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MARMOK-Atlantic

Borja de Miguel

Project Manager

IDOM Consulting, Engineering and Architecture

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 883751.

Introduction

IDOM Consulting, Engineering and Architecture

- Since 1957
- 4000+ employees
- 40 Offices in 125 countries (Headquarters in Bilbao, Spain)
- Employee owned, 700+ partners

MARMOK WEC Technology

- **13 years experience** in marine renewables. Started with the development of a **Spar type OWC** wave energy converter
- Technology with outstanding **simplicity**, **robustness** and **maintainability** (a single moving part, not submerged)
- **Viability** of the technology **demonstrated** offshore during 2.5+ years (**3 consecutive winters**)

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EW challenge

Advance towards commercial viability of the technology by **improving power performance** while maintaining **reliability** and **survivability**.

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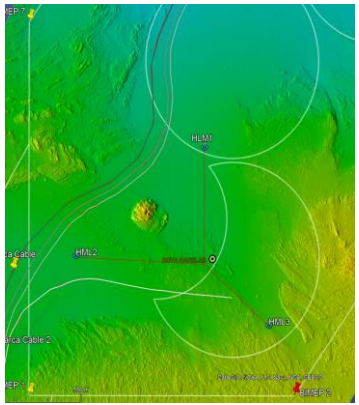
Phase 3 - Schedule

2024 | **2025** | **2026**

Design

Purchases & Retrofitting

Offshore testing



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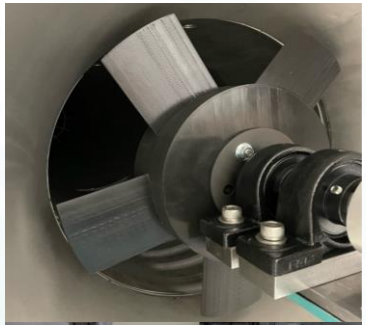
Phase 3 - Schedule

2024 | 2025 | 2026

Lab testing | Onshore testing | Offshore testing

Aerodynamic



Generator

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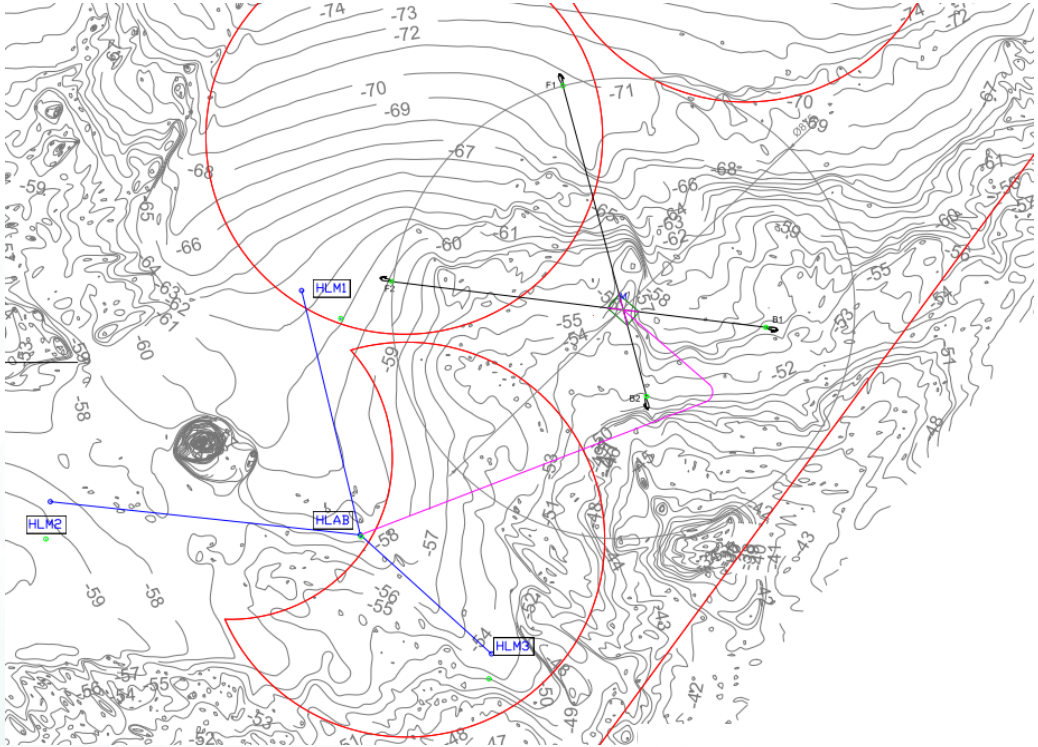
Phase 3 - Progress & activities

Mooring system design

- Adaptation to Berth 1 (50-70m depth)
    - 4 chains + polyester ropes
    - Submerged cell Steel wire cable
- Rocky bottom in SE -> dead weights
- Anchor points agreed with BiMEP



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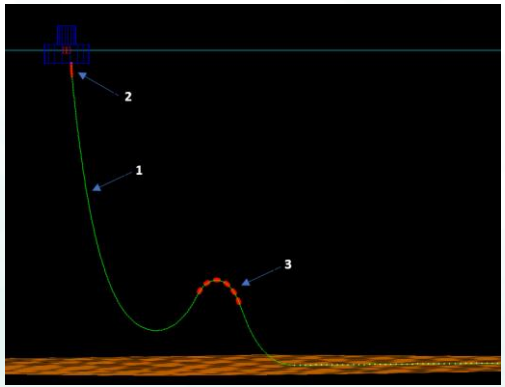
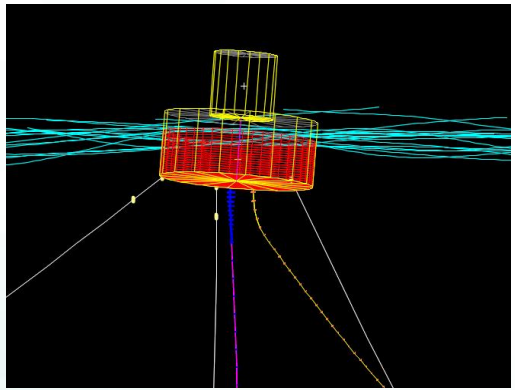
Phase 3 - Progress & activities

Umbilical cable routing design

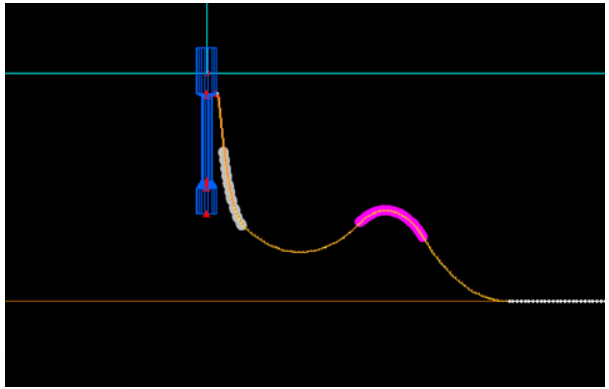
- 2 independent designs
- Main issue on the cable curvature
- Mooring lines and other umbilical clashing checked

HL side





MARMOK-A-5 side



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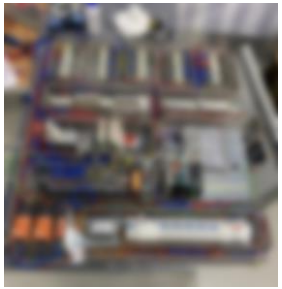
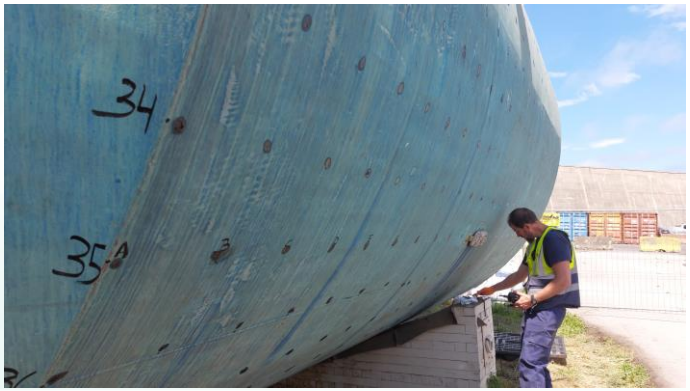
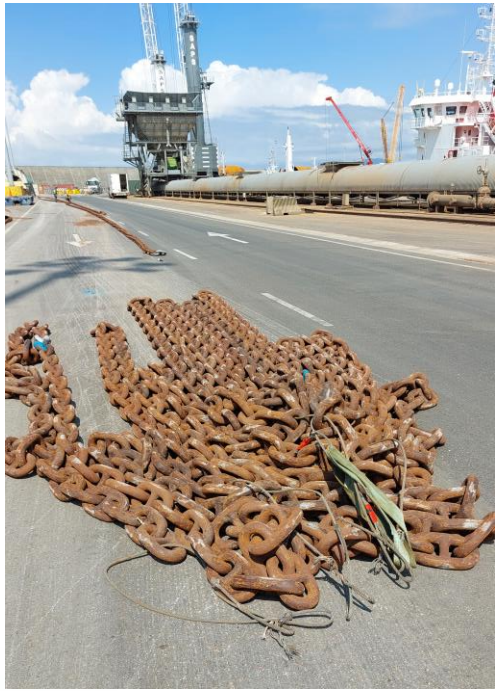
Phase 3 - Progress & activities

MARMOK-A-5 main inspections

- Mooring padeyes
- Electric cabinets
- Ballast tank thickness
- Mooring chains







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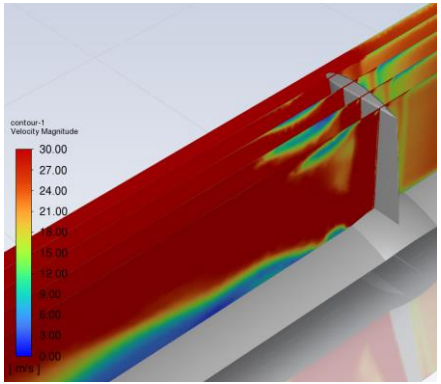
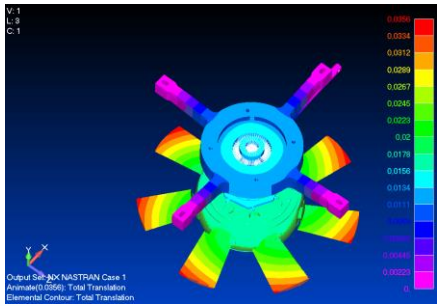
Phase 3 - Progress & activities

PTO design

- Wells turbine with pitching blades
- Extensive CFD numerical campaign
- ULS and FLS analysis performed to ensure mechanical integrity





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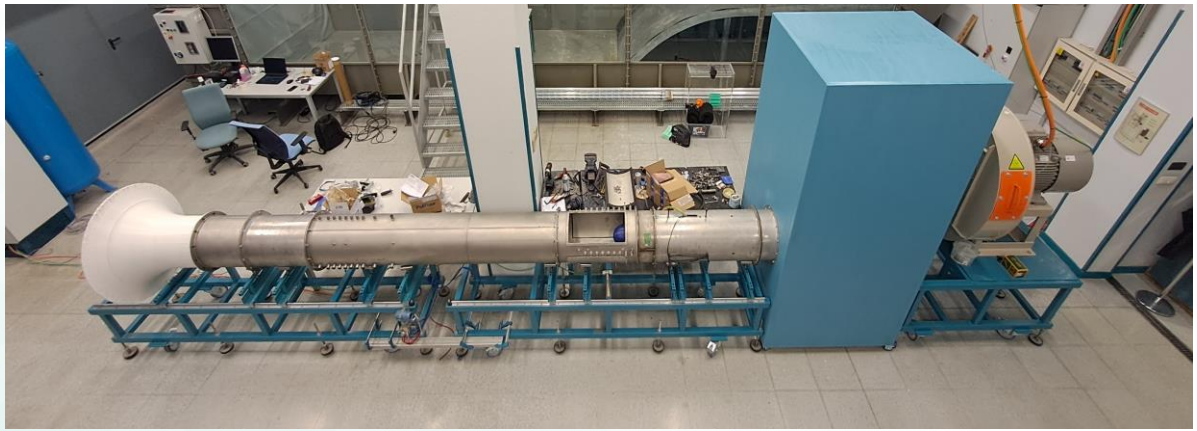
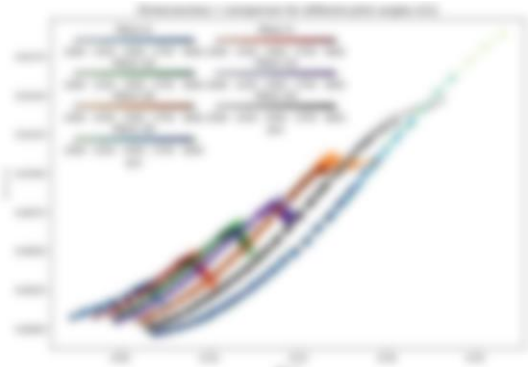
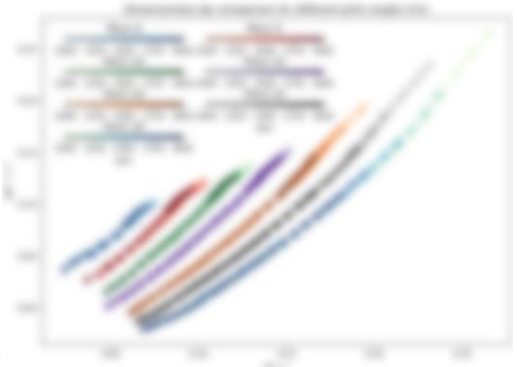
Phase 3 - Progress & activities

PTO design

- Aerodynamic testing in Mondragon Uni







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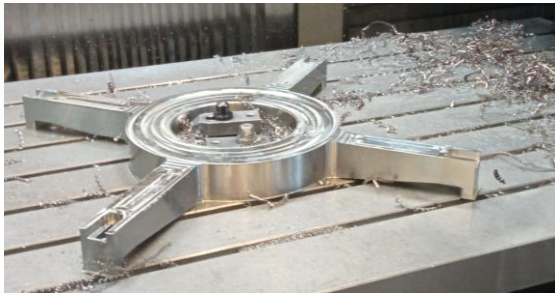
Phase 3 - Progress & activities

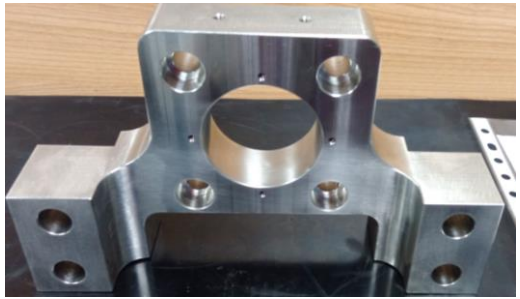
PTO manufacturing

-Manufacturing ongoing

-Off-the-shelf components already received

-1st unit will be assembled within this month





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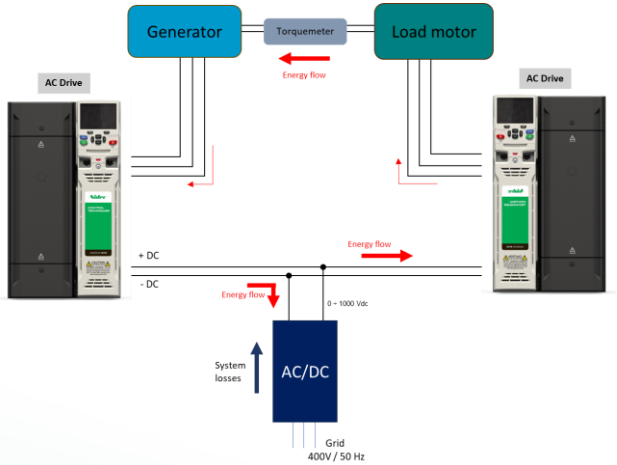
Phase 3 - Progress & activities

PTO laboratory testing

- Pitch mechanism
  - Control tunning
  - Cycling loading

- Electric generator
  - Full characterization of the electric machine in all torque – rpm range



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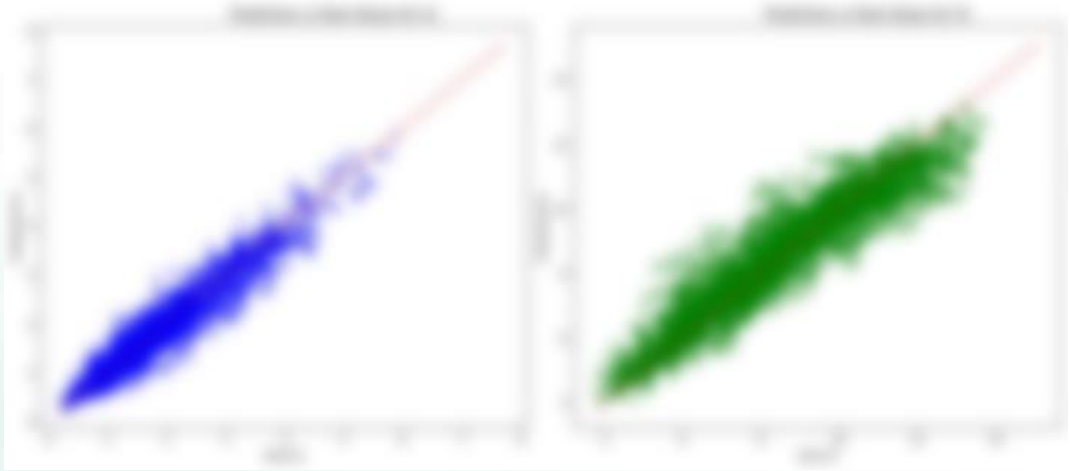
Phase 3 - Progress & activities

PTO control strategy

- Pitch control strategy defined
- Sea states identification through **machine learning**, using internal variables (Chamber pressure and OWC level)
- 2016-2018 offshore datasets being used for training



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Phase 3 - Deployment preparation

- **Contract** with BiMEP already signed
- On the preparation of the documentation required to obtain **permits**
- About to **test PTO** in the **lab** before Mutriku testing
- **Additional PTO units** to be manufactured afterwards
- **Umbilical** cable **PO** about to be launched
- **Umbilical accessories** and **mooring components** to be purchased shortly
- **Retrofitting** activities to be developed during spring 2025

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