

THE FUTURE FOR MARINE FUELS

ANTWERP

27 MAY 2026

AN INTRODUCTION

HOW DID WE GET HERE?

WHY DOES THE TYPE OF MARINE FUEL NEED TO CHANGE?

- **(AFTER SAIL & COAL) FOR OVER 100 YEARS FOSSIL OIL FUELS HAVE BEEN USED IN MARINE ENGINES, TURBINE THEN DIESEL**
- **HEAVY RESIDUAL FUEL (HFO) USED IN LARGER SHIPS WITH SLOW SPEED 2 STROKE DIESEL ENGINES**
- **AND DISTILLATE FUEL USED IN SHIPS WITH MEDIUM AND HIGH SPEED 4 STROKE ENGINES**
- **FUEL CHOICE HAS BEEN ABOUT SHIP TYPE AND ECONOMICS, WHERE FUEL COST IS A MAJOR FACTOR!!**
- **BUT AT PARIS IN 2015 UN SOCIETIES' (COP21) ACCEPTED THAT CLIMATE CHANGE HAD TO BE ADDRESSED HOLDING THE INCREASE IN AVERAGE TEMPS TO WELL BELOW 2 DEGS C ABOVE PRE-INDUSTRIAL LEVELS, AND MAKE EFFORTS TO LIMIT THE TEMPERATURE INCREASE TO 1.5 DEGS C ABOVE PRE-INDUSTRIAL LEVELS**
- **SO, CLIMATE CHANGE ENTERED THE MAINSTREAM AGENDA AND CARBON IDENTIFIED AS THE MAIN PROTAGONIST**
- **EMITTING (2018) AROUND 1.1 Mtpa CO_2 OR 2.9% OF ANTHROPOGENIC EMISSIONS, THE MARINE SECTOR THEREFORE HAD A ROLE TO PLAY - FOR NOT TO DO SO IT WAS ESTIMATED EMISSIONS COULD GROW BY 2050 TO 130% OF 2008 LEVELS.**
- **CARBON IN FUEL HAD TO BE ADDRESSED AND THAT LIMITS FUEL CHOICE.**

WHY DOES THE TYPE OF MARINE FUEL NEED TO CHANGE?

THE IMO RESPONDED WITH AN EVOLVING STRATEGY

- **INTRODUCING MANDATORY TECHNICAL AND OPERATIONAL MEASURES**
- **ENERGY EFFICIENCY EXISTING SHIP INDEX (EEXI-) Design efficiency as grams of CO_2 emitted per tonne-mile**

and

- **CARBON INTENSITY INDICATOR (CII) how many grams of CO_2 a ship emits per unit of transport work over a year.**
- **BOTH IN FORCE SINCE 2022 WITH A TIMETABLE FOR PHASING IN.**
- ***CII AND EEXI DO NOT DIRECTLY IMPOSE MONETARY CHARGES. THEY ARE PERFORMANCE METRICS INFLUENCING CHARGES PAYABLE UNDER EU ETS, FUEL EU MARITIME, AND—SOON—THE IMO MID-TERM MEASURE PENALTIES*.**

and

- **A NET ZERO FRAMEWORK LEADING TO POTENTIAL GLOBAL CARBON PRICING (delayed by opposition)**
- **HENCE LOW CARBON OR CARBON FREE FUELS ARE NOW SOUGHT**

WHY DOES THE TYPE OF MARINE FUEL NEED TO CHANGE?

EU EUROPE WAS NOT SATISFIED WITH PROGRESS

INTRODUCED FROM JANUARY 2025 ITS FUELS MARITIME REGULATION (EU) 2023/1805

- **Penalty scheme covers all fuels and electricity**
- **Sets declining GHG-intensity limits. Ships must meet a maximum yearly average GHG intensity of onboard energy.**

FROM JANUARY 2024 THE EU EMISSIONS TRADING SYSTEM (ETS) COVERS:

- **100% OF EMISSIONS BETWEEN EU PORTS**
- **50% OF EMISSIONS TO/FROM NON-EU PORTS**
- **100% AT BERTH**
- **BASED ON CO_2, WITH CH_4 AND N_20 ADDED FROM 2026**

POLITICAL PROGRESS

- **EARLIER TODAY YOU HAD A REPORT OF THE LATEST IMO POSITION POST THE RECENT MEPC 84**

- **CLEARLY, THE GREEN LOBBY AND THE EU ARE CONCERNED BY DELAYS**

TO ILLUSTRATE THAT :-

A GREEN LOBBY (TRANSPORT AND ENERGY) VIEW OF IMO MEPC 84

Reducing ambition from NZF would ensure failure to meet IMO targets



Source: T&E. Historical data based on IMO GHG studies, DNV (2024) and T&E calculations. BAU based on DNV 'low growth' scenario. Emissions of international shipping 400+ GT. Analysis assumes all proposals come into effect in 2029.

Antwerp 27.05.26

THE STAKEHOLDERS

- **IMO, SHIP BUILDERS, ENGINE MANUFACTURERS, SHIPOWNERS, REFINERIES, FUEL PRODUCERS, BUNKER SUPPLIERS, TERMINAL OPERATORS, AND WASTE MANAGERS**

- **FOR THE WASTE SECTOR THE MAIN ISSUE HAS BEEN MANAGING A DIFFICULT HAZARDOUS WASTE STREAM THAT WITH HEAVY FUELS ESSENTIALLY ONLY ARISES IN THE MARINE BUSINESS AND CAN BE A LARGE PROPORTION OF ITS SERVICE OFFER**

- **IF THE WASTE SECTOR SUPPORTS GOOD ENVIRONMENTAL OBJECTIVES, AND ALTERNATIVE MARINE FUELS BECOME THE NEW 'NORMAL', THEN THE WASTE BUSINESS WILL NEED TO ADAPT**

- **WHICH IS WHY WE ARE HERE TODAY, TO HEAR A RANGE OF PERSPECTIVES FROM A PANEL OF EXPERT SPEAKERS**

- **FIRST TO RECAP ON THE ROLE FOSSIL FUELS HAVE PLAYED**

A BROAD PERSPECTIVE OF THE ROLE FUEL OIL HAS PLAYED

- HEAVY FUEL OIL*, ABOUT 500 Mtpa PRODUCED (5 - 10 % OF THE BARREL)
- CHEAP, FOLLOWS CRUDE OIL PRICING
- MARINE MARKET USES ABOUT 50% OF THAT
- INDEFINITE COMPOSITION, TYPICALLY 8 PLUS COMPONENTS, NOT ALL MINERAL OIL
- SULPHUR AND OTHER CONTAMINANTS CREATE POLLUTION AND CREATE PERFORMANCE CHALLENGES

➢ ON REDUCING USE, WILL THE WORLD SEE LESS NET CARBON?

- DISTILLATE FUELS ARE PROBABLY ABOUT 70 - 90 Mtpa - TO A DEGREE OPERATING AS BRIDGE FUELS?

- TODAY MUCH RESIDUAL FUEL IS SOLD AS VERY LOW SULPHUR FUEL OIL (VLSFO) A BLEND OF RESIDUAL AND DISTILLATE COMPONENTS LIMITED TO A SULPHUR CONTENT OF 0.5% MAX.
- PORT RECEPTION FACILITIES HAVE EVOLVED TO MANAGE A DIFFICULT WASTE FUEL STREAM



Antwerp 27.05.26

SOME KEY CHARACTERISTICS OF A RANGE OF MARINE FUELS

BROAD /QUALITATIVE RELATIVE CHARACTERISTICS OF A RANGE OF MARINE FUELS

CHARACTERISTIC	RESIDUAL FUEL OIL	BIO HVO	METHANOL	LNG	AMMONIA	HYDROGEN
Available as	-	-	Grey, blue, green	-	Grey, blue, green	Grey/blue/green
Ambient I state	Liquid	Liquid	Liquid	Gas	Gas	Gas
Flash Point °C	> 60	> 60	-12	n/a	n/a	n/a
Flammability range %	n/a	n/a	6 – 36	5.3 - 17	15 - 28	4 - 75
Fire Risk	Low	Low	High	Very High	Very High	Very High
Explosive	No	No	Vapour Potential	Yes	Yes	Yes
Water Solubility	Very low	Very Low	High	No	High	No
Energy Density	High	High	50% of MGO	Low	Low	Very High
Toxicity	Low	Low	High	Asphyxiating	High	Asphyxiating
Corrosive	No	No	Can be (wet?)	No	Yes	No, but embrittles metals
Cryogenic storage	No	No	No	Yes	No but low temps	Yes
Special supply/storage materials needed	No	No	Yes	Yes	Yes	Yes
Relative GHG Potential	High	Low if produced sustainably	Low- Depends on source	Not particularly so	Low - Depends on source	Low depends on source

Illustrative Only. Not to be used for making technical or engineering judgements