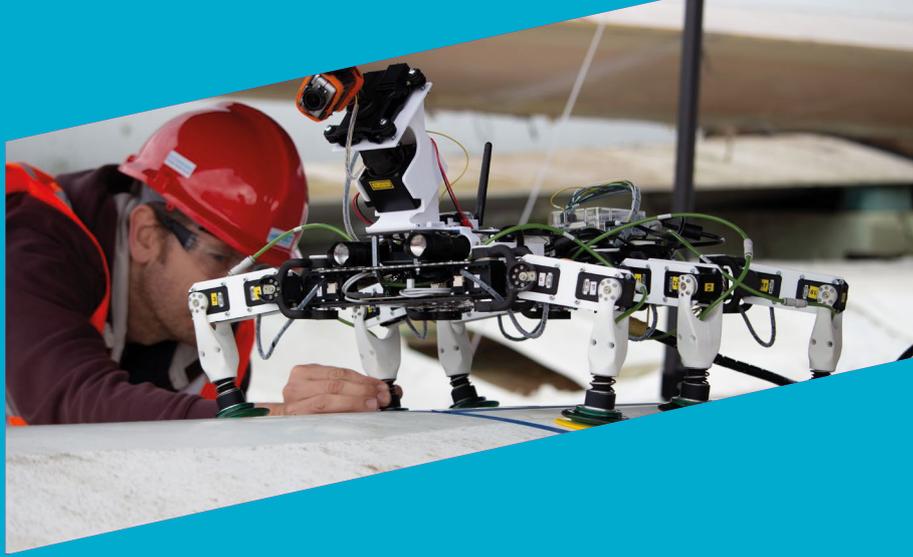




OPERATIONS & MAINTENANCE CENTRE OF EXCELLENCE

ore.catapult.org.uk

CATAPULT
Offshore Renewable Energy



Operations and Maintenance (O&M) activities make up almost a quarter of the lifetime costs of an offshore wind farm and provide a huge opportunity for cost reduction through innovation of products and services.

The O&M Centre of Excellence (OMCE) is a national hub for enhancing the UK's world leading position in offshore wind operational performance. We are a catalyst for innovation, technology, cross-sector collaboration and best practice to enhance safety, reduce cost and support the growth of UK O&M.



The OMCE is established to:

- // Partner with industry to accelerate innovative solutions to market
- // Support the growth of a resilient UK O&M supply chain
- // Stimulate the creation of jobs and innovation-based export markets
- // Drive advances in digital, data, AI, safety, robotics and autonomous systems
- // Propel the decarbonisation of O&M
- // Establish cross-sector collaboration and research programmes

The OMCE engages with UK and overseas offshore wind clusters, academia and government to focus on the development of best practice, innovation and demonstration for O&M.

We work with:

- // Wind farm operators
- // Supply chain: SMEs, Tier 1 and disruptive innovators
- // Government, membership bodies and regulators
- // Academia and research partners
- // Cross-sector industries and partners

A particular focus for the OMCE is to work cross-sector and support organisations currently operating in industries outside of offshore renewable energy, enabling them to achieve entry and provide high-value products and services in O&M.

LOCATED AT THE HEART OF INDUSTRY

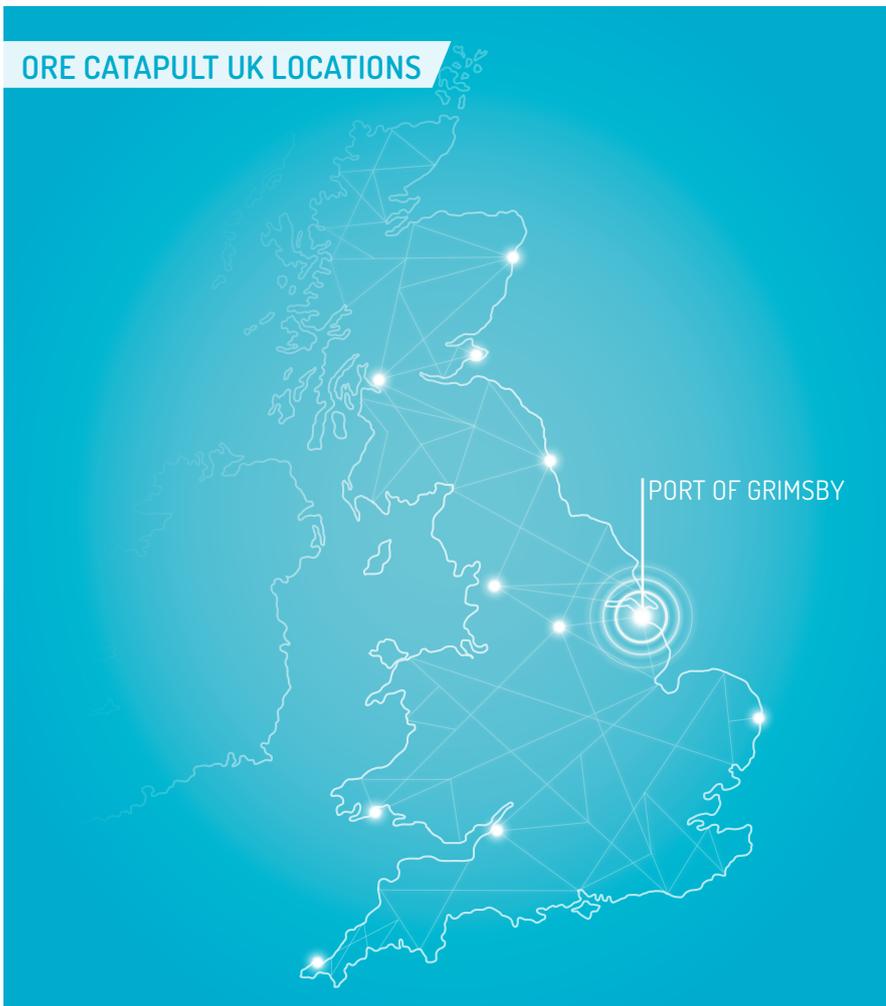
The OMCE is located in the Port of Grimsby, at the heart of UK offshore wind operations. We sit alongside major operators of the world's largest wind farms, working to develop the UK supply chain in response to industry's growing O&M requirements.

From this prime location, we provide a suite of O&M-focused services and programmes centered around three core areas:

Next Generation
Operations and Control

Inspection, Maintenance
and Repair

O&M
Decarbonisation



CASE STUDY

BIRAL

UK-based Bristol Industrial & Research Associates Ltd (Biral) has created an innovative solution that provides users with advanced, real-time information about thunderstorm activity within a 45 nautical mile radius of a wind farm. Biral's BTD-350 technology is virtually maintenance-free and can either interface directly to an integrated system, or operated using the supplied PC compatible display and logging software. The optional warning relay module allows the sensor to automatically sound alarms whenever a storm approaches or the conditions necessary for the beginning of a storm are present.

Biral has been working with ORE Catapult to further develop its BTD-350 thunderstorm and lightning detection system for offshore windfarms. In 2019, the SME installed its technology for testing at our 7MW Levenmouth Demonstration Turbine in Fife. This testing investigated the impact on the performance of Biral's technology when in such close proximity to the moving blades. Previously, the technology had been mounted on land or on large vessels, where there was bountiful space around the unit to monitor the changing weather.



▲ Pictured: Biral lightning detection system

NEXT GENERATION OPERATIONS AND CONTROL

Renewable energy power plants are typically unmanned and may be many miles across, creating logistical challenges for the management of maintenance. Balancing preventative and reactive maintenance means negotiating multiple priorities in a constantly changing landscape, with the potential for significant financial costs through lost generation.

Next Generation Operations and Control covers the onshore management of the O&M lifecycle at multiple levels:

// Strategic

Maximising yield, minimising unplanned maintenance/ repair, cybersecurity, supply chain and logistics optimisation.

// Tactical

Planning and scheduling, coordination, and supply chain interaction.

// Operational

Operational decision making, vessel loadout, marine coordination, transit and transfer, and crew safety.

ORE Catapult is advancing digital techniques applied to renewables data to prevent lost production, enhance equipment reliability and open the way for new operations and maintenance models. A deep understanding of the data produced by renewable power systems combined with the capabilities of the digital sector will drive the next phase in the evolution of electricity generation.

From the OMCE's state-of-the-art Grimsby facility, clients will be able to access a virtual development, testing and simulation environment for new products and processes, built on and learning from real data. This 'mixed environment' is a flexible, modular testbed for businesses to demonstrate and refine their innovative methods of increasing productivity, enhancing safety and reducing cost.

WE WORK ACROSS THE FOLLOWING AREAS:

// Artificial Intelligence

// Machine Learning

// Data Analytics

// Visualisation

// Cybersecurity

// Digital Twins

CASE STUDY

ECHOBOLT

As part of an Innovate UK-funded project, ORE Catapult has partnered with EchoBolt, the leading provider of fastener inspection services in the wind energy sector. It has developed an inspection system that uses ultrasonics to test the tension on the bolts as well as predicting where faults are likely to appear – making scheduled maintenance procedures much more accurate and cost efficient. EchoBolt's technology promises to reduce the costs associated with offshore wind farm bolted connections by a staggering 80%, which results in an estimated saving of £250m/year for the European wind industry.

ORE Catapult has supported EchoBolt in securing Innovate UK funding to expand the capabilities of its technology as well as providing access to our 7MW Levenmouth Demonstration Turbine for further testing in simulated real-world conditions. EchoBolt has also taken advantage of our contacts with GE Renewables and has secured a further testing and validation project on GE's operational turbines later this year.



▲ Pictured: Echobolt bolt torque

INSPECTION, MAINTENANCE & REPAIR

Offshore renewables installations are remote, isolated and physically awkward working locations with inherent hazards of working at height, on or underwater, and distance from emergency support.

Throughout the O&M lifecycle inspection, maintenance and repair is needed for:

- // Subsea assets such as cables, foundations and associated corrosion protection
- // Transition piece, tower and access systems
- // Electrical, mechanical and hydraulic components of the turbine
- // Major components such as generator, gearbox and blades
- // HV equipment on the turbine and at the substation

Current IMR projects supported by ORE Catapult include:

- // Advanced tooling to reduce the risk of injury
- // Access and safety systems to expand the operational window
- // Sensor technology and wearables to monitor technician welfare
- // Communications for operational and emergency requirements
- // Robotics and autonomous systems (RAS) for remote IMR

Industry will continue to strive for the highest safety standards and technological advances will grow in their requirements for robust comms systems offshore.

The OMCE will establish a 5G comms network providing coverage of the Grimsby dock and nearby areas for demonstrations of Industry 4.0 technology. The data output from new technologies will be explored, developed and demonstrated within the OMCE simulated environment.

The OMCE will also provide opportunities for test and validation of robotics and autonomous systems at ORE Catapult's 7MW Levenmouth Demonstration Turbine and National Renewable Energy Centre in Blyth, as well as operational turbines and wind farms.

WE WORK ACROSS THE FOLLOWING AREAS:

- // Safety systems
- // Improved tooling
- // Advanced sensors
- // Robotics & Autonomous Systems
- // Communications technology
- // Training Systems



▲ Pictured: Windcat

O&M DECARBONISATION

The renewables sector will only be truly green and sustainable once it addresses carbon consumption throughout its lifecycle.

Crew Transfer Vessels (CTV) and Service Operations Vessels (SOV) used to get workers to offshore wind farms are almost entirely reliant on marine diesel. Industry targets to fully decarbonise within the next decade mean that critical decisions must be made about vessel designs and fuelling infrastructure.

Failed and end-of-life turbine components – such as blades – are not always repaired. This is an untapped area of financial savings for owners and operators and represents significant supply chain opportunities to seek out full component lifecycle solutions.

The transition to clean maritime is a complex, multinational challenge, with a combination of technical, commercial and regulatory barriers to overcome. The OMCE is bringing together industry, governmental, supply chain and regulatory stakeholders to remove the barriers to uptake of clean fuels, and focus on the rapid acceleration of clean maritime deployment in offshore wind O&M.

ORE Catapult will be working to drive decarbonisation across the O&M lifecycle, creating a ‘wind to wake’ whole system innovation cluster based around a demonstration Net Zero Port, where alternative fuels completely displace petrochemicals, and drive thinking to greater resource efficiency through repair, refurbishment and reuse of parts.

Elements of the project include:

- // Integration of alternative decarbonised fuels into OSW operations - creating a ‘springboard industry’ to accelerate broader maritime decarbonisation
- // Rolling out access to alternative decarbonised fuels for the logistics and supply chain
- // Developing and demonstrating net-zero technologies, systems and processes into O&M
- // Developing and demonstrating the circular economy in wind to maximise recovery and regeneration of materials.

WE WORK ACROSS THE FOLLOWING AREAS:

- // Operational integration
- // Electrical charging
- // Port infrastructure
- // Vessel integration
- // Alternative fuels
- // Circular economy

ENGAGE WITH US



WORK WITH US

ORE Catapult works across the industry, supporting UK start-ups and SMEs as well as major multinationals, market influencers, governing bodies and academia. We work with companies that already operate in renewables and particularly

organisations looking to enter this growing sector. We develop challenges, programmes and projects to enhance and support the renewables sector and the wider energy industry.

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