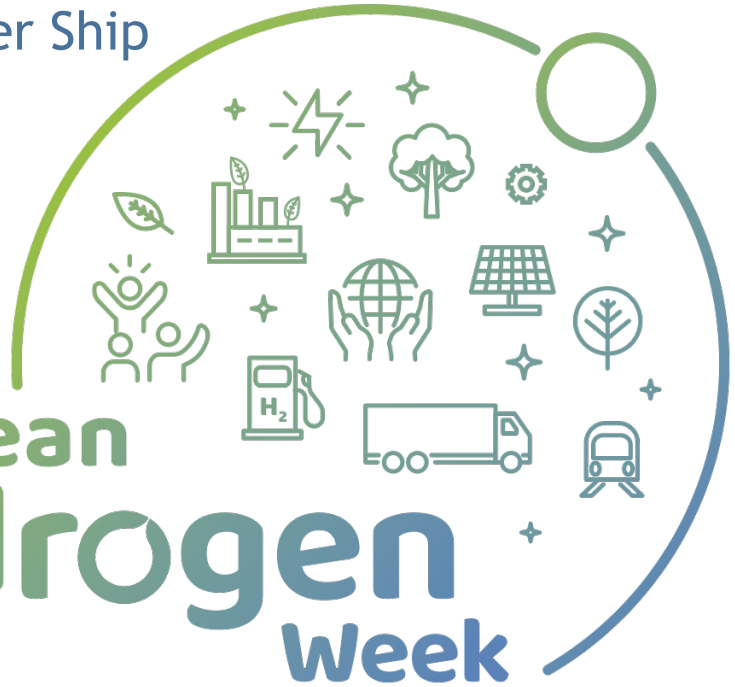
e-SHyIPS

Ecosystemic knowledge in Standards for Hydrogen Implementation on Passenger Ship

e-SHyIPS ON THE WAVE OF HYDROGEN



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Clean Hydrogen Partnership

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Project Overview

- Call year: 2020
- Call topic: FCH-04-2-2020: PNR on hydrogen-based fuels solutions for passenger ships
- Project dates: January 2021 – December 2024
- % stage of implementation: 38 %
- Total project budget: 2.500.000 €
- Clean Hydrogen Partnership max. contribution: 2.500.000 €
- Other financial contribution: /
- Coordinator: POLIMI

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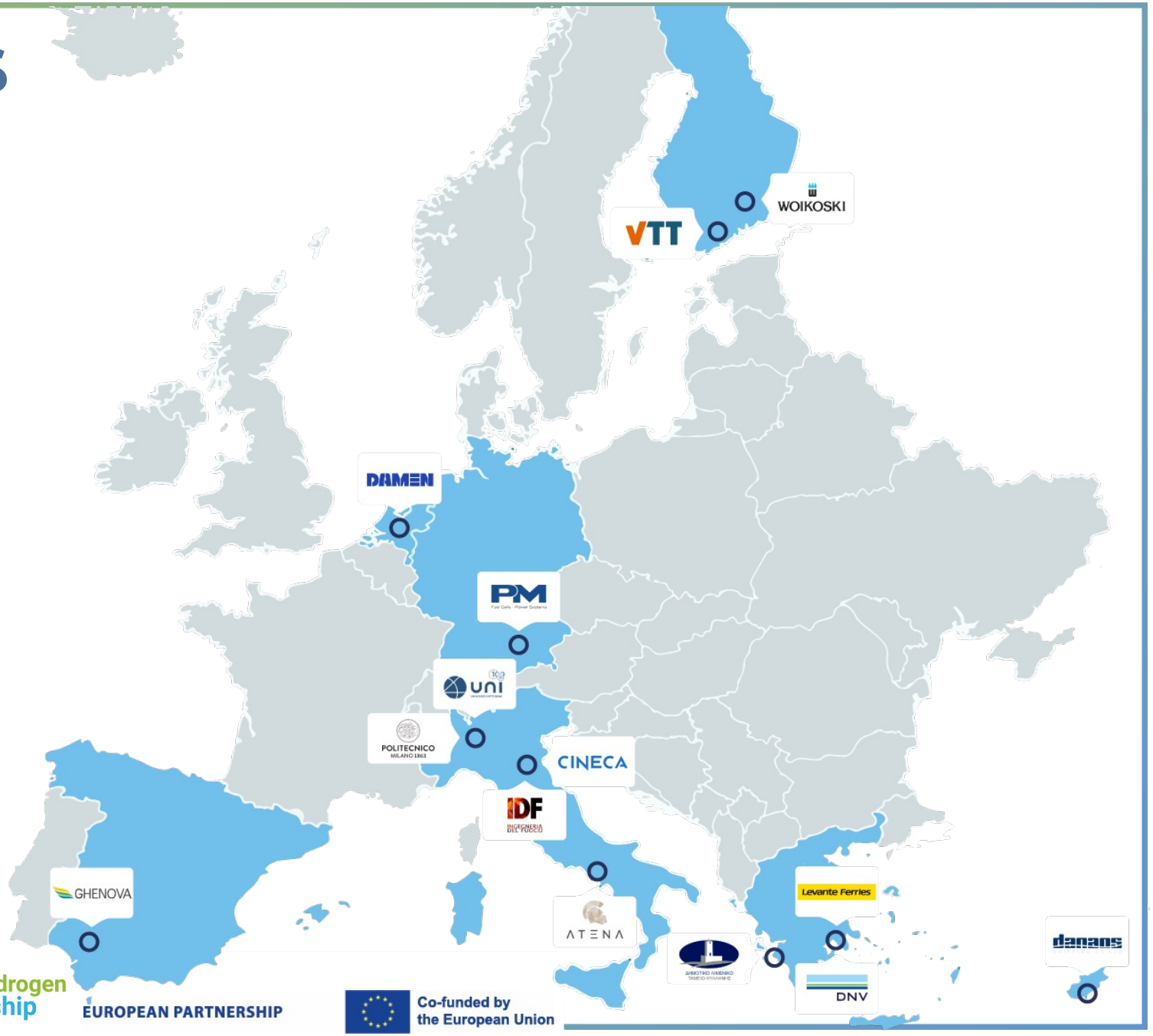
Partners

Politecnico di Milano
UNI Ente Italiano Di Normazione
Teknologian Tutkimuskeskus VTT OY
CINECA Consorzio Interuniversitario
ATENA Future Technology
Proton Motor Fuel Cell
Levante Ferries Naftiki Etaireia
Ghenova Ingenieria sl
Danaos Shipping Company Limited
OY Woikoski AB
IDF - Ingegneria del Fuoco srl
Dimos Andravidas-kyllinis
DNV Hellas sa
Scheepswerf Damen Gorinchem Bv



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Project Summary

To enable investments, financial institutions, shipbuilders, shipowners and charterers need comprehensive and predictable **certification framework**

The IGF Code covers primarily LNG. Since a regulatory framework applicable to hydrogen fuelled ships is not yet available, the only approach is given by **IMO generic 'Alternative Design' process** whereby safety, reliability and dependability of the systems is to be proven equivalent to that of traditional fuels and power generation systems.

The project aims to contribute to the development of a goal-based regulatory framework on the use of hydrogen and hydrogen-based alternative fuels for waterborne transport. **Primary target IMO - IGF update**

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Project Summary

Define the new guidelines for an effective introduction of hydrogen in maritime passenger transport sector and to boost its adoption within the global and EU strategy for a clean and sustainable environment, towards the accomplishment of a zero-emission navigation scenario.

- **Generate** new and **missing knowledge** to define a standardized database
- **Provide** unique **experimental data** for the implementation and modification of international standards and RCS for a more harmonised normative landscape
- **Propose** a **pre-standardization plan** for the IGF Code update of the section for hydrogen-based fuels passenger ships
- **Provide** a **roadmap** for the adoption of FCH on passenger ships in EU maritime sector, to boost the hydrogen economy.
- **Test and develope models and tools** for ship design and safety assessment.

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Project Summary

Through an ecosystem approach, e-SHyIPS integrates theoretical pre-normative research activities on standards with simulation and laboratory experiments

Sharing knowledge within International experts

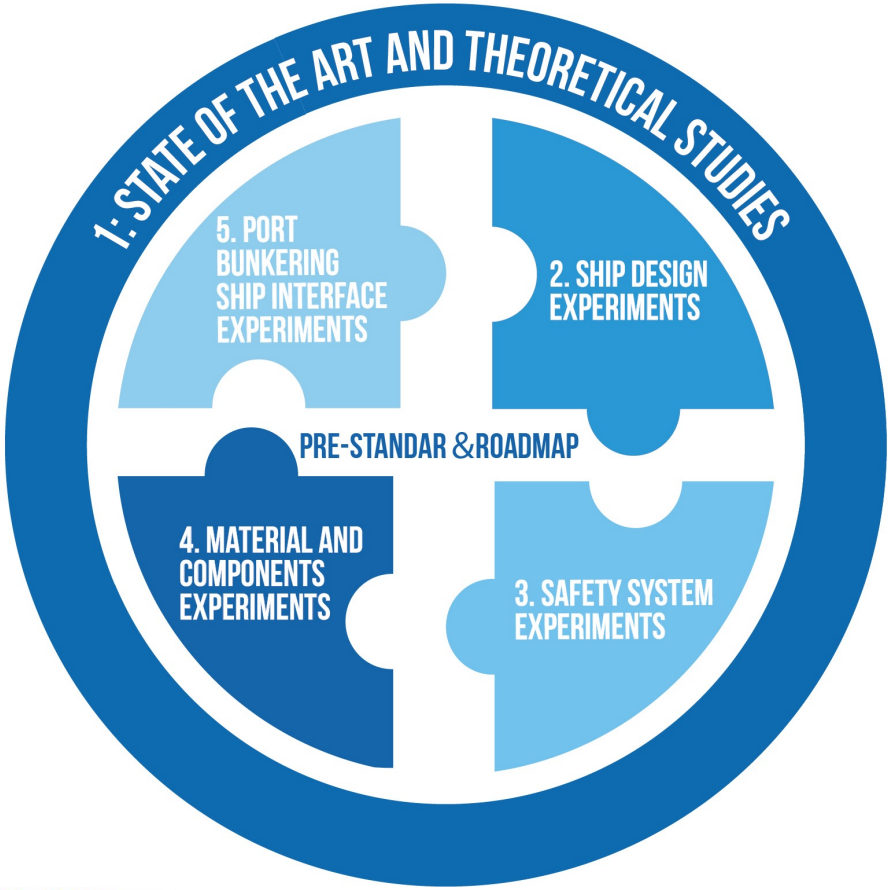
- 14 partners from 7 EU countries
- 21 Advisory board members
- 28 connected projects

Real-time feedback from/to policymakers

- Certification bodies (DNV, RINA and Lloyd's)
- Standardization body UNI - CEN CENELEC - ISO
- IMO - IGF code Technical commission for H2 update
- EU working groups: SFEM Hydrogen and SGMF

Bottom-up approach

- Analysing the regulatory needs and gaps from a design perspective
- Leverage knowledge from experimentation



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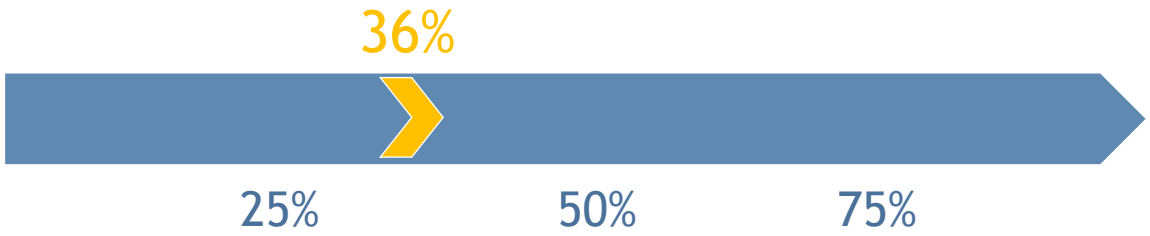
Project Actions

H2 STANDARD MAPPING AND NORMATIVE GAP ANALYSIS SPECIFIC FOCUS ON IGF CODE

Achievement to-date



ALL CHAPTERS COVERED
98 GAPS IDENTIFIED
35 MATCHED WITH CURRENT STANDARDS

- Standards for H2 in non-maritime, LNG and cryogenic vessels that could be relevant in Maritime : #65 standards mapped (current and WIP)
- Technical bodies at EU and International level: #127 developing standards relevant for the project scenarios
- Connection with CEN / CENELEC JTC 6 through UNI CT 056 → mutual exchange of information. Presentation June 2022 plenary meeting, invited to 2023 plenary meeting
- Initiated connection with UNI/CT 030 – Ships, to reach ISO TC 8 and CEN TC 305 [liaison with IMO]
- Inclusion in the AB of CEN/CENELEC and RINA (member of the subcommittee IMO CCC7) [liaison with IMO]

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Project Actions

Achievement to-date

EXPERIMENTATION SETTING TO FILL THE KNOWLEDGE GAP

15% 25% 50% 60% 75%

3 SCENARIOS
2 VESSEL DESIGN IN PROGRESS
4 PILLAR EXPERIMENTAL SETTING: IN PROGRESS
PRELIMINARY RESULTS

To reach the widest impact, the project approach is vessel independent. Despite this, it will focus on specific case studies to be adopted as reference for experimental activities.

Case studies definition on Market size, state of practices and H2 feasibility

SCENARIO S

FAST WATERBUS

DAMEN WATERBUS 2407

SCENARIO M

RO-PAX

LEVANTE FIOR DI LEVANTE FERRY

SCENARIO L

SMALL LUXURY CRUISE

CELEBRITY CRUISE FLORA SHIP

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Challenges

STANDARDS IN GA AND SYSTEM DESIGN OF VERY DIFFERENT OPERATIONAL SCENARIOS

- AB involvement since early stage
- Knolweleage from Cluster projects

SCALING KNOWLEADGE FROM ONE EXP. TO OTHERS

- Experiments based on IGF review
- Progressing set up (from S to L) with verification loops

LACK OF INFO ON SPECIFIC COMPONENTS (expecially for large vessel)

- AB involvement since early stage to evaluate exp. assumption
- Relation with EU ongoing projects
- Scale up from S to L

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Exploitations, Dissemination and Communications Activities

STRATEGIC STANDARDIZATION PLAN FOR IGF CODE UPDATE

- Pre normative plan proposal for IGF code update
- Liaison with ISO TC and IMO

ROADMAP FOR FCH PASSENGER SHIPS

- Market best practices and value proposition models
- models and tools for ship design and safety assessment

- #9 conference attended (project presentation)
- #2 workshops organized (IGF code review and H2 in yachting)
- #6 scientific publication published (plus #2 onoing)

Nov, 29th - STREAMYARD WS
e-SHyIPS workshop on Risks Assessment for design and bunkering

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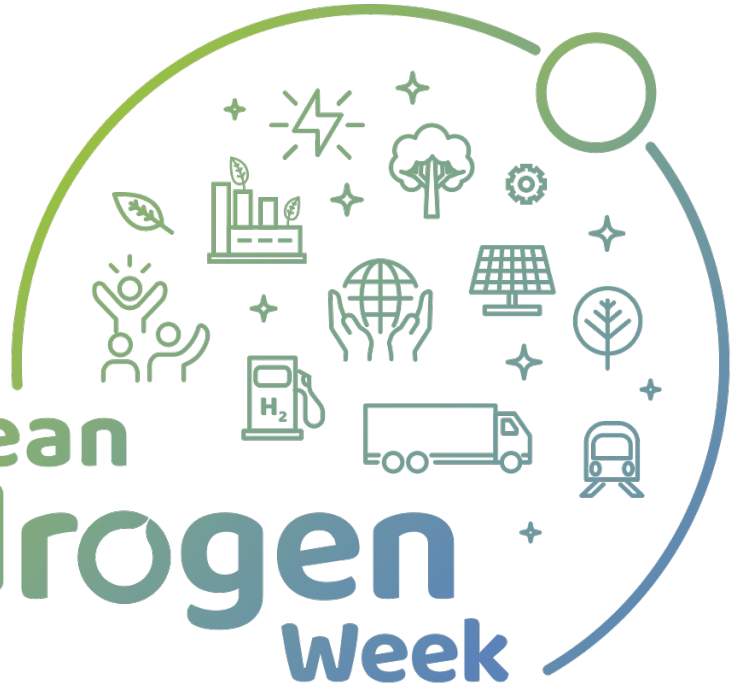

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