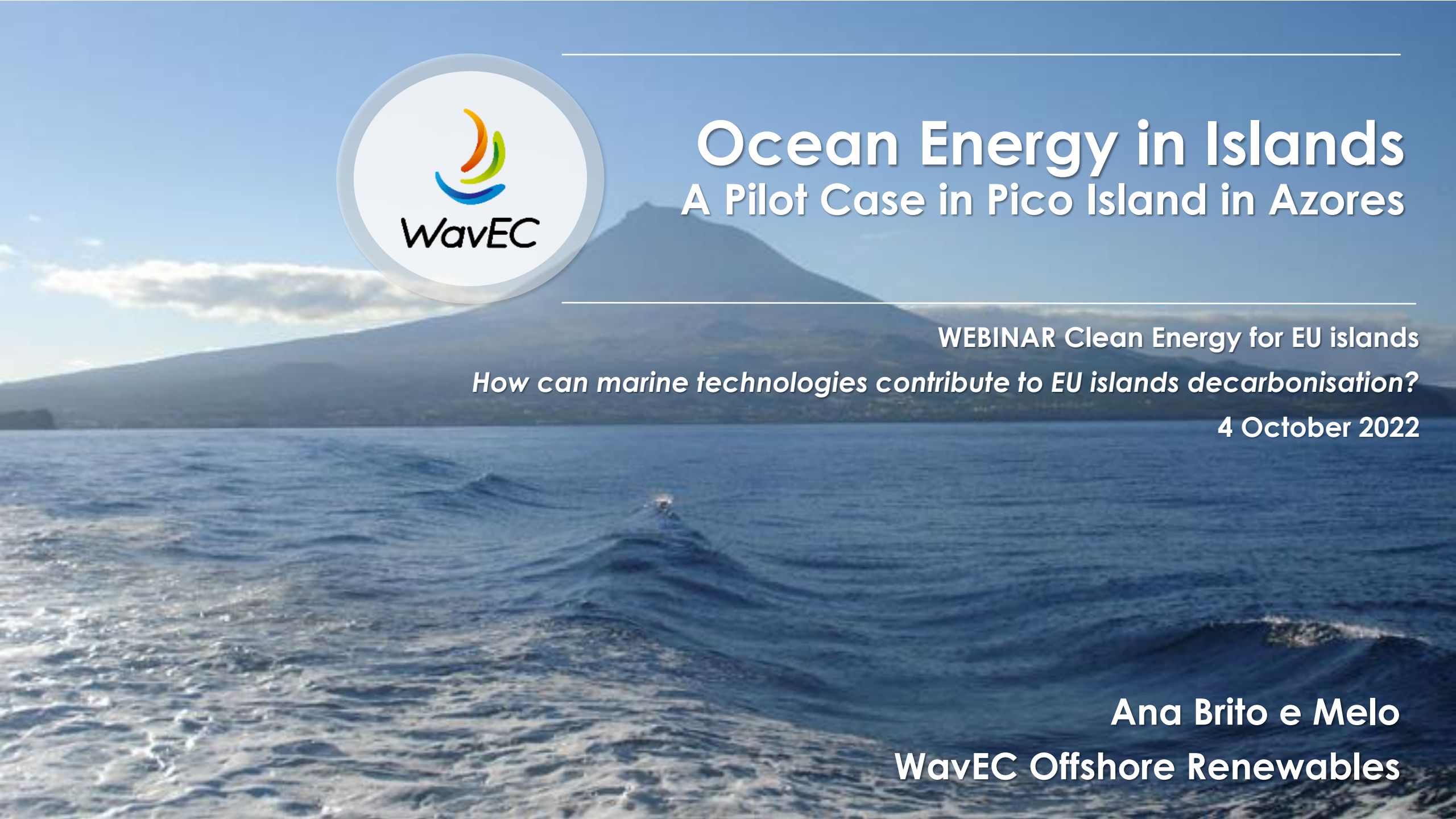

Ocean Energy in Islands
A Pilot Case in Pico Island in Azores

WEBINAR Clean Energy for EU islands

How can marine technologies contribute to EU islands decarbonisation?

4 October 2022

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WavEC Offshore Renewables

Pilot project: Pico Wave Power Plant, Azores, Portugal

CONTENTS:

- Background
- Wave energy pilot project: from concept to reality
- Main challenges
- Looking ahead

Background

Islands and remote coastal areas:

01.

Energy dependence

a major source of economic vulnerability for many insular regions

02.

Costly and polluting imported oil for electricity production,

needs for clean energy

03.

Very often better renewable energy resources than the mainland,

but their potential is not well tapped

Increasing energy self-sufficiency in islands

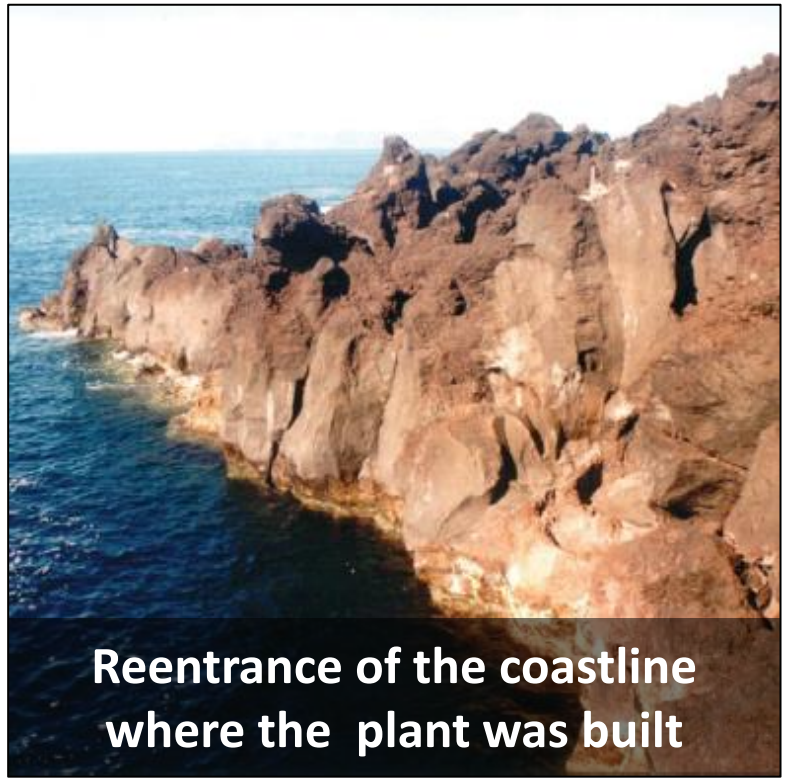
Significant economic benefits while contributing to the implementation of international decarbonisation and climate policy goals.

Pico wave energy plant – from concept to reality

IDEA:	The idea of building a wave energy plant at Azores was supported by the local utility EDA (1986)
OPORTUNITY:	In 1991, the European Commission decided to open a call for wave energy projects
STUDIES:	An European Pilot Plant Study (1992-93) was approved carried out by an international team from Portugal, UK and Ireland
DECISION:	The study identified several sites suitable for a shoreline pilot plant in European coastal waters: One of this Pico island in Azores
GOAL:	1. To be used as a R&D facility to allow testing and demonstration at full scale. 2. To supply part of the island electrical grid

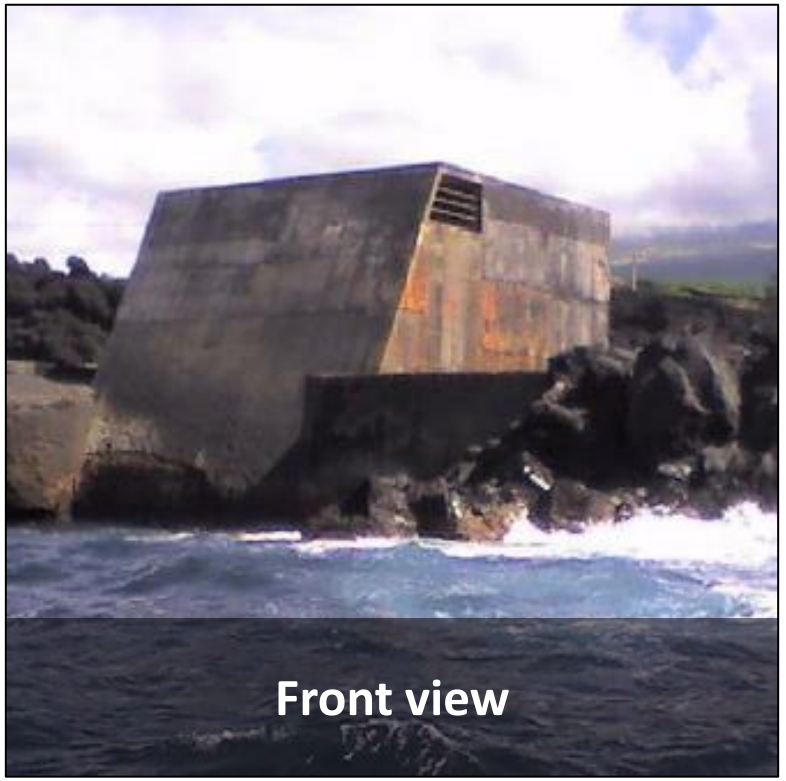
First wave energy plant worldwide to supply an electrical grid

OWC Pico plant in Azores



Reentrance of the coastline where the plant was built

Back view of the plant



Front view

Pico island area ~ 500 km2
15 thousand inhabitants
Annual consumption of electrical energy ~ 8 GWh

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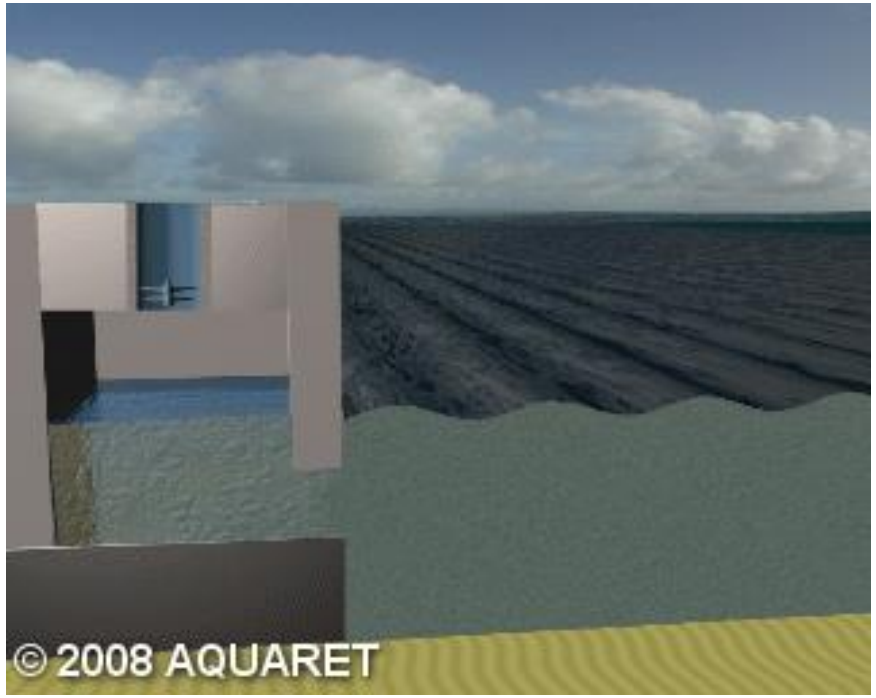
Description of the Technology

Oscillating **W**ater **C**olumn (OWC)



OWC technology

Grid-connected plant
400 kW rated power

Equipped with a Wells turbine – key component

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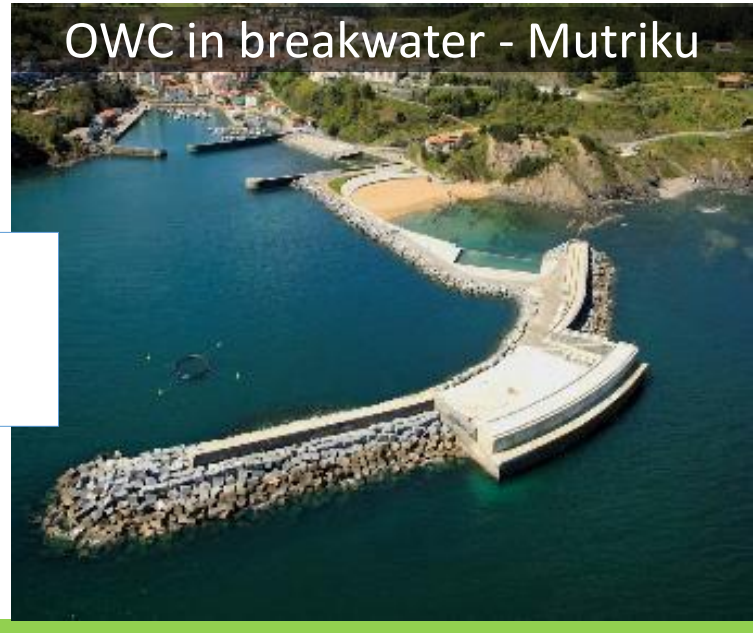
Difficulties, achievements, future perspectives

- Operational during 1999 – 2018; intermittent operation due to technical problems
- A landmark in the development of marine renewables
- Remoteness of the location - the origin of difficulties; not anticipated (e.g. limitations in terms of available infrastructures, technical resources and specialized personnel)
- A rich source of experience: apart from the supply of electrical energy to the island's grid - wide use of the plant for R&D and training
- The coastline based fixed OWCs have proved to be uneconomic because of the requirements to find suitable shoreline topography and the high cost of construction

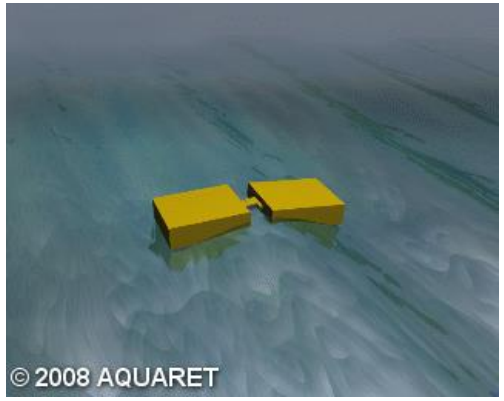
Shoreline OWC – Pico Plant

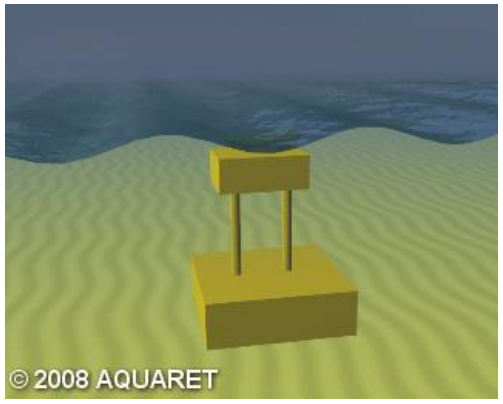
OWC in breakwater - Mutriku

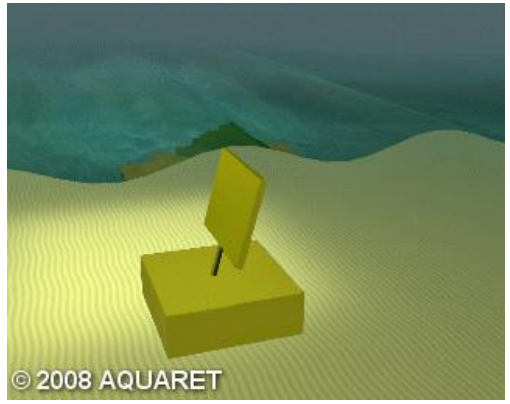


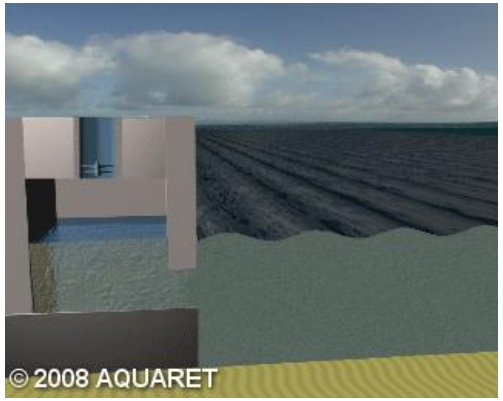
New systems based on OWC concept:
Integration of multiple OWCs into a breakwater is a wiser approach

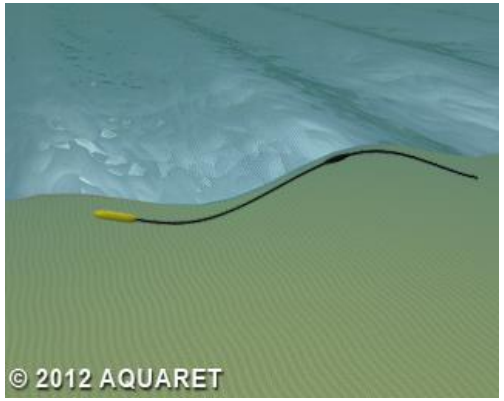
Wave Energy Technologies

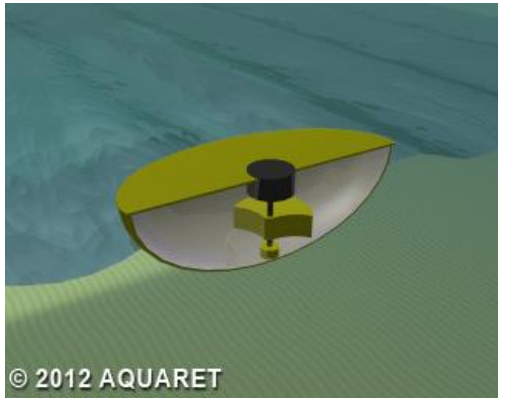












- A wide range of devices have been developed
- Different concepts between an R&D and pre-commercial stage
- Significant progress in the last decades: improvements to the reliability and performance
- Cost reduction potential requires additional R&D

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Ocean Energy in Islands – Main Challenges

Technical Supply Chain

- Local grid often small and unstable
- Remote locations increase OPEX
- Limited quality and availability of equipment
- Local supply with a few or no competitors

Socio-environmental

- Technology not well understood
- Potential conflicts of use in the sea space
- Natural disasters

Financial-Economic

- Often no support mechanism
- Lack of knowledge regarding the ocean energy business
- Limited economic data available

Legal-Political

- Lack of policies in place
- Limited experience in consenting
- Time intensive consenting path

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Enabling Steps

Comprehensible information to all Stakeholders; early community engagement

Reducing complexity of consenting processes; MSP to help avoid conflicts

Adaptation of technology designs so that the devices can be produced and assembled locally

Improve the bankability of the projects

Environmental monitoring process throughout all the phases of the projects

Understanding the socio-economic benefits

Local suppliers require support and training to meet the needs of the ocean energy sector

Appropriate policies and support mechanisms

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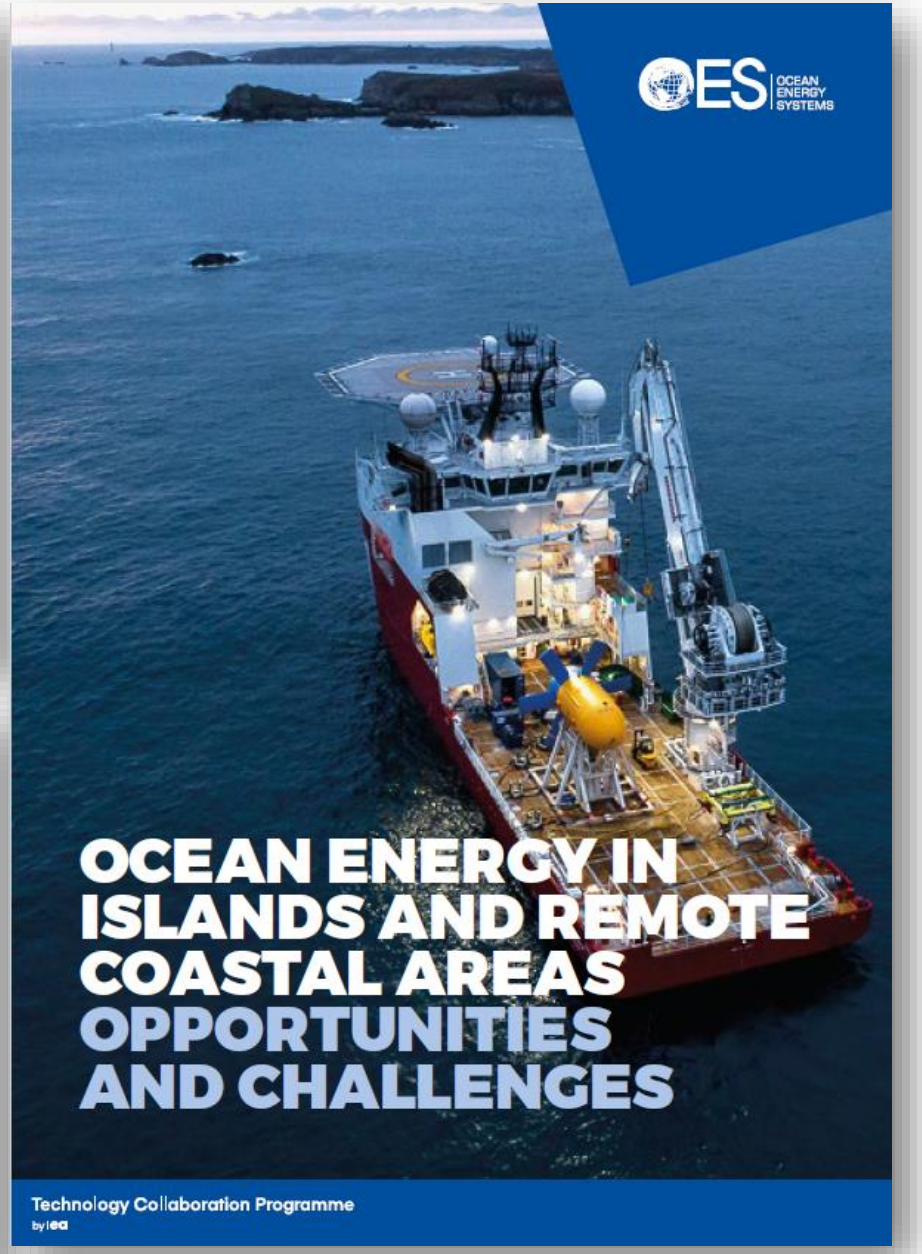

www.ocean-energy-systems.org

Final notes

- **Islands and remote coastal areas face a different reality than their continental counterparts**
- **Ocean energy can provide predictable and low carbon energy and socio-economic benefits.**
- **Opportunity to develop a local skilled workforce and promote science, technology, innovation**

Thank You

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