



OPEN SEA OPERATING EXPERIENCE TO REDUCE WAVE ENERGY COSTS

Official Project Presentation (v1.1)

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Project background

- Wave energy is forecast to have the potential to supply some **10% of European electricity needs**; about half today's total renewable generation.
- Due to its phasing, wave power **complements solar and wind power** and thus facilitates the practical integration of more renewables in the European grid.
- Wave energy **costs remain high** compared to conventional forms of energy. There has been very limited open-sea experience to fully understand the challenges in device performance, survivability and reliability.



Project objectives

- OPERA will remove this roadblock by delivering, for the first time, open access, high-quality **open-sea operating data** to the wave energy development community.
- OPERA will **validate and de-risk** four industrial innovations which together can reduce the costs of wave energy by 50% in the long term.

Innovation	Short description
Novel bi-radial turbine	Mechanically robust and highly efficient turbine for OWC
Advanced control strategies	Predictive control uses incoming wave information for control, applicable to all WECs. Latching (valve control) specific to OWC
Shared mooring system	Reduces mooring line length and cost in WEC farms
Elastomeric mooring tether	Reduces peak loads at mooring and hull connection to enhance structural survivability and reduce mooring line strength requirement and cost

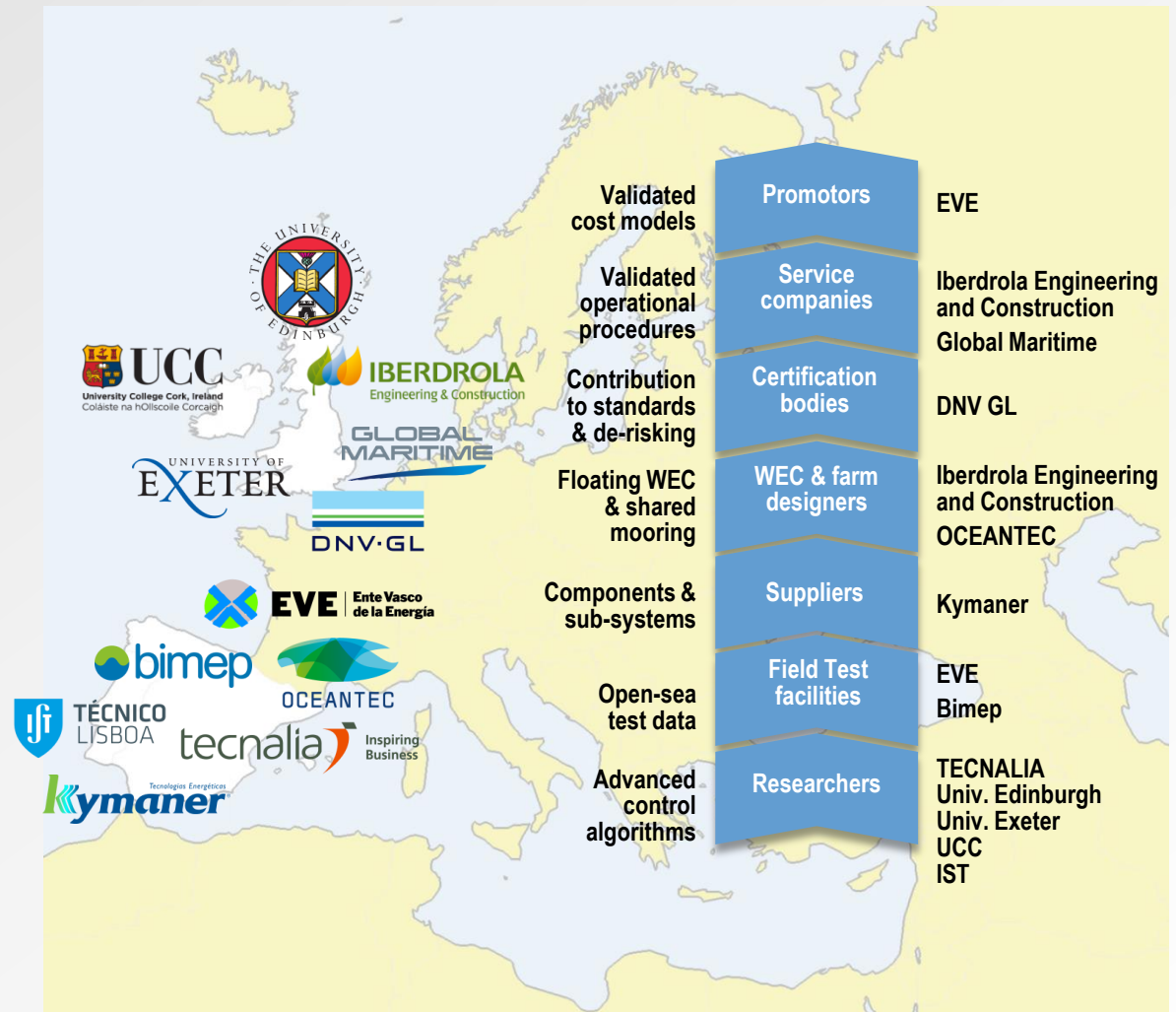
OPERA faces key challenges of wave energy

Problem to solve
Operating data needed to focus research and development
High extreme mooring loads, costly uncertainty on design requirements
High resource variability, unreliable PTO with low efficiency
Poor energy capture
No established/applied sector standards is costly business risk
Costly, non-optimised offshore logistics of uncertain risk
Uncertainties on risks and costs hamper investment
Lack of strong value chain

Specific objective
Collect, stream and publish 2 years of open-sea operating data of both a floating WEC & shoreline wave power plant
De-risk mooring innovations that lower cost by 50% and enhance survivability
Increase OWC power production by 50% and improve reliability
Advance predictive and latching control to enable a 30% increase in power production
Accelerate establishment of standards for wave energy with first documented real-case application of IEC/TC114
Reduce uncertainty, frequency, risk and cost of offshore operations
Improve risk management and cost estimation with real data
Maximise impact on the entire value chain and on society

Consortium

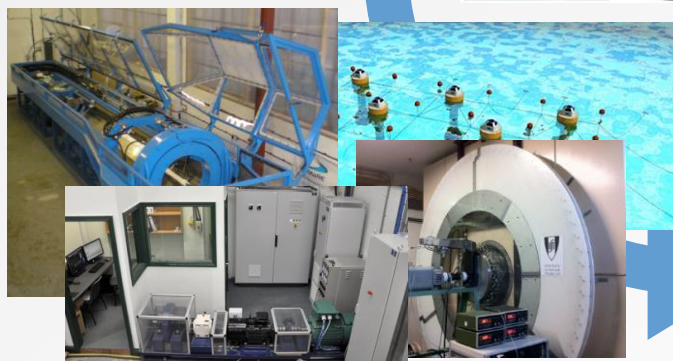
- Multidisciplinary team
- 12 partners
- 4 EU Member States
- Covers value chain



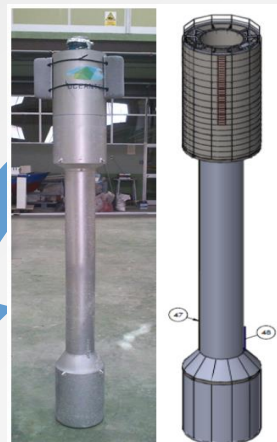
Concept and approach (I)

- **First phase:** open-sea testing of a baseline configuration of the OCEANTEC device (shared mooring, conventional tether, Wells turbine and non-predictive control algorithms).
- **Second phase:** integration of 3 cost reducing innovations: biradial turbine, novel elastomeric tether and predictive control. This phase includes lab-testing and prior derisking in the Mutriku shoreline wave power plant.
- **Third phase:** Comparison of structural and power performance, as well as sub-system reliability and survivability

Test rigs & innovations



Floating OWC (Oceantec)



DE-RISK PATH

BENCHMARK PATH

Nationally Funded

1st Phase



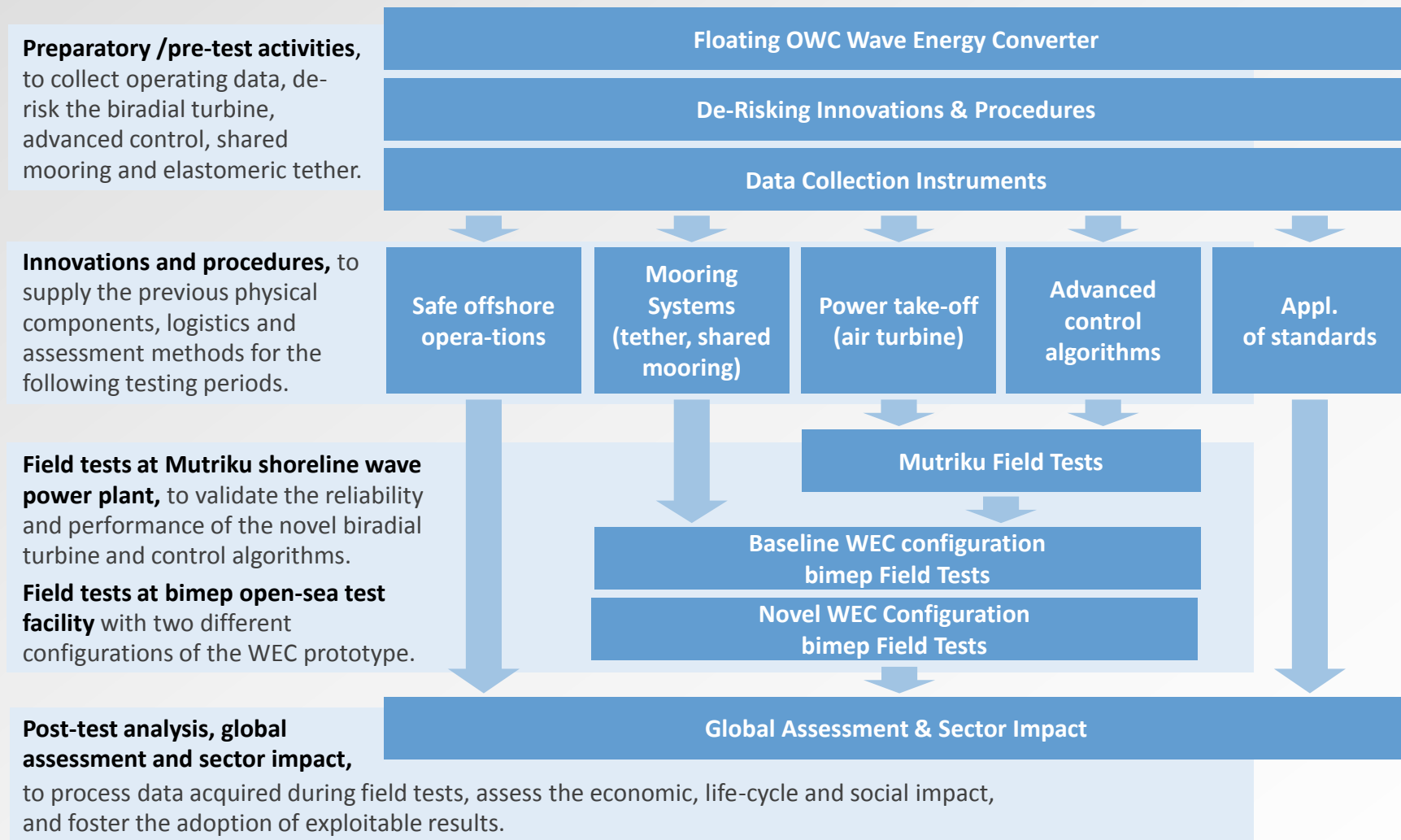
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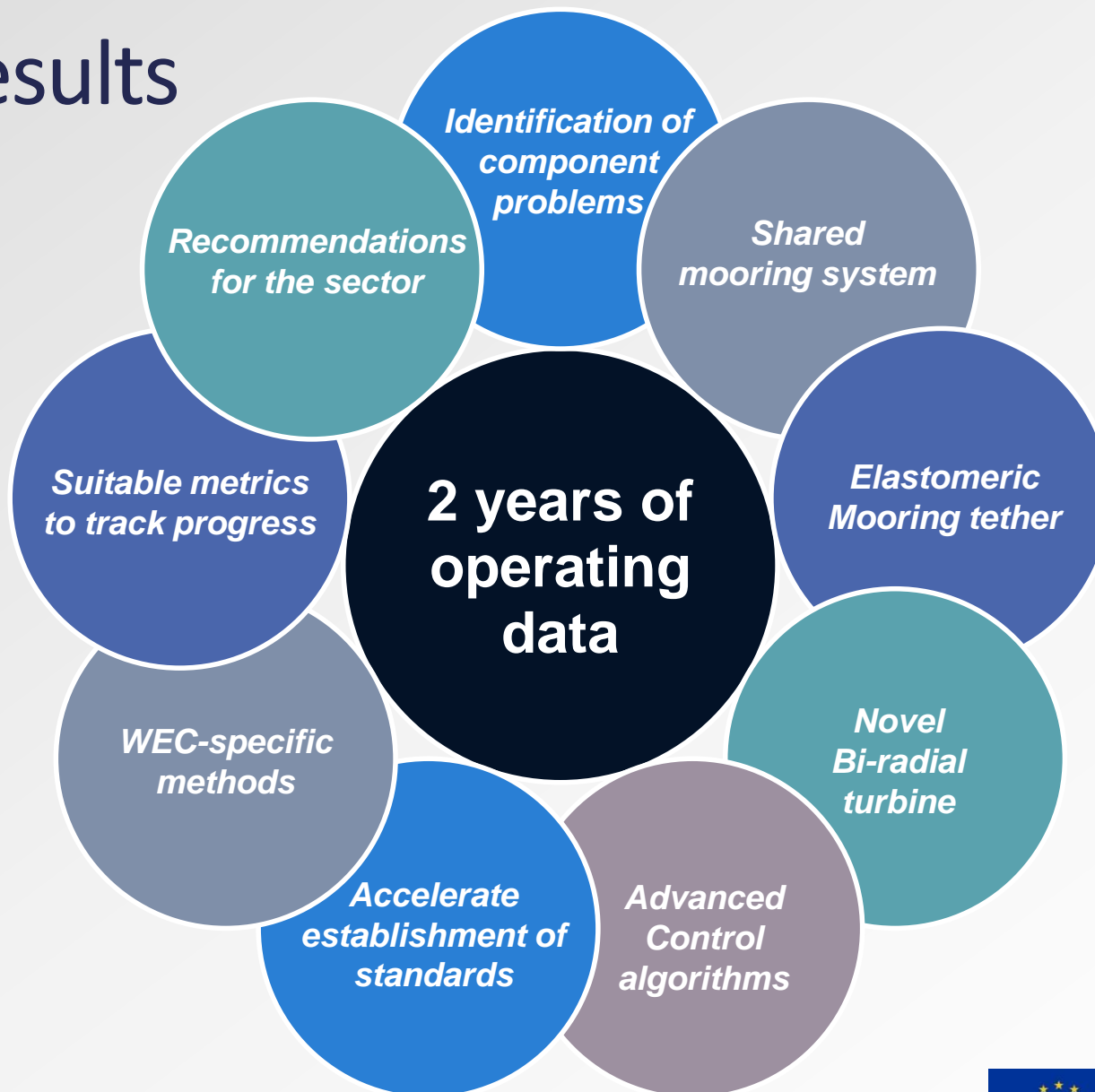
Wave chamber power plant in Mutriku, Basque country, Spain



Concept and approach (I)



Key results



OPERA in figures

42 months

12 partners

4 innovations

8 M€ investment

2 years of data

50% cost reduction





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Further information

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