Aker Solutions

Subsea substation to floating offshore wind (FOW) interface assembly demonstrator

Department for Energy Security & Net Zero

NET ZERO INNOVATION PORTFOLIO

CARBON TRUST

OFFSHORE WIND

Project Lead: Aker Solutions

NZIP Grant: £690,454

Innovation overview

The project aims to apply and qualify Aker Solutions' Oscilay™ cable manufacturing technique for dynamic inter-array cables through a demonstrator project with subsea substation interfaces. The project includes finalising the full jumper assembly testing to deliver a market-ready 66 kV wet mate jumper system. In doing so, the project demonstrates two technologies in unison: the Oscilay™ and a 66 kV wet mate connection system enabling subsea substations, a technology which **can save up to 10% in the cost of a 1 GW floating wind farm**.[1]

Potential benefit to the industry

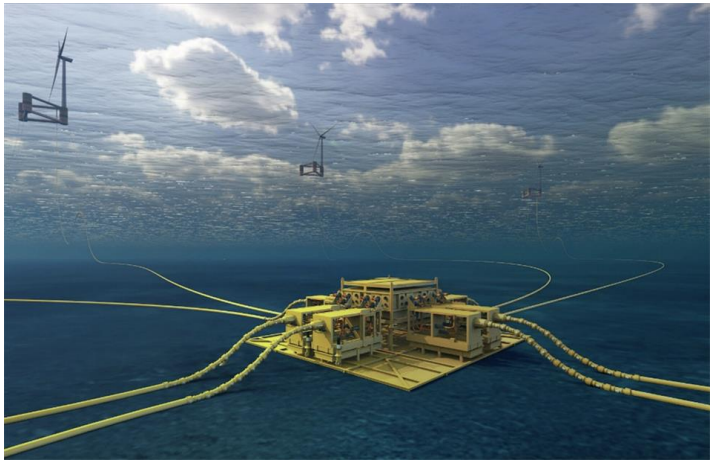
The 66 kV connection system is crucial enabling technology for subsea distribution equipment, facilitating the subsea connection of power cables between turbines and subsea modules. Oscilay™ cables enhance this system with greater machine simplicity, fewer splices and welds, and more straightforward, cost-effective offshore installation.

When combined with the 66 kV wet mate connection system, Oscilay™ cables can significantly boost the efficiency of energy transmission back to shore. This project accelerates the development of subsea HVDC substation technologies, providing vital support for the floating offshore wind industry.

> "The floating offshore wind demonstrator project allowed us to accelerate our R&D programme, provided essential learning to our development team, and achieved successful qualification for some key enabling technologies for offshore wind developments."

Graham Nicholson

Senior Study Manager at Aker Solutions



Source: WindPower Monthly: Aker Solutions to test 'world's first' star-shaped offshore wind cable system – .

[1] Aker Solutions (2024) Aker Solutions to pilot floating-wind power hub

Results

Result #1

The project aimed to derisk the innovative subsea substation and related components. Subsea hubs have the potential to reduce levelised cost of electricity (LCOE) through various means:

Eliminating the need for export dynamic cables at substation

- Only static export cables required.
- Likely to endure fewer conflicts with other ocean users.

Reducing length of inter array cables

- Can reduce inter array cable length by allowing for more strategic placement of the modular substation.
- Cables connecting the turbines to the substation can be shorter, as they don't need to reach the topside.

Eliminating the steel or concrete platform

- Substation sits on the seabed floor without a foundation.

Eliminating required maintenance

- This technology is already maintenance free in oil & gas. Learnings can be applied.

Reducing active cooling

- Subsea substations can leverage the typically stable and cool temperatures on the seabed floor.

Reducing the weight

- Modules weigh a few hundred tonnes compared to topside installations of several thousand tonnes, gaining access to an increased vessel database.

Result #2

Aker Solutions' Oscilay™ manufacturing technique expands on the advantages of conventional static inter array cables manufacturing to create the following benefits:

Fewer splices

- This technology eliminated the need for splicing due to manufacturing weight and volume constraints.
- The technique can shave off 15-20% of manufacturing time by avoiding interruptions for splicing.

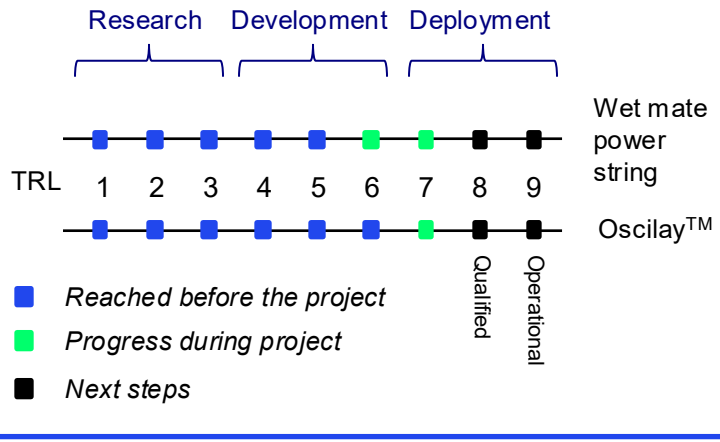
Machine simplicity and flexibility

- Machine reels are stationary as opposed to rotating elements (which is said to make the machinery less costly than planetary systems with a similar capacity).

Simpler and cheaper installation offshore

- Handling and transporting fewer, larger cables can be more straightforward than managing multiple shorter segments.

What's next?



The Floating Offshore Wind (FOW) Demonstration Programme is a competitive funding initiative supporting the development of floating offshore wind technologies. Through the scheme, the government awarded £31.6 million in grants to 11 projects across five challenge areas: dynamic cables, anchorings and moorings, floaters and foundations, industry-defined innovation, and integrated demonstration of multiple technologies. These projects aim to showcase innovative technologies to reduce costs and accelerate the deployment of floating offshore wind turbines.

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Funded by:

Department for Energy Security & Net Zero

Supported by:

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