Session 1: Role of hydrogen in a low-carbon economy – long-term perspective
Views from industry ; Maritime.

International Energy Agency
Technical Collaboration Programme


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Workshop on hydrogen production with CCS
CAMPUS EDF CHATOU
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Jacques Saint-Just
H2 Plus Ltd, ask member
Why Hydrogen in Maritime transport?

Because hydrogen could be an option for maritime transport, which is a major contributor to:

- **GHG emissions**
  - 2.8 % of annual global emissions

- **Pollutant emissions**
  - SOx
  - NOx
  - VOCs
  - Particles
  - ODS, ROGs…

Regulated by IMO (Emission Controlled Area, …) + Kyoto protocol
Golden Gate « Water-go-round »

- passenger capacity of 84
- hydrogen tank capacity for two full days of operation.
Why an IEA task?
The current deployment of H2 technologies in maritime transport is poor

Objective of the task

• provide know-how on the use of hydrogen and fuel cells in the maritime ship propulsion, shore-side electrical power, cargo handling
• evaluate concepts
• initiate research and demonstration projects

This is achieved by creating an exclusive network of
• suppliers of hydrogen and fuel cells
• shipping companies
• advisory and research institutions
How it is done

• Bi-annual meetings of the members of the task and invited stakeholders

• Production of a “white paper” with the conclusions of the group and time horizons
1. Logistics, H2 supply and port development
   • H2 vs other clean fuels, for propulsion & auxiliary power
   • Compressed or LH2, Green or Clean (CCS) H2
   • On-shore power (cold ironing)
   • Fuel cell port handling devices (cranes, trucks)

2. Safety (mainly on-board safety) and RCS
   • Safety issues for H2 storage options (above or below deck)
   • Global regulatory framework

3. On-board technology – fuel cell development/hybrid solutions/energy management and ship design; retrofitting.
Task members (39) and invited stakeholders

- **Industry**: Fincantieri, Wartsila, Nedstack, Hydrogenics, Ballard, ITM, PowerCell, Engie, …

- **Port Authorities, shipyards**: Eastern Adriatic Sea, Damen, Holland, …

- **Registrar and classification**: Lloyd’s Register, DNV GL

- **Government**: European Commission, California Hydrogen Business Council

- **Institutes**: VTT, SINTEF, INTA, …

- **Academia**: NTNU, U. Southampton, Delft, Tokyo, Trieste, Madrid, Lausanne, Genoa, …

Information on the status of H2 in the maritime provided by the members:
Hydrogen demonstrations in the ports of Los Angeles & Long Beach
Hydrogen for maritime applications
projects supported by the European Commission

Maranda
- A hydrogen territory in Scotland: hydrogen production, storage, transportation and utilization for heat, power and mobility.

HySeas
- The world’s first zero emission, sea-going ferry. Demonstrate a circular economy model for the local production

New projects – started 2019
- Fluvial push-boat, Lyon (FR)
- RO-PAX ferry, Stavanger (NO)

FLAGSHIPS
- FC for port/harbor container terminal:
  - Reach Stacker
  - Yard Tractor
  - Mobile HRS

Call for proposals – 2020 onwards
- Next Generation Propulsion for Waterborne >5MW on-board power
- Structuring R&I towards zero emission waterborn transport
- Scaling up and demonstration of a multi-MW Fuel Cell system for shipping

2017-2021
- FCH Funding: ~3M€
- H2020 Funding: ~9.3M€

2016-2021
- FCH Funding: ~5M€

2019-2022
- FCH Funding: ~5M€
- H2020 Funding: ~4-8M€

2019-2022
- FCH Funding: ~4M€

H2020 Funding: ~9.3M€

FCH JU Funding: ~10 M€
MoZEES
Center for environment-friendly energy research focusing on zero-emission transport solutions. The Center is hosted by IFE, Kjeller, Norway, and has a budget of ~ 25 M€ and a duration of 8 years (Director: Øystein Ulleberg)

Objectives
develop battery and hydrogen materials, components, and technologies for existing and future transport applications on road, rail, and sea.
World's first liquefied hydrogen cargo ship

Pilot ship
- Special dome structure for maintaining vacuum
- Stainless steel vacuum thermal insulation double hull
- High thermal insulation supporting structure

H2 from Australian brown coal + CCS

Guideline to complement IGC code is being proposed to IMO by both Japan and Australia
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- **Short term:** numerous niche opportunities for industry; Regulatory framework has a critical role

- **Long-term perspective:** hydrogen will play a major role
Thank you!

Contact for IEA-HIA Task 39

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