Innovation Fund
Stakeholder Consultation event

13 June 2023 - In person and online

Lunch time 13:00 – 14:00 CEST

Next session – workshops:

- Clean tech manufacturing including RES and storage → Room 0D (ground floor)
- Maritime → Room 4B (fourth floor)

Please note the event is livestreamed and recorded.

European Commission

Innovation Fund and the maritime transport sector

Innovation Fund Stakeholders event
DG CLIMA.B4

13 June 2023

The maritime transport sector

A strategic sector with significant environmental impact

90%
of world trade is moved by sea

77%
of EU international

35%
intracommunity trade

3-4% of EU GHG emissions

13,5%
of EU GHG transport emissions

European Commission

The Fit-for-55 package and maritime transport

Why targeting maritime transport emissions?

- **All sectors need to contribute**, including maritime transport
- Maritime transport is a **substantial CO2 emitter** (3-4% of EU CO2 emissions) and emissions have increased, and with that also their share of global and EU emissions
- **Lack of adequate measures** in place at EU or global level

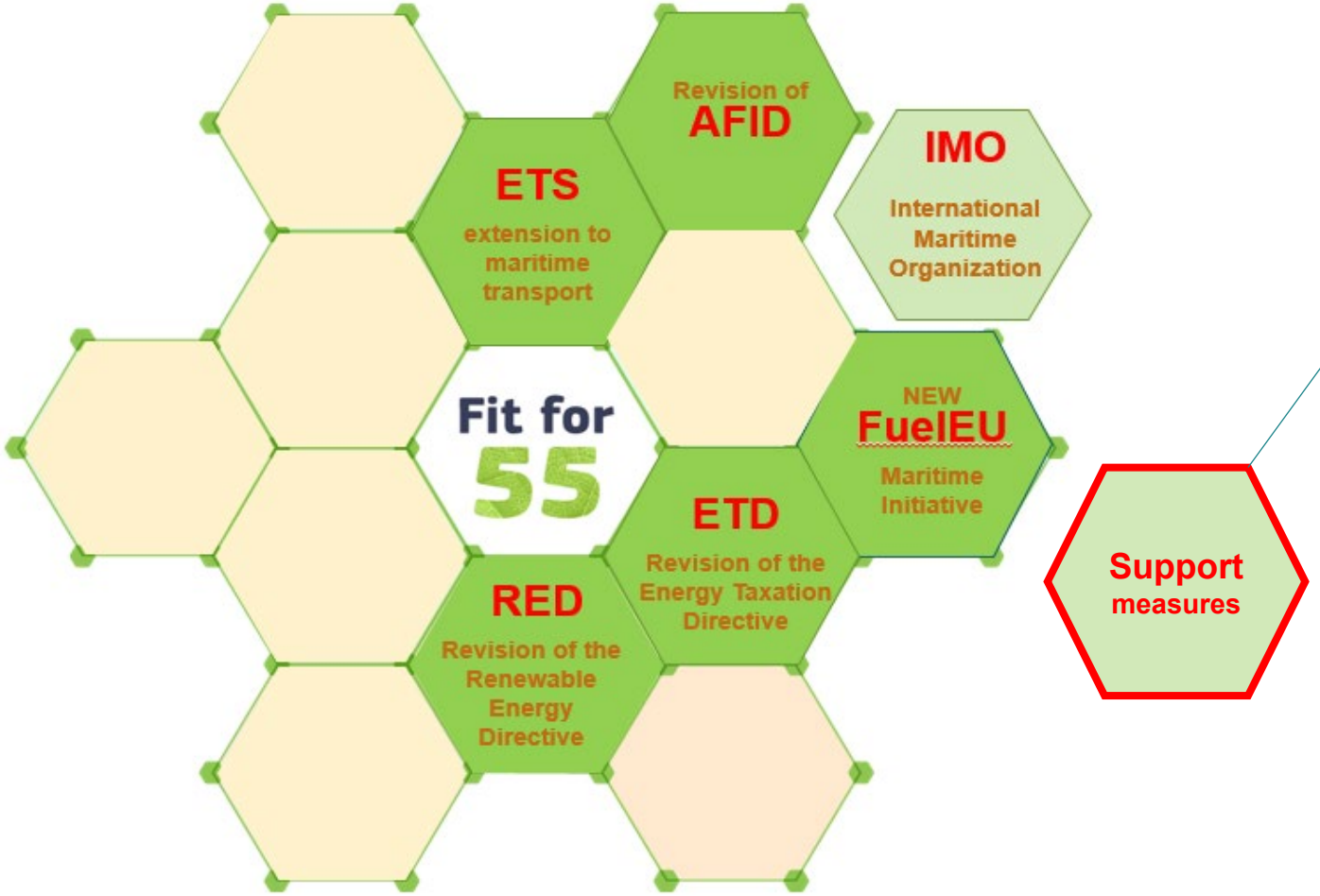
How to reduce emissions?

- The decarbonisation of the sector requires:
  - **Improving energy efficiency** – i.e. using less fuel
  - **Greater use of renewable and low carbon fuels** – i.e. using cleaner fuels
  - **Economic incentives** for cleaner activities – tilt the level playing field.

European Commission

A basket of measures to address GHG emissions from shipping

pricing, targets, standards and support measures



Innovation: e.g.
- Horizon Europe
- Innovation Fund

Strategic Research and Innovation Agenda under Zero - Emission Waterborne Transport Partnership

European Commission

Supporting the decarbonisation of shipping through the Innovation Fund and auctioning revenues

- Some projects in the waterbone sector have already been selected for IF support (HyPush, fuel cell pusher boat for inland navigation, SUSTAIN-SEA, reducing emissions from maritime transport using wind, SOL, sugar for sustainable marine fuel blend, FirstBio2Shipping, bio-LNG for marine shipping).

- Maritime support under the Innnovation Fund:

    - Support projects contributing to the decarbonisation of the maritime sector, including investments in: Energy efficiency of ships, ports, short-sea shipping. Electrification of the sector. Sustainable alternative fuels (such as hydrogen and ammonia from renewables). Zero emissions propulsion technologies (wind). Innovation in regard to ice class ships.

    - Address its full climate impact, including black carbon emissions;

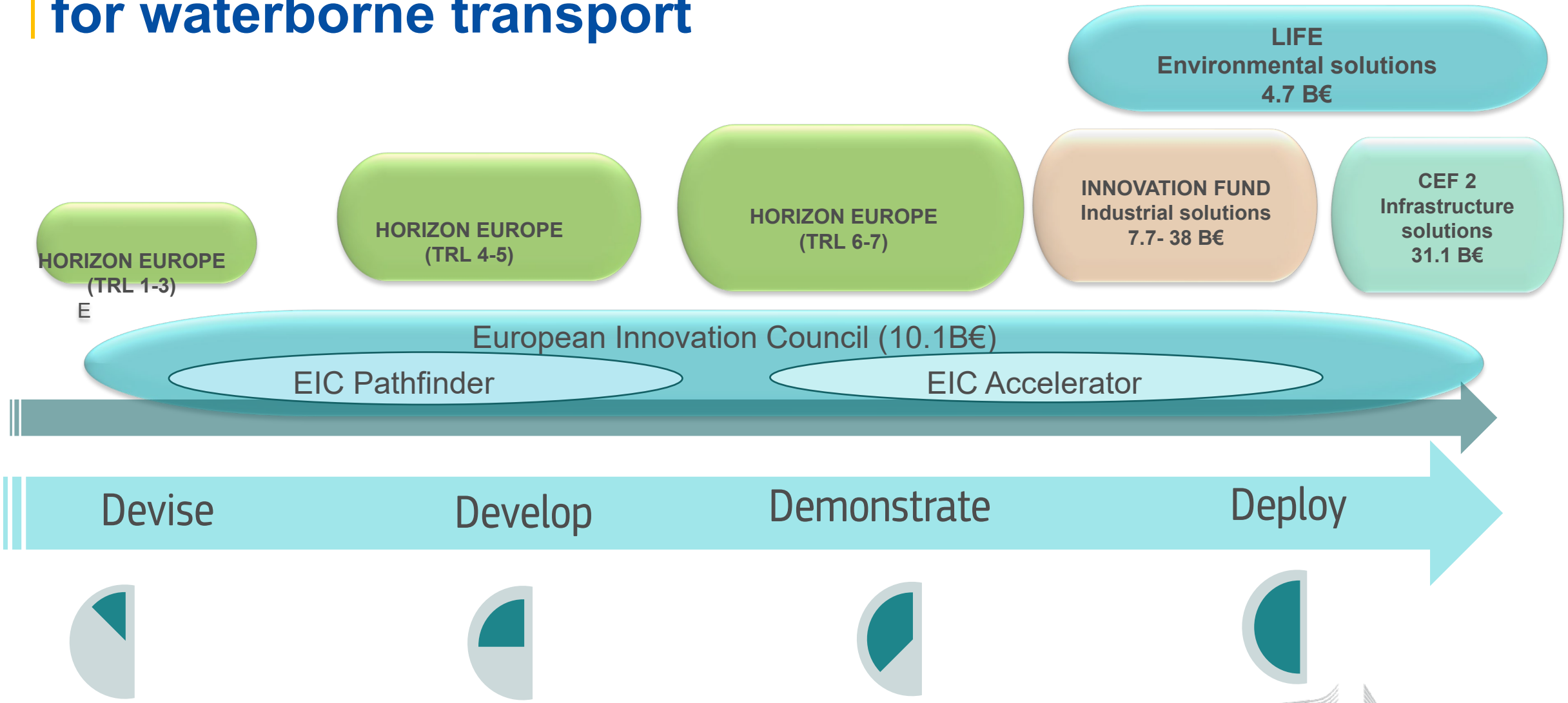
    - Specific criteria taking particular account of the potential for increasing biodiversity protection and for reducing noise and water pollution from projects and investments;

    - Projects with clear added value for the Union shall be eligible;

    - Up to 2030, the Innovation Fund should deploy around **20 million allowances** to accelerate the decarbonisation of the maritime sector.

- In addition, Member States are encouraged to use auctioning revenues for the decarbonisation of the sector and the protection of marine biodiversity.

Synergies between EU programmes to deliver solutions for waterborne transport



European Commission

Examples: cinea.ec.europa.eu/system/files/2021-06/Exploitation_success_stories_H2020-2020_rev.pdf

HORIZON EUROPE 2021-27 €95.5 billion

SPECIFIC PROGRAMME: EUROPEAN DEFENCE FUND

Exclusive focus on defence research & development

- Research actions
- Development actions

SPECIFIC PROGRAMME IMPLEMENTING HORIZON EUROPE & EIT*

Exclusive focus on civil applications

Pillar I — EXCELLENT SCIENCE

- European Research Council
- Marie Skłodowska-Curie
- Research Infrastructures

Pillar II — GLOBAL CHALLENGES & EUROPEAN INDUSTRIAL COMPETITIVENESS

Clusters

- Health
- Culture, Creativity & Inclusive Society
- Civil Security for Society
- Digital, Industry & Space
- Climate, Energy & Mobility
- Food, Bioeconomy, Natural Resources, Agriculture & Environment

Waterborne Transport

- Joint Research Centre
- EU Missions

Pillar III — INNOVATIVE EUROPE

- European Innovation Council
- European Innovation Ecosystems
- European Institute of Innovation & Technology*

WIDENING PARTICIPATION AND STRENGTHENING THE EUROPEAN RESEARCH AREA

- Widening participation & spreading excellence
- Reforming & Enhancing the European R&I system

EURATOM

- Fusion
- Fission
- Joint Research Center

* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

Cluster 5 Climate, Energy & Mobility — **€15.123 billion** (including €1.35 billion from NGEU)

European Commission

Overview of European Partnerships

HORIZON EUROPE PILLAR II - Global challenges & European industrial competitiveness

CLUSTER 1: Health

- Innovative Health Initiative
- Global Health Partnership
- Transformation of health systems
- Chemicals risk assessment
- ERA for Health
- Rare diseases*
- One-Health Anti Microbial Resistance*
- Personalised Medicine*
- Pandemic Preparedness* *Co-funded or co-programmed*

CLUSTER 4: Digital, Industry & Space

- Key Digital Technologies
- Smart Networks & Services
- High Performance Computing
- European Metrology (Art. 185)
- AI-Data-Robotics
- Photonics
- Made in Europe
- Clean steel – low-carbon steelmaking
- Processes4Planet
- Global competitive space systems**

CLUSTER 5: Climate, Energy & Mobility

- Clean Hydrogen
- Clean Aviation
- Single European Sky ATM Research 3
- Europe's Rail
- Connected and Automated Mobility (CCAM)
- Batteries
- Zero-emission waterborne transport
- Zero-emission road transport
- Built4People
- Clean Energy Transition
- Driving Urban Transitions

CLUSTER 6: Food, Bioeconomy, Agriculture, …

- Circular Bio-based Europe
- Rescuing Biodiversity to Safeguard Life on Earth
- Climate Neutral, Sustainable & Productive Blue Economy
- Water4All
- Animal Health & Welfare*
- Accelerating Farming Systems Transitions*
- Agriculture of Data*
- Safe & Sustainable Food System*

Institutionalised Partnerships (Art 185/7)
Institutionalised Partnerships / EIT KICs
Co-Programmed
Co-Funded

* *Calls with opening dates in 2023-24*
** *Calls with opening dates not before 2022*

PILLAR III - Innovative Europe

EIT (KNOWLEDGE & INNOVATION COMMUNITIES)

- InnoEnergy
- Climate
- Digital
- Food
- Health
- Raw Materials
- Manufacturing
- Urban Mobility
- Cultural and Creative Industries

SUPPORT TO INNOVATION ECOSYSTEMS

- Innovative SMEs

CROSS-PILLARS II & III

- European Open Science Cloud

European Commission

Horizon Europe – Waterborne Transport

EU Budget:

- **Partnership: €530 M**
- Collaborative R&I €100 M + other parts of the program

Private side commitment: € 3.3 Bn

Public

European Commission:

- DG RTD
- DG MOVE
- DG CLIMA

Private

Waterborne Technology Platform

>120 members representing entire sector (classification societies, shipbuilders, shipowners, maritime equipment manufacturers, infrastructure and service providers, universities or research institutes)

https://www.waterborne.eu/

European Commission

Zero-emission waterborne transport partnership

Objectives:

Using R&I to develop and demonstrate zero-emission solutions for all main ship types and services by 2030 which will enable zero-emission waterborne transport by 2050.

Eliminating **GHG emissions** from new ships and retrofitted existing ships by means of sustainable alternative climate-neutral fuels, renewable energies, electrification and energy efficiency.

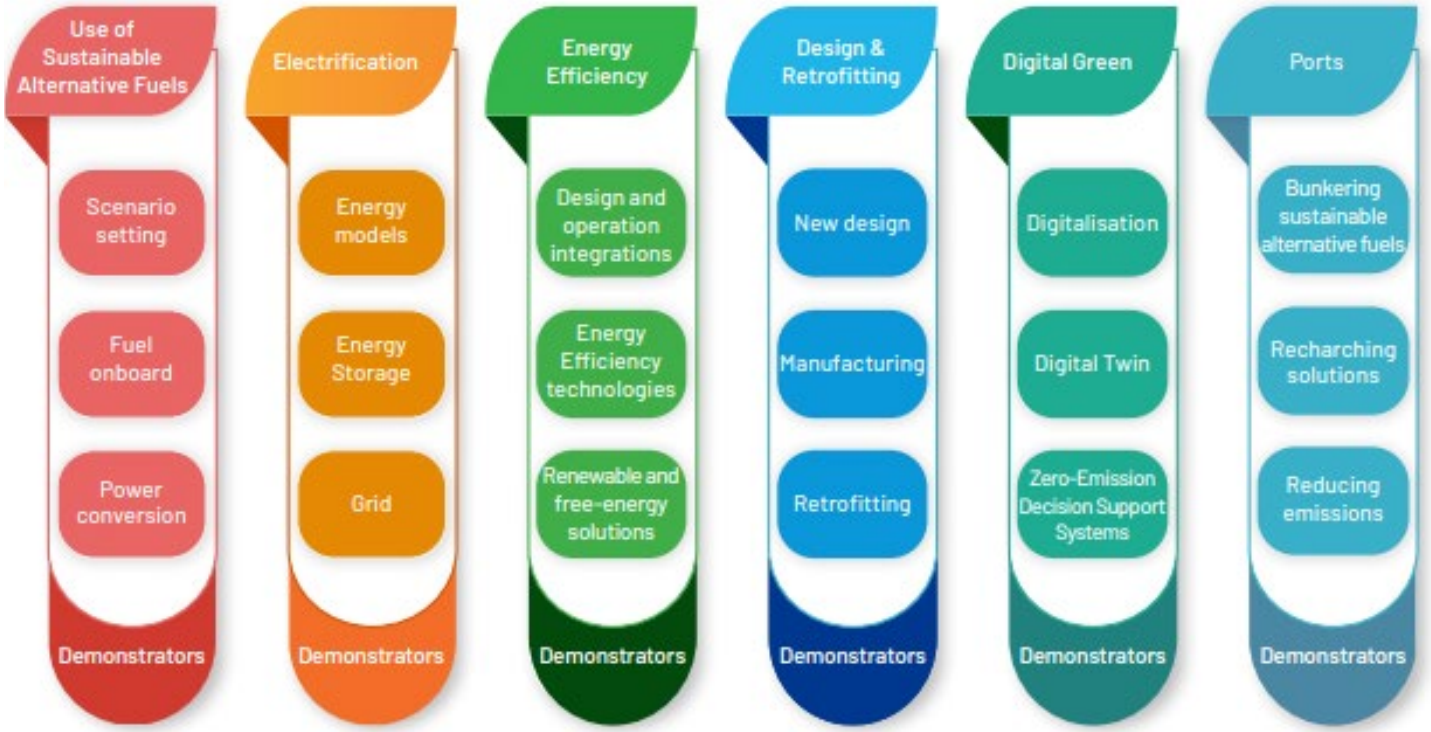
Cutting coastal and inland pollution to air by at least 50% compared to current levels

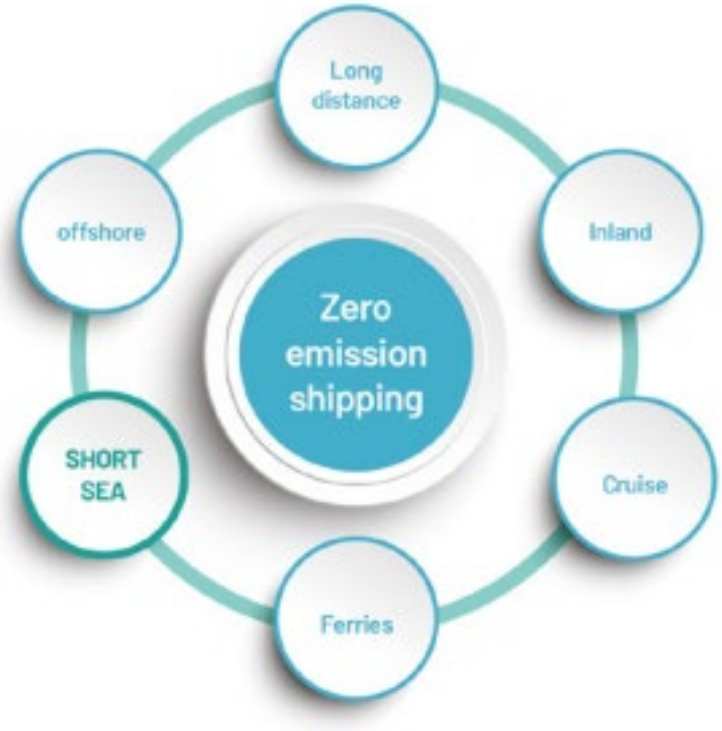
Elimination of pollution to water (including harmful underwater noise) from ships

Zero-Emission Waterborne Transport

European Commission

Zero-Emission Waterborne Transport Partnership
Strategic R&I Agenda





European Commission

Waterborne Transport - Horizon Europe

Zero Emission Waterborne Transport Partnership	• On board integration
Clean Hydrogen Joint Undertaking	• Technology building blocks for various applications
Co-programmed partnership Batteries4EU	• Battery technologies for various applications
EU Mission: Climate-Neutral and Smart Cities	• Port cities
EU Mission: Restore our Ocean and Waters	• Shipping Contribution to Blue Economy

Questions & Answers

Source: job-hunt.org

Thank you

European Commission

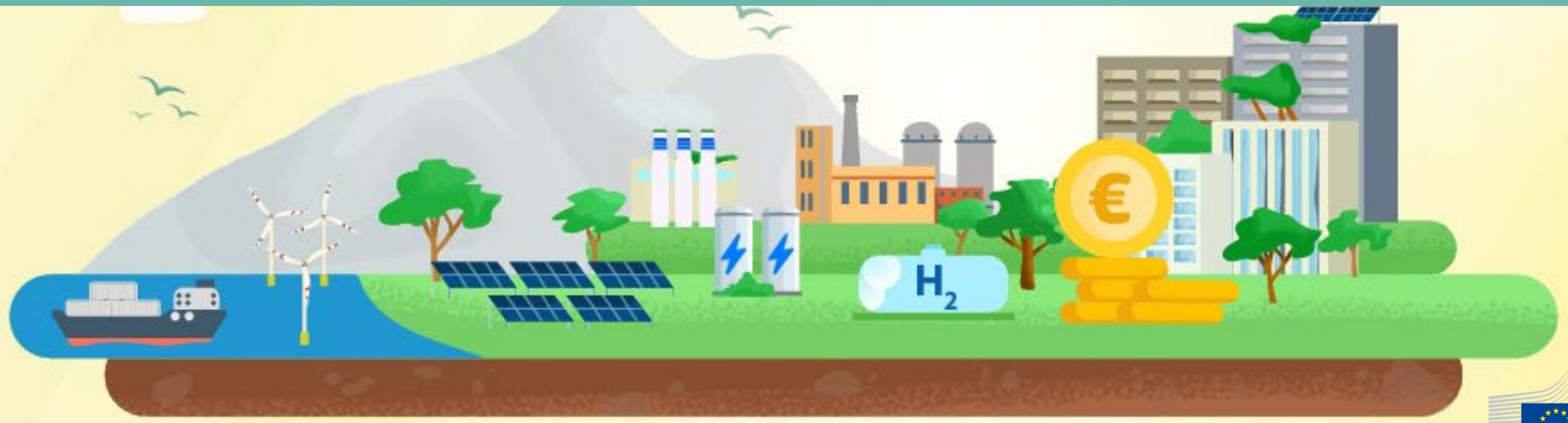
Innovation Fund -*Stakeholder insights*

CLIA, ECSA, ESPO, SEA Europe,Waterborne TP,

Maritime Sector

Cruise Lines International Association (CLIA), European Community Shipowners Association (ECSA), European Sea Ports Organisation (ESPO), Shipboard and Maritime Equipment Association of Europe (SEA Europe), European Research and Innovation Platform for Waterborne Industries (Waterborne);

13 June 2023



European Commission

The following presentation should serve as an indicator of what is known that the sector is developing right now. The technologies and timelines stated have not been academically or scientifically validated. Considering the short timeline to produce this overview, not all individual stakeholders may have been consulted resulting in a list of recommendation that cover a majority view based on the experience of the five association involved in the development of this presentation. This presentation is not intended to be used as prediction for the pathway until 2050, but instead should showcase what are most – likely, known options for the purpose of designing funding options that match these immediate needs.

Disclaimer

Cruise Lines International Association (CLIA), European Community Shipowners Association (ECSA), European Sea Ports Organisation (ESPO), Shipboard and Maritime Equipment Association of Europe (SEA Europe), European Research and Innovation Platform for Waterborne Industries (Waterborne)

European Commission

Overview of the sector and innovative technologies

Cargo, Passenger, Offshore

Vessels (incl. Short Sea Shipping and Deep Sea Shipping)

- *23.000+ vessels (EU only)*
- *39% of the Worlds Fleet*

*Our key concern is the **lack of availability** of **low and zero carbon fuels** at **commercial scale**. The **price gap** between conventional and low- and zero- carbon fuels should be lowered. **R&D, innovation and deployment** of low- and zero- carbon fuels and propulsion technologies on board vessels is key.*

Maritime Cruise

- *400+ vessels ranging from 150 passenger to 6000+*

*In line with the overall Maritime Industry, Cruising has **not committed to one single fuel** option and keeps research, trials, testing and investment focused on a **variety of different energy sources**. The sector is a testbed to introduce innovative solutions into the maritime industry.*

Maritime Infrastructure and Logistics

- *300 Maritime Ten-T ports (+ hundreds of non-Ten-T) /800+ terminals*

*The provision of electricity for **Onshore Power Supply**, fuel **infrastructure for renewable fuels** and **carbon capture** is no only important for **maritime**, but also for the **hinterland**. Production, import, export and distribution are **logistically handled** through a **network** of ports.*

Maritime Shipbuilding and Equipment

- *150+ shipyards, 60 billion turnover**
- *6% global market share / 35% for marine equipment*

*Shipbuilding is a **strategic asset** in Europe (infrastructure + national security). We are a **world leader** in technology. The **Energy Efficiency potential** from one generation of ship to the current one is **a double-digit percentage** without considering alternative fuel option. The effect of a reduction of total cost of ownership, due to efficiency in the value chain is enormous.*

Technologies listed in this report → *In development progress*

Energy Efficiency

focus on technology enhancement in hull and propulsion design; digitalization, route adjustment, Onshore Power Supply, use of renewable energy sources(e.g., wind assisted propulsion), alternative energy sources for certain ship types.

Multi Fuel Engines

dual (multi) fuel engines with LNG, bio-diesel, methane, methanol;

Low and Zero Carbon Fuels

liquified synthetic methane, green methanol towards hydrogen using fuel cell technology; carbon capture; batterie technology; hydrogen as fuel;

European Commission

Planned pipeline of innovative projects

Refitting

- *Immediate focus on* Energy Efficiency design *solutions with a strong drive towards using* drop-in fuel *option in current engines.* Fuel Cell technology *is at an early stage.* Multifuel engines *are being refitted when commercially viable.*

New Build

- Drop in Fuels *remain high on the agenda with* Fuel Cell technology *being at its beginning.* Methanol *is a viable option with* Ammonia *become increasingly interesting.* Electricity *for Short Sea shipping and Ferries are tested at scale.* Wind and Hydrogen *have potential once efficiency increases.* Carbon Capture *needs a regulatory and research framework. An increased safety risks remains a concern.*

Electrification

- *Development and upscaling of* Onshore Power Supply installations *for providing electricity to ships at berth, allow for battery charging or* battery swapping, *integrating Onshore Power Supply into overarching* port electrification
- *Development of smart* energy grids, microgrid solutions *and* storage capacity.

Bunkering Infrastructure for new Fuels

- *Extensive infrastructure development to* bunker fuels with lower energy density, higher storage capacity need *and higher* safety risks

Carbon Capture, Usage and Storage

- *Storage facilities*
- *Pipelines*

Greening of Port operation

- *Development and retrofitting of port equipment propelled by renewable fuels; optimize refuelling solutions*

Technologies listed in this report → *In development progress*

Energy Efficiency
focus on technology enhancement in hull and propulsion design; digitalization, route adjustment, Onshore Power Supply, use of renewable energy sources(e.g., wind assisted propulsion), alternative energy sources for certain ship types.

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Technology Readiness Level (TRL) of envisaged projects

TRL versus Efficiency versus Choice
Although options are existing, energy efficiency, scalability, safety and price are factors that hinder a faster deployment, broad acceptance and progress in TRL.

TRL 6-9 → *TRL 3-5*

Energy Efficiency
focus on technology enhancement in hull and propulsion design; digitalization, route adjustment, Onshore Power Supply, use of renewable energy sources(e.g., wind assisted propulsion), alternative energy sources for certain ship types.

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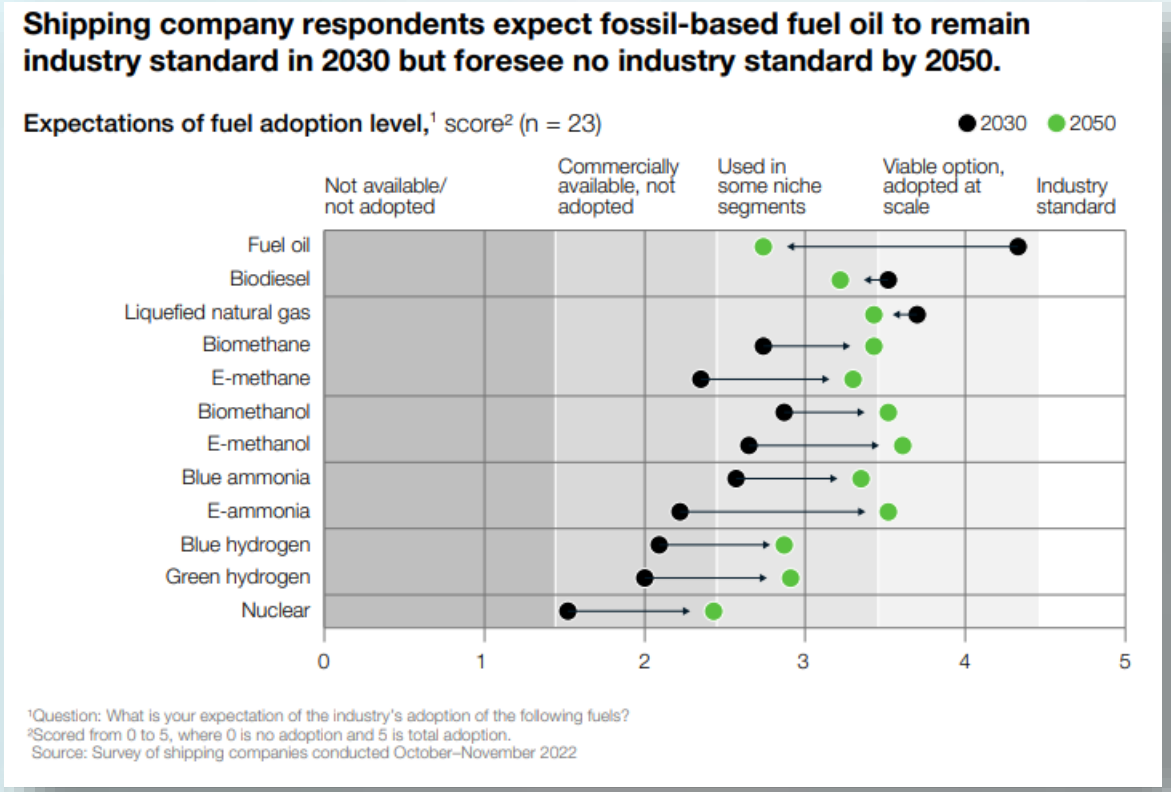

Reference: https://cms.zerocarbonshipping.com/media/uploads/documents/The-Shipping-Industrys-Fuel-Choices-on-the-Path-to-Net-Zero.pdf

European Commission

Type of support required

It is important to consider that multiple technologies may be installed on one ship – funding calls need to allow for a multitude of technologies on one vessel

Project	Type	CAPEX	OPEX	Vehicle
Onshore Power Supply installation for ship to shore electricity connection, recharging of batteries and wider energy grid connection	Grant for CAPEX Funding for OPEX	Installation and grid infrastructure	Tax restriction on electricity	Innovation Fund CEF / AFIF
Refitting or New Building of vessels with multi fuel engines	Grant for CAPEX Funding for OPEX	Grant for technology and equipment and retrofitting	Price cap on fuel, initial funding for fuel uptake,	Innovation Fund Invest EU Programme
Battery Technology – Electrical Storage	Grant for CAPEX Funding for OPEX	Grant for technology, equipment and retrofitting	Tax restriction on electricity, funding for price stability	Innovation Fund EU Investment Fund
Fuel Cell Development and Deployment	Grant for CAPEX Funding for OPEX	Research, deployment and installation using multiple source fuels	Funding for price stability of initial fuel source	Innovation Fund EU Investment Fund
Carbon Capture, Usage and Storage	Grant for CAPEX Grant for OPEX	Research, development, installation, infrastructure	Usage, sealing and continuous monitoring	Innovation Fund EU Investment Fund
Energy Efficiency / Digitalization	Grant for CAPEX Grant for OPEX	New Build program for all types of vessels	Upgrade and integration of digital network	Innovation Fund Horizon Europe
Port Infrastructure and equipment (Bunkering of renewable fuels, deployment of smart and efficient refueling solutions)	Grant for CAPEX Funding for OPEX	Research on strategic need within TENT; Installations	Operation in accordance to new safety requirements	Innovation Fund AFIF /CEF /Horizon
Vessel design (including safety aspects due to new fuel, hull design, energy density and distribution requirements)	Grant for CAPEX Funding for OPEX	Installation and upgrade; New build program	Loss of onboard space; insurance cost;	Innovation Fund Horizon Europe
Waste to Energy	Grant for CAPEX Funding for OPEX	Research and development to create Business Case; Installation	Compounding deployment; waste reception facilities;	Innovation Fund Horizon Europe
Increasing production of low and zero carbon fuels dedicated to the maritime sector	Grant for CAPEX Auction Mechanism (such as Contract for Difference)	Research, installation, deployment; scaling up the production	Contract for Difference to ensure uptake and secure production; Price cap on fuel, initial funding for fuel uptake,	Innovation Fund

Size and amount of financial support required

Project
Onshore Power Supply installation for ship to shore electricity connection, recharging of batteries and wider energy grid connection
Refitting of vessels with multi fuel engines
Battery Technology – Electrical Storage
Fuel Cell Development and Deployment
Carbon Capture, Usage and Storage
Energy Efficiency / Digitalization
Port Infrastructure and equipment (Bunkering of renewable fuels, deployment of smart and efficient refueling solutions)
Vessel design (including safety aspects due to new fuel, hull design, energy density and distribution requirements)
Waste to Energy
Increasing production of low and zero carbon fuels dedicated to the maritime sector

Size of Innovation Fund Auction

- *SMALL*
- *MEDIUM*
- *LARGE*

Consideration should be given to include dedicated calls in all three categories. The multitude of actors in this sector is diverse in size, capability and geographical distribution, resulting in the need for different sizes of funding opportunities.

Estimated Financial Support needed

- *9.9 Billion according to Europparl Research*

The variety of the sizes of projects are showcased in the appendices. This should reiterate the point that all three sizes of calls are needed for the sector.

European Commission

References: https://www.europarl.europa.eu/RegData/etudes/ATAG/2022/729395/EPRS_ATA(2022)729395_EN.pdf

Conclusions and recommendations

Fuel

- *Contribute to* **lowering the price gap** *between conventional and low- and zero- carbon fuels*
- **Fund R&D** *and innovation projects for low- and zero-carbon fuels and propulsion technologies considering* **operational and critical safety issues** *associated with the supply and use of low- and zero-carbon fuels*
- **Fund the scaling up and deployment** *of low- and zero-carbon fuels and propulsion technologies on board vessels (for example via Contract for Difference)*

Ship

- *Keep supporting* **Energy Efficiency** *measures also enabled by digital technologies*
- *Support for* **Drop-in-fuel deployment** *and usage*
- *Uptake of* **Onshore Power Supply**
- **Deployment of a first prototype** *such as Fuel Cell and Carbon Capture trial*
- **First industrial deployment** *for Fuel Cell, Carbon Capture and Multi fuel engines; low and zero Carbon Fuels such as Hydrogen (retrofitting and newbuild program)*
- **Electrification** *of Short Sea Shipping, Inland Waterways and Ferries*

Infrastructure (and logistics)

- **Strong focus on RFNBO** *production (quantity) import, export, storage, economic viability (price) and availability (infrastructure)*
- *Deployment and upscaling of* **Onshore Power Supply** *installations for charging and operation in port including*
- **Carbon Storage facilities**
- **Greening of Port operation** *support the deployment of and RD&I into the use of port equipment propelled by renewable fuels as well as smart refueling solutions. (including supply chain optimization)*

Case studies

Sample Projects listed in the Appendices

- *Battery Technology*
- *Carbon Capture*
- *Fuel Cell Development*
- *Retrofitting Dual Fuel Engines*
- *Digitalization*
- *Hull Design*
- *Onshore Power Supply*
- *Port Infrastructure and Equipment*

See appendices for detailed information

Past Projects

- Research ship ZEUS (for hydrogen)
- Refitting of Grimaldi Cruise Roma and Barcellona (for refitting and installation of batteries)
- Ocean Infinity-Armada (for Ammonia-ready)
- Yara Birkeland (for electric and autonomous)
- Orcelle Wind: https://www.walleniuswilhelmsen.com/news-and-insights/highlighted-topics/orcelle (Factsheet: https://www.walleniuswilhelmsen.com/storage/images/OrcelleWindFactsheet2021.pdf)
- Topeka: https://www.topeka.no/ Topeka is waiting for any progress to happen on the hydrogen/ammonia side. So in that respect it shows how some new maritime innovation projects are dependent on progress being made in other parts of the value chain as well (i.e. need for CfDs or CCfDs).
- Eidesvik: https://eidesvik.no/innovation/eidesvik-and-ship-fc-piloting-ammonia-fuel-cell-for-zero-emission/ Good example of how you can do an innovative project while testing/on contract as well.
- One Dutch innovative project is related Dutch Maritime Masterplan focuses on R&D for the transport sectors including maritime. These focus on hydrogen, methanol and LNG and CCS (LNG zero) in the phase of R&D with matching TRLs. Ships are involved in a way that applying innovative technologies on board of the vessel is part of the research project. Furthermore projects with wind assisted propulsion are begin undertaken by a few Dutch shipowners. The masterplan can be found here: Maritime Master Plan - Nederland Maritiem Land

Appendices

Sample Projects currently under development

Battery Technology (showcasing project of one cruise operator)

Project	Battery Energy Storage System (BESS)	
Status	Close to finalisation	
Technology	10 MWh BESS−first of its kind demonstrator	
Timeline	Aug. 2019 to Sept. 2024 (from concept studies to realisation)	
Project costs	Over € 14 Million	
Goal	(a) Peak Load Shaving, (b) Spinning Reserve, (c) Zero Emission Operation At Port	
Need for grant support from Innovation Fund due to the substantial upfront capital expenditure (CAPEX) required		

Carbon Capture Technology (showcasing project of one cruise operator)

Project	Onboard Carbon Capture	
Status	Prototype Testing	
Technology	Small scale pilot of an onboard carbon capture system	
Timeline	Q2. 2024	
Project costs	Est. $ 2 Million	
Goal	Up to 5% capture and storage of CO2 from the exhaust stream.	
Need for grant support from Innovation Fund due to the substantial upfront capital expenditure (CAPEX) required		

Fuel Cell Technology (showcasing project of one cruise operator)

Project	Solid Oxide Fuel Cell	
Status	Concept	
Technology	Small scale pilot onboard a newbuild vessel	
Timeline	2026	
Project costs	Est. $ 10 Million	
Goal	LNG powered SOFC for increased efficiency and elimination of methane slip.	
Need for grant support from Innovation Fund due to the substantial upfront capital expenditure (CAPEX) required		

Thermo-Catalytic Methane Decomposition:

Hydrogen production with Solid Carbon Capture

Project		
Status	TRL 7	
Technology	LNG to TMD (6 MW) + SCC Liquid Natural Has to Thermo-catalytic Methane Decomposition (TMD) and Solid Carbon Capture (SCC)	
Timeline	Prototypes still under development BOG management for the LNG only Infrastructure needed to handle the solid carbon onboard and ashore (Solid carbon is a product which can have a market, so it is not a waste)	
Project costs	Estimated project Capex – approx. € 15m	

- Develop a study for the production of Hydrogen via Thermo-catalytic Methane Decomposition (TMD)
- During the TMD reaction, methane molecules are decomposed to give hydrogen (gas) and carbon (solid)
- The process would be integrated with a Solid Carbon Capture (SCC) system
- The process would enable a reduction of more than 50% in CO2 emissions
- TMD and SCC onboard allow continued use of existing assets and infrastructure
- Least energy-intensive solution for decarbonization
- TMD would deliver approx. 6 MW capacity, covering all hotel loads of the ship at berth

LH2 to PEMFC – power generation at berth

Project		…
Status	TRL 7	
Technology	LH2 to PEMFC (6 MW) Liquid Hydrogen (LH2) to Proton-Exchange Membrane Fuel Cells (PEMFC)	
Timeline	Not established process No existing components for BOG management (e.g., Compressors) and LH2 pumps for marine applications No existing applications in the cruise segment Challenging simultaneous operations	
Project costs	Estimated project Capex – approx. € 70m	

- Develop a handling and storage system for Liquid Hydrogen (LH2) onboard new building cruise ship class
- LH2 would fuel Proton-Exchange Membrane Fuel Cells (PEMFC)
- LH2 to PEMFC would operate primarily when ships are in European ports to provide zero-emission energy to the ship hotel loads
- PEMFC would deliver approx. 6 MW capacity, covering all hotel loads of the ship at berth
- The LH2 tank capacity would be about 230 m3
- When berthed in TEN T ports, the cruise ships hotel load would be:
- From shore power connection, when available
- From LH2 to PEMFC, or from LBG (Liquefied Bio Gas) to DF gensets

- Developing a study to identify:
- Green LH2 production sites, configuration of LH2 transportation and value chain to TEN T European ports called by MSC cruise forthcoming ships
- LH2 storage and handling configuration onboard cruise ship
- LH2 bunkering and simultaneous operations
- Alternate use of LNG / LH2 in the same containment system onboard
- Alternative design/risk assessment approach, as required by IGF (Part A), since no prescriptive hydrogen requirements are available in IGF
- Configuration and best operating scenario of PEMFC modules to deliver the required hotel load at port during the ships' lifecycle

Retrofitting Multi Fuel Engines (showcasing project of one cruise operator)

Project	Retrofitting existing cruise vessels to operate on dual fuels – diesel and green methanol	…
Status	TRL 3	
Technology	Conversion of two cabins into MeOH bunker stations, conversion of two existing HFO tanks into MeOF storage tank, Fuel Preparation Space build up, including mech ventilation, structural modification, pipe routing, electrical cabling and termination, automation Conversion of one 12V 48/60 CR engine to 12V 51/60 DF-M engine, with all mechanical, electrical and automation components, including systems downstream of FPS to exhaust gas duct top	
Timeline	Initial analysis start in 2022 Feasibility Study completed Apr 2023 Third-party classification society documents review – from June 2022 thru Sept 2025 Onboard structural and piping modifications and installation – From Jan 2024 thru Sept 2025 Onboard engine conversion, FPS to engine systems, exhaust systems – From June 2025 thru Sept 2025 Aim to test by year-end 2025	
Project costs	For initial conversion, ~$15 million per ship, which includes 1 engine and supporting systems.	
Need for financial support from Innovation Fund due to substantial upfront capital expenditure (CAPEX) required		

Methanol as a Fuel (Ammonia)

Project	Methanol Retrofit	Methanol and Fuel Cell Retrofit	Dual Fuel Engine (Methanol)	Dual Fuel Engine (Ammonia)
Status	Design for Approval in Principle	In the pipeline	Onboard testing	Research and design phase
Technology	Retrofit of an existing vessel to tri-fuel methanol / MGO / HFO	Retrofit conversion to methanol as fuel + fuel cell integration	Retrofit vessel with a methanol engine (dual fuel)	Retrofit vessel with Ammonia powered engine
Timeline	Q2. 2026 dry docking	Jun. 2023 to Dec. 2028	Currently tested onboard	Earliest 2025
Project costs	Est. € 20 Million (CAPEX)	Over € 130 Million (CAPEX + 2years OPEX)	€ 20 Million (CAPEX) +	€ 20 Million (CAPEX) +
Goal	GHG reduction through fuel flexibility Reduction in local pollutants in port	Climate neutral operations	Retrofit dredging vessel; retrofit cargo operation	Retrofit cargo vessel
Need for grant support from Innovation Fund due to the substantial upfront capital expenditure (CAPEX) required				

Inland Waterways

Project	Condor H2
Status	In preperation
Technology	Condor H2 will provide fuel-cells with a battery pack as well as hydrogen storage on a pay-per-use basis to enable zero-emission shipping with limited up-front investments for ship owners. The hydrogen will be delivered in ‘tanktainers’ which can be easily loaded on board and quickly swapped when empty, allowing maximum flexibility for longer journeys. It includes newbuilding or retrofitting of existing vessels
Timeline	2023 - 2028
Project costs	Est. € 170 million
Goal	Emission-free inland and near-shore shipping on hydrogen, using an innovative system of special ‘tanktainers’.
Need for grant support from Innovation Fund due to the substantial upfront capital expenditure (CAPEX) required	

OPS Electricity (showcasing project …)

Project	On shore power supply (OPS)	
Status	Many OPS system deployments in port area still in test phase, requiring technological advances to get to TRL 9	
Technology	Supply of shore side electricity as part of an integrated electricity provision and management in the port area.	
Timeline	Deployment of OPS in Europe's ports is ongoing, with frontrunners having installations already now and foreseen by 2026/2027. Most likely another deployment will follow, with deployment before 2030. Speed and success of OPS deployment will depend on innovative solutions and adequate funding.	
Project costs	10 mln on average – CAPEX can vary between 1 and 25 mln depending on the complexity of the installation.	
Goal	Each OPS installation needs to be built in accordance with the specificities and characteristics of each port, requiring innovative solutions including in the areas of fixed, mobile or floating installations, grid connectivity and capacity (grid upgrading, smart grids, microgrids), converter stations, battery charging, energy storage systems, voltage variations, supply efficiency.	
Need for grant support from Innovation Fund due to the substantial upfront capital expenditure (CAPEX) required and lacking business model (OPEX)		

PORT Infrastructure and Equipment (showcasing project of one port)

Project	H2Ports project	
Status	The project will involve the first tests of hydrogen technologies for port handling equipment in Europe.	
Technology	The project includes piloting, evaluating and demonstrating new Fuel Cell (FC) technologies	
Project costs	Small scale project, approx. 4 million euros	
Goal	The project includes piloting, evaluating and demonstrating new Fuel Cell (FC) technologies oriented towards increasing energy efficiency, emissions reductions and the safety of port terminals. The initiative will test and validate hydrogen technologies on port machinery with the aim of having applicable and real solutions without affecting the performance and safety of port operations and producing zero local emissions.	

Innovation Fund

Session Moderation

13 June 2023

European Commission

Session Moderation

Maritime

Jonathan Köhler

We want to hear your views and your experience

1. What are the most promising technologies and strategies for reducing emissions in this sector?
2. What are the main lessons learned from recent projects implemented in Europe, and how to avoid repeating mistakes in new projects?
3. Which areas would benefit from auctions in addition or as an alternative to grants? What additional funding measures are required?

What are the most promising technologies and strategies for reducing emissions in this sector?

1

With regard to the topics

- Deep sea and cruise shipping zero-emission retrofit / replacement — 2
- Wind energy and re-routing — 1
- Ferry and tugs etc. zero-emission retrofit and replacement — 4
- Combinations of 1 – 6
- RFNBO fuel supply and associated bunkering — 3
- Shore power — 6
- Short sea-shipping zero-emission retrofit and replacement — 5

With regard to size of projects (CAPEX)

- EUR 0 – 20 million — a
- EUR 20 – 100 million — b
- Above EUR 100 million — c

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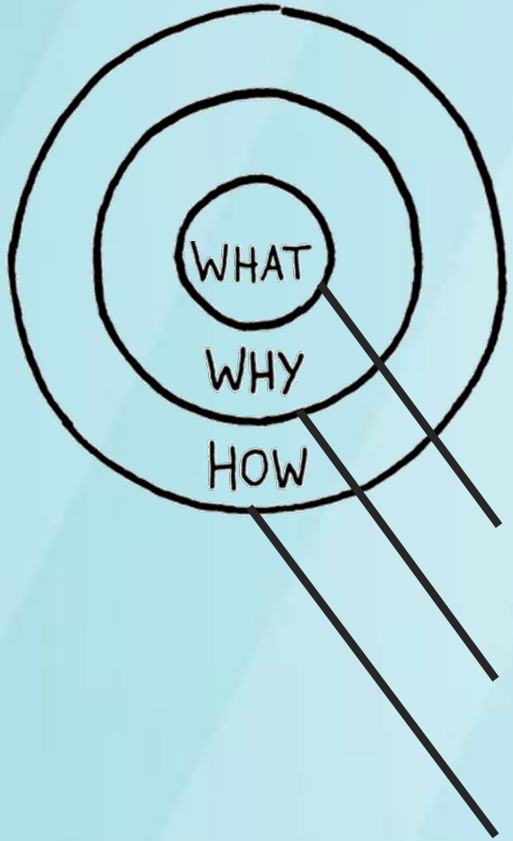
Portfolio of maritime-related IF-funded projects

- **GREENMOTRIL** - Development and operation of a GREEN energy community in the **comprehensive maritime port of Motril – construction of a photovoltaic pant (** grant € 4,347,980, location **Motril**, Spain)
- **FirstBio2Shipping** - First Bio-LNG to Marine Shipping – supply of biogas converted to Bio-LNG - **financing innovative iLNG technology for production of Bio-LNG form biogas which will be delivered to the marine industry as 100% drop-in fuel** (grant € 4,336,058, location Wilp, Netherlands).
- **HyPush** - **Construction of a fuel pusher boat** operating with two hydrogen fuel cells and a lithium battery designed for **inland** river navigation (grant € 3,233,190, location Paris, France)
- **SOL** – **Production of cellulose-to-crude sugar oil** (CSO) to be deployed as a sustainable marine fuel blend component for heavy fuel oil (HFO) (grant € 4,000,000, location Rotterdam, Netherlands)
- **SUSTAIN-SEA** - Reducing maritime transport CO2 emissions using wind energy – **deployment of wind sail technology on 5 vessels that will reduce the fuel consumption** (grant € 4,493,534, location Cantabria, Spain)

What are the main lessons learned from recent projects implemented in Europe, and how to avoid repeating mistakes in new projects?

2



What went well, or what did not go so well?

Why has this happened this way?

How could this experience be replicated (if positive) or avoided (if negative)?

Examples of factors that help avoiding negative experiences and enabling reliable paths for implementation

1. Adequate allocation of funds and contingency
2. Realistic schedule
3. Proper forecasting of barriers
4. Timely management of risks
5. Diligent design and implementation/construction planning
6. Diligent progress monitoring
7. Experienced, well-trained and committed project team
8. Good networking with suppliers, project partners, regulatory agencies, local politicians and communities
9. Well developed and comprehensive contract documents
10. Adequate investigation during project commissioning

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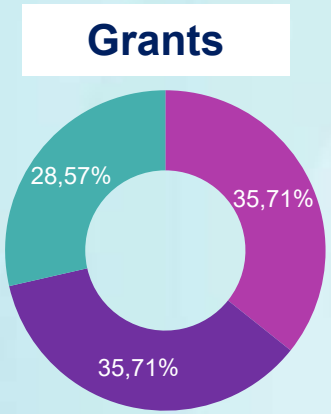
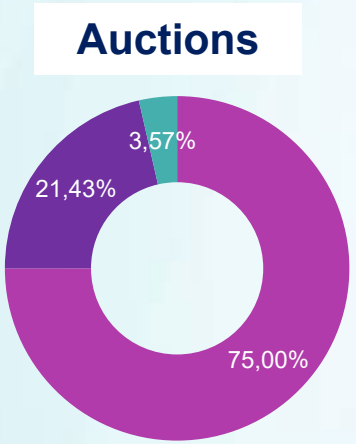
Which areas would benefit from auctions in addition or as an alternative to grants? What additional funding measures are required?

3

Grants (current IF funding) award up to 60 % of a project's relevant cost (i.e., funding gap over 10 years)





Auctions (i.e., competitive bidding) award a fixed premium or (carbon) contracts for difference type of support

Between 0% and 25% **Between 25% and 50%** **Higher than 50%**

Responses from maritime sector only

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Wrapping up: SLIDO polls [multiple choice]

1

What size of projects are you planning?

[ ] EUR 0 – 20 million
[ ] EUR 20 – 100 million
[ ] above EUR 100 million
[ ] N/A

2

What kind of projects are you planning?

[ ] Wind energy and re-routing
[ ] Deep sea and cruise zero-emission retrofit / replacement
[ ] Ferry and tugs zero-emission retrofit / replacement
[ ] Short sea-shipping zero-emission retrofit / replacement
[ ] Shore power
[ ] RFNBO fuel supply and associated bunkering
[ ] other

3

Which areas would benefit from auctions? Other funding measures required?

[ ] auctions are useful for the whole sector
[ ] auctions are useful for certain sectoral techs
[ ] public funding other than grants and auctions is required

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Q&A on slido

Join at

slido.com

#WGAC

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Thank you

https://cinea.ec.europa.eu/programmes/innovation-fund_en

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European Climate, Infrastructure and Environment Executive Agency

CINEATube

European Commission

Innovation Fund
Stakeholder Consultation event

13 June 2023 - In person and online

Break time 15:30 – 16:00 CEST

Next session in Room 0D (ground floor)

Please note the event is livestreamed and recorded.

European Commission