



Future Proof Shipping

Creating a zero-emissions shipping world

Shipping is responsible for a significant portion of the global air pollution:

NO_x : 10-15%

In the EU, NO_x from shipping is expected to exceed NO_x from all land based sources over the coming decade.

CO₂ : 2-3%

Among the top 6 producers of greenhouse gases in the world; similar to the emissions of Germany /Japan at > 1 billion tons of CO₂ a year.

SO_x : 4-9%

Major contributor.
17 of the largest ships produce the same amount of sulphur emissions as all of the world's cars combined.

Sources:
3rd IMO GHG Study
cleanshipping.org
Seablind (movie)
Transport & Environment



Markets are moving towards greater sustainability and transparency



Norway will make its world heritage fjords zero-emissions zones by 2026. The EU has a target to cut greenhouse gas emissions by 40% by 2030 compared with 1990.



IMO announced an objective of 50% reduction of CO2 emissions for the sector by 2050. IMO regulations on emissions are coming up (for sulphur, NOx as well as carbon dioxide).



Consumer goods companies (some of the largest shippers in the world) are leading the way by publicly declaring ambitious emissions reduction targets.



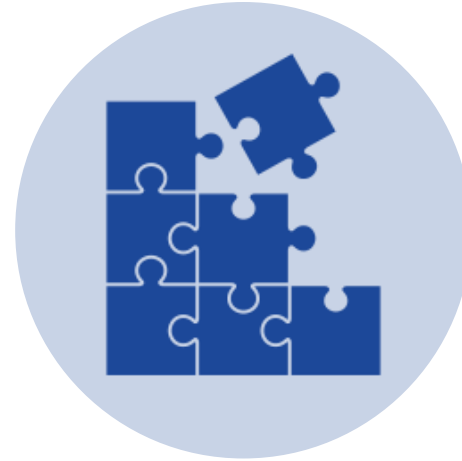
**Future Proof Shipping BV is
a network organisation
that provides zero-emissions
marine transportation
solutions.**

We offer zero-emissions marine transportation solutions



Advisory

An integrated services offering comprising technical, financial and commercial services tailored to the specific needs of our customers.



Project Development

Development of zero-emissions shipping projects by tackling all aspects of the value chain, and end-to-end management of these projects.

Our expertise spans different areas:



Technical

- Vessel assessment and technical advice on suitable zero-emissions technologies.
- Design basis and technical concept.
- Retrofit design and engineering.
- Monitoring and data analysis.
- Energy efficiency and optimization.
- Continued technical and operational support for vessels after the building phase.



Commercial

- Impact assessment and assurance.
- Network building.
- Building zero-emissions projects by tackling all aspects of the value chain.
- Building commercial partnerships across value chain to create and support projects.



Financial

- Cost and ROI calculations.
- Financial products and solutions for the zero-emissions projects.
- Financial participation in, and funding of zero-emissions shipping projects.

We solve the challenges faced by key market parties



Investors

- We enable investment in sustainable shipping by demonstrating that zero-emissions propulsion is technically and commercially feasible.
- We build commercial partnerships to finance zero-emissions vessels (new-builds or retrofits).



Cargo owners / shippers

- We work with you and your partners to reduce the environmental footprint of your company.
- We connect your company to green shipping services, vessel owners and other players in the value chain.
- We offer zero-emissions transportation services.



Ship owners / operators

- We enable you to upgrade your vessel(s) with the most commercially viable zero-emissions systems.
- We offer zero-emissions vessels for chartering.
- We manage the procurement and retrofitting process.
- We provide technical, financial and commercial solutions.

We are navigating towards..

- 6** zero-emissions inland vessels
- 2** zero-emissions short-sea vessels
- 2** zero-emissions ocean-going vessels

Our projects

We are already working on several zero-emissions projects



Project Development: Zero-emissions Inland Cargo Vessel (retrofit)

- 110m * 11.45m ship with total installed power between 1.0 to 1.4 MW.
- We will purchase a vessel in Q1 2019, and perform an energy profiling exercise for 4-6 months.
- After this, the internal combustion engine will be removed, and the new zero-emissions propulsion system, including fuel cells, a battery, an electric motor and hydrogen storage will be installed on board.



Advisory: Financing options for a new-build inland vessel

- Looking for attractive financing options for a green 110m * 11.45m inland ship.
- Plan to use this as a test case for developing a lease model for zero-emissions propulsion technology.



Project Development: Zero-emissions Short-sea Vessel (New-build)

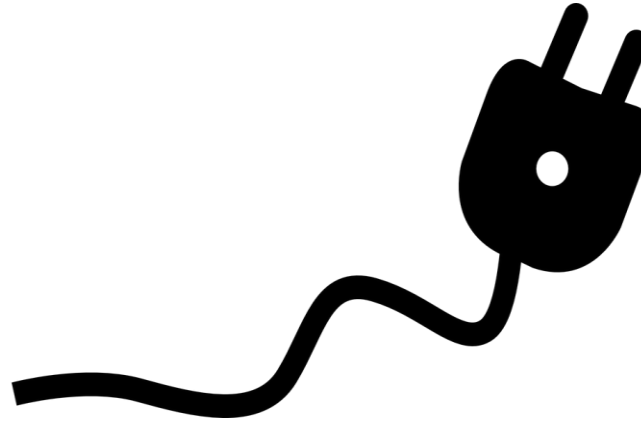
- Investigating the technical and commercial feasibility for a zero-emissions short-sea vessel for a Dutch shipowner.
- This vessel will carry bulk cargo between the Baltics and the Mediterranean.

And have multiple promising opportunities...



Advisory: **UK vessel transporting bulk cargo**

- In early stage talks with an agricultural company in Scotland to explore the possibility of transporting their cargo on ships fuelled with green hydrogen.



Project Development: **Hydrogen power-barge**

- Developing a power-barge concept to supply power to vessels in the port, as a mobile and flexible alternative to shore power.



Advisory: **Zero-emissions ferries in India**

- In early stage talks with a ferry owner and operator in India who is looking to deploy zero-emissions ferries in the north and western parts of the country, to look into the most feasible technology options.

Zero-emissions inland vessel

The project targets a high impact segment: inland shipping



- The European inland waterway fleet comprises 17,639 vessels.*
- This segment of the maritime industry has a significant air pollution ratio in dense urban areas. Therefore, it has great potential for improving air quality on short notice.
- The main hubs of European inland shipping are located between Rotterdam, Antwerp, Duisburg and Amsterdam.

*Source: Perspectives for the use of Hydrogen as a fuel in Inland Shipping, Mari Green, 2018

Volumes transported by Inland Waterways in Europe in 2007
(Source: data PLATINA Deliverable 5.5 (2010) & Google maps, adapted by STC)
{D1.1 List of operational profiles and fleet families; Prominent Project}

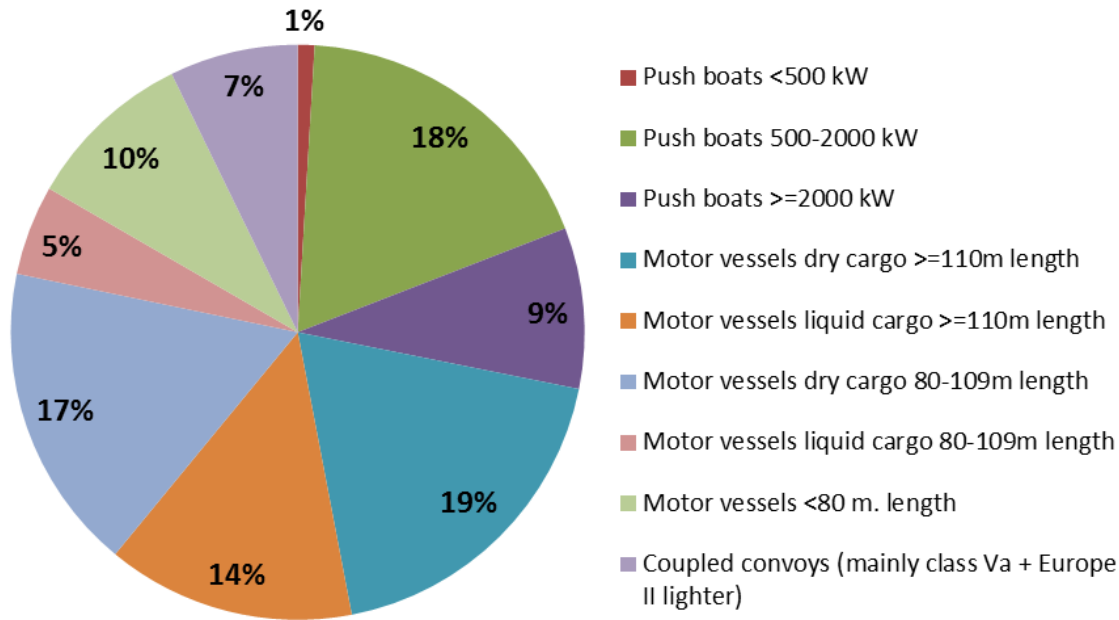
2019: Retrofit existing inland vessel with fuel cells



Reference vessel

- Vessel type: **Inland cargo vessel**
- Dimensions: **110m * 11.45m**
- Total installed power on board is between **1.0 to 1.4 MW**.
- We will purchase an existing vessel and perform an energy profiling exercise for 4-6 months.
- After this, the internal combustion engine will be removed, and the new zero-emissions propulsion system, including fuel cells, an electric motor and hydrogen storage will be installed on board.

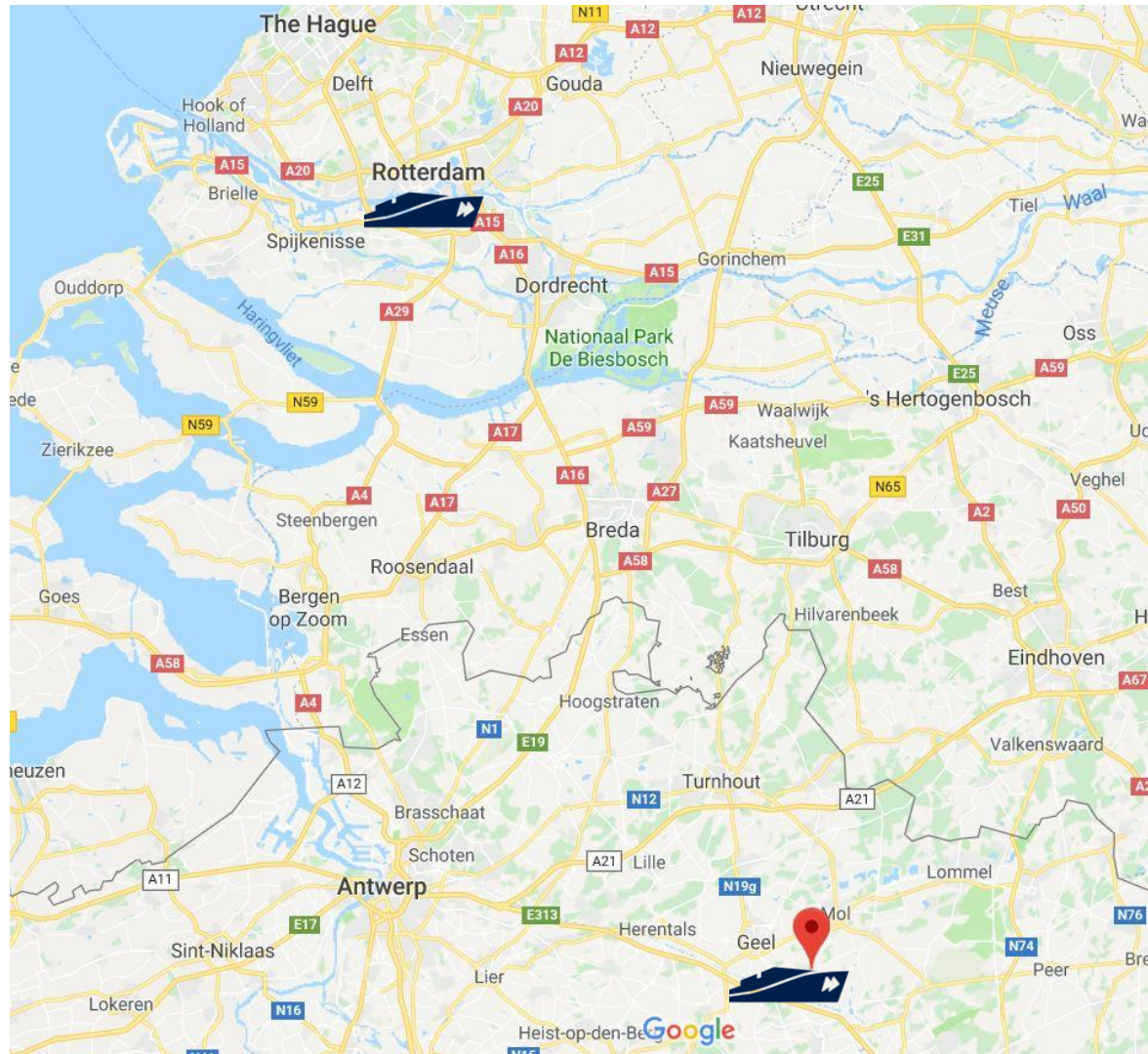
The proposed pilot vessel is representative



Share of main fleet families in Europe based on estimated tonne-kilometres transported
(Source: D1.1 List of operational profiles and fleet families; Prominent Project)

- Of all vessel types in the European inland waterway fleet, the **110m x 11.45m dry cargo vessels** have the biggest impact and relevance on the basis of tonne-kilometres transported.
- These vessels operate on fixed routes over short distances, thereby making it easier to ensure availability of hydrogen for refueling.
- A zero-emissions propulsion system developed for this type of vessel can easily be applied to a majority of the other vessel types.

This vessel will operate between Rotterdam and Meerhout



- The vessel will carry container cargo between the **Port of Rotterdam** and **Meerhout (BE)**.
- We are working on securing a supply of green hydrogen to ensure smooth operations.
- We expect to **reduce emissions by 2000 tons CO₂e annually*** by using fuel cells and green hydrogen on this vessel.

(* Based on base data from the 3rd IMO GHG Study.
To be verified during profiling phase.)

Let's define shipping's new normal together!

futureproofshipping.com