Zero Emission Ship Technology Association
The tide of change
H2 Vessels launched in 2017

- Maranda - 165kW APU
- Energy Observer 22 kW
- Hydroville 600 hp
- Race for Water 60 kW
H2 vessels under construction
H2 Examples of funded vessel projects 2020 2023

Sea Shuttle, Pilot E 2000 kw 2023

ZEFF, Pilot E 2022 2200 kw

Moss lh2 carrier

Havila Kystruten 2022 3200 kw

Fiskerstrand Ferry

Moss lh2 carrier

Kawasaki lh2 carrier
Hydrogen Powered Vessels

Hydrogen vessels exponential trend curve
Current state of the art FCs and H₂ have been demonstrated in a number of small inland and near coastal vessels, proving the viability of the technology.

2023
First commercial use of fuel cells for auxiliary power applications on very large commercial vessels

2023-2025
Demonstration projects lead to IO’s of small FC ship trials (in-land and coastal)

2024
Initial design studies reach their conclusions on viable and non-viable technology options

2025
A solid definition of the regulatory framework is devised based on the technical evidence from demonstration projects

2027
~100 small FC ships operating in Europe. Consensus on preferred fuel options for larger ships

2028
Project evidence aids selection of optimum FC technologies and related fuel

2029
Project evidence aids selection of optimum FC technologies and related fuel

2030
FCH ship ownership cost achieves parity with diesel

2030 Vision

2030 vision

FC passenger ships reach mass market acceptance for small inland and coastal vessels, using hydrogen as a preferred fuel.

Larger vessels select FCs as a preferred zero emission propulsion solution, using a range of fuel types
Barriers

- Volume
- Availability
Solutions to Volume

LOHC’s

- Ammonia
- Magnesium Hydroxide $\text{MgH}_2$
- Sodium Boro Hydride $\text{NaBH}_4$
- Dibenzyltoluene
Solutions to Availability - Hydrogen Hubs

- 1,200 kg/day
- 50 kg/day
- 60 kg/day
- 58,000 kg/day
- 8,000 kg/day
- 30 kg/day
- RE Island
Global Renewable Energy

Figure 11: High-altitude winds could be one such resource, if airborne wind power technologies are successfully developed.
Solutions to Availability

Decentralized Green Hydrogen Hubs
ZESTAs.

Navigating to a sustainable future together