



Research Topics



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Hydrogen Storage



Development and validation of OD and CFD models to optimize fast refueling strategies and thermal management of hydrogen gaseous tanks. Work spans adsorption-based storage to enhance capacity and heat removal, and numerical studies of liquid hydrogen sloshing to quantify loads and boil-off.

Hydrogen mobility



Design and assessment of hydrogen solutions for maritime transport, including retrofit concepts for Ro-Ro vessels and fuel-cell propulsion for inland waterways. Operational logistics are streamlined through swappable H₂ tank-tainers, enabling efficient bunkering while maintaining safety and uptime.

Hydrogen safety



Investigation of hydrogen releases and dispersion in confined spaces using targeted experiments and validated CFD. Results inform risk assessments, ventilation and mitigation strategies, and best practices through contributions to the European Hydrogen Safety Panel.



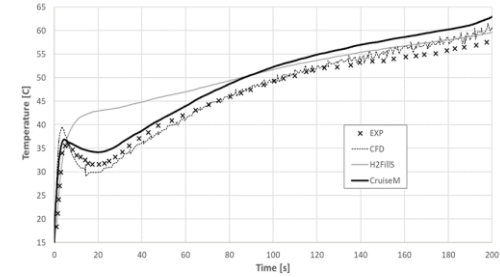
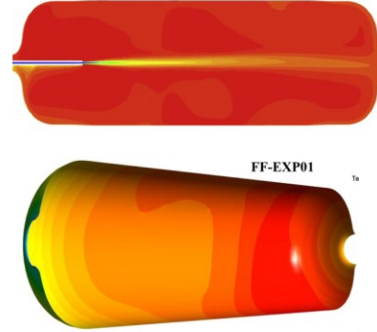
Hydrogen Storage



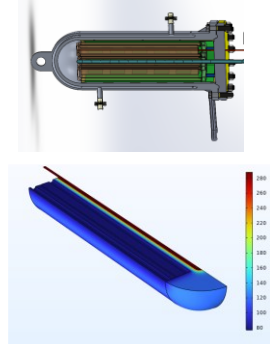
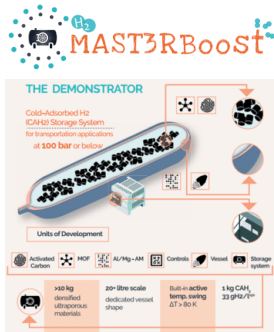
Hydrogen Storage

1. CFD and OD model validation
 - Filling strategies
 - CFD simulation of hydrogen tank
 - OD simulation of refuelling processes
2. Hydrogen adsorption
3. Liquid hydrogen sloshing phenomena

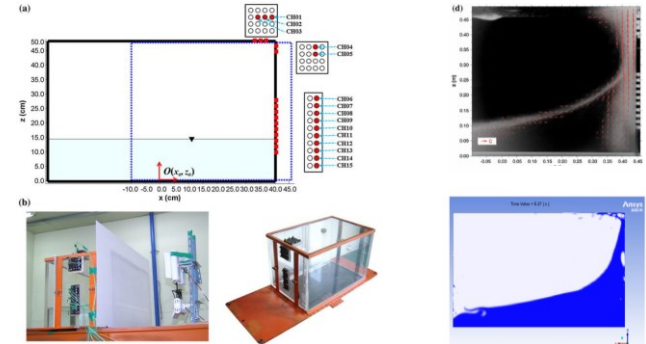
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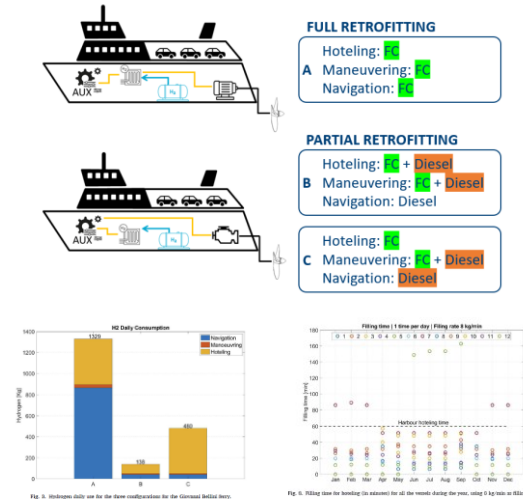
Hydrogen Mobility



Hydrogen Mobility

1. Retrofitting of Ro-Ro vessels
2. Hydrogen fuel cell-powered inland shipping using swappable H2Tank-Tainers

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CleanH2Shipping

Demonstration of CAPEX- and OPEX-efficient hydrogen fuel cell-powered inland shipping using swappable H2Tank-Tainers and building an H₂ ecosystem in and around ports



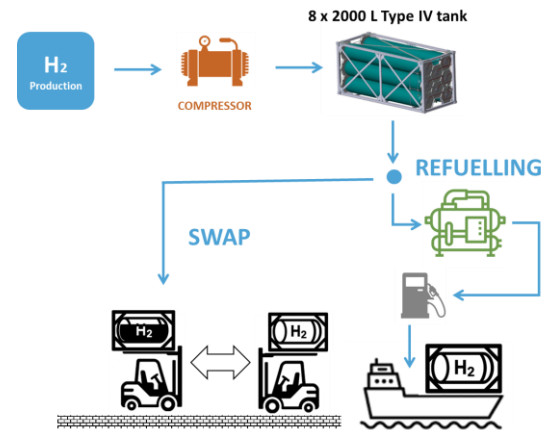
- Development of an H₂ ecosystem using swappable H2Tank-Tainers
- Integration of 0.6 MW fuel-cell system into demonstrator vessel Sylvania
- OPEX-efficiency optimisation of the drive system operation
- Demonstration and operation of H₂ ecosystem and hydrogen fuel-cell powered shipping (2000 hours hydrogen-powered operation of Sylvania, a 135 m long, 610 TEU inland container ship with up to 1.2 MW total power) on the river Rhine
- Techno-economic and life-cycle assessment
- Engage policy makers and authorities to advocate for improved and harmonised regulations on hydrogen handling and use

www.cleanh2shipping.eu

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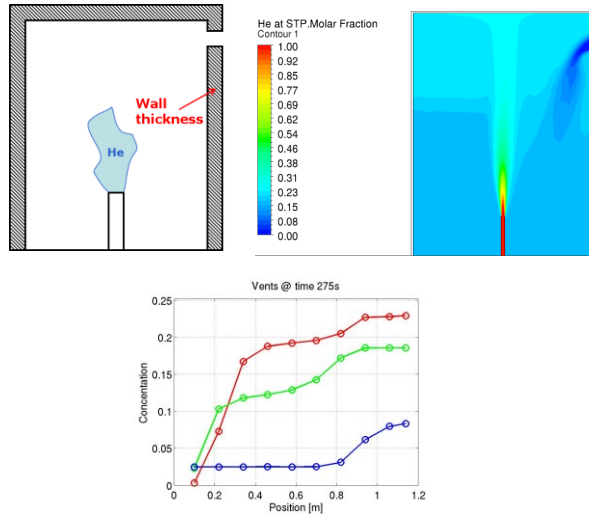
Hydrogen Safety



Hydrogen Safety

1. Release of hydrogen in confined space
2. CFD studies of hydrogen dispersion

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