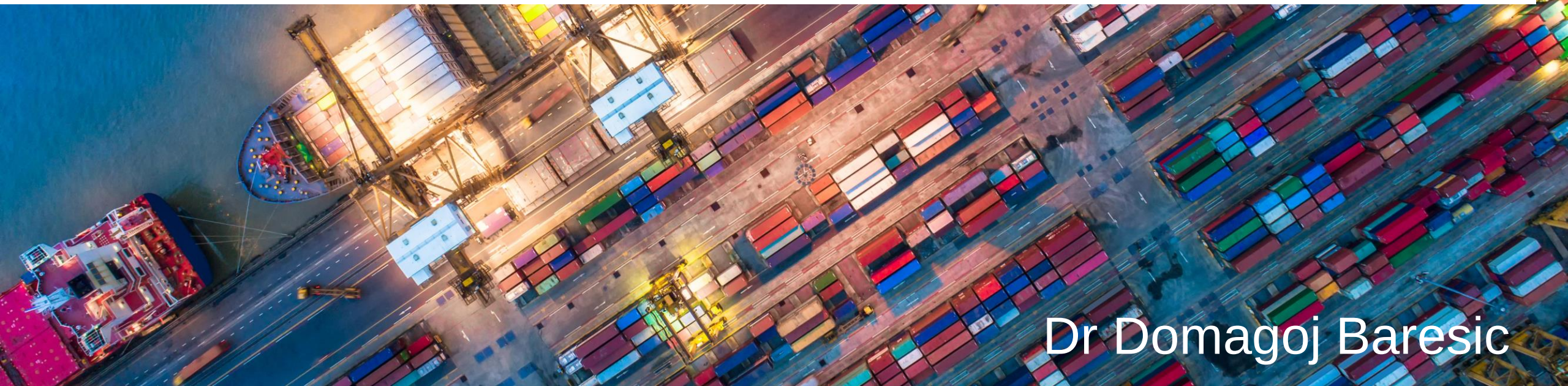
UCL Energy Institute

# **Adoption of ammonia as a marine fuel:**
# The possible transition, IMO developments and role of national action



Dr Domagoj Baresic

# Who are we?

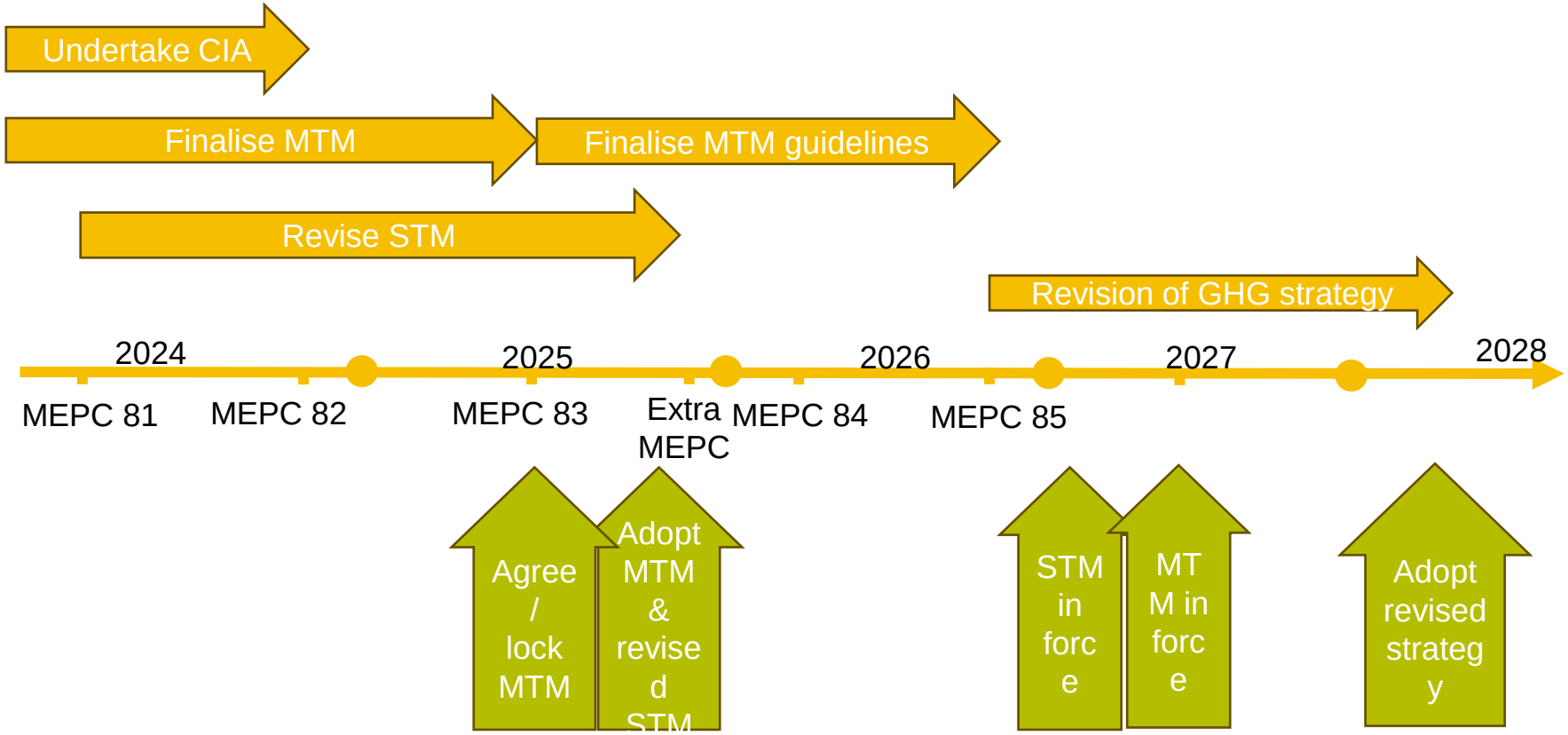
- UCL Shipping and Oceans Research Group - https://www.shippingandoceans.com/post/shipping-off-track-to-meet-5-zero-emission-fuel-target-by-2030-as-new-report-issues-serious-wakeup
- Part of University College London (UCL), Energy Institute
- Group of interdisciplinary researchers, working on maritime environment issues and ocean sustainability

# 2023 IMO GHG Strategy

- WTW GHG reductions (indicative checkpoints):
  - 20-30% by 2030
  - 70-80% by 2040
- Net zero ~2050
- 5-10% (by energy content) zero and near-zero GHG emissions fuel by 2030
- Adopted by 2025, in force 2027:
  - GHG pricing
  - GHG fuel standard

} - promote the energy transition of shipping
- provide the world fleet a needed incentive
- contribute to a level playing field and a just and equitable transition

# IMO regulations – the timeline



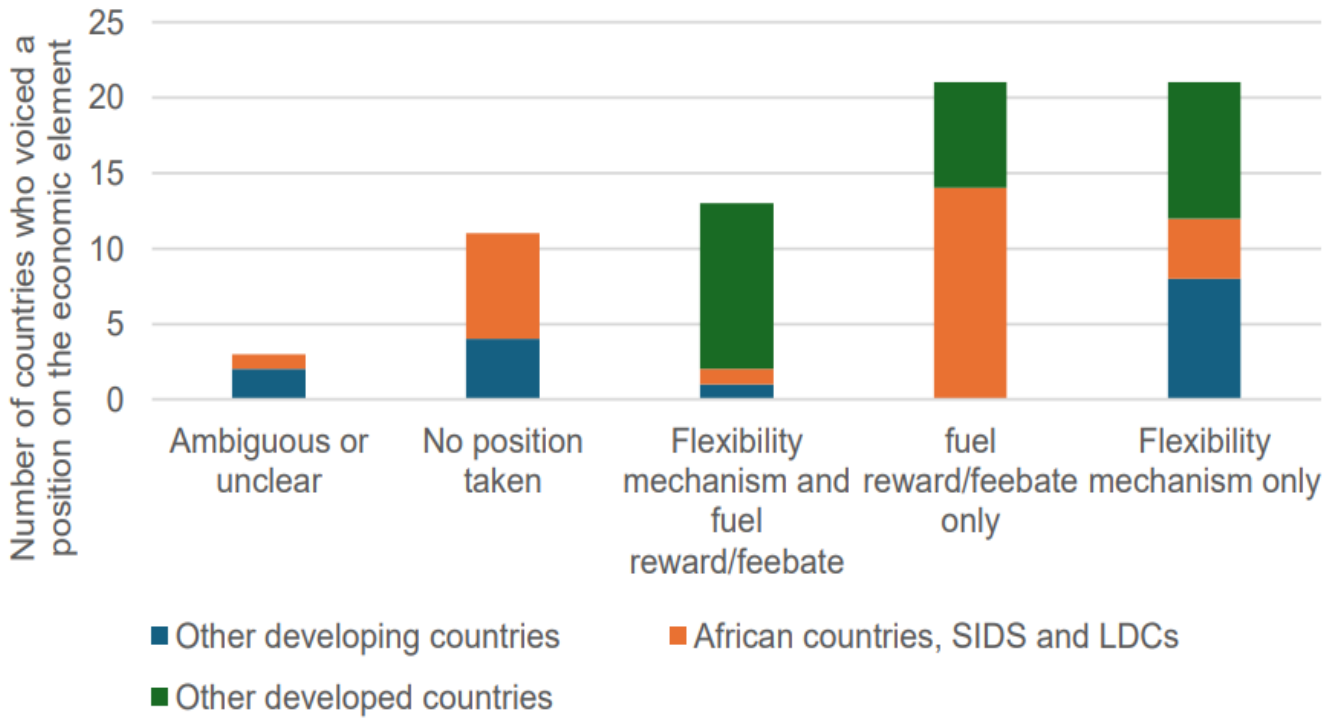
# Current state of IMO discussions…

- The '**fuel standard**' has broad support and large majority want it aligned with more ambitious 'strive' targets

**MBM options** on the table:

- flexibility mechanism on its own and no levy/universal price on GHG,
- a feebate mechanism (associated with a levy/universal price on GHG),
- a feebate mechanism combined with a flexibility mechanism.

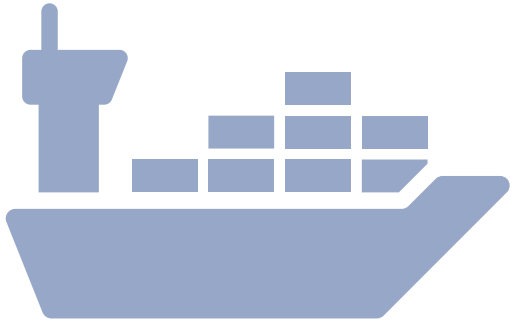
**Revenue use**: in-sector, out of sector, passive vs active




*Source: Smith et al (2024). An overview of the discussions from IMO's 82nd Marine Environment Protection Committee*

# Measuring progress towards alternative fuels - background

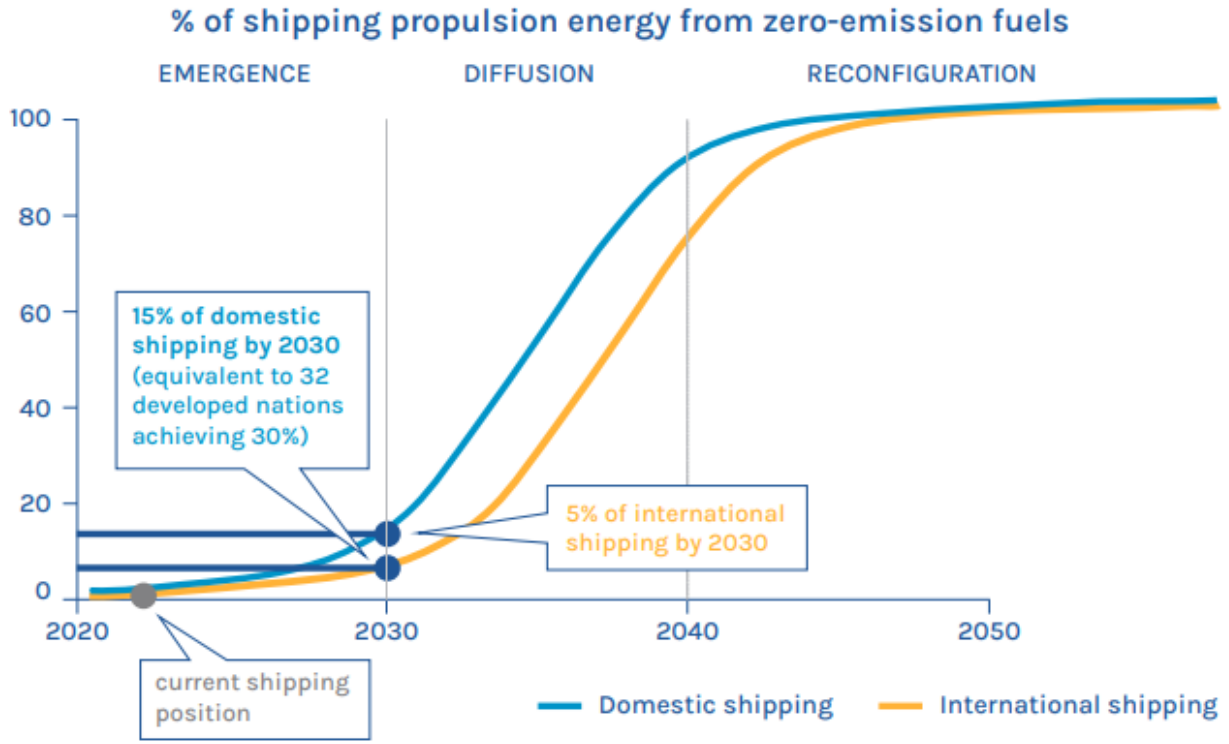
- Climate Champions, UCL/UMAS, GMF in context of GtZ Ambition and 2030 ‘breakthrough’ targets
- **2021** – 5% zero emission fuels by 2030 needed for Paris-aligned shipping decarbonization
- 2021- *‘Getting to 5%: An action plan for delivering zero-emission fuels in shipping’*



# Why 5%?

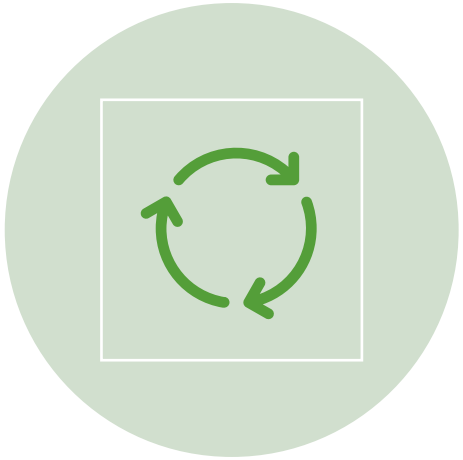
- Estimate ‘tipping point’ by 2030 for rapid diffusion
- Based on S-Curve
- These are ‘scalable zero emission fuels’
- Have to be produced at scale and sustainably

- 5%-10% of SZEF  by 2030
- Equates to 0.6 EJ-1.2 EJ of energy demand.
- Equates to around 29.8 million tonnes of ammonia or 28.1 million tonnes of methanol




*Source: Baresic & Palmer (2022). CLIMATE ACTION IN SHIPPING Progress towards Shipping’s 2030 Breakthrough*

# What are SZEF? (Scalable Zero Emission Fuels)



***NET ZERO WELL-TO-WAKE GHG EMISSIONS***

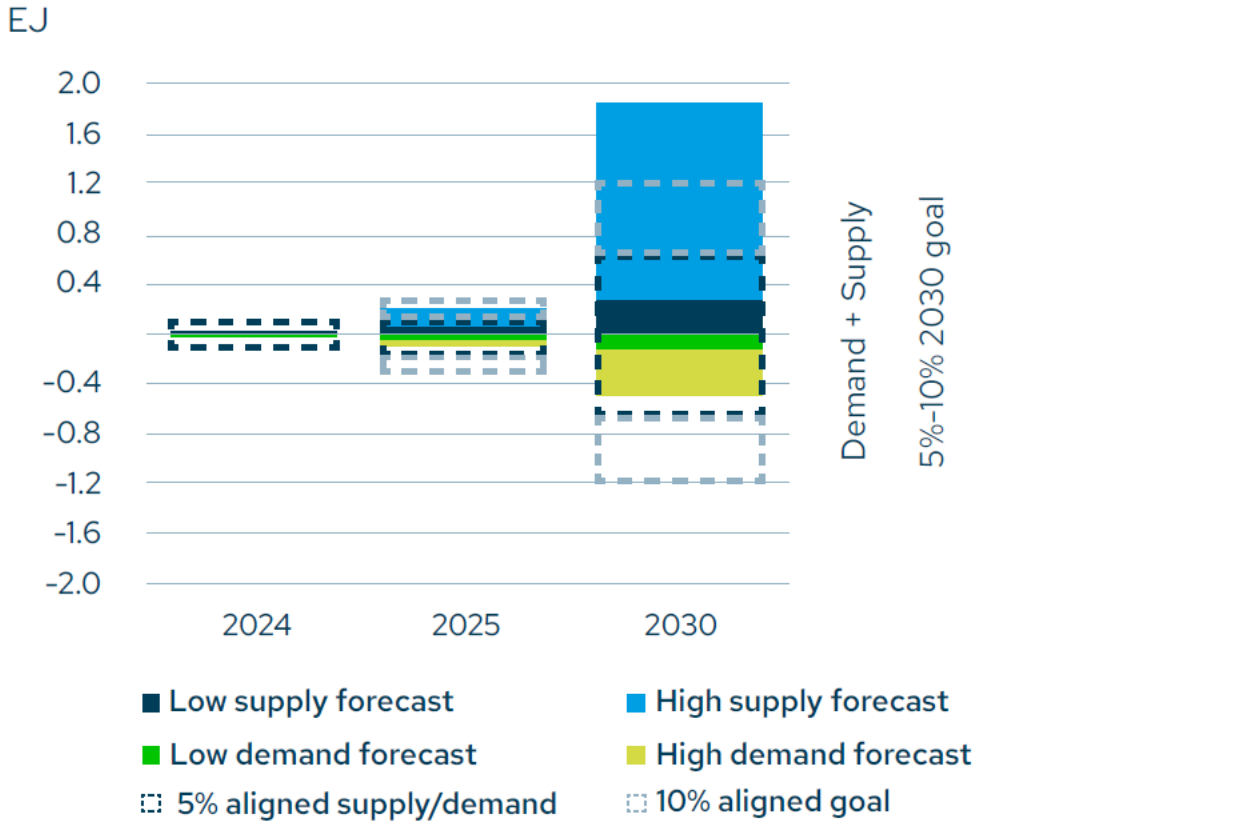
***COMPETITIVE PRICE COMPARED TO FOSSIL FUELS***

***PRODUCED AT VOLUMES TO MEET SIGNIFICANT MARITIME DEMAND***

# Supply vs demand

- Progress ‘partially on track’ with a range of uncertainities
- Current SZEF production in the pipeline could cover less than half (43%) of the fuel needed by 2030
- Current order book of SZEF-capable vessels will only deliver around 25% of the SZEF demand needed to achieve the 2030 target
- However,  this could change rapidly with right signals

**Estimated total SZEF supply and demand for shipping compared to 5-10% 2030 SZEF goal**




*Source: Baresic et al. (2024) CLIMATE ACTION IN SHIPPING Progress towards Shipping’s 2030 Breakthrough, 2024 edition*

# Main findings

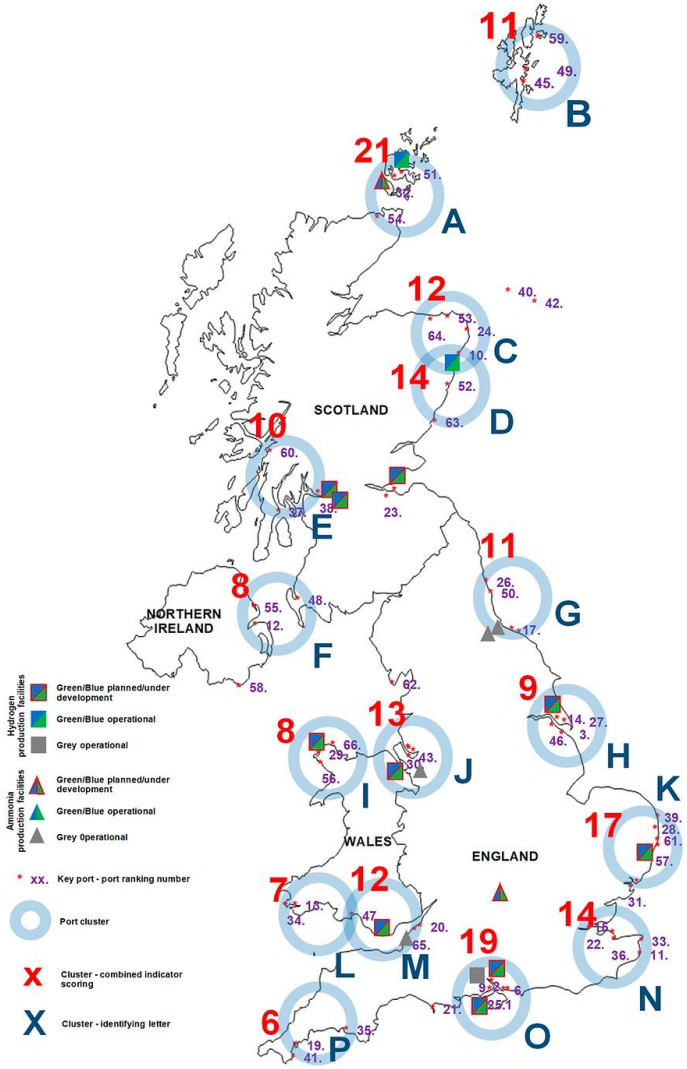
- Slowdown in funding for SZEF-related activities and vessels, combined with more funding going towards conventional fossil-fuelled tonnage.
- Progress has been positive at a global policy level following the 2023 IMO Strategy
- Progress in improving ensuring a just and equitable transition

| CHANGE LEVER | PROGRESS | SCALE OF PROGRESS ON ACTIONS | GOALS BY 2030 |
|---|---|---|---|
| TECHNOLOGY & SUPPLY | | • 3/7 actions 'on track'<br>• 4/7 actions 'partially on track' | • 60 GW green hydrogen electrolyser capacity<br>• Green hydrogen production cost $1.5- $2/kg depending on region<br>• 0.6 EJ of SZEF supply available by 2030 and 0.1 EJ by 2025 (indicative) |
| DEMAND | | • 0/8 actions 'on track'<br>• 2/8 actions 'partially on track'<br>• 6/8 actions 'not on track' | • 600 15k TEU containerships equivalent of SZEF demand[7]<br>• 8.75-12.5% of all TEU-miles to be SZEF by 2030,[8] if other segments also scale out proportionally to SZEF<br>• All new ships to be SZEF-capable<br>• Majority of existing SZEF-ready tonnage to be converted to full SZEF-capability |
| FINANCE | | • 2/5 actions 'partially on track'<br>• 3/5 actions 'not on track' | • Alignment of shipping portfolios for as much of the US$ 500 bn+ of shipping debt to be as close to Poseidon Principles trajectories as possible—with those trajectories expected to match requirements for 1.5oC—but no higher than 10% and the majority to be under 5%<br>• 2/3 or more of all shipping debt to be tied to Poseidon Principles trajectories, increasing coverage from Asia Pacific and Greek lenders, and continued transparency from all Western lenders<br>• Continued or increased issuances and interest for sustainability-linked loans and bonds to shipowners and related segments like ports and fuel suppliers.<br>• Stricter requirements for eligibility for sustainability-linked loans and bonds and focus to shift primarily to SZEF-related assets |
| POLICY | | • 5/10 actions 'on track'<br>• 2/10 actions 'partially on track'<br>• 3/10 actions 'not on track' | • Adoption of ambitious shipping economic instrument with regulatory support for 5%-10% SZEF adoption<br>• Top 20 countries by maritime traffic have ambitious domestic decarbonization policies with increased hydrogen production commitments.<br>• International agreements on zero GHG shipping routes |
| CIVIL SOCIETY | | • 0/5 actions 'on track'<br>• 4/5 actions 'partially on track'<br>• 1/5 actions 'not on track | • Growing SIDS/LDC participation in IMO policy negotiations and or national action plans<br>• Increased NGO pressure<br>• Workforce upskilling/retraining programmes in place |

*Source: Baresic et al. (2024) CLIMATE ACTION IN SHIPPING Progress towards Shipping's 2030 Breakthrough, 2024 edition*

# National Action

- Top 50 UK ports by fuel sales identified, these grouped into 16 ‘clusters’
- Quantitative analysis undertaken to analyze ports by traffic type, industry segments, liner routes, etc.
- Qualitative analysis undertaken to identify local actors, networks, policies, infrastructure developments, etc.
- 4 clusters identified with most potential for further interview analysis – 3 chosen




*Source: Baresic and Rehmatulla (2024) Identifying Locations for Early Adoption of Zero Emission Fuels for Shipping—The UK as a Case Study*

# Thank you!

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