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The energies coalition for transport & logistics

What is the Cost of Greener Shipping?

Shipping under the IMO Net Zero Framework

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October 2025

In collaboration with

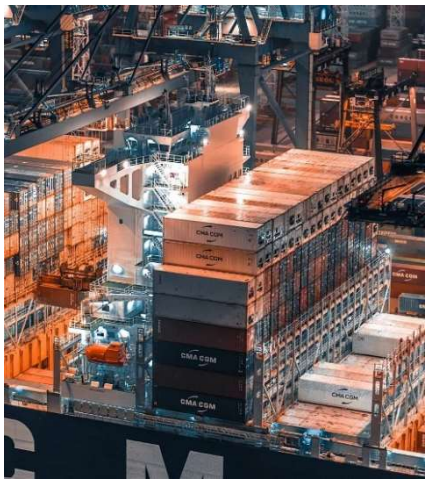
ERM

Shipping plays a pivotal role in the global economy, facilitating around 80% of world merchandise trade by volume[1]. However, its environmental footprint has become a growing concern. In 2024, shipping accounted for roughly 3% of global greenhouse gas (GHG) emissions[2], releasing around 1,000 $MtCO_2e$. Without significant intervention[3], this share could climb to 17% by 2050. This trajectory highlights the urgent need for decisive climate action in the maritime sector.

In response, the International Maritime Organization (IMO) has adopted ambitious decarbonisation targets aiming for **net-zero "by or around" 2050**, with interim targets for 2030 and 2040. This transition falls within the typical lifetime of a ship, making the next two decades a critical window for investment and innovation. The real catalyst for change will be the recently agreed **global carbon pricing mechanism**, expected to significantly reshape investment decisions, operational strategies, and fuel choices across the industry.

This report summarises the key outputs from a study that assesses the cost and implications of decarbonising shipping. It addresses three central questions:

1. **Nature of the transition** – What fuel-switching and technology measures will the shipping industry adopt, and what will be their associated costs?
2. **Economic impacts** – How will decarbonisation affect costs for shippers and the price of shipped goods across different cargo types and trade routes?
3. **Role of policy and finance** – How can industry, policymakers, and financiers work together to reduce costs and accelerate decarbonisation?



The study analysed the TCO (Total Costs of Ownership) for transporting a car and 20-foot container (as well as carried items: pair of shoes and car tyre) across three trade routes (intra-EU, Asia–EU, and US-EU), and evaluated different decarbonisation options, including alternative fuels, electric propulsion, wind-assistance and onboard carbon capture.

The study provides insights into the cost implications of maritime decarbonisation, the interaction between regulatory frameworks and financing mechanisms, and the potential pass-through effects on the prices of everyday goods.

[1] UNCTAD (2023) Shipping Data: UNCTAD Releases New Seaborne Trade Statistics.
[2] OECD (2024) Maritime Transport CO_2 Emissions.
[3] European Parliament (2015) Emission Reduction Targets for International Aviation and Shipping.

Prepared By

New Energies Coalition

New Energies, the Coalition of energies for transport and logistics, is a consortium made up of 21 leading stakeholders operating across international supply chains. It was founded in December 2019 by Rodolphe Saadé, CEO of the CMA CGM Group with the aim of speeding up the development of energy and technology solutions to reduce the sector's impact on climate change.

Movin'On

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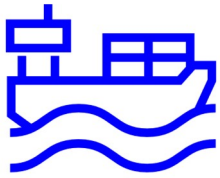
Executive Summary

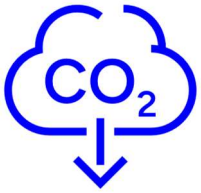
The objective of this study is to examine the costs of greener shipping and how much it will cost to reach IMO ambitions.

Key findings include:

1. 

Decarbonising shipping will inevitably come at a cost reflecting the current and near-term market and production realities of sustainable fuel alternatives and emission reduction technologies

Bio-options (e.g. bio-LNG) might increase costs of deep-sea vessels by **50%**, and e-options (e.g. e-methanol / e-methane) can increase costs by **120%**

2. 

Therefore, meeting the IMO target will increase the average cost of shipping via a combination of carbon abatement options

Carbon abatement costs for long-haul routes range between **$200 and 700/tCO2e**, leading to an increase in average shipping cost of **~20% in 2030** and **~50% in 2040**

3. 

However, decarbonising can cost less than doing nothing, as the penalties paid for continued use of fossil fuels under existing and emerging IMO and EU policies is expected to be significant

Inaction could lead to a **120%** increase in costs by 2040 for long-haul routes, compared to a **50%** increase if proactive measures are taken

4. 

Ultimately, the impact on shipping cost and goods prices will be small, as shipping costs represent a small fraction of total item prices, and decarbonisation affects only part of those costs (not e.g. terminal handling fees).

For the studied goods, the impact of decarbonisation on the price of an item is estimated to be **less than 0.5%**

It is important to clarify that the approach is based on a cost perspective rather than a market price perspective. In the current context of limited availability of renewable fuels, market dynamics—particularly supply and demand imbalances—may influence pricing, but these are not the focus of our analysis.

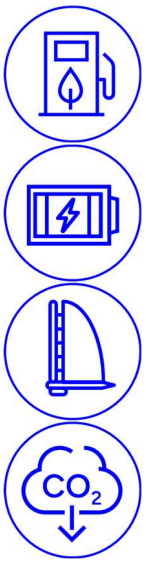
Instead, a Total Cost of Ownership (TCO) approach is adopted, which includes both the capital expenditures (CAPEX) related to the vessel itself and the operating costs, particularly the cost of fuels and technologies required for decarbonization.

Decarbonising shipping is a **necessary** and **potentially economically beneficial** strategy. The industry should prioritise early investment in scalable low-carbon technologies to meet regulatory targets and avoid higher future costs. Shipping customers should expect an **incremental but manageable** increase in shipping costs to accommodate the efforts of shipping companies to meet respective industry targets. Collaboration across the value chain will be essential to ensure a **cost-effective and sustainable transformation** of maritime transport.

Image credit: Neoline / RMK Marine

1. Decarbonising shipping inevitably comes at a cost

There are several promising ways to reduce emissions from shipping vessels, each with different cost implications. The study focused on:



Alternative fuels such as bio-/e-LNG, bio-/e-methanol and e-ammonia offer lower carbon emissions compared to traditional maritime fuels

Electric Vessels are powered by batteries and produce zero emissions during operation, and are typically considered only suited for short-sea (e.g. intra-regional shipping activity)

Wind-Assisted Propulsion Systems (WAPS) using technologies like sails, rotors, or kites to harness wind power and reduce fuel usage

Onboard Carbon Capture Systems (OCCS) to capture carbon dioxide directly from a ship's exhaust before it's released into the atmosphere

The cost of owning and operating a vessel, or the Total Cost of Ownership (TCO), is mainly influenced by decarbonisation through two factors:

1. **Fuel Costs** are typically a major operational cost for shipping companies, and alternative maritime fuels can be significantly more expensive than conventional fuel
2. **Capital Costs** are a major influence, especially for additional equipment (e.g. OCCS) or entirely new propulsion and/or energy storage systems (e.g. electric drive)

Other non-fuel operational costs, such as maintenance costs, crew costs, insurance costs, docking fees etc. are not expected to be significantly affected by decarbonisation.

Note, the study does not cover all costs making up the freight rate (e.g. terminal handling costs) as it is focused on aspects impacted by the energy transition.

Deep-sea vessels: High sensitivity to fuel costs

Deep-sea vessels, which travel long distances and consume large volumes of fuel, are particularly affected by the shift to low-carbon alternatives.

- Bio-based fuels can offer relatively low costs of carbon abatement at **$220-290/tCO$_2$**
- E-fuels, while more scalable in the long term than biofuels, are significantly more expensive and can **double** the TCO at a carbon abatement cost of **$610-670/tCO$_2$**
- Complementary technologies can be effective on long-haul routes, with OCCS at about **$200/tCO$_2$** and WAPS resulting in lower TCO, as their upfront investments are offset by substantial emissions reductions over time

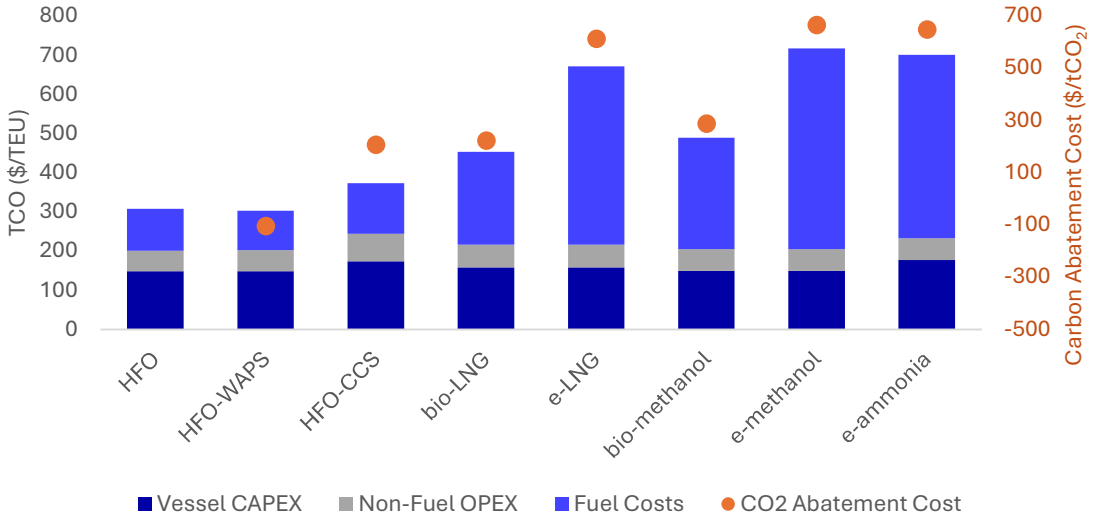


Figure 1: TCO and carbon abatement costs for an Asia-EU Containership in 2030

Short-sea vessels: CAPEX is the main cost driver

Short-sea vessels, such as those operating within the EU, consume less fuel and are less sensitive to fuel cost, making the impact of decarbonisation relatively modest. Carbon abatement costs are generally higher due to the limited emissions savings.

- CCS and WAPS are less viable for short-sea routes, at **$820-1,670/tCO$_2$**, as the CAPEX needed for retrofit or new build vessels is proportionally higher compared to the fuel savings, relative to deep-sea vessels
- Capital costs play a larger role in overall cost, with electrification showing the highest carbon abatement cost at **$1,060/tCO$_2$**

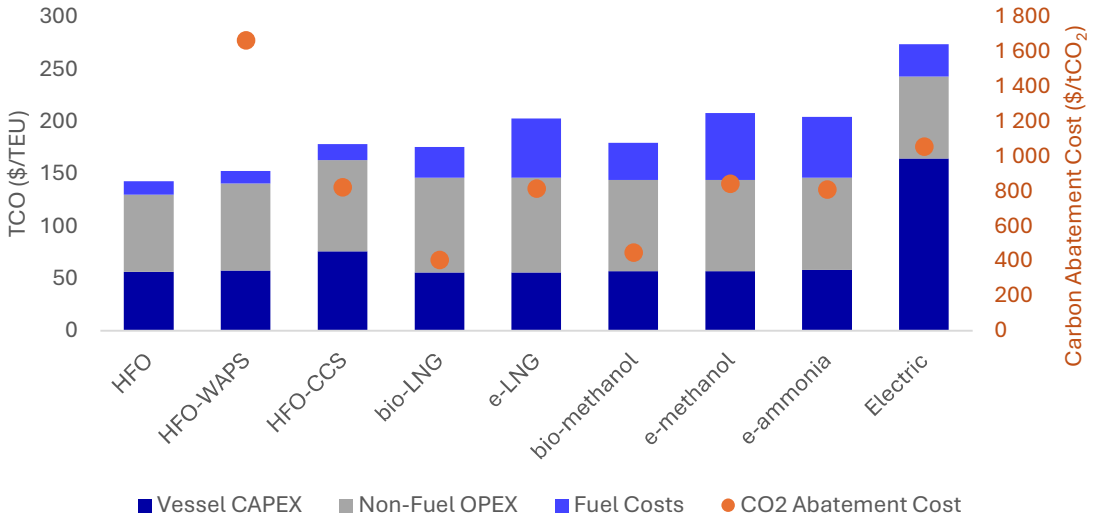


Figure 2: TCO and carbon abatement costs for an Intra-EU Containership in 2030

Cost Drivers: Shipping Tech & Renewables Mix

The overall cost of transition in shipping will be closely linked to the availability and maturity of various technologies and renewable energy sources projected for 2030 and 2040.

Fleets will rely on a combination of emission reduction technologies and alternative fuels to meet IMO decarbonization targets[4]. In this study, high-level assumptions about the fuel mix were made based on technology readiness, current orderbook, published industry scenarios, shipyard availabilities and fuel production capacities.

The fuel mix scenarios highlighted the following:

- The fleet renewal rate is within historical rates
- Production capacity of non-drop-in low carbon fuels is likely to be a key limitation
- This limitation currently results in a high dependence on drop-in biofuels to reach IMO targets

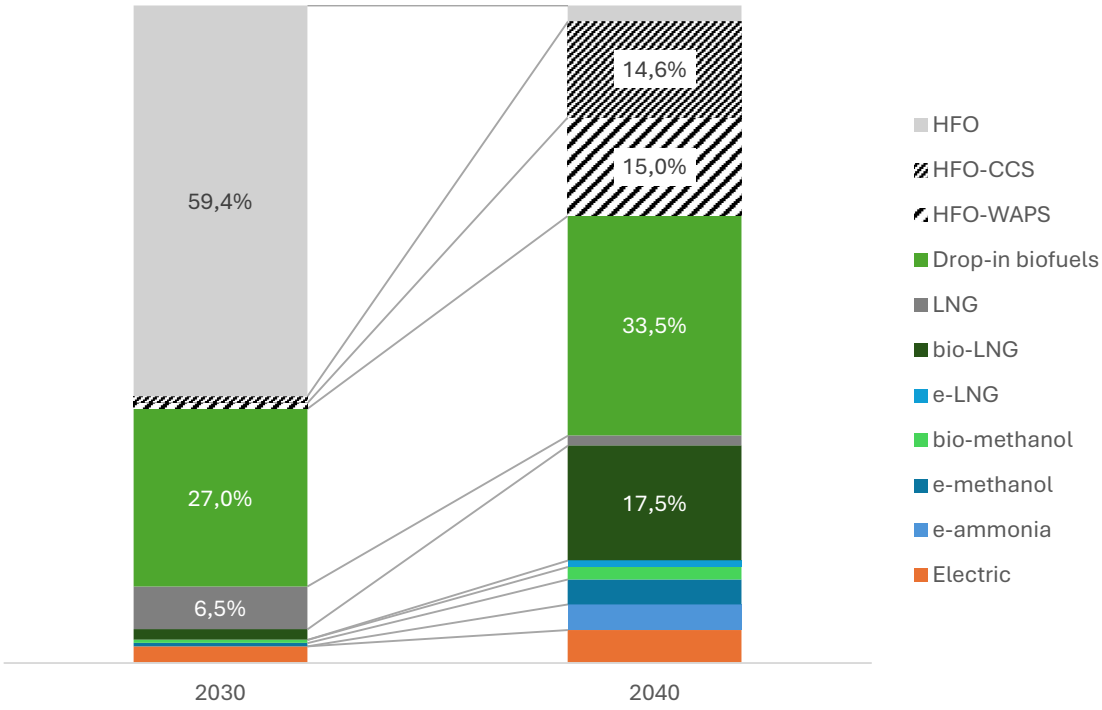


Figure 3: Example fuel mix scenario for short-sea containerships to meet IMO base target (20% reduction by 2030 and 70% reduction by 2040 compared to 2008 baseline)

Strategic choices in fuel and technology, as well as route, can help the industry transition sustainably and cost-effectively. A mix of innovative technologies and renewable fuels will be required for successful decarbonisation. One size does not fit all!

[4] This summary focuses on scenarios that meet the IMO "base" target (20% reduction by 2030 and 70% reduction by 2040, compared to 2008 baseline). However, leading shipping companies like CMA-CGM have committed to more ambitious goals aligned with the IMO "strive" target (30% by 2030 and 80% by 2040) – which is covered in the full report.

2. Therefore, meeting the IMO target will increase the average cost of shipping

To meet the IMO decarbonisation targets, shipping companies will need to adopt a mix of technologies and fuels, as shown in the previous section. The limited supply of low-carbon fuels is a critical barrier to the transition, with production needing to scale rapidly to meet demand from shipping and other sectors.

Considering the cost of these decarbonisation options and the assumed fuel mix, in 2030 **the average cost of the fleet could increase by 10% for intra-EU routes** and **25% for Asia-EU routes**. By 2040, this increase grows to **25%** and **55%**, respectively, with deep-sea containerships experiencing the highest cost sensitivity due to their heavy fuel consumption.

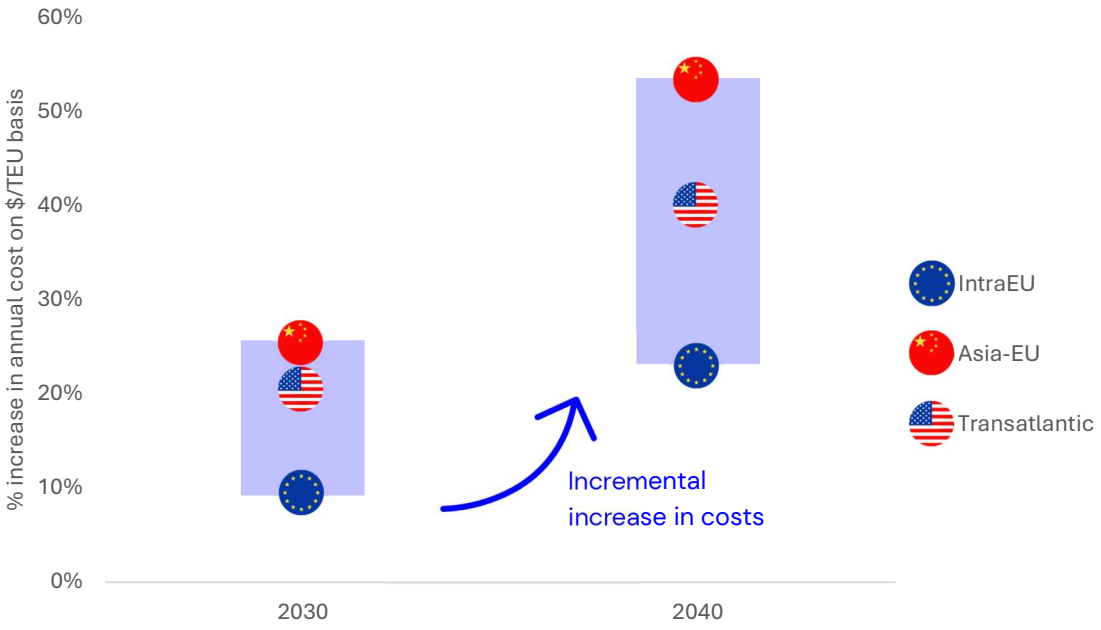


Figure 4: Relative increase in containership costs compared to conventional vessel operation (IntraEU is short-sea whilst Asia-Eu and Transatlantic are deep-sea)

These increases remain well below historical freight market volatility or fossil fuel price swings, suggesting that the transition to low-carbon shipping is financially manageable and that the market is able to absorb some cost changes. Moreover, many components of freight rates (e.g. terminal handling charges, surcharges) are not affected by decarbonisation, further dampening the impact on shippers.

Meeting IMO targets is feasible but will require a coordinated shift across the industry involving a range of decarbonisation options that will increase the average fleet cost. A collective effort is required to successfully achieve sustainable shipping.

3. However, decarbonising can cost less than doing nothing

As global and regional climate policies tighten, the cost of non-compliance rises rapidly. Two major frameworks are driving this shift: the IMO and the EU regulatory regimes, the latter including the EU Emissions Trading System (EU ETS) and the FuelEU Maritime Regulation.

Doing nothing would be more expensive than investing in decarbonisation in the long run if IMO global strategy is implemented on time.

For example, the TCO for an Asia–EU containership in 2040 is projected to be about **120%** higher if no action is taken due to mounting compliance costs. In contrast, reaching the IMO target would result in a **54%** increase in TCO, due to avoided penalties. These savings are most pronounced on long-distance routes with high fuel consumption, where the cost of emissions is greatest.

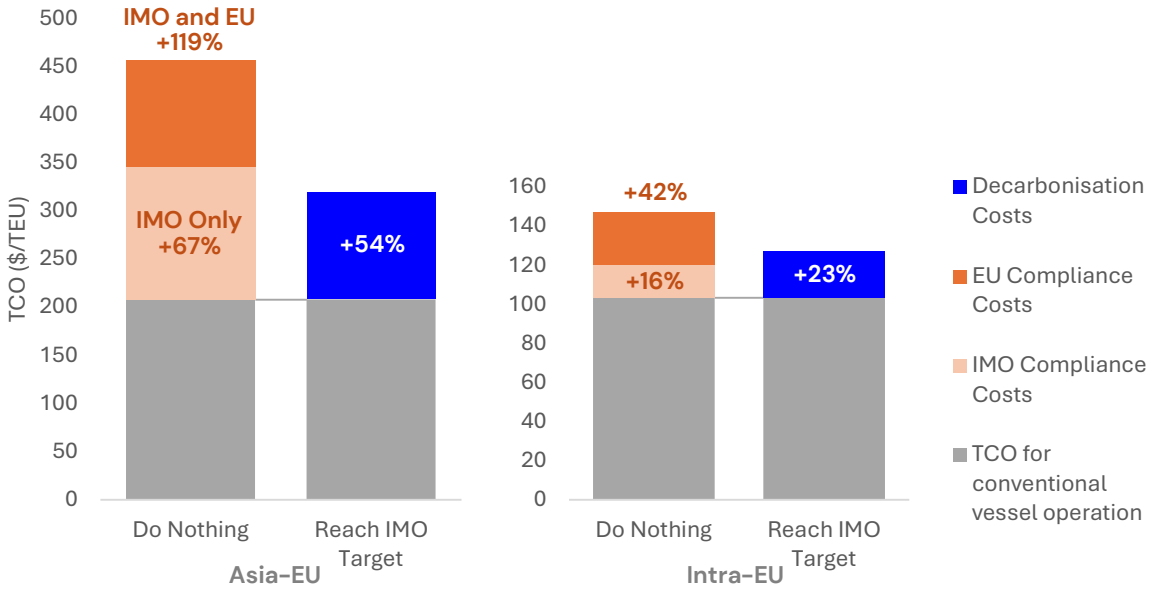


Figure 5: Containership TCO in 2040 considering policy value[5] for different routes

There is still uncertainty about whether these frameworks will be applied simultaneously, as the European Commission is required to review its regulations soon after the IMO Net Zero Framework is passed (due for October 2025). If both policies are stacked, some decarbonisation options could become competitive with HFO by 2030, and most alternative options by 2040; and therefore, the cost of inaction is higher. IMO policies alone may or may not be successful in achieving the same impact (see intra-EU TCO in Figure 4), however, can still de-risk decarbonisation investments.

Investing in decarbonisation is economically strategic, as climate policies help derisk opportunities by imposing penalties for inaction, especially in the long term.

[5] Policy value includes compliance costs (IMO/FuelEU penalty + EU ETS carbon price) and potential policy support (credits from exceeding policy target etc.). For a fleet reaching IMO target, there will likely be some vessels still paying compliance costs and some vessels receiving policy support, though this revenue is highly variable and so is shown here as net zero impact. Full report includes more detail as to potential policy value working.

4. Ultimately, the impact on shipping cost and goods prices is small

While decarbonising the shipping industry introduces additional costs, the effect on the final price of consumer goods is minimal. **Shipping costs make up only a small fraction of the total price of most goods**. Moreover, decarbonisation affects only part of the shipping cost—primarily fuel and vessel-related expenses—while other components such as terminal handling charges, administrative fees, and surcharges remain unchanged. These unaffected costs dampen the overall impact on freight rates and, by extension, item prices.

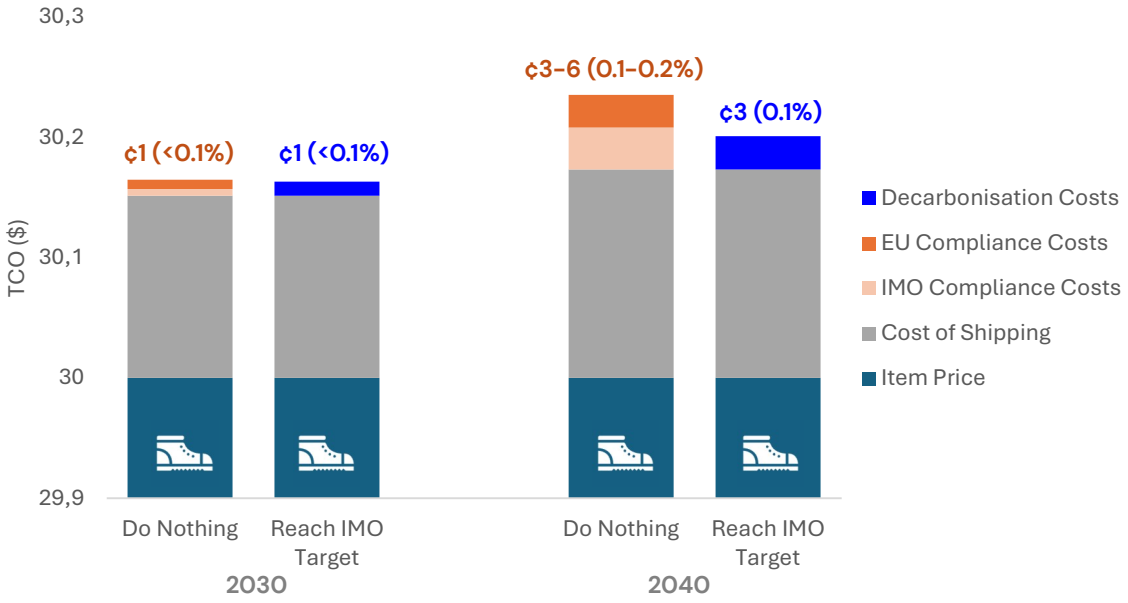


Figure 6: Impact of decarbonisation and policy costs on Asia-EU sneaker price

For a pair of sneakers valued at $30 the shipping costs is estimated to be between $0.07 and $0.17. The additional costs of the shipping energy transition required to meet IMO and European climate targets is projected to be around $0.01 by 2030 and $0.03 by 2040 for sneakers shipped from Asia to the EU. This is equivalent to a **0.1% increase in the price of the sneakers**.

Ultimately there will be a cost to end-customers (of the order of cents) that may be passed on, but the cost increases will be gradual and tolerable

Conclusions and recommendations

To achieve an affordable and effective transition to low-carbon shipping, **collaboration across the entire maritime ecosystem is essential**. Stakeholders—including shipping companies, fuel suppliers, port authorities, financiers, regulators, and customers—must work together to ensure the transition is both economically viable and environmentally sound.

Industry players should prioritise converting high-impact routes and vessels, securing access to affordable and sustainable renewable fuels, and engaging with financiers and customers to share costs and risks.

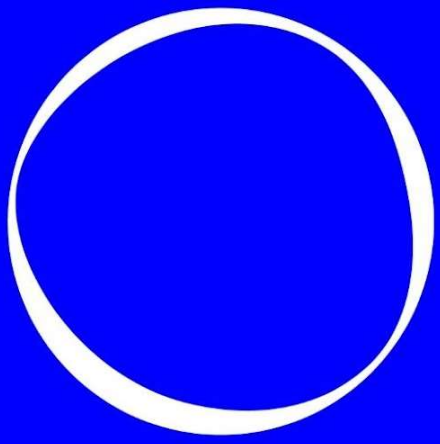
A global approach is crucial, and this is why policymakers play a vital supporting role. They can accelerate progress by:

- **Reinvesting compliance revenues** (e.g., from carbon pricing or emissions regulations) into decarbonization efforts.
- **Supporting the scale-up of competitive, low-carbon fuel alternatives and solutions**.
- **Establishing clear, consistent, and harmonized policy frameworks** to guide industry action and reduce uncertainty.

With coordinated action, the shipping industry can decarbonise strategically: delivering environmental benefits without compromising affordability or global trade.

Glossary

CO_2	Carbon Dioxide	*Primary greenhouse gas*
ETS	Emissions Trading System	*Market-based system capping emissions and trading allowances*
EU	European Union	*Political and economic union of 27 European states*
GHG	Greenhouse Gases	*Gases that trap heat in the atmosphere*
HFO	Heavy Fuel Oil	*Fossil residual oil used as fuel in ships*
IMO	International Maritime Organization	*UN agency regulating global shipping*
LNG	Liquefied Natural Gas	*Natural gas cooled to liquid form for use in storage or transport*
TCO	Total Cost of Ownership	*Total cost over an asset's life cycle including both CAPEX and OPEX*
TEU	Twenty-foot Equivalent Unit	*Standard container unit for cargo capacity*
OCCS	On-board Carbon Capture System	*System capturing CO_2 emissions on board vessels*
OPS	Onshore Power Supply	*Shoreside electrical power for ships at berth*
WAPS	Wind Assisted Propulsion System	*Use of wind energy to assist ship propulsion*



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