H4PERION

Carbon neutral H2ICE running on Hydrogen for sustainable long-distance shipping

Hydrogen **FOR** Performance **E**nhancement and **R**eliable **I**CE **O**peratio**N**



The **H4PERION project** aims to accelerate the **decarbonisation of large oceangoing vessels** by developing a novel internal combustion engine (ICE) capable of running on **biomethane and zero-carbon hydrogen fuel**.

H4PERION's core objective is to develop a fuel roadmap that allows **gradual blending of hydrogen (H_2) and biomethane (CH_4)**, with the ultimate goal of achieving 100% hydrogen operation.

For the first time in maritime history, H2ICE technology will be **deployed as a prime mover on a large vessel**, demonstrated on a RoPax ship, with replication studies targeting cruise ships, newbuild RoPax and cargo vessels.

A **Digital Twin** will integrate data from the real-vessel demo and full-scale lab demo, confirming the achievement of KPIs.

H4PERION proposes a technological pivot from decades-long burning of fossil hydrocarbons in marine engines, towards energy conversion based on low- and zero-carbon fuels.

Expected impact

100%	> 90%	> 90%	80%	> 55%	> 17%
CO_2 emission reduction	NO_x emission reduction	SO_x emission reduction	methane slip reduction	efficiency from fuel to shaft	fuel savings

Impact Pathways

Impact Pathway No. 1
Ultra-efficient zero-carbon power conversion for long-distance shipping

Impact Pathway No. 2
Safe hydrogen fuel handling in ports and on board, including framework for controlling risks and accident scenario mitigation strategies

Impact Pathway No. 3
Contributing towards the establishment of a regulatory framework for low- and zero-carbon fuels

Partner network

16 partners · 7 EU countries · 9 industry partners, covering the whole value chain

University of Vaasa · Wärtsilä · WEGEMT · National Technical University of Athens · TalTech Estonian Maritime Academy · ABS · DELTAMARIN · University of Oulu · Åbo Akademi · MW · DLR · BALance Technology Consulting · Meyer Werft · wasaline

Follow the project

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Co-funded by the European Union

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