Department for Energy Security & Net Zero

NET ZERO INNOVATION PORTFOLIO

# London Marine Consultants (LMC)

## DISCO™ Buoy

CARBON TRUST | OFFSHORE WIND

**Project Lead:** LMC

**Partners:** University of Plymouth

**DESNZ Grant:**

£264,924

DISCO BUOY LONDON MARINE CONSULTANTS

LMC LONDON MARINE CONSULTANTS

## Innovation overview

The DISCO BUOY™ is a disconnectable mooring system for floating offshore wind platforms. The Department for Energy Security & Net Zero (DESNZ) fund aided with design and feasibility studies and model tests at 1:70 and 1:4 scale in a basin facility.

The key design features are listed below:

- Simple, quick and controlled method of mooring connection and disconnection
- Suitable for multi-point spread mooring solutions
- Suitable for semi-submersible and barge shaped floating wind platforms
- Modular design of buoyancy and latch systems, to allow for variations in:
    - Number, size and type of mooring lines and dynamic power cables
    - Site parameters, water depth and environment

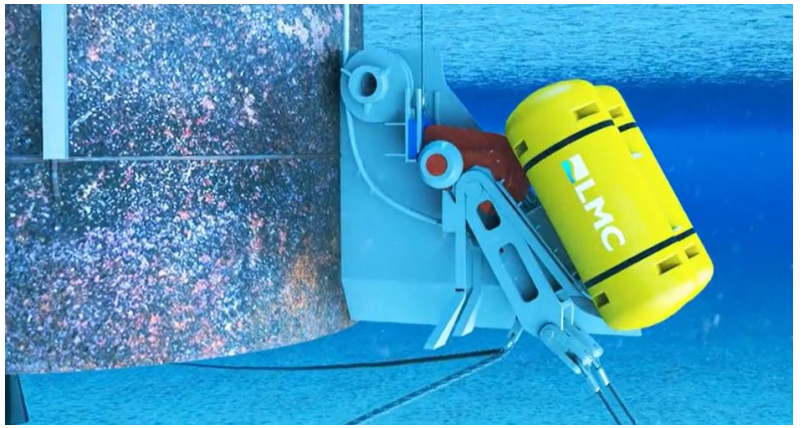
## Potential benefit to the industry

As the floating wind industry develops, it is becoming increasingly evident that there is a requirement to be able to readily disconnect the platform from the mooring and dynamic power cable system in a controlled manner, due to maintenance requirements of large components, and the costs and risks involved in undertaking these operations at sea.

> “LMC are proud that, with the backing of DESNZ, they have increased the technology readiness level of this essential product. The ongoing development of the DISCO BUOY continues to progress, and we look forward to seeing a full mooring and electrical connection system deployed on a demonstration project in the very near future.”

**Nick Palmer**

Director, London Marine Consultants




LMC Disconnectable Buoy Mooring

## Results

As part of the funding received from the Department for Energy Security and Net Zero for their Floating Wind programme, LMC's Disconnectable Mooring and Cable System for Floating Wind has performed as predicted in the 1:70 scale basin tests, and 1:4 scale function tests recently completed at University of Plymouth COAST laboratory. The test demonstrated the bespoke design of the latching mechanism developed.

In the 1:70 scale tests the buoy system mirrored the computer model in both disconnected and connected states. The buoys and mooring maintained control of the floater without unnecessarily high line tensions or platform excursion.

This showed the design achieved its ambitions and proved that:

- Maintaining position within the water column and below the wave zone, ready for connection / reconnection (rather than laying on the seabed or in the wave excitation zone where a greater risk of damage exists). This also keeps the buoys away from the surface where they may be struck by a vessel.
- The requirement to remove buoyancy modules from the power cable (and mooring system) during disconnected stage (to remove the hog bend and wet store) was not a requirement.

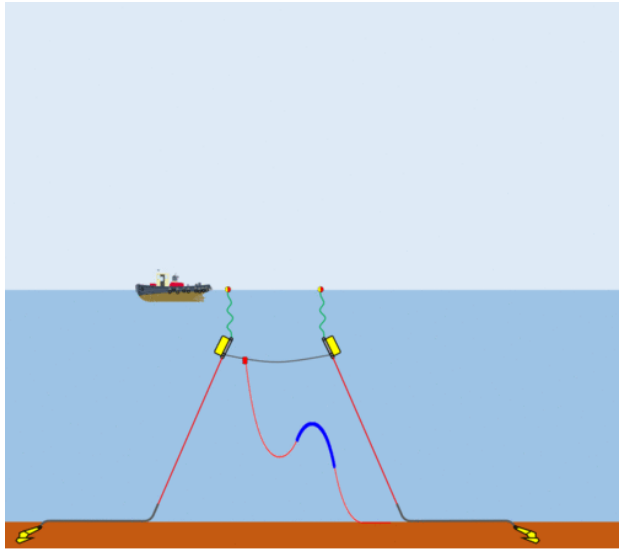


Image: DISCO BUOY: Scale tank test of the 1:70 DISCO BUOY system at Plymouth University's COAST Laboratory

## Results

The 1:4 scale tests again utilised Plymouth university's COAST laboratory. A test rig was fabricated and the receptacle containing the hook and locking plate suspended at water level on the test tank to replicate a floating platform's keel level.

The mooring system was connected via a sheave to the tank floor allowing the distance from the receptacle to be controlled and mimicking mooring line angles at varying water depths.

Using a winch connected to the gantry the DISCO BUOY was pulled into the receptacle.

The hook engaged and proved that:

- The system is self-engaging and does not require intervention for the locking hook to capture the DISCO BUOY
- By altering the buoyancy on the DISCO BUOY and thus the inclination angle in the disconnected state, the system can be revised to function at a wide range of water depths
- During disconnection there is sufficient line tension to disengage the buoy and release it from the receptacle when the locking plate and hook are lifted

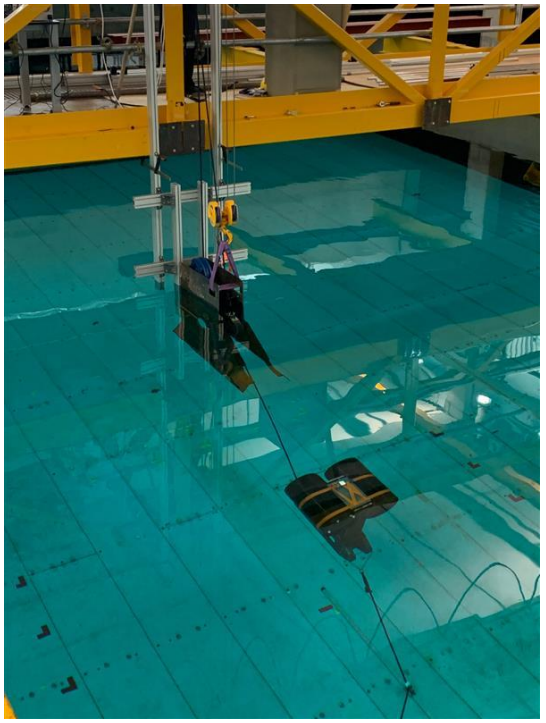


Image: DISCO BUOY: Scale tank test of the 1:4 scale DISCO BUOY system at Plymouth University's COAST Laboratory

### What happens next?

Full scale offshore demonstration with disconnected dynamic cable of the DISCO BUOY system either integrated with a scale foundation or similar test rig.

Further funding to develop the dynamic power cable buoy and connection system.

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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