WavEC
Offshore Renewables

PORTUGAL TEST CENTRES IN THE DEVELOPMENT OF OFFSHORE RENEWABLE ENERGY

MIGUEL LOPES

SEP 2016

OFFSHORE RENEWABLE ENERGY

Test Sites in Portugal

2004

2008

2011-2015

2017-2018

Aguçadoura
AWS, Pelamis, Windfloat, Gravi3

Since 2003

OWC Pico plant and Marinet

Since 2000

MARINET

Peniche:
WaveRoller, Oceanic

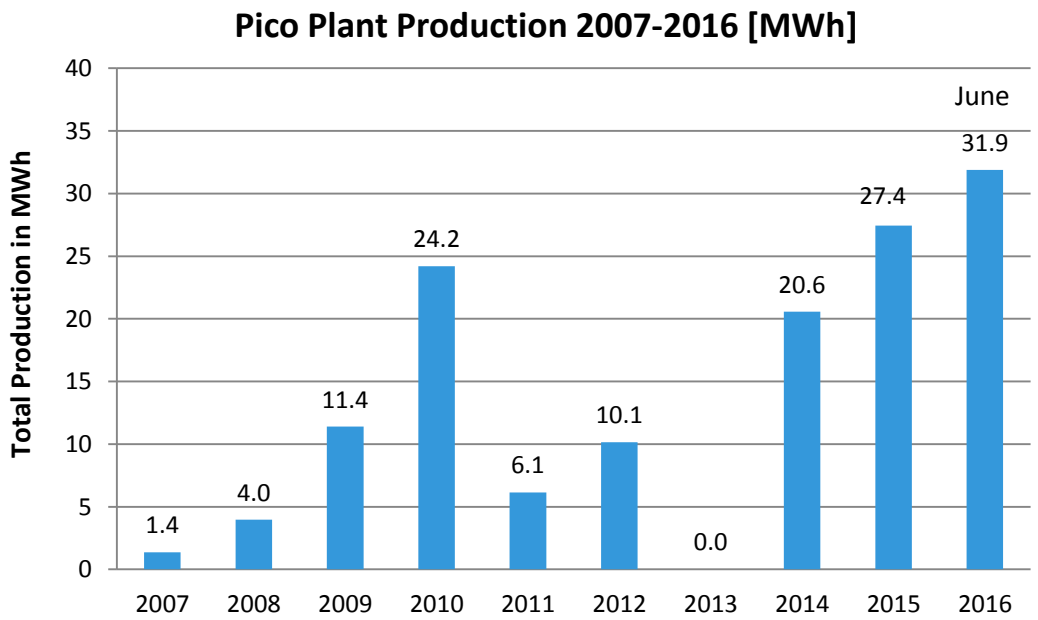
Since 2007

WavEC

PICO OWC WAVE ENERGY PLANT

Historic worldwide unique facility – Grid connected – 400 kW

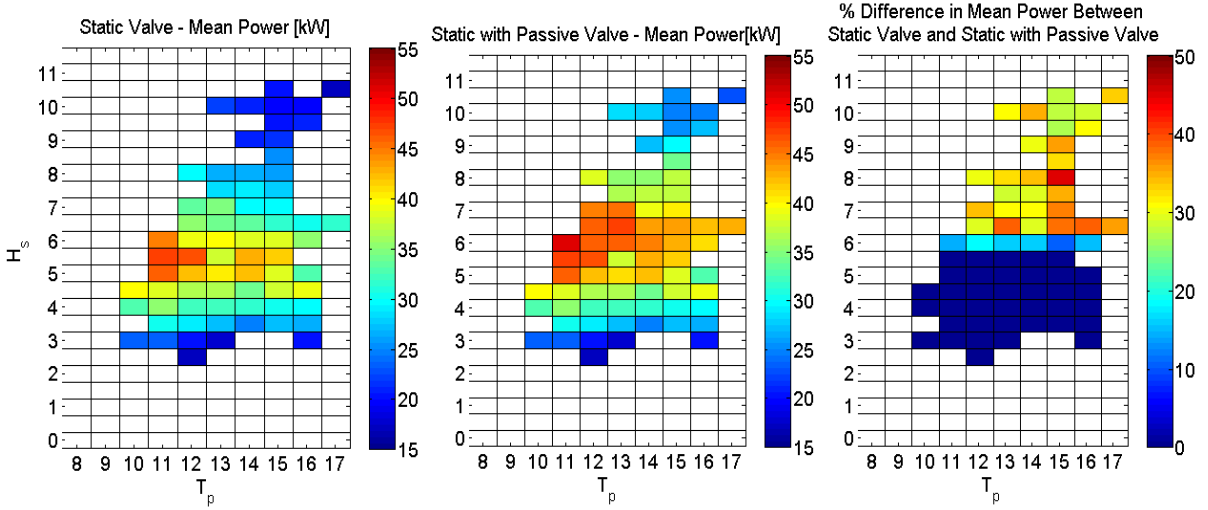
- Demonstration shoreline OWC plant
- Originally finished in 1999 (16 years old)
- Selling electricity to the grid since 2007
- Total of 130 MWh electricity sold, 80 MWh since 2014
- Used as a power plant, demonstrator, base for scientific studies and potentially as an air turbine test bench

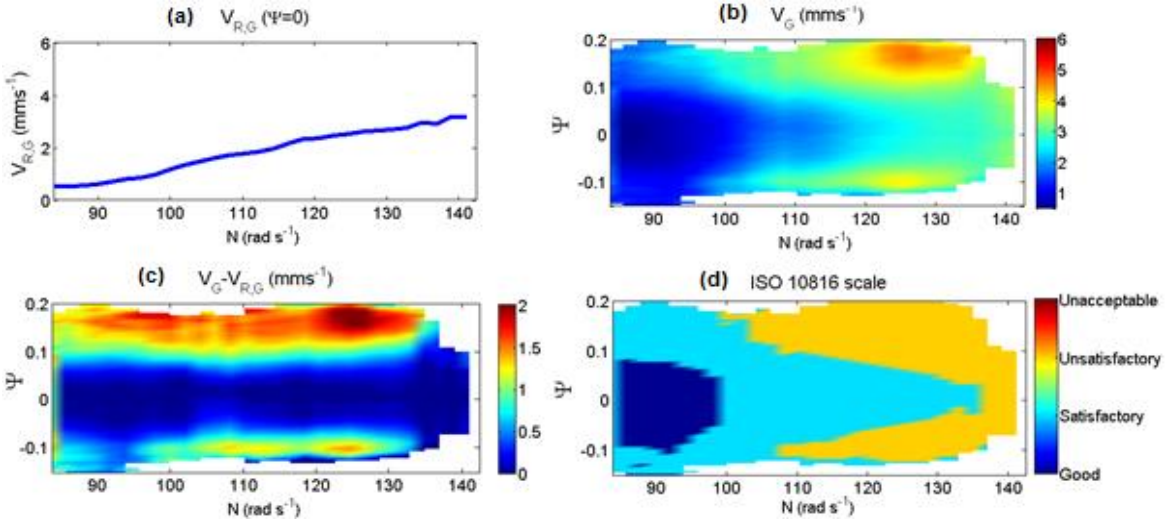


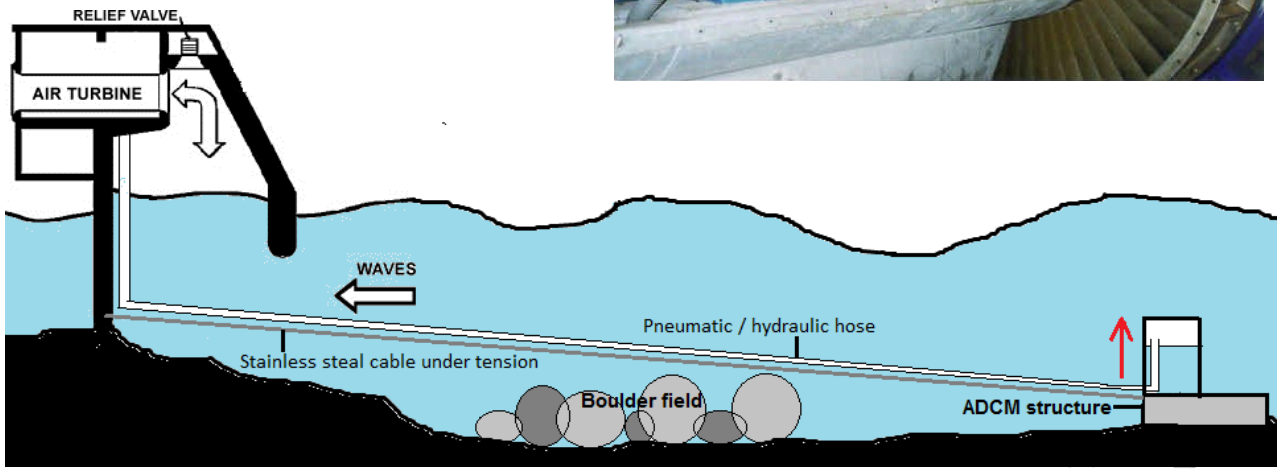
PICO OWC WAVE ENERGY PLANT

Full scale prototype research centre

- Wells turbine performance
- Reliability and ageing of components
- Vibrations and noise
- Control strategies, using the chamber relief valve to optimize the pressure levels







PICO OWC WAS PART OF THE MARINET PROJECT

Transnational Access programme including 42 test centres and 28 partners

MARINET

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AGUÇADOURA – WAVE AND OFFSHORE WIND ENERGY

Test Site nowadays managed by EDP

- Grid Connected, 5.6 km from shore
- 50 m water depth

AWS

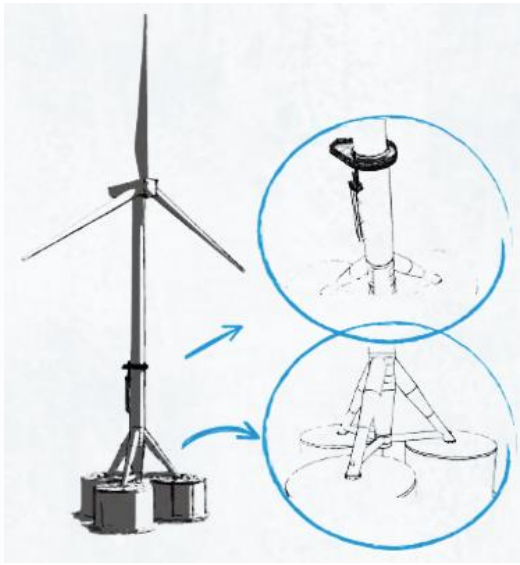
2003-2005

3-Pelamis farm

2008

Windfloat

2011-2015



Demogravi3

2017-2018

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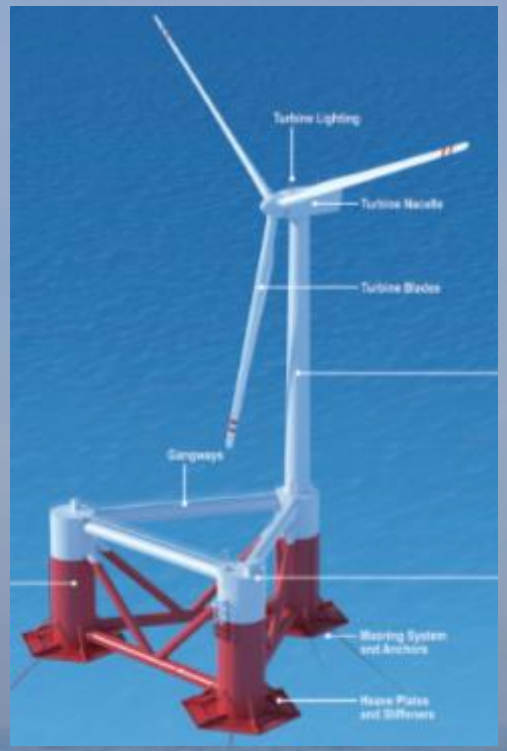
WINDFLOAT PROJECT
FLOATING OFFSHORE WIND



Location: Aguçadoura

- 2011-2015
- Vestas 2.0 MW turbine
- 5 km of the coast, 50 m depth
- Grid connected project
- Investment: 18.9 M€ + Demowfloat
- Total production: 17 GWh
- Phase 2 WF Atlantic (3 X 8.3 MW)

PRINCIPLE
renewable energy delivered

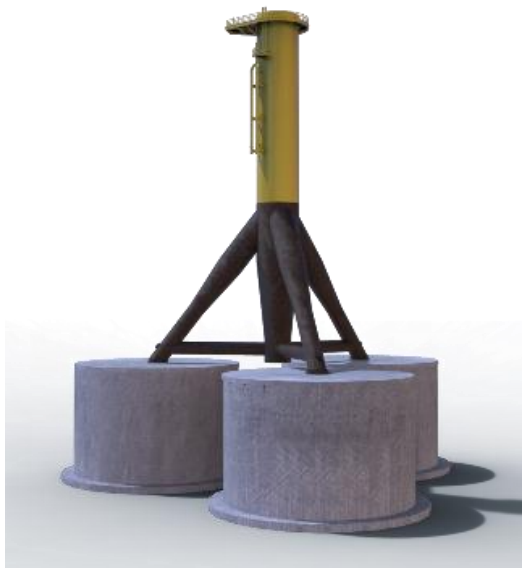
DEMOWFLOAT
Demonstration of the WindFloat Technology

SEVENTH FRAMEWORK PROGRAMME

DEMOGRAVI3 PROJECT

GRAVITY BASE OFFSHORE WIND

DEMOGRAVI3



Location: Aguçadoura

- Under Construction
- Installation June 2017
- 2.0 MW turbine
- Concrete Caissons and metal tripod
- Assembled at port
- Investment: 26.8 M€
- H2020 project

edp renewables

NEWENERGYWORLD 新能源世界

ASM ENERGIA

TYPSA CONSULTING ENGINEERS & ARCHITECTS

POLITÉCNICA

WavEC Offshore Renewables

acciona Infraestructuras

Fraunhofer IWES

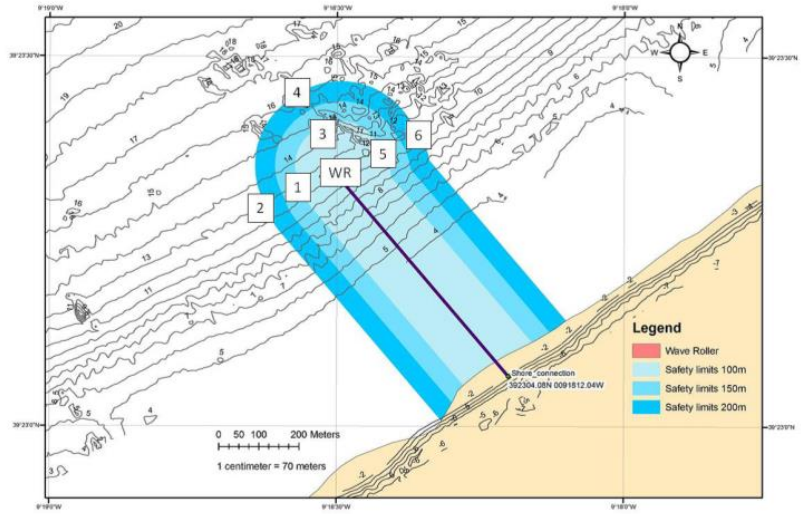
GDG GAVIN & DOHERTY GEOSOLUTIONS

GLOBAL MARITIME

PENICHE - WAVEROLLER

NEARSHORE TEST SITE

- WaveRoller tested several devices in Peniche since 2007, depth 13 m
- In the scope of the surge project, a 300kW machine was installed and tested in 2012
- NER300 project approved will lead to the installation of 5.6MW

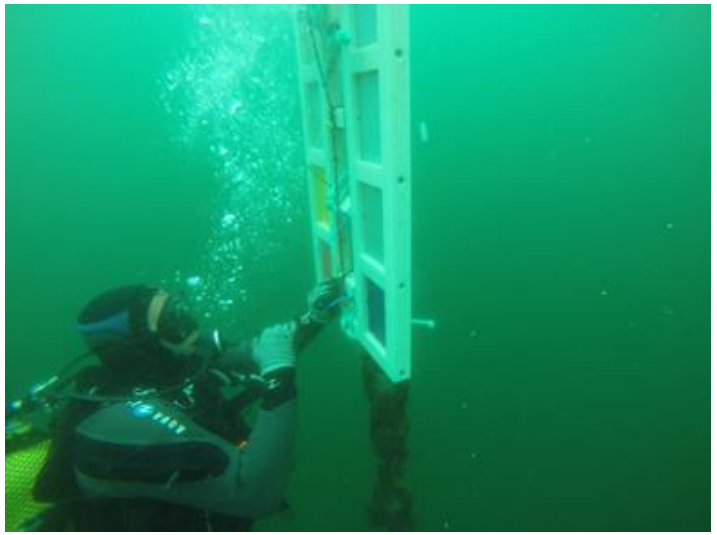


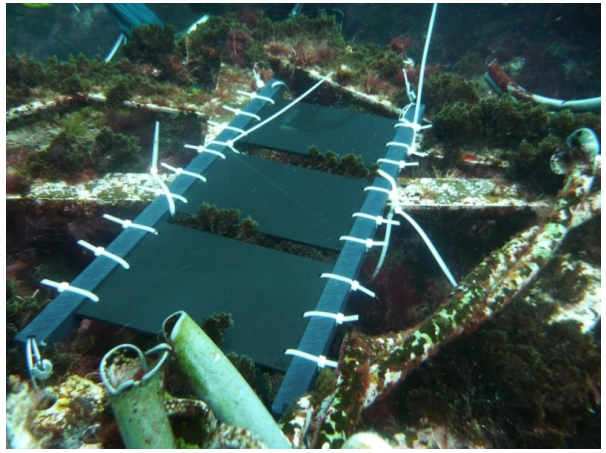
WAVEROLLER®
by AW-Energy

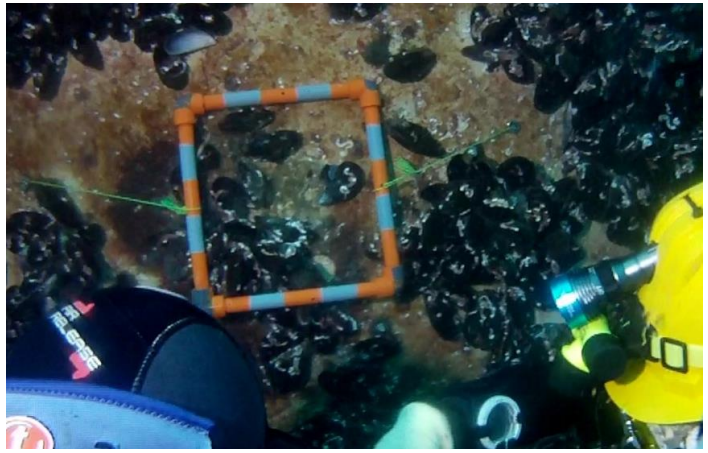
WavEC

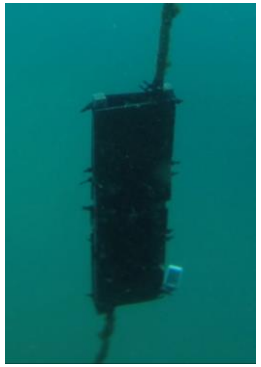
PENICHE – BIOFOULING STUDIES

- WavEC has been developing marine growth studies since 2012 in Aguçadoura, Pico and BIMEP
- A test site is currently set up at Peniche to test several paint solutions in the scope of the OCEANIC project









THANK YOU

www.wavec.org

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QUESTIONS & ANSWERS