Decarbonizing International Shipping: *applying the 5-lever framework*

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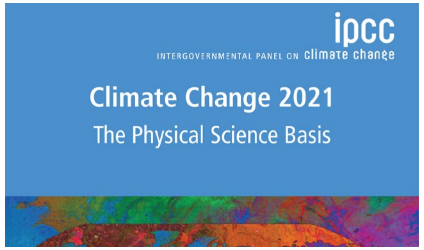
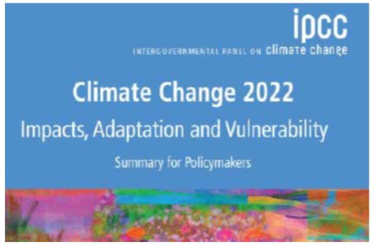
Meeting the Decarbonisation Challenge in the Maritime Sector





'*Emission reduction aspirations*' in international shipping are '*lower than in many other sectors*'

2.9% of global CO_2 2018)

shipping = '*hard-to-abate sector*'

IMO INTERNATIONAL MARITIME ORGANIZATION

50% reduction in GHG emissions from 2008 to 2050

business-as-usual trend: *90-130% higher then 2008 by 2050*

5-lever Framework for Decarbonising Freight Transport

1. Constrain the future demand for shipping
2. Shift freight to lower carbon transport modes

for most routes and cargos shipping has lowest carbon intensity →

container ship 16gCO_2 / tonne-km

3. Maximise vessel loading
4. Improve energy efficiency of shipping operations
5. Switch shipping to low carbon energy

bulk carrier 4gCO_2 / tonne-km

1. Constrain future demand for international shipping

Phasing out fossil fuels reduces amount of coal, oil and gas to be shipped

Fossil fuels = 41% of maritime trade (UNCTAD, 2017)

Substitution of maritime flows of materials for renewable energy infrastructure, biomass etc

Post-pandemic priority for supply chain resilience promoting relocalisation / reshoring ?

Curbing international trade would inhibit economic development of lower income countries

Much international trade yields a net reduction in carbon emissions because production-related emissions in the exporting country are lower than those in the importing country

Low sensitivity of international trade volumes to maritime decarbonisation measures (increasing freight rates and transit times):

IMO high GHG reduction scenario: international trade contracts by only 0.49%

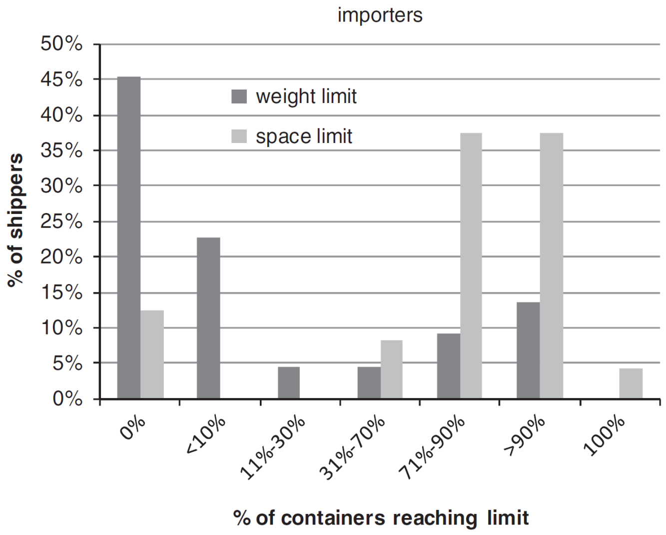
(UNCTAD, 2021)

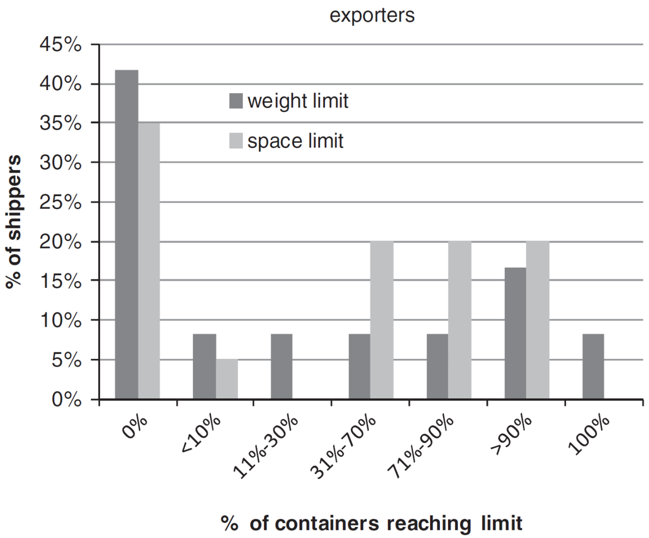
3. Maximise vessel loading

Relatively little research on capacity utilisation of ships by comparison with trucking.

https://bit.ly/3NDjbfd

utilisation at vessel and container levels





Difficult to determine the potential for cutting GHG emissions by raising vessel load factors

- traffic imbalances on many trade lanes: *repositioning of empty containers / vessels*
- need for ballast water – *adding weight to optimise stability / trim*
- current capacity shortages likely to be temporary – *longer term capacity utilisation trend*?

4. Improve the energy efficiency of shipping operations

technical innovation

new generation of energy efficient vessels

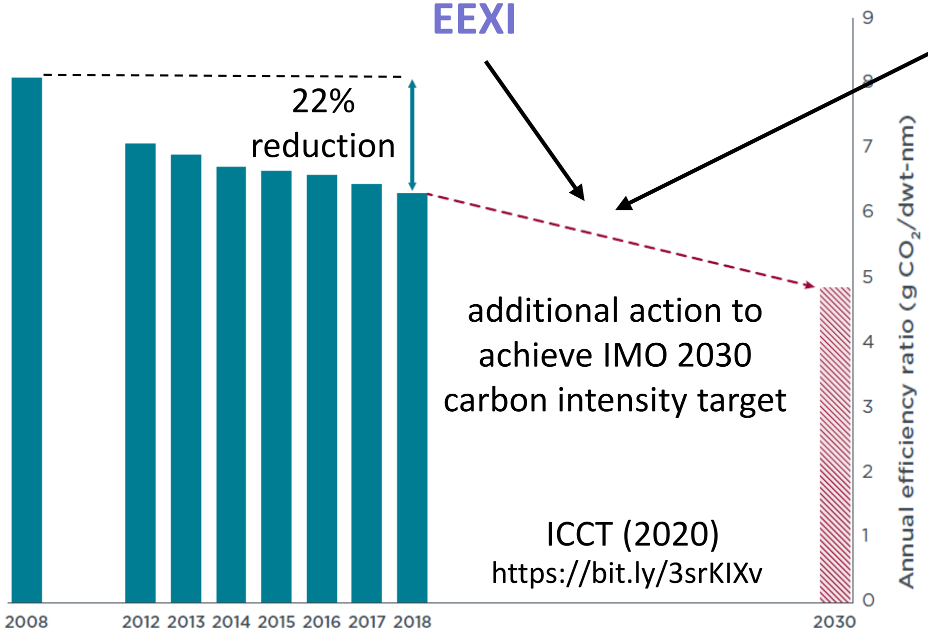
EEDI: tightening fuel economy standards for new vessels

long life assets: *average ship 21 years old (2020)*

opportunties for retrofitting existing vessels

from 2023 fuel economy standard for existing vessels

EEXI



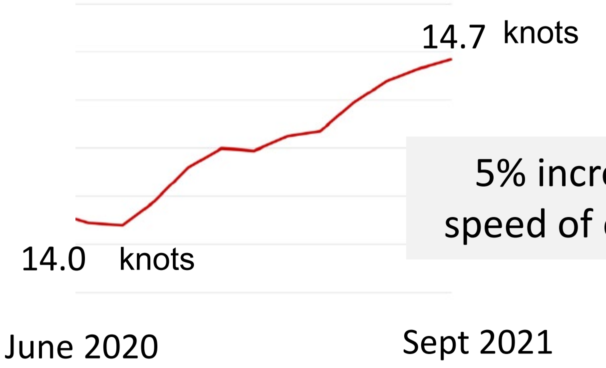
operational improvements

vessel management
weather routeing
hull and propeller cleaning
improved draught and trim
upgraded maintenance
speed optimisation

Enhanced SEEMP / CII

voluntary → mandatory

10% reduction in vessel speed reduces fuel consumption by 23% (IMO)



5% increase in average speed of container vessels

Source: VesselsValue

5. Switch shipping to low carbon energy

By 2050 64% of reduction in CO_2 emissions predicted to come from alternative fuels

IMO 4th GHG study (2020)
https://bit.ly/3GsW0Sr

Unlike road and rail freight, shipping has limited direct access to **low carbon electricity**

Ships account for around 58% of CO_2 emissions in European and Asian ports (Merk, 2014)

‘*cold ironing*’ –in port access to low-carbon shore-side electricity

biofuels: bio-LNG, bio-methanol, biodiesel

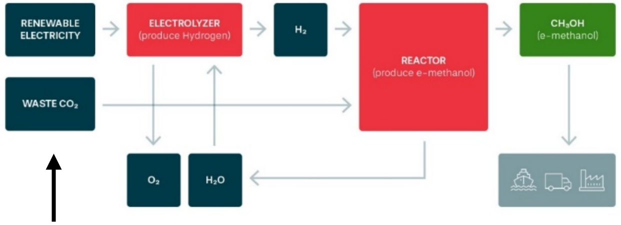
extensive land requirements

high life-cycle GHG emissions of biofuels produced at scale from crop cultivation

wind-assisted ship propulsion (WASP) https://bit.ly/3y2bQxq

Sails could be retrofitted to 40,000 existing ships contributing 20% of energy
https://bit.ly/3aqUOTP

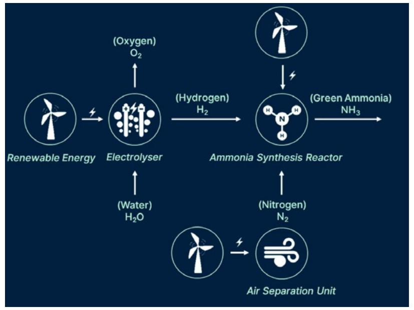
e-methanol



sequestered CO_2

https://bit.ly/3PoChYg

green ammonia

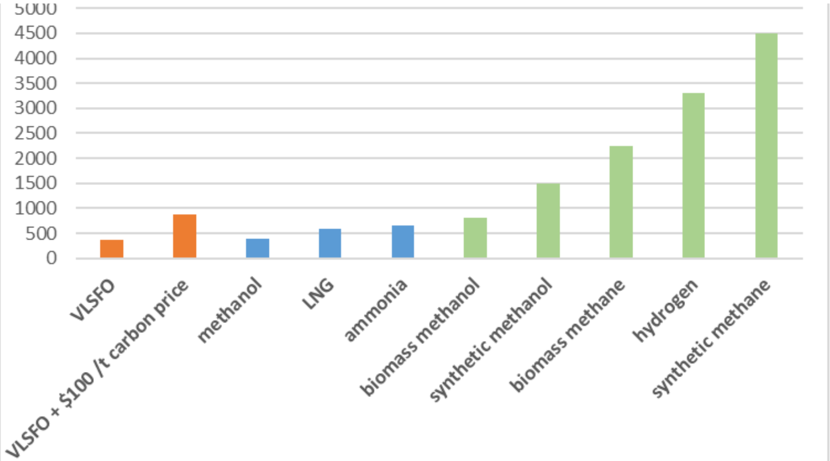


differing strengths and weaknesses

vast demand for green hydrogen

transformation of global marine energy supply system

Estimated 2050 fuel prices for marine fuels (IMO 4th GHG study)



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Net-Zero logistics:
A DELICATE BALANCE
Professor Alan McKinnon shares his reasons why the challenge of net-zero is of particular importance to the logistics sector.
Alan McKinnon | Professor of Logistics | Kuehne Logistics University

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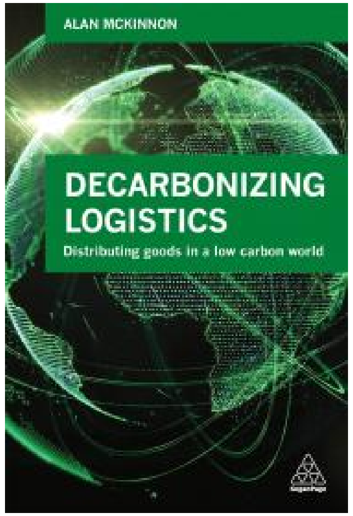
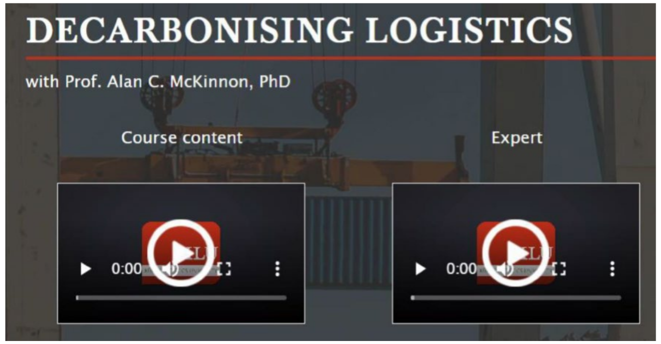


Digital lectures



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