CATAPULT
Offshore Renewable Energy

RE ENERGISE

#2 SUMMER 2020

POWERING THE GREEN RECOVERY

KICK-STARTING THE GREEN RECOVERY

The importance of cross-sector innovation

GREEN LIGHT FOR GREEN HYDROGEN

Solving the intermittency issue

DATA AND ROBOTICS

Creating the jobs of the future

A VISION FOR SMART O&M

ORE Catapult's national Operations & Maintenance Centre of Excellence specialises in helping UK businesses create and commercialise technologies for the offshore renewables sector.

Our programmes directly support UK supply chain companies and green economic growth. To do this, we are investing in bigger and better facilities with our new Grimsby operation, starting in 2020:

- // Industry 4.0 inspired virtual environment providing large-scale wind farm simulation; enabling development, demonstration and test of optimisation software, data analysis tools and operational techniques
- // Robotics development and testing, linking to the virtual environment with hardware-in-the-loop capabilities for stimulating sensors and automation logic
- // Advanced communication and data transmission rigs
- // Providing reconfigurable industrial scale assets for technology demonstration
- // Supporting decarbonisation and clean growth programmes for offshore wind O&M, maritime and ports

Interested in working with the Operations and Maintenance Centre of Excellence? Contact us:

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WELCOME

Welcome to Re-Energise, the new name for ORE Catapult's tri-annual magazine

GUEST FOREWORD

THE RT HON KWASI KWARTENG

MINISTER OF STATE FOR BUSINESS, ENERGY AND CLEAN GROWTH

The COVID-19 health pandemic has had an enormous impact on the global economy, and we will feel its effects for years to come. This Government is intent on not only tackling and defeating this crisis, but also ensuring that our economy builds back greener, and stronger, than ever.

We must work fast to get back on track with our strategies of levelling up the regions of the UK and backing the cutting-edge green technologies, such as offshore renewables and green hydrogen energy, that will drive economic growth in all parts of the country and help us achieve our Net-Zero targets by 2050.

We have some of the best and most productive companies in the world, but we want to mend that gap in opportunity, productivity and connectivity between the regions of the UK. That is why the Catapult Network, and initiatives such as the Offshore Wind Growth Partnership which are committed to supporting and growing the UK's supply chain, capitalising on regional strengths and increasing UK content, are so vital.

This is a government that backs Britain and believes in British innovation. The most successful societies are always the most innovative, and the UK has already developed some of the most transformative technologies. We lead the world in offshore wind and hydrogen energy, as well as industries such as robotics, autonomous systems and artificial intelligence. These will be essential in driving exports, creating high-tech jobs and generating UK economic benefit, on which we will build the future prosperity of this country.

Department for Business, Energy & Industrial Strategy

EUROPEAN UNION Investing in Your Future European Regional Development Fund 2007-13

energy technologies institute

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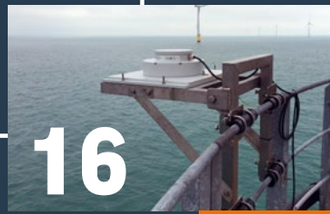


A turbine for Hywind Scotland being towed into position (Credit: Equinor)

CROSS-SECTOR INNOVATION IN OFFSHORE RENEWABLES CAN BE THE CATALYST FOR A GREEN ECONOMIC RECOVERY

ANDREW JAMIESON - Chief Executive of the Offshore Renewable Energy Catapult

The COVID-19 crisis has had a devastating impact on the global economy. Most sectors are feeling the effects but industries such as automotive, aerospace, defense and oil and gas in particular have been hard hit by the global economic downturn.

As attention turns to recovery, the UK's commitment to becoming a net-zero carbon economy by 2050 dictates a pressing need to expand our national clean energy infrastructure, with a near four-fold expansion of our current offshore wind capacity by 2030, and perhaps double that again by 2050.

This growing demand for green electricity, as we transition from fossil fuels towards a low-carbon energy supply, creates a platform from which to foster and facilitate cross-sector partnerships and innovation, taking advantage of critical expertise and experience in some of the UK's leading industries to meet future demand and provide the catalyst for robust economic recovery.

Those same sectors that have been hard hit, and their associated supply chains, can perhaps find green shoots of opportunity within the growing renewable energy industries, in technologies such as offshore wind, tidal energy, and green hydrogen for example, as the world gets back on track to tackle the climate emergency.

Like all growing industries, offshore wind stands to benefit significantly from cross-sector innovation and knowledge transfer. If the UK is to maintain its world-leader status in offshore wind, as well as meet and exceed its ambitious net-zero goals by 2050, adopting proven technology from other sectors is essential. In fact, cross-pollination of processes and technologies from different sectors is central to the mission-led innovation framework adopted by the UK's Industrial Strategy.

More often than not, we are siloed into thinking a particular way and soon become trapped into a standardised, uninspiring creative process. As a result, there is little room for innovation, with ideas and creative problem-solving becoming stagnant. It is therefore critical to learn lessons from other sectors faced with similar challenges to equip the industry with the best-practice innovation.

Bringing together innovative thinking from multiple different sectors is often more efficient than developing the technology from the ground-up. Cross-sector collaboration brings together a wider range of experience and ideas that, in turn, increases the likelihood of solving industry challenges more efficiently by avoiding the need to re-invent the wheel.

For offshore wind, there are clear synergies in operations and maintenance procedures with the oil and gas, automotive and aerospace sectors. However, inspiration and innovation can come from all sorts of industries. At ORE Catapult, we work with a range of companies and start-ups across a wide spectrum of sectors and have seen in practice how they can feed in to the UK's burgeoning wind power needs.

OIL AND GAS

Historically, Tekmar designed and manufactured seals and protection systems for subsea applications in the oil and gas sector. In 2008, Tekmar diversified with its first-generation TekLink cable protection system for the offshore renewable energy sector. This move has seen Tekmar become the market-leader in cable protection systems for the sector. In the years since entering the offshore renewable energy market, Tekmar has seen more than a threefold increase in turnover and the launch of a new company, AgileTek, in 2018.

CHOPPER-INSPIRED TECHNOLOGY

Protecting against erosion of the leading-edge of an offshore wind turbine blade is a major area of research and innovation for the offshore wind industry. Aerospace component manufacturer Doncasters Bramah has created a metallic alloy leading-edge protection system that could provide near lifetime protection for the blade. Inspired by aerospace technology used in helicopter rotor blades, the metal alloy acts as an erosion barrier as well as increasing the blade's ability to withstand higher blade tip speeds. This, in turn, contributes to a 6% reduction in the capital cost of a wind turbine.

DRIVING FORWARD OFFSHORE WIND WITH FORMULA ONE

Anakata Wind Power Ltd developed game-changing technology to improve the aerodynamics of wind turbine blades and increase energy output by up to 10%. Anakata's Formula 1-inspired blade enhancements

ACT Blade's innovative wind turbine blade design

THIS GROWING DEMAND FOR GREEN ELECTRICITY CREATES A PLATFORM FROM WHICH TO FOSTER AND FACILITATE CROSS-SECTOR PARTNERSHIPS AND INNOVATION

can be retrofitted to fit any blade quickly, safely and with ease. Having already successfully installed its technology on turbines in the UK, Europe and the US, the company has now penetrated the Chinese market after successfully installing its blade 'winglets' on a turbine at China's Gansu Changma wind farm.

YACHT DESIGN TO OFFSHORE WIND

Edinburgh-based ACT Blade is adapting its sail modelling technology into modular blades that are over 50% lighter than those in use today in the offshore wind sector. As a result, the blade can capture more wind, increase energy production and lower costs. ACT Blade's disruptive design has the potential to reduce the Levelised Cost of Energy (LCoE) by 8.7% while increasing energy production by 9.7%. The ORE Catapult Research and Disruptive Innovation team worked with engineers from world-leading yacht design specialists SMAR Azure, resulting in the spin-off company focusing on the offshore wind sector.

CRIME FIGHTING TO CLEAN, GREEN ENERGY

With its origins in public safety, R2S is used to taking detailed pictures of crime scenes that are then stitched together to be referred back to later, meaning if a crime scene is disrupted or detectives had an open-ended case, they could virtually 'step into' the original crime scene with just a few clicks. In 2018, R2S began exploring the world of offshore wind energy. The 360º, information rich walk-throughs enable users to see a highly detailed record of any asset they are looking to inspect – in this case, technicians could assess an offshore wind turbine with their feet firmly planted on dry land.

RAIL INDUSTRY INNOVATION

UK-based Smart Component Technologies (SCT) has its origins in the rail industry, working with major industry partners including Network Rail, High Speed 2 and London Underground. The offshore wind opportunity was soon realised as SCT's innovative remote condition monitoring technology for bolted assets has the potential to reduce O&M costs by 15% as it eliminates the need for bolting inspections and therefore reduces the scheduled downtime of a turbine and lowers the risk to personnel.

From innovative start-ups developing novel and disruptive technologies with new materials or artificial intelligence, to universities developing new software or sensors and some of the world's biggest companies developing ever larger turbines, the offshore wind industry is already a major UK success story, and the opportunity keeps on growing.

Offshore wind sector growth in the UK provides significant opportunity, but it is a truly global market with huge and growing demand from across Europe, China, the US, Japan and elsewhere.

If the green economy is to spark a wider economic recovery, those industries with directly translatable, proven technology and knowledge should take inspiration from the businesses that have already taken the leap, and recognise the opportunity to diversify into a market with anticipated exponential growth over the coming decades.

The cross-sector transfer of innovation, technology and experience will not only help tackle the climate emergency but can help to re-power the UK economy.

Hywind Scotland (Credit: Equinor)

Windcat crew transfer vessel

PRIORITISING THE OPPORTUNITIES FOR INNOVATION

The Government-backed Offshore Wind Innovation Hub (OWIH) is the UK's primary coordinator for innovation, focusing on offshore wind energy cost reduction and maximising UK economic impact.

The OWIH actively engages with industry, academia, other research organisations and the public sector to identify the innovation priorities for offshore wind in the UK. These priorities are then developed into technology innovation roadmaps, identifying the natural owners of the technology and know-how to tackle these challenges, and work with them to link up investment, development support and open up routes to market.

In partnership with industry and the Knowledge Transfer Network, the Hub's first programme was the Offshore Wind Innovation Exchange (OWiX), a cross-sector scheme that aims to accelerate offshore wind cost reduction by matching industry challenges with innovative solutions adapted from other parts of the economy. These innovation challenges offer supply chain growth opportunities throughout the offshore wind sector and provide opportunities for cross sector innovation transfer.

The role of the OWIH and OWiX is vital in ensuring the continued operation and improvements of our offshore wind farms, now more than ever.

CASE STUDY

The global COVID-19 pandemic has impacted all manners of operations and maintenance (O&M) activities for offshore wind farms, including social distancing measures on crew transfer vessels (CTV). For this reason, ORE Catapult, alongside the Knowledge Transfer Network, G+ offshore wind health and safety group, and the Workboat Association, has responded quickly to the unprecedented challenges facing the industry and is working to find and implement solutions in support of business continuity and the safe operation of critical clean energy infrastructure.

As a result, the organisations worked together to set an Innovation Challenge to seek a rapid solution to increase physical separation during small vessel transit for offshore wind turbine technicians. The challenge was identified by members of the Operational Contingency initiative, established by ORE Catapult's O&M Centre of Excellence in response to the COVID-19 crisis. Of the original 19 innovative submissions, five were shortlisted to pitch their solutions to the challenge setters .

Find out more about the Innovation Challenges that are spearheading the UK's green economic recovery on the OWiX website **here**

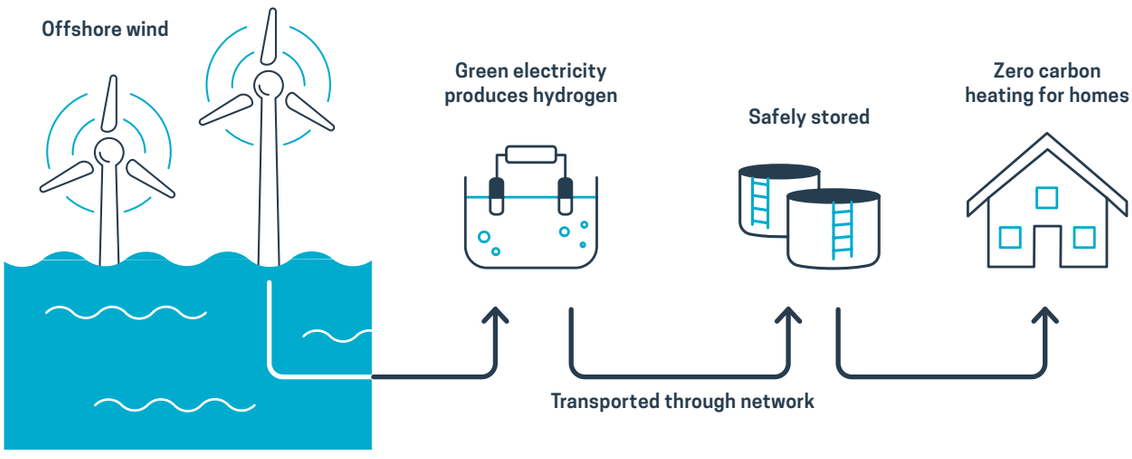
A GREEN LIGHT FOR GREEN HYDROGEN

Green hydrogen can help solve the issue of wind power intermittency, and contribute to the green recovery.

Walkway to ORE Catapult's 7MW Levenmouth Demonstration Turbine, Fife.

For the UK to meet its net-zero targets by 2050, we will need to diversify our offshore renewable energy portfolio by mixing offshore wind with tidal, wave, floating hybrid platforms and hydrogen generation. This means energy infrastructure built in harmony with the geographical realities and strengths of each region, utilising existing fossil fuel infrastructures for a minimal transitional cost. Through two pioneering community projects, ORE Catapult seeks to illustrate what this new local energy future can look like, both in infrastructure terms and domestically. At Methil in Fife, Scotland, and Milford Haven in South Wales, we aim to demonstrate how hydrogen storage can solve wind power variability and form an important ingredient in the recipe for a green economic recovery in the UK.

Let's take a look at a project that is just starting, and a promising initiative currently under proposal.



MH:EK (MILFORD HAVEN ENERGY KINGDOM)

Location: Milford Haven, Pembrokeshire, Wales
Project: A two-year, £4.5 million project being delivered by ORE Catapult, Pembrokeshire County Council, Wales & West Utilities, Riversimple and the Port of Milford Haven.

MH:EK will provide a blueprint for an investible, local, hydrogen-based energy system on the Milford Haven Waterway that will allow for the integration of heat, power and transport. It will help to safeguard local energy and automotive sector jobs and maintain the momentum in the UK's transition from natural gas to hydrogen. The project will build hydrogen-ready features and technologies such as fuel cell RASA cars designed by partner RiverSimple and a commercial scale hybrid heating system. It will also investigate the role hydrogen can play in the Port's housing, commercial and renewables projects and will allow local people to test real-world hydrogen vehicles and home heating equipment.

The Milford Haven Waterway is an ideal location to trial this new approach. It's located at the centre of nationally important energy infrastructure, with major energy-related investment targeting efficiency and decarbonisation, underway. Milford Haven, Pembroke and Pembroke Dock have a population of around 30,000 people, providing a range of diverse and representative energy supply and demand centres connected to the local gas and electricity networks.

PROJECT METHILLTOUNE

Location: Methil (Levenmouth), Fife, Scotland
Project: ORE Catapult is a key participant in SGN's proposed H100 Fife project, which will be submitted by SGN to Ofgem's annual Network Innovation Competition in a bid to secure funding.

ORE Catapult has a key role to play in the proposed H100 Fife project, which aims to lay the foundations for decarbonising heating by developing and demonstrating a world-first hydrogen-to-homes network. Primarily powered by our 7MW Levenmouth Demonstration Turbine in Methil, Fife, the project's purpose-built electrolysis plant will supply low-carbon heating to around 300 local homes. An on-site storage system will hold enough hydrogen to ensure heat supply won't be disrupted during even the coldest weather conditions. Gas will be transported through a new network of pipes to hydrogen appliances in households using the materials and fittings commonly used today.

Fife was recently announced as the preferred site for SGN's H100 project, which also follows on from a 2019 BEIS-funded feasibility study by the Methilltoune consortium, comprised of SGN, ORE Catapult, Arup and Kiwa. If its funding bid to Ofgem is successful, SGN will begin construction within a year, with a five-year fully operational phase planned from 2022/23.

OFFSHORE WIND OPERATIONAL CONTINGENCY PLANNING GROUP: RESPONDING TO THE INDUSTRY'S CHALLENGES IN THE FACE OF COVID-19

As with all industries, offshore wind is feeling the impact of the COVID-19 pandemic, with working restrictions affecting the ongoing operations and maintenance (O&M) of offshore wind farms.

As the UK's leading technology innovation and research centre for offshore renewables, playing a pivotal role in de-risking technology innovation for the sector, ORE Catapult is in pole position to play a critical role in the sector's response to the challenges presented by COVID-19.

Over the past seven years, ORE Catapult has worked closely with industry to enable transformational change, increase UK content in the supply chain, and reduce the Levelised Cost of Energy (LCoE) of offshore wind.

In direct response to the global COVID-19 pandemic, ORE Catapult's Grimsby-based Operations & Maintenance Centre of Excellence (OMCE) established the Offshore Wind Operational Contingency Planning Group. The Group provides a single point of liaison between UK Government, regulators, the offshore wind industry and its supply chain. It supports effective collaboration to help deal with more immediate, short-term issues and plan for the medium to long-term challenges, maintaining business continuity in offshore wind development, construction and O&M.

Since the Group's inception in April, there has been a significant rise in participation, and the discussions have led to several key outputs. Participants vary from across Government and the industry, including representatives from BEIS and organisations such as the Workboat Association, Offshore Wind Health and Safety Group G+, Renewable UK, James Fisher and Sons, Siemens Gamesa Renewable Energy, and Global Marine Group.

The Group convenes on a bi-weekly call, with the agenda covering health and safety updates from industry, 'burning issues' for discussion, and updates from offshore wind clusters in both the UK and overseas – including the operational responses of countries such as Germany, Belgium, the USA and Taiwan. The Group also receives feedback on Government action and decision-making that could impact on offshore wind O&M.

A significant output from the Group was the launch of a Crew Transfer Vessel (CTV) Innovation Challenge in response to the social distancing measures which restricted the number of crew onboard, to as little as four personnel at any one time. The challenge sought a cross-sector screening solution to divide crew safely and enable transit personnel numbers to be increased. A substantial number of applications were submitted and, at time of publication, are being considered by an industry panel.

ORE Catapult also implemented a COVID-19 survey and used its results to produce a rolling report informing Government departments, including BEIS and DIT, of the short, medium and long-term needs of industry and proposing necessary action during the pandemic. Also, the Catapult's Analysis and Insights team undertook modelling of the economic impact of the current crisis on the UK supply chain. Going forward, the Group's ongoing feedback to Government will include cluster group engagement from across the UK, as well as an in-depth understanding of how the industry will continue to operate effectively post COVID-19.

Chris Hill, ORE Catapult's Operational Performance Director, said: "It was important that we responded quickly to industry's requirement for an Operational Contingency Planning Group, as it became clear that we were entering a challenging period for the entire industry.

"Convening stakeholders, including from owners, OEMs, supply chain, Government, industry bodies and regulators, has led to essential dialogue, from which we've taken action to support business continuity and the operation of critical energy infrastructure offshore. We fully intend to keep the Group going, as we take the lessons learned from industry and begin to support green economic growth in the aftermath of COVID-19."

An offshore wind technician working on a turbine at Burbo Bank wind farm (Credit: Orsted)

Barrow Offshore Wind Farm
(Credit: Centrica and Orsted)

ENERGISING THE UK SUPPLY CHAIN: MAXIMISING OPPORTUNITIES FROM THE GREEN ECONOMIC RECOVERY

Almost all of the UK's industrial sectors are feeling the effects of the COVID-19 crisis, with many industries, including automotive, aerospace, defence and oil and gas, in particular, hard hit by the global economic downturn. Those same sectors, and their associated supply chains, are now turning to the offshore renewable energy sector to explore commercial opportunities as the world gets back on track to tackle the climate emergency.

Offshore renewables can be the catalyst for a green economic recovery post COVID-19 and, as the UK's leading technology innovation and research centre for offshore renewable energy, ORE Catapult can play a vital role. We encourage the cross-sector transfer of innovation and support companies every step of the way to commercialisation, from developing an idea, through to demonstrating and validating technologies and providing business support in bringing their innovative product or service to market.

Our three supply chain growth programmes - Launch Academy, Fit For Offshore Renewables (F4OR) and the Offshore Wind Growth Partnership – offer a range of support mechanisms to ensure a strong representation of UK content in domestic projects, as well as supporting a vibrant export market.

And let's not forget the regional growth that was at the forefront of the agenda pre-COVID-19. Levelling up coastal communities must remain a priority, with offshore renewables well placed to deliver on that. We are establishing national Centres of Excellence, such as in Operations & Maintenance, Testing & Validation, Floating Offshore Wind and Marine Energy Engineering, closely aligned with regional strengths and priorities.

Our new Energy Transition Alliance with the Oil & Gas Technology Centre is an ambitious, £10m collaboration, aimed at accelerating the development of offshore renewables and decarbonising oil and gas production to deliver net-zero, maximising UK economic benefit and retaining energy security. The energy transition, both in terms of our entire energy portfolio and the decarbonisation of oil and gas production, presents enormous opportunities for knowledge, skills and supply chain transfer.

Lastly, our demonstration facilities at Blyth and Levenmouth, as well as industrial sites such as EDF's Blyth Offshore Demonstrator, Vattenfall's European Offshore Wind Demonstration Centre and Equinor's Hywind for floating technology, enable UK businesses to demonstrate their new technologies in a real-world environment. But further investment in such facilities, to accelerate the development of new products and services, is vital.

The Offshore Wind Sector Deal has set out a path to quadruple wind power generation in the next decade, increase UK supply chain content in offshore wind farms to at least 60% and bring about a five-fold increase in exports. Now, more than ever, cross-sector collaboration and innovation to grow the UK supply chain is crucial if the UK is to kick-start its green economic recovery, and ORE Catapult is leading the way.

OFFSHORE RENEWABLES CAN BE THE CATALYST FOR A GREEN ECONOMIC RECOVERY POST COVID-19

CATAPULT Offshore Renewable Energy | LAUNCH ACADEMY

Offshore Wind Growth Partnership OWGP

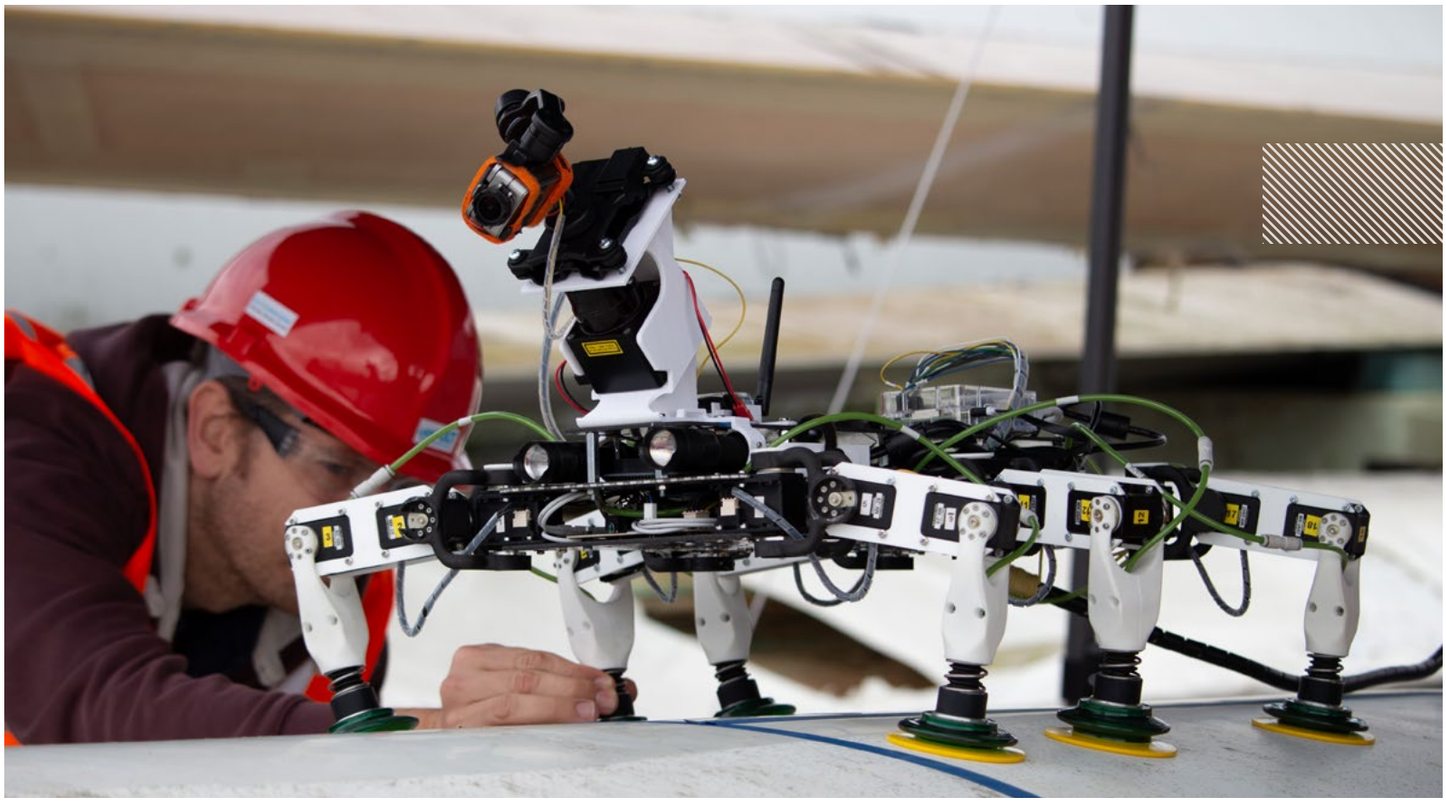
F4OR Fit For Offshore Renewables

DATA, DIGITALISATION AND ROBOTICS: CREATING THE JOBS OF THE FUTURE AND SPEARHEADING THE GREEN RECOVERY

The rise of robotics and artificial intelligence applications in the operations and maintenance of offshore renewable plant presents UK companies with enormous supply chain and export opportunities that will help fuel our economic recovery post-COVID-19.

Even before the COVID-19 crisis hit, offshore renewables owner/operators were turning to robotics, autonomous systems, big data and artificial intelligence as a way to drive down costs, further reduce safety risks in offshore working and increase the productivity of their offshore wind and tidal energy farms. This shift also offered high-tech businesses in other sectors with an entry point into the fast-growing offshore renewables sector.

A further, and even more compelling case, for these technologies is that the UK cannot meet its climate change commitments without them. To achieve net-zero by 2050 will require deployment of at least seven-times more fixed and floating offshore wind capacity than we have today, and only by deploying a combination of robotics, autonomous systems and artificial intelligence approaches can offshore operations achieve such scale-up while continuing to reduce energy bills.



BladeBUG under test at ORE Catapult's National Renewable Energy Centre

In recent months, the COVID-19 pandemic has served to highlight this urgency to adopt robotics and Smart O&M in order to provide safer working environments for technicians and operational efficiency improvements. As these new areas of expertise become ever-more critical to offshore renewables in its next high-growth phase, they also offer long-term careers to both young people starting out and to experienced workers with automotive, oil and gas and defence backgrounds.

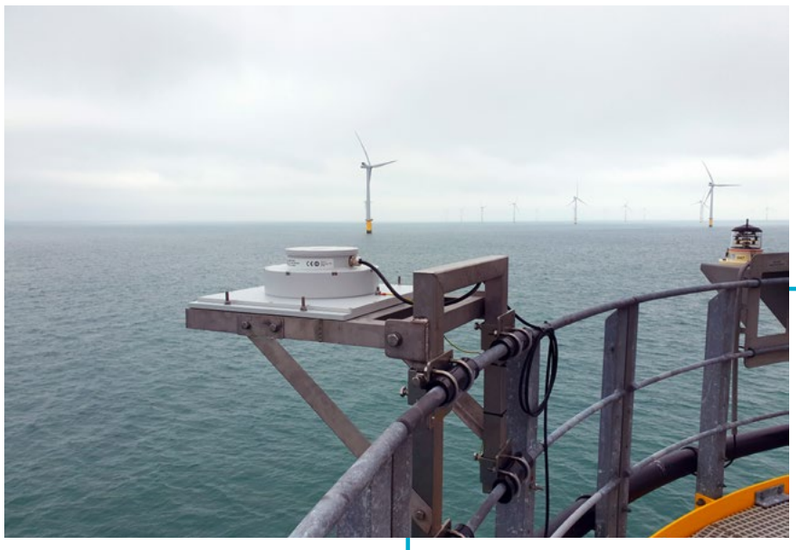
Onshore role creation, including remote supervision, data analytics, advanced programming and software engineering, will be essential to the integration of robotics and autonomous systems. To harness the potential of data analytics, which is crucial to honing the performance of wind farms, we'll also need to recruit and train up data engineers, digital tech developers and analysts. All this will help to spearhead economic recovery and combat potential unemployment, while at the same time decarbonising the economy.

Here at ORE Catapult, data, digitalisation, robotics and autonomous systems are increasing areas of strategic focus, and we are working with UK small businesses and academic researchers to develop solutions that integrate them into offshore wind and tidal operations. Innovations such as BladeBUG's blade crawler and ROVCO's 3D underwater imaging systems are now at the cutting-edge of wind farm operations and maintenance.

The increasing abundance of Big Data and analytics, combined with our reliance on cyberspace, has improved the productivity and efficiency of our energy production but has also left us more vulnerable than ever to cyber-attacks. With remote access technology becoming a focal point in O&M activity, the issue of cybersecurity has never been more important.

At ORE Catapult, we are researching ways in which the offshore wind sector can better protect itself and ultimately prevent these cyber-attacks from happening. Our Wind Digital Innovation Forum, for one, is building on our extensive experience and existing portfolio of wind-related data initiatives, focusing on four key strategic areas, including cybersecurity.

This commitment to investing in future technologies such as robotics and Big Data is vital if we are to kick-start the UK's green economic recovery - putting UK companies at the helm of a thriving domestic and global export market and ensuring our transition to a cleaner, greener future.



Miros' WaveWeather technology installed on offshore wind turbine (Credit Miros)

PROJECT SNAPSHOTS

Miros

Aberdeen-based Miros is a trusted provider of reliable, real-time ocean data to the offshore wind sector through the development of a number of sensors and systems for environmental monitoring. Miros' WaveWeather sensors will allow vessel operators to increase operability by up to 15% during operations and maintenance activities and help wind farm owner/operators reduce maintenance costs by up to 80% against traditionally used wave buoys.

In 2019, Miros installed its WaveWeather technology at ORE Catapult's Levenmouth Demonstration Turbine, providing insights to sea surface conditions and a range of meteorological parameters - boosting bankability and investor confidence in WaveWeather and accelerating its journey to market.

Data was subsequently fed into ORE Catapult's Platform for Operational Data (POD), providing open access to offshore wind information for academics, researchers, and the wider community pursuing growth opportunities in renewable energy.

Now Miros has their eyes set a little further afield. Earlier this year, Miros was among eight green energy innovators to secure major collaborations in China thanks to support from the ORE Catapult and TUS-Wind collaboration, TORC.

ELECTRODE

It is well known that cable failures can be costly for offshore wind farm operators. Add to this gaps in knowledge between individual stakeholders and, as a result, publicly available information of these cable failures remains scarce.

This is where ORE Catapult's Electrical cable failure trending & reliability analysis for operational developments (ELECTRODE) project comes in. ELECTRODE is joining every point on the cable highway to bridge the gaps in knowledge between cable stakeholders – providing regular, up-to-date industry-backed evidence, and reducing the volume of cable failures through reducing uncertainty and encouraging innovation to tackle key reliability challenges.

Industry-wide collaboration and the sharing of data could provide operators with the knowledge they need to set ambitious innovation pathways and identify the technologies that will improve early detection and preventative maintenance.

ORE Catapult is uniquely placed to convene this group of stakeholders, stretching from those at the point of design through to the technology innovators we support in finding solutions to the industry's most urgent challenges.

CLUE

The Concepts, Planning, Demonstration and Replication of Local User-friendly Energy Communities (CLUE) project aims to investigate how we better serve the energy needs of our local communities and combine different energy sources with local demand more effectively.

CLUE is a world-first series of demonstrations tackling the integrated energy system challenge for heat, power and transport. It will demonstrate a range of local energy community solutions by implementing projects across Europe, including one at our Levenmouth Demonstration Turbine. Our turbine will be used to show how energy produced from offshore wind can be distributed through a web-of-cells network architecture that offers the potential for local communities to trade energy with one another, and lead to greater generation and demand balancing at a regional and national level.

ORE Catapult is the lead partner in the Scottish CLUE consortium, providing local energy system and stakeholder knowledge as well as our 7MW Levenmouth Demonstration Turbine for testing purposes. The project acts as a stepping-stone to highlight the potential of integrating hydrogen as part of our renewable energy mix on a larger scale for future/follow-on projects.

R2S technology at work

Levenmouth Demonstration Turbine used in the CLUE project

Anakata

Oxford's Anakata Wind Power is one of the companies being supported through the £2m TUS-ORE Catapult Research Centre (TORC), which provides entry points for British technologies to the Chinese market. As a result, in December 2019, it successfully installed its innovative wind turbine blade system at China's Gansu Changma wind farm.

Anakata's blade winglets are inspired by rotor add-on devices used in Formula 1. They can improve energy output of wind turbines by up to 10% and can mitigate blade leading-edge erosion. They have so far been retrofitted onto a variety of turbine models and in a variety of locations.

We estimate that there are more than 20,000 wind turbines in China that could be retrofitted with Anakata rotor upgrades. Many of the parts will continue to be manufactured in the UK, enabling further investment in UK manufacturing and the continued development of enhanced technology solutions for offshore wind, both in the UK and globally.

R2S

Aberdeen-based JF AIS as part of James Fisher and Sons PLC, brings its powerful digital twin solution named R2S to the offshore wind industry, presenting asset data in a real-world context to save time and money, improve safety and enhance collaboration. R2S produces virtual walk-throughs of offshore assets embedded with data, enabling personnel to remotely visit sites and easily access technical and operational data – saving time and cost, improving safety, and enhancing collaboration.

JF AIS has completed a critical research project with ORE Catapult to transfer digital twin technology into the offshore wind sector using its R2S technology. As part of the pilot project, the R2S technology was used to recreate a data-rich digital twin of our Levenmouth Demonstration Turbine to prove the unique solution enables technicians and interdisciplinary teams to view the turbine's inner workings and all pieces of equipment anywhere, at any time.

Wind Digital Innovation Forum

The Wind Digital Innovation Forum (WDIF) is an on and offshore wind industry-specific initiative that aims to enable a step-change in the use of data and digital technology to inform decisions and improve performance. The Forum was collaboratively launched by the Offshore Renewable Energy and Digital Catapults in order to spearhead the data revolution within the offshore renewables sector.

Established in 2019, the focus areas in the first year for the WDIF were to develop a digital transformation roadmap and cybersecurity standards for the UK wind industry, as well as launching real-world data integration studies and a Disruptive Digital Technology Taskforce to incubate market entrants.

Members of the Forum have the chance to influence its policy and participate in projects at the cutting-edge of the UK's digital and energy sectors.

NEWS ROUNDUP

UK innovators on the road to decarbonising China's energy production

Eight UK innovators are bringing their game-changing solutions to the Chinese green energy industry as they sign significant agreements to develop and provide renewable energy technologies to the Chinese offshore wind market.

The eight innovators, from backgrounds as diverse as Formula 1, robotics, oil and gas, marine energy and digital, have all been supported by TORC, the joint venture research and incubation centre established in March 2019 by the UK's Offshore Renewable Energy Catapult and China's Tus Wind.

With the Chinese offshore wind industry expected to provide UK companies with a £2.6bn export opportunity by 2030, the potential prize has never been greater for innovative companies that can act now and establish themselves in the market.

Industry giants back ORE Catapult's Floating Offshore Wind Centre of Excellence

Ten of the world's leading offshore energy organisations have joined forces with our national Floating Offshore Wind Centre of Excellence (FOWCoE) to drive forward the development of next-generation offshore wind technologies.

Offshore wind developers EDF Renewables, EDP Renewables, Equinor, ESB, Mainstream Renewable Power, ScottishPower Renewables, SSE Renewables, and Offshore Wind Power Ltd (OWPL), a Joint Venture between the Green Investment Group and RIDG, are joined by energy companies Total and Shell in the Centre of Excellence.

The FOWCoE will focus on all areas of floating wind activity in the UK across four key workstreams – technology development, supply chain and operations, development and consent, and delivering net zero. As part of the Centre of Excellence, we will use our world-class skills and expertise to benchmark global standards for floating offshore wind and reinforce the UK's position as a world-leader.

One small step for BladeBUG, one giant leap for offshore wind

Earlier this year, UK-based BladeBUG completed trials for its novel inspect-and-repair robot at our National Renewable Energy Centre. The robot was put through its paces as it walked on blade surfaces, proving the stability of its vacuum adhesion technology and its dexterity in adapting to the varying curves of the blades.

This game-changing technology is set to revolutionise blade maintenance of offshore wind turbines, reducing manual working and ensuring a safer, more cost-effective and efficient way of working.

With its capabilities now validated, BladeBUG will begin integration into another Innovate UK-funded project, MIMRee, that is developing fully autonomous inspection and repair missions to offshore wind farms.

Robotics and autonomous systems to play vital role in green recovery

One year on from the launch of MIMRee (Multi-Platform Inspection, Maintenance and Repair in Extreme Environments), the £4.2m project reports breakthroughs in its quest to demonstrate an end-to-end autonomous inspect and repair mission to offshore wind farms.

These impressive milestones include blur-free imagery of moving blades; the integration of mission planning software with inspection drones and a vessel; BladeBUG technology proven at our National Renewable Energy Centre in Blyth; and the testing of forensic imaging.

Chris Hill, Operational Performance Director at ORE Catapult said: "Robotics and autonomous systems are vital to optimising offshore wind operations and meeting our net-zero targets by mid-century. UK companies are well placed to lead this technological revolution and having a project like MIMRee home-grown in the UK, spearheaded by UK businesses and our leading academic institutions, gives us a competitive advantage for the supply chain of the future."

Anakata's blade winglets deployed at a Chinese wind farm

BladeBUG on the Levenmouth Turbine (illustration)

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