

# Wave2theFuture Essentials

An IPCEI Hy2Tech Project

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**FINCANTIERI**

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Intro

Fincantieri and Hydrogen

IPCEI

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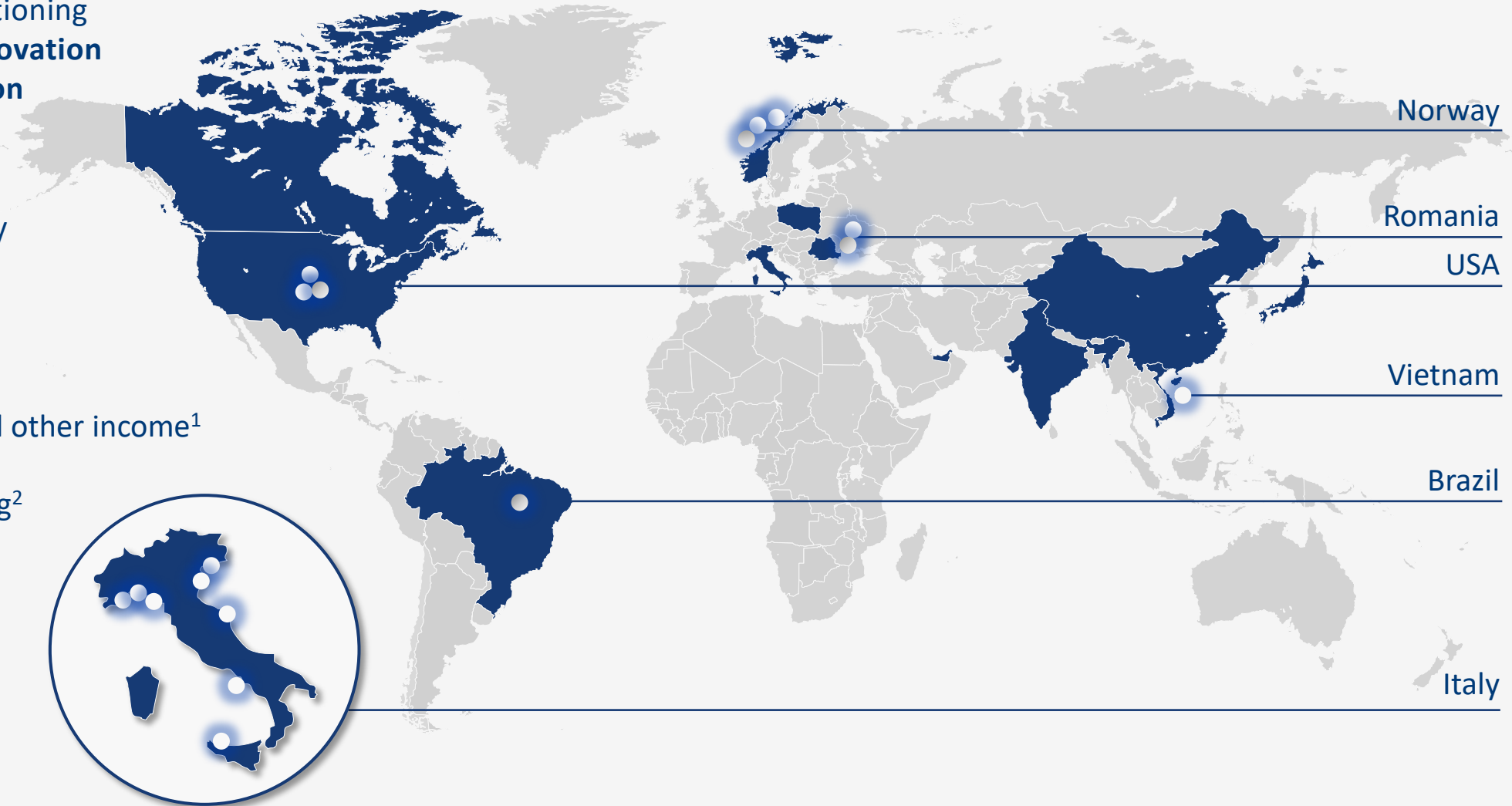
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# A leading global Group with widespread international presence


● Shipyards

- **Leading player in Shipbuilding** with a strong competitive positioning thanks to **technology, innovation and best-in-class execution**
- Growth led by organic diversification, global production capacity and wide client base



 **€ 7.7 bn** revenues and other income<sup>1</sup>

 **€ 41.1 bn** total backlog<sup>2</sup>

 **18 shipyards** in 3 continents

 **+22,000 employees** 52% in Italy

1. FY23 revenues  
 2. Value as of June 30, 2024. Sum of backlog and soft backlog; soft backlog represents the value of existing contract options and letters of intent as well as contracts in advanced negotiation, none of which yet reflected in backlog




# Environmental impact of the maritime sector



2,9% Of global CO<sub>2</sub> emissions

1.076 million ton Maritime CO<sub>2</sub> emissions




Decarbonization targets: CO<sub>2</sub> emissions w.r.t. 2008

- 2030: - 20%
- 2040: - 70%
- 2050: - 100%



3-4% EU's total CO<sub>2</sub> emissions

124 million ton Maritime CO<sub>2</sub> emissions



Decarbonization targets: GHG emissions w.r.t. 1990

- 2030: - 55%
- 2050: - 90%

Source

- World data: IMO, Fourth Greenhouse Gas Study 2020.
- European data: Fourth Annual Report from the European Commission on CO<sub>2</sub> Emissions from Maritime Transport (period 2018-2021), Brussels, 2023



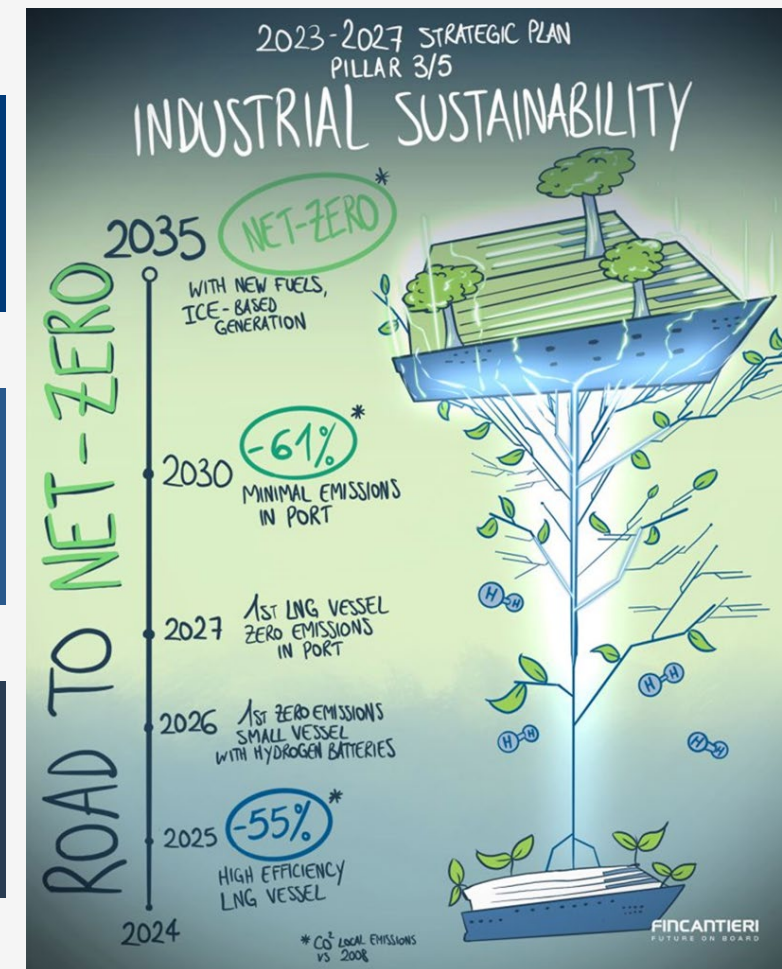


# FINCANTIERI Strategic Plan – NET ZERO BY 2035

- Technological improvements to cut energy consumptions, including both propulsion and hotel load.
- New Fuels and innovative propulsion technologies, such as fuel cells and batteries.

- Implementing process digitalization and new solutions to generate higher efficiencies in operations, engineering and procurement
- Increasing digital integration to turn into Design Digital Authority with Artificial Intelligence and Data Analytics

- Ship operations in line with Net-Zero targets with more frequent bunkering and lower cruise speeding.
- Evolving from EPC to Life Cycle Management (EPC+Services) to enhance portfolio distinctiveness.
- Push on advanced analytics developing digital applications and data platform



Intro

Fincantieri and Hydrogen

IPCEI

Wave2theFuture

**FINCANTIERI**

Wave 2 the Future





# H<sub>2</sub> Projects

**U-212A**  
 PEM 270kW  
 Naval application

**FC SWATH**  
 PEM  
 MY Concept

**Zero-emission**  
 Study for an  
 experimental  
 ship

**MarHySafe**  
 Pre normative  
 research

HANDBOOK FOR  
 HYDROGEN-FUELLED  
 VESSELS

**ZEUS**  
 Lab ship

**Wave2theFuture**  
 IPCEI

**FC-SHIP**  
 LifeCycle

**MC-WAP**  
 MCFC 500kW  
 onshore

**TESEO**  
 PEM 260 kW  
 onshore

**Leadership Tecn.**  
 Generazione  
 Elettrica  
 Innovativa

**GreenCruise**  
 Integration of  
 new  
 technologies

**TECBIA**  
 PEM  
 24 m boat

**STASHH**  
 Standard for  
 modular fuel  
 cells

**HiSEA**  
 Test area

**Area**  
**SciencePark**  
 Test area





# ZEUS: Zero Emission Ultimate Ship

The prototype is equipped with an hybrid propulsion system.

Diesel-electric + H2 Fuel Cells + Batteries for sailing up to 6 hours with zero emission.

## Technologies

- FC – PEM Fuel Cells (H2/Air)
- BAT - Batteries (Litium FeP)
- MH – H2 Storage (metallic hydrides)

## Technical data

- FC Power 140 kW
- BAT Power 160 kWh
- MH Energy 50 kg H2 (6h autonomy)
- Diesel Generators 2 x 150 kW
- Electric motors 2 x 93 kW

## Features

- Built and owned: Fincantieri
- Italian Flag
- Certified by RINA
- Dim.: L= 25,6 m | B= 6,4 m | Tonnage = 100 t





# Hydrogen as an innovation vector

ZEUS (Zero Emission Ultimate Ship)



First RINA Classed ship capable to be propelled by hydrogen, with a nominal power of 120 kW guarantee by PEM fuel cells + BESS

STATUS: launched in 2022

Viking Neptune



First real onboard implementation of PEM fuel cells, with nominal power of 100 kW, with hydrogen produced and stored aboard a cruise vessel

STATUS: delivered in November 2022

IPCEI Hy2Tech Project



Validation of Fuel Cell technologies (PEM, SOFC) & liquid hydrogen storage system on board two cruise ships with a nominal power of several MW.

STATUS: started in 2023, will end in 2029



Intro

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IPCEI

Wave 2 the Future

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# Key distinctive aspects

## Important

In order to qualify as an IPCEI, a project must be important quantitatively or qualitatively.

It should be particularly important in size or scope or imply a very considerable level of technological or financial risk, or both.

## Project

### SINGLE PROJECT

The aid proposal must concern a single project, which is clearly defined in respect of its objectives as well as the terms of its implementation, including its participants and its funding.

### INTEGRATED PROJECT

The aid proposal may also concern an 'integrated project' that is a group of single projects inserted in a common structure, roadmap or programme aiming at the same objective and based on a coherent systemic approach.

The individual components of the integrated project may relate to separate levels of the supply chain but must be complementary and significantly add value in their contribution towards the achievement of the European objective

## Common European Interest

### GENERAL CRITERIA

Represent a concrete, clear and identifiable important contribution to the Union's Objectives strategies.

Is designed to overcome important **market or systemic failures**.

Ordinarily involves at least four MS.

Benefits must extend beyond the funding MS to a wider part of EU.

**Positive spillover** effects, beyond the sector concerned.

### SPECIFIC CRITERIA

**RDI** must be of a major innovative nature or an important added value.

**FID** is the upscaling of pilot facilities, demonstration plants or of the first-in-kind equipment and facilities.

New product or service with high R&I content or the deployment of an innovative production process.

NO mass production or commercial activities.

## Market Compatibility

### NECESSITY

The aid must not subsidise the costs of a project that an undertaking would anyhow incur and must not compensate for the normal business risk of an economic activity

### PROPORTIONALITY

The aid amount will not exceed the **minimum necessary** for the aided project to be sufficiently profitable

### FUNDING GAP

Difference between the positive / negative cash flows over the lifetime of the investment, discounted on the basis of an appropriate discount factor reflecting the rate of return necessary to carry out the project.

Maximum permitted aid in relation to the eligible costs.



# IPCEIs in the Hydrogen value chain

## WAVE 1 Hy2Tech

### Hydrogen Generation Technology

- 1s1 Energy\*
- Advent\*
- Ansaldo
- AVL
- Christof Industries
- De Nora
- Elcogen\*
- Elogen
- Enel
- Genvia
- H2B2\*
- Cummins
- John Cockerill
- John Cockerill
- McPhy\*
- Nordex
- Ørsted
- Sener
- Stargate
- Sunfire\*
- Synthos

### Fuel Cells Technology

- 1s1 Energy\*
- Advent\*
- Alstom
- Ansaldo
- Arkema
- Bosch DE
- Daimler Truck
- De Nora
- EKPO
- Elcogen\*
- Fincantieri
- Genvia
- HYVIA
- Iveco
- Nedstack\*
- Plastic Omnium AT
- Symbio

### Storage, Transportation and Distribution Technology

- Arkema
- B&T Composites\*
- Daimler Truck
- Enel
- Faurecia
- NAFTA
- Neste
- Ørsted
- Plastic Omnium FR

### End User Technology

- Alstom FR
- Alstom IT
- Bosch AT
- Daimler Truck
- Fincantieri
- HYVIA
- Iveco CZ
- Iveco ES
- Iveco IT
- Neste
- Ørsted
- Plastic Omnium AT
- Plastic Omnium FR

## WAVE 2 Hy2Use

### Hydrogen Infrastructure

- Air Liquide France
- Air Liquide Netherlands - CurtHyl
- Air Liquide Netherlands - ELYgator
- Bay of Biscay Hydrogen (Petronor/Repsol)
- Bondalti
- Cartagena Hydrogen Network (Repsol)
- ENGIE Belgium
- ENGIE Netherlands
- Fluxys
- H2 Aboño (EDP)
- H2-Fifty
- H2 Los Barrios (EDP)
- HyCC
- Iberdrola
- MassHylia (TotalEnergies and ENGIE France)
- Ørsted
- P2X Solutions\*
- PKN Orlen
- Shell
- Uniper

### Hydrogen applications in Industry

- Borealis
- Enel Green Power/Endesa
- ENGIE Belgium
- Everfuel\*
- Hybrit Development
- IAM Caecius
- NextChem
- RINA-CSM
- RONA
- SardHy Green Hydrogen
- Solar Foods\*
- South Italy Green Hydrogen
- TECforLime
- TITAN Cement
- VERBUND

## WAVE 3 Hy2In fra

### Electrolysers

- AIR LIQUIDE
- Energie Salentine
- ENERTRAG
- EWE HYDROGEN
- Fusion Fuel
- GHS
- HGH
- HydroHub Fenne
- Lhyfe
- Linde
- Lingen
- Polenergia
- Rostock EnergyPort
- RWE
- SAIPEM
- Winpower

### Pipelines

- AquaDuctus
- Creos
- Eustream
- EWE NETZ
- Gasnetz Hamburg
- Gasunie
- Nowega
- OGE
- Ontras
- SNAM
- Thyssengas

### Storage

- EWE GASSPEICHER
- RWE Gas Storage
- VNG

### LOHC Handling terminals

- Hydrogenious
- Vopak

### Cross-workstream collaboration

- Facilitating future interconnections**
- Common agreement on interoperability
- Joint recommendations on operational rules
- Contribution to standardisation

## WAVE 4 Hy2Move

### Mobility and transport applications

- Air Products
- Airbus DE
- Airbus ES
- Airbus FR
- BMW
- Évolution synergétique
- Hydrogène de France
- Skeleton
- Tomark

### Fuel cell technology

- Airbus DE
- BMW
- Hydrogène de France
- Michelin
- UFI

### Hydrogen onboard storage solutions

- Airbus DE
- Airbus ES
- Airbus FR
- BMW
- Tomark

### Hydrogen production technologies

- Air Products
- Gen-Hy Cube
- Michelin
- Neuman & Esser

# WAVE 1 Hy2Tech (2022)

Hydrogen Generation Technology	Fuel Cells Technology	Storage, Transportation and Distribution Technology	End User Technology
1s1 Energy* Advent* Ansaldo AVL Christof Industries De Nora Elcogen* Elogen Enel Genvia H2B2* Cummins John Cockerill John Cockerill McPhy* Nordex Ørsted Sener Stargate Sunfire* Synthos	1s1 Energy* Advent* Alstom Ansaldo Arkema Bosch DE Daimler Truck De Nora EKPO Elcogen* Genvia HYVIA Iveco Nedstack* Plastic Omnium AT Symbio	Arkema B&T Composites* Daimler Truck Enel Faurecia NAFTA Neste Ørsted Plastic Omnium FR	Alstom FR Alstom IT Bosch AT Daimler Truck Fincantieri <b>(highlighted)</b> HYVIA Iveco CZ Iveco ES Iveco IT Neste Ørsted Plastic Omnium AT Plastic Omnium FR

- Approved funding in wave 1: **5.4 b€**
- Approved funding in waves 1-2-3-4: **18.9 b€**

- Total project costs in waves 1-2-3-4: **43 b€**  
*(In 2023 the GDP of the Republic of Slovenia was 56 b€)*

Hydrogen Generation Technology	Fuel Cells Technology	Storage, Transportation and Distribution Technology	End User Technology
<ul style="list-style-type: none"> <li>Contributes to key EU objectives (i.e. EU Green Deal, EU Climate Law and REPowerEU)</li> <li>Boosts breakthrough innovation</li> <li>Generates positive spill-over effects across the EU</li> <li>Ensures proportionate public spending</li> <li>Ensures fair competition</li> </ul>	<ul style="list-style-type: none"> <li>15 countries participating: </li> <li>35 companies, including large industrial players and small and medium sized enterprises</li> <li>41 research, development and first industrial deployment projects</li> <li>Collaborations with +300 indirect partners all over Europe</li> <li>Up to €5.4 billion public investment, which will unlock €8.8 billion private investment</li> </ul>		

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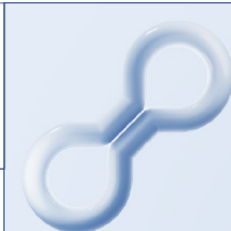
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**IPCEI HY2Tech TF2  
Fuel Cells Technology**

**IPCEI HY2Tech TF4  
End User Technology**



**WP1  
Hybrid Green Power  
Generation System**



**WP2  
Green Combined Cycle Gas  
Turbine fuelled by H2**



**WP3  
H2-technologies demonstrates  
in operational conditions**





# WP1- Development of Hybrid Green Power Generation Systems (HGPGS)



## TF2 Fuel Cells Technology

Objective

Development of Hybrid Green Power Generation Systems (HGPGS) which requires the development of the following technologies:

- Fuel Cell stack (PEM/SOFC) and relevant controlling system.
- Internal Combustion Engine fuelled by H<sub>2</sub>.





# WP2 – Development of a Green Combined Cycle Gas Turbine fuelled by Hydrogen (G-CCGT)



## TF4 End User Technology

### Objective

Development of a Green Combined Cycle Gas Turbine (G-CCGT) fuelled by H<sub>2</sub>, consisting of design and implementation of a high efficiency combined cycle plant.

The G-CCGT provides the highest Energy Density, it assures needed flexibility, and represents the most advanced technology using H<sub>2</sub>, responding to the total power requirement of any ship from 20MW above.





# WP3 – Integration of Hydrogen-based technologies onboard of Green Cruise vessels



## TF4 End User Technology

### Objective

Development of Hydrogen-based solutions.

Design, construction, testing and validation on real operational conditions.



Thanks for your attention

Paolo Guglia



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the European Union  
NextGenerationEU



Ministero delle Imprese  
e del Made in Italy



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