Decarbonising the Maritime Sector: Challenges and Opportunities

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Agenda

1. About Eurogas
2. What is the Current Legal Scenario?
3. What Challenges?
4. Solutions
5. Q&A

About Eurogas

Eurogas is the trade association for gaseous energies in Europe, including 105 members across 28 countries.

Our members cover:

- Gas wholesale and retail gas markets
- The distribution of natural gas, biomethane and hydrogen
- Gases use in the transport/mobility sector
- Technology providers including value chain methane emissions management

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What is the Current Legal Scenario?

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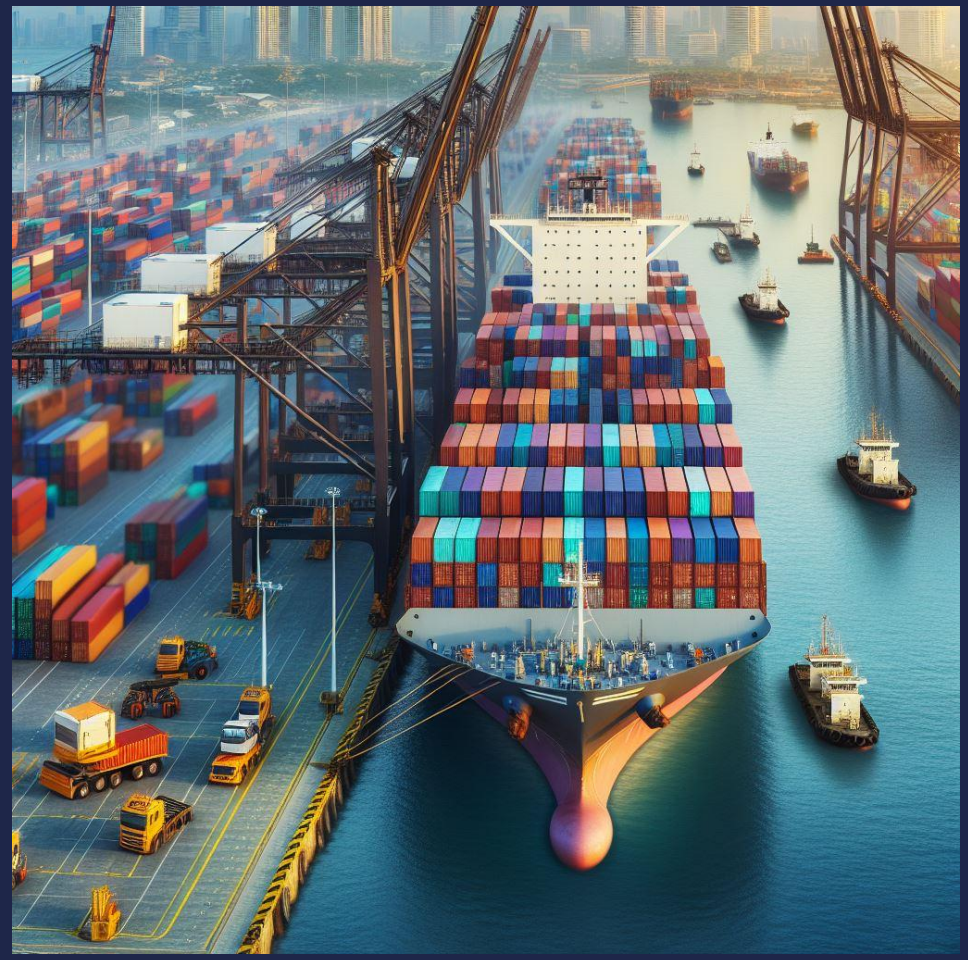
How to Decarbonise Shipping?

Public authorities' intervention required for a fair decarbonisation process

Legal instruments:

- FuelEU Maritime
- Renewable Energy Directive (RED)
- RED DA ‘Union Database’
- ETS II for Transport & Buildings
- EU MRV
- IMO

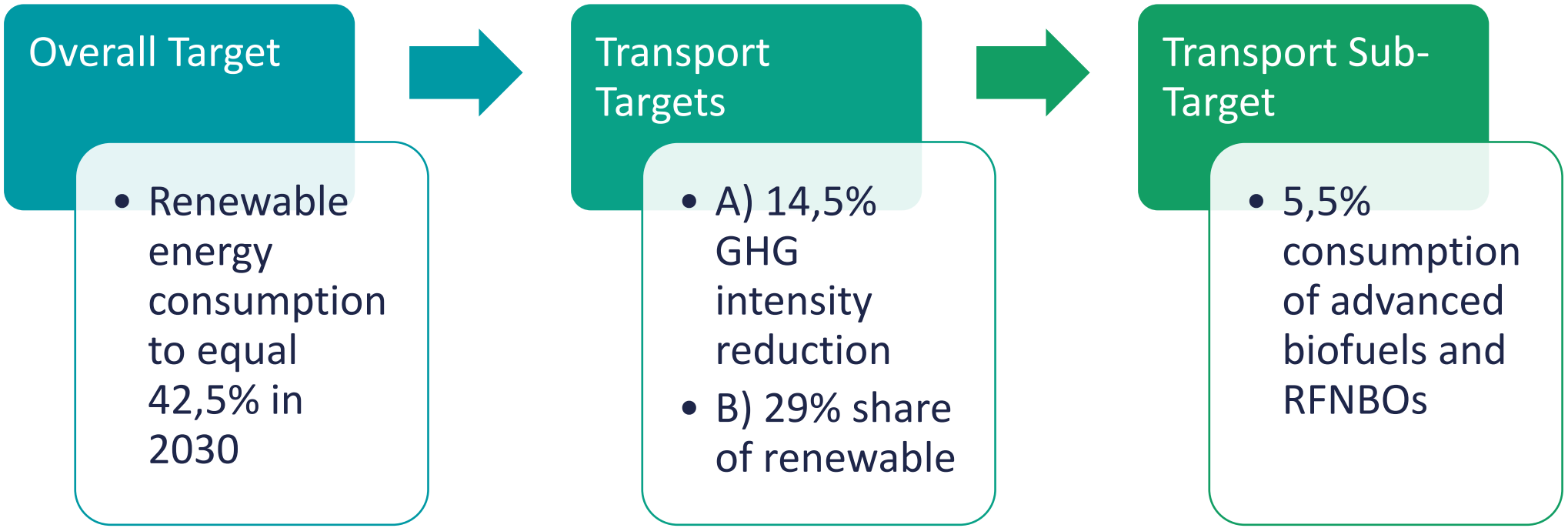


FuelEU Maritime

- Scope: vessels > 5000 GT used on intra-EU/EEA journeys
- Reduction of GHG intensity emissions (gCO2eq/MJ) at fleet level based on 2020 values
- Well-to-wake emissions calculation - Accounts for CO_2, CH_4 and NO_x emissions
  - GHGe [gCO_{2eq}] = WtT (fuel, electricity) + TtW (combustion, slip)
- Additional features:
  - Flexibility mechanism (banking and borrowing)
  - Pooling mechanism
  - MRV approach
  - Zero-Emission at berth in 2030/2035

GHG Reduction Targets	
Year	GHG Reduction
2025	-2%
2030	-6%
2035	-14,5%
2040	-31%
2045	-62%
2050	-80%

Renewable Energy Directive - Basics



N.B. Emissions counting based on a life-cycle greenhouse gas emissions

Renewable Energy Directive - Basics

Art.26 Biofuels from food and feed crops

Art.27 Calculation rules of RFNBOs and Recycled Carbon Fuels

Art.29 Sustainability and GHG emission saving criteria for biofuels

Annexes V and VI rules for calculating GHG impact of biofuels

Annex IX, part A, feedstocks of Advanced Biofuels benefitting form double counting

Annex IX, part B, feedstocks of Biofuels benefitting form double counting

RED: Union Database (Art.31a)

- Art.31a of RED III (2023) extends the scope to all liquid and gaseous renewable fuels and recycled carbon fuels, and to all end-uses.
- What? Creation of a central register to track consignments of fuels from production to consumption at EU level.
- How? Obligation for economic operators to enter data concerning
  - Fuels' sustainability
  - Life-cycle GHG emissions
  - Subsidies received

  } Checked by Accredited Certification Bodies
- Key elements:
  - To be set up by the EC by 21/11/2024 (not operational yet)
  - The interconnected gas system is considered a single mass balance system – movements to be tracked by TSOs/DSOs

RED: Union Database (Art.31a)
State of Play

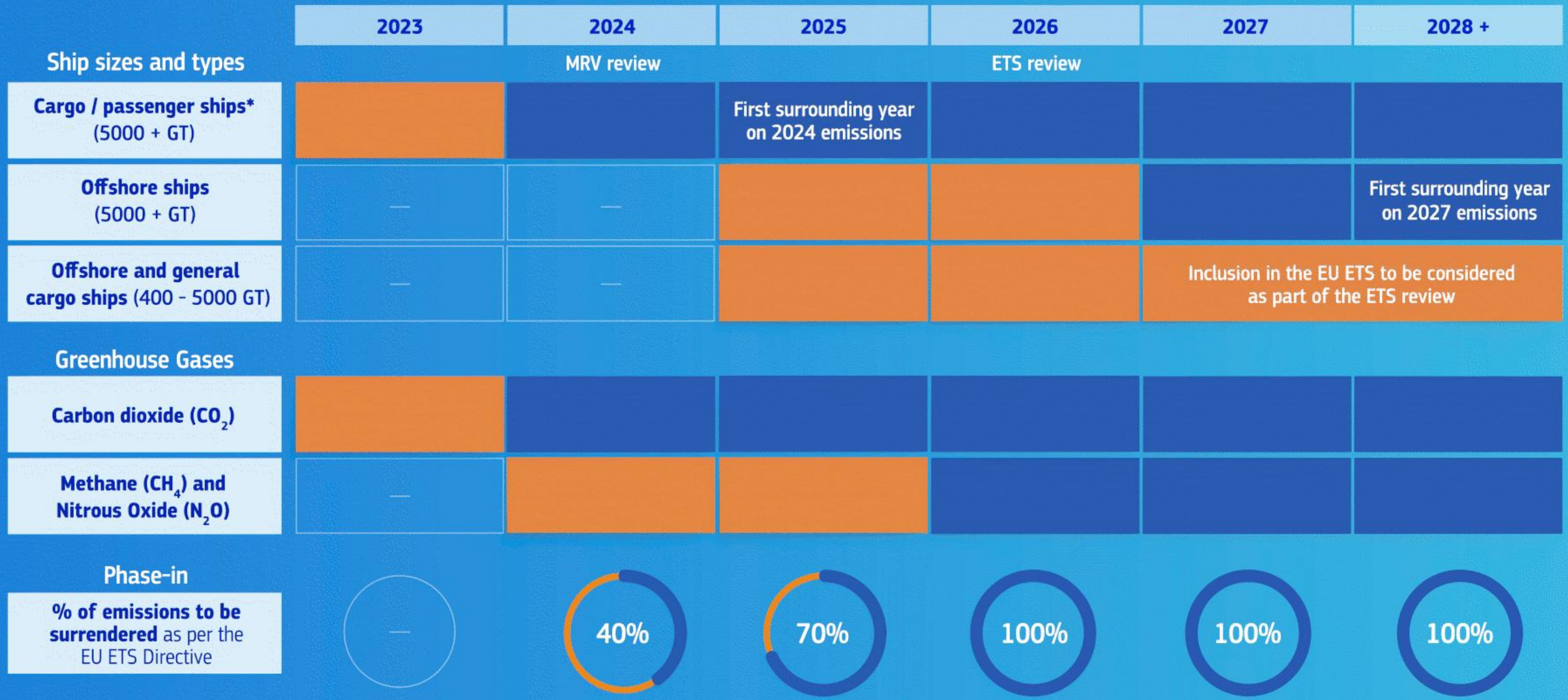
- UDB Platform launched on 21 November 2024 but not operative.
- Transposition deadline of RED III for Member States is 21 May 2025, and use of UDB for economic operators becoming mandatory
- Next Steps (delayed):

  As already presented in the various technical meetings, the 21/11/2024 deadline is for the UDB team to put online the whole application to also cover gaseous fuels. As far as the Economic Operators are concerned, European Commission (EC) is trying to populate the UDB with the raw materials data. Therefore, there will be no immediate sanctions for the EOs immediately after 21/11/24. EC plans to agree on a date with the EU MSs beyond which the use will be mandatory and indeed sanctions could be applied after that date. EC is having meetings with the RED Committee on these aspects ***and once an agreement will be reached EC will respectively communicate the date through the certification schemes****.*

- In the meantime, business as usual continues (e.g. use of *Nabisy* for German GHG quotas, use of ISCC etc.)

EU ETS Extension to Maritime Transport

Introduction Timeline



*Ships already covered today by the EU MRV regulation

Under MRV scope

Under MRV and EU ETS scope

EU Monitoring, Reporting & Verification (MRV)

- Monitoring obligation for shipping companies to report about their vessels on:
  (N.B. vessels as of >400 GT for inland & >5000 GT for overseas)
  - CO_2 CH_4, NO_x
  - Fuel consumption
  - Distance travelled
  - Cargo carried
- Reporting obligation for shipping companies to report about their vessels the above
- Verification of reported data by independent and accredited verifiers
- The data is then made publicly available

IMO - MEPC

- 2023 IMO Strategy on Reduction of GHG Emissions from Ships (adopted at MEPC 80 in July 2023)
- Goal: reduction in carbon intensity of international shipping
  - -20% annual GHG emissions of international shipping by 2030, striving for -30%
  - -70% annual GHG emissions of international shipping by 2040, striving for -80%
  - Uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources: at least 5%; striving for 10%
  - Peak shipping emissions asap
  - Review energy efficiency design requirements for ships
  - Net-zero GHG emissions "*by or around 2050*"
- MEPC 83 (7-11 April, London): LCA methodology approval (well-to-wake based)

What Challenges?

EU Guidelines on Demonstration of GHG/Sustainability Marine Fuel Certification

- UDB enforcement timeline unclear
- 3rd country imports
  - No mass-balancing for non-EU countries
  - European Commission will require cooperation agreements and other safeguards for eligibility of fuels on EU compliance market
- Unclear connection of UDB with FuelEU Maritime Register
- Relationship IMO – FuelEU Maritime

Solutions

How to decarbonise shipping?

- Design improvements (Hull, Propeller, Engine, etc.)
- Route optimisation / speed adaption
- Connection to the e-grid when at berth

... and by using alternative fuels:

- BioLNG
- Methanol
- Ammonia
- Hydrogen

Gaseous Fuels in the Maritime Sector

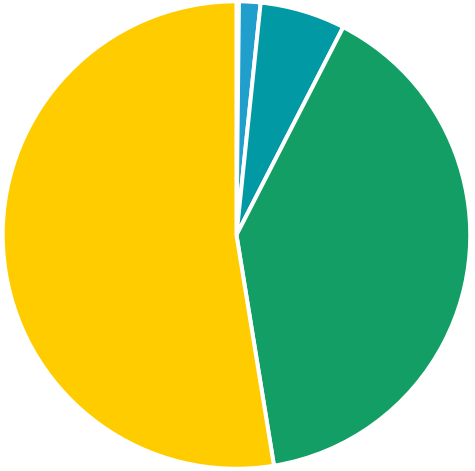
	(Bio-/E-)LNG	Ammonia	Hydrogen	(Bio-/E-)Methanol
Advantages	• Substantial NO_x SO_x PM cut • 20-25% CO_2 emissions cut • Decarbonisation through	• Substantial NO_x SO_x PM & CO_2 cut	• Substantial NO_x SO_x PM & CO_2 cut	• Substantial NO_x SO_x PM & CO_2 cut • Liquid at room temp. • Easy handling
Decarb.	• BioLNG & E-LNG from CO_2 + green H_2	• Green ammonia via electrolysis & Haber process	• Green H_2 from electrolysis	• BioMethanol & E-Methanol from CO_2 + green H_2
Engine	• Mature engine technology (single and dual fuel)	• Engine under development	• Under development (FC and ICE) • Infra investment needed	• Under development • Available as dual fuel • Limited infrastructure
Infrastructure	• Fast growing Infrastructure	• Very Limited	• Very Limited	• Limited
Challenges	• Methane slips • Requires cryogenic tank (-162°C)	• N_2O emissions • Toxic & Corrosive • Competition with fertilisers	• High price • Storage problematic • Liquid H2 requires cryogenic tank (-253°C)	• Low energy density • Pilot fuel needed

What is the market saying?

Ships **in service** in June 2024 sorted by fuel

- Conventional Fuels: 98%
- Alternative Fuels: 2%

Alternatively Fuelled Ships in Service in June 2024

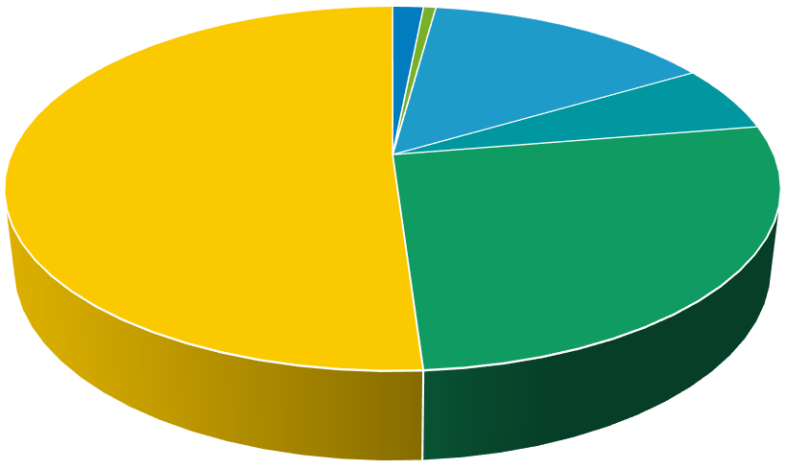


Ammonia Hydrogen Methanol LPG Battery/Hybrid LNG

Ships **in order** in June 2024 sorted by fuel

- Conventional Fuels: 72,9%
- Alternative Fuels: 27,1%

Alternatively Fuelled Ships in Order in June 2024



Ammonia Hydrogen Methanol LPG Battery/Hybrid LNG

Source: DNV's Alternative Fuels Insights for the shipping industry

Q&A