PARTNERS

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Co-funded by the European Union

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sH$_2$YpS

Sustainable HYdrogen powered Shipping

THE PROJECT

The shipping industry is facing one of the most demanding challenges ever: to find the way to achieve zero-emission navigation. The time to achieve such goal is very short: the next big deadline imposed by the IMO is to reduce the total annual GHG emissions from international shipping by at least 50% by 2050.

Hydrogen is one of few zero-emission solutions that is very promising, but the technology necessary to use it on board is not completely ready. To combine the tight application times (50 % reduction by 2050 of GHG emissions from shipping) and the technological gap, sHYpS is centered around the idea of a swappable storage system for the liquid hydrogen, based on new c-type ISO containers. This solution can enable a full zero emission ship platform in the needed time.

DURATION
48
MONTHS

€14,295,314
PROJECT BUDGET

The project has received €8,621,612.45 funding, from the European Union's Horizon Europe research and innovation programme.

13
PARTNERS

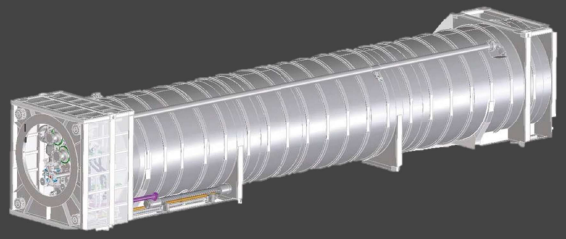
6
EUROPEAN COUNTRIES

OBJECTIVES AND RESULTS

To pursuit its goals, the Specific - Technical and Industrial - Objectives (SOs) of the sHYpS are described below:

S01 **Design, build and test a prototype of an intermodal ISO 45 LH2** container and of its evaporator (by CHART). **Design and test the tank connection space** (to safely connect the container to the ship's power plant).

- Design finalized and approved for construction;
- Prototype manufacture in progress.



S02 **Design the structural integration between the H2 fuel handling and the energy system** through the detailed design of a 6MW PEM fuel cell powertrain and have the system ready to be reviewed by Lloyd's.

- Design development and construction of a 375 kW PEM fuel cell module ready for the integration within a 40ft container;
- Power generation system design approval and risk assessment completed.

S03 **Integrate the LH2 storage system, the fuel handling system and the electric connection to the ship backbone, onboard one Viking's newbuild cruise ship.**

- Design of GH2 and auxiliary systems (ventilation, vent, inert and cooling water) integrated with the ship plant.

S04 **Integrate the LH2 storage system, the fuel handling system and the electric connection to the ship backbone, onboard one Viking's newbuild cruise ship.**

Design of GH2 and auxiliary systems (ventilation, vent, inert and cooling water) integrated with the ship plant.

S05 **Complete extended testing at components level** to have Lloyd's review and **test the full system onboard.**

- Test campaign on a fuel cell module to demonstrate the efficiency target and to optimize the system at different loads;

S06

- On-land test site for LH2 tank and fuel preparation system under development.

S07 **Validate that an LH2 container supply chain is viable** (by PLP and PoB) and unlock a zero-emission operation model for large ships.

S08 **Demonstrate the scalability of the LH2 system and its logistics.**

Develop a solution which is **fully adoptable by many kinds of ship with a conceptual design** (by NAV and K17) **for 5,000 DWT and 8,000 DWT / 700 TEU cargo and containers vessels.**

Increase knowledge and expertise on hydrogen-as-a-fuel **pertinent rules for marine application.**