



EST. 1961

GLANDER
INTERNATIONAL
BUNKERING



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DESTINATION: NET-ZERO

MUSTAFA EL ZEIN



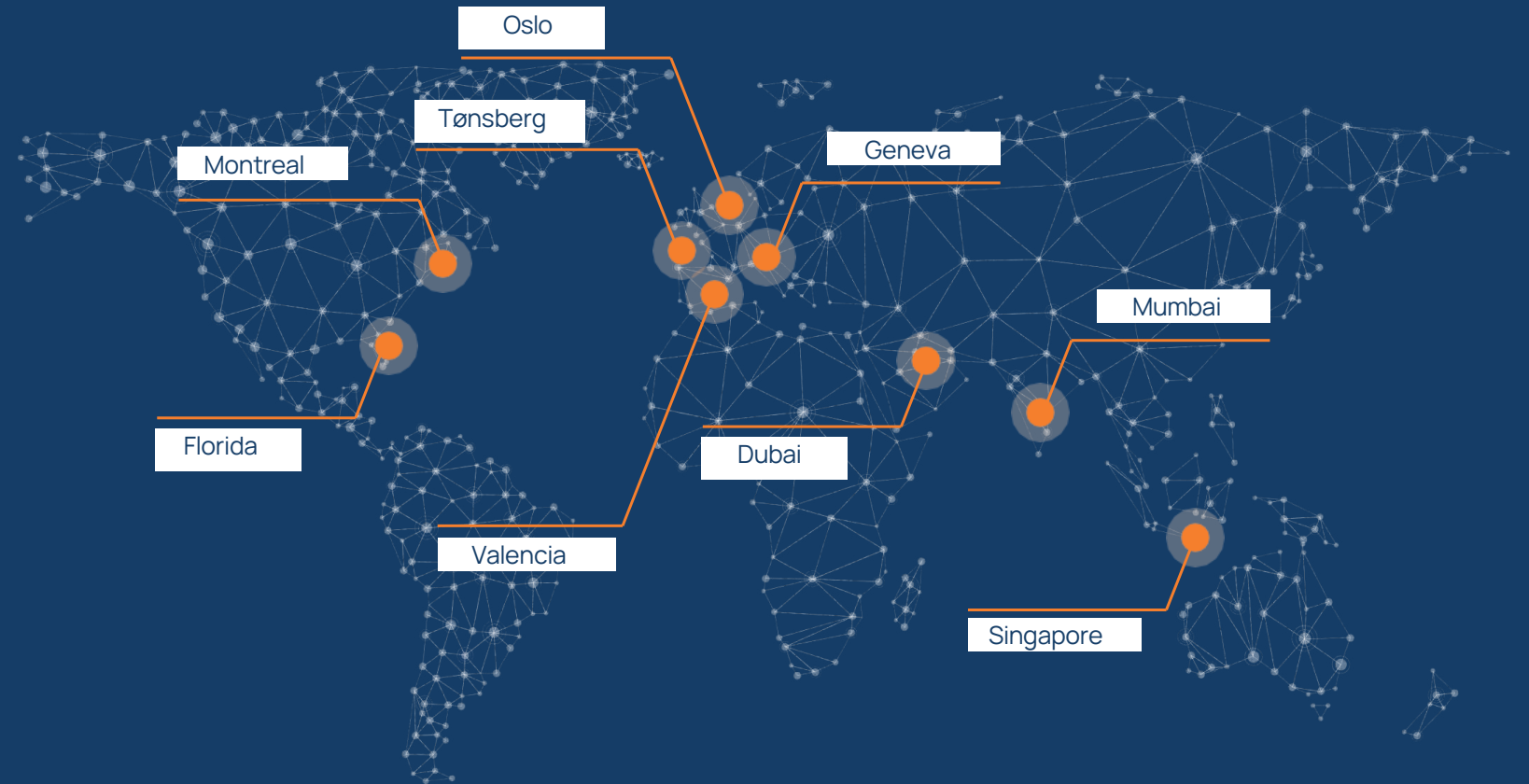


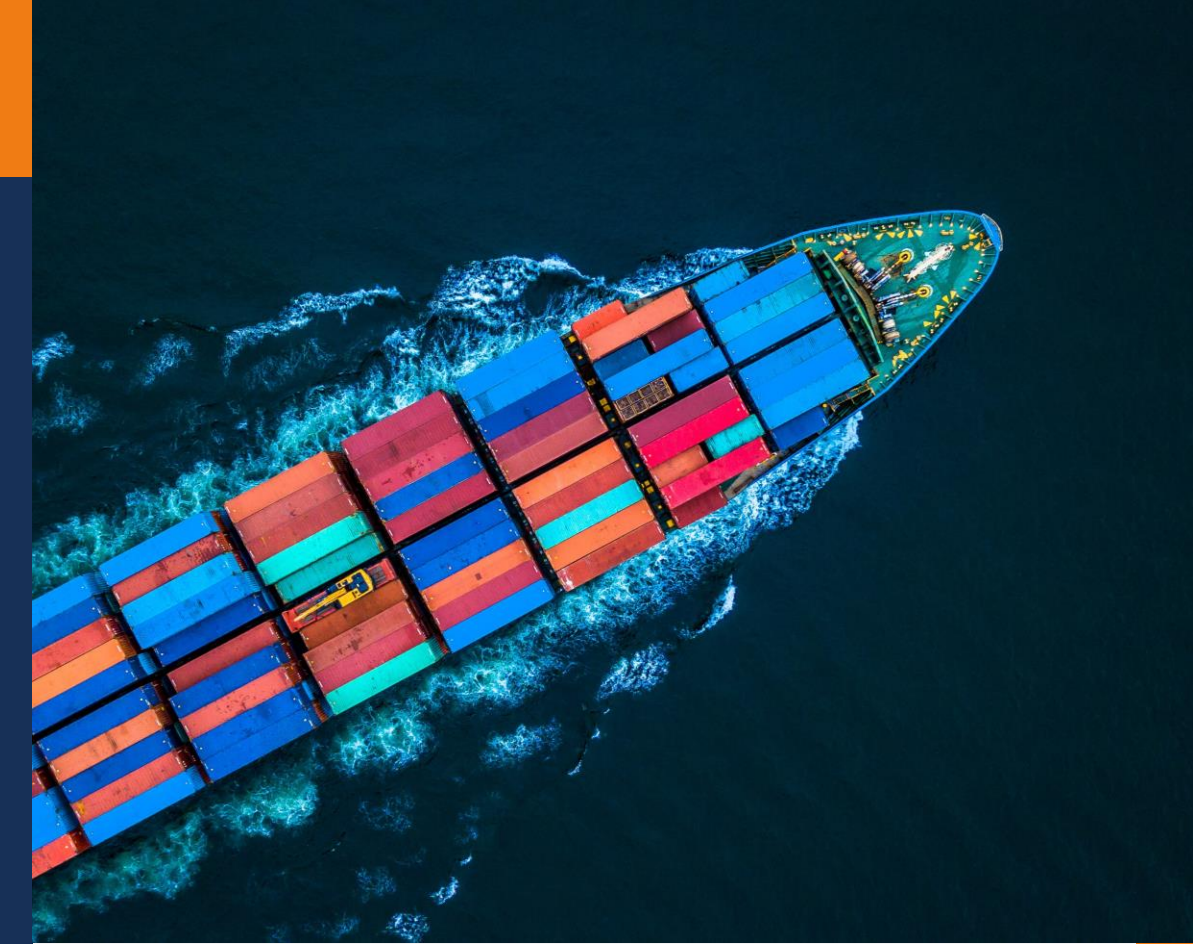
WHO WE ARE

- World leading bunker and lubricant trading firm since **1961**.
- Specializing in **new fuels** on the journey to **decarbonizing the** shipping industry.
- Multicultural and multilingual company operating worldwide from **9 offices**.
- Industry leader delivering **reliably, safely** and at **competitive prices**.

GLOBAL POSITIONING

- ✔ Strategic locations cover all time zones
- ✔ Marine fuel expertise & partnerships
- ✔ Up to date training and knowledge
- ✔ Worldwide supplier of fuels and lubricants





AGENDA

- 01** EU ETS & FuelEU Maritime Regulations
- 02** Drop-in Biofuels
- 03** Global Biofuel Availability
- 04** LNG Marine Fuel
- 05** Global LNG Availability
- 06** Drop-in Bio-LNG & E-LNG
- 07** END / Q&A

NAVIGATING REGULATIONS

IMO & MEPC



What does it do?

The IMO's Marine Environment Protection Committee (MEPC) undertakes maritime environmental issues to achieve net-zero greenhouse gas emissions.

When?

By 2050 with checkpoints in 2030 and 2040

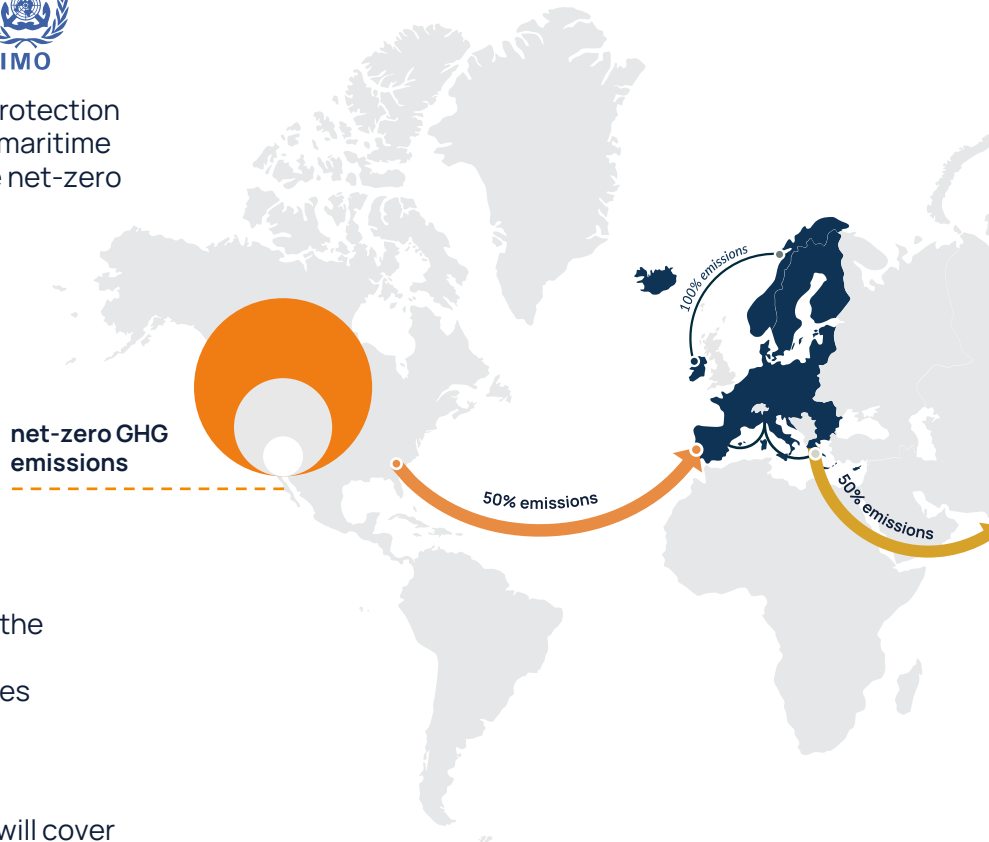
EU ETS

What does it do?

It will regulate GHG emissions in the EU/EEA through cap-and-trade, restricting tradable EU Allowances (carbon credits).

When?

Starting Jan 1, 2024, the EU ETS will cover cargo/passenger vessels of 5000GT or more, expanding to offshore vessels in 2027



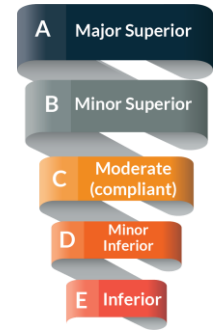
Carbon Intensity Indicator (CII)

What does it do?

CII is a measure of a vessel's operational efficiency for CO2 emissions.

When?

Starting 2023, vessels must collect emissions data and be rated A-E for annual operational efficiency



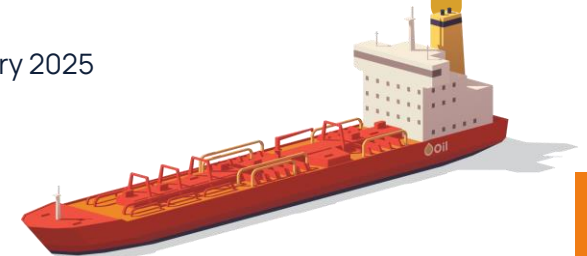
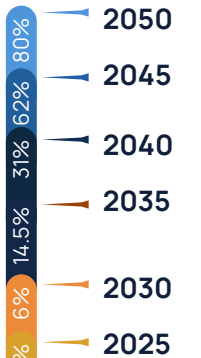
FuelEU Maritime

What does it do?

It sets requirements to gradually decrease GHG intensity in voyages in, to and from the EU.

When?

Starting from 1 January 2025



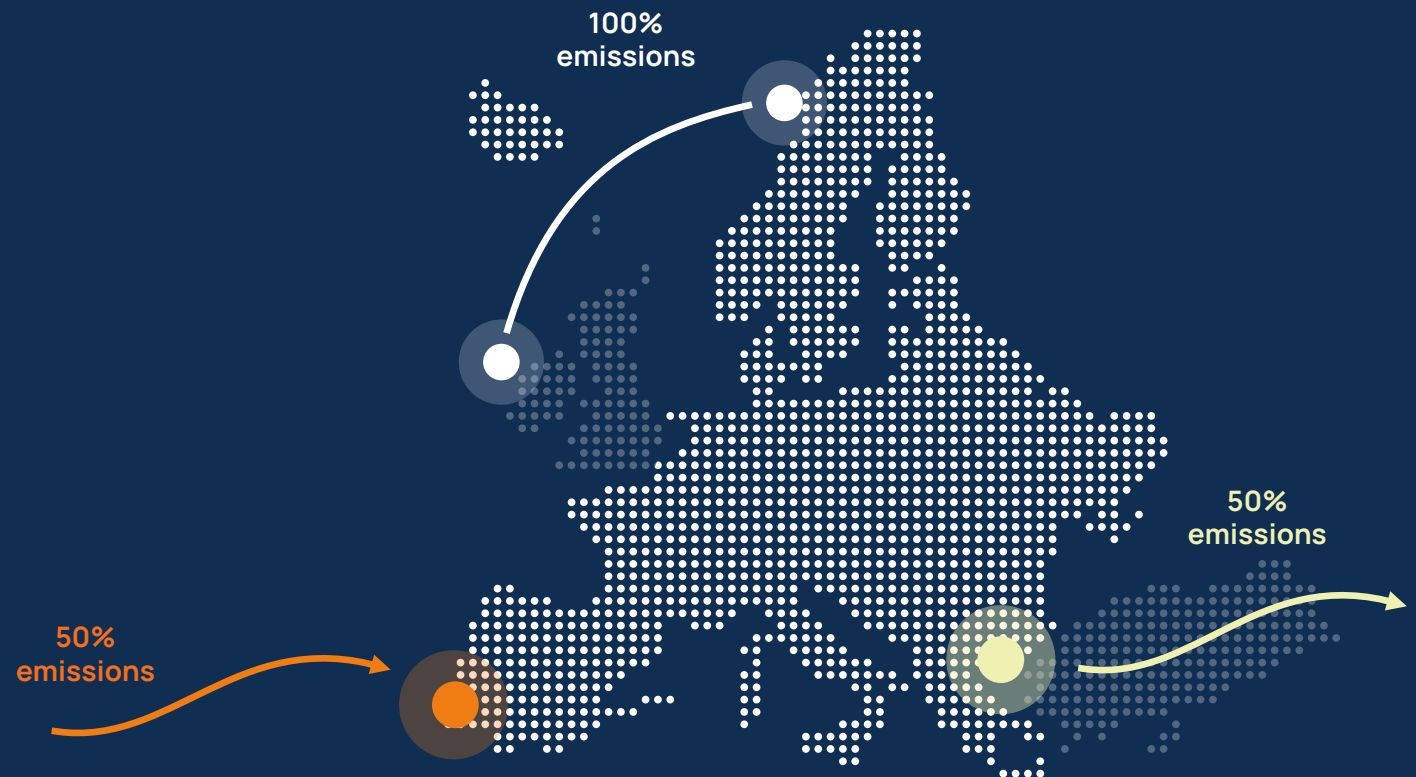
THE EUROPEAN UNION EMISSIONS TRADING SYSTEM (EU ETS)

What is it?

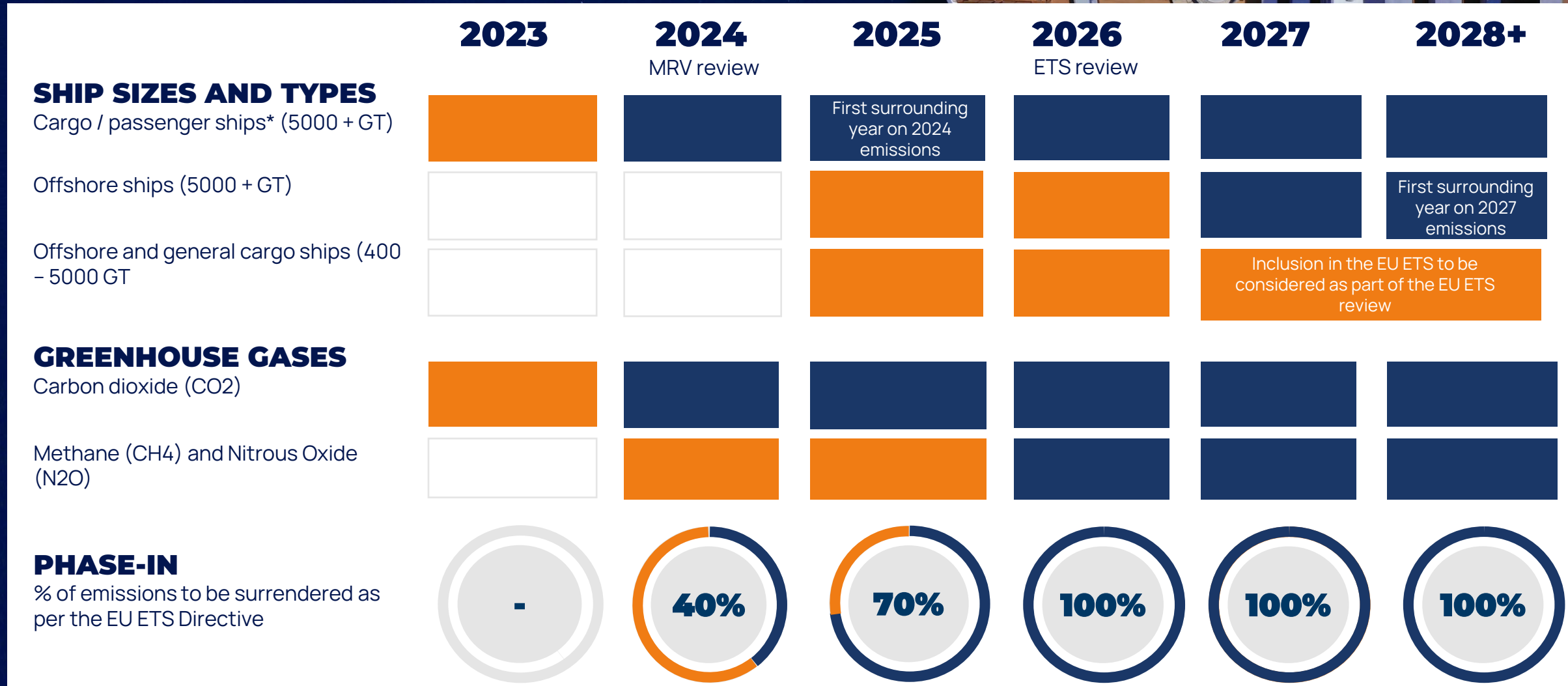
The world's first, largest multi-national regulatory program to limit global warming by reducing GHG emissions. Launched in 2005, it only covered power generation and energy-intensive industries but has since expanded. In 2023, the EU legislative bodies decided to include shipping from 2024 onwards.

Which voyages will be affected?

The EU ETS covers 100% of emissions on voyages and port calls within the EU/EEA, and 50% of emissions on voyages into or out of the EU/EEA, are subject to the EU ETS.



EU ETS EXTENSION TO MARITIME TRANSPORT INTRODUCTION TIMELINE



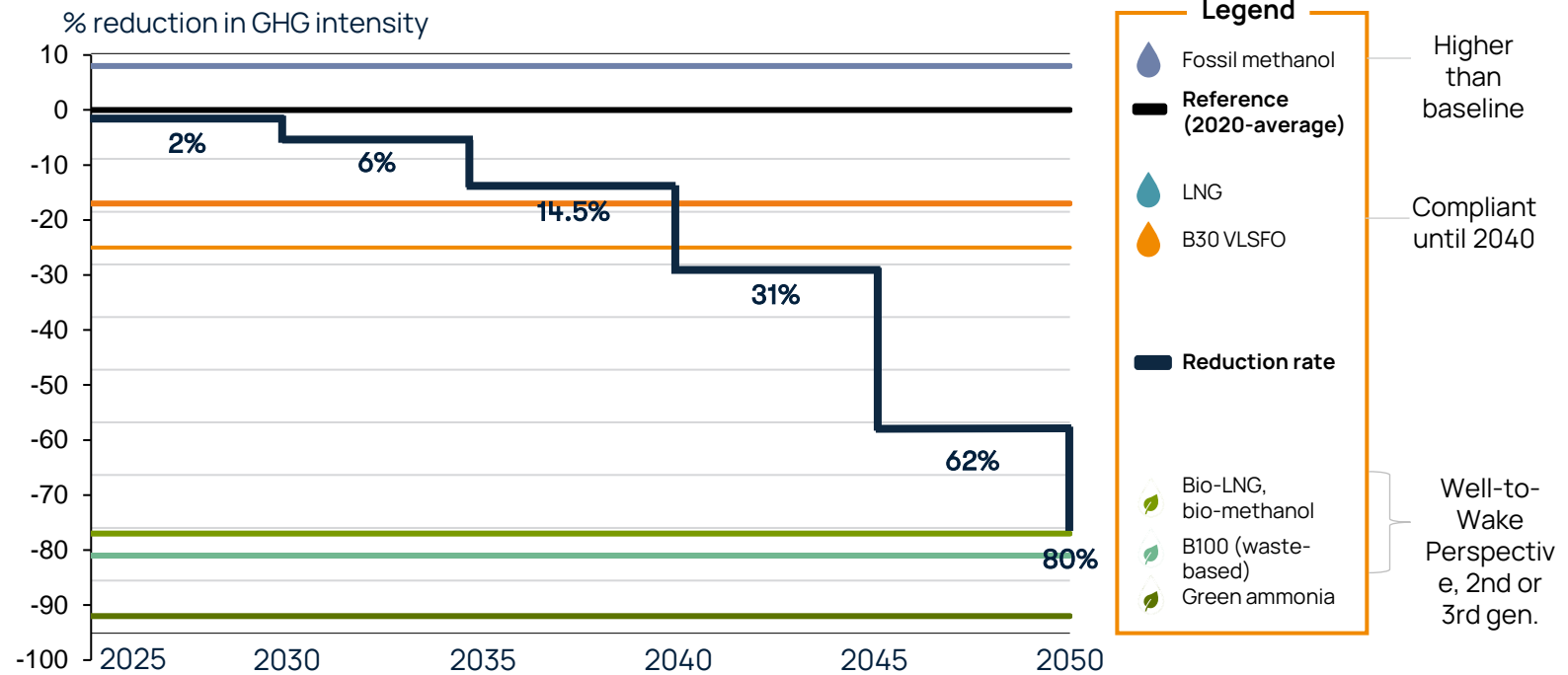
*Ships already covered today by the EU MRV regulation

Under MRV scope

Under MRV scope and EU ETS scope

FUEL EU MARITIME

- All ships above 5000 GT transporting passengers or cargo.
- 50% of energy use into or out of EEA, 100% of energy use between and within EEA ports.
- Compliance can be banked, borrowed and pooled.
- Mandatory 2% RFNBO* use from 2034. “Equivalent fuels with a similar or higher decarbonization potential” can be accepted.
- Penalty: 2,400 EUR per tonne VLSFO energy equivalent or around 58,50 EUR per GJ non-compliant energy.



*RFNBO: Renewable liquid and gaseous fuels of non-biological origin.



WHAT IS **BIOFUEL?**

- ✓ A drop-in fuel that can replace gas oil and fuel oil.
- ✓ Looks like and behaves like gasoil
- ✓ Produced from sustainable feedstocks, categorized into 1st, 2nd and 3rd generation
- ✓ 2nd and 3rd generation biofuels are produced from waste and residue are all classed as sustainable.
- ✓ Currently, the most viable and suitable biofuels for use in the maritime industry are fatty acid methyl ester (FAME Biodiesel) & hydrotreated vegetable oil (HVO).
- ✓ Biofuels from certain feedstocks are considered renewable and give immediate emission reductions based on the well-to-wake LCA principle.

BIOFUEL

GENERATIONS



1ST GENERATION*

Biofuels that are produced directly from food crops, which are known as conventional biofuels.

Examples:

Corn, wheat, soybean oil, rapeseed oil, sugar cane

2ND GENERATION

Biofuels that are not produced from food crops but from waste and residual oils.

Examples:

Used cooking oils, tallow, waste and residual oils

3RD GENERATION

Biofuels that are derived from algae or residual oils, which are capable of higher yields with lower resource inputs.

Examples:

Only non-food crops like microalgae and macroalgae, POME, tall oil, etc.

*Not considered sustainable, considered as fossil under IMO well-to-wake (full LCA)



BIOFUEL BENEFITS



Drop-in fuel that can be used in existing ship engines.



Globally tested by laboratories, shipping companies and bunker suppliers.



Approved by most OEM & accepted by IMO in blends up to B30 without approval from flag state



B20-B30 pathway to CII compliance



Long-term viable solution as pilot fuel



Helps fulfil customers ESG targets and sustainability-linked loans.





WHERE WE SUPPLY **BIOFUEL**



Infrastructure on the land side is highly developed, while marine specific biofuel infrastructure is scarce. However, last minute delivery for biobunkering is being developed rapidly.

Note: It may be possible to source biofuels in areas not marked on this map. Refer to our bunker traders for the updated biofuel supply locations.

-  Biofuel supply areas
-  Our biofuel supply locations (existing and upcoming)



LNG

FOR MARITIME

What is LNG?

- Natural gas, similar to pipeline gas
- Super-cooled to -162°C
- 600 times the energy density of pipeline gas
- Often measured in energy units, typically $\$/\text{MMBtu}$
- MGO/biofuel will still be needed as pilot fuel

Is LNG an established marine fuel today?

Yes:

- LNG tankers have been running on LNG for over 50 years with uptake across other sectors began in 2000
- Growth mainly in the container, car, and cruise segments

How is it stored?

- Must be stored in special insulated tanks
- LNG bunker tanks are 2-2.5 times larger than comparable conventional fuel tanks

How is it bunkered?

- Ship-to-ship, truck-to-ship, shore/pipeline-to-ship
- Compatibility studies between bunker and receiving vessel are necessary (more complex than conventional fuel)
- Port authorities validate bunker procedures for each vessel segment

How is it burned onboard?

- LNG needs to be returned to its gaseous form to be used
- Achieved by passing LNG through a heat exchanger
- Engines must be specifically designed or adapted to use LNG
- Engines come in both pure gas (only LNG) and dual fuel (LNG and conventional fuels)

Where can we get it from?

- Widely available in large-scale cargoes worldwide
- Europe, North America, and much of Asia benefit from a well-developed network
- Possible future bottleneck: LNG bunkering vessels (LNGBV) and terminal loading capacity
- LNG as a bunker fuel is expected to be available in Panama, the Middle East, and the US West Coast by around 2025



LNG

BUNKER DEMAND GROWTH

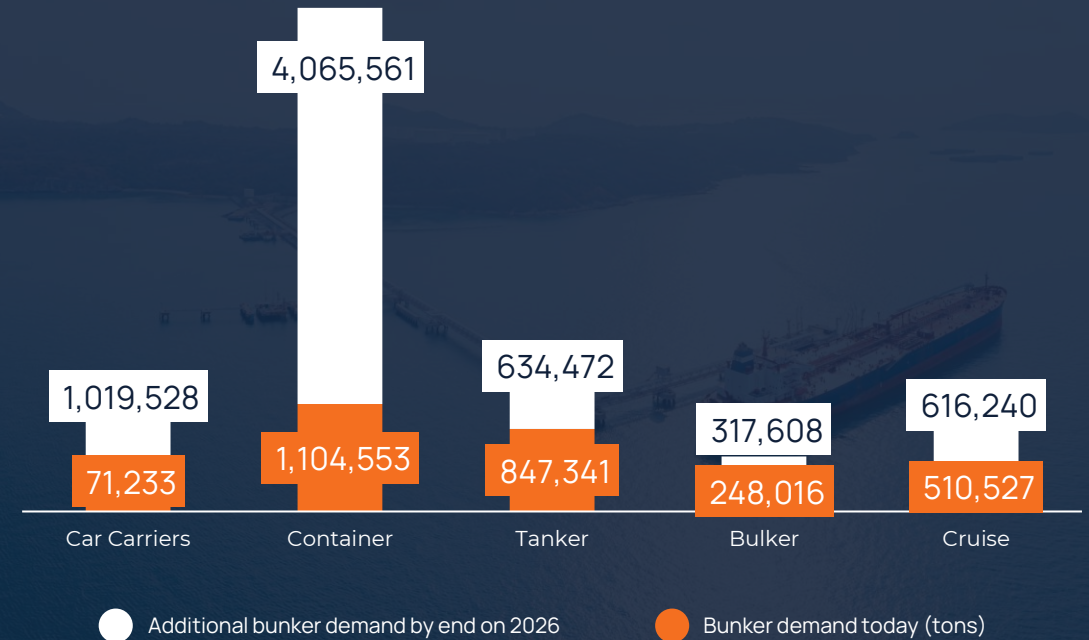
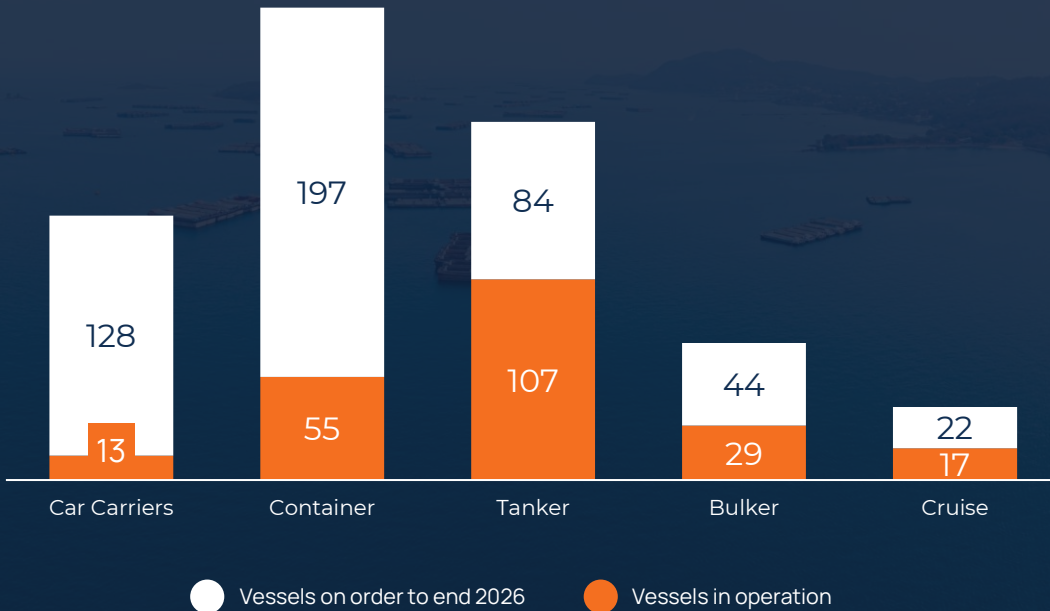
BY SEGMENT



Growth to 2026
in Selected Vessel Segments



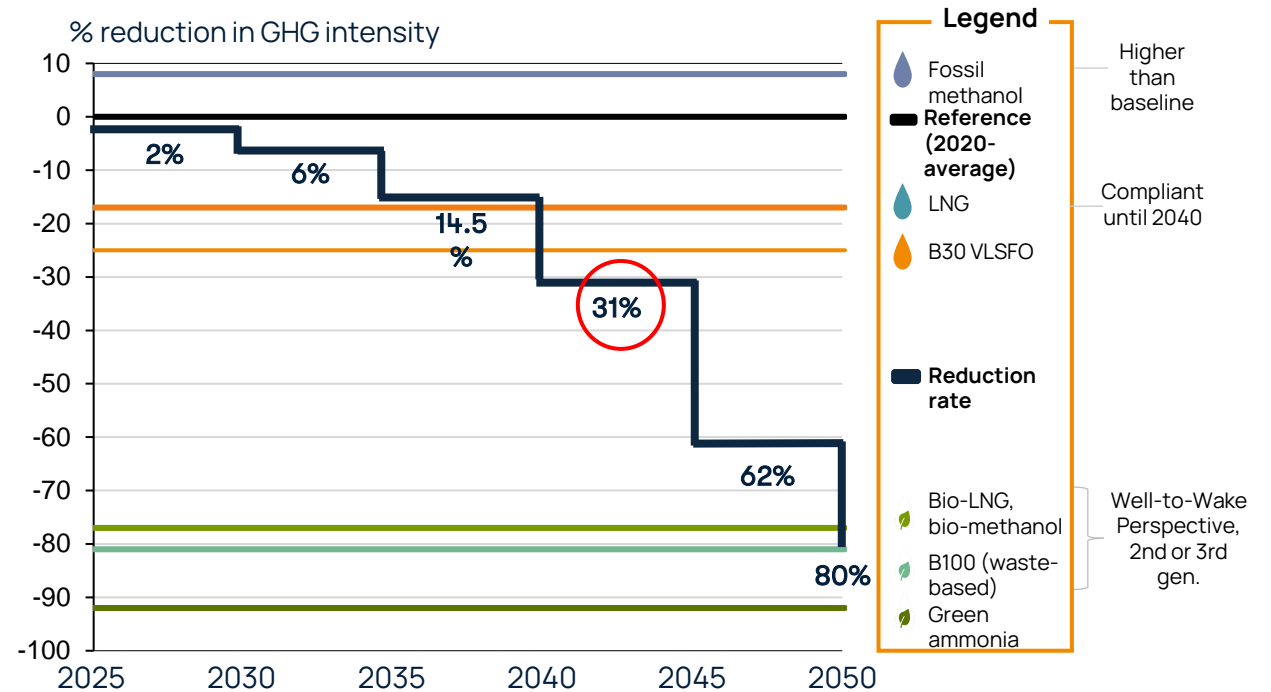
Associated Growth to 2026
in potential LNG Bunker Demand (Tons LNG)



Source DNV, Clarksons and BH assessment data as of July 2023

LNG PROVIDES CLEAR BENEFITS IN THE NEAR TERM

- FuelEU Maritime: fossil LNG is **compliant until 2039**
- **Methane slip** is a well identified topic by all industry stakeholders. To further reduce, **continuous technical progress** is made
- Bio-LNG can **reduce GHG emissions by up to 80%** (if methane leakage in the production process and on-board methane slip are minimised)
- Bio-methane is mainly produced from **anaerobic digestion of agricultural and human waste** (e.g. animal manure, silage, wastewater, landfill)
- If avoided emissions are taken into account, bio-LNG, when it is produced from **anaerobic digestion of manure**, can even achieve **negative emissions**



60+



YEARS OF
EXPERIENCE



THANK YOU