



R&D ACTIVITIES – RENEWABLE MARINE ENERGY



⇒ Background

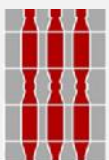
- ⇒ Our facilities, processes, activities
- ⇒ Our products
- ⇒ From actuation to power generation

⇒ Marine Renewable Energy

- ⇒ Energy potential and technology status
- ⇒ Research background
- ⇒ Projects in wave energy
- ⇒ Projects in tidal energy



BACKGROUND



Background

Our facilities, processes and activities



Processes and activities:

- Metal cutting
- Turning
- Grinding
- Heat treatments
- Thermo-chemical treatments
- Galvanic treatments
- Non-destructive tests
- Assembly
- Test laboratory
- Industrial repair



UMBRA CUSCINETTI S.p.A.

Foligno - more than 29,000 m²
Ballscrews, actuators, bearings,
electrospindles and milling heads

UMBRA CUSCINETTI S.p.A.

Albanella
Research Centre



**KUHN PRÄZISIONSSPINDELN
und GEWINDETECHNIK GmbH**

Freiberg - more than 2,500 m²
Ballscrews

PRÄZISIONSKUGELN ELTMANN GmbH

Eltmann - more than 12,000 m²
Balls



UMBRA CUSCINETTI Inc.

Everett - more than 5,000 m²
Gears, torque tubes



Background

Our products



AEROSPACE



ENERGY



INDUSTRY



STEEL BALLS



BEARINGS



BALLSCREWS



ACME SCREWS

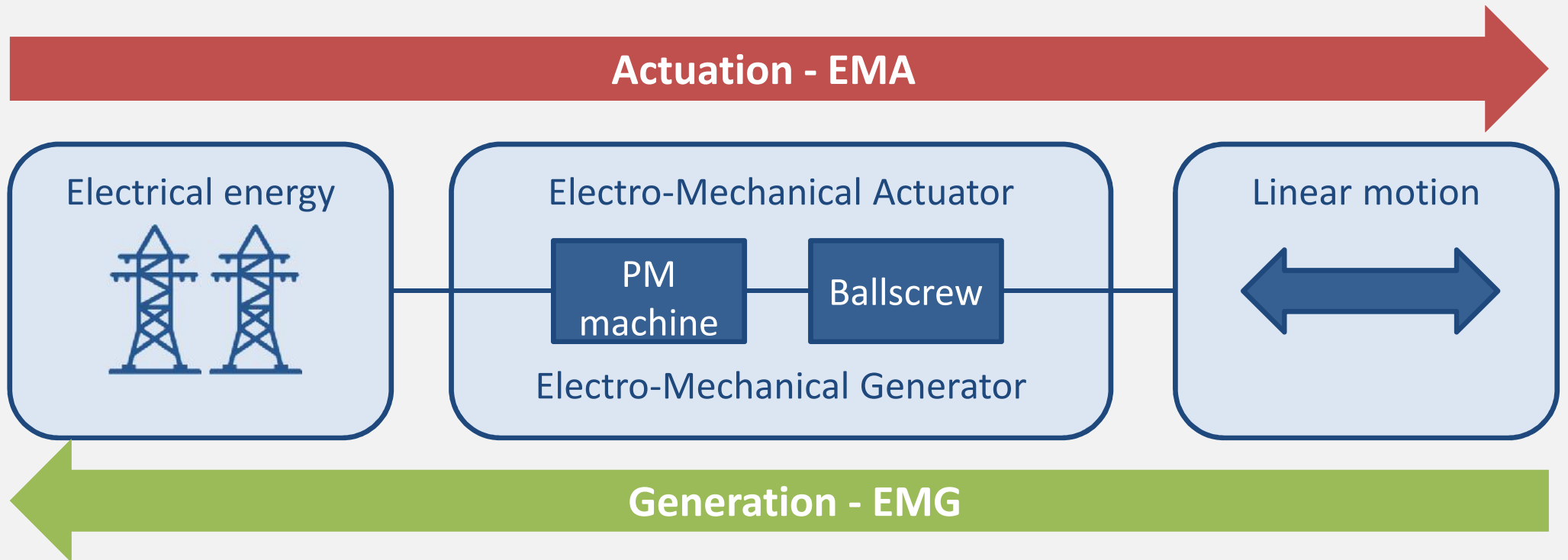


SHAFTS



ELECTRO-MECHANICAL
ACTUATORS

From actuation to power generation



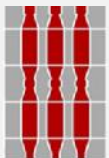
Common Characteristics

- High efficiency
- High reliability
- High power density
- Long life
- Low maintainability
- No pressurized fluids
- Tunable design



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MARINE RENEWABLE ENERGY



**wave energy
SCOTLAND**



Marine Renewable Energy

Energy potential and technology status

Global electricity consumption: (IRENA*, 2016)

23,322 TWh/year

Energy potential from sea waves: (IRENA, 2014)

29,500 TWh/year

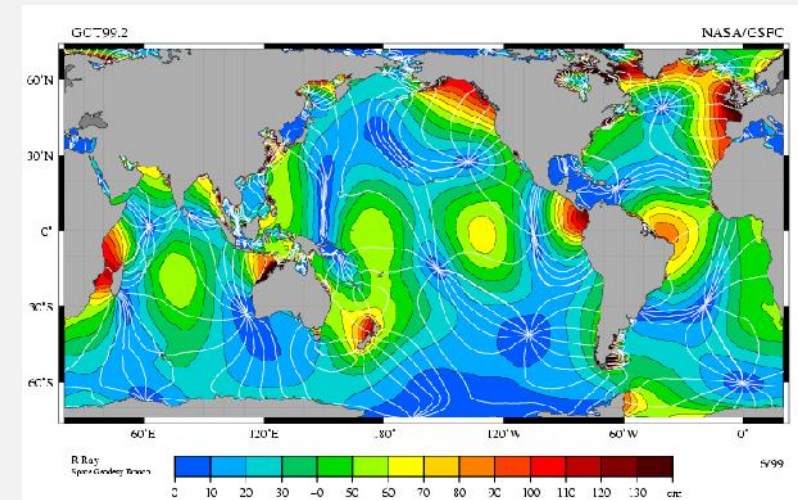
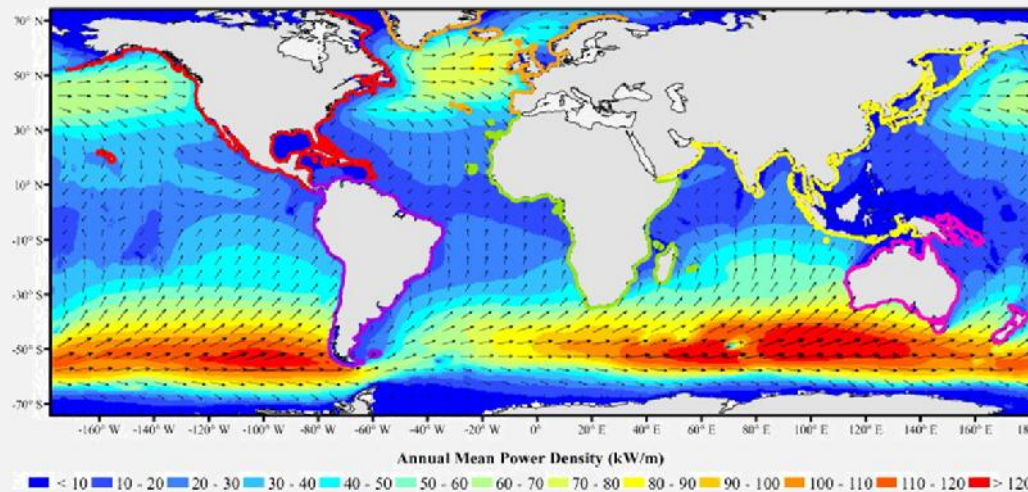
Energy potential from tidal currents: (IRENA, 2014)

7,800 TWh/year

of commercial devices (today):

ZERO

Predictable - Available at night - Well distributed worldwide

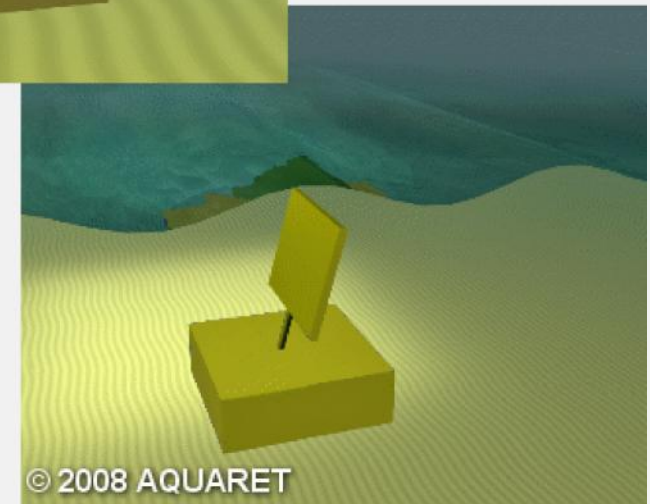
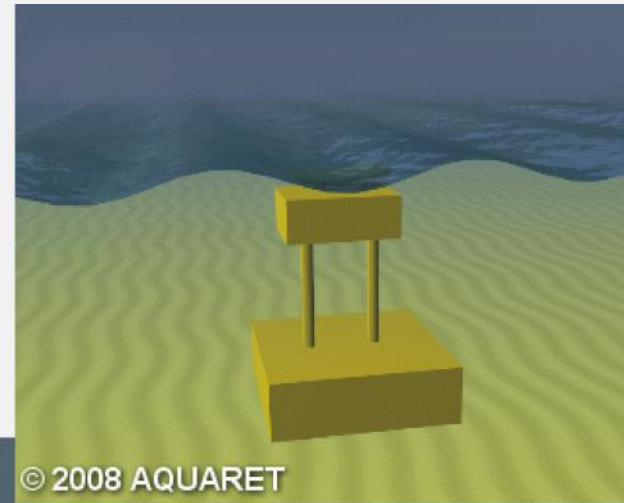
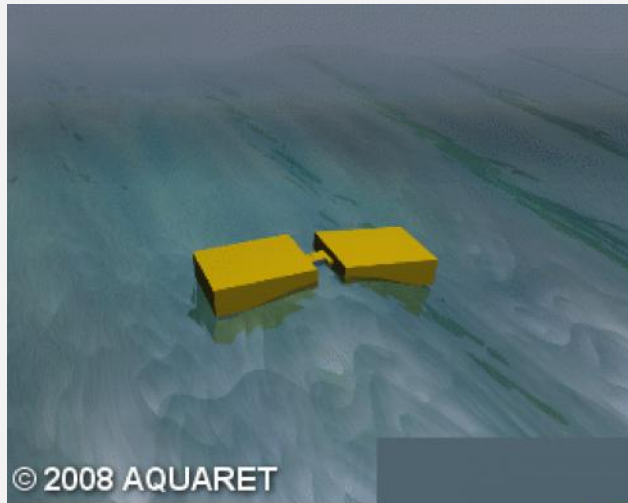


* IRENA= International Renewable Energy Agency

Marine Renewable Energy

Energy potential and technology status

Many of the devices under development need to convert slow, reciprocating linear motion into electricity



Marine Renewable Energy

Seven years of work by the numbers

- ➔ 6 Masters of Science theses concluded, 3 ongoing
- ➔ 6 publications in international conferences
- ➔ 6 research projects
- ➔ 1 pre-commercial project
- ➔ Primary Sponsorship of International Network on Offshore Renewable Energy
- ➔ Presentations at major conferences and networking events in the Marine Sector





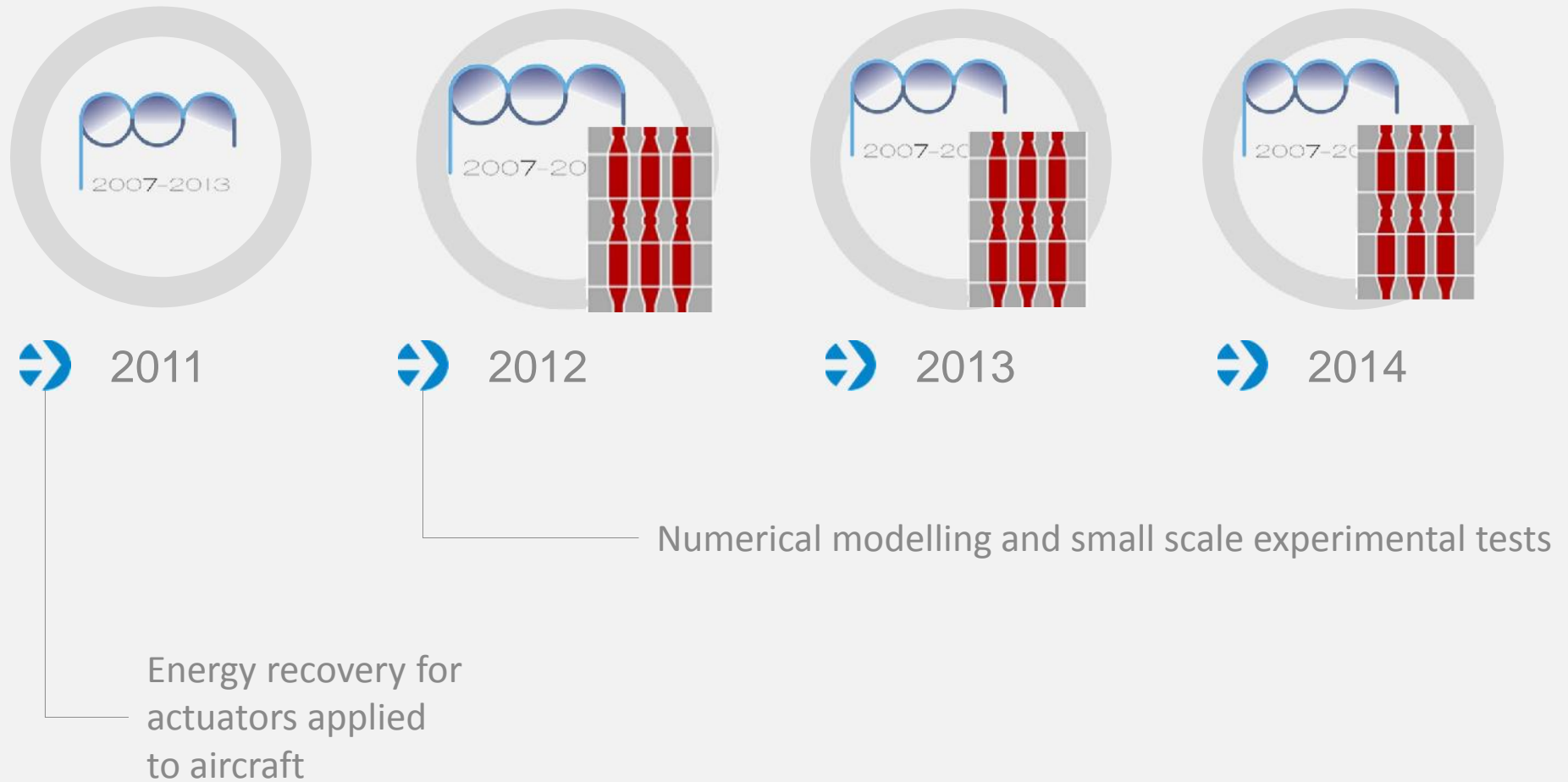
MARINE RENEWABLE ENERGY

Projects in wave energy



Marine Renewable Energy

Projects in wave energy



Marine Renewable Energy

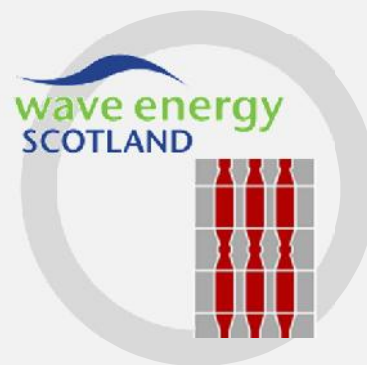
Projects in wave energy



➔ 2015

ReBaS

Dry and wet tests on medium scale generator



➔ 2016

WE-BACK

Alternative architecture and a more efficient motion conversion chain.



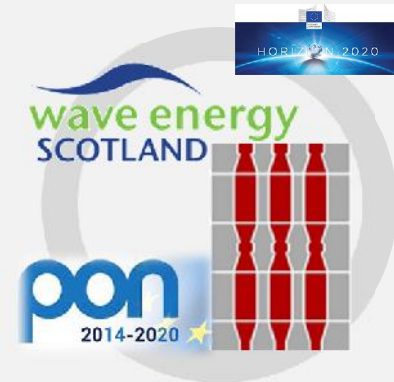
➔ 2017

EMERGE

Sea trials in Scotland on full-scale generator

GENERA

Sea trials in Italy on full-scale generator



➔ 2018

Marine Renewable Energy

Projects in wave energy

Project name: ReBaS (2015-2016)



WAVE ENERGY SCOTLAND Enterprise

Call : International search for innovative power take-off systems

Topic: Power Take Off (PTO) technologies



Marine Renewable Energy

Projects in wave energy

Project name: GENERA (2017-2019)



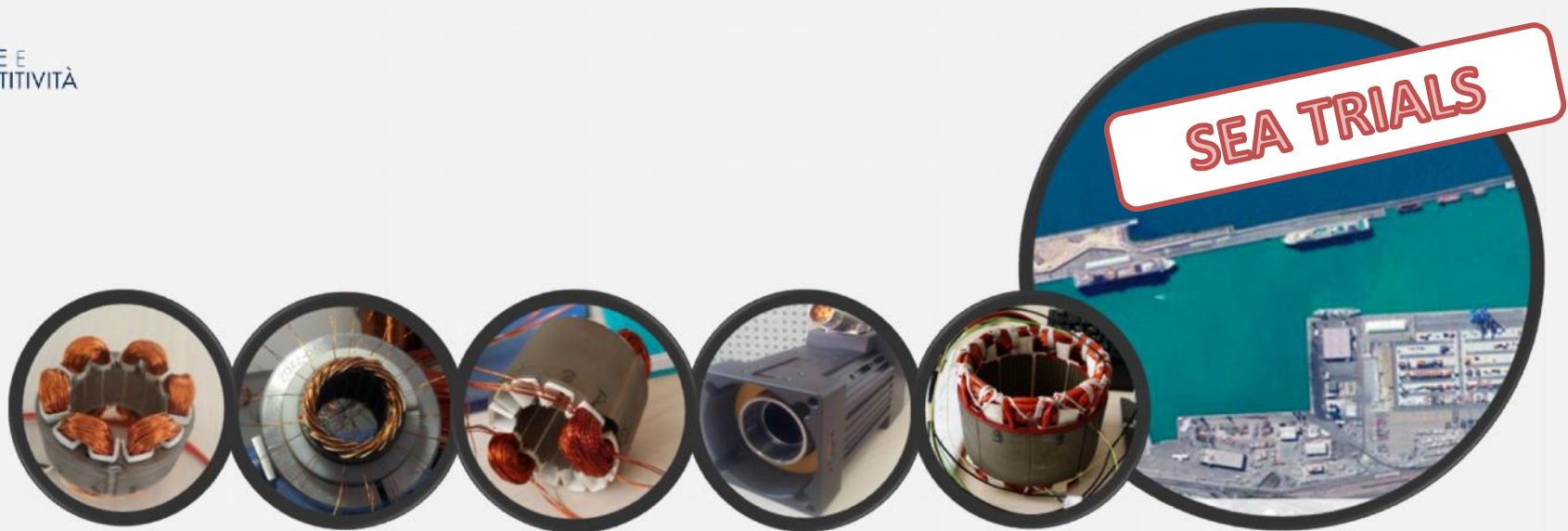
*Ministero
dello Sviluppo Economico*

Ministero dello Sviluppo Economico (MISE)

Call : Programma Operativo Nazionale Imprese e Competitività 2014-2020

Topic: ENERGY

PON IMPRESE E
COMPETITIVITÀ
2014-20



Marine Renewable Energy

Projects in wave energy

Project name: EMERGE (2017-2019)



WAVE ENERGY SCOTLAND Enterprise

Call : International search for innovative power take-off systems (STAGE III entry)

Topic: Power Take Off (PTO) technologies

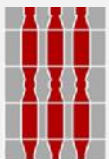




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MARINE RENEWABLE ENERGY

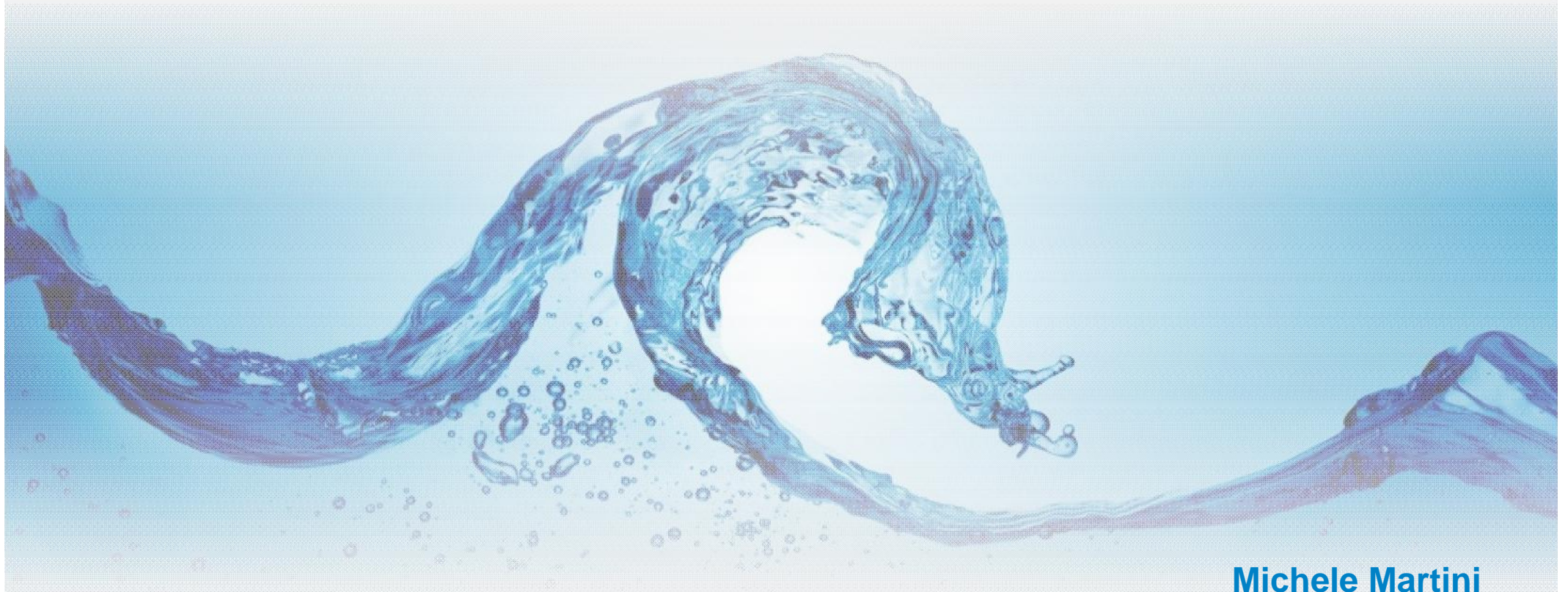
Projects in tidal energy





- ⇒ 2016: tests at small scale in laboratory flume (six EMGs)
- ⇒ 2017: tests at small scale at sea off the coast of Brest, France
- ⇒ 2019: tests at full scale at sea, location TBC

THANK YOU FOR YOUR ATTENTION



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