



Switching up to 5G

This autumn, a unique offshore wind 'living lab' in Grimsby, UK, was switched on to launch what is being heralded as a new digital future. It is hoped that the £2.8m project will accelerate the development of a new generation of digital technologies that are essential to the huge expansion of offshore wind farms. PES spoke to Ben George, Head of Smart O&M at the Offshore Renewable Energy (ORE) Catapult, to find out more.

PES: It's great to catch up with you at what is an exciting time for ORE Catapult, with your involvement in the biggest offshore wind 'living lab' in the world off the Grimsby coast in the UK. Perhaps you could begin by giving us an overview of this project?

Ben George: The biggest offshore wind 'living lab' in the world is being created off the Grimsby coast through the development of the 5G Ports and Offshore Renewable Technology Accelerator Lincolnshire (PORTAL) covering the port of Grimsby and the Lynn and Inner Dowsing wind farm.

The £2.8m project will accelerate the development of a new generation of digital technologies, essential for the huge expansion of offshore wind generation required to meet the UK's climate targets.

It is being driven by a consortium led by the Offshore Renewable Energy (ORE) Catapult, bringing together the expertise of Microsoft, XceCo, Associated British Ports (ABP), Boldyn Networks, JET Connectivity, Accelleran and Satellite Applications Catapult.

The 5G PORTAL allows technology developers to test and demonstrate their equipment in real-world conditions, with access to reliable, high-speed communications. It aims to kickstart a digital revolution in offshore wind O&M in the region and attract users from the global offshore wind sector.

PES: Talk us through what the site looks like. It's made up of 15 5G radio transmitters across five sites, isn't it?

BG: To create the 5G PORTAL, two 5G technology development and demonstration zones linked by a fibre network were created, one end at Grimsby Port and the other within

the Lynn and Inner Dowsing wind farm. Fifteen 5G radio transmitters are placed across five sites, including four wind turbines and a radio mast in the port, working in conjunction with a solar-powered 5G buoy developed by JET Connectivity, together providing an extended private 5G network over a 45 km² area.

Uniquely, the 5G PORTAL is integrated into both an operational port and an operational offshore wind farm.

PES: What makes Grimsby such a good location? Presumably, this is good news for the local economy in the creation of a new enterprise.

BG: The Humber region is at the very heart of the UK's offshore wind sector, and Grimsby

hosts the country's largest port for offshore wind operations and maintenance, as well as ORE Catapult's O&M Centre of Excellence. This development builds on the area's rich energy heritage and extensive experience of servicing offshore wind farms.

The region has seen significant investment over the past few years into building, operating, and maintaining the next generation of offshore wind farms, promising new jobs, export opportunities, and clean power nationally. This 5G PORTAL will now add to Grimsby's reputation as being a world leader in developing, demonstrating, and fielding the latest O&M technology and techniques.

PES: Is it your hope that the project will accelerate the development of a new



generation of digital technologies, which will aid the huge expansion of offshore wind generation required to meet climate targets? What will this new generation of technologies involve?

BG: That is our hope, yes. The 5G PORTAL will accelerate development of a new generation of digital technologies essential to the huge expansion of offshore wind farms, required to meet the UK target to deploy 50GW of offshore wind by 2030.

This 'living lab' provides the opportunity for technology developers to access real-world conditions and environments, and with a backbone of reliable, high-speed communications, we believe it will attract investment from the global offshore wind market that will be felt regionally, and nationally as offshore wind rapidly expands and opens significant export opportunities. This is key to making our wind farms smarter, safer, and greener.

It will provide a live test and demonstration zone for robotics, AI, remote sensors, wearable technology, zero-emission vessels, and smart ports, driving forward the digital evolution of our next-generation wind farms. Innovators can make the most of this unique integrated resource as they bring new products and services to market, both in the UK and across the world.

Examples of these technologies that were demonstrated at the 5G PORTAL launch

include ABP and HeroTech8; autonomously controlled drones designed to conduct inspections offshore, providing video, sensor capture, and data transmission before returning to base.

Microsoft delivered a live feed from the port mast and relayed data back to base, where it was shown through HoloLens interactive software as interactive augmented reality. This will remotely assist and direct field technicians with instructions overlaid on their visors.

ABP and BT video monitoring and image processing with AI was used to monitor lock gate movements and vessel conditions with image recognition software, to determine changes or damage to vessels.

Xocean, an autonomous, solar-powered 5m vessel to help with subsurface and asset inspections was also demonstrated, along with JET Connectivity's brand new large solar-powered 5G buoy. They demonstrated their data dashboard, showing environmental, weather, and 5G service data from the buoy itself.

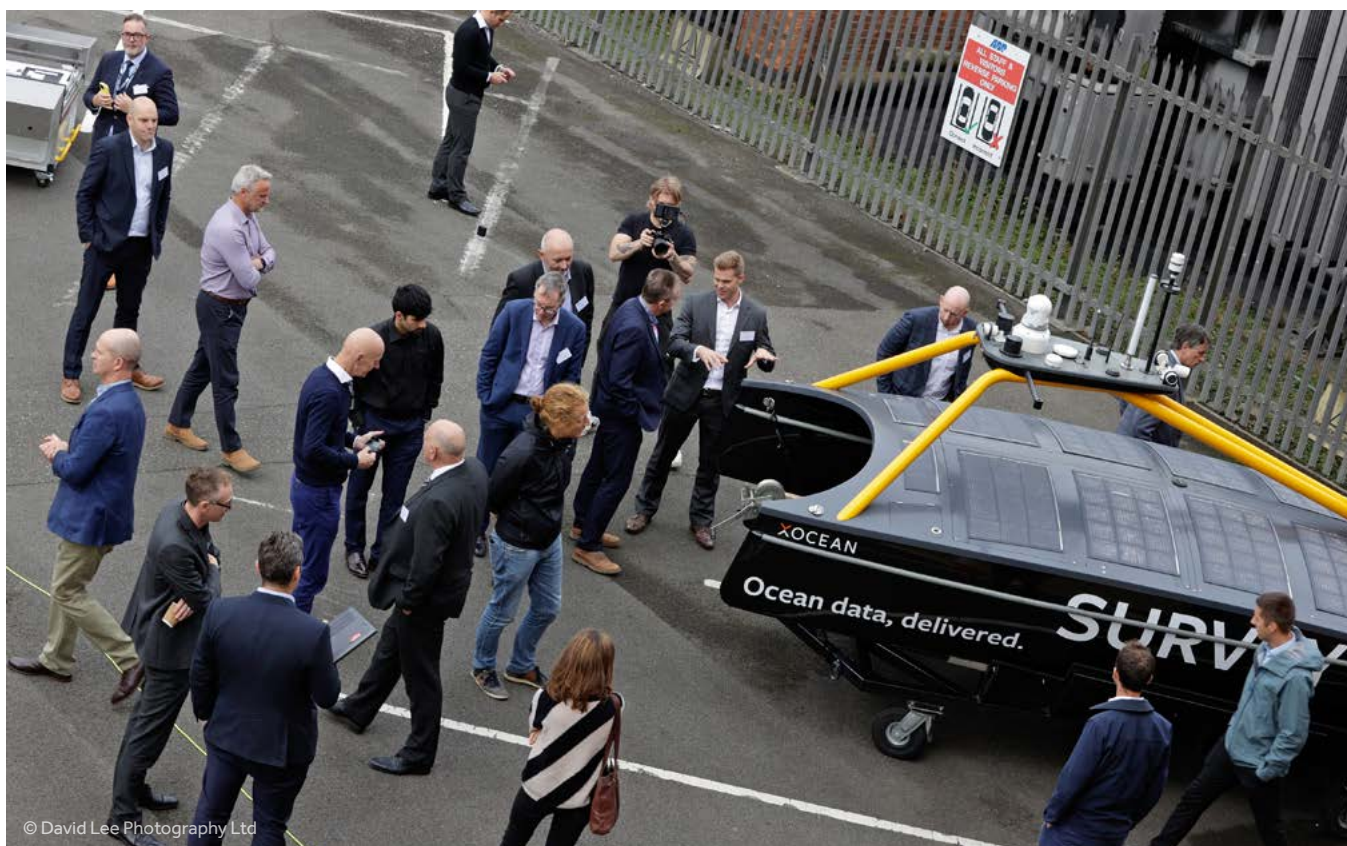
PES: It is being driven by a consortium led by the Offshore Renewable Energy (ORE) Catapult and bringing together the expertise of Microsoft, Boldyn Networks, JET Connectivity, XceCo, Associated British Ports (ABP), Accelleran and Satellite Applications Catapult, is that right? How is the project being funded?



Ben George

BG: Yes, that's correct. The £2.8m project is funded with £1.2m from the Innovate UK Cyber Physical Infrastructure (CPI) fund, £1m from the Greater Lincolnshire Local Enterprise Partnership (LEP), and industry match funding.

PES: Is the idea then for the 5G testbed to allow technology providers to test and demonstrate their equipment in real-world conditions, with access to reliable, high-speed communications and therefore kickstart a digital revolution in offshore wind O&M in the region?



An Xocean autonomous, solar powered vessel to help with subsurface and turbine inspections at the switch on of the 5G PORTAL



A graphic of the 5G connectivity created at the 5G PORTAL from the port of Grimsby across to the Lynn and Inner Dowsing wind farm

BG: Yes. The offshore wind sector is growing rapidly, increasing the need for smart O&M. On average, O&M accounts for 25% of the total lifetime cost of an offshore wind farm, and as the sector expands, there is a strong push to reduce this cost by using robotics, autonomous solutions, and remote sensors to support necessary inspections, maintenance, and repair.

PES: How can the latest remote digital solutions that require high bandwidth, low latency wireless communications be used to make O&M safer, greener and more effective?

BG: Many new digital solutions rely on the type of high-fidelity wireless data communications that 5G provides, and while 5G is being installed in new wind farms, these are not available for wider development and testing.

The 5G PORTAL creates the 5G infrastructure that provides an accessible and operationally integrated testbed for new technologies that are essential to the roll out of offshore wind globally.

PES: What kind of digital solutions are we talking about? And how can these be used to support inspections, maintenance and repair to bring down the cost of O&M of an offshore wind farm as the sector expands?

BG: As mentioned above, O&M accounts for 25% of the total lifetime cost of an offshore wind farm on average, and as the sector expands, there is a strong push to reduce this cost by using technology

to support necessary inspections, maintenance, and repair.

Applications of this technology include robotics and autonomous systems (RAS), remote sensors, wearable technology, cyber security, zero-emission vessels smart ports, and aquaculture. Appropriate utilisation of these systems saves time for technicians in the field and supports better decision-making back on land, both of which lead to cost savings for operators and supporting organisations that make up the supply chain. This ultimately leads to lower costs to electricity consumers.

PES: How do you see the 5G testbed helping UK innovators and technology developers as they bring new products and services to market, including for export into an offshore wind sector that is booming around the world?

BG: Through providing the operational environment, connectivity, and collaborative support with the expertise of ORE Catapult, the broader Catapult network, industry partners, and academia, the 5G PORTAL offers innovators and technology developers a full ecosystem of support.

It will provide a real-world development, demonstration, and test zone for robotics and autonomous systems (RAS), remote sensors, wearable technology, cyber security, zero-emission vessels, smart ports, and aquaculture that will drive the digital future of O&M. This gives UK

innovators and technology developers the upper hand as they bring new products and services to market, including for export into an offshore wind sector that is booming around the world.

PES: Many new digital solutions rely on high-fidelity wireless data communications that 5G provides, and while 5G is being installed in new wind farms, these are not available for wider development and testing. Do you see the Testbed as therefore becoming an essential part of the roll-out of offshore wind globally, looking to the future?

BG: The 5G PORTAL creates a key and unique asset, expertise, and capability, attracting inward investment from the UK and around the world while enabling innovation in leading-edge technologies that benefit from being proven in an operational setting. This living lab investment opens a realm of new possibilities for UK innovators and SMEs, enabling the development and testing of digital twins, AI, robotics, and 5G in a totally unique offshore wind environment.

This is a fantastic opportunity for technology developers to utilise high-speed connectivity in a real-world testbed location. Collaboration is at the centre of this initiative, bringing together experts from each part of the supply chain, the ideal environment for leading innovation.

www.orecatapult.org.uk