Department for Energy Security & Net Zero

NET ZERO INNOVATION PORTFOLIO

Copenhagen Offshore Partners (COP)

Integrated demonstration

CARBON TRUST | OFFSHORE WIND

Project Lead: Copenhagen Offshore Partners

Partners: Bekaert, BES Group, ORE Catapult, Sealip, Stiesdal, Subsea Micropiles

NZIP Grant:

£2,642,000

COP COPENHAGEN OFFSHORE PARTNERS

Innovation overview

Copenhagen Offshore Partners (COP) is actively supporting technologists and supply chain companies in the development and demonstration of innovative solutions crucial for reducing the costs associated with floating offshore wind farms. This effort is part of the Integrated Floating Offshore Wind Demonstrator project (INFLOAT). The innovations being developed were identified through the work of the Pentland Floating Offshore Wind Farm project team and through engagement with the supply chain. They align with the technology challenge areas outlined in the Floating Offshore Wind Demonstrator Programme. Key areas of focus include: The development and qualification of a novel and versatile anchor solution; the creation and qualification of a nylon mooring system rope; the testing and development of a scale industrialised floating foundation; the establishment of a design envelope for dynamic cable solutions.; the development of a Condition Monitoring System and a Digital Twin.

Potential benefit to the industry

The innovative technologies developed by the INFLOAT consortium partners are being tested for deployment on the Pentland Floating Offshore Wind Farm demonstrator project. The deployment and verification of these innovative technologies on a demonstrator project is vital for technical de-risking, such that future commercial scale projects can deploy the technologies at lower cost than conventional technologies and in a bankable and insurable way.

> “As part of the Pentland Floating Offshore Wind Farm project, INFLOAT has played a crucial role in supporting the testing and qualification of innovations required for driving down costs of and de-risking floating offshore wind farms. It's a clear demonstration of the UK Government taking a global lead in the development of an industry which will be vital to achieving Net Zero targets.”

David Crooks

Senior Engineering Manager at Copenhagen Offshore Partners

Stiesdal TetraSub

Results

Despite revisions to Pentland Floating Offshore Wind Farm timeline preventing the in-situ demonstration of the INFLOAT innovations, significant progress has been made. The INFLOAT consortium partners were supported in the following ways:

- Bekaert have planned and commenced the qualification a nylon mooring rope with DNV. The use of this rope in a semi-taut nylon fibre based mooring configuration, would offer a 4 times reduction in footprint over a catenary arrangement in shallower water.

- Subsea Micropiles have progressed the qualification of their novel and versatile anchor solution through onshore and quayside testing. The anchor has been developed further for offshore operational tests in Scapa Flow (Orkney) in March 2025. Anchoring solutions for hard and rocky substrates, which are cost effective and can scale, are essential for floating offshore wind lease areas which are not suitable for standard anchoring solutions. Additionally, there is promise that the Subsea Micropiles anchor solution may be suitable, and in some cases, more cost effective than standard anchoring solutions across a wide variety of seabed conditions.

- Stiesdal Offshore worked with supply chain companies to enhance the constructability of its floating TetraSub foundation and developed be-spoke tooling; required to facilitate rapid quayside assembly. Tests were also performed to demonstrate and validate numerical models of key nodes of the TetraSub foundation.

- Sealip have developed and numerically tested dynamic cable configurations that could accommodate the lateral movement of a floating offshore wind turbine moored in shallow water.

- BES Group worked with Stiesdal Offshore to optimise the arrangement of Condition Monitoring Sensors to be deployed on the floating foundation to inform a digital twin. ORE Catapult progressed the development of a digital twin, working to enable the optimisation of remote monitoring, predictive maintenance and wholistic system optimisation. A digital twin informed by onboard sensor measurements will ultimately lead to more accurate models and less conservatism in design, and thus a greater reduction in cost of future foundations.

Towing of the Stiesdal TetraSub

What happens next?

The findings from the development activities will enable the deployment of technologies that will facilitate the industrialisation and cost out of FLOW technologies and ultimately reduce LCoE.

Subsea Micropiles anchoring solutions will be demonstrated in Orkney (March 2025).

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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INFLOAT – Pentland Floating Offshore Windfarm

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