A weathervanning solution to decrease the LCOE of floating offshore wind

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Our goal is to re-think the system to bring LCOE reduction to floating wind

Current technologies face challenges

- “Spar” and “semisub” successfully proven but require large weights for stability
- Tension leg platforms (TLPs) reduce weight but installation is very complex
- Challenge to scale up to >10MW turbines due to increasing bending moments on tower base

How to overcome these?

Re-think the system to take advantage of the floating environment, in order to:

A. Enable substantial reduction of loads and steel weight
B. Improve scalability to 15MW+ turbines
C. Enable cheaper installation in deeper waters
D. Ensure industrialization and mass production
Our patented technology

Lighter design
Lower bending moments, less steel required

Easy to Install
Full assembly at Port, installed with local vessels

Reliable
Use of passive systems, downwind configuration

Scalable
Suited for larger turbines (15MW+) & deeper waters

Environmentally friendly
Lowest footprint, less emissions during construction
The PivotBuoy Project

Project description

- H2020 funded project to validate the PivotBuoy® system
- Prototype to be tested at PLOCAN in a real environment
- System in the water, getting ready for installation
- Consortium: 9 industrial + R&D partners

PivotBuoy Project:
- Plocan test site (Spain)
- X30 platform (1:3 scale)
- 50m water depth
- 3 tensioned moorings + GBS
- Vestas V29 + ABB converter
- 20kV cable connection

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement Nº815159
Project aims to validate cost reduction path

Potential levelized-cost-of-energy path (€/MWh, normalized)

- State of Art
- Platform weight reduction
- Mooring & Anchor
- Novel connection
- Assembly & installation
- Maintainability & reliability
- Upscale to 10MW
- Integration of new downwind rotors
- Economies of scale in large farms
- Long-term finance margin & lifetime
- Long-term floating wind

PivotBuoy direct impact

Long term potential
Design phase: advanced simulations & optimization

1:50 scale model tests (ECN)

3D CFD modelling with Fraunhofer to assess performance in downwind configuration (Fraunhofer)

Coupled analysis with Orcaflex & HAWC2 models & cross-validation (X1 & DTU)

CFD simulations to assess wave impact load on PivotBuoy (WavEC)
Manufactured in Santander & shipped to GC

Floater components manufactured at DEGIMA facilities in Santander

Components shipped with Noatum Logistics to Gran Canaria

Loading out at Hidramar Shipyard
Assembly & load-out completed with local means, getting ready for commissioning

- Positioning of different elements
- Coat Painting
- Welding of the whole structure
- WT Nacelle assembly
- Electrical equipment integration
- Adaptation Vestas V29 to downwind
- Load-out
- Rotor assembly
- Port acceptance testing
- Installation (anchors, cable, floater)
- Commissioning & testing at PLOCAN
Gravity based foundation installed in its final location offshore

Foundations successfully installed offshore

- Three reinforced concrete blocks
- Manufactured locally in the port of Las Palmas
- Installation using standard anchor handling tug with help from local vessel to ensure relative position
- Successful installation at a depth of around 50 meters, within 0.5 meter of their target positions (well below the 1 meter radius requirement)

Demonstrating minimal impact on seabed

- Minimal impact on marine life during installation & operation
- Installation with standard local vessels
- Minimized footprint on seabed and potential for artificial reef
Now working on industrialization phase

Learnings being applied to 15MW+ design
Working with partners & suppliers in industrializing processes to get ready for commercial phase.

Phase 1
Validation in lab
1:64 & 1:50 scale validation

Phase 2
Part scale pilot
1:3 scale, Vestas V29, real conditions

Phase 3
Industrialization
Upscale design & optimization for serial production
For further info:
www.pivotbuoy.eu
www.x1wind.com

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