EUROPEWAVE

TRIMARAN- ARRECIFE

Iñigo Doria

CEO

Arrecife Energy Systems S.L

ARRECIFE energy systems

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

Arrecife's Technology

- Cross-flow direct turbine system
- Inspired by nature in coral reefs behaviour
- Breaking the wave: Allows obtaining energy from both kinetic and potential energy
- Turbines designed for common waves
- Constant delivery of energy to the grid due to multiple turbines
- Single mooring line

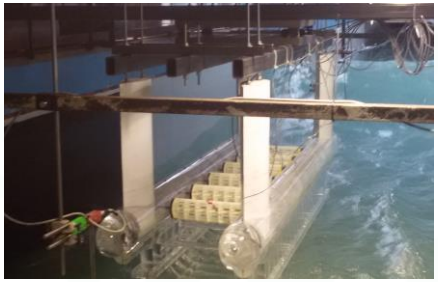
EUROPEWAVE

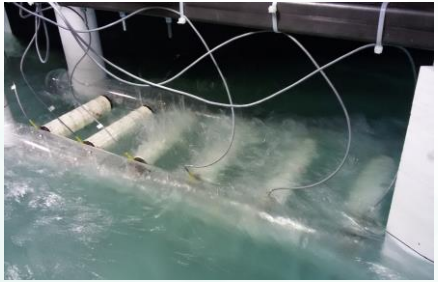
This Project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement 883751

ARRECIFE energy systems

Previous Developments

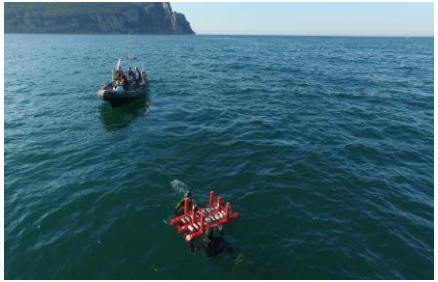
2015





1:10-Scale Laboratory Tests with fixed system

2017

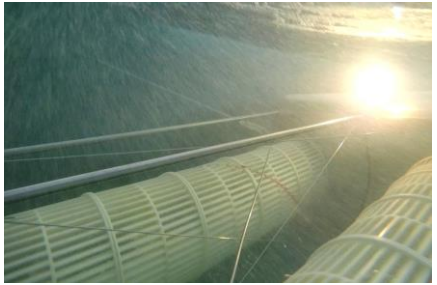


1:10-Scale Sea Tests

2019

75 kW Sea Tests (BIMEP)

2021



1kW Sea Tests

EUROPEWAVE

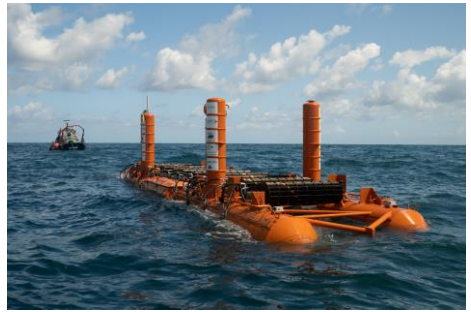
This Project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement 883751

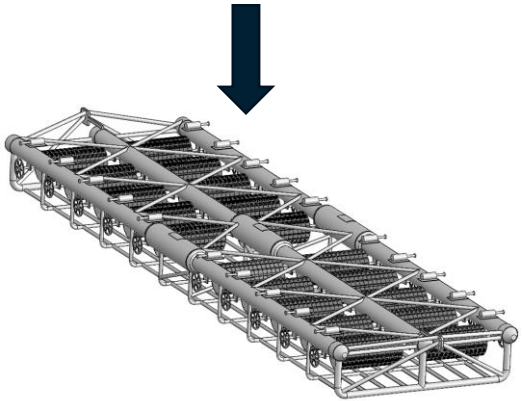
ARRECIFE energy systems

Why Europewave

Strong potential for optimization identified during previous tests

- ✓ Conversion of catamaran into trimaran:
  - ✓ Improve stability
  - ✓ Increase production with reduced increase of costs
- ✓ Improve the generation system: Hydraulic to electric
- ✓ Simplification of survival system. Removing immersion system
- ✓ Study of optimal height and arrangement of turbines





EUROPEWAVE

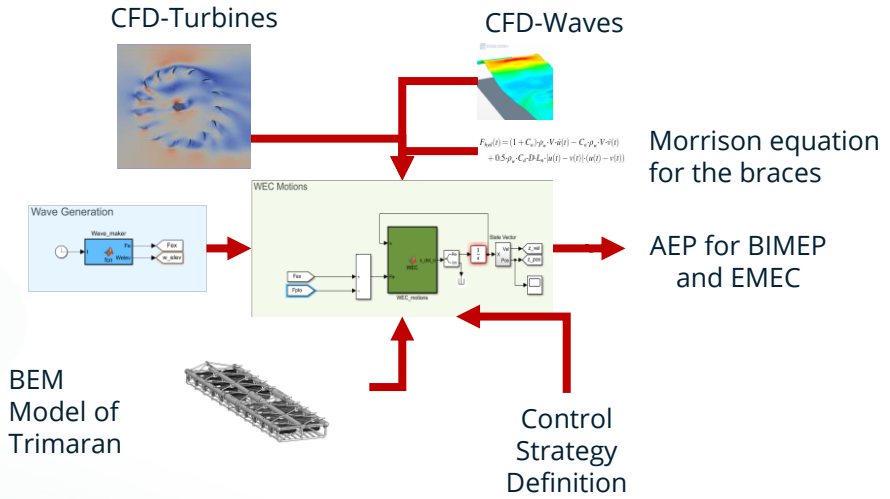
This Project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement 883751

ARRECIFE energy systems

Phase 1 Main activities

- Trimaran Design
- CFD Analysis
- Performance Simulations
- Model Fabrication
- Lab testing - IH Cantabria
- Conclusions - Final report

tecnalia
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE



EUROPEWAVE

This Project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement 883751

ARRECIFE energy systems

Project team

PHASE 1 SUBCONTRACTORS

Lab Testing Facility **IH Cantabria**

Structures Manufacturer (TBD)

Turbines Manufacturer (TBD)

ARRECIFE ENERGY SYSTEMS
Lead Contractor & Tech. Developer

Iñigo Doria
Project Manager

Jose Javier Doria
Chief Engineer

Rafael Urrutia
Systems Engineer

TECNALIA
Consortium Member & Main Advisor

MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

Imanol Touzon
Lead Analyst

Ander Aristondo
CFD Analyst

Joannès Berque
Power Assessment

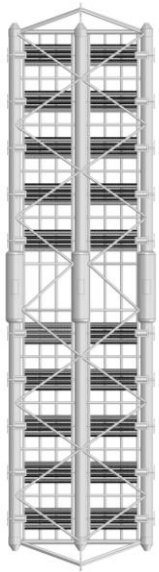
Alberto Del Pozo
Control & El. Designer

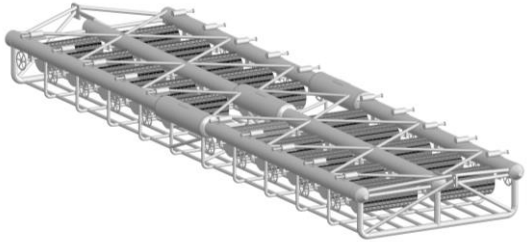
EUROPEWAVE

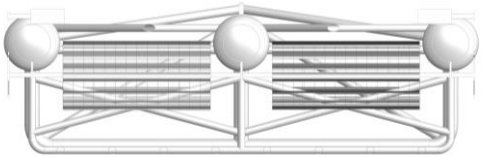
This Project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement 883751

Phase 3 deployment

- Dimensions: 36m (lenght) x 10m (width)
- Weight: 66t
- 20 Turbines system
- 15 kW generators
- Power unit: 300-400kW







EUROPEWAVE

This Project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement 883751

ARRECIFE energy systems

Future contractors may be required

- Generators
    - Low speed and compact
    - Water resistant generators
- Power electronics and control: Ways to get the most efficiency from every rotation
- Mooring solutions (e.g: turret)
- Cable and connectors solutions
- Full scale composite or 3D turbines
- Anti-corrosion systems

EUROPEWAVE

This Project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement 883751

ARRECIFE energy systems

EUROPEWAVE

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