

ZERO44

MaritimeMET Webinar Series

Emission regulations in the maritime industry

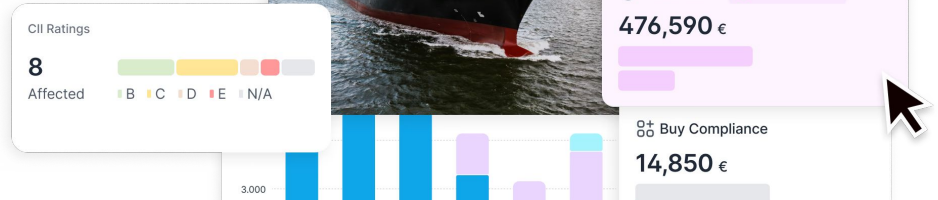
Friederike Hesse, February 21, 2025

Introduction

We are ZERO44

Fact sheet

- Founded in 2022
- 20 employees
- Offices in Berlin, Hamburg and Singapore
- Software as a Service for the shipping industry to manage CII, EU ETS and FuelEU



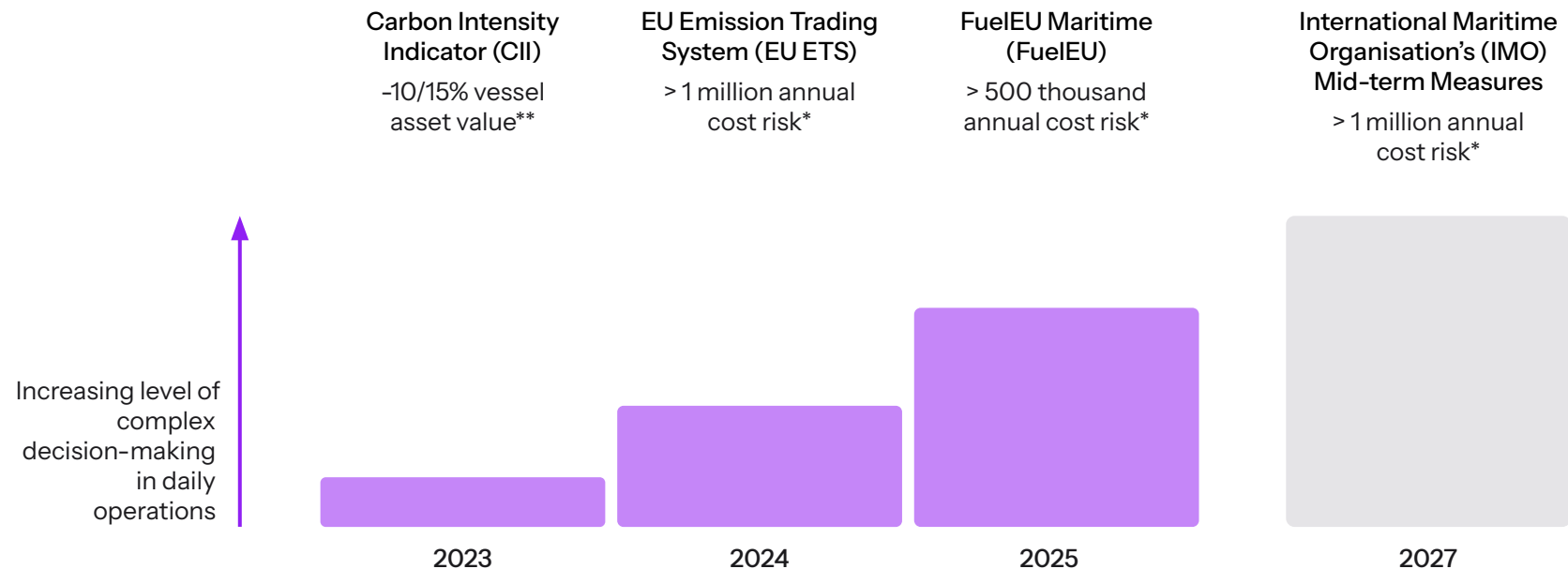
Selected Customers



Selected Partners



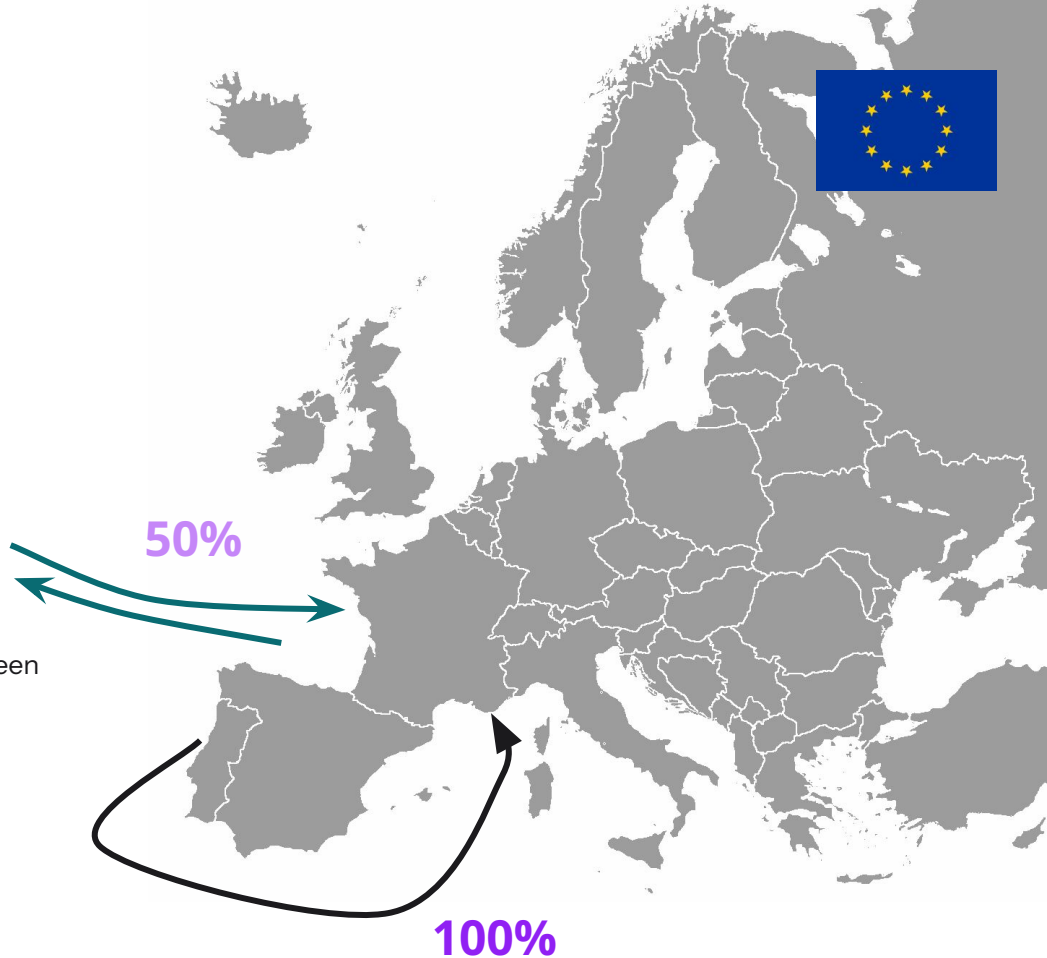
Three regulations in three years have created a lot of complexity



Voyages to and from Europe are being regulated

Scope of the EU regulation

- Extension of EU ETS to the shipping industry (1.1.2024)
- Introduction of FuelEU Maritime (1.1.2025)
- Emissions from ships > 5,000 GT
- Voyages into and out of Europe count 50%
- Voyages within Europe count 100%
- Reporting period: calendar year
- Verification period: first quarter of the following year
- Decisions, EUA surrendering and penalty payments between April and September of the following year



The regulation incentivizes efficiency gains as well as fuel choice

EU ETS Price Development

EUA Price

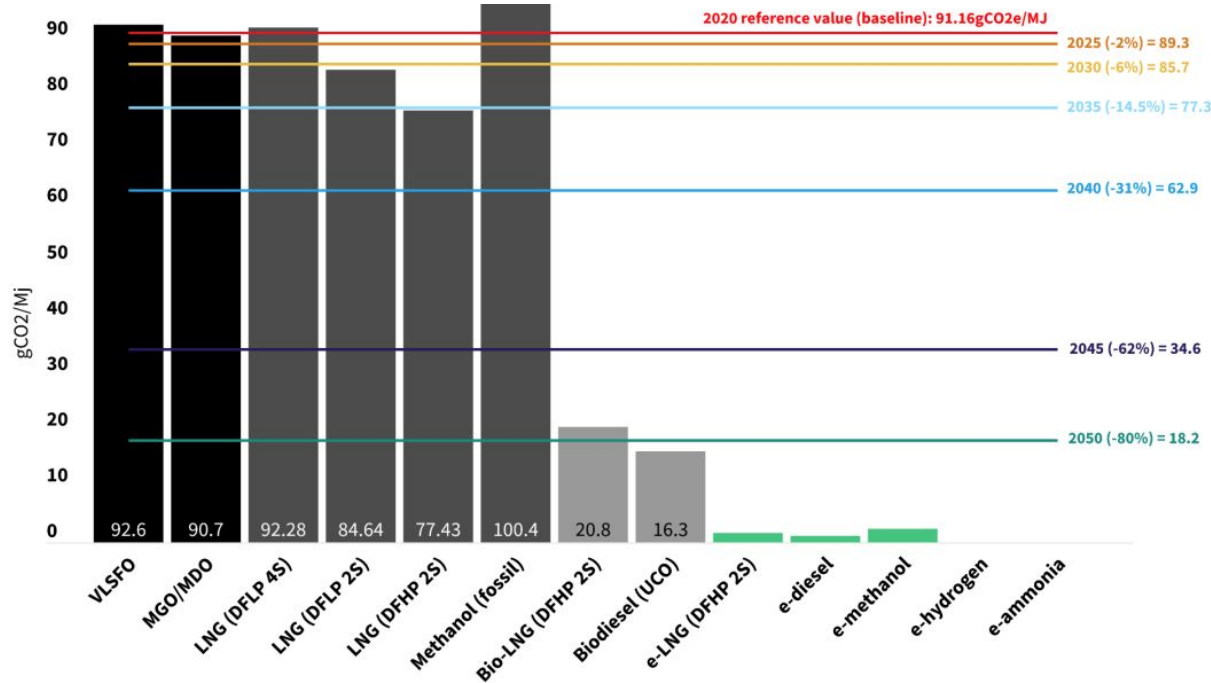
72.23 €



EU ETS for the Shipping Industry

- Demands to surrender 1 EU Carbon Allowance (EUA) per ton of CO₂ emitted on EU voyages
- EUAs are traded at the stock exchanges EEX (Leipzig) and ICE (London)
- Same market as for stationary appliances and airlines
- Carbon emissions can be reduced through:
 - Slow steaming
 - Technical efficiency measures (hull cleaning, propeller improvements, etc.)
 - Operational efficiency measures (weather routing, just-in-time arrival, slow steaming, etc.)
 - Alternative fuels

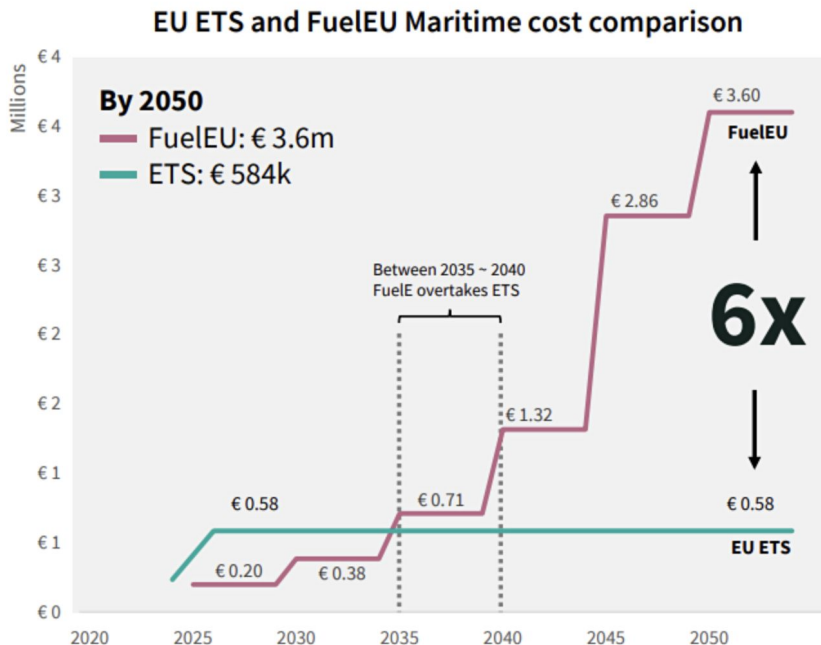
The regulation specifically incentivizes demand for sustainable fuel types and alternative propulsion



FuelEU Maritime

- Defines GHG intensity levels that must be reached
- Issues penalties if GHG intensity is too high
- Gives special credits for:
 - On-shore power supply
 - Wind propulsion
 - E-fuels (Renewable Fuels of Non-biological Origin)
- Allows for pooling, banking and borrowing

Over time, FuelEU Maritime will be the stronger incentive



EU ETS and FuelEU costs compared

- Exemplary calculation for a large handy bulk carrier emitting 9,725 t of CO₂ eq on voyages to and from the EU, and 1,399 t of CO₂eq on intra-EU voyages or at berth in EU ports
- Assumption: EUA price will be stable after 2025
- Result: by 2050 (assuming unchanged fuel mix) the cost for FuelEU would be 6 times higher than EU ETS
- The analysis also shows that FuelEU costs over time become prohibitively big and will truly force the shipping industry to change fuels

IMO Mid-term Measures announced for 2027

GHG pricing (market-based measure)

IMO member states are currently divided on whether to implement a general carbon price like a levy or a feebate. There is also a lot of discussion on how to use the funds generated by the GHG price.

Goal-based fuel standard

IMO member states want to implement a goal-based fuel standard (comparable to FuelEU). The size of the financial remedy is still being debated as well as technical questions around certification and reporting. There is currently a majority in favor of flexibility measures comparable to FuelEU.

Process and timeline

- The regulation is drafted and enforced globally by the International Maritime Organisation (IMO) based in London:
 - 176 member states who turn IMO regulations into national law (enforced by flag states and port authorities)
- The Marine Environment Protection Committee (MEPC) has been negotiating the so-called “Mid-term Measures” on the path to carbon zero since 2023
- On April 7, 2025 the MEPC is aiming to conclude the negotiations
- The measures are planned to enter into force in January 2027

FuelEU explored

Strategic options for shipping companies

Decision-making for FuelEU Maritime is complex

Compliance can be achieved in many ways

- Changing the vessel's fuel mix...
- ...with an additional incentive for using Renewable Fuels of Non-Biological Origin
- Using on-shore power supply
- Using wind propulsion
- Using one of the flexibility mechanisms (i.e. banking, borrowing or pooling)
- Paying the FuelEU penalty

Or any combination of the above

Picking the optimal strategy requires

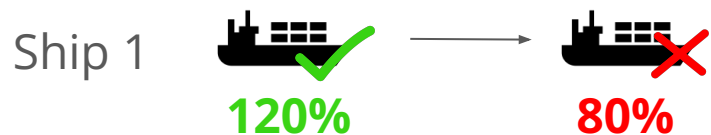
Careful analysis of all different options

Alignment with external parties and data sources

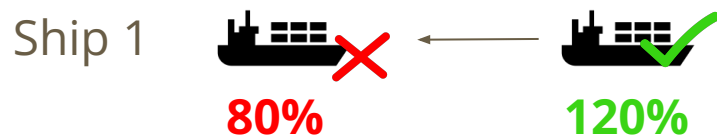
Understanding implications of decisions across multiple regulations

What does pooling, banking and borrowing mean?

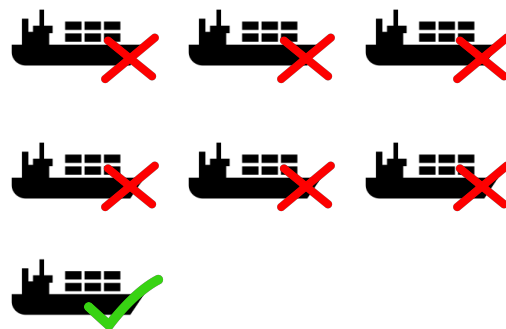
Banking between years



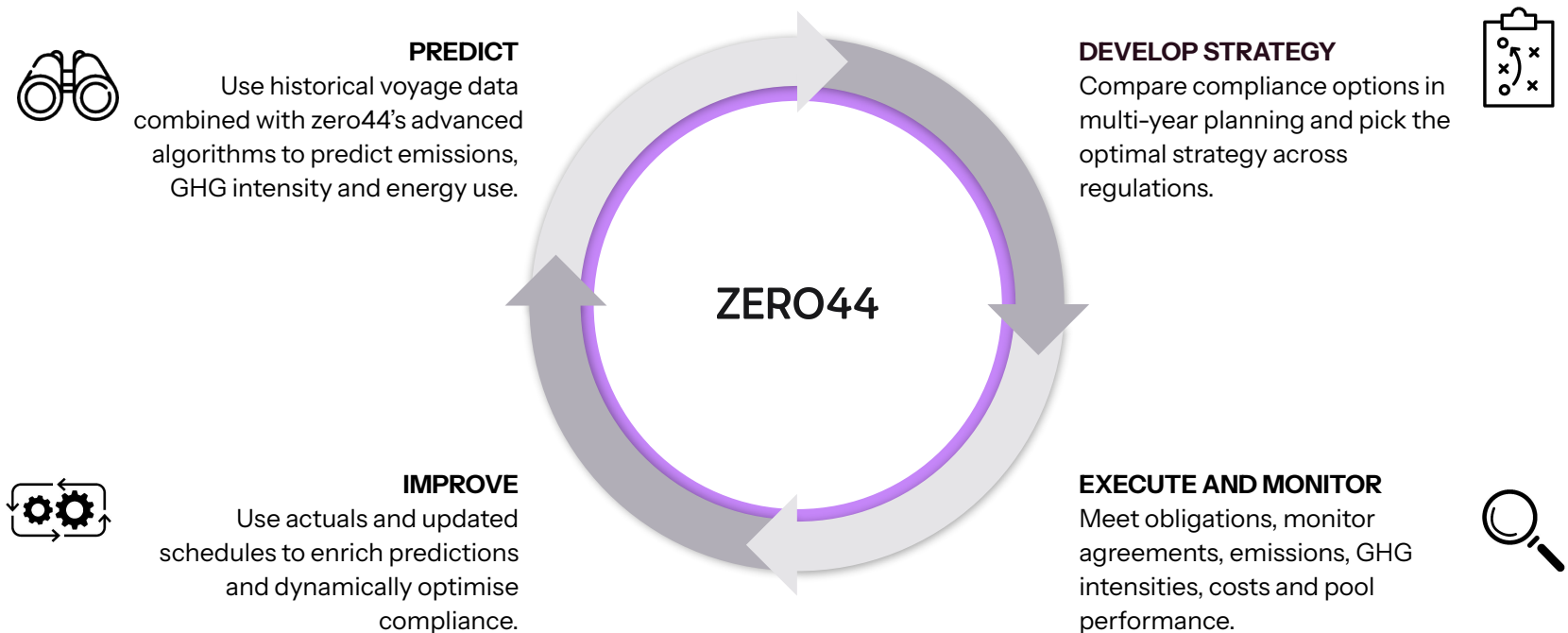
Borrowing from next year



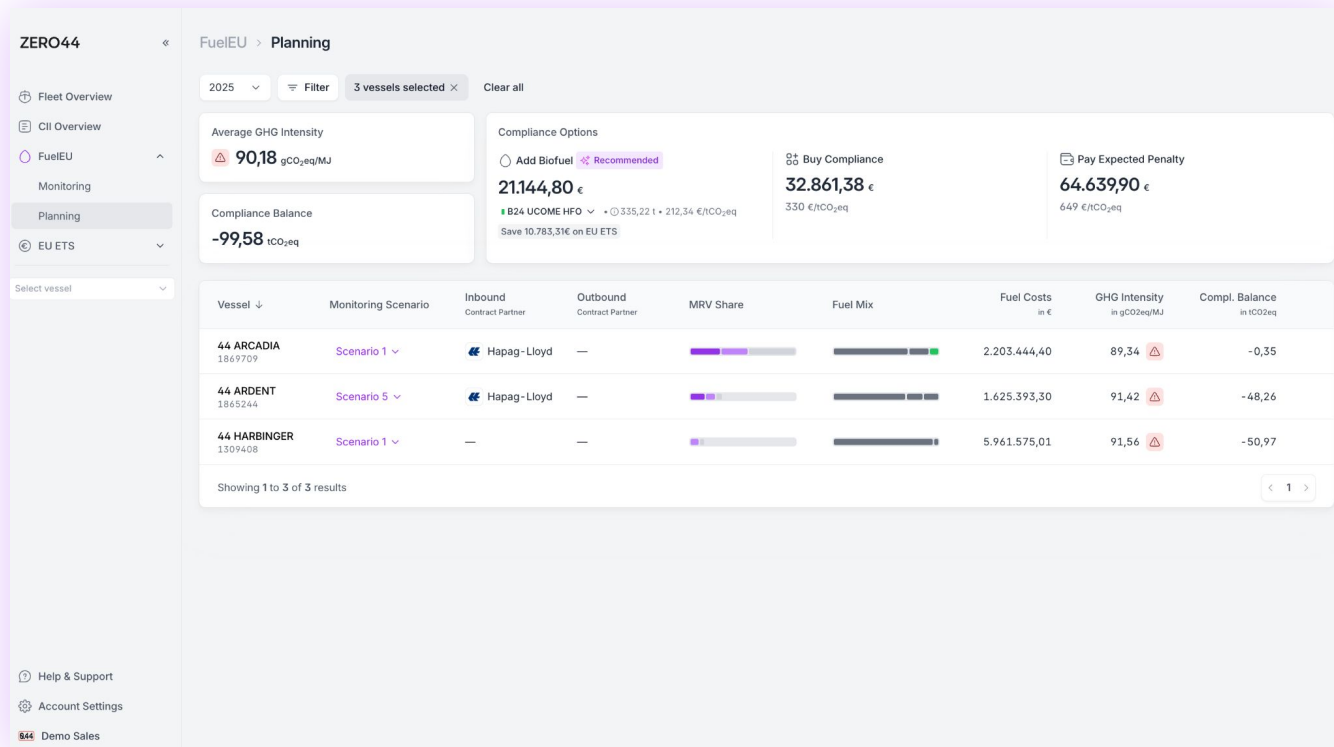
Pooling between vessels in same year



Shipping companies will need a continuous planning and controlling cycle to handle FuelEU



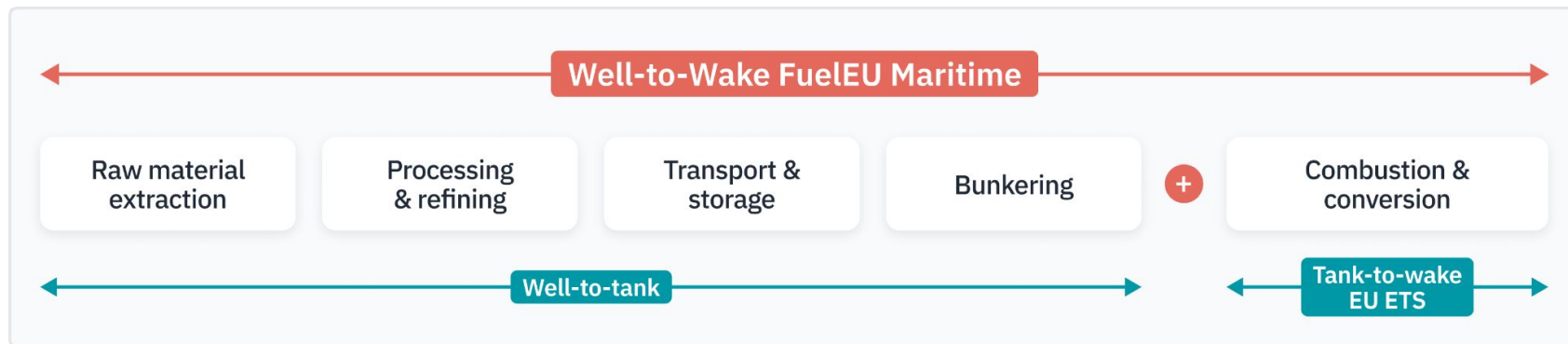
ZERO44 example: compliance options explored



FuelEU explored

Data and contractual challenges

Extended data set



- Next to carbon dioxide, FuelEU covers methane and nitrous oxide
 - (EU ETS will include them from 2026)
- FuelEU covers emissions over the full lifecycle from “Well to Wake”

Very strict requirements for alternative fuels

Eligibility Requirements for Biofuels in FuelEU Maritime:

1. Not produced from food and feed crops
2. Minimum GHG emission savings $\geq 50-65\%$

Non-eligible fuels will be assigned emission factors of their fossil fuel counterparts!

Required additional information not currently needed for fossil fuel BDN:

GHG intensity of the fuel; Guarantees of origin for fuels from renewable sources (biofuels, RFNBOs); 'Proof of sustainability' for biofuels

Where can <i>"actual emission factors"</i> be calculated?	WTT	TTW			Slippage
		Combustion Emission Factors			
		CO2	CH4	N2O	
Fossil	No(1)	No(3)	yes(5)	Yes(5)	Yes(5)
Bio	Yes(2)	Yes(4)	Yes(5)	Yes(5)	Yes(5)
Synthetic	Yes(2)	Yes(4)	Yes(5)	Yes(5)	Yes(5)

*(1) – WTT for fossil fuels – always DEFAULT.
(2) – WTT for bio/RFNBO RED/recast Gas Directive methodologies.
(3) – TTW CO2 emission factor fossil fuels - always DEFAULT.
(4), (5) – ACTUAL VALUE possible if demonstrated by International Standard*

Source: European Commission

ISCC sample template for sustainability declarations and Proof of Sustainability (PoS)

Greenhouse Gas (GHG) information

Total default value according to RED applied: ☐ Yes ☐ No

E = Total GHG emissions from supply and use of the fuel (gCO₂eq/kg)

E = Def + E₁ + E₂ + E₃ + E₄ + E₅ + E₆ + E₇ + E₈ + E₉ + E₁₀ + E₁₁ + E₁₂ + E₁₃ + E₁₄ + E₁₅ + E₁₆ + E₁₇ + E₁₈ + E₁₉ + E₂₀ + E₂₁ + E₂₂ + E₂₃ + E₂₄ + E₂₅ + E₂₆ + E₂₇ + E₂₈ + E₂₉ + E₃₀ + E₃₁ + E₃₂ + E₃₃ + E₃₄ + E₃₅ + E₃₆ + E₃₇ + E₃₈ + E₃₉ + E₄₀ + E₄₁ + E₄₂ + E₄₃ + E₄₄ + E₄₅ + E₄₆ + E₄₇ + E₄₈ + E₄₉ + E₅₀ + E₅₁ + E₅₂ + E₅₃ + E₅₄ + E₅₅ + E₅₆ + E₅₇ + E₅₈ + E₅₉ + E₆₀ + E₆₁ + E₆₂ + E₆₃ + E₆₄ + E₆₅ + E₆₆ + E₆₇ + E₆₈ + E₆₉ + E₇₀ + E₇₁ + E₇₂ + E₇₃ + E₇₄ + E₇₅ + E₇₆ + E₇₇ + E₇₈ + E₇₉ + E₈₀ + E₈₁ + E₈₂ + E₈₃ + E₈₄ + E₈₅ + E₈₆ + E₈₇ + E₈₈ + E₈₉ + E₉₀ + E₉₁ + E₉₂ + E₉₃ + E₉₄ + E₉₅ + E₉₆ + E₉₇ + E₉₈ + E₉₉ + E₁₀₀ + E₁₀₁ + E₁₀₂ + E₁₀₃ + E₁₀₄ + E₁₀₅ + E₁₀₆ + E₁₀₇ + E₁₀₈ + E₁₀₉ + E₁₁₀ + E₁₁₁ + E₁₁₂ + E₁₁₃ + E₁₁₄ + E₁₁₅ + E₁₁₆ + E₁₁₇ + E₁₁₈ + E₁₁₉ + E₁₂₀ + E₁₂₁ + E₁₂₂ + E₁₂₃ + E₁₂₄ + E₁₂₅ + E₁₂₆ + E₁₂₇ + E₁₂₈ + E₁₂₉ + E₁₃₀ + E₁₃₁ + E₁₃₂ + E₁₃₃ + E₁₃₄ + E₁₃₅ + E₁₃₆ + E₁₃₇ + E₁₃₈ + E₁₃₉ + E₁₄₀ + E₁₄₁ + E₁₄₂ + E₁₄₃ + E₁₄₄ + E₁₄₅ + E₁₄₆ + E₁₄₇ + E₁₄₈ + E₁₄₉ + E₁₅₀ + E₁₅₁ + E₁₅₂ + E₁₅₃ + E₁₅₄ + E₁₅₅ + E₁₅₆ + E₁₅₇ + 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Result: companies will need to handle a huge amount of different fuel types and blends

ZERO44 Account Settings

Managed Accounts Stakeholders **Fuels** + Create fuel

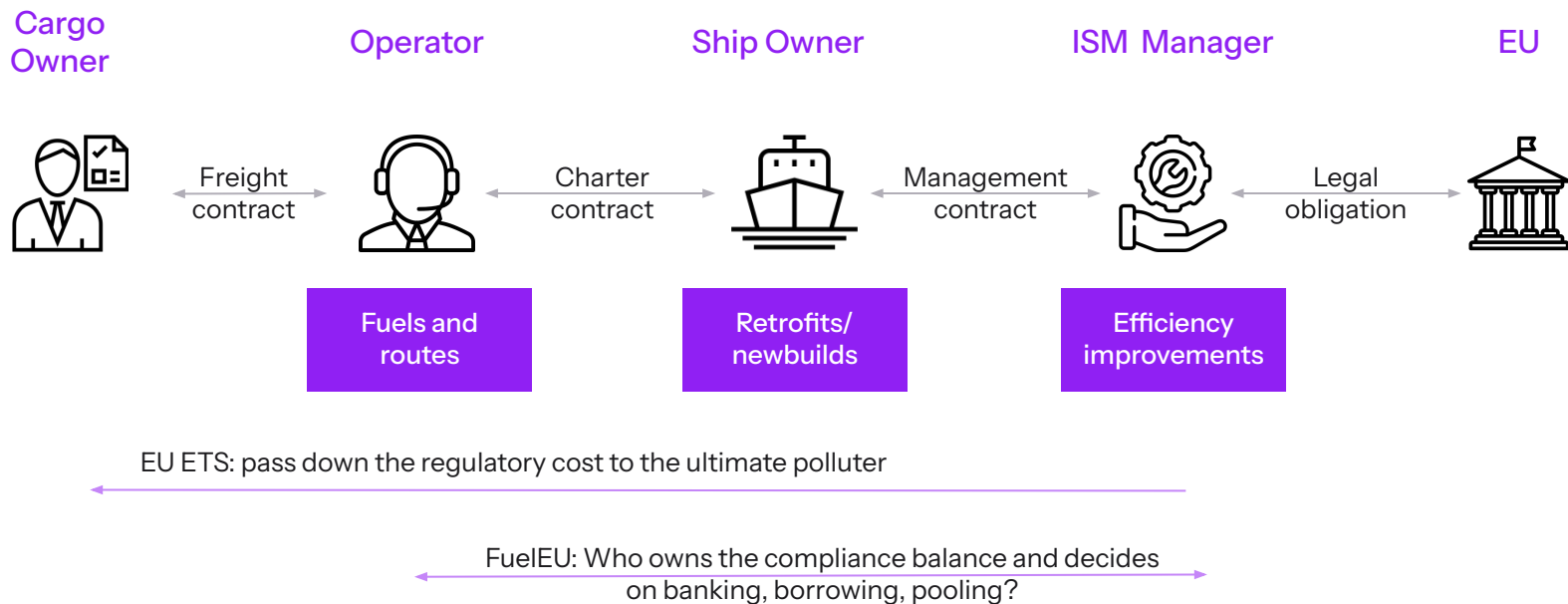
Name ↑	Type	LCV in MJ/kg	TTW Cf CO ₂ in g CO ₂ /kg fuel	WTW Ef in g CO ₂ /kg MJ	RED II certified	Price in \$ per t	Converted price in € per t	Blend components	
MGO	Fossil fuel	0,0427	3,2060	90,6319	—	642	623,3	100.0% MGO	✎
MDO	Fossil fuel	0,0427	3,2060	90,6319	—	520	504,85	100.0% MDO	✎
LFO	Fossil fuel	0,0411	3,1510	91,2512	—	518	502,91	100.0% LFO	✎
HFO	Fossil fuel	0,0405	3,1140	91,6012	—	486	471,84	100.0% HFO	✎
B30 UCOME HFO	Fuel blend	0,0395	—	70,3933	Yes	779	756,31	30.0% B100 UCOME 70.0% HFO	✎
B30 (LFO)	Fuel blend	0,0399	—	70,3600	Yes	—	—	30.0% B100 UCOME 70.0% LFO	✎
B24 UCOME HFO	Fuel blend	0,0397	—	74,7247	Yes	735	713,59	24.0% B100 UCOME 76.0% HFO	✎
B23 (HFO)	Fuel blend	0,0397	—	75,4400	Yes	—	—	23.0% B100 UCOME 77.0% HFO	✎
B100 UCOME	Biofuel	0,0370	—	16,2316	Yes	1,252	1,215,53	100.0% B100 UCOME	✎

Help & Support Account Settings Demo Sales

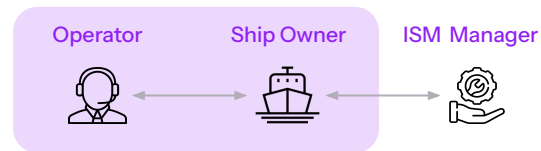
Fuel complexity

- Define the underlying biofuel with LCV and WtW Cf, confirm RED II certification
 - Note: each biofuel will be different
- Define the exact blend you are buying: share and type of fossil fuel
- Expect time lag to receive the proof of sustainability from your fuel supplier
- This is a reporting and a planning challenge

Many stakeholders need to align on the actions to take



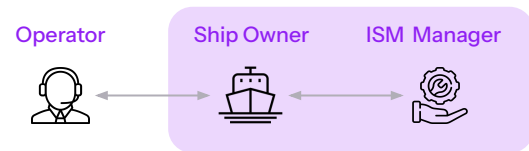
The BIMCO FuelEU time charter clause



Main points:

- T/C period \leq calendar year:
 - Owner owns compliance balance, i.e. strategy
 - Charterer receives penalty surcharges and/or reimbursements depending on his fuel choice
- T/C period $>$ compliance period:
 - Charterer owns compliance balance, i.e. strategy
 - Charterer instructs owner on banking, pooling borrowing
 - Charterer receives bonus or penalty payment depending on the success of the compliance strategy
 - Charterer is fully responsible for all incurred costs

The BIMCO Shipman clause



Main points:

- Managers:
 - Prepare, update and send FuelEU Monitoring plan
 - Send BDNs and Proof of Sustainability to verifier (request that info from owner)
 - Provide owner with regular reports on Compliance Balance and GHG intensity
 - Send FuelEU reporting data to the verifier and provide owner with verification result and documentation
 - Pay eventual penalties to the EU (after having received the money from the owner)
- Owners:
 - Own the compliance balance and decide on compliance strategy
 - Inform Manager if new fuels are being used
 - Forward BDNs and Proof of Sustainability to manager and take full responsibility for accurateness
 - Provide Manager with “adequate security” for eventual penalty payments
 - Instruct Manager on banking, borrowing and pooling for the execution with the verifier and the authorities
 - Send any penalty payments due for FuelEU to the Manager for him to pay the EU

ZERO44

Contact data

Thank you and reach out if you
have any further questions!



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