Outlook on fuel cells for marine applications

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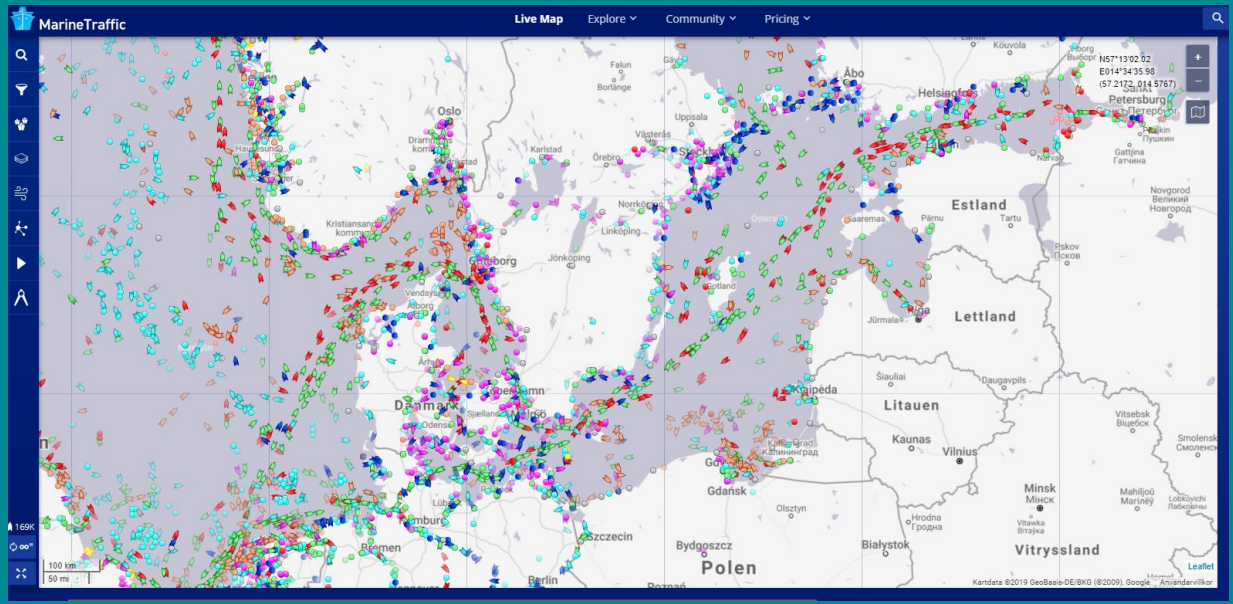
Swedish Marine Technology Forum (SMTF)

RISE

Shipping in the Swedish transport system

- Sweden has the longest coast in Europe
- 50 lager ports
- 90 % of Swedish trade on keel
- Transports 130 million ton gods & 29 million passengers
- International market
- IMO, EU and national rules and regulations



Energy sources in shipping

- Diesel / HFO
  combustion engine
- Diesel electrical
  Combustion engine that feeds an electric motor
- LNG, Methanol
- Hybrid
  Combustion engine in combination with batteries
- Plugin-hybrid
  Combustion engine in combination with batteries that can be charge while moored
- Battery
  100% battery that charges while moored
- Fuel cells, the future?

Energy demand

- Outboard engine 2 kW
- Emma Maersk main engine 80 100 kW
- Cargo ship 15-40 tons fuel / day

Why fuel cells in the maritime industry

- Emission reduction
- Needs vast amounts of energy
- Weight
- Operates ”off the grid”
- Hybrid solutions

Hydroville Antwerp

- 14 x 4 m
- Max speed 27 knots
- 16 passengers
- 2x hydrogen internal combustion engines (H2ICED) with a total shaft power of 441kW
- In operation 2017

Water-go-round

- Based on the SF-BREEZE (5 MW)
- Operational in 2019
- 21 meter
- 84 passengers
- 2 x 300 kW
- 120 kW battery for boost
- Speed 22 knots

Norled Ferry

- Express Ferry
- 299 passengers & 80 cars
- Liquid hydrogen
- 2 x 200 kW Fuel cell
- In operation 2021

Research vessel Aranda

- 165 kW
- Fuel cell to power electrical equipment during measurements
- Cold climate test
- Container installation on deck
- Project ends 2021

”Swedish” projects and initiatives

- M/S Mariella Stockholm – Helsinki
  Methanol fuel cell in container
  2009-2017
  Part of Pa-X-ell project
- Urban Water Trucks
- Swedish Sea Rescue Society

Challenges

- Maritime environment
- Use and storage of liquefied hydrogen
- Retrofit
- Safety issues
- New business models
- Technical competences onboard
- Cost of development – ships are often one off builds

The road forward

- Electromobility for Shipping
  ABB, Northvolt, Stena, RISE, Svensk Sjöfart
- Swedish Electric Transport Laboratory, SEEL
- Demo projects – we need to show that the technology works
- Studies on safety related issues for hydrogen and batteries on ships
- Develop rules and regulations with flag state and classifications society

SARGASSO

Providing infrastructure for open innovation

- Innovation & collaboration plattform
- Non-profit
- Independent
- Structured process
- Full non-disclosure set-up
- A vast diversified collection of intelligent networks

Thanks!

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