The challenge for Naval Architecture and Ocean Engineering in the face of the development of the Marine Renewable Energy

ENERMAR

Asociación de Ingenieros Navales y Oceánicos de España

April 18th, 2024

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Naval Architect and Marine Engineer

MEMBER OF THE ENERMAR WORKING GROUP

GT ENERMAR

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AINE – Naval and Ocean Engineers Association of Spain

The **Association of Naval and Ocean Engineers of Spain (AINE)** is a non-profit association of professionals, which has been working **since 1930** in defence of its members and promoting projects and initiatives that encourage the development of the Maritime Sector

The **Association** is linked to the **Official College of Naval and Ocean Engineers (COIN)**, and both aim to cooperate in the promotion of the profession and the regulation of its practice

Both entities **promote positive initiatives for the maritime sector and encourage dissemination and research**, and to this end they maintain numerous activities such as the **Working Groups *(Grupos de Trabajo – GT)***

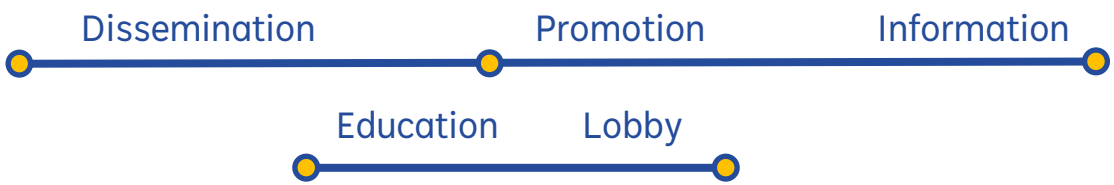
ENERMAR is the **Marine Renewable Energies Working Group** whose **main objective is the promotion of Naval and Oceanic Engineering** in this field, specifically disseminating the functions and capabilities of the **Naval and Oceanic Engineer**

Start 2009

It was born to establish the link between **Spanish Naval Engineering (leader for centuries)** and Spanish Industrial Engineering (leader in onshore wind energy) **to develop marine renewable energies in Spain**

Objectives

1. **Promotion of the Naval and Oceanic Engineering** in the Marine Renewable Energy Sector
2. **Dissemination** of the functions and capabilities of the Naval and Oceanic Engineer in the field of Administrations, companies, organisations, entities, etc.
3. **Promotion of Marine Renewable Energies** for sustainable energy development, and support for the achievement of the European Union's objective
4. **5 vectors:**



GT ENERMAR

Committees

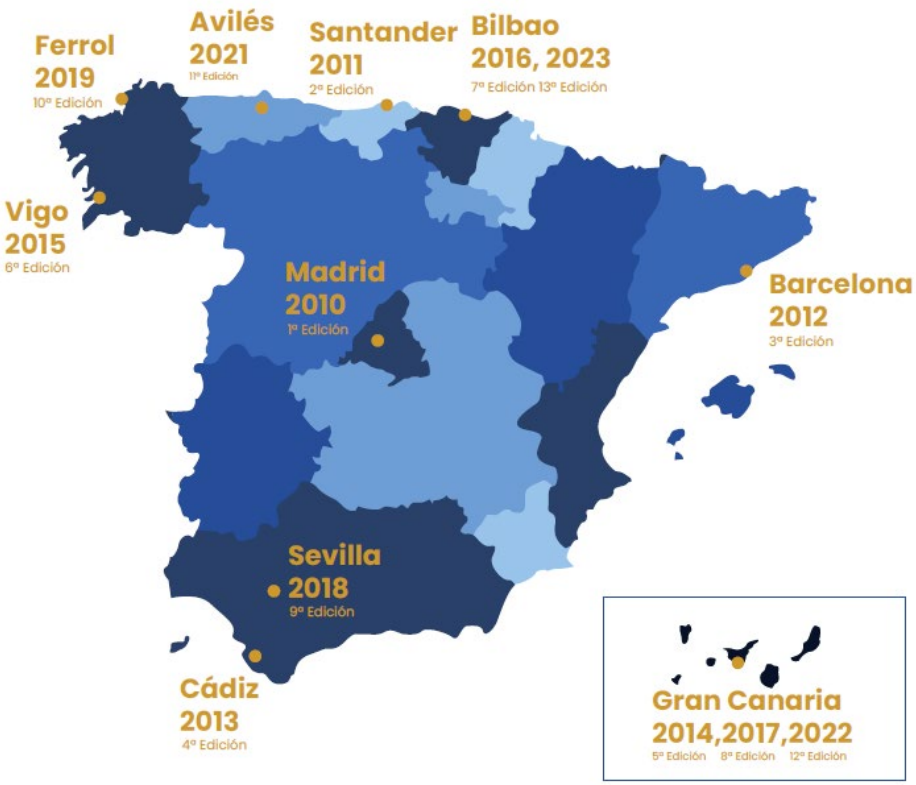
- Executive
- Training
- Dissemination
- Events
- Awards
- Communication, Documentation and Publications

Members

The ENERMAR Working Group is composed of **26 naval engineers, women and men** who work in companies linked to marine renewable energies, such as technology companies, construction companies, engineering companies, universities, technology centres, classification societies and consultancies

Ana Bezunartea
Ana Peña
Andrea Novás
Beatriz Spuch
Borja del Arco
Carla Chawla
Cecilio Barahona
Daniel Santos
Francisco de Manuel
Francisco Moreno
Hugo Martínez
Jaime Domínguez
Jaime Pancorbo
Javier González-Arias
Jorge Dahl
Juan Moya
Juan Ramón Hidalgo
Luis Guerrero
Pablo Ruiz de Aguiar
Pedro Collantes
Pilar Heras
Raúl Rodríguez
Rodrigo Larca
Silvia Oriola
Soledad Samoza
Vicente Díaz

ENERMAR TECHNICAL CONFERENCES (ANNUAL EVENT)



13
Conferences

+90
Sponsors

+180
Speakers

+700
Assistants

55
Technical panels

21
Round Table Discussions

2023 - ENERMAR TECHNICAL CONFERENCES - BILBAO

The **13TH ENERMAR 2023** Technical Conference was **sponsored by 12 organisations** from the marine renewable energy sector:

PLATINUM SPONSORSHIP

saitec offshore technologies

GOLD SPONSORSHIP

acciona Construcción

Bluenewables

FLORES Offshore Renewable Energies partnership in the Pact for Skills

Co-funded by the European Union

Iberdrola

OW OCEAN WINDS

OWC An ABL Group Company

PIPESPAIN

wunderhexicon

PREMIUM SPONSORSHIP

Nautilus Floating Solutions

LR

GHENOVA

14ª Jornadas Técnicas ENERMAR

26 · 27 · 28 JUNIO 2024

El mar y las energías renovables:

La aportación de la Ingeniería Naval y Oceánica

Ubicado en: A Coruña

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26, 27 and 28 June 2024

LA CORUÑA - SPAIN

You are all invited!

Marine Renewable Energy Development

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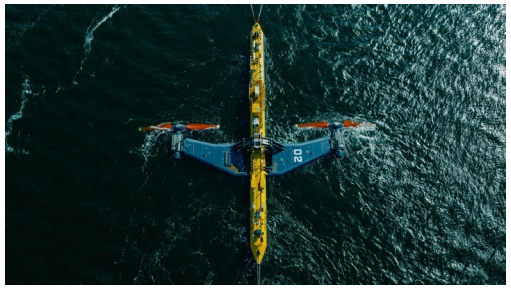
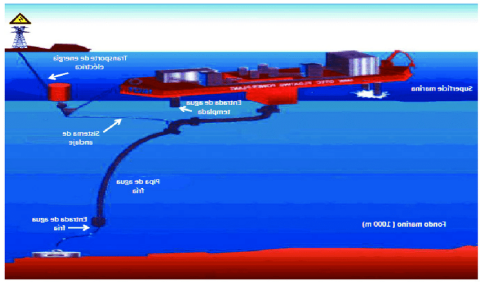
OVERVIEW OF MARINE RENEWABLE ENERGY

Natural resources of the sea

- Bottom Fixed and Floating Offshore Wind
- Offshore Solar
- Wave Energy
- Salinity Gradient Power
- Tidal / current Energy
- Thermal Gradient Power

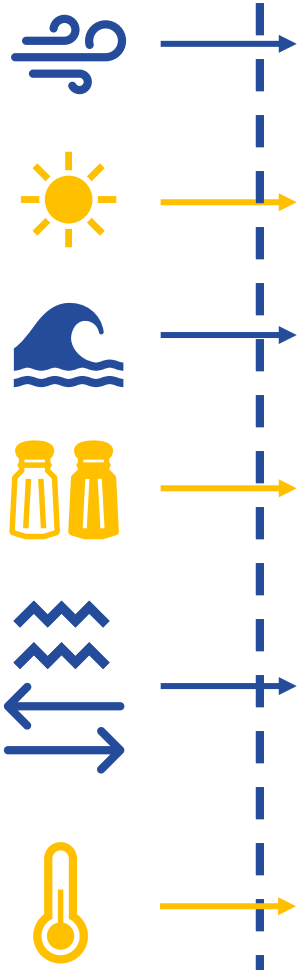





OVERVIEW OF MARINE RENEWABLE ENERGY

Natural resources of the sea



	Maturity level	MW (2024)	MW (2030)
Bottom Fixed Offshore Wind	Commercial Scale	64 GW*	200 GW*
Floating Offshore Wind	Prototype / Pre-commercial Scale	< 200 MW*	5 - 10 GW*
Offshore Solar	Prototypes	< 5 MW***	0.5 – 1 GW***
Wave Energy	Prototypes	25 MW**	0.5 GW**
Salinity Gradient Power	Under development	-	-
Tidal / Current Energy	Prototype / Pre-commercial Scale	42 MW**	2.3 GW**
Thermal Gradient Power	Under development	-	-

*Global Offshore Wind Report 2023 – Global wind power installation
**Assessment of Wave Energy Converters Based on Historical Data from a Given Point in the Sea (2022) and 2030 Ocean Energy Vision
***Internal Research

Spain as an innovative country

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SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

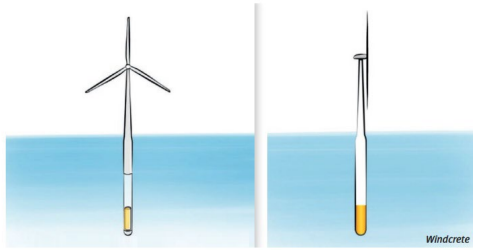
Spain is one of the leading countries in the world in the development of floating technologies for renewable energies:

FLOATING WIND – 2023: 51 solutions of which 15 are Spanish

W2 Power
(EnerOcean)

HiveWind
(Euskadi Sener + Nervión N&O)

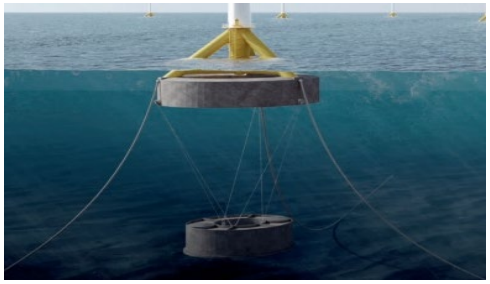
Windcrete
(Univ. Politécnica de Cataluña)



SATH
(Saitec Offshore Technologies)

TLPWind
(Iberdrola Ingeniería y Construcción SAU)

Wheel
(Esteyco)



SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

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FLOATING WIND – 2023: 51 solutions of which 15 are Spanish

Crown Buoy
(Seaplace / Brezo Energy)

Triwind Floater
(Beridi)

Nautilus Floating Solutions
(Subsea 7 + Vicinay Marine)

PivotBuoy
(X1 Wind)

Firovi
(Firovisa)

WIND-bos
(BlueNewables)

SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

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FLOATING WIND – 2023: 51 solutions of which 15 are Spanish

S-bos
(Acciona / BlueNewables)

CT-bos
(Acciona / BlueNewables)

Others Large Spanish Companies
(confidential – under development)

BOTTOM FIXED WIND – 2023:

ELISA
(Esteyco)

ARGO
(Acciona)

G-bos
(BlueNewables)

SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

Spain is one of the leading countries in the world in the development of floating technologies for renewable energies:

FLOATING OFFSHORE SUBSTATIONS (FOSS)

Basque Country Consortium
(Leader: IDOM)

Zero-Emission FOSS
(Navantia / Redeia / Sener)

Others Spanish Companies
(confidential – under development)

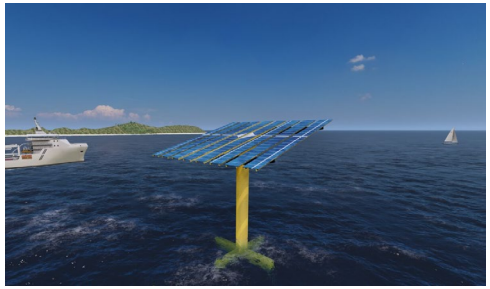
SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

Spain is one of the leading countries in the world in the development of floating technologies for renewable energies:

FLOATING SOLAR – 2023:

PV-bos
(BlueNewables)

HelioSea
(University of Oviedo)



Waves Energy MARMOK A-5
(IDOM)

WAVES AND CURRENTS/TIDAL – 2023:

Waves Energy Mutriku
(BIMEP)

Current Energy - ATIR 2.0
(Magallanes Renovables)

Waves Eenrgy - Arrecife Energy System
(Arrecife)

Others under development...

SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

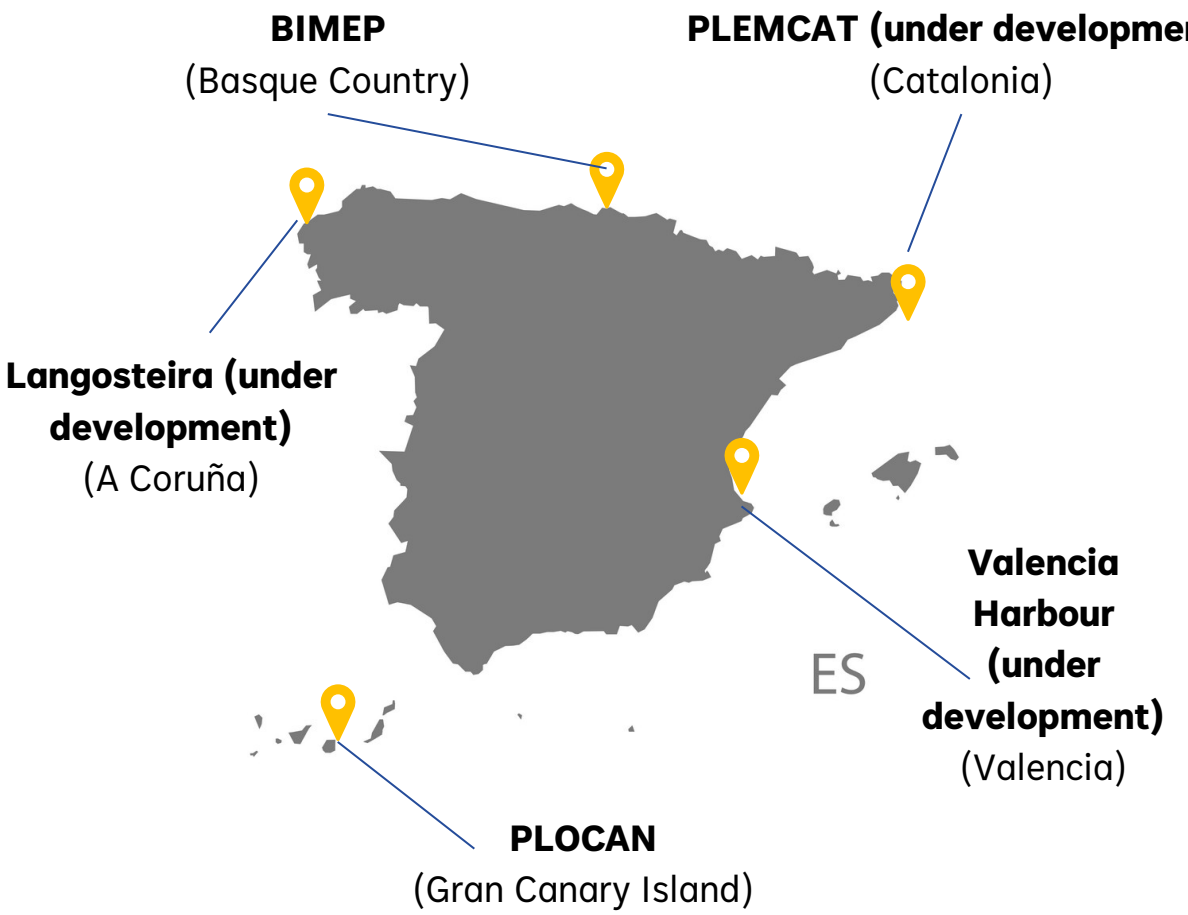
Spain is one of the leading countries in the world in the development of floating technologies for renewable energies:

OTHERS – 2023:

Floating Lidar
(Eolos)

HarsLab – Offshore Lab
(Tecnalia - BIMEP)

OFFSHORE TEST SITES – 2023:



SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

Spain is one of the leading countries in the world in the development of floating technologies for renewable energies:

SHIPYARDS FOR OFFSHORE CONSTRUCTIONS:

Navantia (Ferrol and Cádiz)

Other small and medium Shipyards

Gondán / Armón / Astander / Zamakona / Murueta / Astican / Balenciaga / Nodosa / MetalShips / Cardama / Freire / Astillero San Enrique

Dragados Offshore (Cádiz)

Other suppliers:

Vicinay Marine / Grupo Zima

Schwartz Hautmont

Duro Felguera

Haizea / Navacel / ...

Nervión N&O (Avilés)

Large Global Construction Companies:

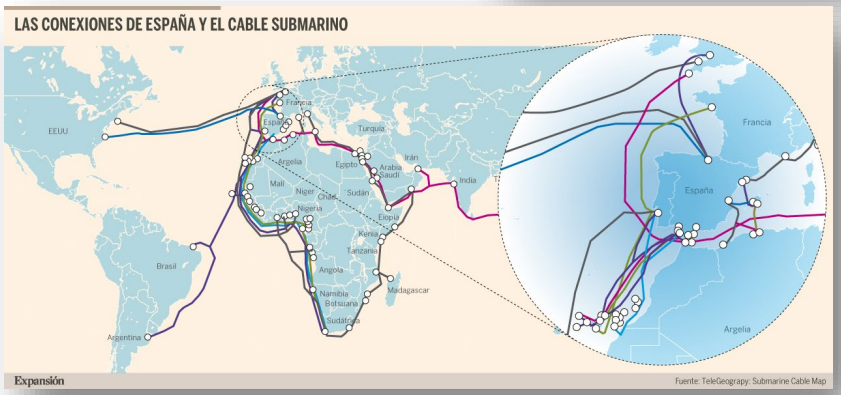
Acciona / Ferrovial / Cobra

ACS / OHL / Sacyr / FCC

SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

There are **several reasons** why **Spain** has a significant number of **companies developing floating technologies**:

1. Shipbuilding Tradition



2. Strategic Location and extensive coastline

3. Advanced Naval and ports Infrastructure

SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

There are **several reasons** why **Spain** has a significant number of **companies developing floating technologies**:

4. Experience in Renewable Energies

5. Investment in R&D

CDTI INNOVACIÓN

IDAE
Instituto para la Diversificación y Ahorro de la Energía

Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

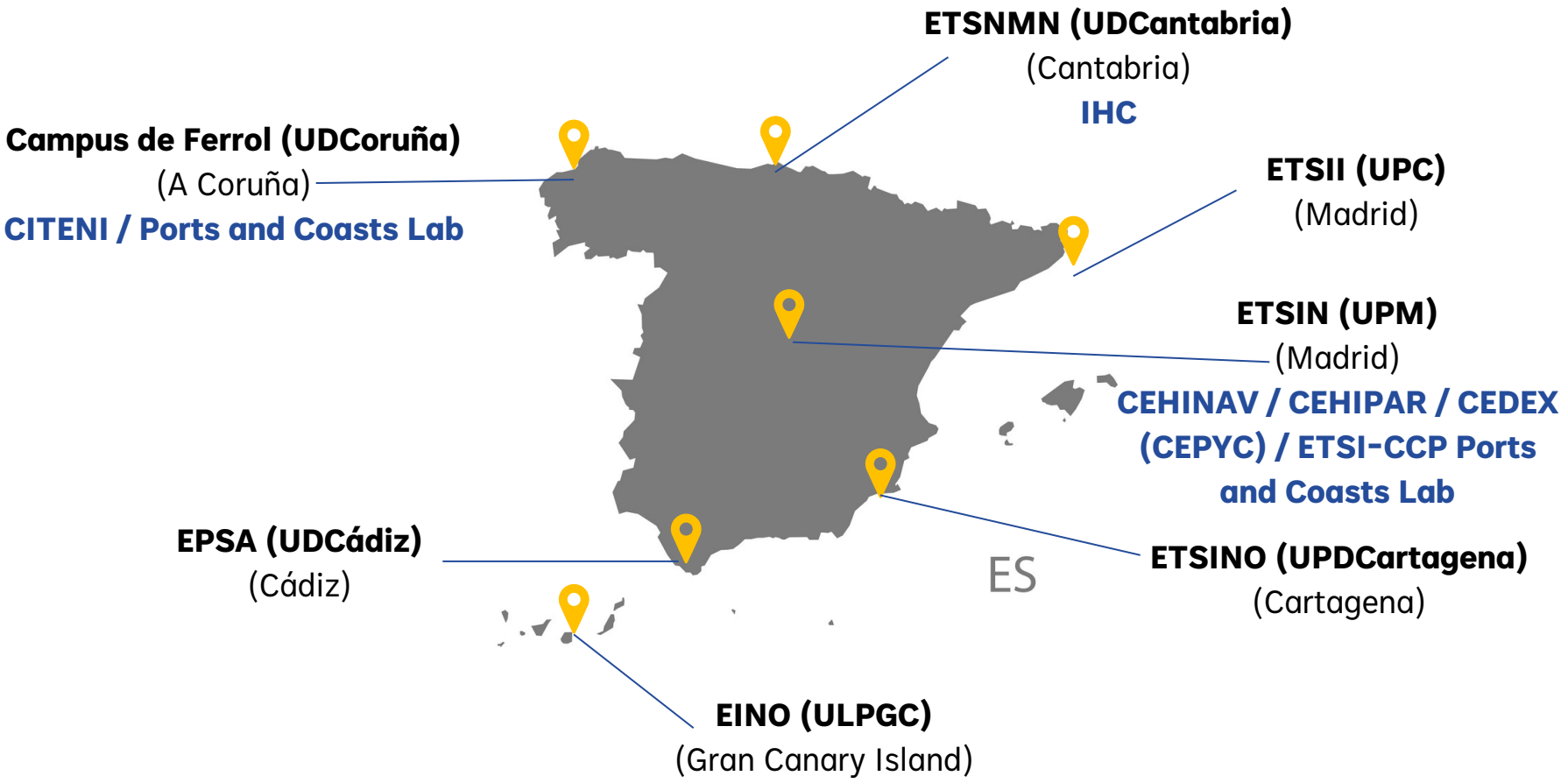
6. Public-Private Collaboration

7. International Market and Export Capacity

SPAIN AS A SUPPLIER OF OFFSHORE TECHNOLOGY

There are **several reasons** why **Spain** has a significant number of **companies developing floating technologies**:

8. University in Naval and Oceanic Engineering / Test Facilities



The role of the Naval and Oceanic Engineering

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THE ROLE OF THE NAVAL AN OCEANIC ENGINEERING

- Today there is a deficit of naval engineers - In Spain, only **75 engineers are graduated** each year (data from 2023)
- Their **role is essential for the development of marine renewable energies**

Today, the role of a naval engineer is **multidimensional and encompasses a wide range of responsibilities and areas of specialization**. Some key roles that a naval engineer plays nowadays include:

Technical development:

1. Structural Design
2. Hydrodynamics
3. Materials and Construction
4. Systems Integration
5. Cost and Feasibility Analysis
6. New Energies and Hybridation
7. Construction, transport and Installation

Business development:

1. Harbour and offshore logistics
2. Shipping
3. Project management
4. Insurances
5. Procurement and sales
6. Certification
7. Financial

THANK YOU

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