



Easing the O&M burden with uncrewed systems delivering data

Offshore wind is increasingly contributing to the UK's energy mix. An installed base of more than 2,500 turbines across 52 wind farms supplied around 17% of the UK nation's electricity last year; a percentage rate that's increasing. Maintaining that supply means that the operations and maintenance (O&M) workload is also increasing. But with vessel availability still tight could uncrewed surface vessels (USVs) ease the O&M burden?

Finding and predicting faults

Innovative ocean data company XOCEAN is helping wind farm operators understand the health of their turbine foundations, inter-array cables and export cables, finding faults and providing the data to help predict them before they happen.

It's doing so by supplying high quality data using small uncrewed vessels. They come with lower human, carbon and operational overheads, and allow for greater flexibility and resource and time efficiency than their crewed alternatives, with guaranteed high quality data deliverables.

Over the last five years, the company has worked on O&M scopes on over half of all operational wind farms in the UK, many with multiple visits to inform operation and maintenance programmes and ensure safe and continuous operation.

Long term collaborator SSE, for example, has been using XOCEAN on its 140 turbine Greater Gabbard wind farm since 2020, with 15 survey scopes now completed, providing SSE with greater insight into the health of the farm.

This is in addition to preconstruction survey work, as well as other hydrographic and fisheries survey scopes, that the company has performed in over 23 jurisdictions globally so far.

Planned surveys

A large amount of the O&M work in the offshore wind sector is for regular planned and

preventative maintenance,' says Adam Bonner, XOCEAN's Head of Business Development for O&M.

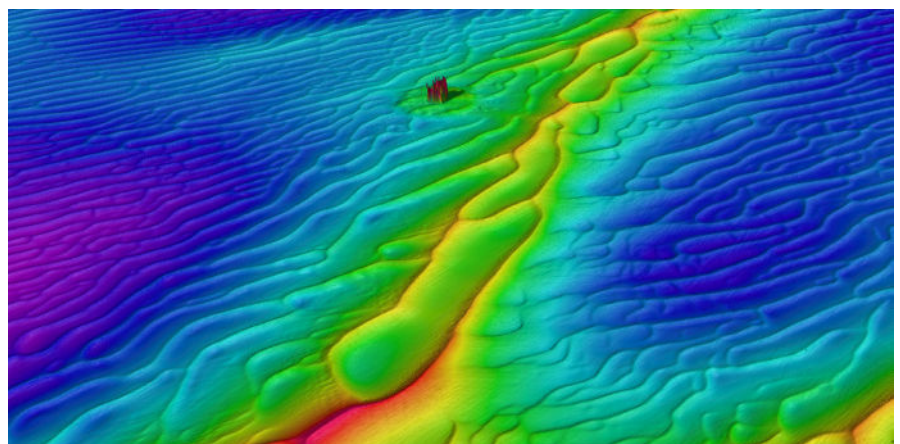
'The frequency of routine monitoring is site specific,' he says, 'but typically follows a more intensive monitoring period immediately after build. The focus is everything beneath the water line, from foundation integrity to inter-array and export cable health and understanding the dynamic environment they're in.'

'There's been a lot of focus on preventing scour around turbine bases, where currents wash out the sediment around foundations which needs to be managed using approaches such as rock scour protection,' Bonner continues.

'Similarly, issues like inter-array cable exposure and free span are common. While not always an immediate concern for remediation, they can soon become problematic.

'We will identify these issues on surveys, but many operators are also interested in repeat visits to provide greater insight into transient issues like sand mobility and wider seabed morphology that cause and influence these issues, so they can then prevent bigger problems in the future.

'But it's also about responding rapidly, to identify an emergent issue or complete a debris clearance survey to get a jack-up in for a turbine repair. One of our benefits is that we can respond fast when the clock on lost revenues is ticking.'



Example of bathymetry data around a wind turbine foundation for asset protection monitoring



XOCLEAN deploying multiple USVs

Uncrewed resource efficiency

XOCLEAN's workhorse is its well established XO-450 USV, over 20 of which are helping operators to identify and prevent problems with high resolution, accurate, timely survey data

These lightweight USVs carry the same sensors as traditional survey vessels, including a range of multibeam echosounders (MBES) and sub bottom profilers, as well as magnetometers and side scan sonar, as required.

Enhanced maritime satellite systems onboard the USVs enable near real time access to data acquired for quality control and processing using its Cyberdeck platform, for accelerated delivery to the customer.

'A big benefit is their low carbon footprint, typically using less than one litre of fuel per hour, compared with what could be hundreds or indeed thousands of litres on a crewed vessel,' explains Bonner. 'There's also the reduced seafarer exposure, due to having no people offshore, as well as, due to being remotely operated, operational flexibility.'

'This operational flexibility, coupled with its fleet size means that multiple USVs can be deployed at a time on any one scope, greatly reducing the survey acquisition time, which can be important when data is time critical,' Bonner argues.

Fast and flexible response

'The USVs are extremely easy to transport and launch. We can road transport them to any port for launch and recovery, which means we can be fast and flexible, with the potential to respond to urgent work in a matter of days. Their shallow draft also means the same survey platform can operate from shore to fully over the horizon.'

Ensuring integrity

Fast responses are also not always about looking for a fault. While wind farms are built to withstand the harsh environments they are placed, increasingly frequent intense storms that can churn up the subsurface have been a concern.

'Last winter, for example, Storm Babet saw significant winds and swells offshore. Operators concerned about the impact of the increased seabed and sediment mobility on their turbine foundations contacted XOCLEAN to go out and check for them,' recalls Bonner.

'We could mobilise quickly and share near real time visualisation data, so they knew what they had to deal with, or not, in terms of remedial action, preventing damage and downtime,' he says.

Commercial flexibility and lower risk profiles

But it's not just about being flexible logistically, according to XOCLEAN chief commercial officer Andrea Phillips. 'We're able to be flexible and innovative around contracting strategies, reducing those headaches around planning and budgeting and project and data management.

'We work with operators to understand the data they need and how best to get it with the contracting strategy that works best for them, which could be anything from a lump sum or a framework agreement. Working in partnership can have great benefits, helping to understand and tailor what data is needed, from survey line planning to informing intelligent monitoring strategies for efficient O&M through to the types of data reliably delivered.'

'We've also seen that operators find not having potentially 70 tonne survey vessels operating near their assets a huge benefit,' adds Bonner. 'Our lightweight, plastic hulled, 4 m long vessels, present a very different risk profile to operators than many larger crewed survey vessels. This translates equally to SIMOPS planning and the risk to other assets working in the wind farm, such as walk-to-work (WTW) vessels or service operations vessels (SOVs), reducing marine logistics issues.'

Meeting growing demand

Meticulous efficiency will be needed, as more wind farms come online and the workload increases. Thanks to the operational range of these, the new generation of wind farms further from shore, such as Dogger Bank, which they've already worked on, are easily within their grasp. So are floating offshore wind farms, where anchor and cable integrity will require potentially even more scrutiny.

XOCLEAN, which currently has over 250 staff, is growing to meet the demand. It recently raised €30 million Series B funding to accelerate its international growth and drive further technical innovation, setting it on a secure path.

For this business, it's all about data delivery and it is keen to keep innovating around how it does just that, as well as the types of data and the insight that brings. 'The USV is just a platform,' concludes Bonner. 'We're looking at what other data we can deliver to optimise value while on projects. For example, we're doing research and development around topside inspection options and exploring new sensors so we can provide greater insights to our customers. There's definitely more to come.'

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