The implications of the IMO Revised GHG Strategy for shipping

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Key takeaways

1. **Transition to zero-emission fuels:** The International Maritime Organization's (IMO) revised greenhouse gas emissions strategy sets critical targets that will require a significant and accelerated shift to zero-emission fuels. The strategy's target of 70% (striving for 80%) reduction in absolute emissions would likely require the average ship to reduce its greenhouse gas (GHG) intensity by ~90% by 2040, when increased trade volumes are accounted for. More immediately, the strategy aims for 5-10% of the energy used in shipping in 2030 to have zero or near-zero GHG emissions. Both targets point to the need for substantial investments and development in zero-emission technologies within an ambitious timeline.
2. **Industry and policy measures:** The adoption of mid-term measures in 2025, including a fuel standard and a GHG pricing mechanism, will be crucial. A combination of measures is essential to create certainty of demand for new fuels, and flexibly incentivise a rapid and equitable transition.
3. **Just and equitable transition:** It's important to ensure that the transition is just and equitable, leaving no one behind. This includes considering the impacts of measures on different countries and regions, as well as developing policy frameworks that address the opportunities and needs of the Global South.
4. **Public-private collaboration and industry action:** Pilot projects, operational efficiency improvements, green shipping corridors require collaborations between industry and public authorities as well as researchers in paving the way for shipping's energy transition.
5. **Fuel choices:** Reaching the GHG reduction targets will require a mix of strategies, including improving energy efficiency and making specific fuel choices. Transition solutions now have a short window for commercial viability. The focus needs to be on scalable zero-emission fuels like e-ammonia, e-methanol,[1] and green hydrogen, as these will need to make up the majority of the sector's fuel use by the late 2030's.

1 where e-ammonia, e-methanol and green hydrogen are derived primarily from renewable energy (and not biogenic feedstocks)

6. **Global implications and collaboration:** The outcomes of the IMO's strategy will impact the global shipping community. International collaboration, policy adoption, and technology development are crucial elements to meet the set targets.
7. **National and regional policy action:** To ensure an energy transition aligned with the goals of the Paris Agreement, the strategy needs to be backed by ambitious national and regional policies, as well as industry initiatives to maximise investments in zero-emission shipping.
8. **Urgency and early action:** While the industry has made progress in operational and technical efficiencies, achieving the 2030 and subsequent targets demands further innovation, investment, and collaboration for zero-emission fuels. Early adopters will play a crucial role in leading the way for the broader industry.

Introduction

In recent years, momentum towards zero-emission shipping has been building, with maritime leaders pioneering zero-emission technologies and calling for regulatory frameworks.

A key milestone was reached in July 2023, when Member States of the International Maritime Organization (IMO), during its 80th Marine Environment Protection Committee (MEPC80) meeting, agreed on a revised greenhouse gas (GHG) strategy. Whereas the IMO's initial strategy from 2018 set the industry on a path to decarbonise, the revised strategy now lays out a clearer pathway for an accelerated, large-scale shift to zero-emission fuels, which need to account for the majority of the sector's energy use by 2040. This is a crucial step not only for shipping but for the global community as a whole.

The Revised Strategy

The IMO's revised strategy sets a clear end date for the use of fossil fuels by setting the target of net-zero GHG emissions "by or around, i.e., close to 2050", with indicative checkpoints for reducing GHG emissions by 20% (striving for 30%) by 2030 and 70% (striving for 80%) by 2040. Furthermore, the strategy now also includes a target of at least 5% uptake of zero or near-zero GHG emission technologies, fuels, and/or energy sources by 2030. Importantly, the ambitions and targets now take a well-to-wake approach to GHG emissions that considers the full lifespan of the fuels, from production to combustion. Furthermore, the text includes references to ensuring "a just and equitable transition", a concept that was absent in the IMO's initial GHG strategy.

The goals for reducing GHG emissions from ships can be approached in two ways: by looking at the overall sector's targets for 2030 and 2040, and by examining the specific goals for individual ships. One way to understand the latter is by focusing on GHG intensity. This measures the amount of greenhouse gas emissions per transport work, essentially for each ship. To calculate this intensity, the total amount of emissions that needs to be reduced is divided by the entire shipping activity. This means that the GHG intensity is affected by an increase or decrease of trade volumes. In simple terms, if there's more shipping activity or trade volume, the emissions produced per ship needs to decrease to meet the emission reduction targets.

The current targets are benched against 2008 levels. Yet trade volumes have increased significantly since then, impacting the total GHG intensity reduction targets necessary to meet the absolute reduction targets. Keeping this growth of trade volumes in mind, the absolute emissions reduction targets for 2030 and 2040 can be translated as:

- **2030:** 20-30% absolute reduction target is equivalent to 55-61% reduction in GHG intensity for an average ship.
- **2040:** 70-80% absolute reduction target is equivalent to 86-91% in GHG intensity for an average ship.[2]

The IMO's revised strategy is considerably more ambitious than its 2018 plan as it not only sets an end date for fossil fuels but also includes interim targets that make it clear that action cannot wait (see Table 1). This should be a strong demand signal to fuel suppliers and instil confidence in the transition. Furthermore, the well-to-wake basis helps to further spur demand for truly green fuels. Under the previous tank-to-wake approach, grey and brown ammonia or hydrogen, produced directly from fossil fuels, would be considered to have close to zero emissions despite emitting more than their green counterparts on a well-to-wake basis.

	2018 Initial GHG Strategy	2023 Revised GHG Strategy
Absolute emission reduction	2050: At least -50%	2030: -20% striving for -30% 2040: -70% striving for -80% ~2050: -100%
Emission intensity	2030: at least -40% 2050: at least -70%	2030: at least -40%
Fuel uptake target	-	2030: 5% striving for 10%
Just and equitable transition	-	Included
Policy measures	Lists potential short-term, mid-term, and long-term measures	Commits to the adoption of mid-term measures by 2025, including technical and economic measures
Scope	Tank-to-wake carbon emissions	Well-to-wake GHG emissions

Table 1: *Comparison of 2018 vs. 2023 IMO GHG Strategy*

What does this mean for the shipping sector?

The strategy provides the industry with a clear pathway for shipping decarbonisation by pointing to the need to invest at scale in zero-emission fuels and technologies. As an agreed UN Strategy, adopted unanimously, it removes any uncertainty that the energy transition will happen and as such provides a strong demand signal for scalable zero-emission fuels.

However, a zero-emission future cannot be driven by the IMO alone. To ensure an energy transition aligned with the goals of the Paris Agreement, the strategy needs to be backed by ambitious national and regional policies, as well as industry initiatives to maximise investments in zero-emission shipping.

2 Smith, T., Bonello, J. and Kapur, A. (2023). How can international shipping align with 1.5°C: Focus on 1.5°C alignment in 2030.

The outcomes from MEPC80 will undoubtedly have important implications for the wider shipping community in the following areas: (1) the adoption of policy measures at the IMO, (2) the need to ensure the transition is just and equitable, (3) public-private collaboration, and (4) fuel choices.

1. The adoption of mid-term measures

The coming years will mark the development, adoption, and entry into force of IMO policy measures which aim to achieve the ambitions of the revised strategy and are already in their third and final phase of development.

The IMO has committed to adopting a holistic and fuel-agnostic framework by 2025 for entry into force in 2027. At MECP80, Member States agreed to the further development of a "basket of mid-term measures", which will include a fuel standard and a market-based measure through a GHG pricing mechanism.

The fuel standard will regulate the GHG intensity of fuel by setting a mandate on the maximum intensity and reducing the limit in set intervals (e.g. one, three or five years). This will send a clear and unambiguous message to shipowners and fuel suppliers that the uptake of near-zero and zero-emission fuels must rapidly increase between now and 2040. Furthermore, it will indicate that both a compatible fleet and sufficient production volumes of fuel need to be able to match this demand.

The GHG pricing mechanism will provide a further incentive to reduce emissions. Disbursement of revenue raised through a GHG pricing mechanism can, on the one hand, stimulate the early use of zero-emission fuels and, on the other, contribute towards an equitable transition as funds can be channelled to Small Island Developing States (SIDs) and Least Developed Countries (LDCs).

While this monetary disbursement can help close the price gap between fossil and zero-emission fuels, the exact emissions reduction outcome of a pricing mechanism is more uncertain, as it will not put a cap on emissions but rather make it more costly to emit. A combination of the two measures, as indicated in Figure 1, therefore means that the flexibility and revenue generation of GHG pricing is complemented by the certainty of GHG reduction created by the fuel standard. The wider shipping value chain should prepare for both policy measures and their respective implications and opportunities.

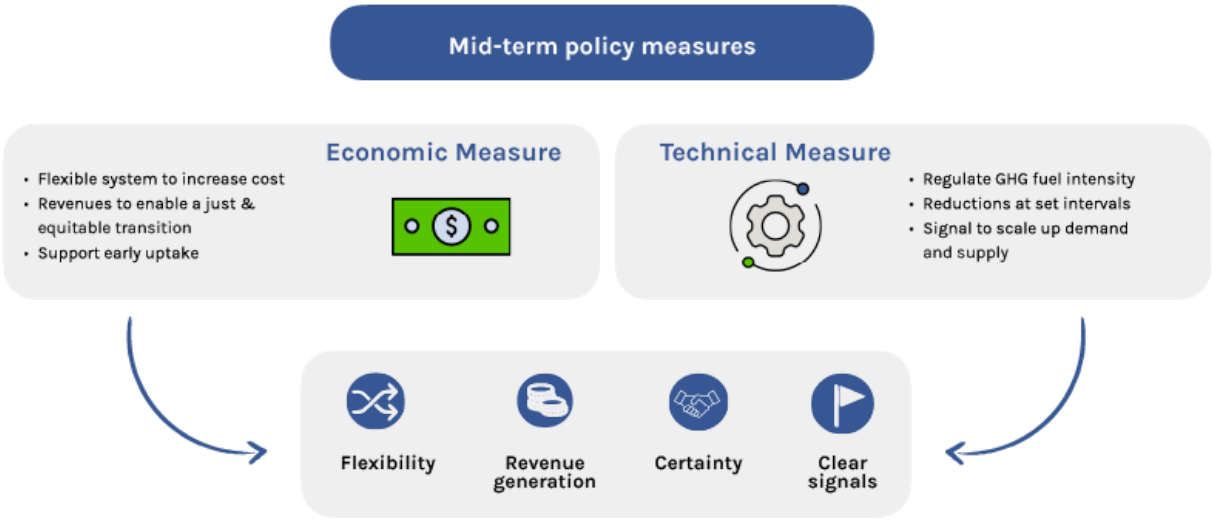

Figure 1: *Advantages of a basket of mid-term policy measures*

To support the further development and adoption of measures, a comprehensive impact assessment will be conducted in 2024. This process is primarily to evaluate the impact on the global fleet and on states as well as to identify measures that can mitigate any negative impacts and how revenues from an economic instrument can be used. The assessment will therefore provide important inputs to help member states finalise the design of the two measures. The outcomes of this assessment will most likely only be final in the spring of 2024, close to the adoption of the measures which is expected in the autumn of 2025, with entry into force no earlier than 2027 (see Figure 2).

Figure 2: *Timeline for policy measure development and the IMO's comprehensive impact assessment (CIA)*

2. Enabling a just and equitable transition

While the sector is progressing towards a zero-emission future, it is equally crucial that no one is left behind in the transition. This is particularly important to maximise broad support and consensus in a multilateral process like the IMO.

Policy measures will have different impacts on different countries and regions. For example, any policy-induced change in transport costs will have a greater impact on countries with a greater distance to their major trading partners. This in turn can impact a country's trade competitiveness, exports, and economic growth. Furthermore, various countries argue that the transition should be inclusive and allow equal access to the required infrastructure and technologies, rather than favour those countries with existing economic and industrial bases. Other countries argue that the transition should be equitable in relation to climate impacts, and must acknowledge and address the economic and other impacts created by the past, present, and future GHG emissions from international shipping.

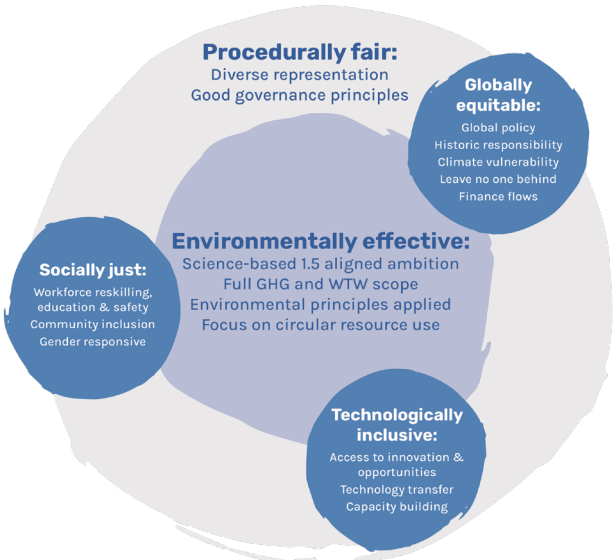

Figure 3: *The key elements for shipping's just and equitable transition*

To this end, the term "just and equitable transition" became a central topic in the IMO discussions in the run-up toward MEPC80. However, there is a lack of consensus on what "just and equitable" means for the IMO's GHG policy. Figure 3 aims to organise the components of a just and equitable transition by highlighting that the transition should not only be full and effective, but should also be globally equitable, socially just, and technologically inclusive.[3]

3 Shaw, A., & De Beukelaer, C. (2022). Why should we talk about a 'just and equitable' transition for shipping?

One key aspect of ensuring a just and equitable transition is unlocking global opportunities for fuel production. Shipping's fuel and energy transition can only happen with the urgency and scale needed if national governments and international regulators establish policy frameworks that make the transition and fuel production commercially viable, globally available, and accessible for all countries and companies alike.[4] Shipping's transition offers strategic development opportunities for many developing countries through the creation of a global market for green fuels. This also provides significant opportunities for companies with operations in such countries.

A global fuel standard and an emissions pricing mechanism will be vital in unlocking the potential to produce zero-emission fuels in developing countries. While the fuel standard will send clear demand signals to zero-emission fuel suppliers, reinvesting the generated revenues of a GHG pricing mechanism to support the energy transition of shipping will therefore not only support decarbonisation efforts but can also help ensure the transition leaves no one behind.[5]

3. Public-private collaboration to catalyse industry action

In the lead-up to MEPC80, industry initiatives such as pilot projects and green corridors (specific shipping routes where the feasibility of zero-emission shipping is catalysed by a combination of public and private actions) played an instrumental role in identifying feasible and impactful opportunities for early action. These initiatives, including both short-term and longer-term action, aim to bring together industry actors, researchers, and importantly public authorities into dialogue around how zero-emission shipping can be developed and deployed on specific routes.

In terms of short-term action, operational efficiency measures can already be taken today to reduce emissions and fuel consumption without high capital investment, new technology, or new regulation. Improving operational efficiency to minimise consumption and keep costs down will therefore be a prerequisite for the full transition to zero-emission fuels.[6]

In relation to longer-term decarbonisation projects, this year's fourth edition of the Mapping of Pilot and Demonstration Projects by the Getting to Zero Coalition identified a total of 373 zero-emission pilot projects, a significant 84% surge over the previous year (see Figure 4a).[7] The scope of these projects indicates that the transition is increasingly a global effort, with emerging initiatives in countries such as Thailand, Egypt, Malaysia, and South Africa (See Figure 4b). These projects emphasise collaboration, with a vast majority involving partnerships across multiple countries, including between developing and developed nations.

While global activity varies by region, there is a clear focus on hydrogen-based fuels, with ammonia gaining dominance in larger ship types and receiving the most Approvals in Principle over the last year. Additionally, more mature methanol technologies are transitioning from pilot phases to commercialisation. These developments underscore the maritime industry's commitment to decarbonise by 2050 and highlight the need for robust emission reduction strategies from the IMO.

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4 Shaw, A. et al. (2023). Decarbonising shipping while ensuring an equitable transition.

5 Englert, D. et al. (2022). Carbon Revenues From International Shipping: Enabling an Effective and Equitable Energy Transition.

6 Krantz, R. et al (2023). Short-Term Action Opportunities.

7 Rosenberg, A. & Leitão, A. (2023). Mapping of Zero Emission Pilots and Demonstration Projects – fourth edition.

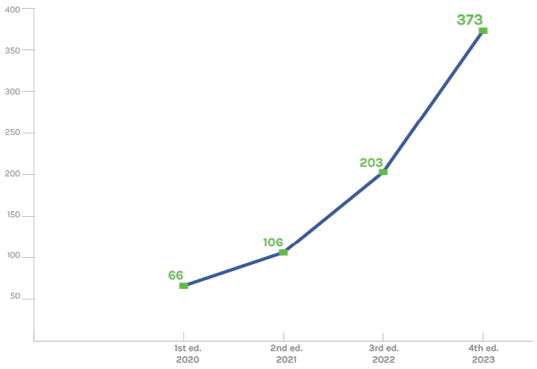

Figure 4a: *The number of pilot projects 2020-2023*

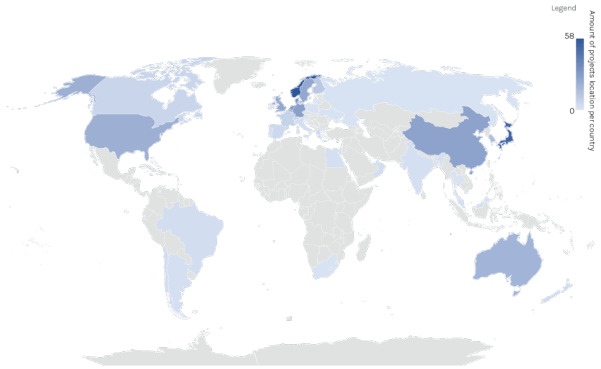

Figure 4b: *Geographical spread of pilot projects in 2023*

In addition to pilot projects, multiple green corridors are currently under development. The Clydebank Declaration, launched in 2021 in conjunction with COP26, aims to support the establishment of at least six green shipping corridors by 2050. In the years following this declaration, close to 30 initiatives have emerged around the world. More than 110 stakeholders from across the value chain are engaged in these initiatives, and a significant level of public-private collaboration can be seen.

While the outcomes of MEPC80 set the pathway for a full transition of the sector and push the industry to look towards large-scale implementation, first-mover initiatives such as green corridors will play an important role in the coming years. As the industry prepares for mid-term measures to be adopted and enter into force, first movers are critical in spurring the first steps to align the sector's supply and demand chains for zero-emission shipping, as well as prepare the industry for a wide-scale energy transition. Green corridors, for example, enable more coordinated investments on both land and sea. Using public-private collaboration and industry partnerships to share and manage risks can also help lower the threshold for investment at scale. Their success will be an essential part of meeting the IMO checkpoint of 5% (striving for 10%) zero-emission fuel use by 2030, which would be a strong indicator that zero-emissions solutions are mature and ready for global adoption on all routes.

This early industry action through green corridors still however entails significant costs and risks for first movers. In the immediate future (2024-2027), given the absence of IMO mid-term measures in force, national governments will need to provide support, especially in closing the cost gap associated with the early use of new fuels. National governments can play a major role in narrowing this price gap, particularly by facilitating private-sector investments by mitigating the risks associated with the development of scalable zero-emission technologies and reduce the financial disparities connected to early-stage technological advancements. The decisions made at MEPC80 have not eliminated the need for this action, particularly ahead of any economic measures coming through IMO regulations. The revised strategy can, however, provide assurance that national support will act as a bridge to a global framework which, given the IMO's stated ambitions, should be supported by policy from 2027. This means that national government and industry investments are less likely to end up stranded, leading to increased opportunities for public-private collaboration aligned with steep GHG reductions in the sector. This is likely to enable significant learning and knowledge gains by the stakeholders involved in these collaborations, which will create advantages for those countries and companies that capitalise on these opportunities early.

4. Fuel Choices

The pathway of GHG reductions prescribed by the IMO is likely to significantly impact the technology and fuel mix of international shipping in the coming decades. The figure below (Figure 5) indicates various ways in which the fuel mix could evolve, which in combination with similar levels of energy efficiency improvement, could achieve the IMO's revised strategy ambitions for the 2030 emissions reduction target. The four scenarios each indicate a different uptake scale of the various fuel options.

In the short-term, changes may be limited as there are multiple ways to achieve the 20-30% GHG reduction by 2030 target, as indicated above. Beyond 2030, the GHG emissions and GHG intensity (as measured by CO2e/tnm, or CO2 equivalent per tonne nautical mile) will need to continue to decrease. Further reductions through efficiency improvement will become increasingly difficult and expensive, and a significantly greater uptake of fuels with the lowest GHG intensity will be needed. More specifically, through the 2030s, as policy drives the fleet's average GHG intensity to 86-91% below the 2008 baseline in 2040, it will be increasingly difficult to use fuels that only offer lower GHG intensity and cannot competitively achieve near-zero (e.g. 90% reduction relative to low sulphur fuel oil) and ultimately zero GHG emissions.

This means that many of the technologies and fuels that typically enable 40-80% lower GHG intensity (including many biofuels, blue fuels from natural gas with carbon capture and storage (CCS), and onboard CCS) will play a transitional role and will over time become less commercially relevant (approximately from when the IMO's mid-term measures enter into force in the late 2020s through the late 2030s) as they will reach limits in their ability to achieve policy compliance. Liquified natural gas (LNG), for example, even in combination with maximised technical and operational efficiency is unlikely to be a policy-compliant solution beyond 2030. In other words, blue and green fuels may be used in parallel in the earlier stage of transition and blue fuels may appear lower cost in the short-term, but the more reliance on transition solutions in the short-term, the shorter the time scale for scaling up in preparation for the 2040 target. This potentially short time frame of commercial relevance for transition solutions is consequently also likely to affect the levels of investment into these technologies, further affecting their competitiveness relative to the solutions that enable 80% emissions reduction and lower GHG intensity. This makes it vital to align now on investing in the solutions that are most likely to be needed in 2040 and beyond.

Shipping's stakeholders therefore need to prepare long-life assets for a rapid fuel transition taking place over the 2030s. **This means having a plan not just for how an asset's GHG emissions can be rapidly reduced through the use of a range of fuels, but how an asset will remain competitive as policy stimulates the design and increasingly the operation of ships optimised for near-zero and zero GHG emission fuel use.**

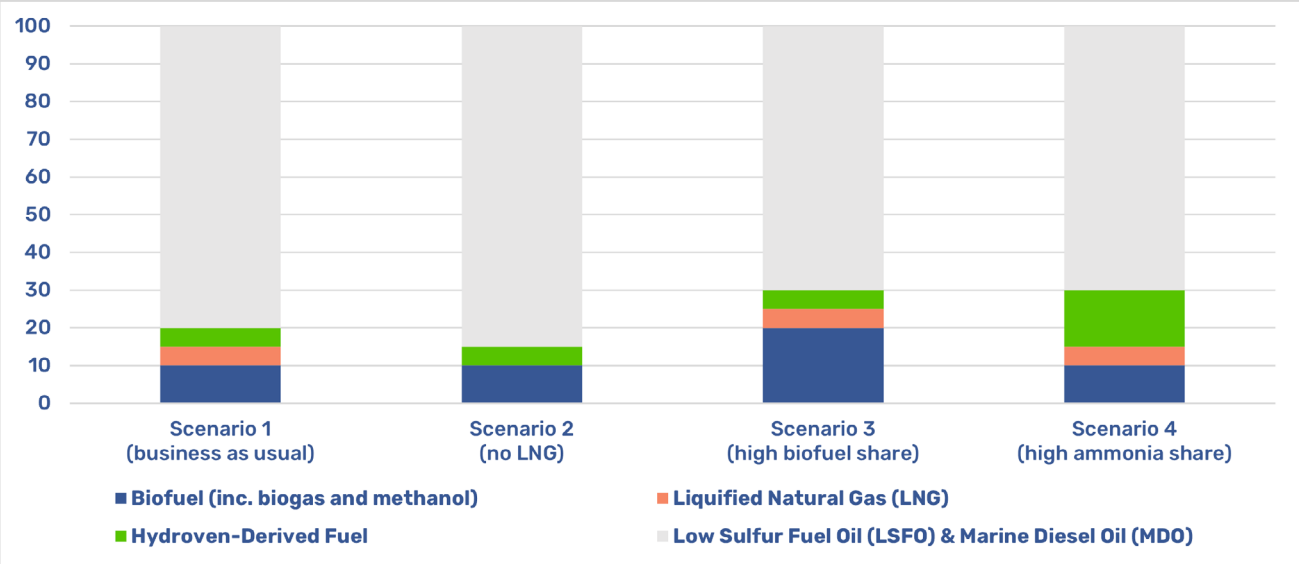

Figure 5: *Characterisation of four fuel mix scenarios in 2030 expressed as a percentage (%) of energy requirement for international shipping (Smith, Bonello & Kapur, 2023).*

Conclusions

The IMO's revised greenhouse gas strategy represents a monumental commitment towards global maritime decarbonisation. The targets for 2030, 2040, and 2050 emphasise the urgency of transitioning away from fossil fuels.

Achieving these goals requires substantial investment in and development of zero-emission technologies. Mid-term policy measures, including a fuel standard and GHG pricing mechanism, are crucial for creating demand certainty for new fuels and supporting a transition that is just and equitable. Public-private collaborations, industry actions, and early initiatives like pilot projects and green corridors are vital for a successful energy transition.

The IMO's revised strategy is a testament to the maritime sector's proactive stance towards making shipping more sustainable. First movers and other front-runners such as the Getting to Zero Coalition are unequivocally ready to continue investing in zero-emission pilot projects, increase international collaborations, and showcase their dedication to the transition.