

## Success Story: Ørsted A/S

# Met Ocean Data Transmissions Using Innovative Electromagnetic Signalling

Wind farms can now prove their structures are not harmful to subsea environments

**Ørsted A/S, a Danish multinational clean energy leader that constructs and operates offshore wind farms in Denmark, Germany, the Netherlands, and the UK (with projects in Taiwan and the US) came to CSignum Ltd. to determine how electromagnetic (EM) field data transmissions could benefit their business.**

Now having operated flawlessly for six months in real-world operation at Ørsted's site in Skaerbaek, the verdict is in. The CSignum EM-1™ transmits continuous and reliable data through the water in places and circumstances where acoustic, wired, and optical solution transmissions are often disrupted. Beyond the transmission reliability, however, is an even more important mission.

The stakes are high for Ørsted, which has in a little more than a decade transformed into a clean energy offshore wind power provider. To remain clean energy-compliant, Ørsted must be able to show that long-term deployment of wind farm subsea structures is not harmful to the environment, but potentially beneficial. After all, fifty years from now at the end of their structural life, these turbines will be removed and it's important to be able to show the environment can return to its previous pristine state.

The data Ørsted is gathering is not only critical to how their business is operating but also to prove their hypothesis that their wind farm subsea structures cause no environmental harm. Rather, the structures, where fish and other marine life make their home, actually have a positive impact on underwater environments.

Operators do not have easy access to the proof that is reflected in this data today. Most wind farm operators must send teams of divers to retrieve data and make

visual assessments – visits themselves that can have a negative environmental impact, are costly, cause unnecessary downtime and inefficiencies in performance, as well as hold potential health and safety risks.

### HOW IT WORKS

The EM-1 is the first and only platform to carry data with low-frequency EM waves. The data travels from below the water to receivers at or above the waterline, on land, or in the air, all in an extremely energy-efficient way.

The EM-1 works seamlessly with the standard interfaces of sondes, sensors, AUVs, ADCPs, and dataloggers. Our technology uses safe, silent, and invisible electromagnetic fields to communicate data from devices below the water through the water column, seabed, structures, challenging water conditions, and across the water's surface – and back again. It provides visibility in near real-time regarding the environmental impact of wind farm structures on the seabed, surrounding sea life, and the condition of the water flowing through and around them.

Working with CSignum and Xylem, Ørsted instrumentation engineers deployed EM-1 connected to standard Xylem sensors and sondes. CSignum's EM-1 can transmit data from the seabed to another transmitter/receiver to collate corrosion, stress, accelerometers topside on monopiles or jackets. The transmitters/receivers can then send data from an ADCP to shore either using the wind farm's own cellular network or through SatCom.

In the Ørsted deployment, it is transmitting metocean

data on the water's parameters including ocean temperatures, oxygen levels, the speed and direction of water flow, and wave height to predict the stresses to and integrity of these structures and their impact on the local sea life and seawater.

Our technology optimises power consumption and battery life, reducing the need for routine maintenance. With the EM-1's automated readings, Ørsted no longer needs to send out work boats and teams to manually inspect systems and gather data. The ability to transmit signals via standard sonde and ADCP through the seabed, steel, and concrete structures as well as the water's surface means data can be uploaded directly on demand or on schedule to cellular and satellite networks on land and in the air.

Our technology has proven to be a game-changer for Ørsted. By enabling met ocean data transmission via EM technology, ESG requirements are being satisfied. CSignum enables Ørsted to retrieve data for the first time from difficult-to-reach places under adverse conditions and set a 360° baseline for the impact of their structures, providing greater visibility into conditions under the water and within the turbine's water column.

## THE ADDED BENEFITS OF ELECTROMAGNETIC FIELD DATA TRANSMISSION

### CSignum's Technology Works Seamlessly with Existing Deployments

The EM-1 works with acoustic and optical solutions that are already deployed, but in more places and under

more adverse conditions than those deployments. While acoustic and optical solutions work well in certain specific conditions, they still have their drawbacks. The signals lose their integrity and scatter when they reach the surface or in adverse environments where line of sight is compromised or underwater noise and ambient light cause interference. Acoustic solutions can also cause harm to marine life.

Cables will snag or fail due to repeated stresses from wave motion and are expensive to repair or replace. The methods of fixing them in place can cause erosion or damage to the seabed or be unsuitable in locations with a fragile ecosystem.

### Breakthrough in Electromagnetic Signalling makes the Internet of Underwater Things a reality

When it comes to the Internet of Underwater Things (IoUT), no solution has been able to connect networks on land to digital things below water without the use of cables. Until now. Our EM technology provides the solution to digitise and scale subsea devices for underwater industries, bringing to market a true Internet of Underwater Things, encouraging greater sustainability, delivering increased performance, and allowing preparedness for unforeseen events.

Ørsted has been able to increase the efficiency and operations of thousands of turbines, improve safety, for its work boats, reduce maintenance costs, accurately, calculate remaining asset life and, most importantly, ensure sustainability of the surrounding environment.