Greening projects for inland navigation in Europe

Introductory speech for moderated panel discussion on:
“FINAL DESTINATION H2 FUEL CELL? – OR ARE THERE MORE SUITABLE SOLUTIONS FOR THE DANUBE?”

Danube Business Talks 2022, Danube Dialogue

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PLATINA3

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Content of presentation

- Intro EICB
- Technology pathways
- Overview of promising past and ongoing IWT greening projects
- Presentation of project-related “highlights” in greening IWT
  - Future Proof Shipping
  - Zero Emission Services
- PLATINA project actions

About EICB

- Established in 2007
- Based on Rotterdam
- Not-for-profit organisation
- Dedicated to inland navigation on European level
- Knowledge development and dissemination on innovations for greening and energy transition
- Bridge between policy, society and the IWT sector
- EICB Innovation Lab: pre-competitive collaboration
- Involved in various EU funded projects, e.g. coordinator of PLATINA3

Technology pathways

2020 2035 2050

Hybridisation

Combustion

Clean combustion → **Emission free combustion**

Fossil Fuels	**Bio Blended Fuels**	**Bio/Blue(CCS) Fuels**	**Renewable Synthetic Fuels**
Diesel	HVO		E-Diesel
LNG		Bio Methane (LBM)	E-Methane
		Bio Methanol	E-Methanol
		Blue Hydrogen	E-Hydrogen

NRMM Stage V and equivalents → **Synthetic fuel Engines**

Electrification

Fossil sources → **Bio/Blue(CCS) Sources** → **Renewable Sources**

Battery (grey/blue/green electricity)
Lithium ion; Lithium iron phosphate; flow batteries?

Battery (Green electricity)

Fuel Cell
Grey/Blue Hydrogen (compressed, liquified?); Methanol

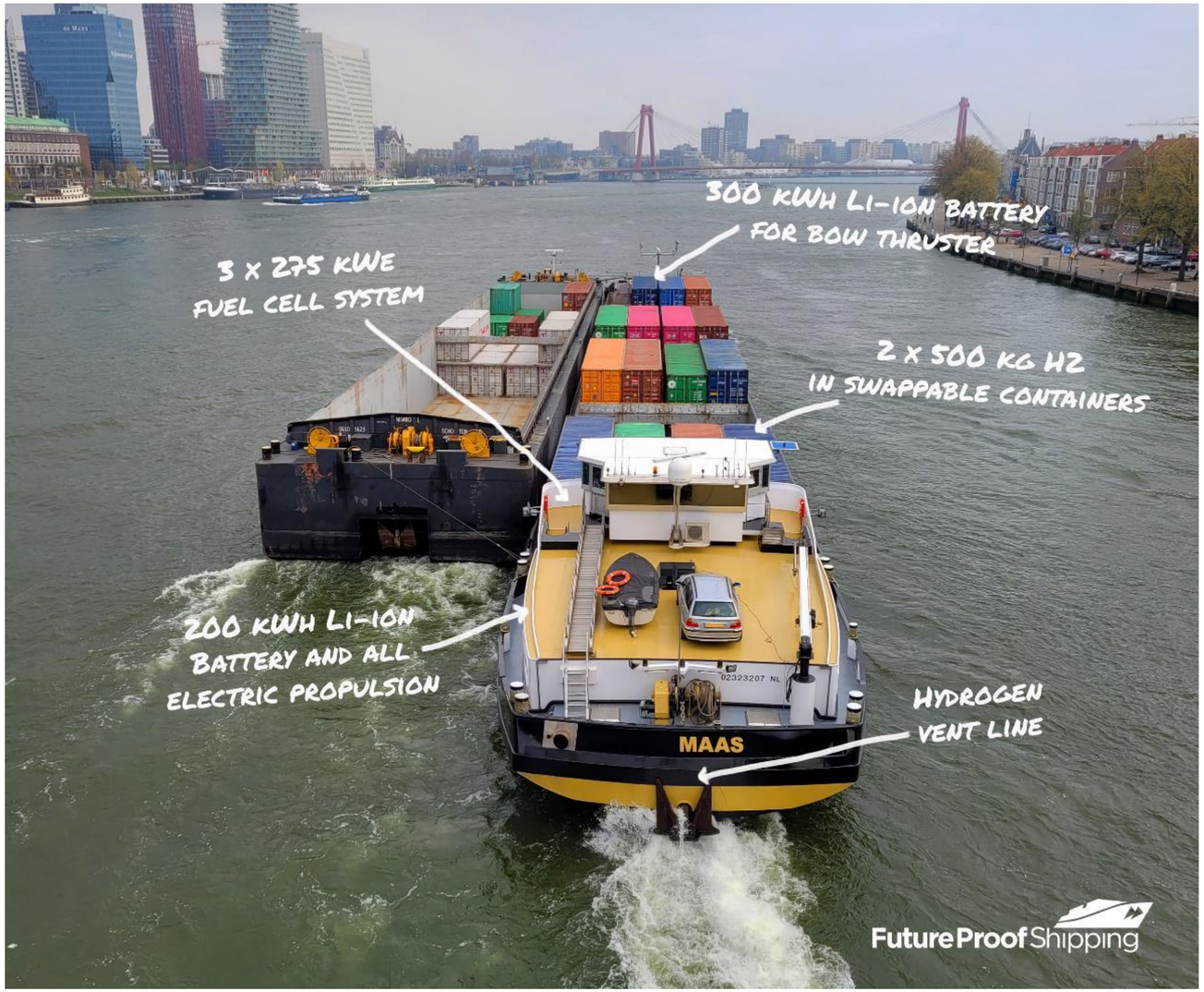
Fuel Cell
E-Hydrogen; E-Methanol

On shore power supply

Promising IWT greening projects

- **Diesel-electric drive and optimised design**
- **State-of-the-art engine replacement solutions: Stage V, NRE, Euro VI**
- **Usage of biodiesel (HVO)**
- **Hydrogen fuel cell retrofit and newbuild (FPS Maas, NRPC Antonie)**
- **Zero-Emission-Services with full battery electric drive (Alphenaar)**
- **Hydrogen combustion (CMB.Tech, ABC)**
- **Planned for 2023+:**
  - **Demonstrations with methanol (Mercurius)**
  - **Deployment of 6 hydrogen FC inland vessels**
  - **Upscaling ZES to a larger group of vessels and routes**

FPS Maas: What will happen during the retrofit?



- Typical 'Rhine' container/dry cargo vessel: 110m x11.45m
- Installed power is ~ 1.4 MW
- Between NL and BE, around 200 km one way
- Remove all diesel technology and replace with hydrogen, fuel cells and batteries
- Reduce emissions by 2000 tons CO2e/y (equivalent to 80.000 trees)
- Showcase it is possible technically
- Highlight there are companies with high societal and environmental awareness

The retrofit of the FPS Maas is underway

- Left: The Maas sailing into Holland Shipyards' yard at Werkendam for retrofit in August 2022
- Above: The fuel cell in construction – Koedood Marine Group, Kooiman Marine Group and Nedstack
- Regular updates on the retrofit in pictures and video: https://www.linkedin.com/company/future-proof-shipping/

Zero Emission Services
A new integrated energy concept for inland shipping

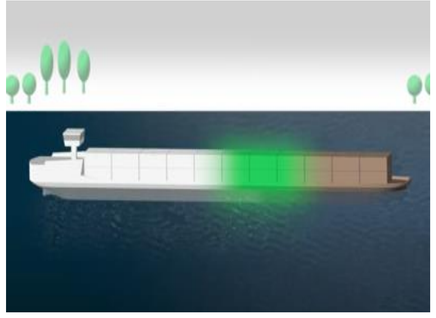
Exchangeable energy containers

ZESpacks are future proof: Initially with Lithium-ion batteries, but ready for other energy carriers such as hydrogen and ammonia. ZESpacks are charged using renewable power.

Open Access charging infrastructure

ZESpack charging stations are connected to the electricity grid, so they can be used to stabilize the grid or meet temporary local demand for power.

Pay per use payment system



Shipowners pay only for the energy they use: no upfront investment in energy storage systems.

ZESpacks: Swappable Modular Energy Containers

- **Zero-emission energy**: charged with certified renewable energy
- **Future proof**: initially using Lithium-ion batteries, yet ready for using hydrogen fuel cells or other future energy carriers
- **Open access**: standardized open access interface to allow for rapid market adoption
- **Performance**: 1 MW power / 2.9 MWh energy storage sufficient for a range of 60 - 90 km per ZESpack
- **Safety**: Approval in Principal (Aip) awarded by Lloyds Register.
- **Mobile / modular**: Designed for maritime applications (including shocks / vibrations)

* 2MWh is vergelijkbaar met 36 Tesla’s met een 55kWh batterij

First docking station operational in CCT Alpherium, Alphen a/d Rijn

- Double (parallel) charging @ 1 MW
- 2 x ZESPacks charge in 2.5 hours
- Total area required 15 x 25 m

- **Hub**: Energy and transport converge at ZES charging stations: trucks, electric reach stackers and other modalities also have access to sustainable energy.
- **Grid stabilization**: Charging infrastructure combined with ZESpacks can support the energy grid.

Zero Emission Services

- **Zero emission** — No emissions of CO2, NOx and particulate matter. Less noise, less vibration.
- **Affordable** — Pay per use, no uncertain investment for vessel owners / operators.
- **Efficient** — Because empty ZESpacks can be exchanged with full ones in 20 minutes, the charging of energy is disconnected from the loading of the vessel.
  This **optimizes logistics** for shipper and contributes to **modal shift**.
- **Open Access** — Separation between energy container and electric engine and **standardization** allow multiple providers to use ZESpacks.
- **Future-proof** — In time, other energy carriers, such as hydrogen, can also be containerized and added to the "fleet" of ZESpacks. No lock-in on fuel technology.
- **Multiple applications** — Grid stabilization, storage, mobile energy, energy hub function.
- **Scalable** — The features listed above make the ZES concept very scalable
- **Applicable today** — Already **in operation** since September 2021.

PLATINA3 project - introduction

Platform for the implementation of a future inland navigation action programme

- **Coordination & Support Action Horizon 2020**
- **Implementation of the NAIADES III policy**
- **1 Jan 2021 – 30 June 2023**
- **14 partners, 2 mln euro budget**
- **www.platina3.eu**

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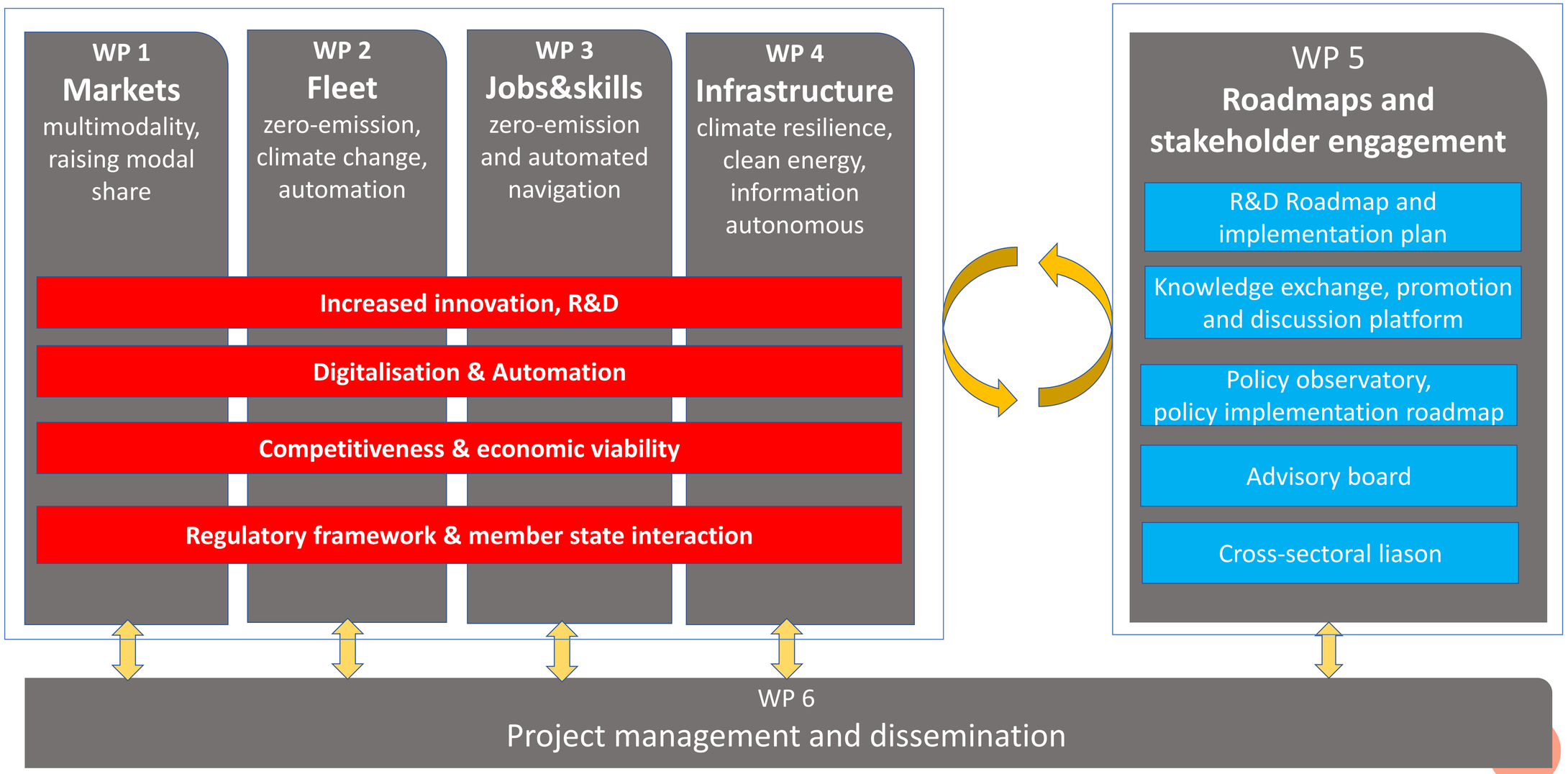
PLATINA3 project structure



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PLATINA3 project actions on greening IWT

- **Roadmap for RD&I on zero-emission IWT**
- **New financial instrument for greening the fleet**
- **Towards a European Emission label and energy index for inland vessels**
- **Regulatory actions to support energy transition**
- **Infrastructure for alternative energy along waterways and in ports**

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PLATINA3 5th Stage Event

19 & 20 October Budapest (hybrid), hosted by Danube Commission

Main topics:

- Standards for competence related to the use of zero or low emission propulsion systems and for refresher classes for environmentally friendly vessel operation;
- Roadmap for on board systems allowing automation of inland navigation vessels, vision on board systems and autonomous navigation, and competencies needed to operate them;
- Alternative energy infrastructure along the waterway and in ports;
- Consolidated R&D roadmap and implementation plan for IWT;

Registration:

- https://platina3.eu/event/budapest-2022/

More information:

- https://platina3.eu

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Thank you for your attention

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