OPEN SEA OPERATING EXPERIENCE TO REDUCE WAVE ENERGY COSTS

Official Project Presentation (v1.5)

Mr. Pablo Ruiz-Minguela
OPERA Project Coordinator

Derio, 30-05-2018

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654444

Key Challenges of Wave Energy

- Reduce COST of energy
- Improve overall PERFORMANCE
- Lower RISKS to attract investors

→ **Very limited EXPERIENCE of real open-sea operation**

Project Aims

Collect, analyse and share for the first time high-quality **open-sea operating data and experience**

Validate & de-risk **4 industrial innovations** for wave energy

Innovation	Target	LCOE impact
Novel biradial air turbine	50% higher annual efficiency compared to Wells turbine	33%
Advanced control strategies	30% increase in energy production	23%
Elastomeric mooring tether	Reduce peak loads by 70%	7-10%
Shared mooring configuration	50% reduction in overall mooring costs in arrays	5-8%

Reduce the **cost of wave energy** by 50% in the long term

Methodology

1 Baseline configuration
Nationally funded prototype (2.5 M€)

3 Benchmarking of new configuration
Global assessment

DATA COLLECTION
2 years

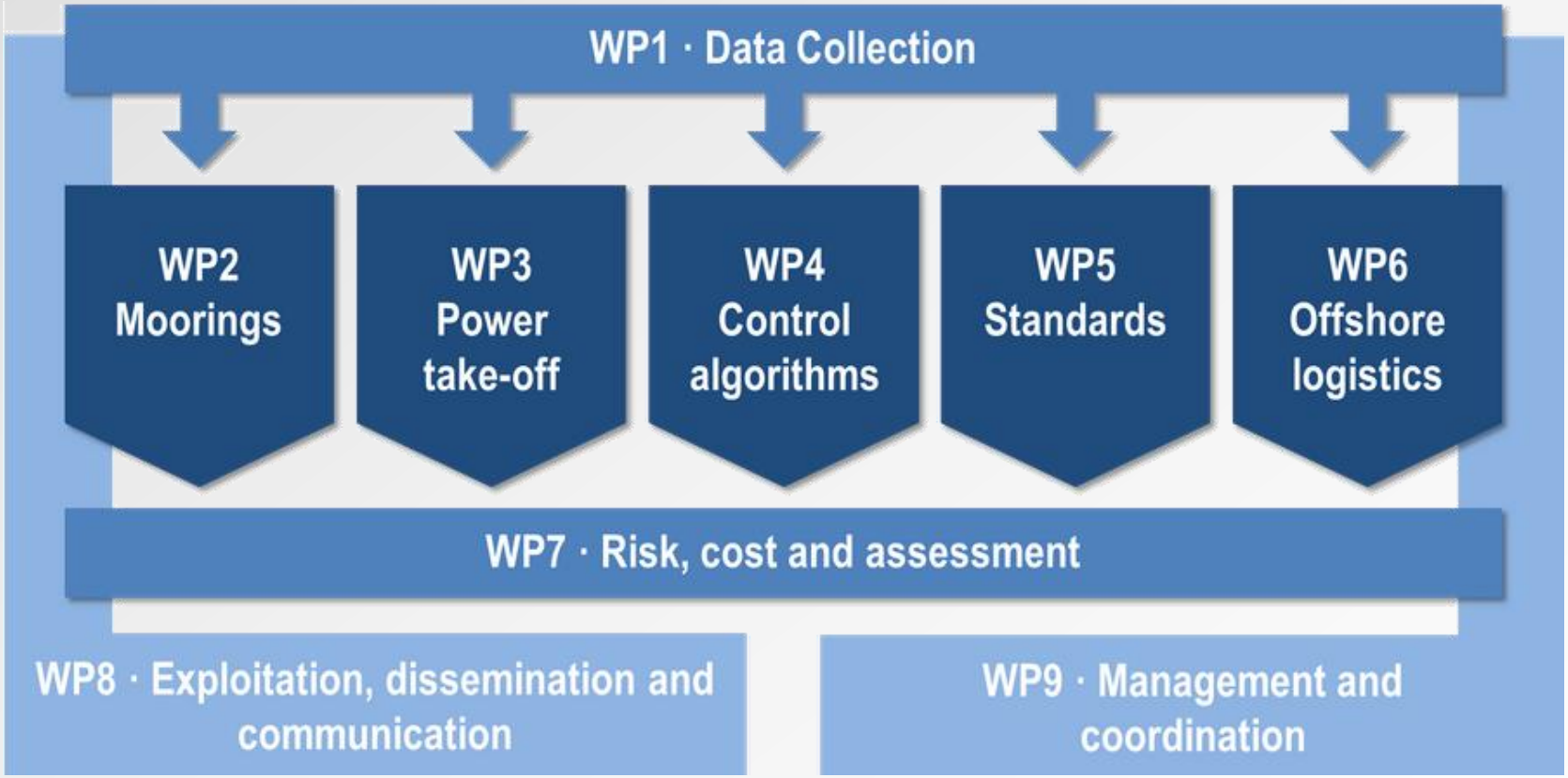
2 De-risking path
Innovations and procedures

Consortium

- 11 partners / 4 Countries
- Multidisciplinary team
- Covers value chain

Validated cost models	Promotors	EVE
Validated operational procedures	Service companies	Global Maritime
Contribution to standards & de-risking	Certification bodies	DNV GL
Floating WEC & shared mooring	WEC & farm designers	OCEANTEC
Components & sub-systems	Suppliers	Kymaner
Open-sea test data	Field Test facilities	EVE BiMEP
Advanced control algorithms	Researchers	TECNALIA Univ. Edinburgh Univ. Exeter UCC IST

Project Work Plan



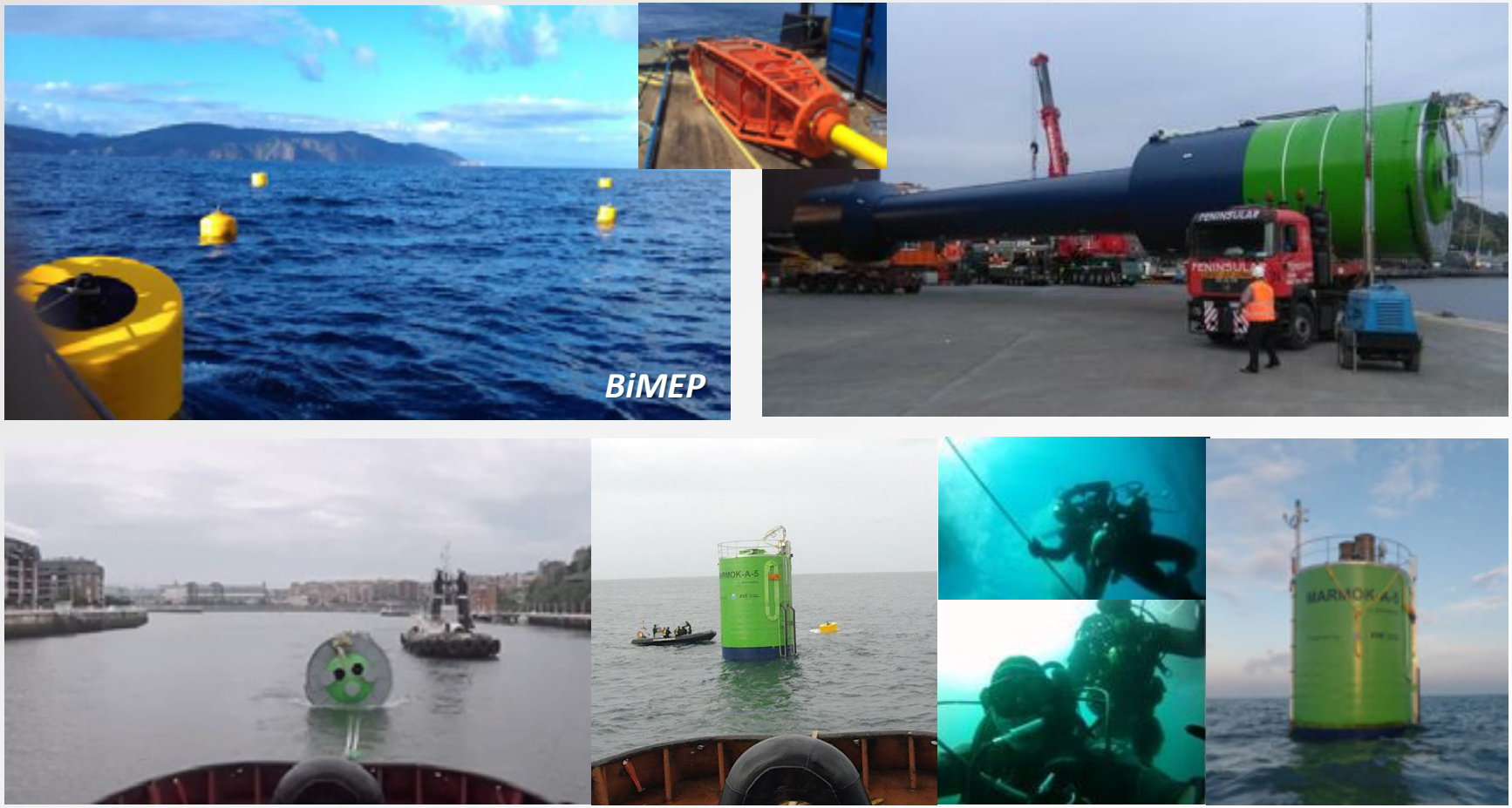
42 months

5.7 M€

67%

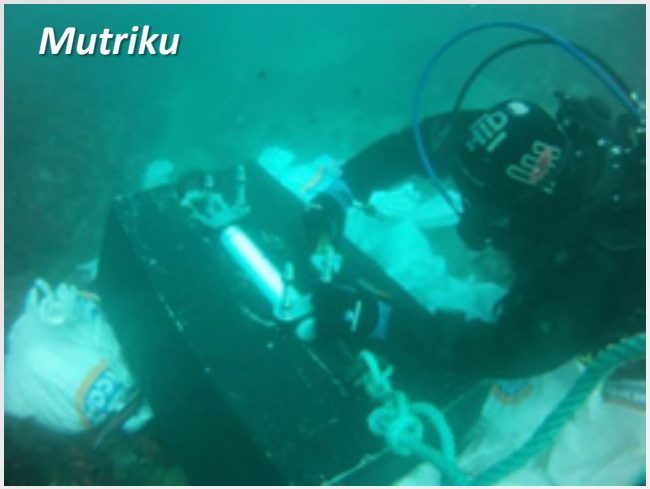
Progress and Achievements (I)

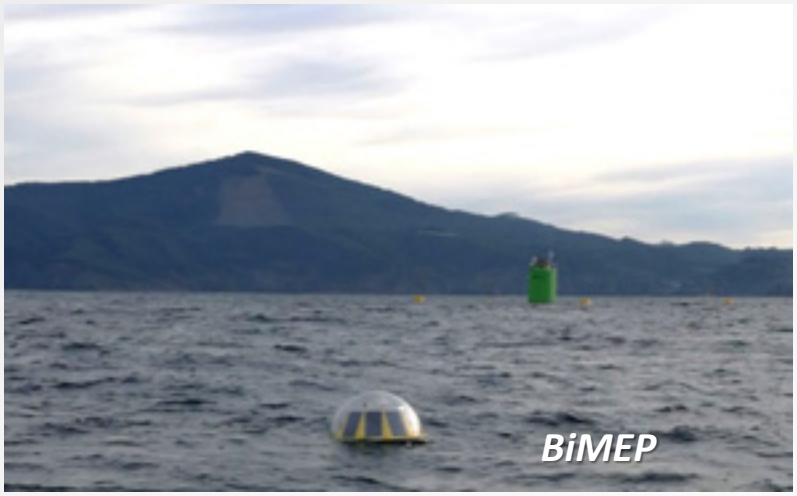
Deployment, commissioning & testing of baseline configuration: MARMOK-A-5

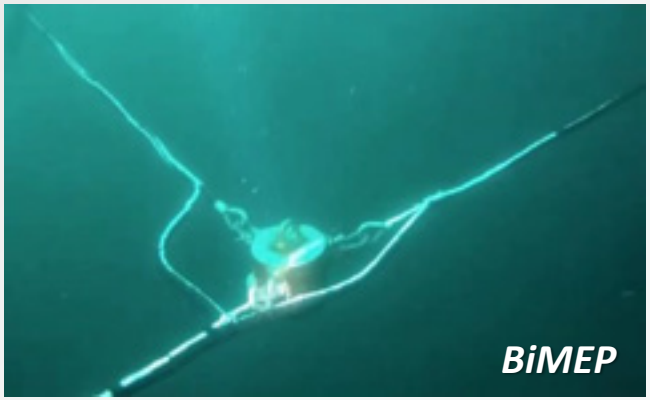


Progress and Achievements (II)

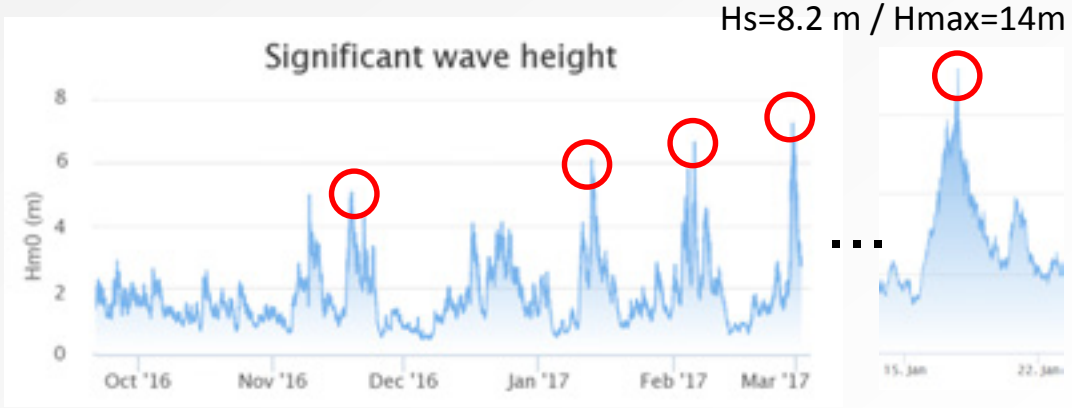
Deployment of instrumentation, data streaming & data access tool







Hs=8.2 m / Hmax=14m

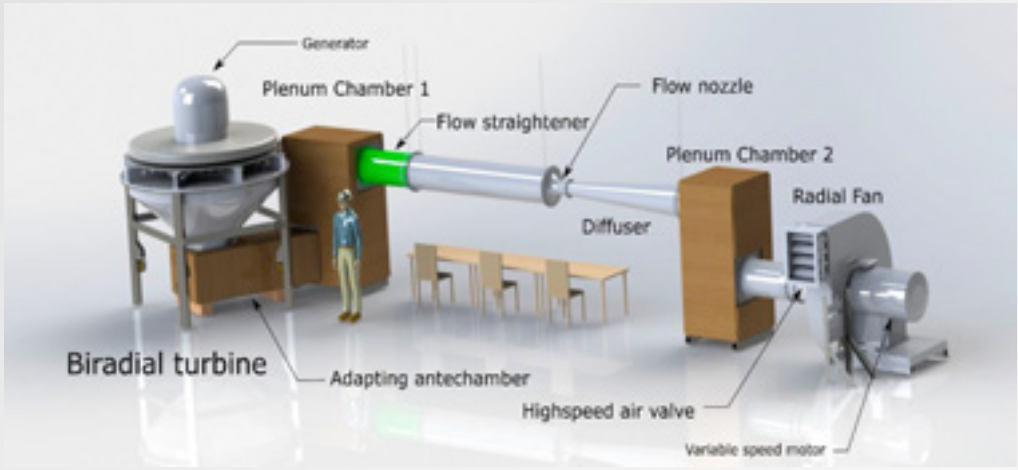


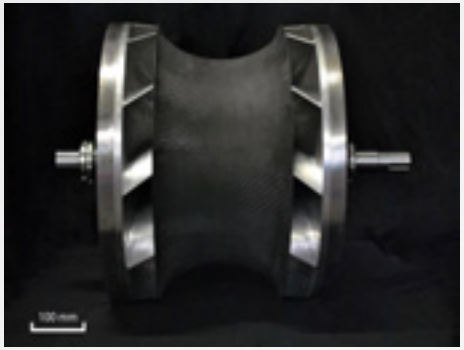
Progress and Achievements (III)

Design, manufacture and physical testing of elastomeric tethers

Progress and Achievements (IV)

Design, manufacture and laboratory testing of biradial turbine



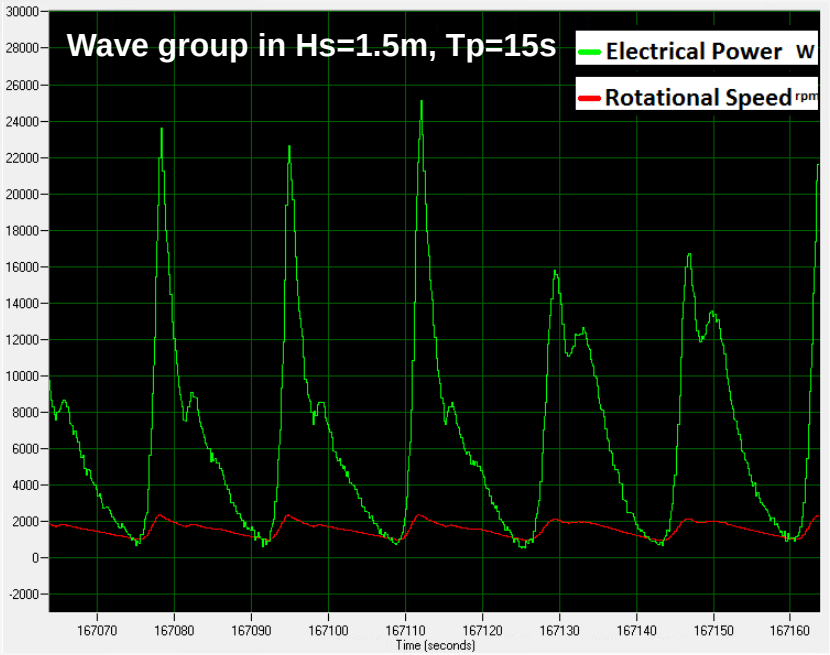


Progress and Achievements (V)

Installation, commissioning and testing of turbine-generator set at Mutriku

Progress and Achievements (VI)

Customization and dry lab testing of control algorithms for Mutriku and MARMOK-A5



Mutriku testing of 5 control laws over 6 months

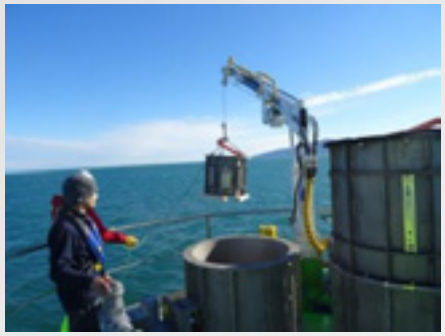
Progress and Achievements (VII)

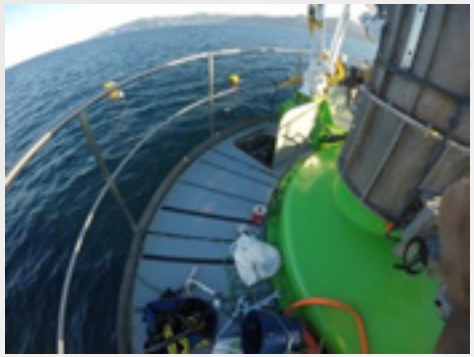
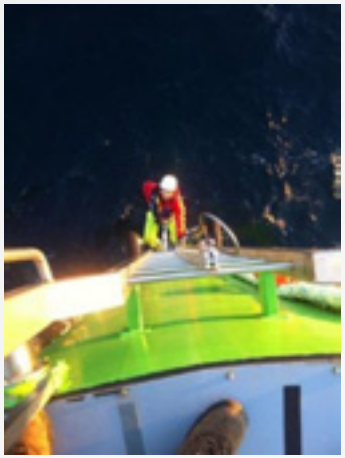
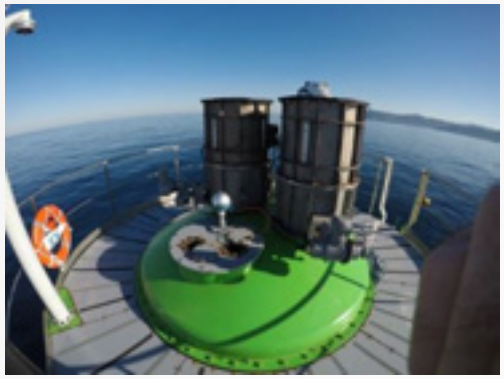
Development of hardware and software framework for practical implementation of Technical Specifications and standards

Initial results of the application of Technical Specifications and standards

Progress and Achievements (VIII)

Detailed characterization of offshore operations, costs and O&M logging framework

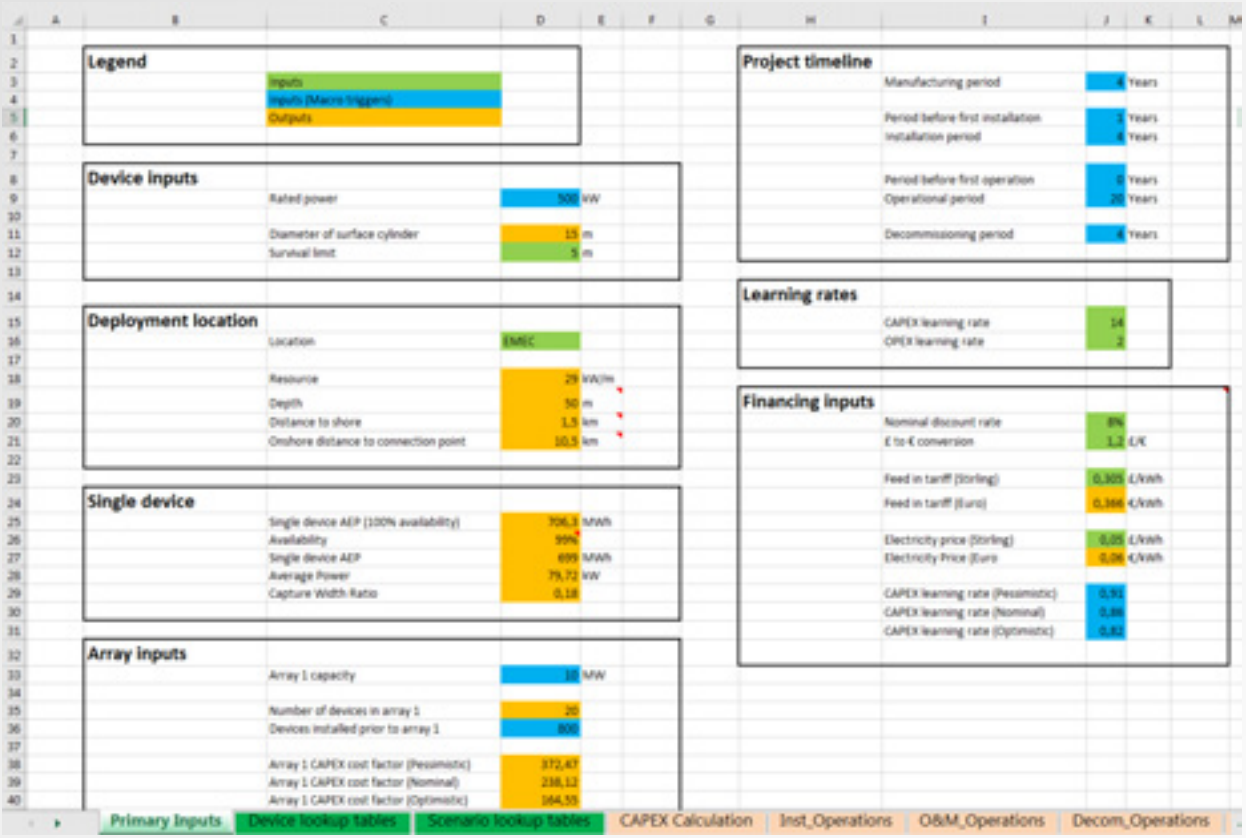


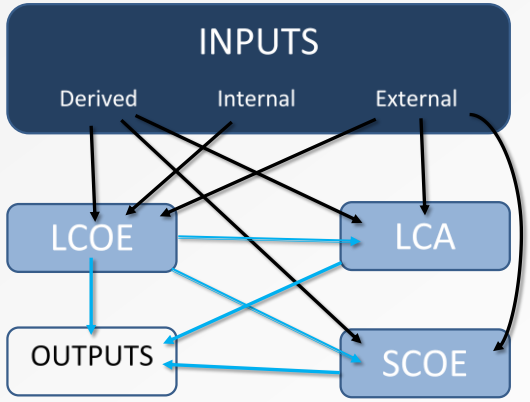





Monitoring of offshore operations and logistics

Progress and Achievements (IX)

Global model of LCOE, LCA and SCOE for wave energy

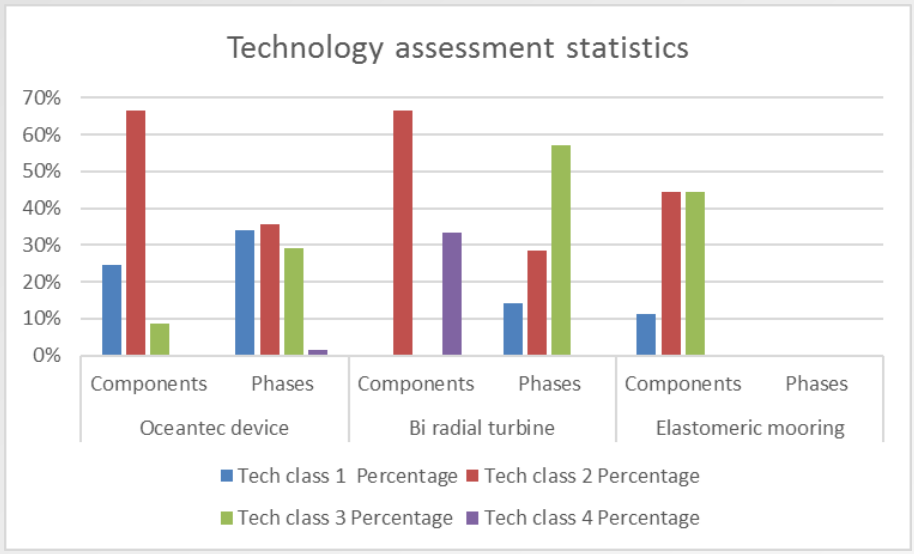


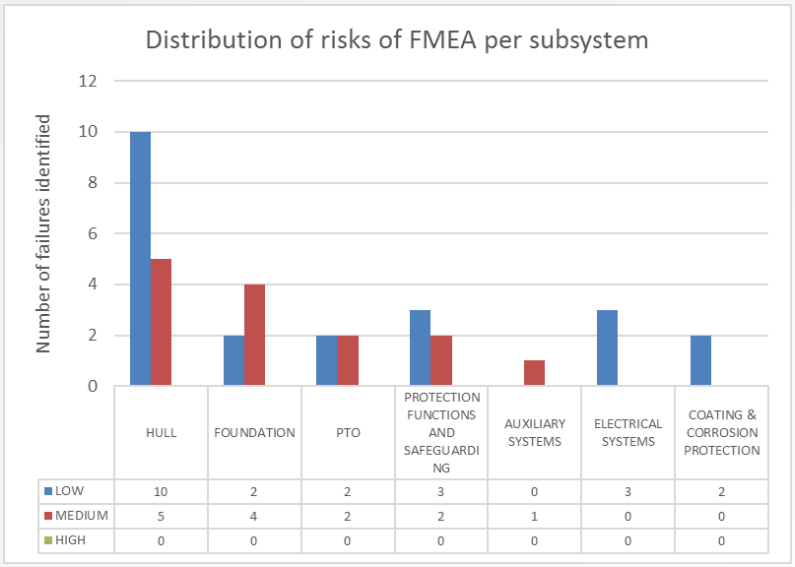


Scenario definition and results for baseline configuration

Progress and Achievements (X)

Risk and failure data collection protocol

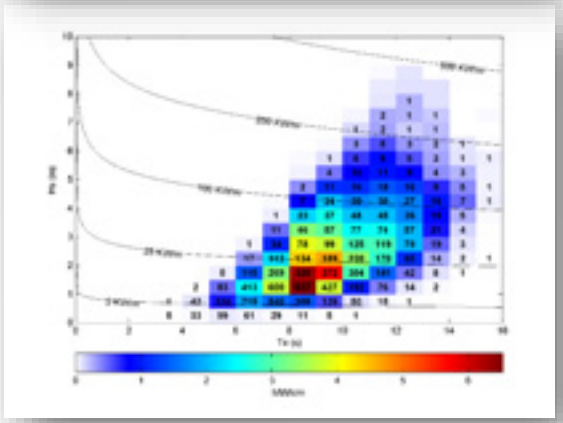




Periodic update of technical risks (min. every 6 months)

Forthcoming Activities

- Retrieval of prototype and redeployment of novel configuration (Summer 2018):
  - Elastormeric mooring tethers
  - Biradial turbine
  - Advanced control law
- Second programme of field tests at BiMEP open-sea test facility to benchmark and validate the innovations.
- Dissemination of project results



February 2016 • July 2019

Further information

Website: www.opera-h2020.eu

Coordinator: Mr. Pablo Ruiz-Minguela

jpablo.ruiz-minguela@tecnalia.com

Disclaimer

This Presentation reflects only the author's views and the Agency is not responsible for any use that may be made of the information contained therein