

# ADRESSING GREENHOUSE GAS (GHG) EMISSIONS OF RESEARCH VESSEL AT NATIONAL AND EUROPEAN LEVELS

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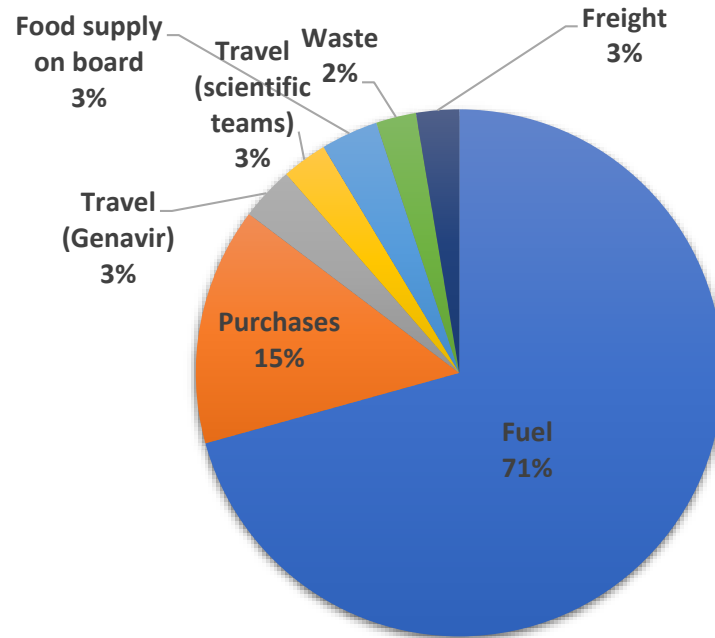
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Institute (MI)



# Addressing greenhouse gas (GHG) emissions of the French oceanographic fleet

From cruise preparation to data storage, the FOF emits around 43,000 tCO<sub>2</sub>e annually.

43 000 tCO<sub>2</sub>e ~ 0,5% of French maritime sector carbon footprint nevertheless reducing carbon footprint of the Fleet is a key issue.



# Taking into account the different 'states' of an oceanographic vessel in decarbonisation strategy

**Average allocation of yearly fuel consumption (7 700 tons) for the French oceanographic fleet**

Technical stops : approximately 350 days/year

Quayside (port calls, loading, waiting, etc.) : 900 à 950 days/year

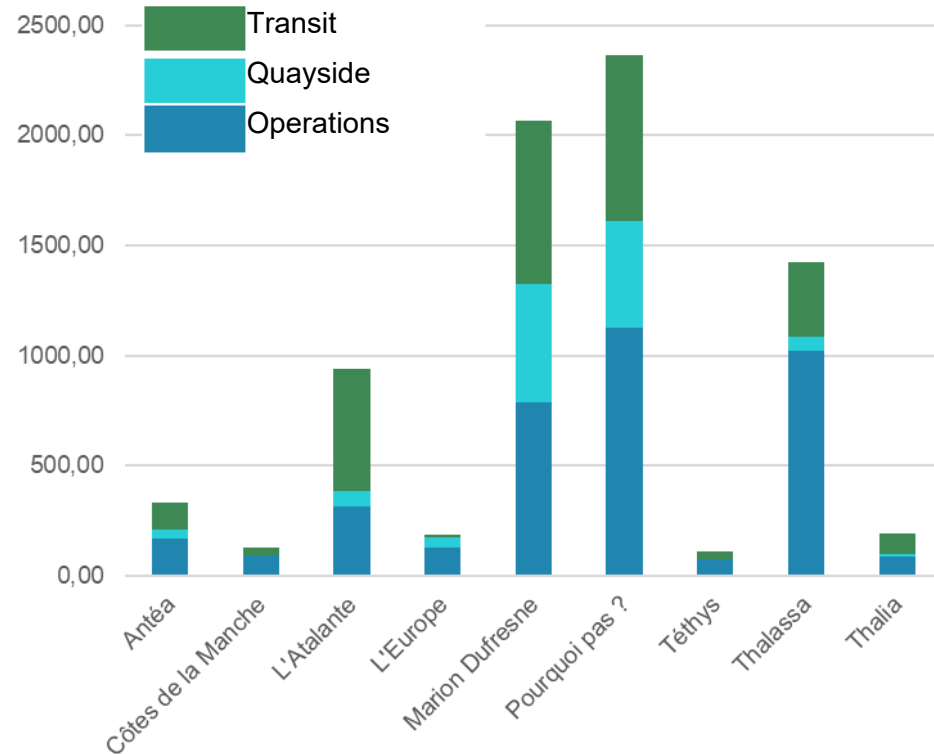
Transits between cruises : 300 à 350 days/year  
Transits inside cruises : about 200 days/year

Scientific/technical operations : about 1500 jours/an

14%

35%

51%



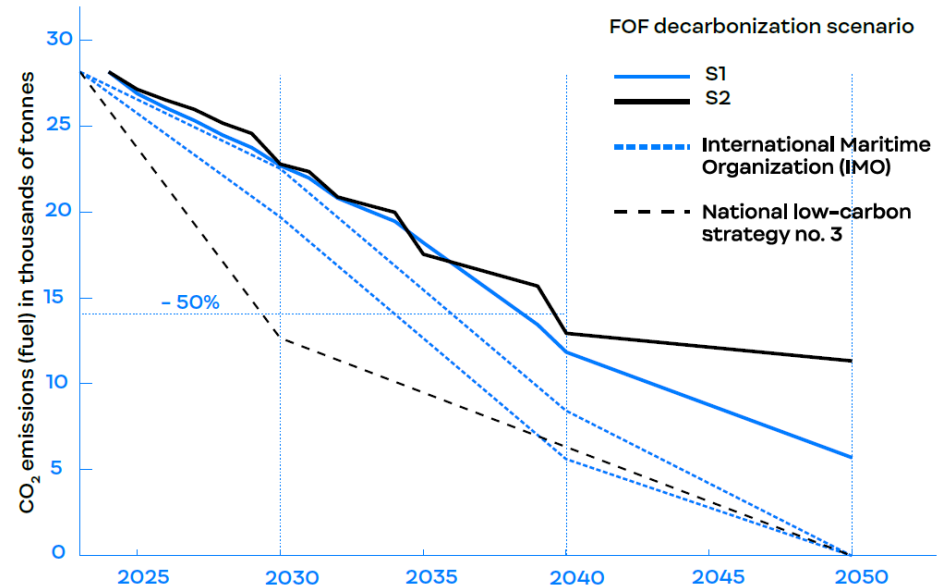
# Insight from a model and scenarios to 2050

A model structured per vessel with an annual time step taking into account 3 states - **at quayside, in transit, in operation** - associated with respective energy requirements/sources :

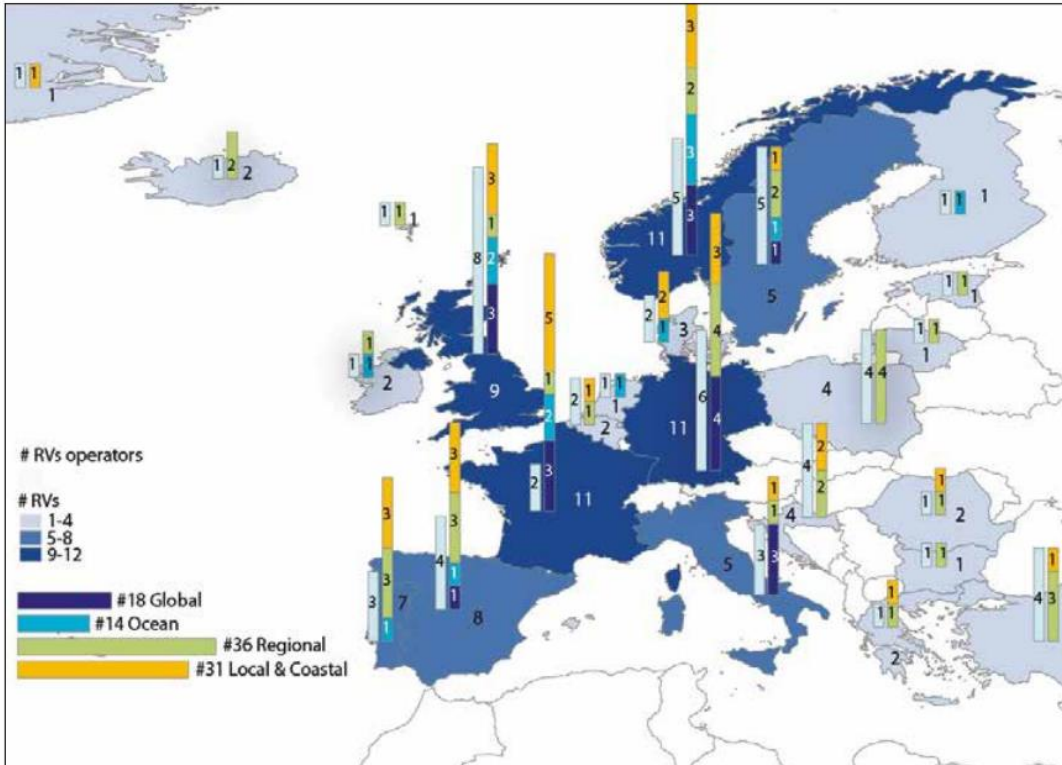
- **current alternatif fuel,**
- **low carbon fuel (e.fuels)**
- **shore to ship power**
- **wind assisted propulsion**
- **renewable energy on board**

Scenario-based approach, e.g.

- **S2 : The renewal of ocean-class vessels allow wind assisted propulsion during transits** (more than 50% of propulsion energy)
- **S1 : alternative fuels will be developed industrially,** (higher additional operating costs).



# At European scale...



Next generation

Position Paper 25

## European Research Vessels

Current status and Foreseeable Evolution

www.marineboard.eu

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**MARINE BOARD**  
Advancing Seas & Ocean Science

# At european scale

- ICES Working Group completed a review of fuel consumption/ emissions of 67 international Research vessels with data provided by vessel operators

- Data has been extrapolated to provide an estimate of consumption/emissions of the current European fleet

**ICES** INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA  
**CIEM** COMMISSION FOR THE EXTRA-TERRITORIAL ZONES OF THE SEA

## WGGRF

Working Group on Greening the Research Fleet

**OUR OBJECTIVE**

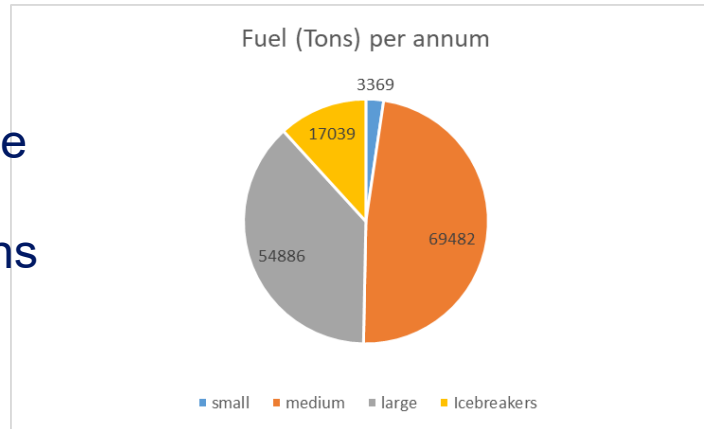
WGGRF consolidates and distributes knowledge, best practice and recommendations regarding

- environmentally sustainable new-builds/refits
- and low-emission operation of research vessels.

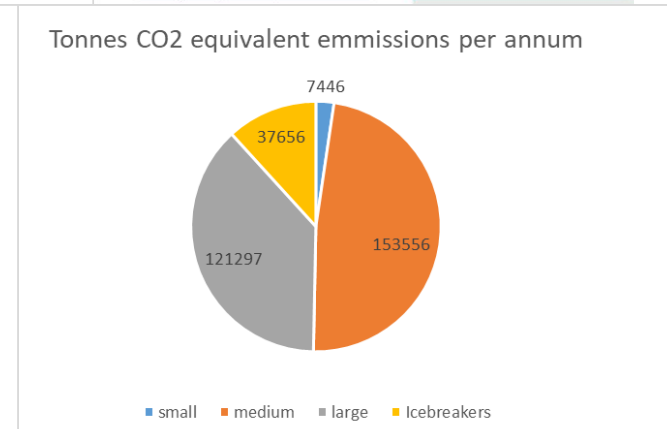
**OUR EXPERTISE**

- Expertise as operators of international operating research vessels
- Expertise on environmental impact of ships
- Overview on IMO and other regulations and their legal relevance for operation of research vessels

Data Science and Technology Steering Group (DSTSG)



Total 144776 Tons Fuel



Total 319955 Tons CO2 equiv

# RV Emissions as part of the overall problem

- Total Maritime emissions in 2023 for a European fleet of 12,300 ships was 126.7 million tonnes of CO<sub>2</sub> into the atmosphere
- Monitored ships used 41 million tonnes of fuel in 2023
- European RV fuel consumption represents c. 0.25% of the European Fleet consumption
- European RV Fleet emissions represent approximately 0.35% of Total European fleet emissions

## IMO: near net zero ambitions 2050

2023 IMO Strategy on Reduction of GHG from Ships (MEPC.377(80))



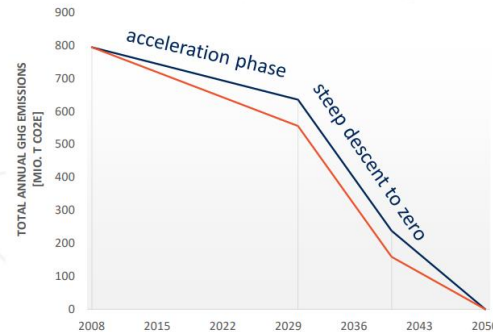
### Ambitions

- (1) Total annual GHG emission reduction envisaged:

20-30 % vs. 2008 by 2030  
70-80 % vs. 2008 by 2040  
near 100% by 2050

- (2) Uptake of at least 5%, striving for 10 % of zero or near zero GHG energy sources by 2030.

- (3) GHG emissions per transport work: - 40% by 2030 vs. 2008



# FuelEU Maritime Regulation: Vessel Scope Summary

## Included and Excluded Vessels

### Vessels Included in Regulation

All commercial ships over 5,000 GT, including passenger and cargo vessels, must comply with GHG limits and operational mandates.

### Vessels Excluded from Regulation

Warships, fishing vessels, wooden ships, non-mechanical ships, government non-commercial ships, and offshore vessels are excluded. This includes Research vessels .....

## IMO Net-Zero Framework

The regulation applies to:  
All oceangoing ships over 5,000 gross tonnage (GT) engaged in international trade.

Represent over 85% of global shipping emissions.

Are already subject to fuel data collection under IMO's Data Collection System (DCS).  
Must comply with GHG Fuel Intensity (GFI) targets starting 1 January 2028

The following are **not** covered under the current framework:

Ships under 5,000 GT – (**although discussions are ongoing to possibly include vessels between 400 GT and 5,000 GT in future revisions**).

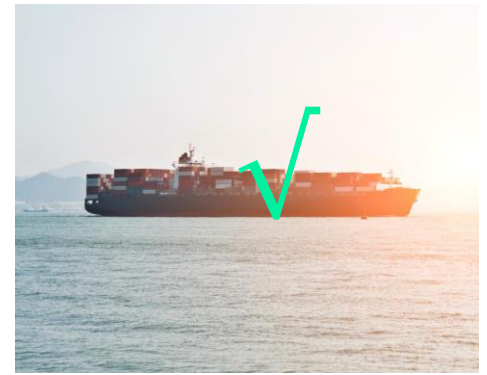
Domestic vessels – the framework applies only to international voyages.

Non-commercial government vessels – used for public service or humanitarian missions.

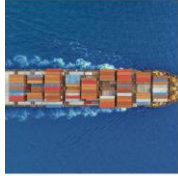
### **Implications for Offshore and Research Vessels**

If an offshore or research vessel is over 5,000 GT and engaged in international trade (e.g., transporting cargo or personnel between countries commercially), it may fall under the scope???

Otherwise, they are **not** subject to the Net-Zero Framework's fuel intensity or pricing mechanisms.

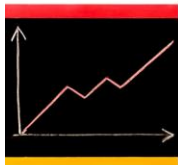


# Potential Inclusion of Smaller Vessels



## Expansion of GHG Strategy

IMO plans to revise the Net-Zero GHG Strategy to include vessels sized 400 GT to 5,000 GT, broadening decarbonization scope.



## Review Criteria

The review assesses emission inventories, technological feasibility, economic impacts, and safety for smaller vessel inclusion.



## Data Collection and Compliance

Consideration of extending IMO Data Collection System and readiness of operators for compliance with new standards.

## Candidate Measures for Smaller Vessels

### Technical Regulations

Extending fuel standards and energy efficiency requirements to smaller vessels to reduce emissions.

### Economic Measures

Adapting greenhouse gas pricing mechanisms to incentivize emission reductions for smaller vessels.

### Life-Cycle Emissions Accounting

Using well-to-wake methodology to assess full life-cycle emissions of smaller vessels' fuels.

### Incentives and Infrastructure

Providing incentives for early adopters and upgrading port infrastructure for zero-emission technologies.

## Timeline for Scope Expansion Decisions

### Key Decision Milestones

Decisions on smaller vessel inclusion follow a timeline with major milestones set for 2026, 2027, and 2028.

### Phased Implementation

Implementation of mid-term measures begins in 2027, ensuring a phased and manageable approach to regulation.

### Oversight and Assessments

The IMO Marine Environment Protection Committee oversees scope expansion with impact assessments and stakeholder consultations.

# Present and future RV Fuels vs world fleet

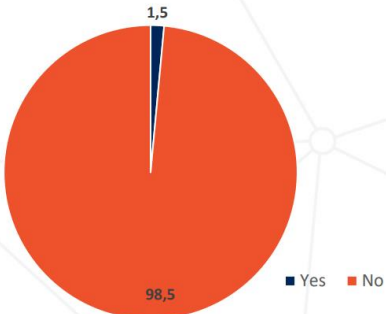
## RV-Fleet: Propulsion Trends



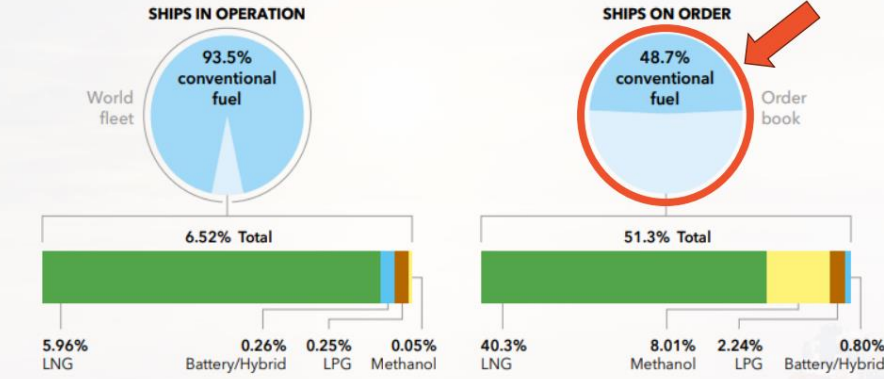
Energy Carriers used and in NBs



Dual fuel ready? [%]  
(use of HVO not considered)

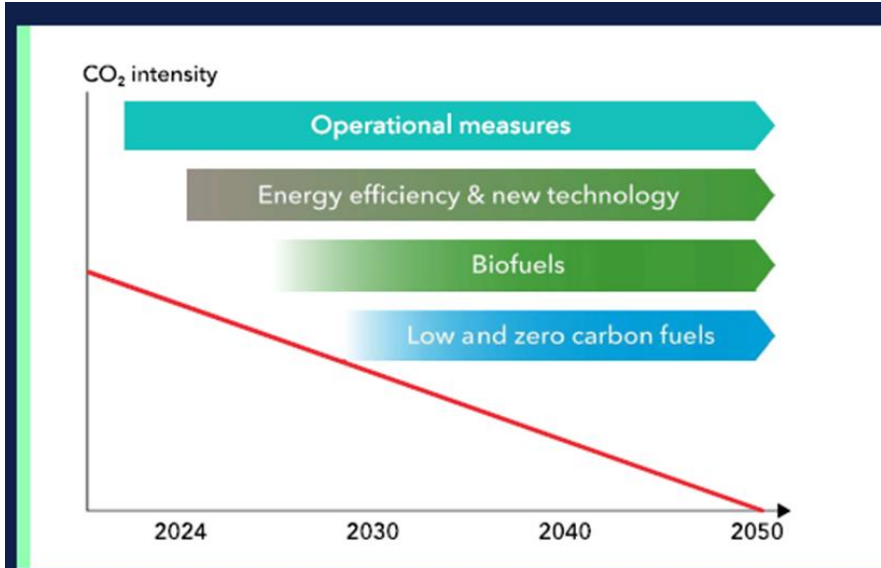


Alternative fuel uptake in the world fleet by gross tonnage



Sources: IHSMarkit (ihsmarkit.com) and DNV's Alternative Fuels Insights for the shipping industry - AFI platform (afi.dnv.com)

# NET ZERO PATHWAY

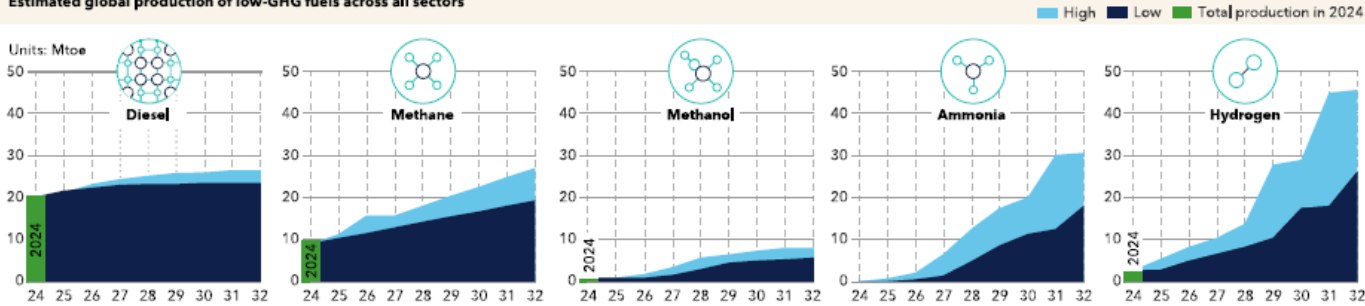


- **Low-/zero- carbon fuels:** End solution that requires industry transition
- **Biofuels:** Drop-in fuels
- **Energy efficiency and technology:** Considerable industry experience, ongoing innovation, need for performance validation
- **Operational measures:** Low hanging fruit not always within operators reach

# Low GHG Fuel production

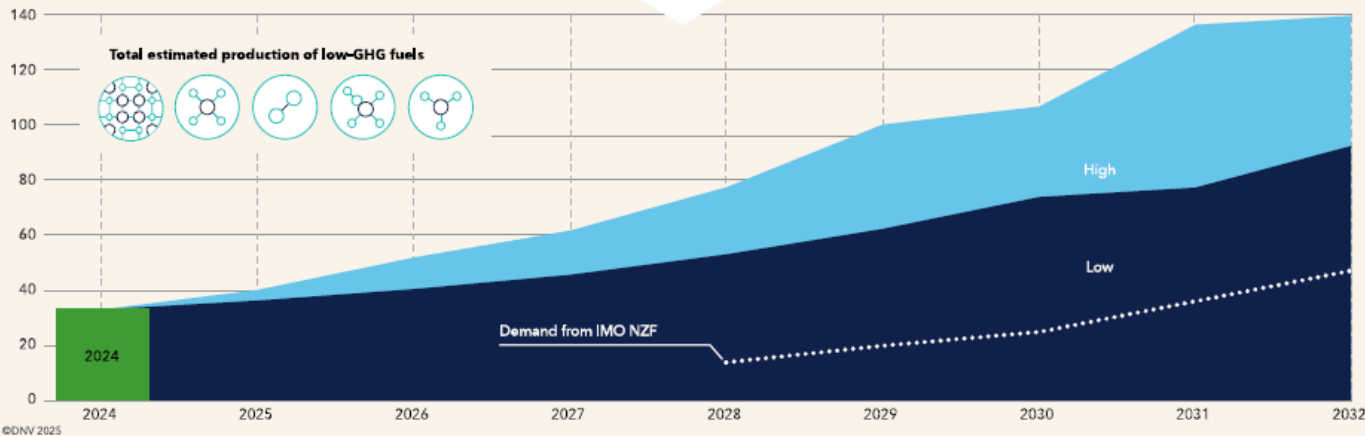
FIGURE 5-1

Estimated global production of low-GHG fuels across all sectors





























“The Competition for low GHG fuels is accelerating across many industries”

“Such fuels are sought after by aviation and heavy duty trucking “



# Current /recent New builds RV Fleet

| Country |                                                                                     | In service | Vessel                          | Measures includes         |       | Future Measures   |
|---------|-------------------------------------------------------------------------------------|------------|---------------------------------|---------------------------|-------|-------------------|
| DE      |    | 2021       | <i>Atair</i>                    | LNG                       |       |                   |
| IE      |    | 2022       | <i>Tom Crean</i>                | HVO                       |       |                   |
| FR      |    | 2022       | <i>Pererverance</i>             | Sail                      |       |                   |
| AE      |    | 2022       | <i>Jaywun</i>                   | Battery/Hybrid            |       |                   |
| NZ      |    | 2024       | <i>Kaharoa ii</i>               |                           |       |                   |
| ES      |    | 2024       | <i>Oden de Buen</i>             | LNG                       |       |                   |
| IS      |    | 2024       | <i>Þórunn Þórðardóttir</i>      | Battery/Hybrid            |       |                   |
| US      |    | 2025       | <i>David Packard</i>            |                           |       |                   |
| FR      |    | 2026       | <i>Anita Conti</i>              | Battery/Hybrid            | HVO   |                   |
| UK      |    | 2026       | <i>Corystes 2</i>               | Battery/Hybrid            |       |                   |
| NL      |    | 2026       | <i>Anne Weber van der bosse</i> | Battery                   | Solar | Methanol          |
| DE      |    | 2026       | <i>Meteor iv</i>                | Battery                   |       |                   |
| US      |    | 2026       | <i>Discoverer</i>               | Battery/Hybrid            |       |                   |
| US      |    | 2026       | <i>Oceanographer</i>            | Battery/Hybrid            |       |                   |
| US      |    | 2026       | <i>Taani</i>                    | Variable Speed Blue drive |       |                   |
| US      |    | 2026       | <i>Narragansett Dawn</i>        | Variable Speed Blue drive |       |                   |
| US      |    | 2026       | <i>Gilbert Mason</i>            | Variable Speed Blue drive |       |                   |
| CA      |    | 2026       | <i>Naalak Nappaaluk</i>         |                           |       |                   |
| SA      |    | 2027       | <i>Thuwal II</i>                |                           |       | Dual fuel engines |
| US      |    | 2027       | <i>Surveyor</i>                 | Efficient Diesel?         |       |                   |
| US      |    | 2028       | <i>Navigator</i>                | Efficient Diesel?         |       |                   |
| IT      |    | 2028       | <i>Arcadia</i>                  |                           |       |                   |
| US      |    | 2029       | <i>TCRV Scripts</i>             | Hydrogen FC/Hybrid        |       | Methanol          |
| DE      |   | 2032       | <i>Polarstern</i>               | Battery                   | HVO   | Methanol          |
| UK      |  | 2032       | <i>Cefas Endeavpur</i>          |                           |       | Methanol          |
| SE      |  | 2035?      | <i>New Oden</i>                 | Battery/Hybrid            |       | Methanol          |

# Methanol.....

- Being Methanol ready will lead to larger vessels to accommodate similar range/ endurance capability
- MGO usage will be higher for these vessels while waiting for Methanol supply to scale up and for methanol engine technology to be reliable...
- Energy efficiency more important than ever given the likely future cost of Low GHG fuels and to reduce the MGO usage in the interim
- Range of measures required : Shore power, low hotels loads, efficient hulls, energy saving devices vs URN?, Wind assistance, solar, operational measures, bartering, chartering, use of autonomous vessels

# Conclusions

Decarbonising research fleets is an urgent challenge, and we must take action now:

- take the first measure
- prepare a new generation of offshore vessels
- coordinate and exchange information at the international level



# Conclusions

Manifesto proposal at Nice – UNOC

**Decarbonising research vessels is an ethical and environmental requirement**

<https://forms.ifremer.fr/pdg/manifesto-on-decarbonising-research-vessels/>

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