The future of fast passenger boats, and the world's first hydrogen car ferry on LH2

Tyssedal, 25.04.2019
Norled at a glance

- One of the major Ferry operators in Norway.
- Market leader within Fast Ferries («High speed crafts») in Norway and #4 Globally.
- Major player within Fjord tourism.
- Nationwide operations from Oslo to Tromsø.
- ~300 MUSD (NOK 2.4 billions) in revenue
- 1 200 employees, HQ in Stavanger
- Founded in 1855
- Innovation-driven right for more than 160 years
- Norled aims to operate with low and zero emissions
A major transport player in Norway

#2 Ferry company

57 Ro-ro ferries
29 Routes

#1 Express boat company

28 fast ferries
18 Routes
From grey to green – the icon

MF Ampere - the first zero-emission ferry in the world
The entire sector – transformed from predominantly grey to predominantly green in just a few years – huge savings in fuel costs – helps finance a renewal of the fleet.
Creating yet another icon for zero emission shipping
World’s first ship driven by LH$_2$

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<tr>
<td>Length</td>
<td>82.40 m</td>
<td>Car capacity</td>
<td>80</td>
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<tr>
<td>Beam</td>
<td>16.75 m</td>
<td>Truck capacity</td>
<td>10</td>
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<td>Draught</td>
<td>2.8 m</td>
<td>Passenger capacity</td>
<td>299</td>
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<td>LMG80-DEH2</td>
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LMG Marin

Map showing locations of Skipavik, Nesvik, and Hjelmeland.
The hydrogen arrangement
Introducing zero emission fast ferries (ZEFF)

Battery and hydrogen operations

Foil-assisted hull lift to reduce fuel consumption

35 knots and up to 300 pax

Being developed for several routes in Norway

Hydrogen supply key challenge
Our hydrogen ambition

• Liquid hydrogen - the new game changer in the maritime industry?

• Hydrogen to play an important role towards IMO’s goal of reducing the shipping sector’s overall CO₂ output by 50 percent by 2050

• Create a market for production and utilization of (liquid) hydrogen in Norway

• Bring down the price of H₂/LH₂ to outcompete other fuels on commercial terms

• MF Ampere turned the Norwegian ferry-sector upside down with the world’s first battery-driven ship:
  – LH₂ to have an impact reaching far beyond the ferry industry
  – Develop hydrogen solutions that also can be utilized in other industries
Hydrogen as a business opportunity

- Norled aims to be an active customer and a preferred partner for H₂/LH₂ suppliers
- Norled aims to create a market for liquid hydrogen as the first-mover
- Geographical locations vs. logistics will decide upon locations for H₂/ LH₂ production
- Transport, storage and bunkering solutions to be developed
A maritime hydrogen market in Norway

Hydrogen is not available in Norway today and supply chains must be developed.

Norled’s estimated need for $H_2/LH_2$ for its car ferries and fast ferries is approx. 10-15 tons per day in 2025.

Analysis ongoing for production sites and logistics solutions for $H_2/LH_2$.

Ref. Greenstat
Summary:
MF Ampere turned the Norwegian ferry-sector upside down. Hydrogen will have impact beyond the particularities of the industry

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<th>Battery/ RoPax Ferry / 2015</th>
<th>Hydrogen/ RoPax Ferry / 2021</th>
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<td><img src="image2" alt="Hydrogen/ RoPax Ferry / 2021" /></td>
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<tr>
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<th>Hydrogen/ Express Boat / 2022</th>
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<td><img src="image4" alt="Hydrogen/ Express Boat / 2022" /></td>
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Thank you for your attention!