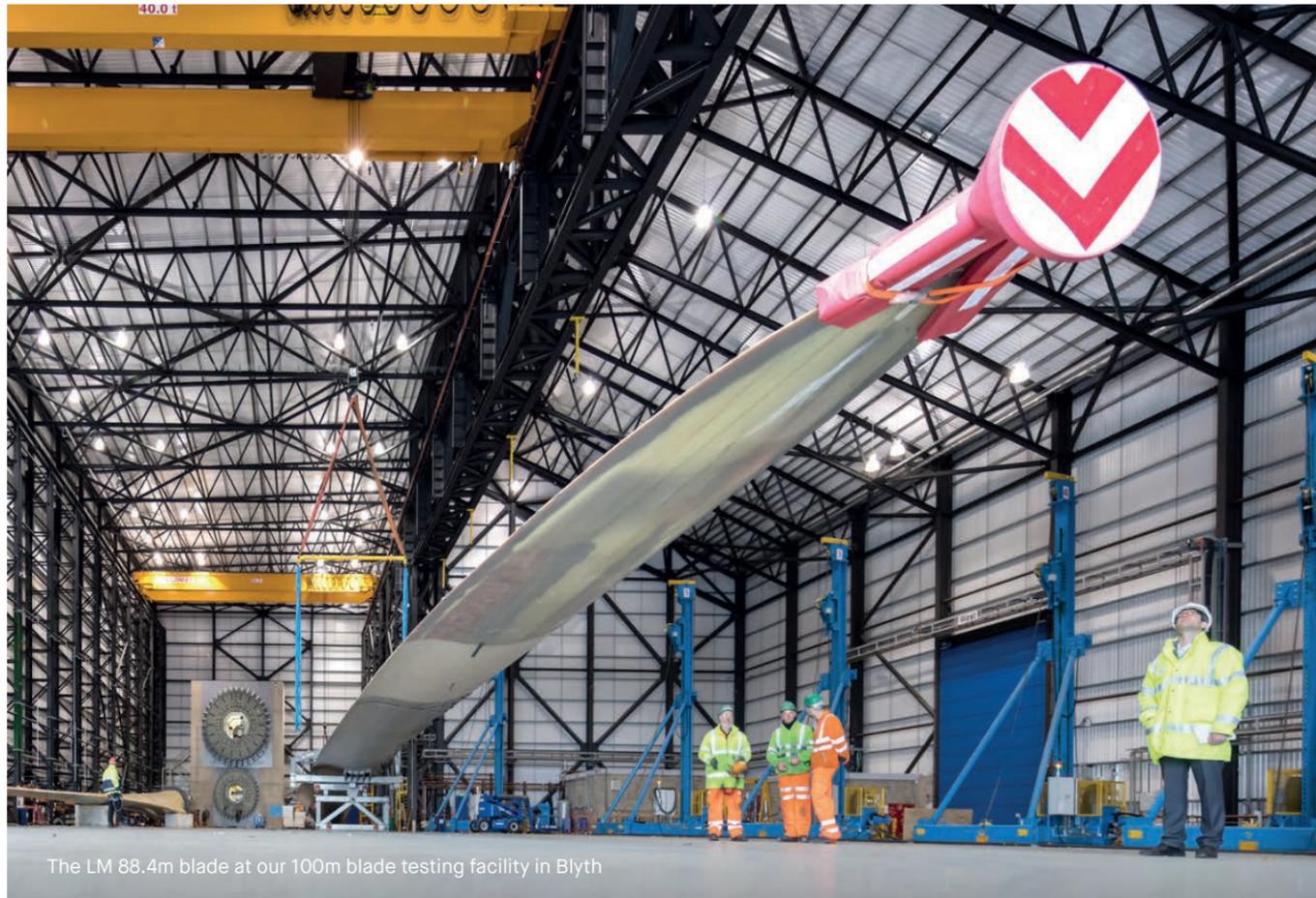
Bi-axial testing has the potential to reduce overall test times by up to a quarter.

## XL Blade

The Demowind-funded XL Blade project's overarching objective is to reduce the overall cost of offshore wind by designing, validating and deploying the world's largest offshore wind turbine blade.

The project combines the technological leadership of three offshore wind industry leaders – Adwen, LM Wind Power and ORE Catapult – across three participating countries.

In March, the Catapult's National Renewable Energy Centre took delivery of the world's longest blade, the LM 88.4 P, which is currently undergoing testing in our world-leading 100m blade test facility. At 88.4m long, the blade will achieve a significant reduction in the levelised cost of energy (LCoE) by means of lighter construction and a more predictable operational expenditure through reliability-driven design. It will also be the first blade to undergo a novel way of testing that applies loads to a wind turbine blade on two axes simultaneously, called bi-axial testing. The technique has the potential to slash fatigue test times in half, and reduce overall test times by up to a quarter.



The LM 88.4m blade at our 100m blade testing facility in Blyth



Image courtesy of Atlantis Resources

## Atlantis Resources

Atlantis Resources, the world leaders in tidal power generation, chose ORE Catapult to prove and de-risk its next-generation AR1500 turbine. Ahead of its deployment in the Pentland Firth at Meygen, the world's largest planned tidal stream project, the turbine underwent a rigorous representative testing programme.

The tides in the Firth, which connect the North Sea and the Atlantic ocean, are among the strongest in the world. Millions of tonnes of water surge through the area every day, accelerated by a natural channel. At our testing centre in Blyth, our state-of-the-art 3MW powertrain test facility simulated the extreme dynamic loading conditions that the AR1500 will experience in the water.

By carrying out controlled tests on the turbine in conditions as close as possible to the tidal environment, we gave Atlantis the confidence to move forward with the deployment phase. It also helped Atlantis reduce the length of the offshore commissioning phase: a particularly expensive period of the project.

Testing was completed within the 21-day schedule, and the AR1500 was shipped north for installation in 2017.



We provided investor confidence by supporting the validation of the control system and mechanical hardware.

## O&M Centre of Excellence

O&M activities make up almost a quarter of the lifetime costs of an offshore wind farm and provide a huge opportunity for UK companies to supply their products and services. The O&M Centre of Excellence, a joint initiative between ORE Catapult and the University of Hull, is located on the Humber and is a national resource which will have international impact.

It brings together key stakeholders from the offshore wind sector to build on the UK's world leading expertise in the operations and maintenance of offshore wind farms and drive solution-focused innovation and improvements in O&M.

The O&M Centre of Excellence will drive collaboration between industry, government, regulators, academia and stakeholders. It will focus on priority O&M challenges and accelerate the development and deployment of innovative solutions, ensuring:

- Continued cost reduction,
- Rapid growth in UK SMEs supplying and exporting O&M products and services,
- Strengthening the UK's position as a world leader in offshore wind O&M,
- Reduced risk and improved safety within O&M.



Lincs offshore wind farm



SPOWTT's forecasting tool has the potential to increase revenue by €11M per annum.

## SPOWTT

The physical and mental wellbeing of crew members being transited to offshore wind farms is the subject of a groundbreaking €3.6m collaborative European study.

The Catapult is co-ordinating the DemoWind2-funded project Improving the Safety and Productivity of Offshore Wind Technician Transit (SPOWTT), which is revealing how vessel motion during certain weather conditions affects the wellbeing of workers.

The result will be a forecasting tool that will help marine coordinators determine whether or not to proceed with deploying personnel in turbulent conditions. By helping offshore wind owner/operators create a safer working environment, the Catapult is transforming the industry's approach to technician-led operations and maintenance activities, while minimising the impact of adverse weather crew transits on workers as much as possible.

The collaboration involves seven organisations from across Europe, including Siemens Gamesa Renewable Energy and the University of Hull. The project partners estimate that revenue could increase by €11M per annum if the tool is applied across the currently-installed fleet of Siemens 3.6MW turbines by 2020.

## SPARTA/WEBS

With the UK's offshore wind sector looking to double its installed capacity by 2030, strategic decision-making has become more important than ever. The difference between getting it right and wrong can be in the hundreds of millions of pounds.

The Catapult supports good strategic decision-making by benchmarking the performance, availability and reliability of offshore and onshore wind farms in the SPARTA and WEBS projects, respectively.

SPARTA (System Performance, Availability and Reliability Trend Analysis) is the world's first benchmarking platform for offshore wind farms. The Catapult's portfolio review, published in 2017, provided unique insight into the performance, availability and reliability of 93.7% of the installed capacity of UK operational offshore wind.

WEBS (Wind Energy Benchmarking Services) Ltd was formed in April 2016 and is now a joint venture between ORE Catapult and Natural Power. It provides unique, secure, anonymised and independent web-based benchmarking for wind farms, using consistent KPIs to help strengthen operational strategy, improve performance, reduce costs and manage risks.



Ørsted's offshore wind farm at Burbo Bank



Image courtesy of  
EDF Energy Renewables



## Offshore Wind Innovation Hub

In order to achieve the UK offshore wind industry's aim to supply one third of the country's electricity by 2030, it is vital to understand the areas of offshore wind where there is a demand for innovation.

Funded by the Department for Business, Energy and Industrial Strategy (BEIS) and delivered jointly by the Catapult and Innovate UK's Knowledge Transfer Network (KTN), the Offshore Wind Innovation Hub is the UK's primary coordinating body for innovation to reduce the cost of offshore wind energy and grow UK jobs in the sector. It coordinates with industry, supply chain and academia to provide Government and industry with an impartial, inclusive and trusted view of the innovation needs of the UK offshore wind sector, supply chain growth opportunities, and a comprehensive view of the funding landscape in offshore wind. The Hub has developed a set of technology innovation roadmaps. These are advanced prioritisation tools that identify the innovation needs of the offshore wind sector.

**Inovo**  
121 George Street,  
Glasgow, G1 1RD  
+44 (0)333 004 1400

**National Renewable Energy Centre**  
Albert Street, Blyth,  
Northumberland, NE24 1LZ  
+44 (0)1670 359 555

**Fife Renewables Innovation Centre (FRIC)**  
Ajax Way,  
Leven, KY8 3RS  
+44 (0)1670 357 649

**O&M Centre of Excellence**  
Room 241, 2nd Floor  
Wilberforce Building,  
University of Hull, HU6 7RX

[ore.catapult.org.uk](http://ore.catapult.org.uk)  
[info@ore.catapult.org.uk](mailto:info@ore.catapult.org.uk)

Twitter  
[@ORECatapult](https://twitter.com/ORECatapult)

**CATAPULT**  
Offshore Renewable Energy

We work with  
**Innovate UK**

Partner Projects:  
ACT Blade  
ATAM Group  
Atlantis Resources  
Bouyant Works  
FS Found

GreenSpur  
GyroMetric Systems  
JDR Cables  
Limpet Technology  
Magnomatics  
Modus & Osbit

Nova Innovation  
O&MCE  
Octue  
ODB  
OWIH  
Perceptual Robotics

Research Hub Network  
Rovco  
SPOWTT  
Tekmar  
SPARTA / WEBS  
XL Blade



We work with  
**Innovate UK**

