International Energy Agency

Energy Technology Perspectives 2024

The Future of Shipping

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26 November 2024

Energy Technology Perspectives 2024 - webinar series

- **Clean technology manufacturing and trade**
  26 November 2024, 12:00 – 13:15 (CET)

- **The future of shipping**
  26 November 2024, 14:30 – 15:30 (CET)

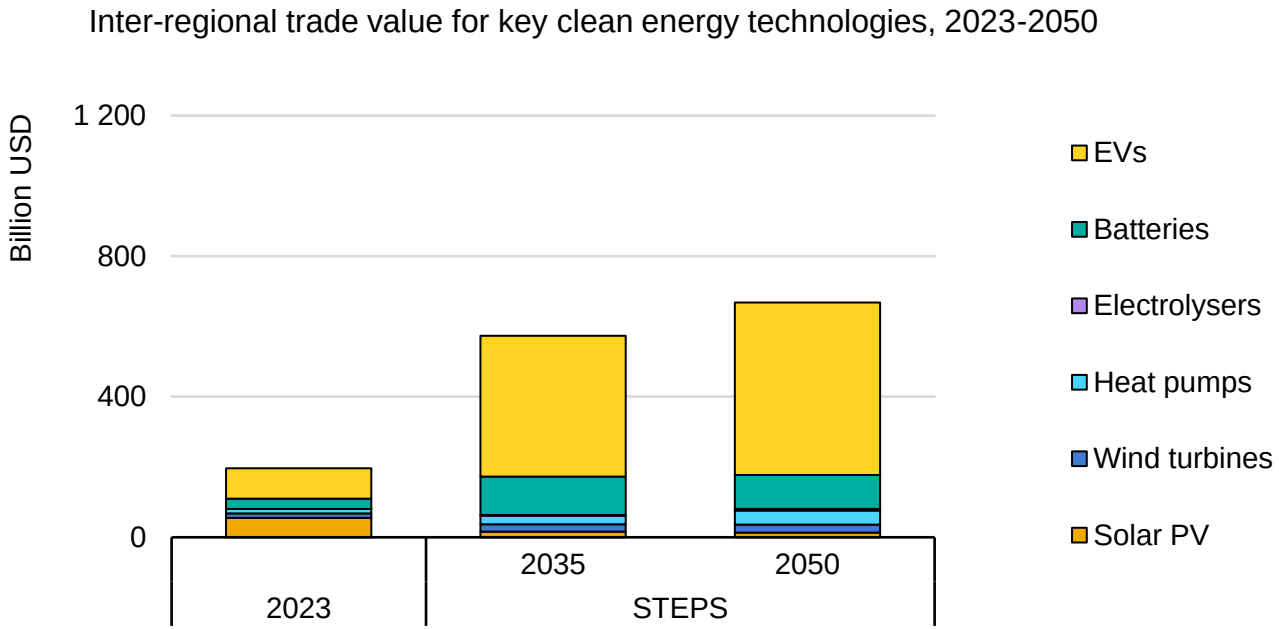
- **Unlocking manufacturing opportunities in emerging markets**
  3 December 2024, 12:30 – 13:45 (CET)

- **Near zero emission materials production and trade**
  6 December 2024, 15:00 – 16:00 (CET)

Agenda

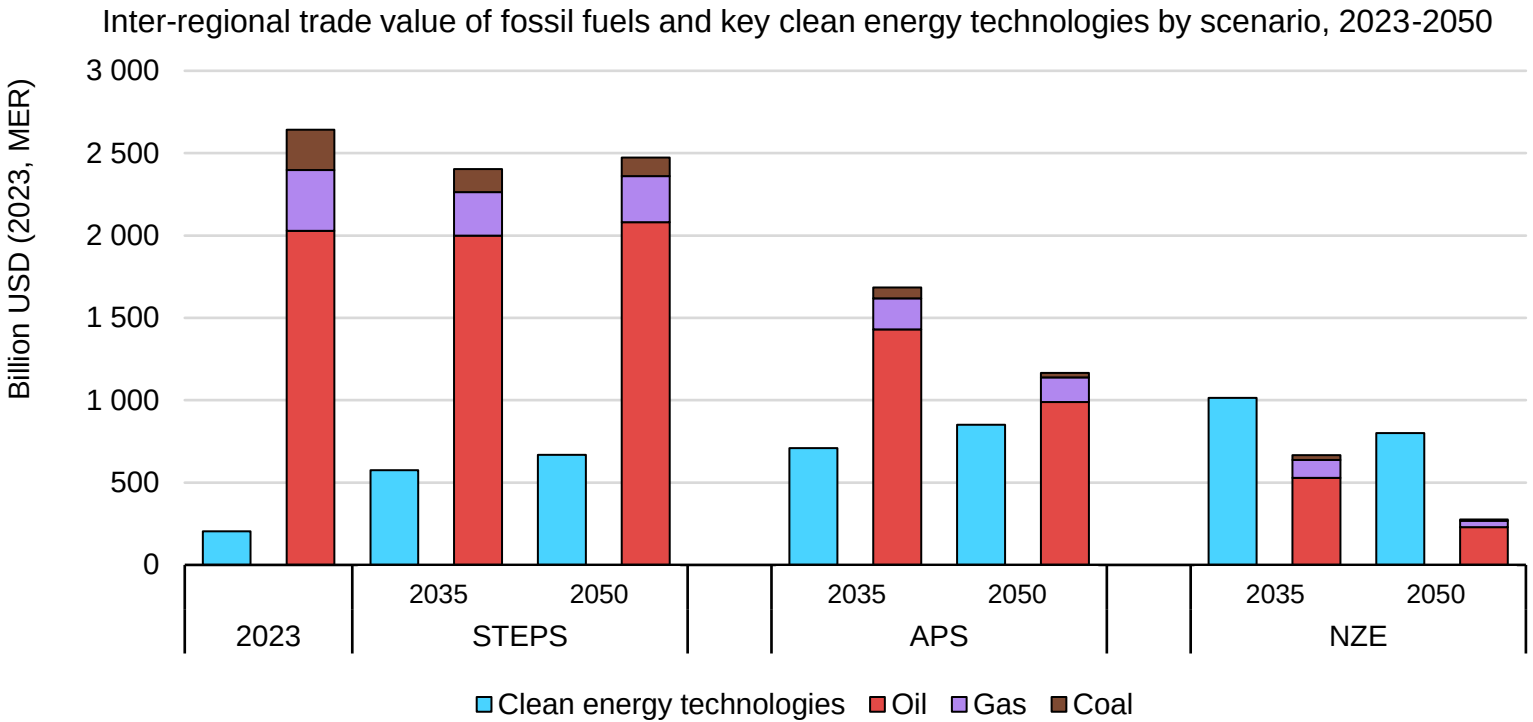
- **14.30 Introduction** [Leonardo Paoli]
- **14:35 Impact of the energy transition on shipping industry** [Johannes Hampp]
  - Activity modelling and impact of decarbonisation
  - Maritime chokepoints
- **14:50 Decarbonising the shipping sector**
  - Technologies for low-emission shipping [Laurence Cret]
  - CO_2 emission trajectories [Hannes Gauch]
  - Alternative fuels bunkering [Giovanni Andrean]
- **15:10 Commentary by Dr Jasper Verschuur**, Assistant Professor at University of Technology Delft
- **15:15 Q&A Session**

Clean energy technology trade is one the rise



Inter-regional trade for clean technologies is set to triple to 2035 in the STEPS. The increase can be faster if climate ambition is accelerated.

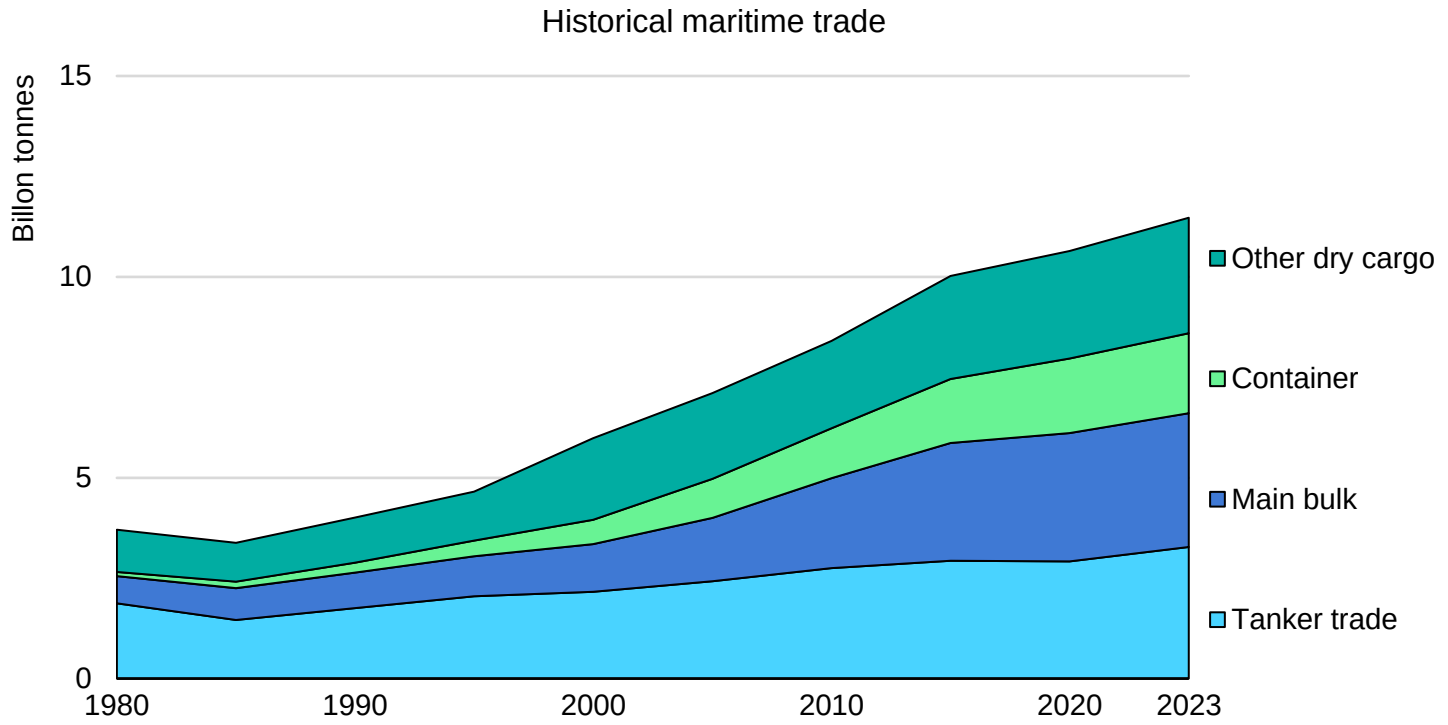
Trade in fossil fuels is set to plateau or decline



The decline in the value of fossil fuel trade is dependent on climate ambition, but under no scenario it increases in the long term. Shipping is at the center of the global trade system, with 80% of all traded mass being carried by sea.

Impact of the energy transition on shipping industry

Economic growth and globalisation drove increases in trade volumes



Ship-based trade has been rapidly increasing since the 1990s, mainly due to bulk and containerised goods.

New methodology for shipping activity

Global Energy and climate model

- Clean energy techs*
- Near-zero emissions materials*
- Fossil and alternative fuels
- Materials & recycling
- Motor vehicles

External data

- Other goods (via macro-economic drivers)

* New with ETP-2024

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Shipping activity and routes

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Bilateral trade scenarios, (product-level)

Mapping to ship types and distances

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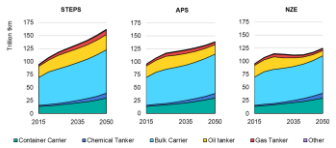
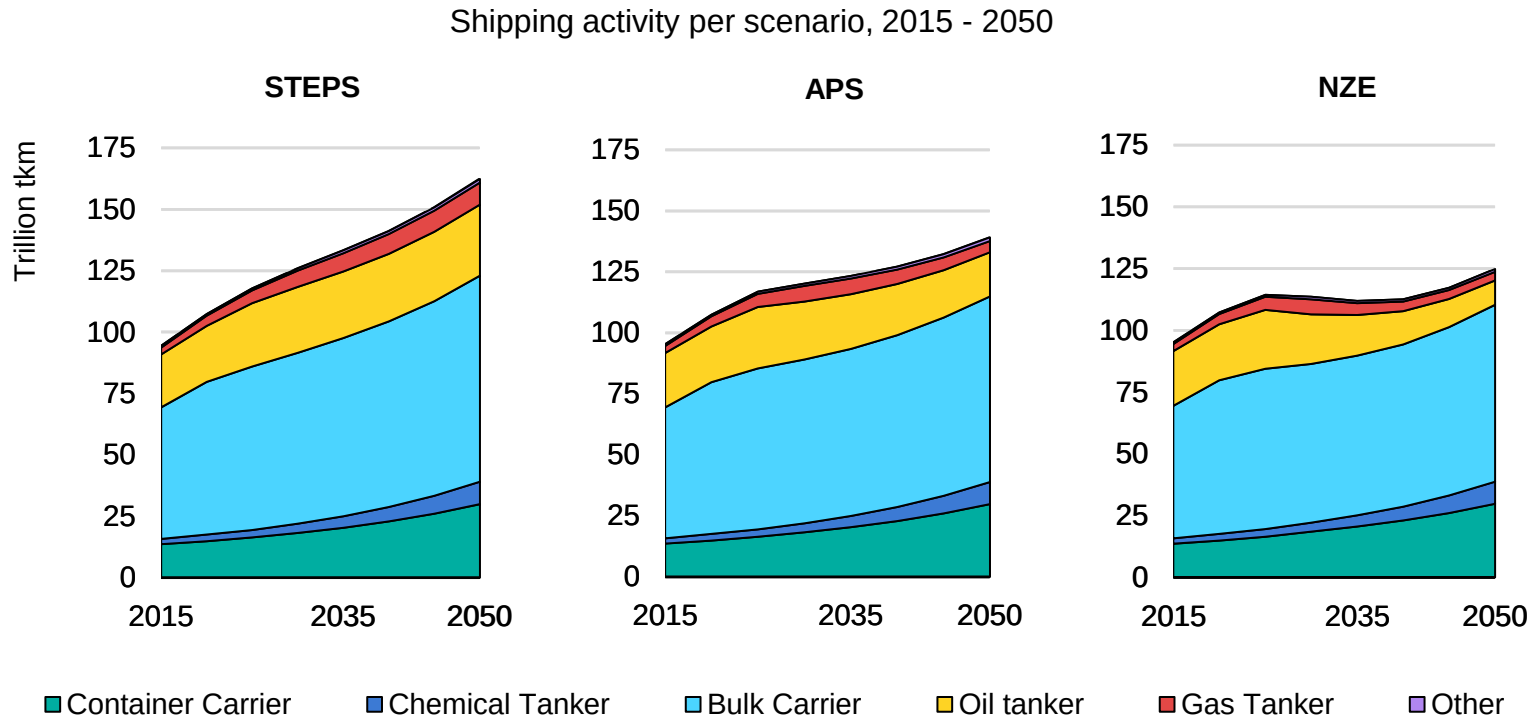
Scenario-specific shipping activity



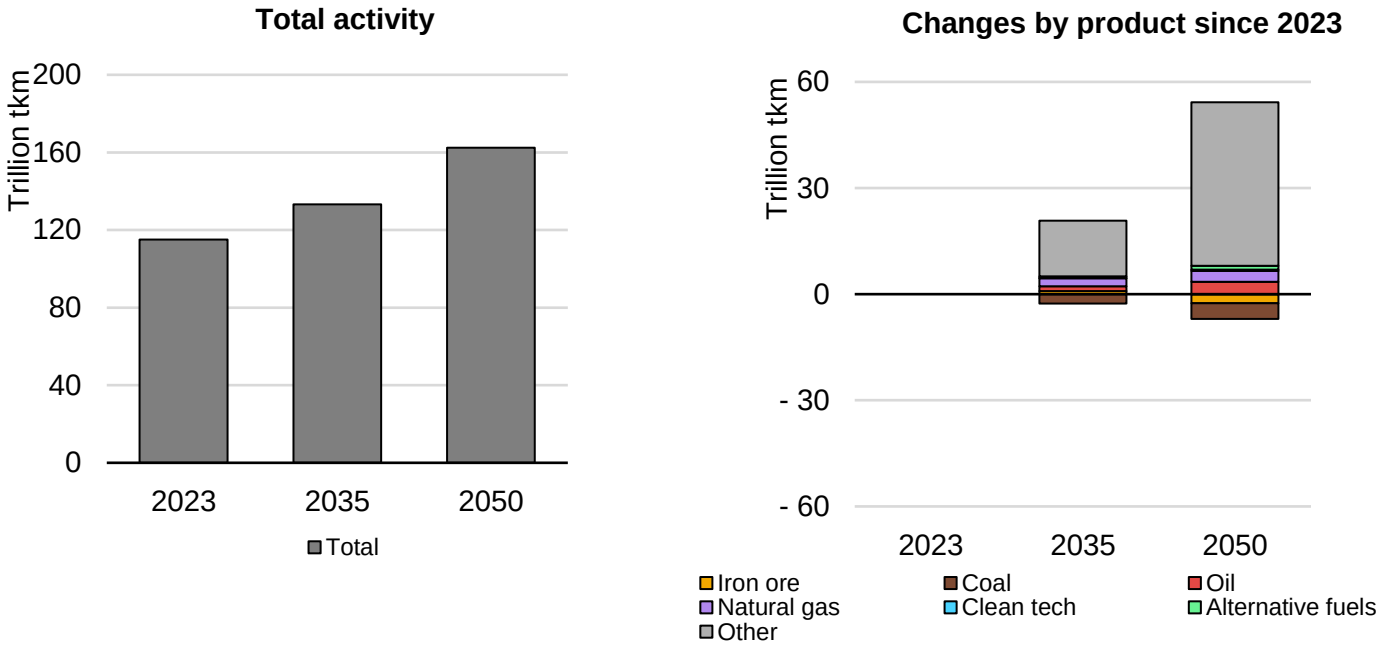
Clean energy transitions impact shipping activity



Bulk and containerised goods will continue to raise shipping activity until 2050. Faster energy transitions will help delay the increase.

Transitions dampen the role of energy in shipping

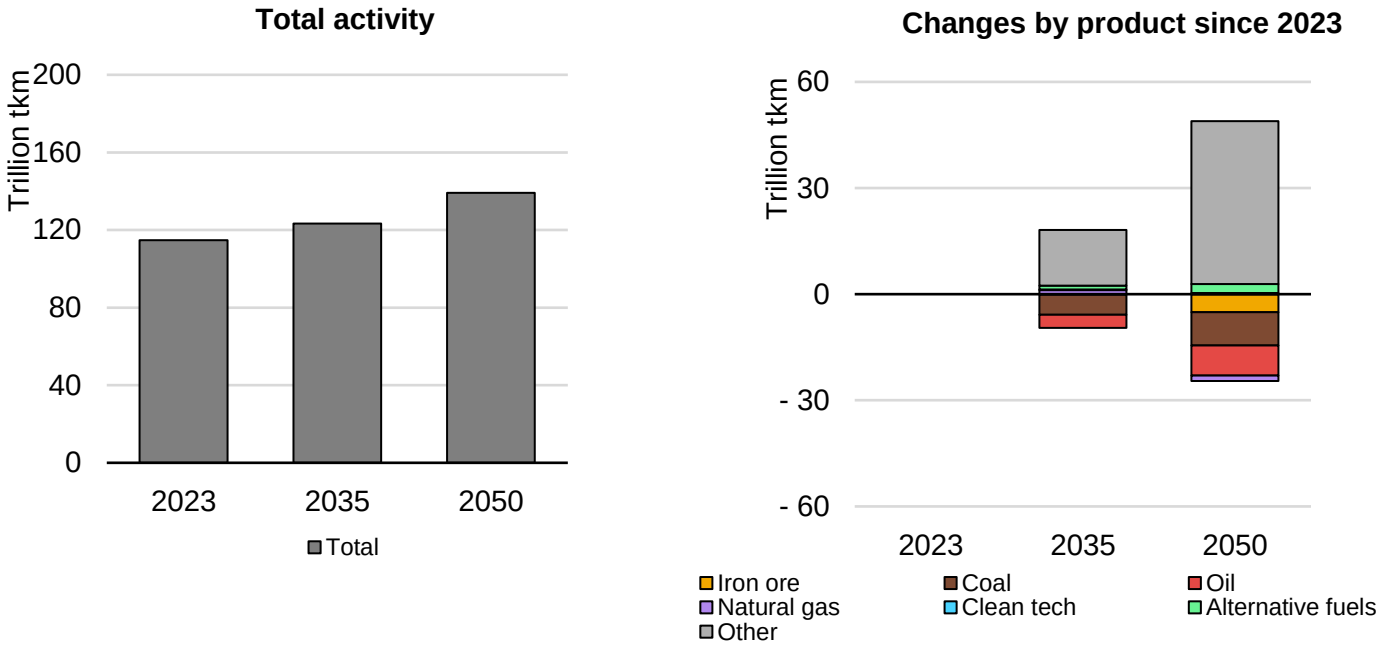
Stated Policies Scenario



With ongoing transitions, fossil fuels are no longer main drivers for shipping activity, while clean techs and alternative fuels leave only a small footprint.

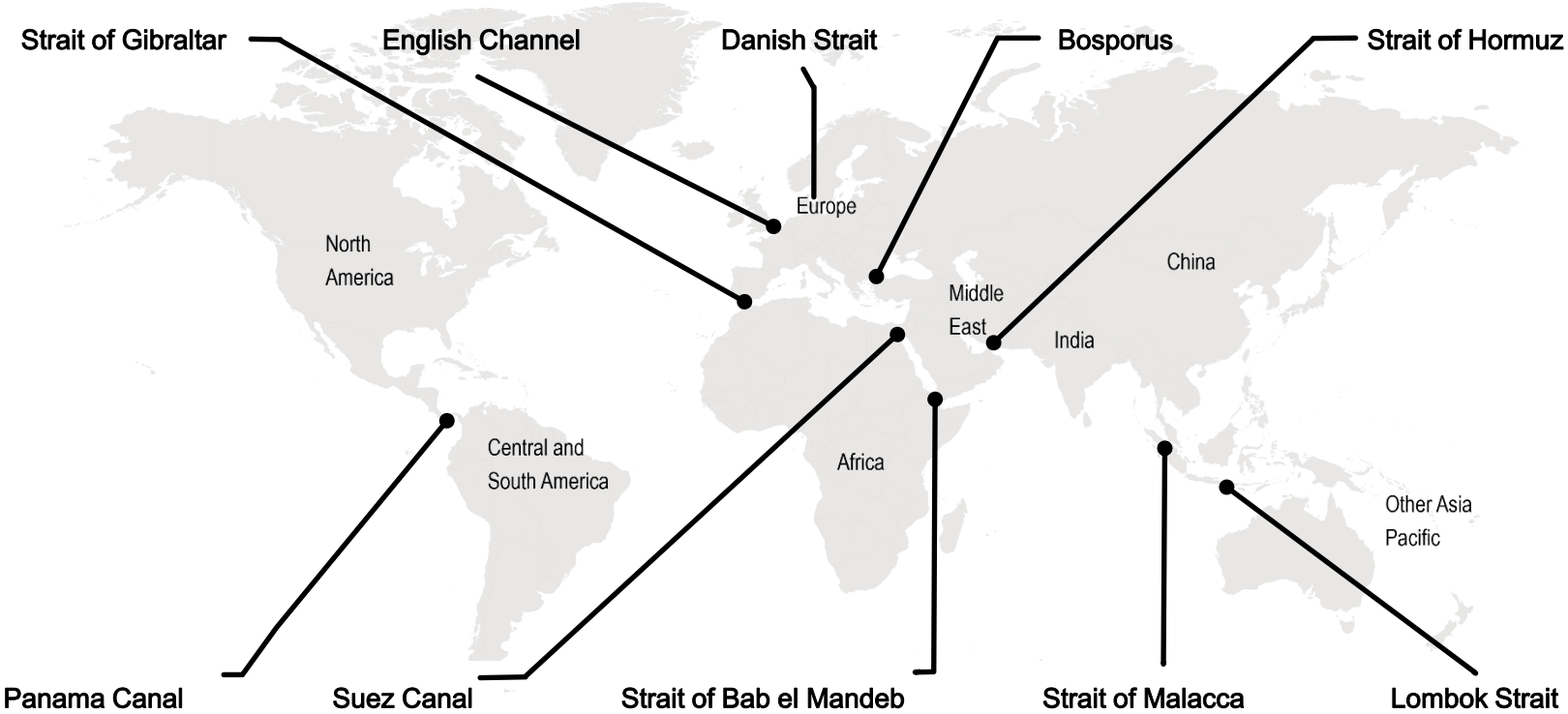
Faster transitions reduce shipping demand

Announced Pledges Scenario



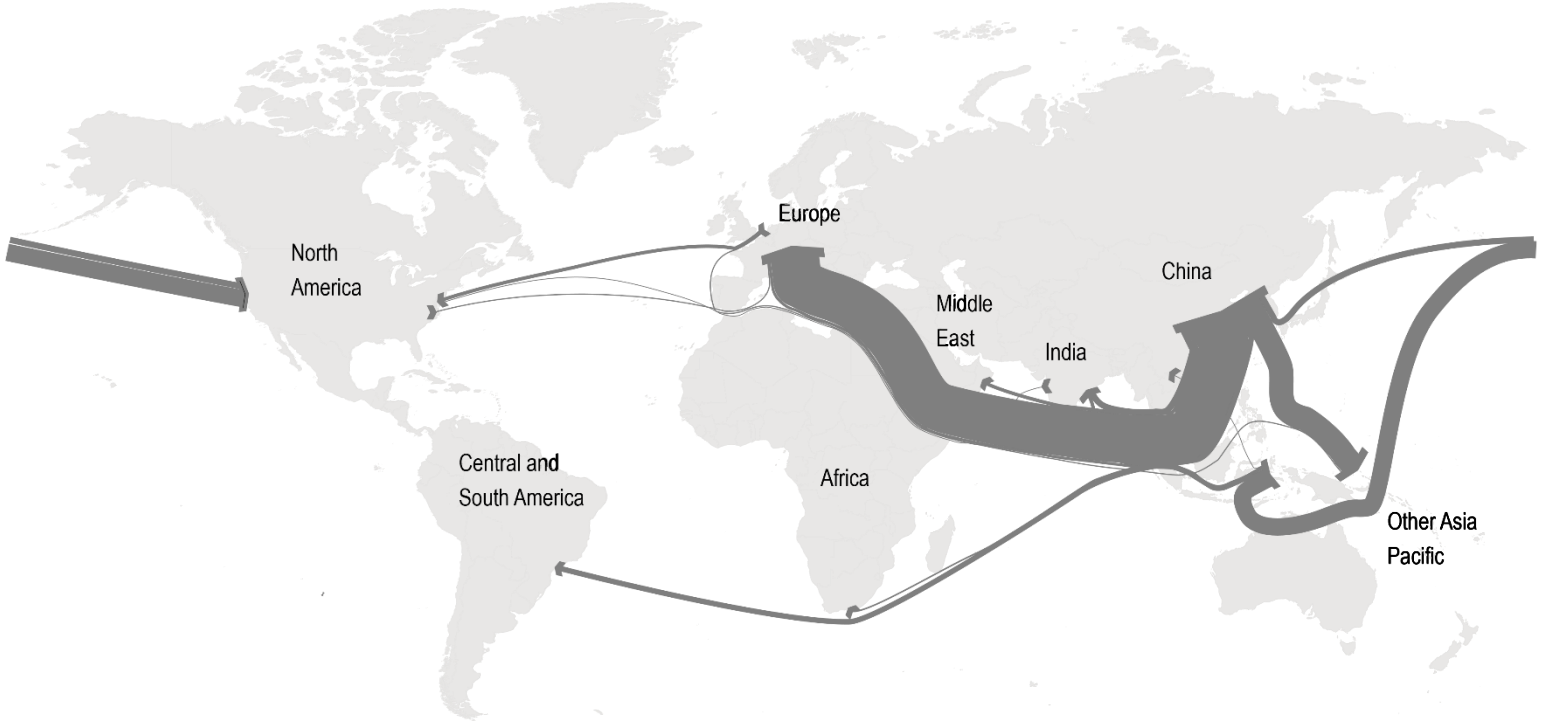
Faster energy transitions reduce the need for fossil fuels, clean tech trade will not fill the resulting gap.

Nearly 60% of seaborne trade passes through a chokepoint



Clean tech exports become more concentrated in Asia

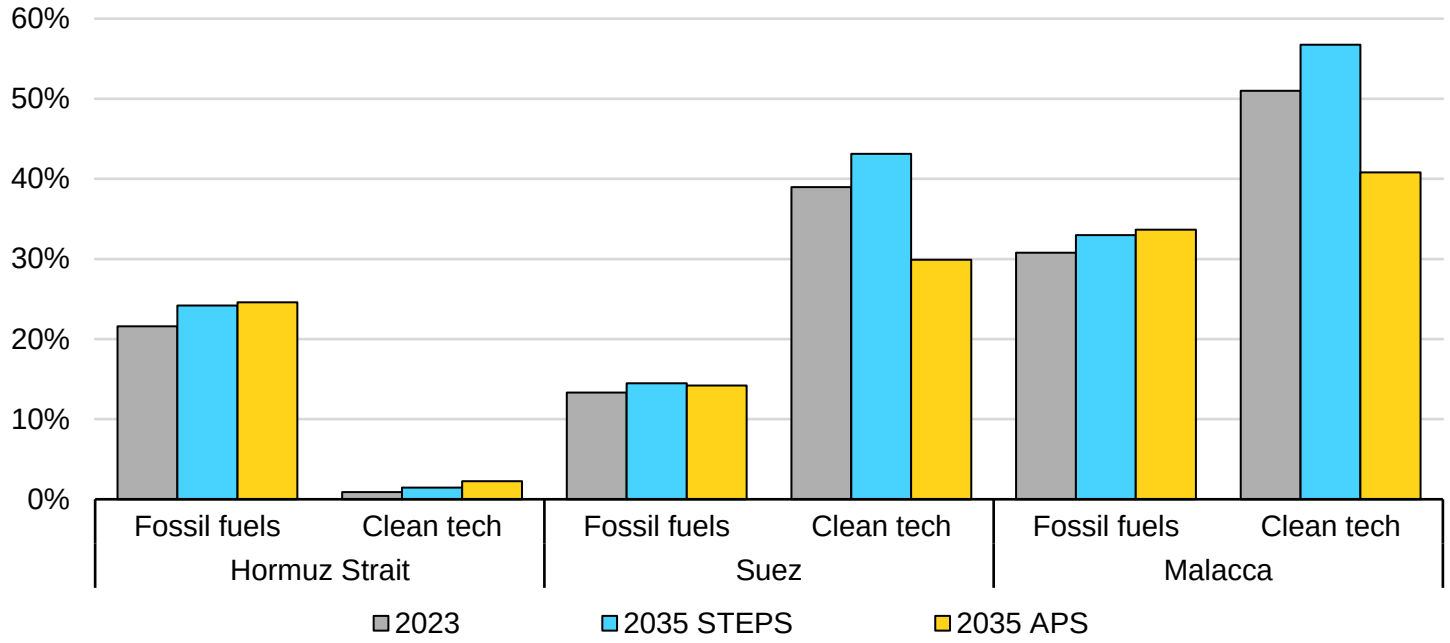
Key clean energy technology trade flows, Stated Policies Scenario, 2035



Trade value for clean techs increases nearly 3-fold to around 600 billion, and becomes more concentrated along a few shipping routes.

Over half clean tech trade passes through the strait of Malacca

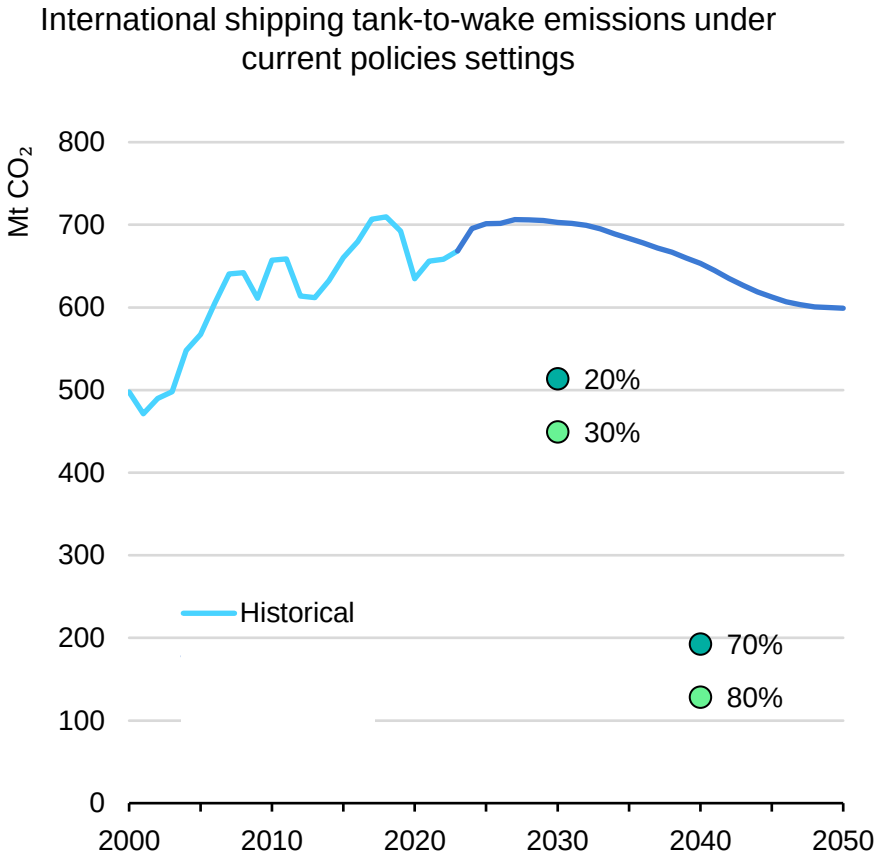
Share of total maritime trade value passing through selected chokepoints by product category in the STEPS and APS, 2035



In the APS, a more geographically diversified supply chain for clean energy technologies leads to lower shares of trade to pass through key chokepoints.

Decarbonising the shipping sector

Policy drivers of international shipping decarbonisation



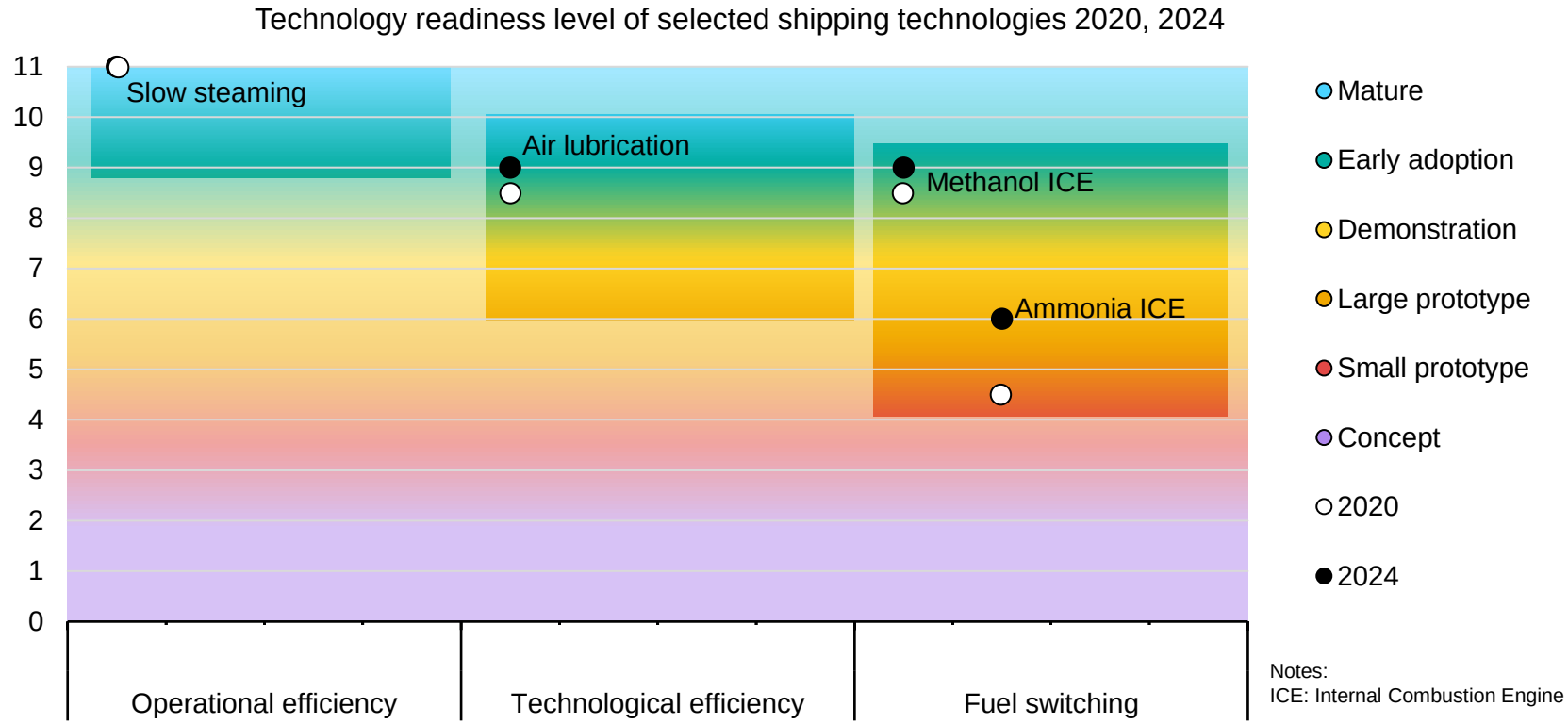
- Under **current policies settings**, emissions from international shipping are expected to decrease slightly to 2050
  - IMO regulations (EEDI, EEXI, CII)
  - EU ETS, FuelEU maritime

Stated Policies Scenario

- Revised IMO GHG strategy:
  - Net zero “by or around” 2050
  - Checkpoints in 2030 and 2040
  - Minimum uptake of low-emissions fuels by 2030
  - Considers well-to-wake emissions

Announced Pledges Scenario

Technologies for shipping decarbonisation

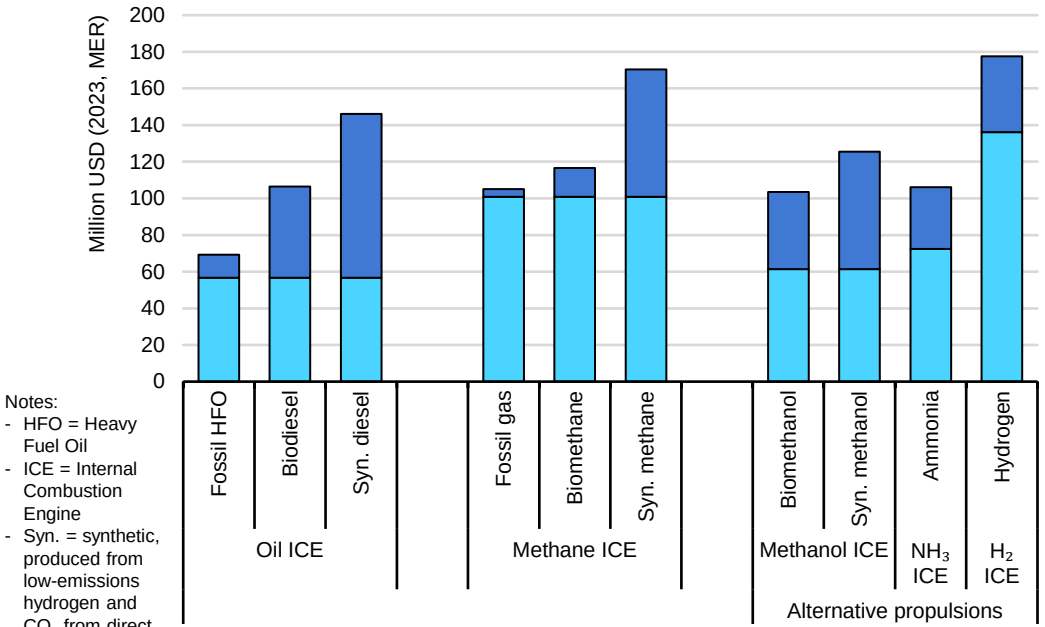


In the near term, commercially-available technologies and strategies can help reduce energy consumption. In the longer term, switching to alternative fuels in necessary and requires further technological developments.

Total cost of ownership of different alternatives

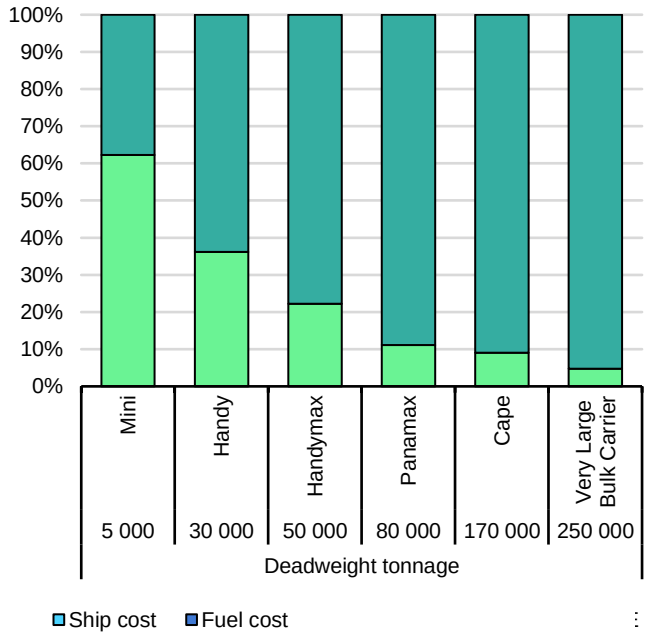
Total cost of ownership and cheapest alternative propulsion, APS 2035

Total cost of ownership of a representative bulk carrier



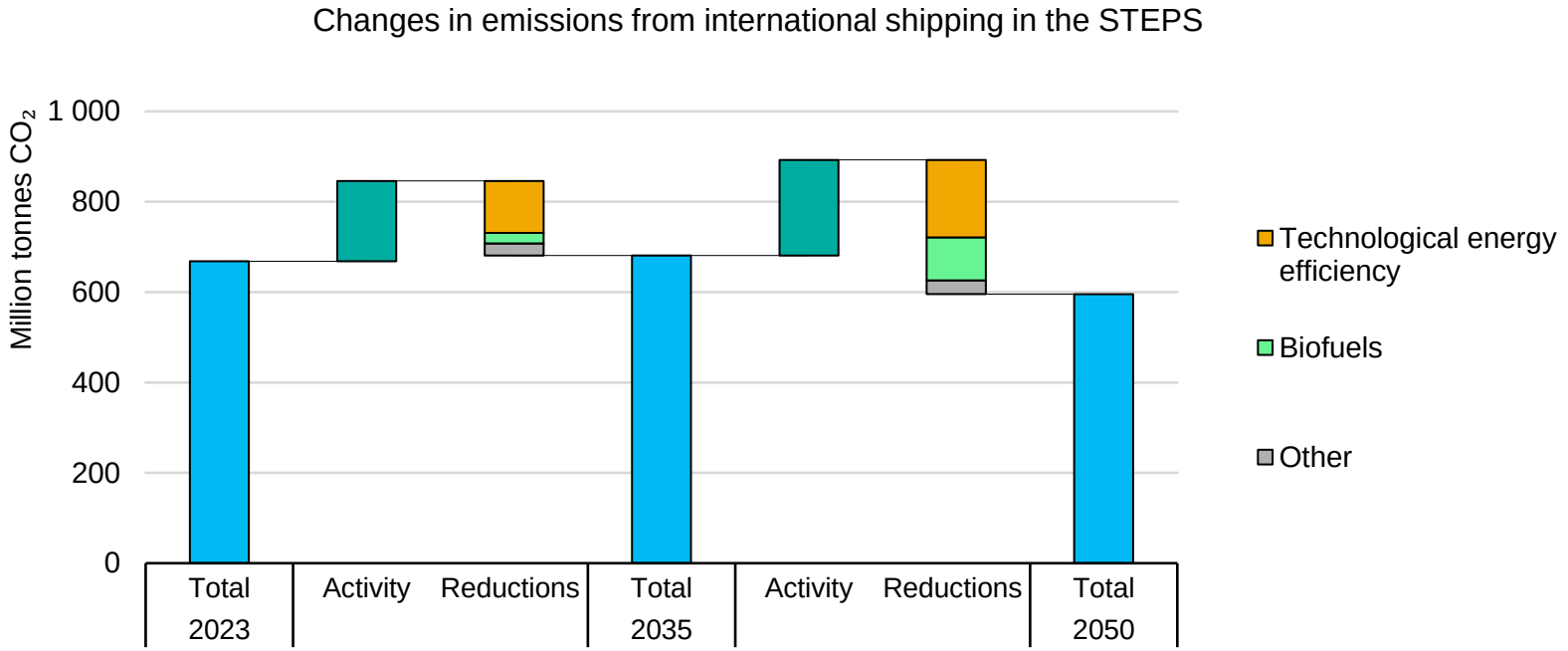
Notes:
- HFO = Heavy Fuel Oil
- ICE = Internal Combustion Engine
- Syn. = synthetic, produced from low-emissions hydrogen and CO_2 from direct air capture.

Share of ships by cheapest alternative propulsion



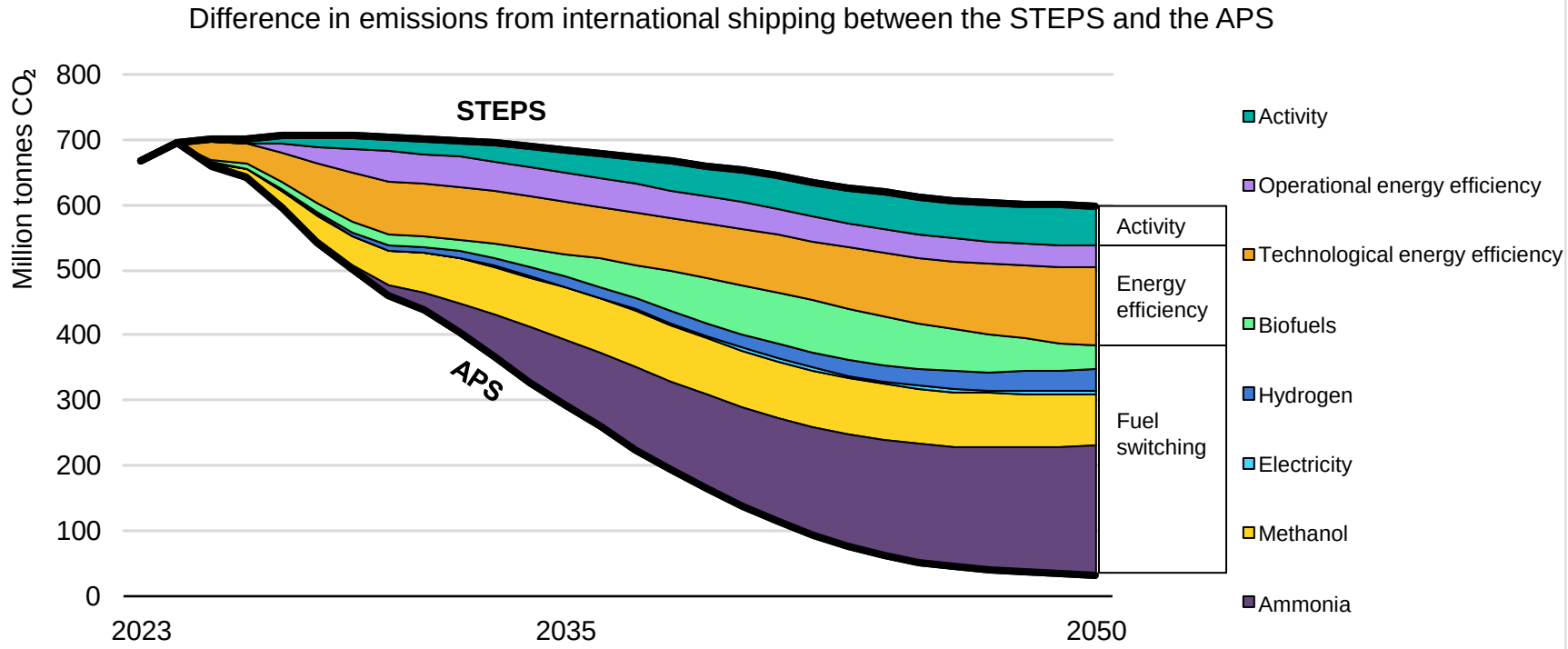
Ammonia necessitates specific safety measures but tends to be the cheapest alternative propulsion for large ocean-going vessels.

Efficiency balances activity increase under current policy settings



Energy efficiency and the use of biofuels counteract the increase in emissions through increased shipping activity but are not enough to significantly bring down emissions.

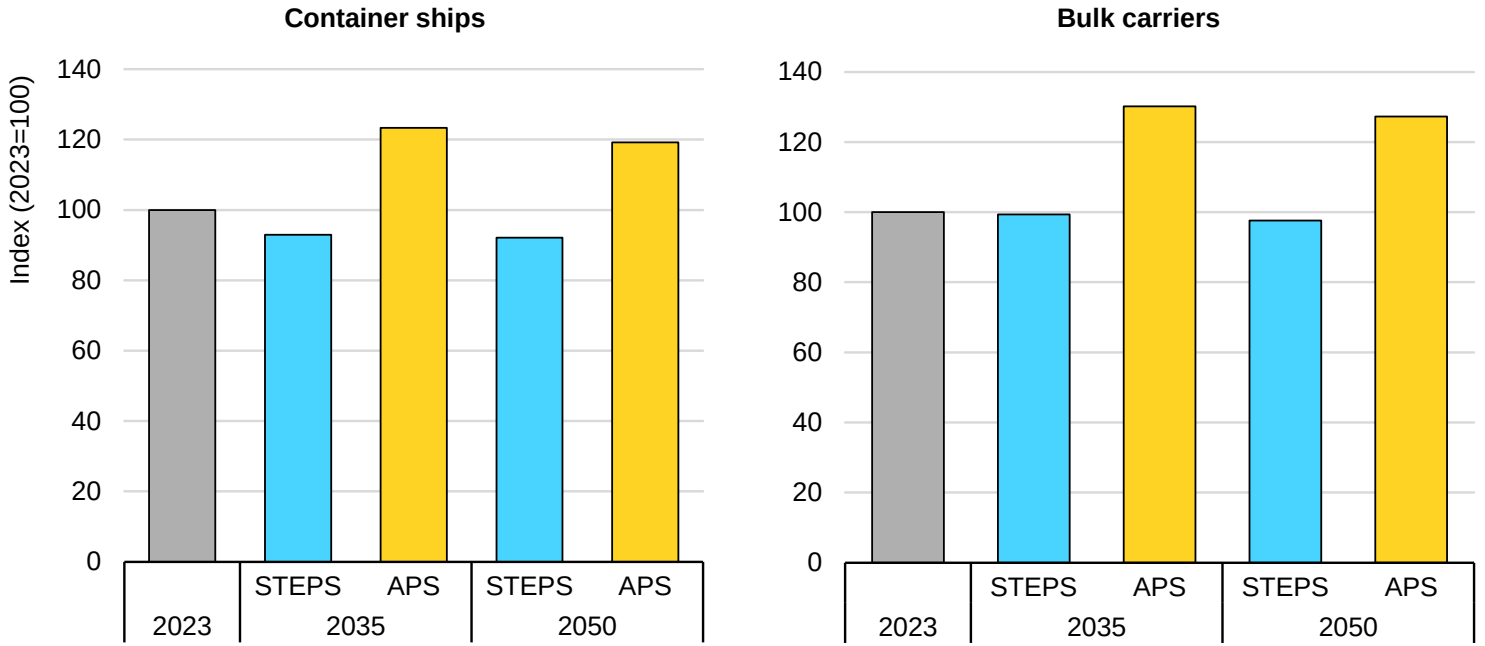
Shipping decarbonisation shows a large implementation gap



Announced pledges can be met by a combination of energy efficiency strategies and low-emissions fuels, notably ammonia.

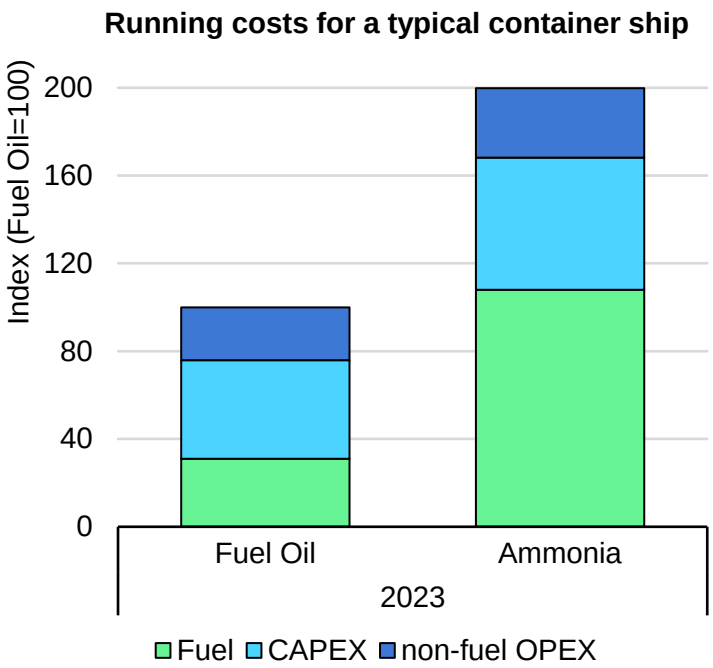
Shipping cost increase moderated during transition

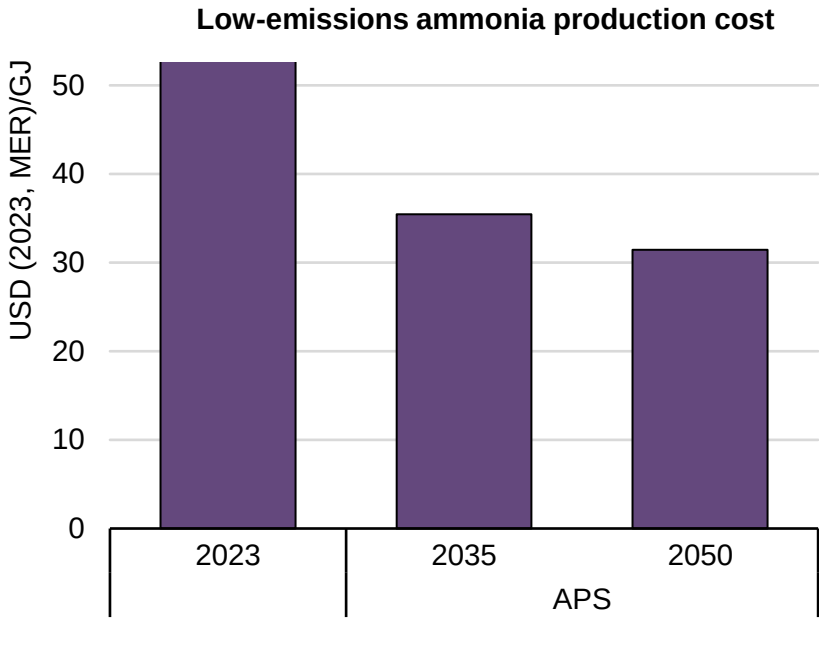
Change of running costs in international shipping



Low-emissions fuels are more expensive than conventional fuels,
but average running costs are capped at around 25% higher in the APS thanks to efficiency and technology learning.

Shipping cost increase moderated during transition





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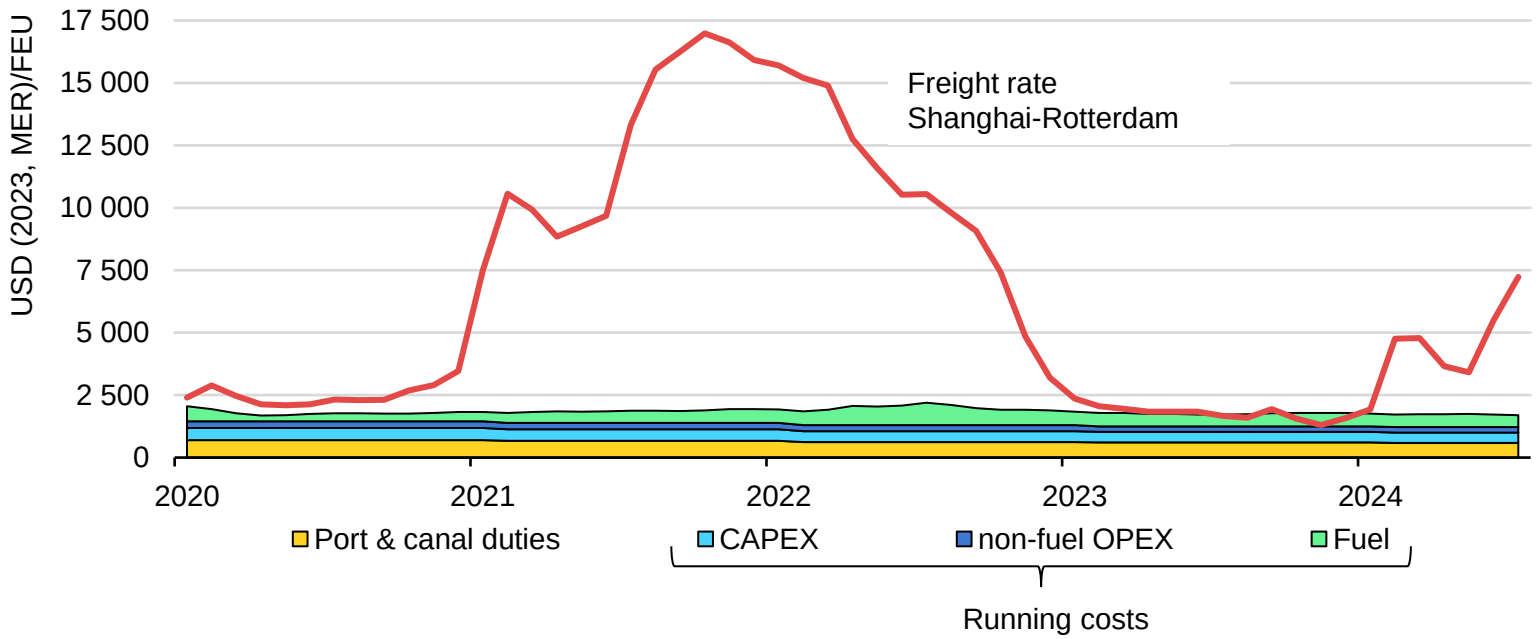


Low-emissions fuels are more expensive than conventional fuels, but average running costs are capped at around 25% higher in the APS thanks to efficiency and technology learning.

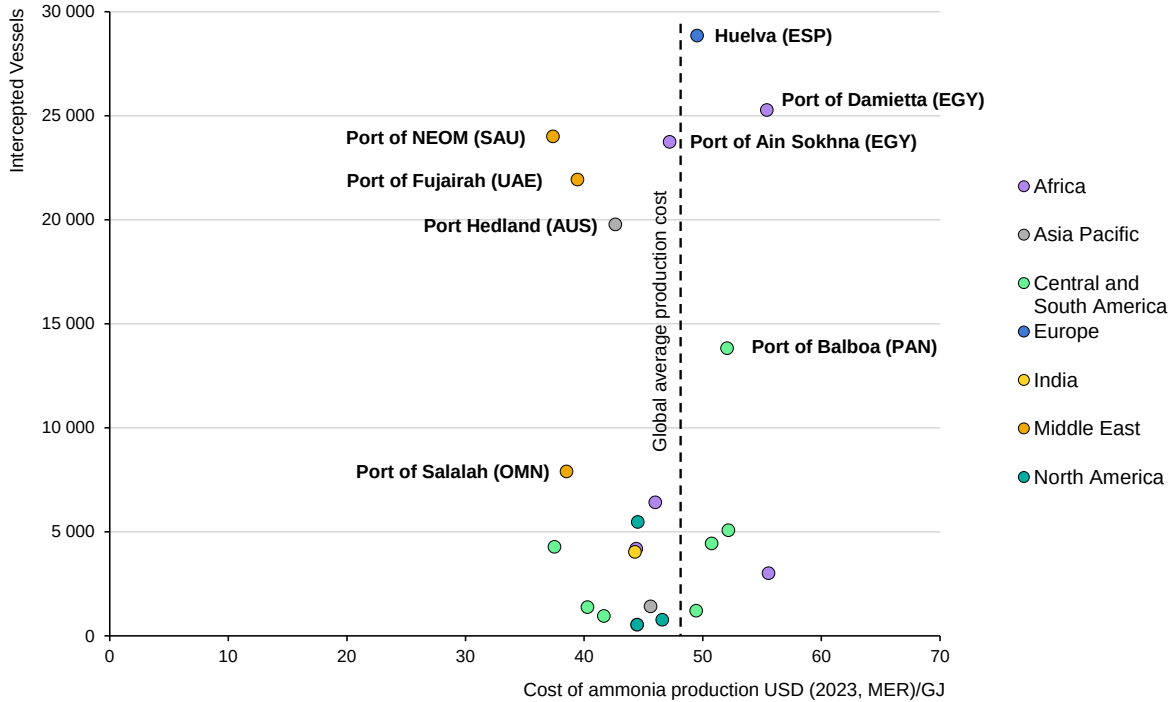
Alternative fuels might open new opportunities for bunkering

	Fossil fuel oil	Alternative fuels
Ease to transport fuel	Low cost	Higher costs
Fuel supply	Concentrated in existing refineries	Not developed yet
Fuel production costs	Similar costs globally	Dependent on resource endowment
Key advantages	Established logistics and economics of scales	Low local production costs

The existing bunkering model, where few major hubs provide most fuel to the shipping industry might continue in the future by importing fuels from low production cost regions.

Low-cost producers may also begin to locally supply bunker fuel

Cost of producing electrolytic ammonia and maritime traffic at selected ports in the Announced Pledges Scenario, 2030



Several ports, mostly located close to main shipping routes, are well-placed to become new entrants in the refuelling industry with ammonia at low cost even if the bunkering hub model is likely to stay

Commentary by Dr Verschuur

Question and Answers