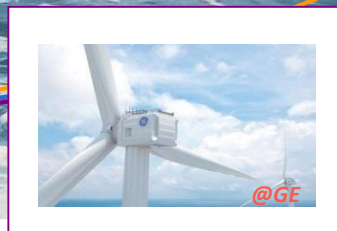
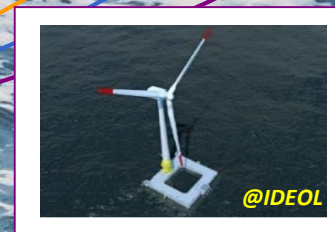


FAID

18 – 19/03/2019



CE PROJET EST COFINANCÉ PAR
LE FONDS EUROPÉEN DE DÉVELOPPEMENT RÉGIONAL

Offshore wind : a reality for European energetic transition



HYWIND Scotland 30 MW
(5 FOWT of 6 MW– October 2017)







End of 2017 : 15,8 GW offshore wind connected in UE
End of 2017 : 17,6 GW offshore wind worldwide
End of 2018 : 18,5 GW offshore wind connected in UE
 (Source : WindEurope)

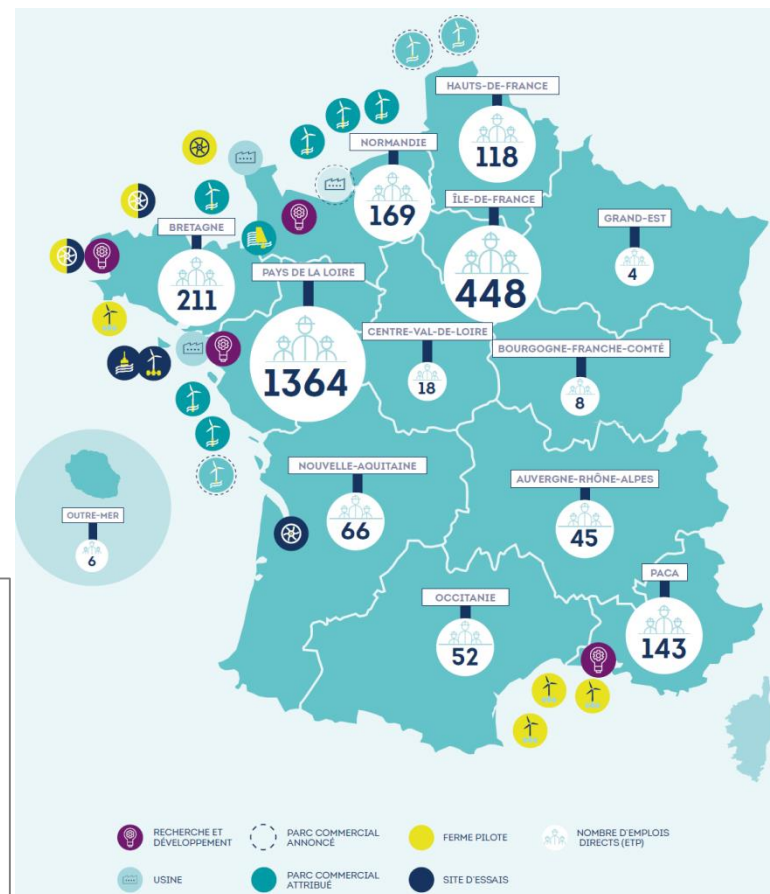


FLOATGEN –France 2 MW
SEMREV Test site from Centrale Nantes
September 2018



France – 4 pilot Farms – 100 MW
2021
 1 off Brittany
 3 in the Mediterranean

					
	Structures de formation et de R&D	Développeurs Exploitants	Entreprises prestataires ou fournisseurs de la chaîne de valeur	Institutionnels	TOTAL
Nombre d'ETP* <small>*emplois équivalent temps plein</small>	201	305	2099	45	2650



Source : Observatoire des EMR, June 2018
(C2 STRATÉGIES – BLUESIGN)

- Pays de la Loire leading the pack.
- **Industrial stakeholders**
 - Big Groups like GE, Chantiers de l'Atlantique, Rollix,... positioned **for export** through the Nantes St Nazaire harbour
 - SMEs : engineering design, resource and impact assessment , ...
- **Research Innovation Training** (WEAMEC ecosystem)

WEAMEC

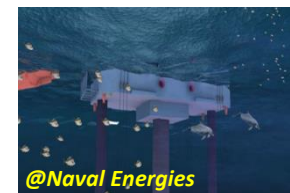
WEst Atlantic Marine Energy Community

WEAMEC federates

the **MRE** ecosystem of the Pays de la Loire Region
in the fields of **Research, Innovation** and **Education**



**Stronger Together
to
Collaborate Wider**



WEAMEC is a vibrant [Research-Innovation-Training] ecosystem



Research Training

A network of ~ 30 labs, and R&D structure



About 175 FTP
Full Time Equivalent jobs

Innovation

A lot of innovation partners
And ~ 60 companies involved



> 500 projects
> 100 M€ [2015-2020]

WEAMEC is a vibrant [Research-Innovation-Training] ecosystem

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> 500 projects
> 100 M€ [2015-2020]

Development support

Strong support of collectivities



<https://www.weamec.fr/en/>

Tests facilities

Gateway to this very rich but sometimes complex, ecosystem

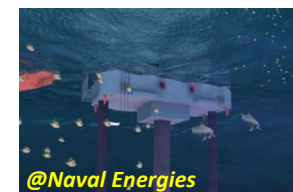
Showcase of skills, facilities, projects,... of our academic and industrial partners

Regional Observatory : real economy of MRE research / innovation in PdIL Region

Dynamic booster at Regional, National and European levels

WEAMEC


- A strong and dynamic regional **Ecosystem** (Research Innovation Training) - **170 FTEs, > 200 projects, 50 M€.**
- A gateway to this ecosystem.
- An observatory of MRE activities of the PdIL region (R I T).
- A co-built technological **roadmap** and an **international strategy**.
- WEAMEC Regional research **projects calls** (Pays de la Loire Region, Nantes Métropole, CARENE).



Simulation & tests tools for engineering

FRYDOM 
*Simulation of complex
marine operations*

EOS 
*CFD simulation
of FWT Farms*

LEHERO-MG 
*Bio colonization roughness
Hydrodynamic load*


SOFTWIND 
*Tests in tank
Software in the Loop*

ECOSFARM 
*Farm modelisation for
detailed design*


Electrical connection and cables

OWARD 
*AC/DC optimal connexion
of an offshore wind farm*

COMEOL 
*Dynamic command of
OWF for grid services*

OMCEND 
*SHM of cable
protection layer*

Logistic and installation

OPT-EMR 
*Optimisation of the MRE
logistic chain*




**Complementary projects
Good thematic coverage**

Foundations and mooring

AMM 
*Advanced Mooring
Monitoring EMR*

RENDEVEOL 
*Anchoring Geotechnic
data base*


ROS 3D 
*Soil heterogeneities effects
on foundations design*


DYNA 
*Dynamic aging of
soil/structures interfaces*

SHM OWTGrout 
SHM of grouted foundations

Blades


ASAPE 
Dynamic blades add-on

FIRMAIN 
*Composite damage
in marine environment*

CEAUCOMP 
*Cracks propagations in composite
under marine environment*

Environmental characterization tools

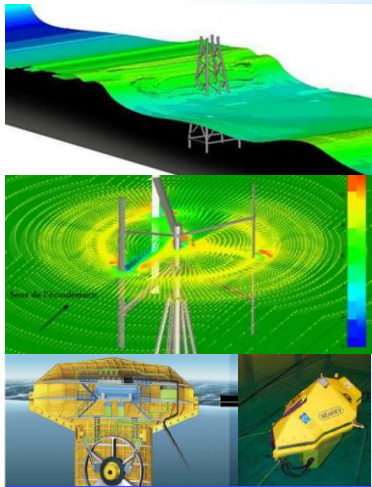
ECHOSONDE 
*Pelagos continuous survey on site
by width band acoustic*

HOOPLA 
*Benthos survey
by biological marker (Haploids)*

PROSE
*Heterogeneous soils characterization
by seismic and electric waves*

Complete and Complementary Competences across the whole Research and Innovation process *Design and tests of energetic systems*

MODELING, SIMULATION
Air-water-ground
structures



Device Engineering



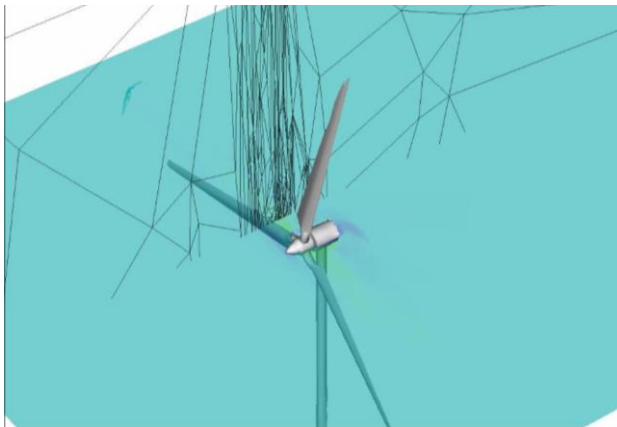
**ICI : HIGH
PERFORMANCE
COMPUTING
CENTER
0.28 PetaFlops**



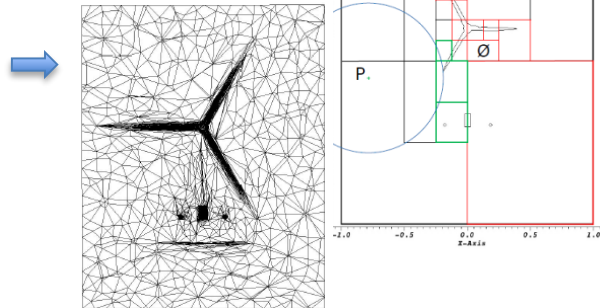
EOS – Wind turbine offshore simulation

- Development of a highly accurate parallel direct CFD model to simulate offshore wind turbine dynamics
- Better understand physics around wind turbines (vortex generation), interaction between turbine, water air and wake modelling
- Validate, benchmark and reset simplified existing models used by engineering.

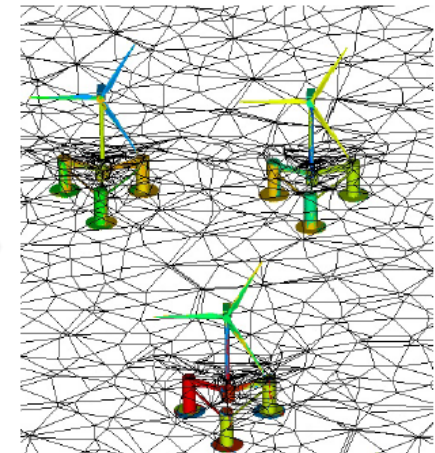
First CFD simulations with the existing solver



Acceleration of computation of the phase functions to represent different domains in the simulation



Parallel meshing of models up to 100 wind turbines



- Development of an aero-hydro coupled solver
- Study of water/air/wind turbine interactions in the one and two wind turbine cases
- Implementation in a massively parallel CFD platform

FRyDoM

Flexible and Rigid body Dynamic modelling for Marine operations



Context and needs :

Marine operations are present at every stage of the Marine Renewable Devices from their installation, maintenance to their decommissioning. Numerical simulation is a modern powerful mean to analyse and plan these operations. The project address the need for a new generation of simulation tools for complex marine operations.



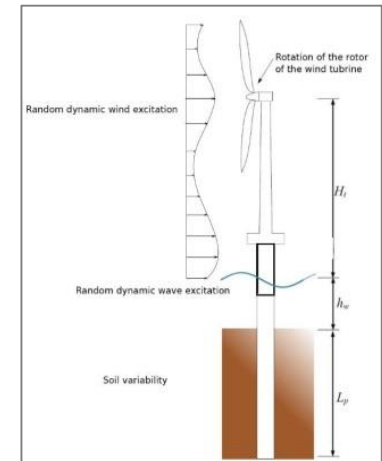
*SEM-REV test site's electrical hub installation
(Ecole Centrale de Nantes – SEM-REV)*



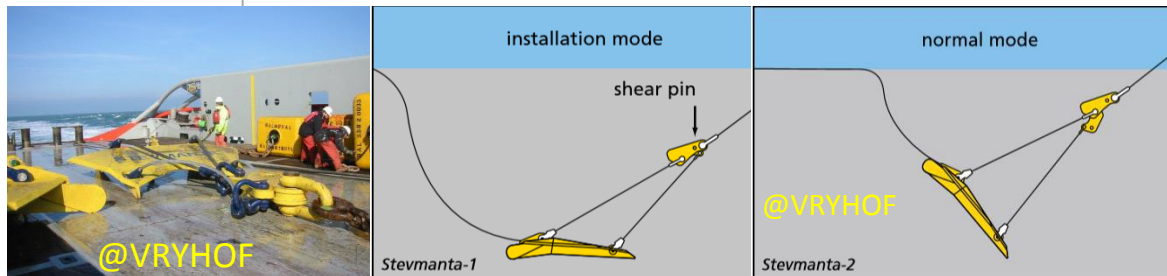
WeAMEC operates its own Research call



DYNA : better understanding of the aging of soil-structure interfaces with heterogeneous soil structures dynamically stressed by the forces associated with both wind and waves.
Partners : UN, IFSTTAR, INNOSEA, GEOTEC.

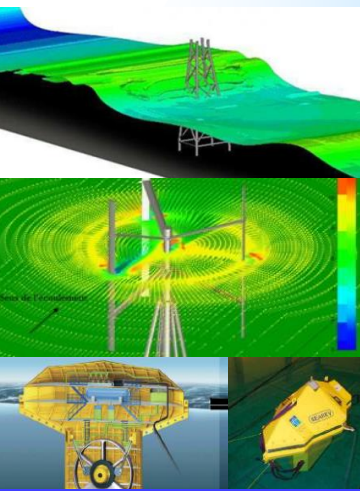


The simulation skills developed in this project can be used to design innovative “Dynamically Installed Anchors” or helical anchors.



Complete and Complementary Competences across the whole Research and Innovation process *Design and tests of energetic systems*

MODELING, SIMULATION
Air-water-ground
structures



Device Engineering



ICI : HIGH
PERFORMANCE
COMPUTING
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0.28 PetaFlops

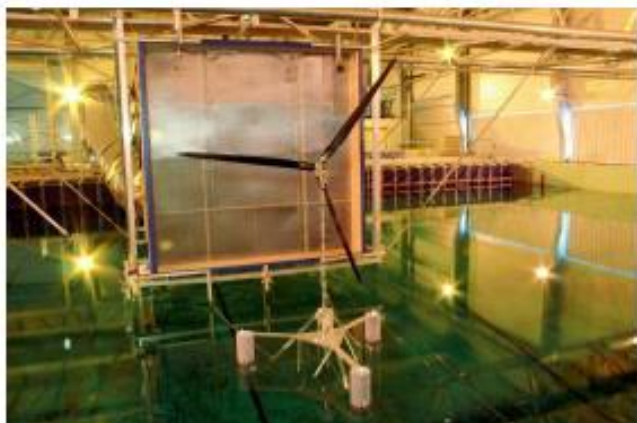


Wave Tank / Wind Tunnel / Centrifuge / Electrical test benches



Model tests

Fixed offshore, Flexible models, Floating Wind



- Ocean tanks with waves, current and wind.
- THEOREM French network for hydrodynamic facilities (IFREMER / ECN)
- Many European projects (MARINET 1 then 2)
- IRT Project MOQUA (ECN / CSTB)
- WEAMEC Project SOFTWIND



WEAMEC

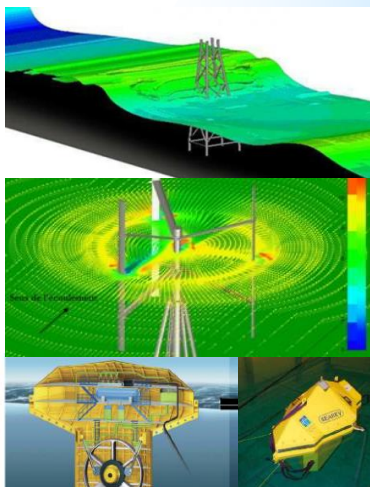
Research, Education
& Innovation
in Pays de la Loire
FOR MARINE ENERGY

SHAKE THE FUTURE.

TheoRem
TESTING FACILITIES FOR HYDRODYNAMICS AND MARINE RENEWABLE ENERGY

Complete and Complementary Competences across the whole Research and Innovation process *Design and tests of energetic systems*

MODELING, SIMULATION
Air-water-ground
structures



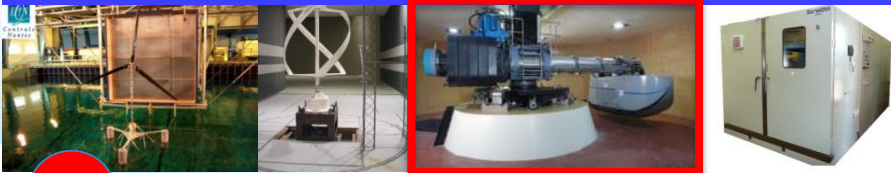
Device Engineering



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CENTER

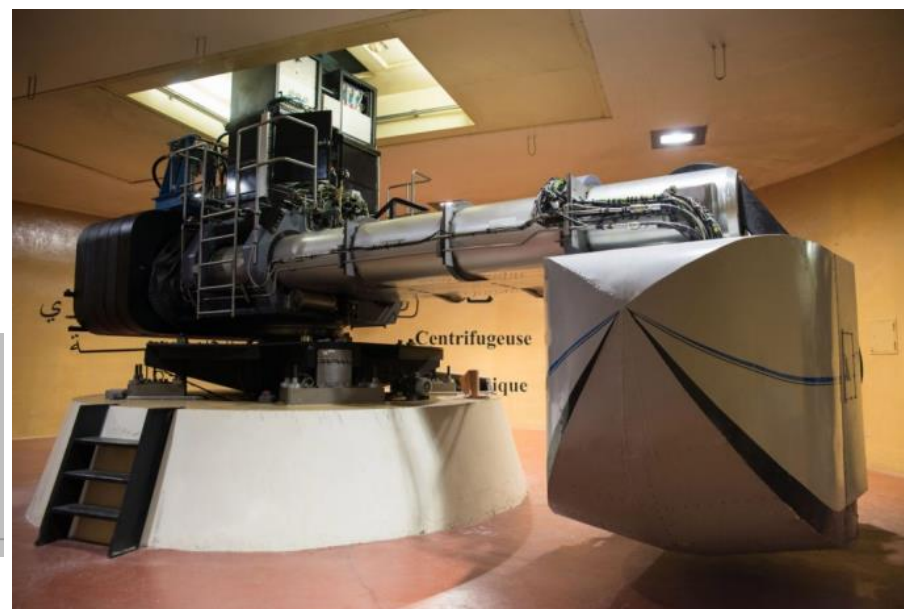
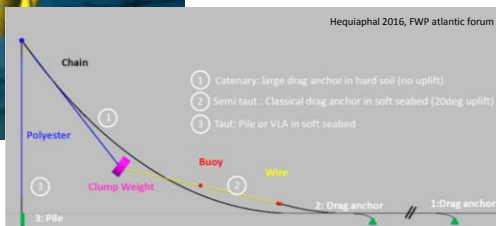
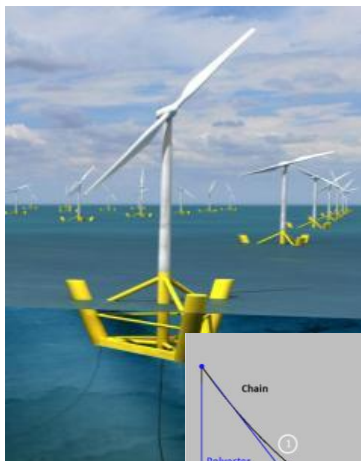


Wave Tank / Wind Tunnel / Centrifuge / Electrical test benches



1 2 3 4 5 6 7 8 9

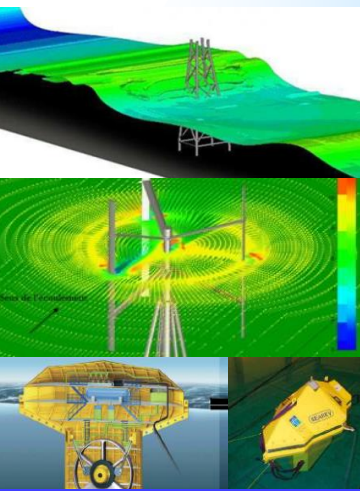
- Large centrifuge, allowing to study, on a reduced scale, the important loads related to the weight of the offshore structures and the solicitations of swells or wind, on the fatigue of the soil around the structure.



- Reduction of the lateral extent of the catenary anchors for floating wind turbines, able to partially recover vertical forces.

Complete and Complementary Competences across the whole Research and Innovation process *Design and tests of energetic systems*

MODELING, SIMULATION
Air-water-ground
structures



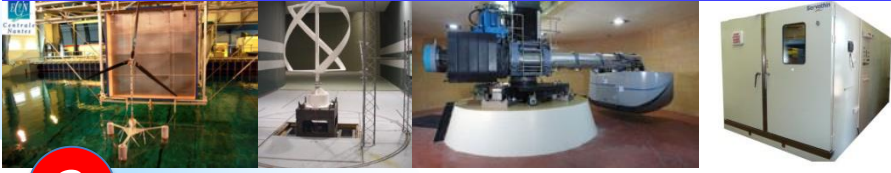
Device Engineering



**ICI : HIGH
PERFORMANCE
COMPUTING
CENTER**



Wave Tank / Wind Tunnel / Centrifuge / Electrical test benches



1 2 3 4 5 6 7 8 9

**Experimental tests
from scaled model
to real size prototype**

1 2 3 4 5 6 7 8 9

Sea tests site SEMREV



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- WEAMEC Call for « International projects »



Support the development of the international relations of WEAMEC's ecosystem research teams:

- WEAMEC funds a research project in close collaboration between two laboratories: one from a PdlL research establishment and the second of an international research lab.
- **Opened over the course of the period 2016-2020.**
- Financing of :
 - the salary of the Researcher **during about 2 years (€215 k)** (PhD, CDD, CDI on projects) employed by the French Partner.
 - materials.
- Selection criteria : part of co-funding of project partners.
- This operation should be described as a **Research, Innovation project**.



WEAMEC

31/05/2017
Website Online

www.weamec.fr

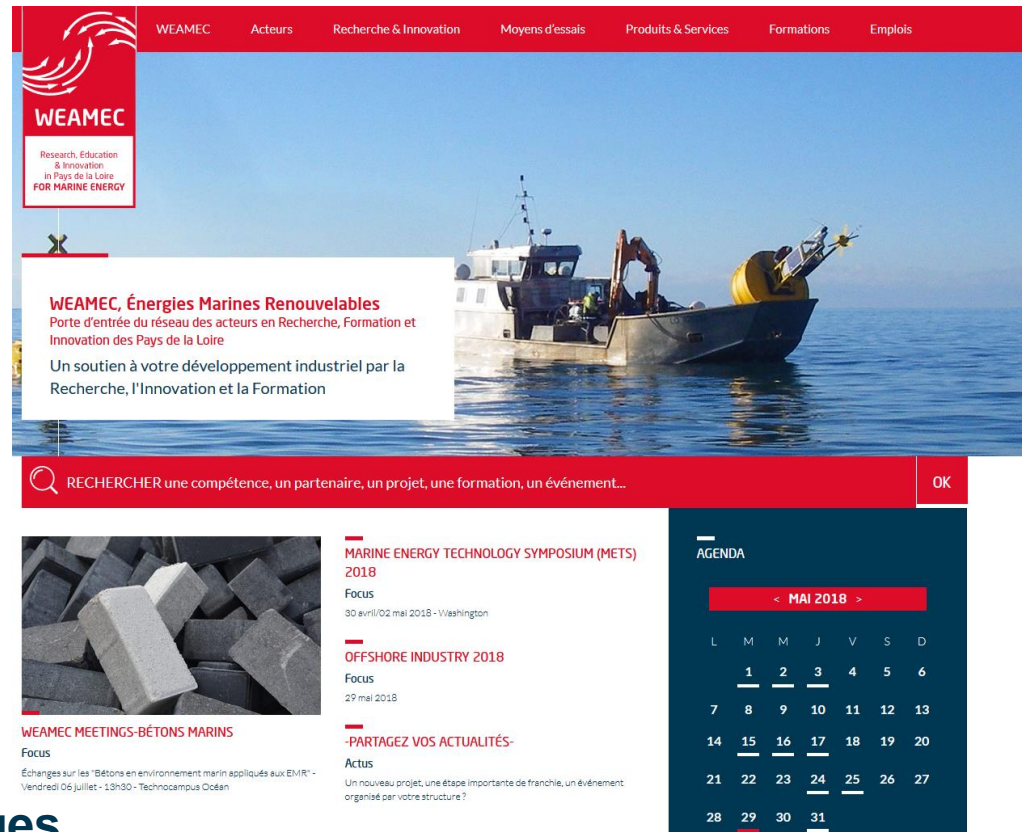


For the scientific
and technical
community that
creates projects in
the field of MRE

35 383
connections
since site online
≈ 1 684/month

76 932
consulted pages
since site online
≈ 3 663/month

31%
**of international
consultations**
In 65 different countries



912

forms on line
538 in FR & 374 in ENG
83 stakeholders / 64 trainings
25 test facilities / 47 projects
185 news/events...



WEAMEC

Research, Education
& Innovation
in Pays de la Loire
FOR MARINE ENERGY



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WEAMEC

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44321 Nantes Cedex 3

**Your challenges have solutions, please contact WeAMEC,
we can make it with you !**