BUREAU VERITAS

FUTURE SHIPPING TEAM

SUSTAINABLE MARITIME SHIPPING

GHG Intensity Regulatory Compliance

- Clean Energy Supply -

REGULATORY INFLUENCES ON ENERGY CHOICE

Trade-routes:

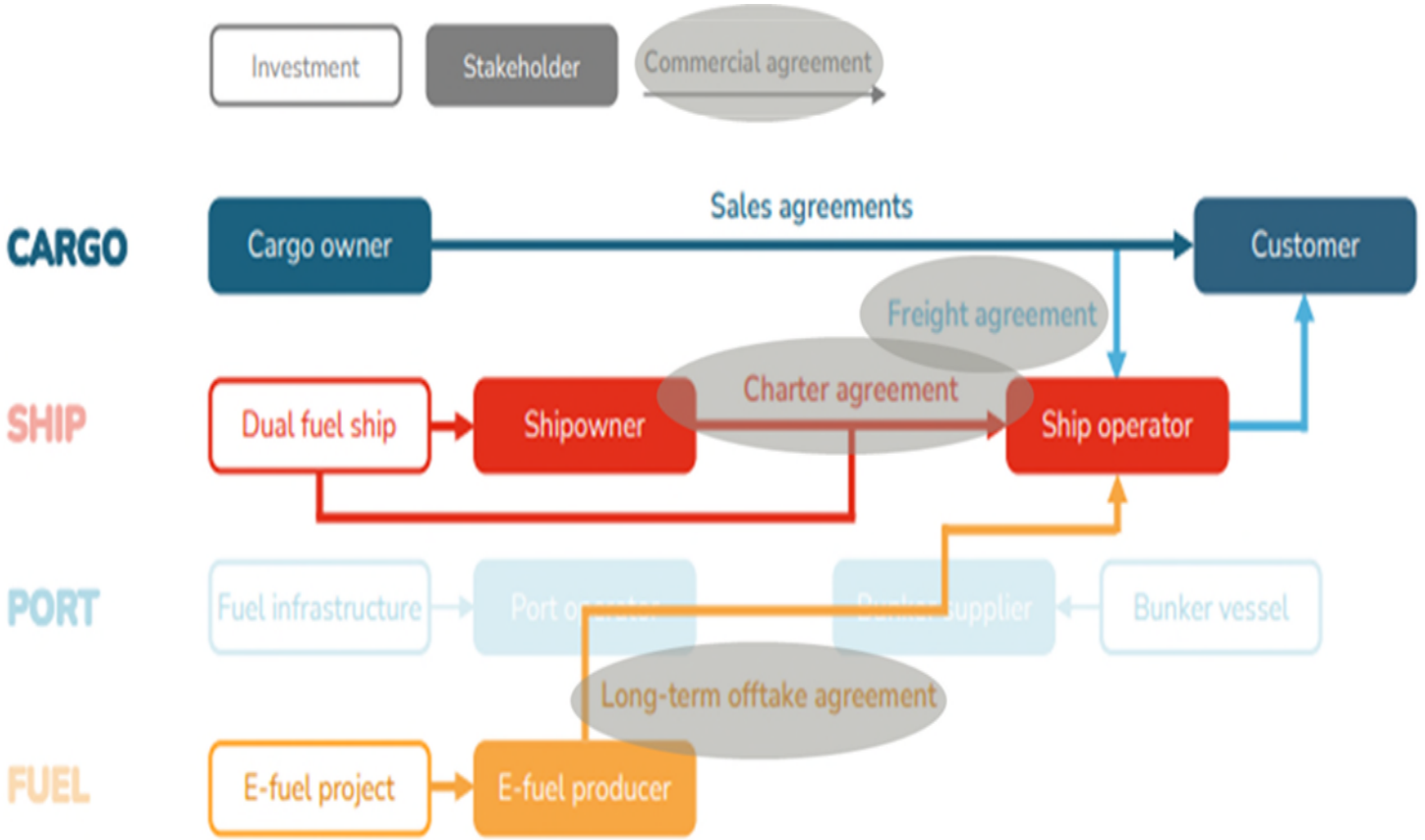
Geo-politics
Climate
CII regulations

Supply Chain:

Offtake
Price
WtT intensity

Costs:

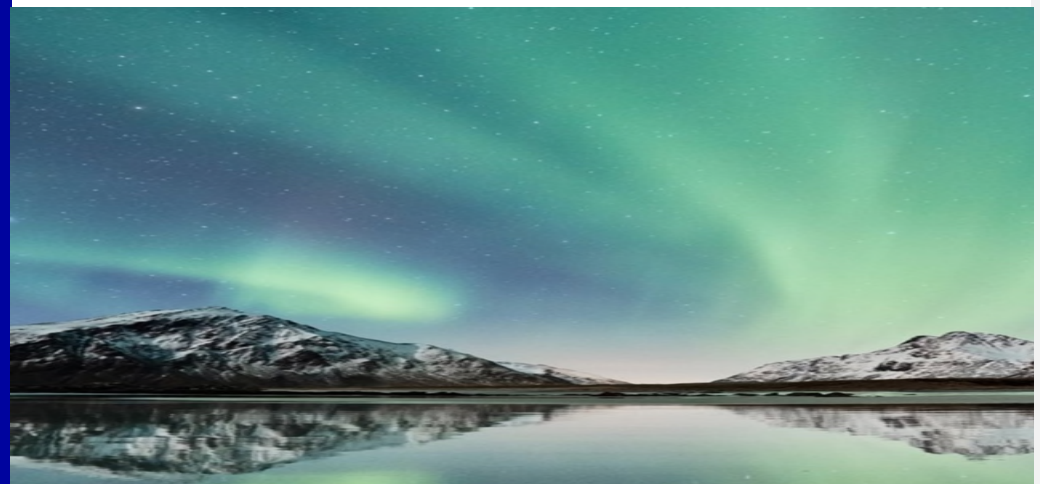
Levy Systems
TCO vs TCO
TtW intensity



Re: UMAS BBCGSC Febr 2025

MID TERM MEASURES

IMO GHG FUEL INTENSITY MEASURES (GFI)



IMO MEPC 83 APPROVALS AND ADOPTIONS

- MEPC 83 majority approval of **new Marpol Annex VI Ch 5** (from 2028)
  - 1) Goal based fuel standards (GFI) (incl reporting)
  - 2) Implementing an IMO fund (name under discussion)
  - 3) Creating an Emission Trading System (ETS) mechanism to support the use of ZNZ fuels
  - 4) IMO DCS data review (additional data, revised BDN data (incl GHG intensity/feedstock info etc etc), data transparency
  - 5) Measurement methods of CH4 and N2O in emissions

- Adoption of NOx code amendments
  - Combined Tier II and Tier III operation of engines
  - Configuration of systems with different emission standards
  - Guidelines for SCR systems

- CII – new reduction factors 2027 – 2030 (13,625%/16,25%/18,875%/21.5%)
- SEEMP guidelines (underway vs not underway)
- EEDI revisions after May 2026 new construction

MEPC 83 mid-term strategy GHG

Compliance units; banking & transfer & voluntary cancel

Compliance units according to GFI att reduction compared to the GFI target

SU (surplus unit) = overcompliant

DU (deficit unit) = undercompliant

SU/DU units can be banked/transferred/paid

GFI attained = attained GFI is a weighted average of GHG intensity of all energy sources used by a ship in a year

Based on annual CO2etonne/TJ (WtW GHG emissions)

- ❑ GHG intensity of the energy source used
- ❑ Total energy used of that energy source
- ❑ Total annual energy used of all energy sources

GFI target consisting of Direct Compliance Target and Base Compliance Target (resp Tier I and Tier II)

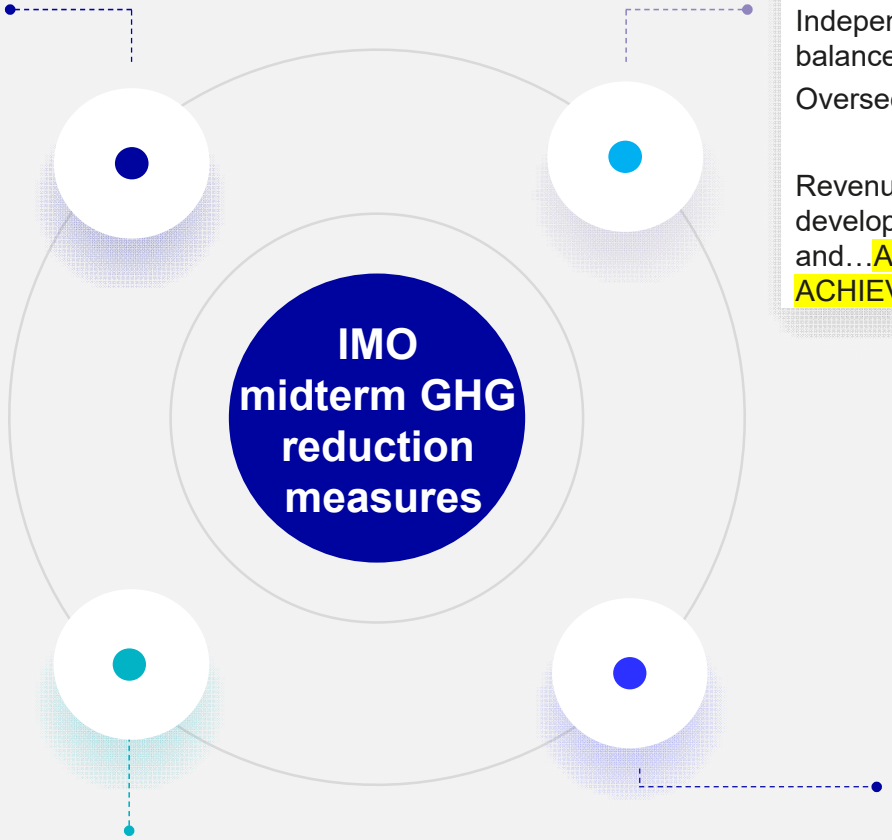
Target based on GHG reduction strategy

Tier I deficit: USD 100 per ton CO2 eq (2028-2030)

Tier II deficit USD 380 per ton CO2 eq (2028-2030)

Possible thresholds for use of ZNZ fuels of 10-25% until 2034 (for early adoptors)

Responsibility: ISM manager (at reporting date).



GFI Levy/Contributions

Levy/contribution between 18,75 – 150 USD/ton CO2eq LCA (WtW GHG emissions)

IMO Fund

Name: *'Net -Zero Fund*

Independent fund governed by Governance Board with balanced gender and geographic representation

Overseen and audited by MEPC

Revenue from contributions, expenditures for credits, technical developments and compensating effects of GHG and…AWARDING ZNZ ACHIEVERS WHEN 19 gCO2e/MJ IS ACHIEVED

Data

IMO DCS – MARPOL VI chapter 4, reg 27 new appendixes:

Annual fuel(s) consumption/NM incl EEDI, EEXI and CII data

New additional data on BDN

WtW GHG intensity + Lower Calorific Value

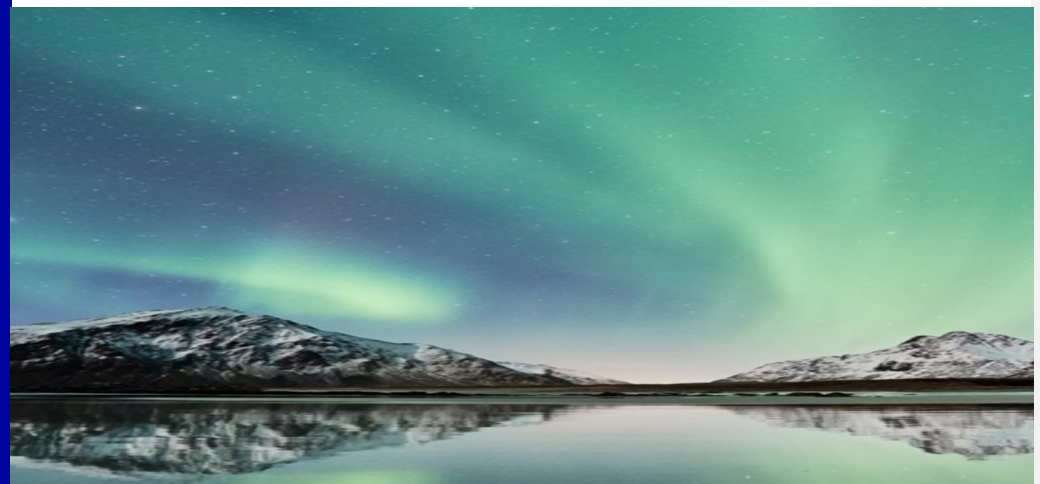
For calculations:of GFI att and GFI target

Baseline eq: 93.3 gCO2e/MJ (=LSFO 2025/ LSFO+MGO 2009)

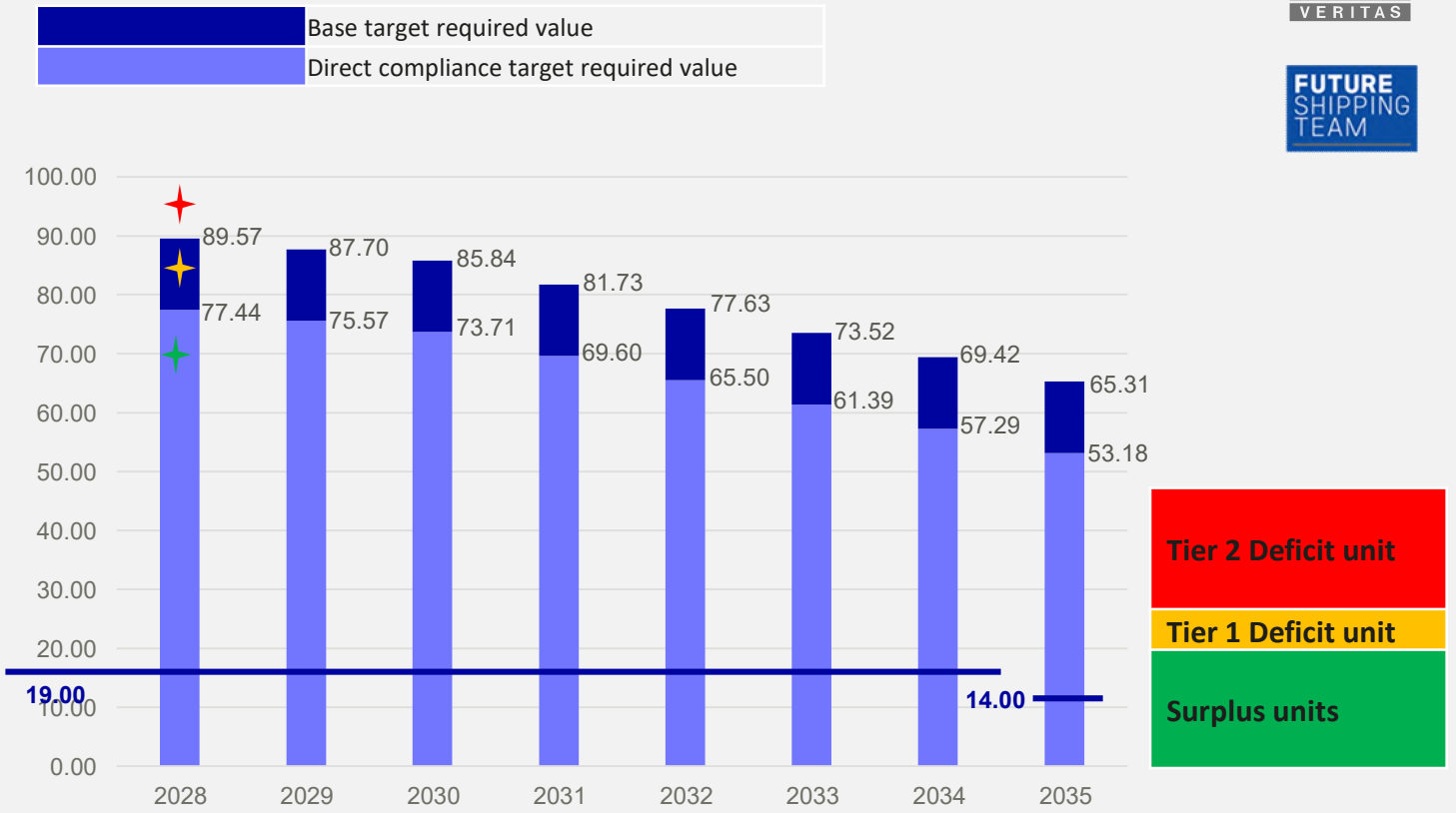
MID TERM MEASURES
IMPACT

Costs are dependent on:

- **GHG/Fuel compliance strategy**
- **GHG intensity**
- **Blending**
- **WtT GHG intensity**
- **Composition of the fleet**
- **Trading**
- **Economic value of Surplus Units**



IMO MEPC 83 IMPACT



Direct compliance, surplus units = (77.44 - annual GFIattained) × $Energy_{total}$

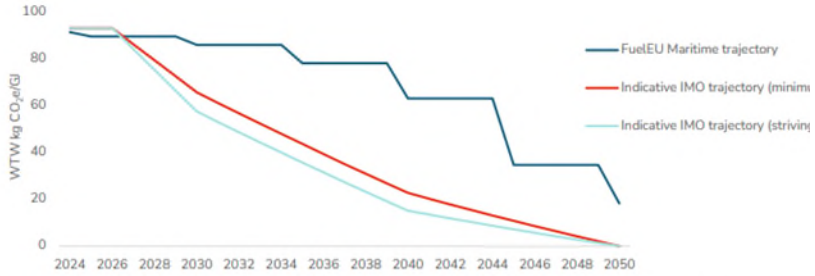
Tier 1 compliance deficit = (77.44 – annual GFIattained) × $Energy_{total}$

Tier 2 compliance deficit = (89.57- annual GFIattained) × $Energy_{total}$ + **Tier 1 compliance deficit** = 12.13 × $Energy_{total}$

ZNZs below the value may receive rewards from IMO Net-Zero Fund for the ZNZs used (ZNZs means zero or near-zero GHG emission technologies, fuels and/or energy sources)

TOTAL OPERATING COSTS

INFLUENTIAL FACTORS IMO STRATEGY & EU

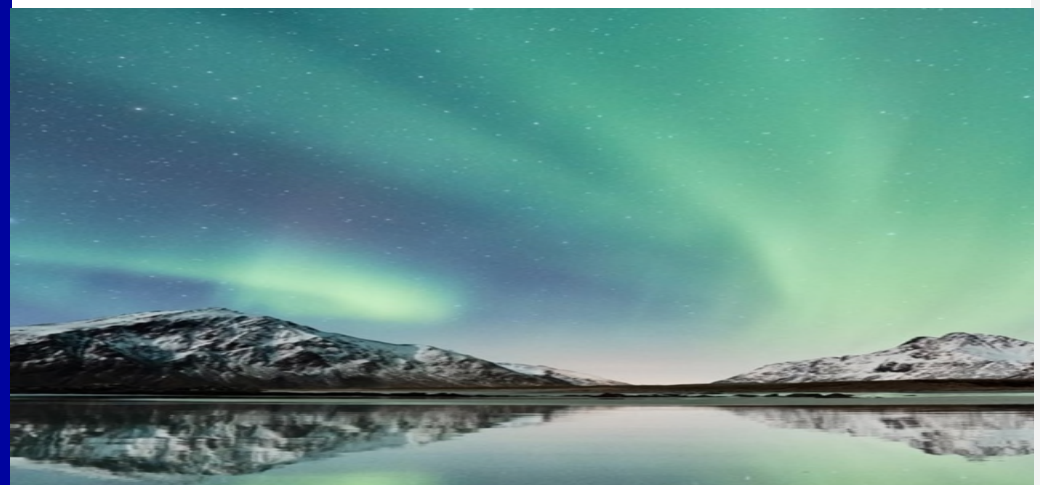


***Note:** Estimate of 2008 WTW absolute emissions and projections of future energy demand based on IMO 3rd and 4th GHG Studies.*

[16] Based on 2022 EU MRV data; assumes 2022 levels of overcompliance is pooled and that blended biofuel ratio is 70% fossil fuel; 30% biofuel

[17] IMO: 2023 Revised Strategy on the Reduction of GHG Emissions from Ships

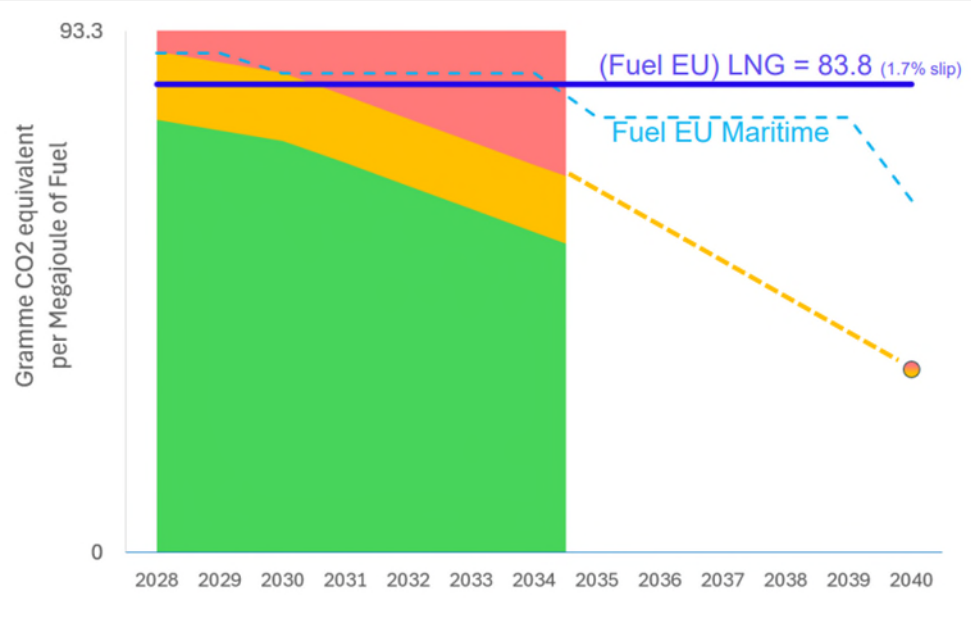
Re: UMAS - Comparison of FuelEU and indicative IMO 2023 Revised GHG Strategy



IMO GHG STRATEGY AND EU ETS / FUEL EU

Avoidance of double pricing

- EU now will review the IMO mid term measures (International) to reach the European targets
- FUEL EU will report to EU parliament
- Then alignment is sought in the form of a transition or removal of EU payments



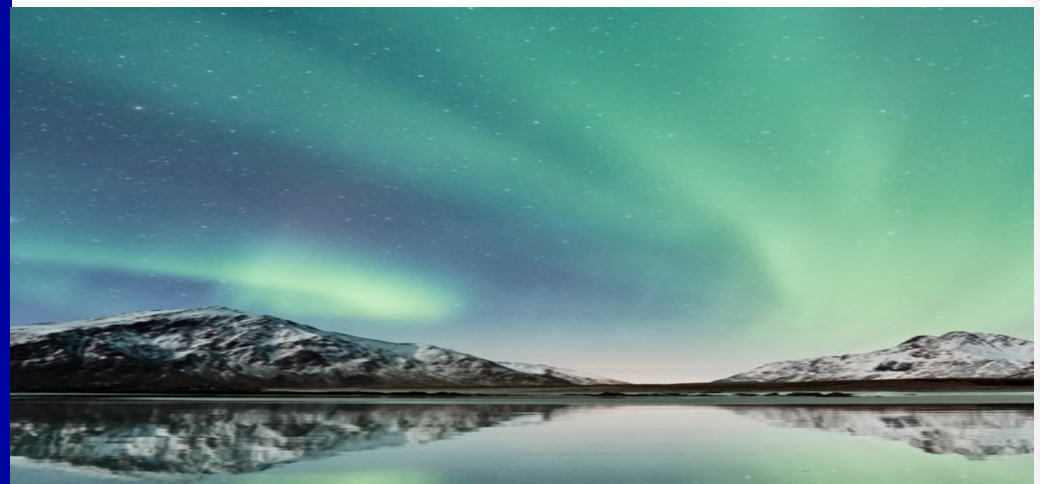
FUELS OPERATIONAL COSTS (STUDIES ONGOING)

VLSFO LNG bio-MeOH B100

TOTAL OPERATING COST

GHG COMPLIANCE STRATEGY

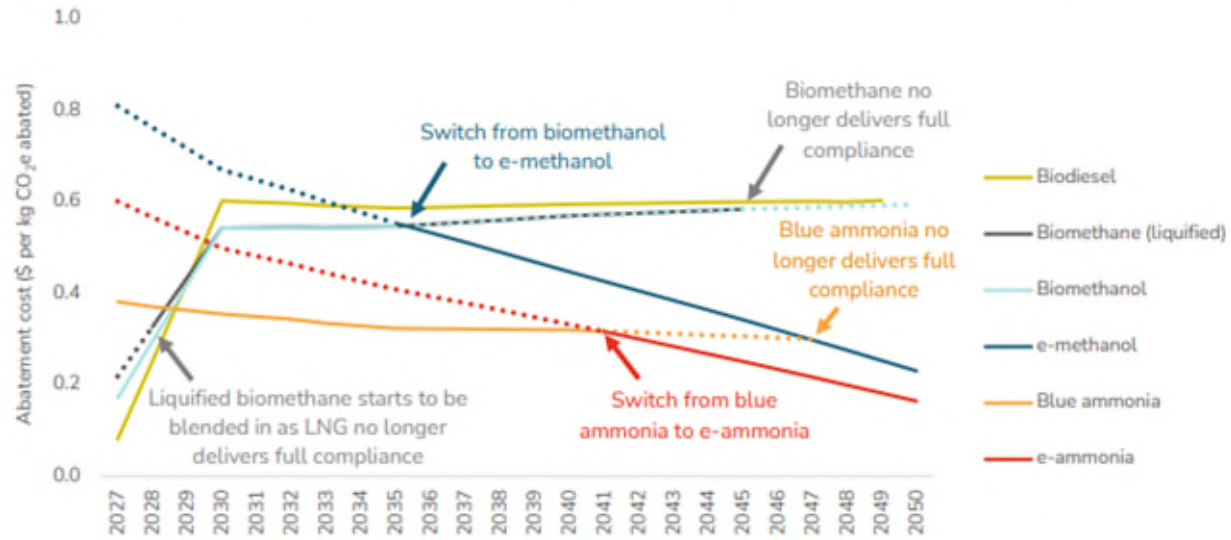
(FOR SHIPOWNERS AND CHARTERERS)



OPERATIONAL LIFE TIME SERVICE COSTS

- Close to 50% of new construction orders are alternative fuel ready
  (Clarkson –World Fleet Register)
- Choice of grey, green or e- alternative fuels is dependent on IMO/EU GHG levy on GHG WtW intensity.
- **A lifetime fuel compliance strategy**
  - based on fuel costs and emission intensity
  - determined by the IMO/EU responsible stakeholder (bunker supply contract)

Figure 34: Fuel cost and emissions intensity in terms of cost abatement ($ per kg of CO_2e abated per GJ) versus LFSO

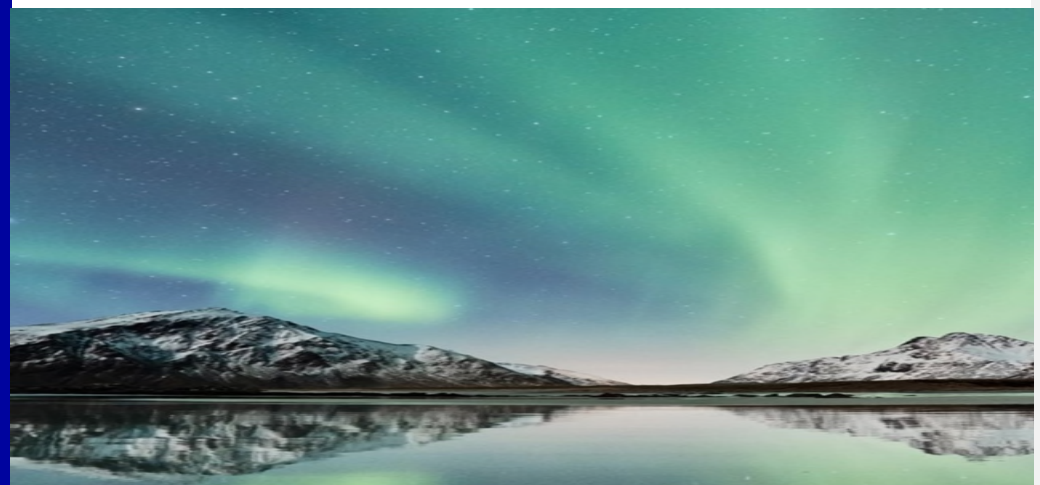


***Note:** Outputs reflect scenario where carbon price is set to zero and no subsidies have been applied.*

Re: UMAS – Building a business case for green shipping corridors Febr 2025

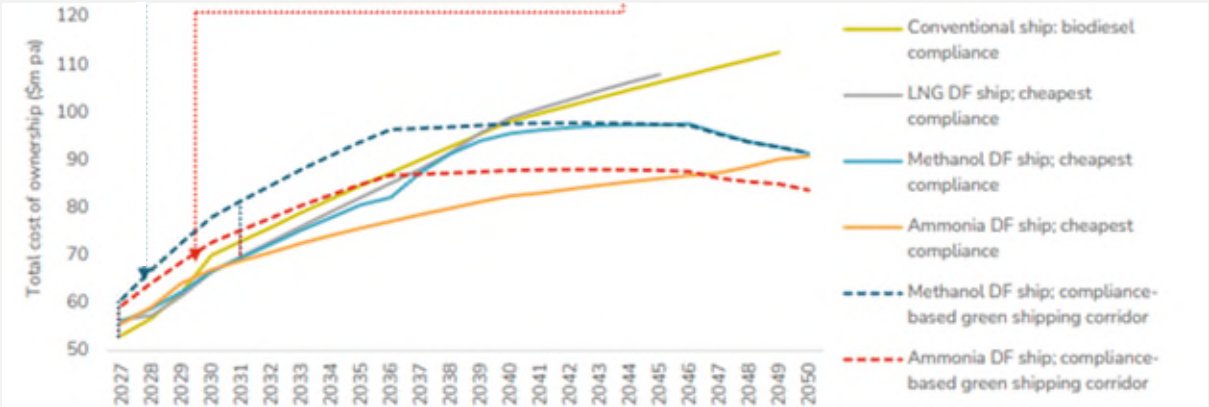
TOTAL COST OF OWNERSHIP
INFLUENTIAL FACTORS

TCO
=
PURCHASE PRICE
+
LIFETIME SERVICE COSTS
-
(REMAINING VALUE)



EARLY COMPLIANCE COSTS VS COMPLIANCE STRATEGY COSTS

- Overcompliance on IMO and EU GHG Strategy Goals is expensive but with good pooling/banking/trading perspectives.
- Cheapest compliance implicates uncertainty and controls … requires a fuel strategy over the lifetime of the vessel based on IMO/EU mechanisms
- Total Cost of Ownership is critical for choosing a LEASE contract or a PURCHASE contract (based on 15 yrs service)



***Note:** Based on 24,000 teu containership sailing between East Asia to Europe consuming approximately 30,000 tonnes LSFO equivalent per annum. Cost assumptions are detailed in the Appendix.*

Re: UMAS – Building a business case for green shipping corridors Febr 2025

KEY TAKE-AWAYS FOR GHG INTENSITY COMPLIANCE

TRADE ROUTES

Trade routes are changing

- **Geopolitics**
- **Technology &design**
- **Regulations**

CLEAN ENERGY SUPPLY

Clean Energy Supply

Must be operational by 2028-2030

COSTS

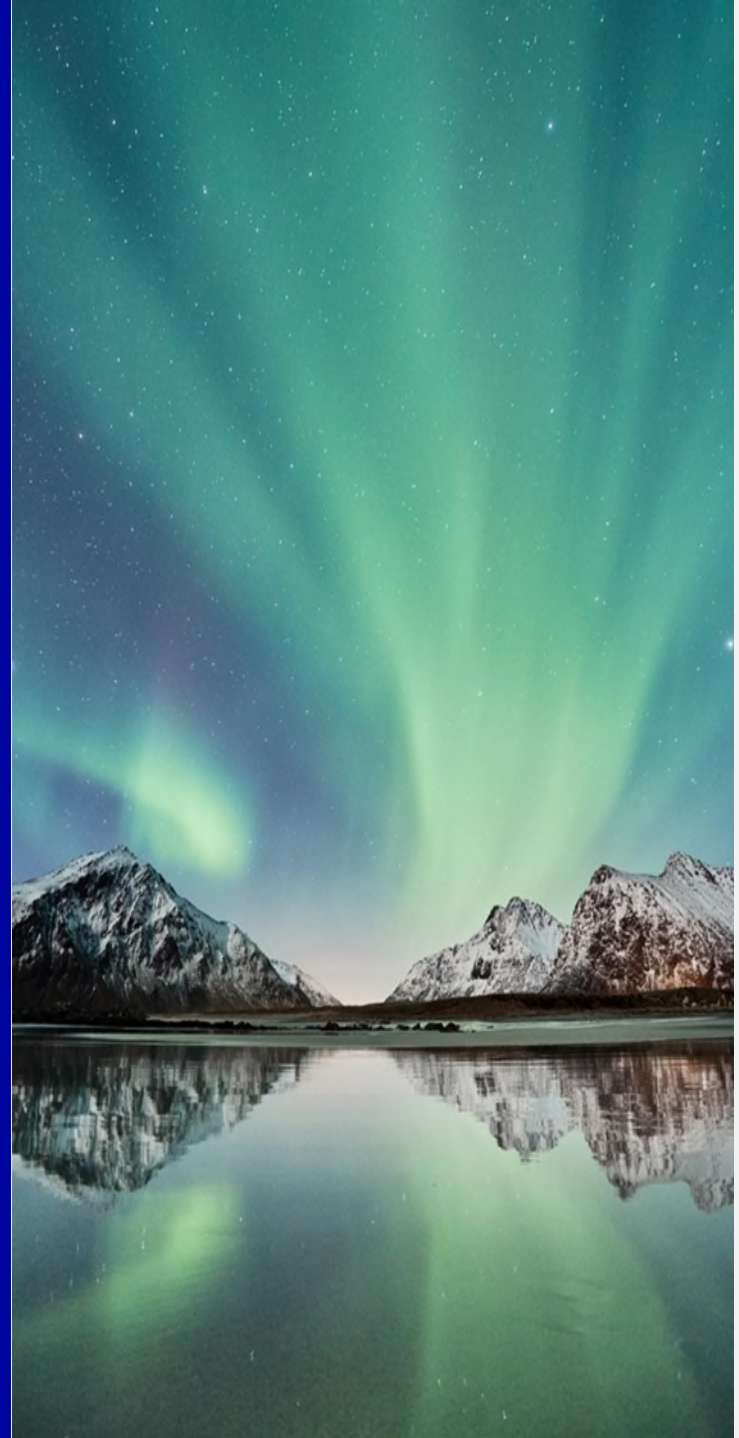
GHG levy sytems

Determines the timing for changes

GHG INTENSITY

Well-to-Wake (LCA)

Leading value-proposition



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BUREAU VERITAS

Shaping a World of Trust

LEAP | 28

Be the preferred partner for customers' excellence and sustainability