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R&D Offshore Renewable Projects on international collaboration between UK-EU

International Collaboration in ORE: UK-EU collaboration opportunities post-BREXIT

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R&D Ocean Energy Engineer

20 January 2021

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Supergen Offshore Renewable Energy

R&D for cost-effective offshore renewable technologies in a fully decarbonised context

Content

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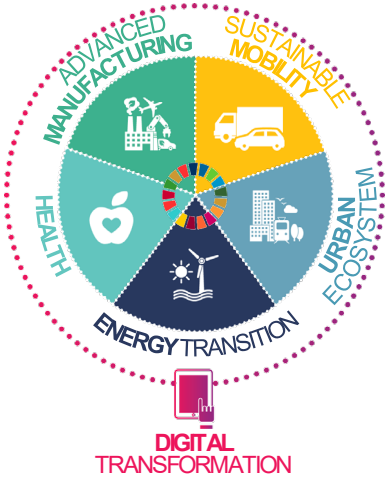
Short introduction about TECNALIA

1st private organisation in Spain in project contracting, participation and leadership under the EU **Horizon 2020** Programme.

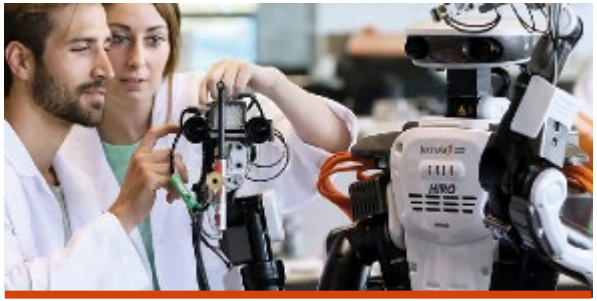


IMPACT SERVICES

Laboratory Services

R&D and Innovation Projects

Development of **Investment Opportunities**



> 7.400 CLIENT COMPANIES

(2011 - 2019) **75% SMEs** **25% Large companies**

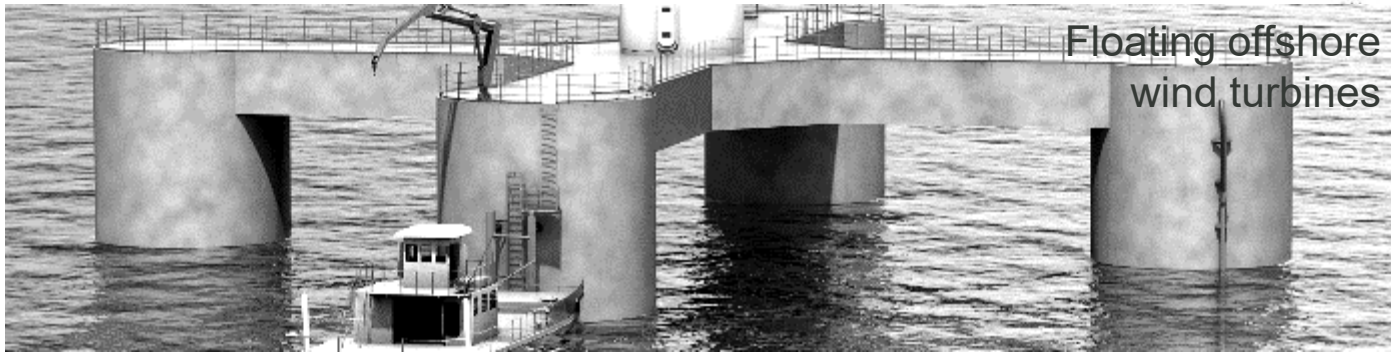
Benchmark Research and Technological Development Centre in Europe, with **1,446** experts of **29** nationalities, oriented towards transforming technology into GDP to improve People's quality of life, creating business opportunities in Companies.

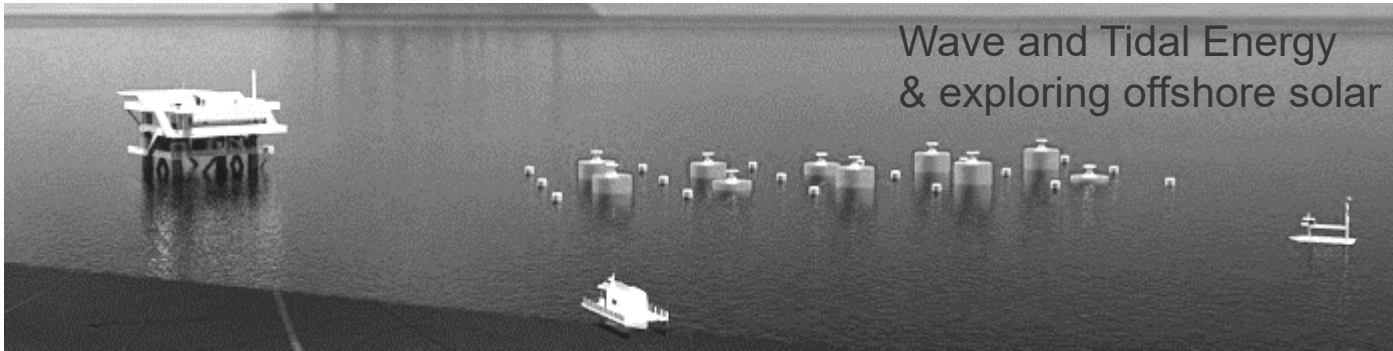
Offshore Renewable Energy

- New solutions for installation and O&M
- Optimised designs for reducing costs of foundations and electrical infrastructure
- Test and analysis of materials and components for harsh environments

- Design tools for floating platforms
- Tank testing and numerical analysis
- Analysis and design of mooring systems and electrical connections

- Design tools for the optimisation of arrays
- Performance assessment
- Optimisation of Power Take-Off and Control systems





15 **years** of experience in the offshore renewable energy sector (since 2004)

+€40m worth on R&D

4 **patents** transferred to industry (including 2 SMEs)

contributing to numerous international committees and advisory groups

tank and open-sea **testing of full-size and scaled devices**

collaborating with the regional government on the definition of **a marine energy strategy**

Participation on the organisation of international and national events, **among which the EWTEC 2023 in Bilbao with University of Basque Country**

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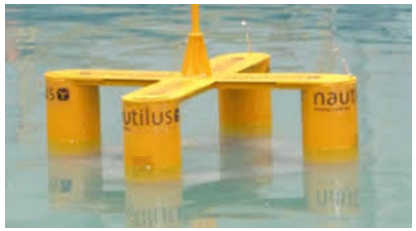
2 technology-based companies created



OCEANTEC

in partnership with Iberdrola,

development of wave energy converters.

Acquired by IDOM in 2018

nautilus floating solutions

a consortium made up of four industrial companies plus TECNALIA

aiming at developing cost-effective floating platforms for offshore wind in deep waters.

European Research Projects

20 participation in

5 led projects

>€7m funding

>33% success rate

New European Offshore Renewable Strategy

EUROPEAN COMMISSION

Brussels, 19.11.2020
COM(2020) 741 final

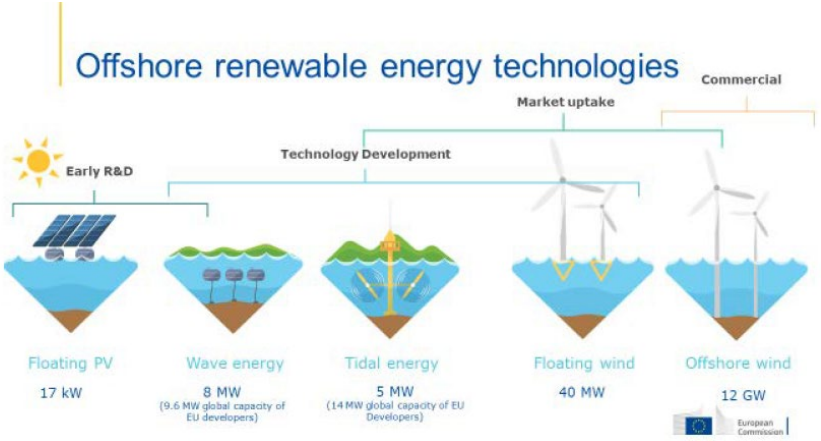
COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future

{SWD(2020) 273 final}

	1991*	2010**	Today	2030	2050
Average power capacity of offshore wind turbine	0,45 MW	3MW	7,8MW	↗	↗
EU offshore wind energy capacity	5MW	3GW	12GW	≥60GW	300GW
Ocean energy capacity (e.g. wave, tidal)		3,8MW	13MW	≥1GW	40GW

* First offshore wind farm: Vindeby, Denmark.
** Including UK



Source: JRC

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Industrial Associations are even more ambitious

Ocean energy will deliver large volumes of the renewable energy that Europe needs

100GW Capacity

10% of Europe's electricity consumption

Ocean energy can deliver 100 GW of capacity by 2050 – equivalent to 10% of Europe's electricity consumption today.

With almost 45% of Europe's citizens living in coastal regions, ocean energy can be readily delivered where it is needed.

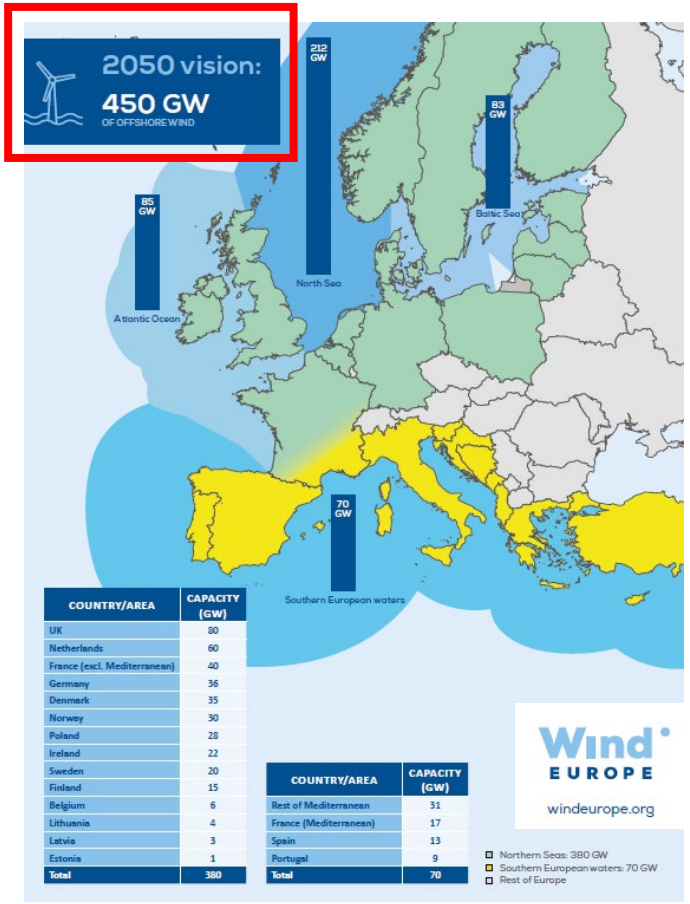
Ocean energy will help deliver a just transition

Ocean energy can create 400,000 jobs by 2050. Many of these jobs will revitalise coastal communities that historically served shipbuilding, fishing and the oil & gas sector

Ocean energy can create **400,000 jobs by 2050**

2030 Ocean Energy Vision
Industry analysis of future deployments, costs and supply chains

Ocean Energy Europe



COUNTRY/AREA	CAPACITY (GW)
UK	80
Netherlands	60
France (excl. Mediterranean)	40
Germany	36
Denmark	35
Norway	30
Poland	28
Ireland	22
Sweden	20
Finland	15
Belgium	6
Lithuania	4
Latvia	3
Estonia	1
Total	380

COUNTRY/AREA	CAPACITY (GW)
Rest of Mediterranean	31
France (Mediterranean)	17
Spain	13
Portugal	9
Total	70

Wind EUROPE
windeurope.org

- Northern Seas: 380 GW
- Southern European waters: 70 GW
- Rest of Europe

Qualification of innovative floating substructures for 10MW wind turbines and water depths greater than 50m

- Advanced numerical modelling and experimental testing of floating structures.
- Tools for costs calculation and life cycle analysis of floating wind turbines, developed for concepts assessment.
- Methodology for the risk analysis and application to the design, for the identification of potential design constraints.
- Recommended practice for the design of floating wind turbines.
- Industrialization of NAUTILUS design, considering manufacturing, transport, installation, O&M and decommissioning stages.
- Pre-FEED and FEED designs for different wind turbines and offshore sites across Europe and USA.

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Research applied to innovative and integral solutions for foundations, towers and auxiliary systems of high power offshore wind turbines

SEAPOWER

- Numerical models for the design and evaluation of offshore wind turbines
- Design optimisation of jacket foundations.
- New solutions for join systems not screwed.
- Innovation in transition pieces for both fixed and floating
- Coatings resistant to corrosion and biofouling.
- Tower design optimisation for large wind turbines.
- Integrated lifting systems in offshore wind turbines
- Connection of dynamic cables to structures.
- New solutions for electrical transformers for large wind turbines

Development and demonstration of an automated, modular and environmentally friendly multi-functional platform for open sea farm installations of the Blue Growth Industry

theBlueGrowthfarm

Design of a low-cost, corrosion-resistant, low-maintenance modular concrete floating multi-purpose offshore platform, capable of accommodating aquaculture, wind and wave energy systems and then to test and validate this design through the construction and sea deployment a pilot scale platform.

Open Sea Operating Experience to Reduce Wave Energy Cost

- Floating wave energy device (MARMOK-A-5) developed by the Basque company IDOM/Oceantec.
- Grid-connected and tested at BiMEP in two different configurations over three consecutive winters.
- Demonstrated survivability in rough seas up to 14 m maximum wave height and displayed increasing availability reaching 90%.
- The research team gained more than 1,000 man-hours of experience in operation and maintenance as well as confidence in its power performance and mooring system robustness.
- The experimental results confirm that the innovations can improve turbine efficiency by 55%, increase the overall power production by 30% and reduce the peak loads in the mooring lines by 50%.

Next Evolution in Materials and Models for Ocean energy

Improvement of the design and performance of tidal turbine blades. It will create a larger, lighter and more durable composite blade for floating tidal turbines, enabling devices to reach capacities of over 2 MW. **This will boost the competitiveness of tidal energy by reducing its Levelised Cost of Energy and increasing the yield of tidal turbines.**

- design, model and test blade materials and prototypes
- enable developers to significantly reduce both capital and operational costs
- improve the yield and reliability of tidal turbines
- advance the state-of-the-art of tidal turbine technology

NEMMO
MAKING BETTER BLADES

A novel tidal blade design

Tailored composites, coatings and appendages

Models of harsh hydrodynamic and environmental stresses

Numerical models for the prediction of lifespan and mechanical properties

A new test rig to evaluate fatigue and cavitation

Novel testing procedure for bio-fouling and evaluation of marine environments

More Information

HarshLab
OFFSHORE MATERIALS & COMPONENTS LAB

Laboratory for Experimentation and Validation of Materials, Components and Subsystems in Real Marine Environment.

- Evaluation of materials, components and stand-alone systems in real offshore environment: Atmospheric, splash, immersion, confined and marine bottom zones.
- Trial of solutions to protect against corrosion, fouling, corrosion-fatigue. Corrosion monitoring.
- Training of personnel in offshore operations.

FLOATING SOLAR POWER

Focus on reduce the LCoE of Floating PV plants and guarantee the survival of floating PV plants in extreme conditions

- Specific anchoring systems for extreme water level variations (reservoirs) and for harsh environment (offshore PV)
- Module manufacturing process based on fiberglass-reinforced resins to achieve maximum lightness, resistance and integration in floating structures.

- Specific tracking systems for Floating PV, equipped with a survival system for extreme conditions.
- Design of cost - optimized structures, specific for aquatic or marine environmental. New materials.

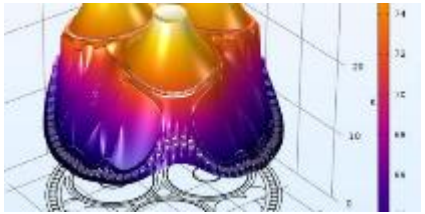
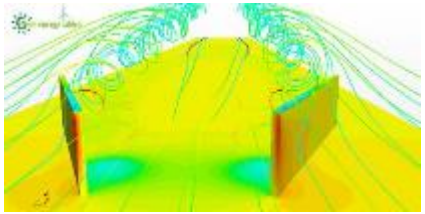
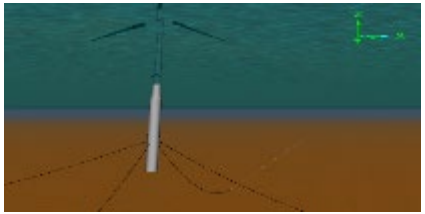
National and International collaboration

THE UNIVERSITY
of EDINBURGH

JRL-ORE areas of active basic research in colaboration with

JRL-ORE Joint Research Laboratory on OFFSHORE RENEWABLE ENERGY

More Information

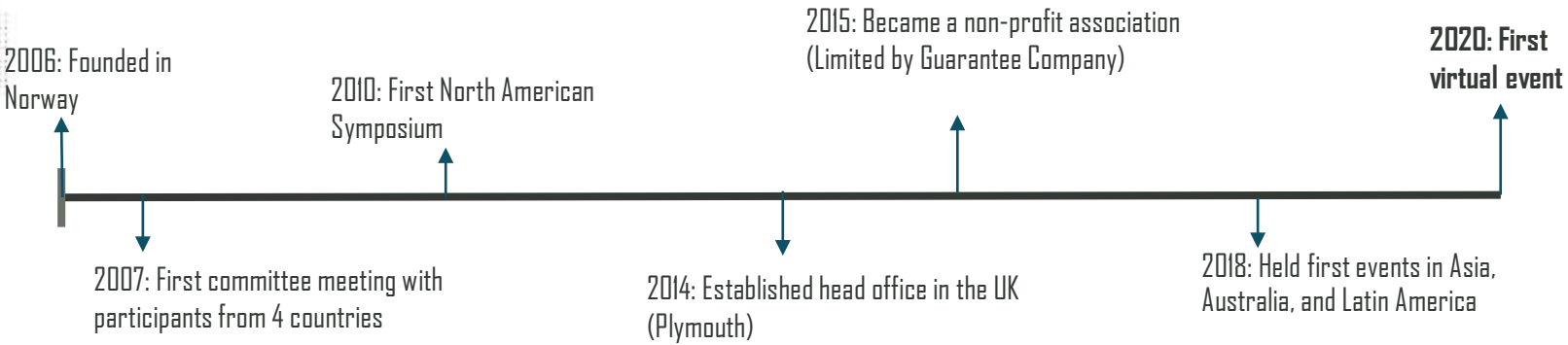
POWER ELECTRONIC CONVERTERS	GRID INTEGRATION	DIGITAL MODELS	CONTROL STRATEGIES
			
			
FLUID DYNAMICS	OFFSHORE RENEWABLE ENERGY TECHNOLOGIES	TECHNO-ECONOMIC ANALYSIS	MATERIALS FOR OFFSHORE RENEWABLE ENERGY

International Network on Offshore Renewable Energy

What is INORE?

- An international association of early-stage researchers and young professionals working on ORE across all disciplines
- ~1500 members across 75 countries
- Non-profit (registered UK Charity) run via sponsorships
- Word-of-mouth organization run by volunteers
- Aim: **to facilitate networking and knowledge transfer between young researchers in ORE**

International Network on Offshore Renewable Energy



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Some Sponsors from previous events:

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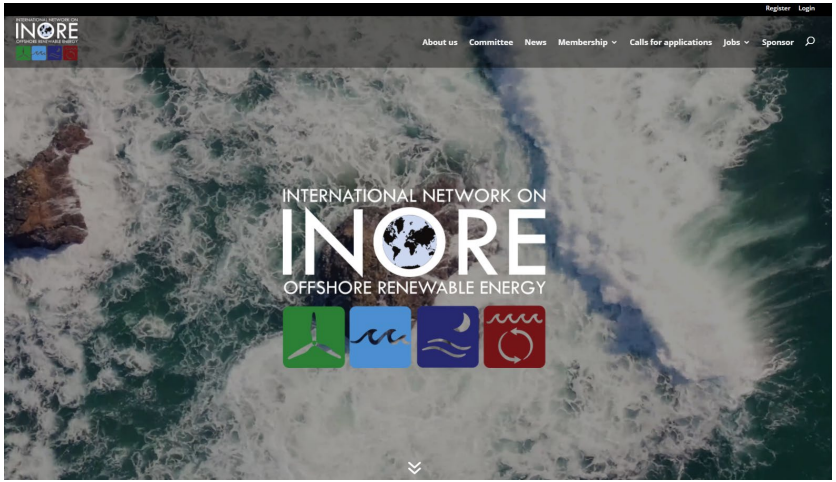
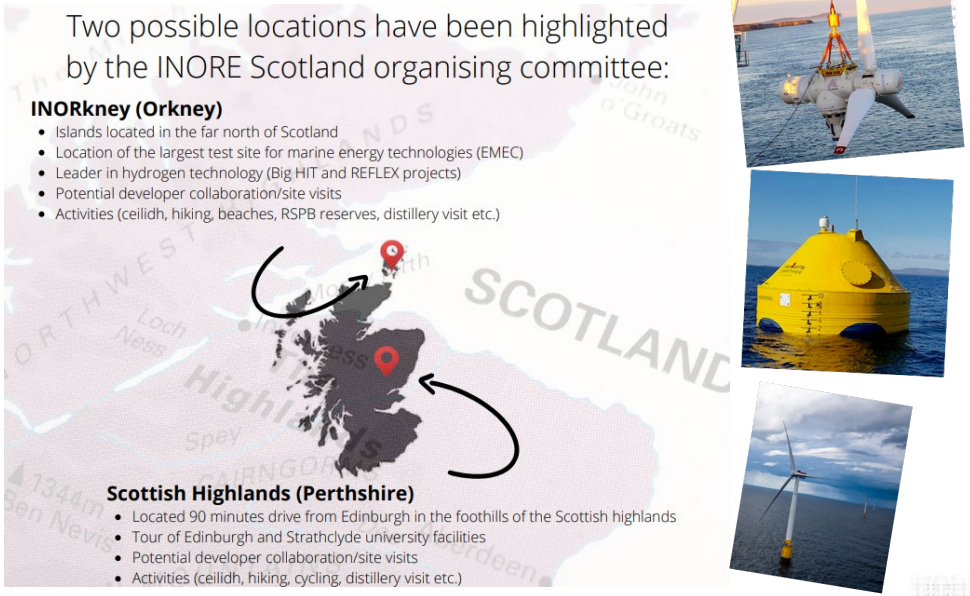
International Network on Offshore Renewable Energy



www.inorean.org

CHECK IT OUT!



... Hope to see you at the 2021's event

ESKERRIK ASKO
GRACIAS
THANK YOU
MERCI

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