A Pathway to Zero-Emission Shipping

INTERNATIONAL TRADE & SUSTAINABILITY

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14TH DECEMBER 2021

UN CLIMATE CHANGE CONFERENCE UK 2021

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Shipping

Maritime shipping, the backbone of global commerce, accounts for almost **3% of global greenhouse gas (GHG) emissions**.

Roughly 85% of maritime shipping emissions are contributed to international shipping, namely the transport of goods by containerships, bulk carrier ships, and tankers.

While shipping has become more energy-efficient since 2012, **emissions from the sector could increase by up to 50%** above 2008 emissions **by 2050** due to a continued **increase in demand for internationally-shipped goods**

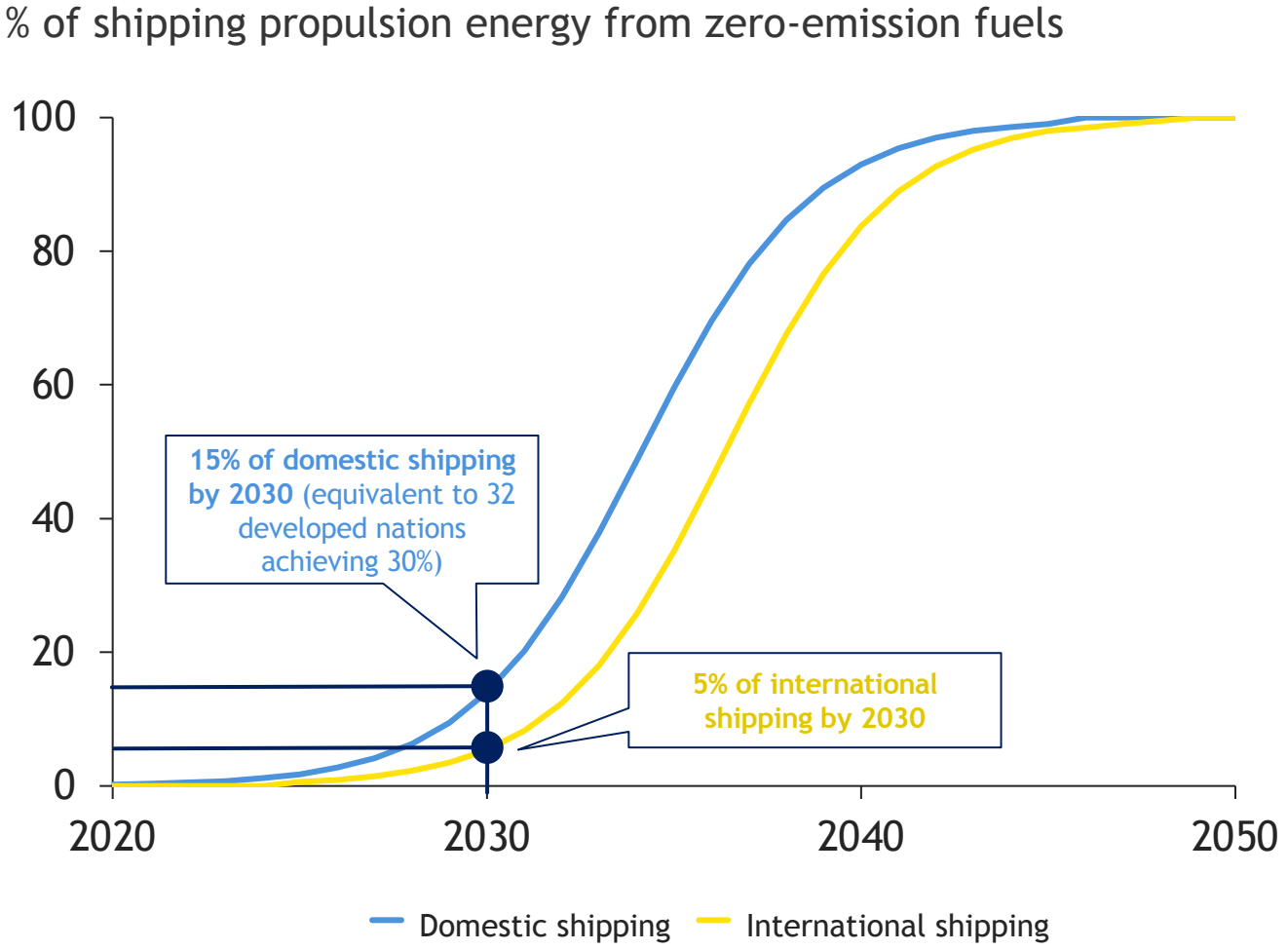
Given the interconnectedness of shipping makes it a powerful source of solution

Source: ETC 2019

Zero emission fuels for shipping propulsion energy

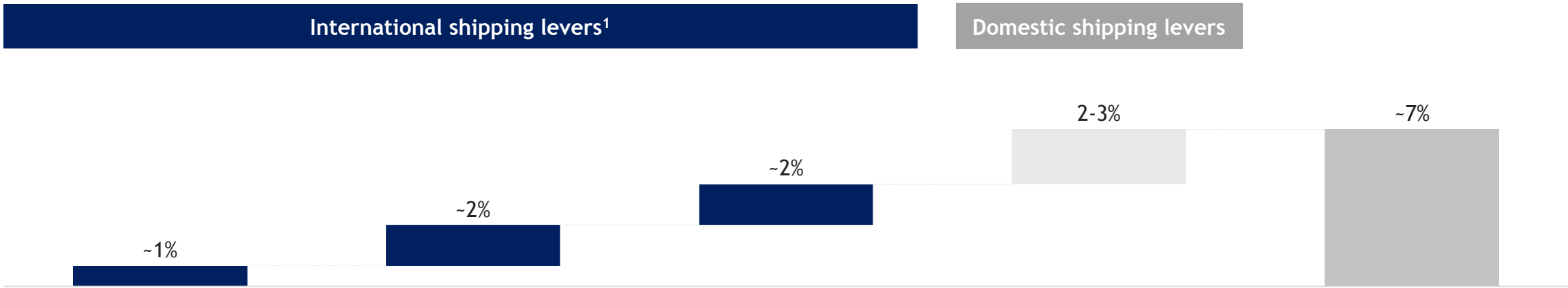
For full decarbonization in line with Paris, the 2030 target for zero emission fuels should be 5% for international shipping and 15% for domestic

S-Curve | Zero emission fuels for shipping propulsion energy



Note: Based on a smoothed sigmoid curve forced to 100% at the end given the starting point.
Source: High Level Champions, 2020

Zero emission fuels making up 5% of international shipping by 2030 can be achieved via three international shipping levers



10 large container routes

10 large deep-sea routes account for 0.8% of total CO_2 in 2018, such as Rotterdam-Singapore, Rotterdam-New York, LA – Singapore, Hong Kong – Singapore

Ammonia & LPG tankers use ammonia as fuel

Ammonia transport alone accounts for ~0.1% of emissions in 2018, with LPG tankers added the sum would be ~2.0%

Niche geographies

E.g., Chile-US, Japan-Australia, Dubai-Singapore, Australia-Singapore, Denmark-Norway

32 developed nations decarbonize domestic shipping 30%

If these nations achieve 30% of propulsion from zero emission sources this would correspond to a 2-3% reduction in emissions

Total shipping energy from zero emission fuels 2030

Source: UMAS, 4th IMO GHG Study

Zero emission fuel supply need to scale up and costs to go down

The ”Green Hydrogen Catapult” aims for 45 GW by 2026 with secured finance, commissioning in 2027 and reaching $2/kg

Founding members - Six green hydrogen industry leaders and the Rocky Mountain Institute

YARA · Ørsted · cwp Renewables · IBERDROLA · ACWA POWER · Envision · Rocky Mountain Institute

Target 2026	Target 2050
• To deploy 25 gigawatts renewables-based hydrogen production, boosting current ambition 2.5x • Halving the current cost of hydrogen to below US$2 per kilogram	• To align the production and use of green hydrogen with a trajectory that displaces fossil fuels at a rate consistent with achieving net zero global emissions by 2050

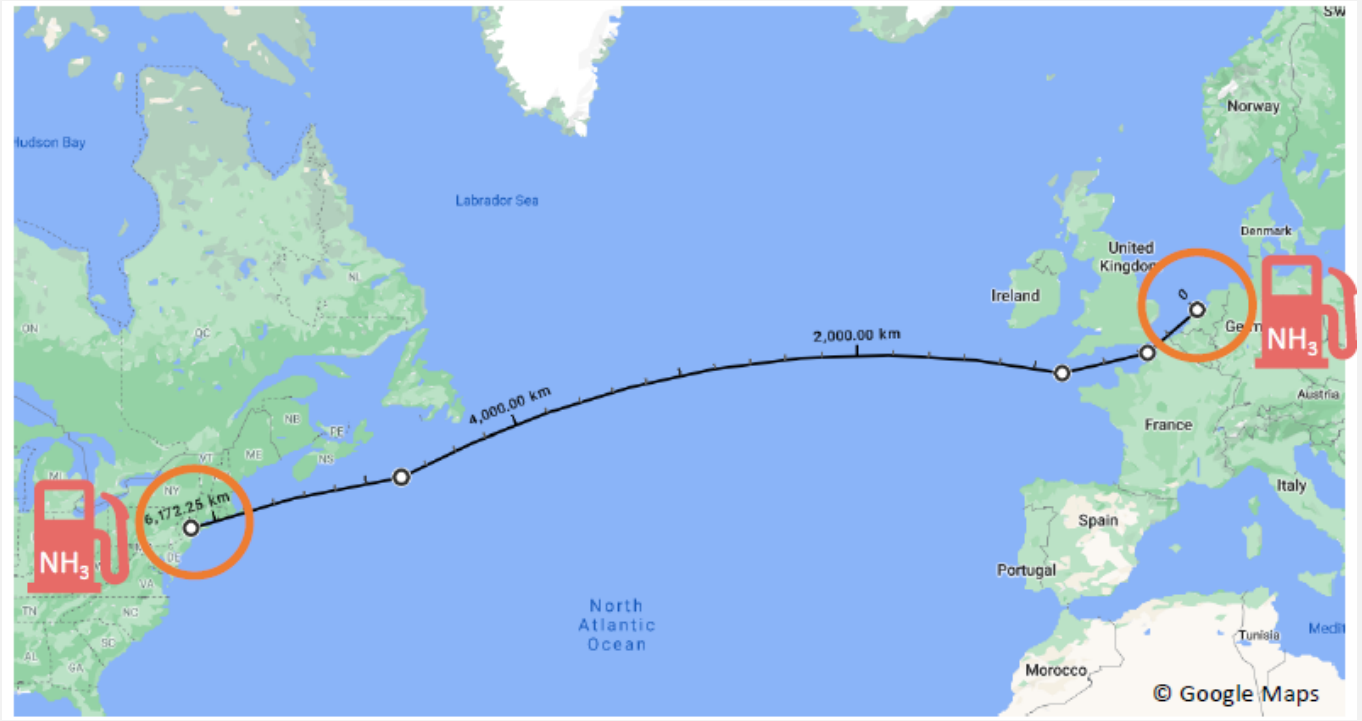
If green ammonia is the fuel, 68 GW of hydrogen electrolyser capacity needed by 2030

Data		Source
Shipping energy need 2030	12.9 EJ	UMAS
% of energy from zero emission fuels	7%	HLCC 2020
Shipping energy need from zero emission fuels	**0.74 EJ**	
Ammonia energy/ton	18.6 GJ/t	IRENA
Hydrogen electrolyzer capacity need to produce 1 Mt ammonia	1.7 GW	Hydrogen Council
Hydrogen electrolyzer capacity need for 0.74 EJ of ammonia	**68 GW**	-

Green Corridors

A green corridor is defined as a shipping route between 2 major port hubs on which the technological, economic and regulatory feasibility of the operation of zero-emissions ships is catalysed through public and private actions

- **By 2022:** Multiple commitments of national governments and industry consortia to develop deep sea zero-emission ships and associated infrastructure.
- **By 2025:** First zero-emission ships (incl. associated infrastructure) start commercial operation on at least 6 deep-sea corridors
- **By 2030:** Large-scale operation of zero-emission ships (incl. associated infrastructure) on these corridors with diffusion to others.



Source: Getting to Zero Coalition & Clydebank Declaration

Green Corridors – Critical building blocks

Cross Value Chain Collaboration

A viable fuel pathway

Customer demand

Policy and Regulation

Source: The Next Wave Green Corridors (2021)

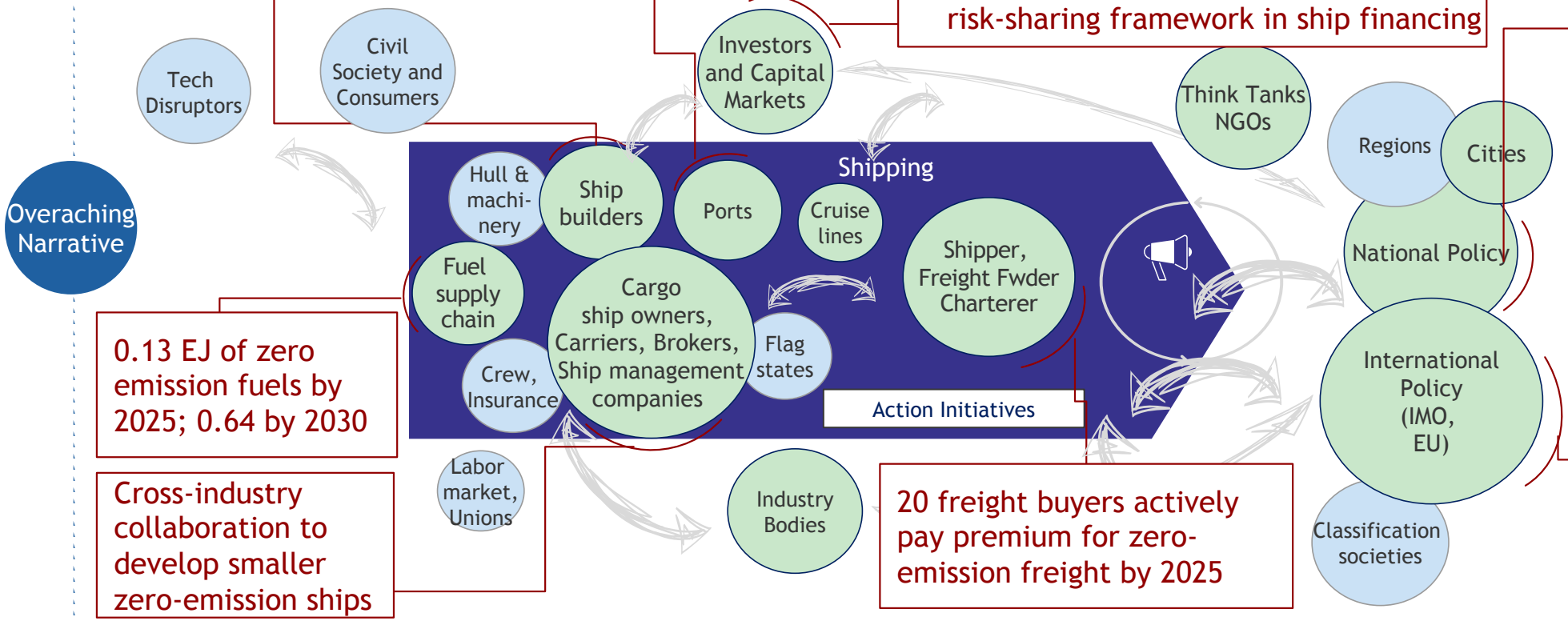
Objective | 5% zero-emission fuels by 2030, 100% by 2045

10 zero-emission deep sea ships in operation by 2025, 100 by 2030

Government-industry collaboration to scale fuel production/facilities

- $3-6bn investment from non-state actors and $2-4bn from government support by 2025
- Better transparency, governance and risk-sharing framework in ship financing

- 30% domestic shipping decarbonized by 2030
- Governments set production targets for zero carbon fuels (intermodal usage) and phase out fossil bunkers in domestic shipping



0.13 EJ of zero emission fuels by 2025; 0.64 by 2030

Cross-industry collaboration to develop smaller zero-emission ships

20 freight buyers actively pay premium for zero-emission freight by 2025

- IMO agrees on comprehensive decarbonization strategy, in line with Paris 1.5°C trajectory by 2023
- Multiple nations make plurilateral commitments to decarbonize shipping
- International agreements on creation of green shipping routes

Primary campaign focus | Secondary campaign focus | x Campaign objective | Influence

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