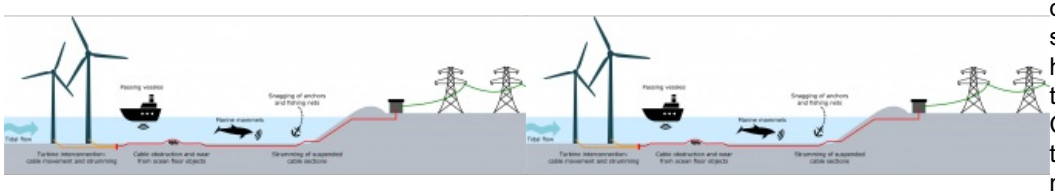
Integrated Subsea Cable Monitoring System Tested at EMEC



An innovate UK-funded project focused on developing a smart integrated monitoring system for offshore energy subsea cables has drawn to a close following successful tests at the European Marine Energy Centre (EMEC) in Orkney. The novel technology will ultimately lead to better maintenance and repair of underwater cables, reducing costs in the offshore energy sector.

The 12-month Innovate UK-funded 'Cable Lifetime Enhancement via Monitoring using Advanced Thermal and electrical Infrastructure Sensing' (CLEMATIS) project demonstrated the technical and commercial viability of a new multifunctional distributed sensor system for the monitoring of subsea cable infrastructure in the offshore renewable energy sector.

The CLEMATIS project included the Fraunhofer Centre for Applied Photonics and Synaptec, whose technologies were integrated into the system, and EMEC and SEA, who provided market intelligence, test equipment and facilities to enable the system to be tested in real life conditions. The project built on the 2016 desk-based ORCHIDS feasibility study which identified various breakthrough techniques that could be combined into a single power cable monitoring system and provide detailed fault prediction, dynamic thermal rating implementation and fault location.

Acoustic and thermal sensing

CLEMATIS progressed this initial study from the desk to laboratory demonstrations and early field tests both on and offshore. Field demonstrations took place at EMEC testing the distributed acoustic and thermal sensing capabilities with onshore sections of marine cable. Early success in these tests provided the impetus to test the system on an installed offshore power cable, thus expanding the original scope of the CLEMATIS project.

In June 2018, the system was demonstrated on a live subsea cable at EMEC’s Fall of Warness tidal energy test site.

The CLEMATIS system is a holistic monitoring system that exploits the optical communications fibre in marine power cables. The system turns entire lengths of power cable into reconfigurable acoustic and temperature sensors. A quasi-distributed electrical system makes use of the same optical fibre to interrogate passive electrical current and voltage sensors distributed throughout the infrastructure.

This is the first time that such techniques have been combined into one monitoring system enabling end users to simultaneously monitor temperature and load on the energy network, and log any cable trauma such as anchor strike, scour related cable strumming or mistakes in cable installation.

Change in offshore renewable energy operations

Potential faults can be captured before turning catastrophic, and major faults or outages can be located immediately with accuracy. The system will therefore bring about a step change in offshore renewable energy operations and maintenance, reducing the requirement for visual inspections thus cutting ROV, diver and vessel hire costs.

Further to this, the studies found there to be potential for the acoustic system to detect much more than tidal flow or direct cable disturbance. Early results indicate the system may even be able to pick up external acoustic signals, for example from passing vessels and even interaction with marine mammals.

The CLEMATIS project was led by Dr Henry Bookey, Fraunhofer UK Research: “Fibre communications are widely used in cables and umbilicals in oil and gas applications. The ability to monitor real time cable status can save huge sums in lost production through early indication of fault development and help avert major problems by diagnosing and pinpointing cable damage in real time."

“The technology emerging from the CLEMATIS project will allow cable health to be monitored accurately and cost effectively. As the project draws to a close, we are seeking opportunities and potential partners to take this solution to market," he added.

Smart integrated monitoring system for offshore energy subsea cables (Courtesy: Fraunhofer)