

Feasible Pathways to Reduce Emissions in the Container Sector

International Maritime Statistics Forum -Hamburg 25th of October 2022 - 11:15 CET Kai Miller





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Agenda



- 1. Container Sector: Energy Demand
- 2. Regulatory Framework
- 3. Pathway and Bridge Technologies
- 4. Emission Calculation Standards
- 5. Outlook





Section 1

Container Sector: Energy Demand

Energy Demand

Vessel p.a.

OE

Container Sector

- Container vessel type: Scrubber fitted, 24,000 TEU
- Trade: Far East NW EU
- Fuel consumption / sailing (HFO): 8,400 mt
- Fuel consumption / sailing (Ammonia): 20,500 mt
- Energy required: / sailing: 164 GWh
- Solar panel: 1 m²; 350 KWh / year*

Fleet p.a.

Parameters

- Fleet: ca. 5.5k container vessels**
- Emissions / year: rd. 235,000,000 mt CO2e
- VLFSO needed / year: rd. 73,000,000 mt
- Standard windmill: 3.5 MW
- Assumed efficiency loss: 50%





Energy demand





- Rd. 800 football pitches .
- Rd. 18,666 TEU (1 sailing) required for shipping panels, emitting 15,510.33 mt CO2e in the sailing.

Compares to

- Installed capacity in Germany***: .
 - 29,500 Onshore windmills
 - 1,500 Offshore windmills

*Reflecting efficiency loss; industrial and retail panels in different locations **Clarksons ***IRENA





Section 2 Regulatory Framework

Regulatory Timeline





- EU ETS (EU Fit for 55)
- Internal EU shipping: 100% emission coverage (2- EU ports)
- External EU shipping: 50% emission coverage (1- EU port)

EU ETS (EU Fit for 55)

 External EU shipping: 100% emission coverage (1- EU port)

> As per 17th Aug 2022 Given in good faith but without guarantee Subject to final regulatory implementation Sources: Lloyds Register, ABS, FIS, IMO, DNV

Carbon Intensity Indicator (CII) Rating IMO regulation on global basis



- Corrective action plan to be implemented
 - if rating D for 3 consecutive years
 - or rating E
- Capacity (dwt) not cargo reflected
 - i.e. utilisation factors still to be developed
- CII rating to be reflected in seaexplorer





Current State of Regulation



IMO (GLOBAL)

- MEPC 79 (December 2022)
- MEPC 80 (July 2023)
- EEDI, EEXI \rightarrow asset
- CII → purely based on dwt
- EEOI → operational: transport work / cargo

EU FIT FOR 55 (EUROPEAN UNION)

- Shipping industry included in the ETS [European Trading Scheme] from 2024 onwards
- Emissions entirely priced:
 - 2024 both ports located in EU
 - 2027 one port located in EU
- Renewable Energy Directive II
- Fuel EU Maritime



Section 3 Pathway and Bridge Technologies

Existing Fleet Overview



- Fuel / Engine type:
 - Conventional: ~99%
 - Dual Fuel: ~1%

\rightarrow Currently existing modes of propulsion:

- Biofuel
- LNG



Vessels in Service

Available Container Slot Capacity until 2026

- Total slot capacity until 2026: 32.283 million
- Most of the slot capacity still conventionally fueled (~89%)
- Orders not yet reflected in the register:
 - Korea Shipbuilding & Offshore Engineering: 29 Methanol-propelled ships
 - Dalian Shipbuilding: Series of Methanolpropelled ships for CMA CGM

Accumulated Green vs. Conventional Slot Capacity Projected Until 2026



Source: Clarksons, Financial Times, As of 12th of October 2022



Scrubber Spread Average Prices ARA / SIN

- Scrubber investment: 2.7 million
- Maximum spread: ~460
 \$ / mt (04.07.2022)
- Minimum spread: ~35 \$ / mt (02.11.2020)
- Scrubbers might be converted to direct carbon capture devices

How long and against what will VLFSO be the ultimate cost benchmark?





Pathways to Reduce Emissions in the Container Sector





The Cost of CO2 Reflecting EU Taxonomy

- Based on 1st half 2022 EU ETS prices of 27 weeks
- LNG prices affected by Russia – Ukraine crisis
- Up to 2026, rd. 11% of total fleet dual fuel
- Scrubber emissions to be added if HFO is utilised

The Cost of CO2





EU ETS – Cost of Compliance Maersk Price Estimates



- Maersk estimates of cost increase per FEU on selected trades
- To be applied as a standalone surcharge effective Q1 2023
- Based on assumed CO2 cost: 90 EUR / ton (EU ETS Allowance price)

Tradelane	Environmental Fee (€ / FEU)	CO2 Emissions (mt)	VLSFO (mt)
South America West Coast – Europe	213	2.37	0.74
North Europe – Far East	99	1.10	0.34
Far East – North Europe	170	1.89	0.59
Middle East – North Europe	106	1.18	0.37
North Europe – US	184	2.04	0.64



Section 4

Emission Calculation Standards

Unifying Standards



Emissions



 Radiative forcing (CO2, SOx, Nox, PM)



Scope

- Well-to-Wake (WTW)
- Tank-to-Wake (TTW)
- WtT Emissions = LCV $\left(\frac{MJ}{a}\right) *$
 - $CO_{2eqWtT}\left(\frac{gCO_{2eq}}{MI}\right)$

Distances

- Ship log books, AIS, Midports,...
- Likely higher due to stops at intermediary ports, deviations due to weather etc.
- SFC proposes a flat adjustment of +15%

Utilisation

- Fully laden
- 70% (SFC)
- Modelled on journey level
- Real-time reported (noon report)



Energy density

Basis: VLSFO: 0,041 MJ/g

- Biodiesel: -10% / 0,0372 MJ/g
- Ammonia: -50% / 0,0186 MJ/g
- Methanol: -50% / 0,0199 MJ/g
- LNG: +20% / 0.0491 MJ/a

Percentage values approximate

Standards



- ISO 14064-1/2/3 → system and process standards
- EN 16258 → currently accepted standard (SFC)
- ISO 14083 (release 2023) → GHG calculation standard for the transportation sector
- IPCC principles (National GHG inventories)



Section 5 Outlook

Influencing the pathway...



Macro

- New China 5 year outlook → Increase electric vehicles; competition for renewable energy sources etc.
- Shift from initially planned energy strategies due to Russia / Ukraine crisis
- Increased interest rate levels affect developments for conventional as well as low carbon projects
- Nearshoring due to recession and geopolitical woes
- Quo vadis: Inflation

Micro

- Smarter supply chain planning (seaexplorer.com)
- Reduced dwell time
- Optimised surface transportation
- Improved utilisation of equipment
- Competition between different industries + sectors for the best possible access to low carbon fuels
- Real Estate crunch due to rising interest rate levels
- ...

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