



HYDRUS
ENGINEERING EXCELLENCE



est. 2009

our vision

to navigate our clients through iconic projects
by pushing and defining the boundaries of
excellence

ultimately, to find purpose in creating value
that we will be proud of, to become the best
version of what we can be.



Hydrus Ecosystem



183 people
in total

32 female
18%
151 male
82%

3
divisions
5
dep/ments

8
directors
26
managers

WM Services

Our services towards the shipping and energy industries

- ☐ Investment analysis to evaluate the feasibility of a project.
- ☐ Market analysis (Supply sources, regional infrastructure developments)
- ☐ Business model and commercial operation analysis
- ☐ Financial modeling and analysis

- ☐ Technology options analysis
- ☐ Identification of regulatory requirements and license applications.
- ☐ Policy monitoring and impact analysis

- ☐ Preparation of EU funding applications
- ☐ End-to-end management services for EU funded project

WATERMEAN
SUSTAINABLE BLUE INNOVATION



Minority Shareholder

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WM References

Our references

- ❑ Business Plans and market analysis for four (4) alternative fuel vessels (electric, hydrogen, hybrid, LNG)
- ❑ Feasibility study for RAE exploring Alternative fuels in shipping
- ❑ LPG as marine fuel guide for WLPGA
- ❑ Support to three (3) regional FSRU projects
- ❑ Helped project developers secure financing and funding for alternative fuels projects (hydrogen, electricity, LNG)

WATERMEAN
SUSTAINABLE BLUE INNOVATION

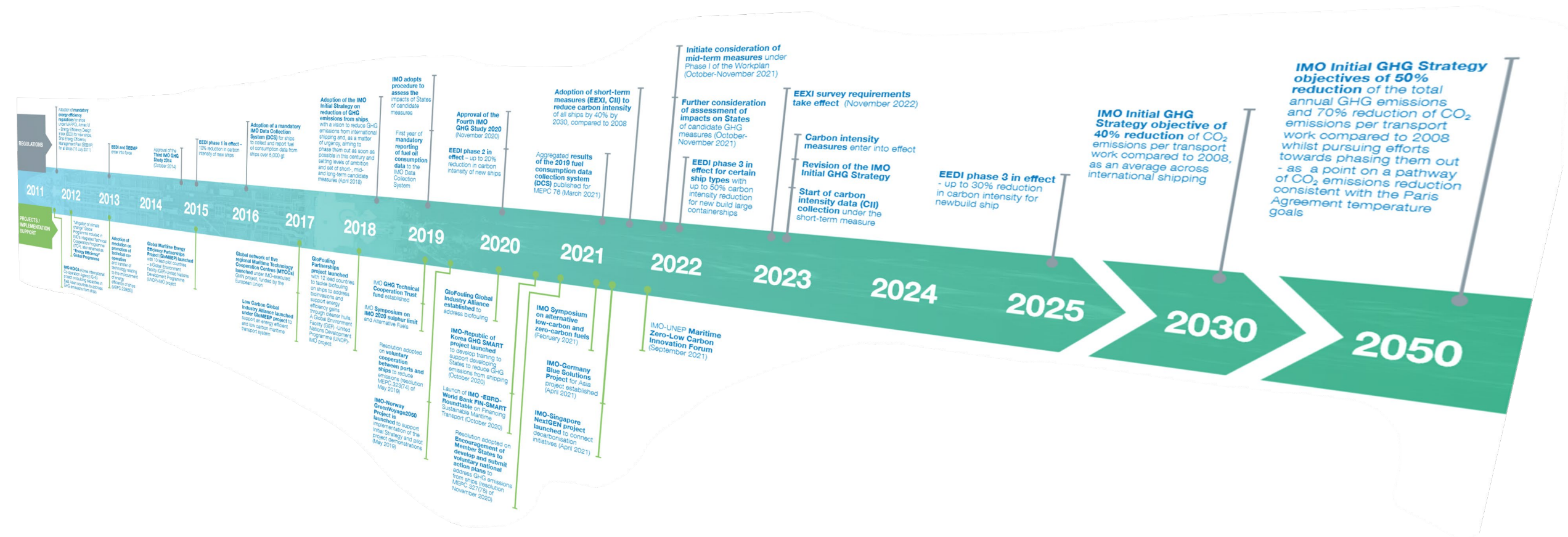


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IMO 50% Reduction call

The International Maritime Organization (IMO), the United Nations' regulatory body for shipping, called for a 50 percent reduction in greenhouse gas (GHG) emissions by 2050, compared to 2008 levels, in order to align the industry with the objectives of the Paris Climate Agreement.



Powering Decarbonization Through our innovation Hub

Our moto is simple:

Innovate

Collaborate

Decarbonize



our innovation hub

PORT ENERGY UPGRADE



Scope:

Development of suitable framework for the transition to Shore-Side Electricity for 16 EU maritime ports.

EU-funding

PORTS



Scope:

FEED study for the Shore-Side Electricity (SSE) at the Cruise terminal of the Port of Piraeus.

EU-funding

PORTS



Scope:

Electrification in the Eastern Mediterranean for three EU member states Cyprus, Greece and Slovenia.

EU-funding

PORTS



Scope:

FEED studies for the Shore-Side Electricity (SSE) at the Port of Volos.

EU-funding

PORTS



Scope:

FEED studies for the Shore-Side Electricity (SSE) at the Port of Igoumenitsa.

EU-funding

PORTS

our innovation hub



Scope:

Holistic approach towards the adoption of Natural Gas (NG) in Cyprus and the development of a sustainable NG market

HYDRUS work involves:

- Develop of a concept design of a Small-Scale LNG carrier for the Eastern Mediterranean;
- Review of existing regulation and guidelines affecting CNG carrier vessels,
- Commercial assessment for the CNG supply needs defining parameters affecting the design characteristics of a CNG vessel

EU-funding

ALT-FUELS



Scope:

Development of tangible solutions for large-storage of ammonia as fuel onboard.

HYDRUS work involves:

- Overall coordination of the project
- Identification and benchmarking of available technical solutions
- Detailed engineering design of tank storage system and ancillaries for the retrofit onboard the demonstrator vessel
- Basic engineering design for tank storage system integration onboard different type of vessels (container carrier, bulker carrier, tanker and passenger vessel)

EU-funding

ALT-FUELS

GREEN TRANSITION



Scope:

Nucleated around the MOH Refinery in Agioi Theodoroi, Greece, which is destined to become the Flagship Hydrogen Valley in the South-eastern Mediterranean geography

HYDRUS work involves:

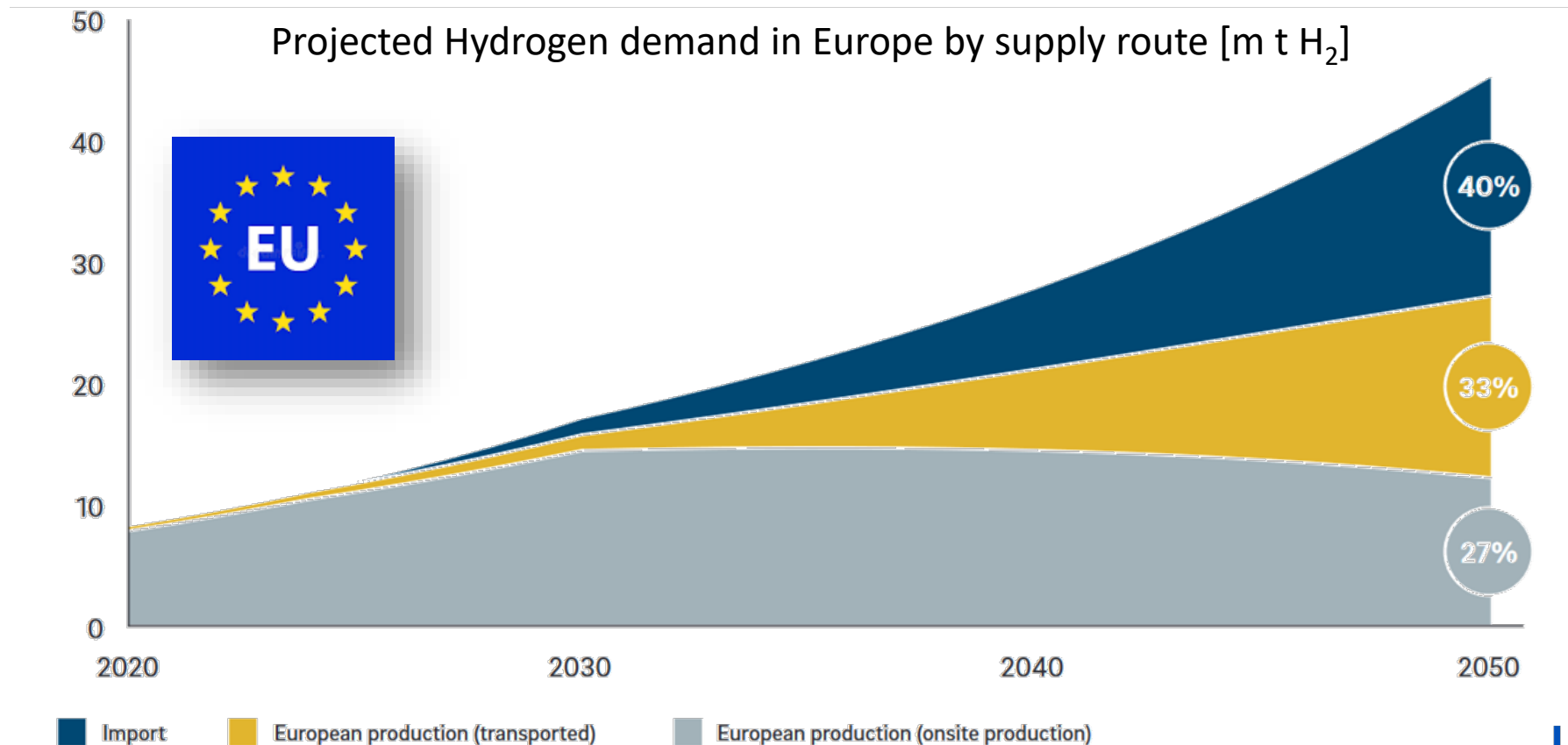
- Participation in the overall coordination of the project
- Provide engineering for the first hydrogen short-sea ferry in Greece
- Technical co-ordination of work packages that hydrogen end-user applications
- Techno-economic feasibilities for Hydrogen vessels

EU-funding

ALT-FUELS

Hydrogen Demand

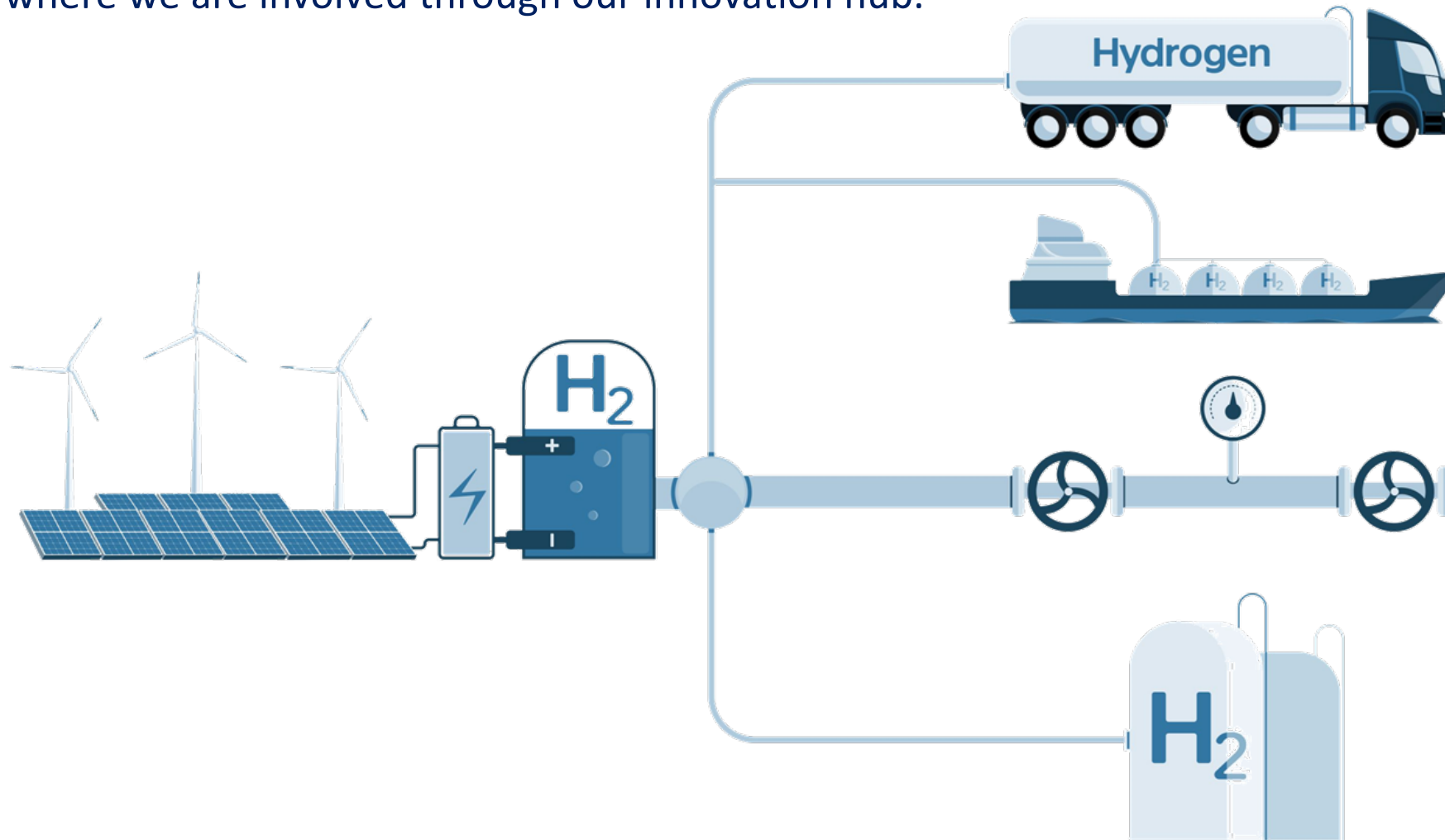
In the coming decades, two trends will contribute to the overall development of the transportation market. First, demand for clean hydrogen from new sectors will increase, and second, clean hydrogen will need to replace the primarily gray hydrogen produced onsite today. The European Union's Hydrogen Strategy, announced in 2020, aims to mobilize support and stimulate investment to build a full-fledged hydrogen ecosystem from 2025



Source: Roland Berger

Enabler or Barrier

So far, more emphasis has been placed on production and uses of liquid hydrogen, so transportation technologies are left behind. Yet lack of such technologies can be a barrier for the development of hydrogen supply chains, and this is where we are involved through our innovation hub.

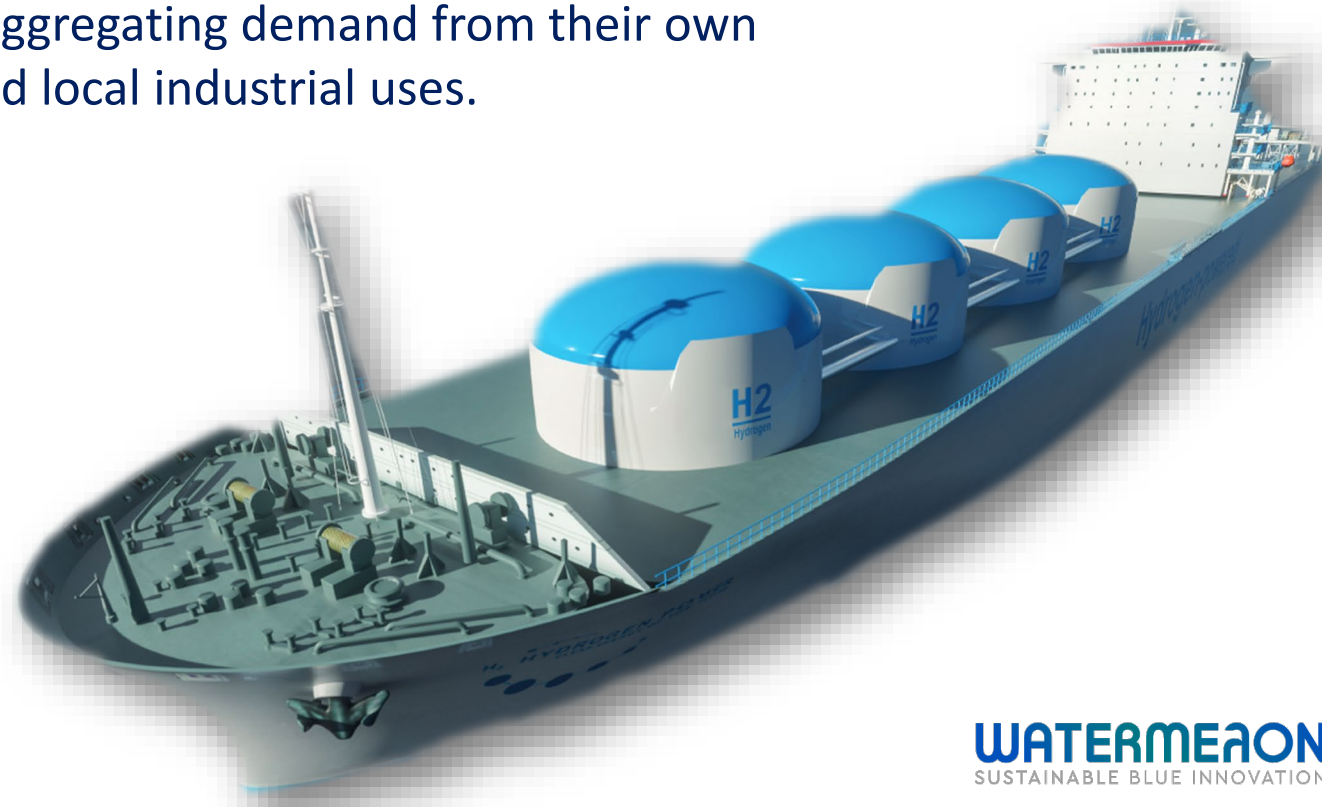
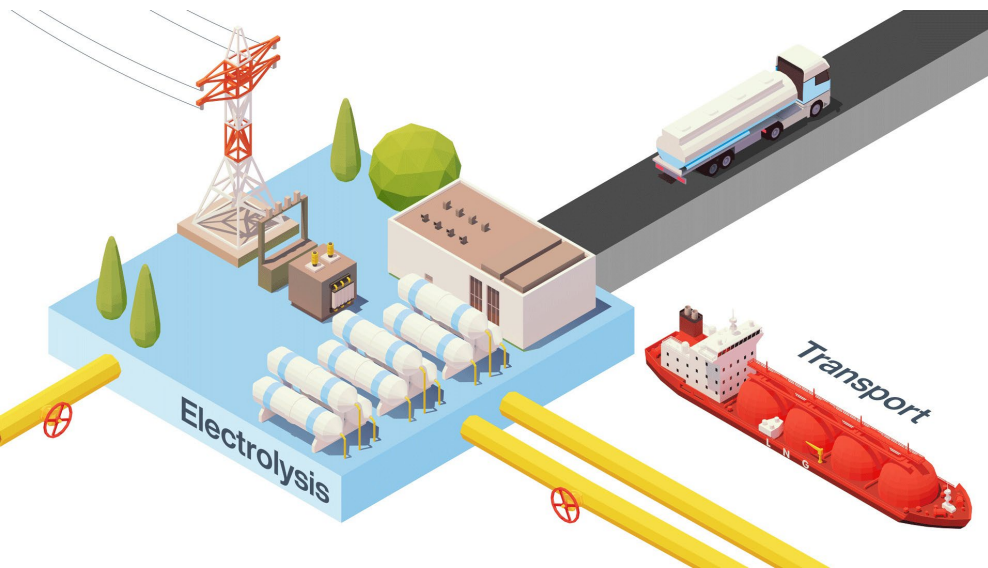


Shipping hydrogen

Hydrogen can be transported in ships in several ways.

- For shorter distances, compressed hydrogen may be feasible,
- For longer distances and larger volumes liquified hydrogen, ammonia and liquid organic hydrogen carriers (LOHC) appear to be the best solutions

Ports are ideally situated to become hydrogen hubs – aggregating demand from their own operations, from maritime transport, land transport and local industrial uses.



LH2CRAFT in a nutshell

LH2CRAFT is a Clean Hydrogen JU - EU Co-funded Project:

- ✓ 48 months duration
- ✓ 7.7M € budget / 6.5M € funded
- ✓ 14 Partners, including:
 - 5x - Industry Partners
 - 3x - Classification Societies / IACS Members
 - 6x - Technical Universities / Associations
- ✓ Coordinator: HYDRUS ENGINEERING SA
- ✓ Self-funding of 1.2M € by KSOE (Korean Republic)



Challenges of LH2 applications in maritime industry

- ✓ Lack of developed designs for large-scale solutions for the storage and bulk transportation of LH2 for oceangoing shipping (<1250 m³).
- ✓ Need for advanced designs and insulation technologies due to extreme cryogenic storage conditions (-253 °C)
- ✓ Complexity due to lower heat of vaporisation and different material compatibility characteristics
- ✓ Significantly increased CAPEX of the LH2 containment system

LH2CRAFT Clean Hydrogen JU SRIA* main objectives to **tackle the challenges**

- ✓ LH2 containment tank capacity [tons]:
350 tons in 2024 and 2800 tons in 2030
- ✓ CAPEX of installed LH2 containment tank [€/kg]:
50 €/kg in 2024 and less than 10 €/kg in 2030
- ✓ LH2 boil-off [%/day]:
0.5 %/day in 2024 and less than 0.3 %/day in 2030

Competitiveness of LH2CRAFT Project due to its main context:

- ✓ Design of a scalable LH2 storage system to large dimensions, in the range of those implemented for LNG shipping today e.g., 200,000 m3 per ship.
- ✓ Demonstration and first application of the developed liquid hydrogen storage design and technology at reduced scale
- ✓ Approval in Principle (AIP) for the LH2 containment concept a major IACS Classification Society
- ✓ Materials and component selection and integrity testing for LH2 exposure
- ✓ Sub-system testing for thermo-mechanical validation
- ✓ Development of a preliminary integrated ship design with a corresponding cost estimation

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An aerial photograph of a ship's deck, showing various equipment and structures. A semi-transparent blue rectangle is overlaid on the left side of the image, containing the text "THANK YOU" in white, bold, sans-serif capital letters. The ship's deck is light-colored with red safety lines. The surrounding water is a deep blue with whitecaps.

THANK YOU

