Shipping and the environment
Regulations and consequences

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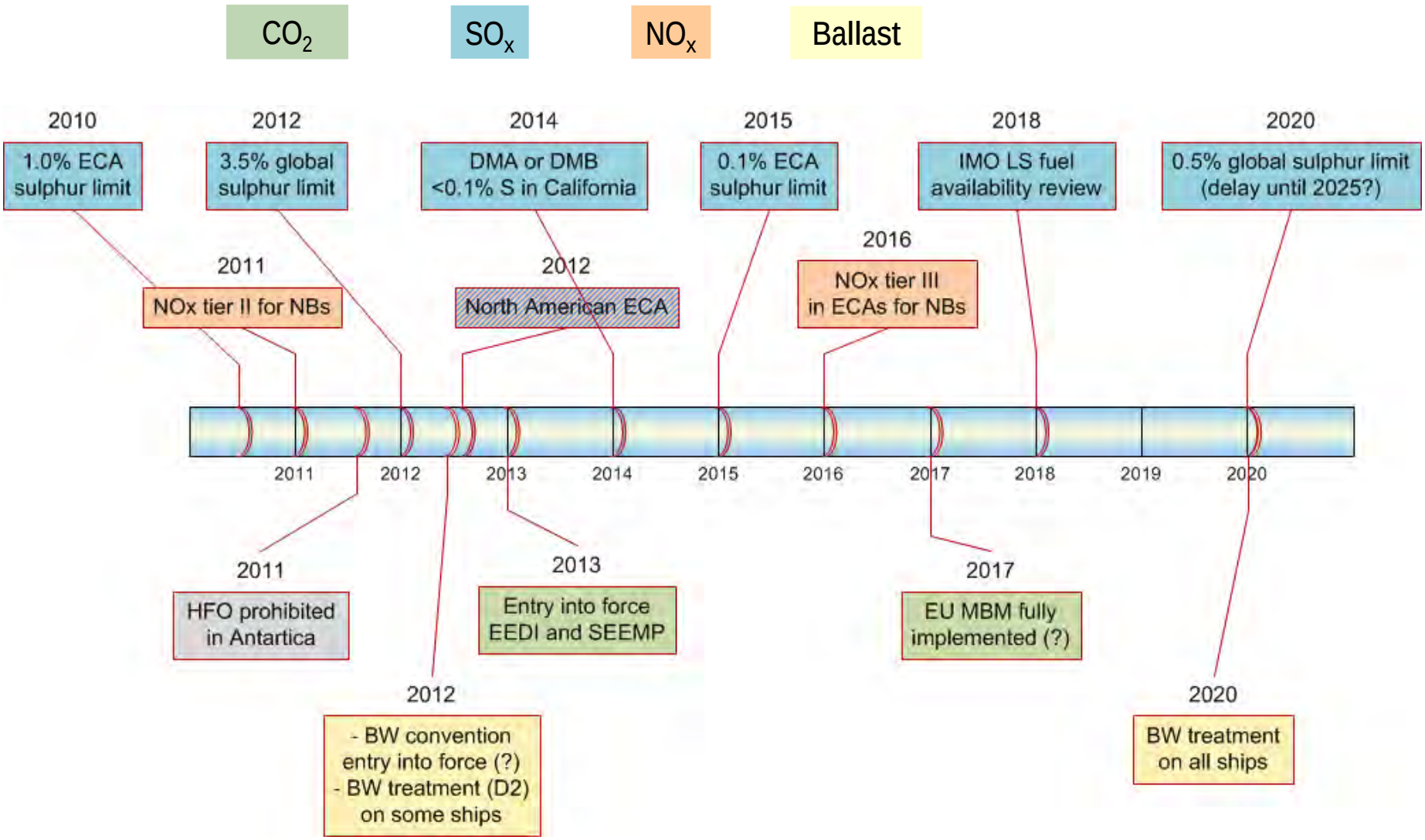
MANAGING RISK

Stakeholders

Demanding regulatory timeline



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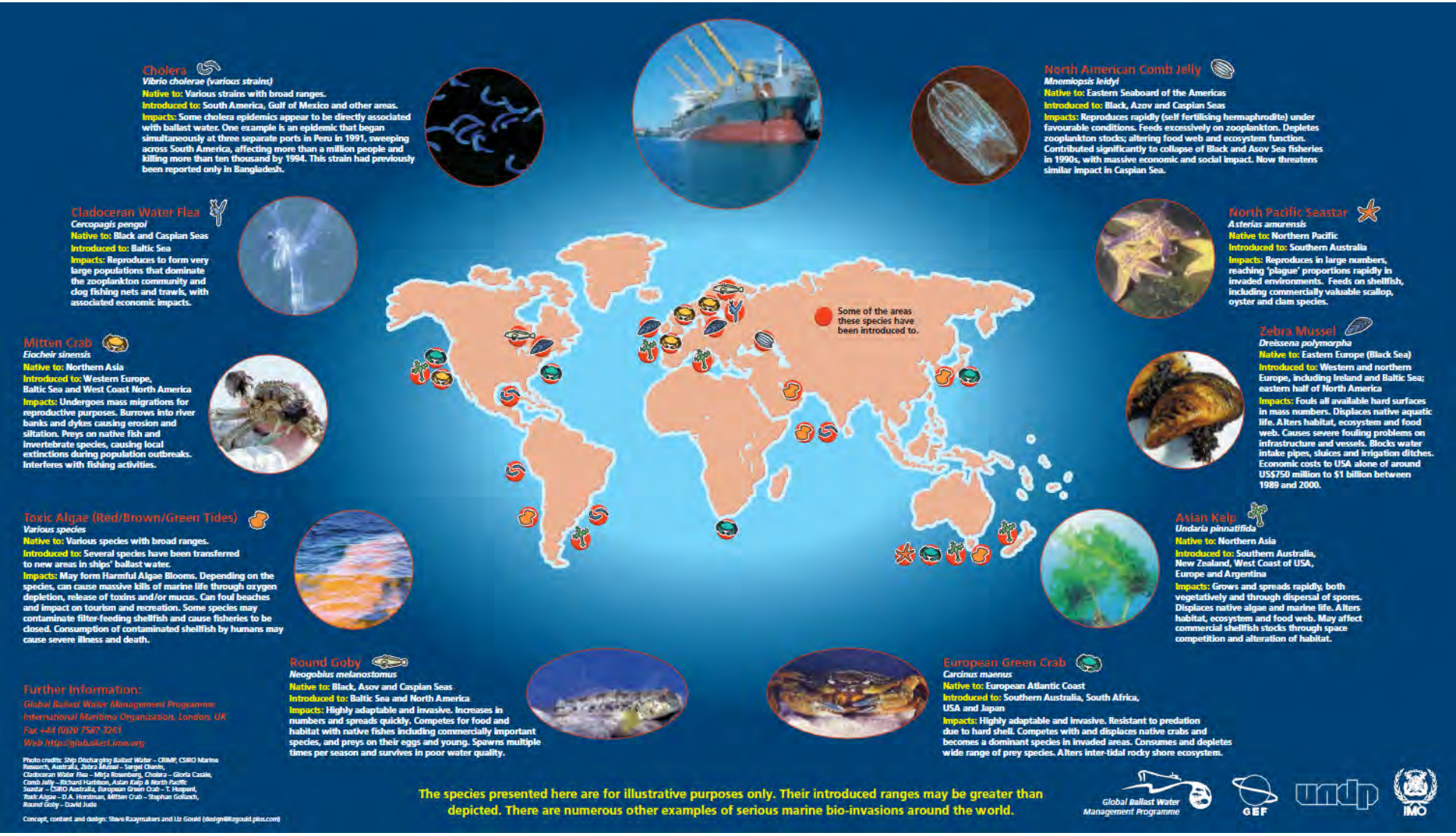
The (fuel) cost of doing business?

Ballast water

The problem

Introduction of invasive marine species by ships' ballast water
- one of the four greatest threats to the world's oceans

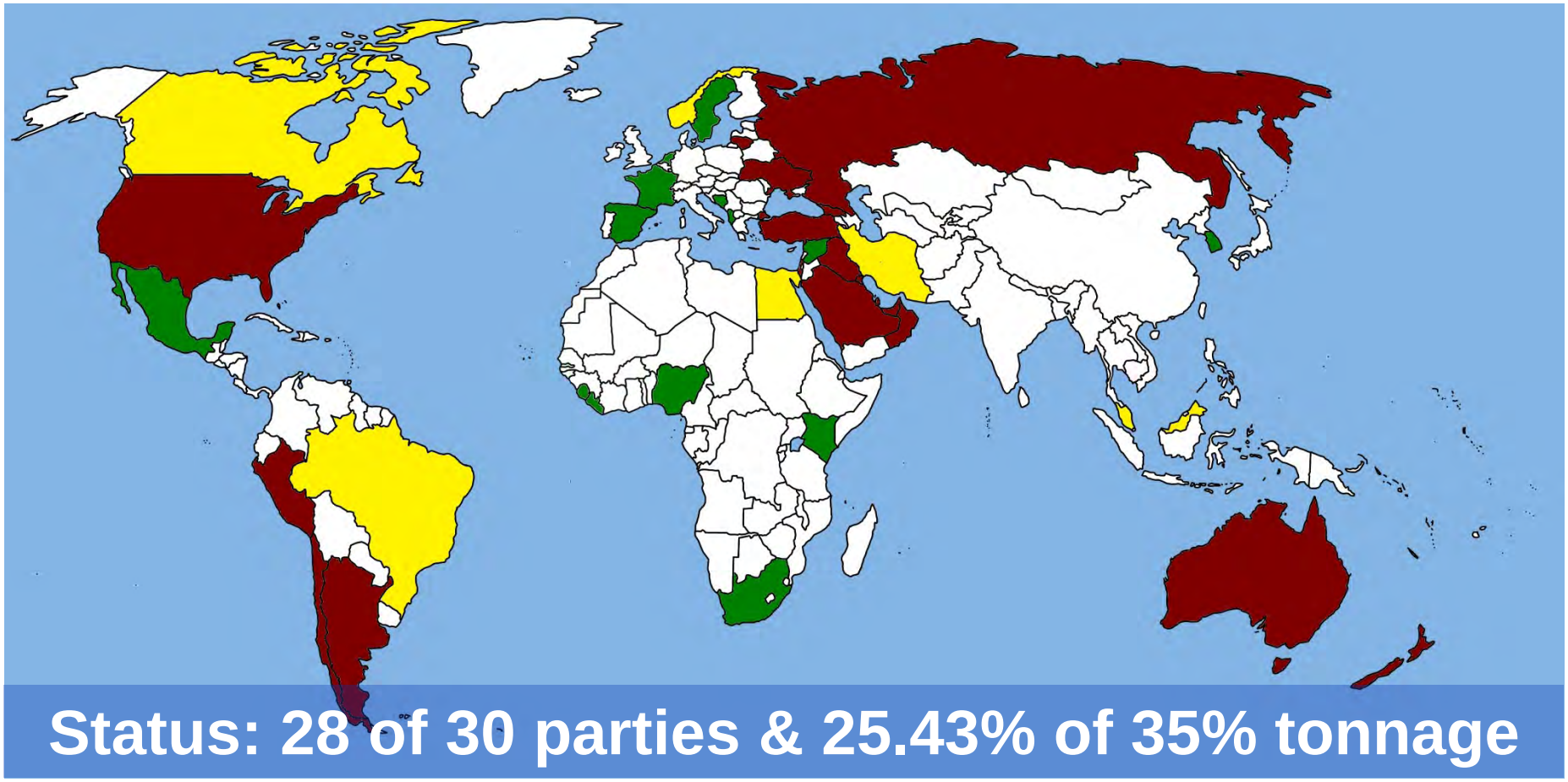


The International Response

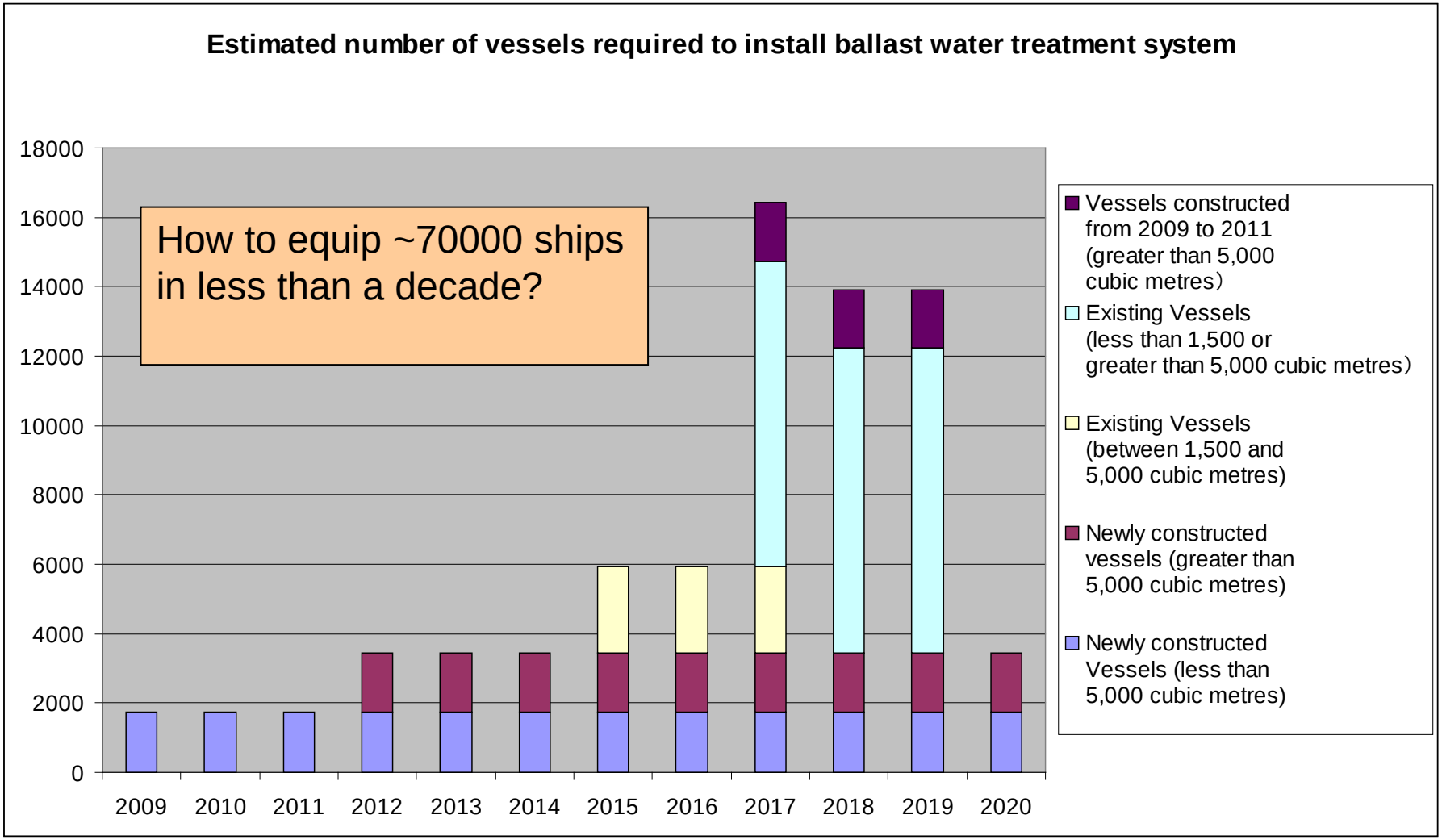
- **The Ballast Water Management Convention**
  - The Ballast Water Convention was adopted in 2004

- **Mandatory compliance for all ships and offshore structures**
  - All ships to be fitted with treatment system before the end of 2020 regardless of age and size

Ratification status; who goes next?



Treatment systems – looming bottlenecks?

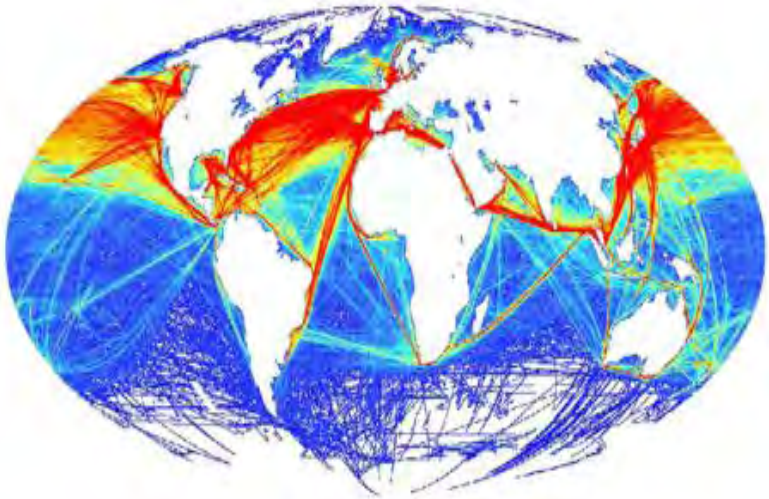


Air emissions

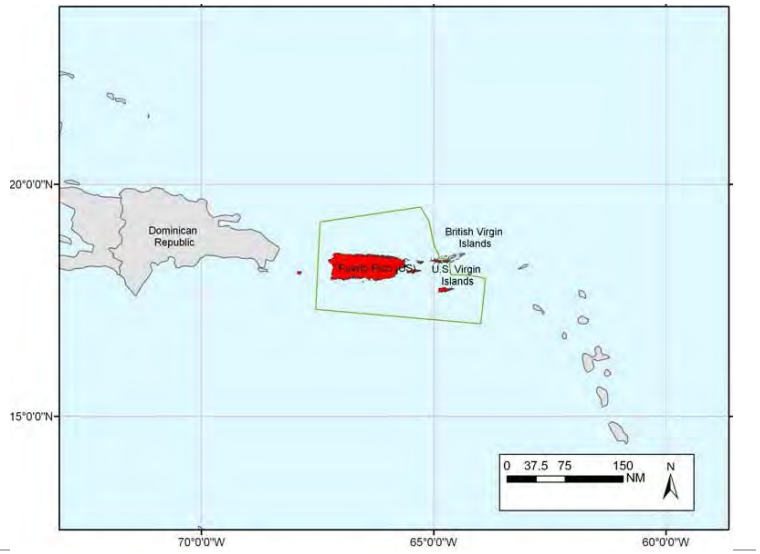
SOx, NOx, and particles

Stricter sulphur regulations

Trade patterns show global impact



Emission Control Areas – huge implications



Revised California Regulations (effective end 2011)

Requirements

Fuel Requirement	Effective Date	Percent Sulfur Content Limit
Phase I	July 1, 2009[1]	Marine gas oil (DMA) at or below 1.5% sulfur; or Marine diesel oil (DMB) at or below 0.5% sulfur
	August 1, 2012[2]	Marine gas oil (DMA) at or below 1.0% sulfur; or Marine diesel oil (DMB) at or below 0.5% sulfur
Phase II	January 1, 2014[3]	Marine gas oil (DMA) or marine diesel oil (DMB) at or below 0.1% sulfur

1 No change from the existing requirements.
2 Marine gas oil sulfur limit reduced from 1.5% to 1%. No change in marine diesel oil limit.
3 Implementation delayed from 2012 to 2014.

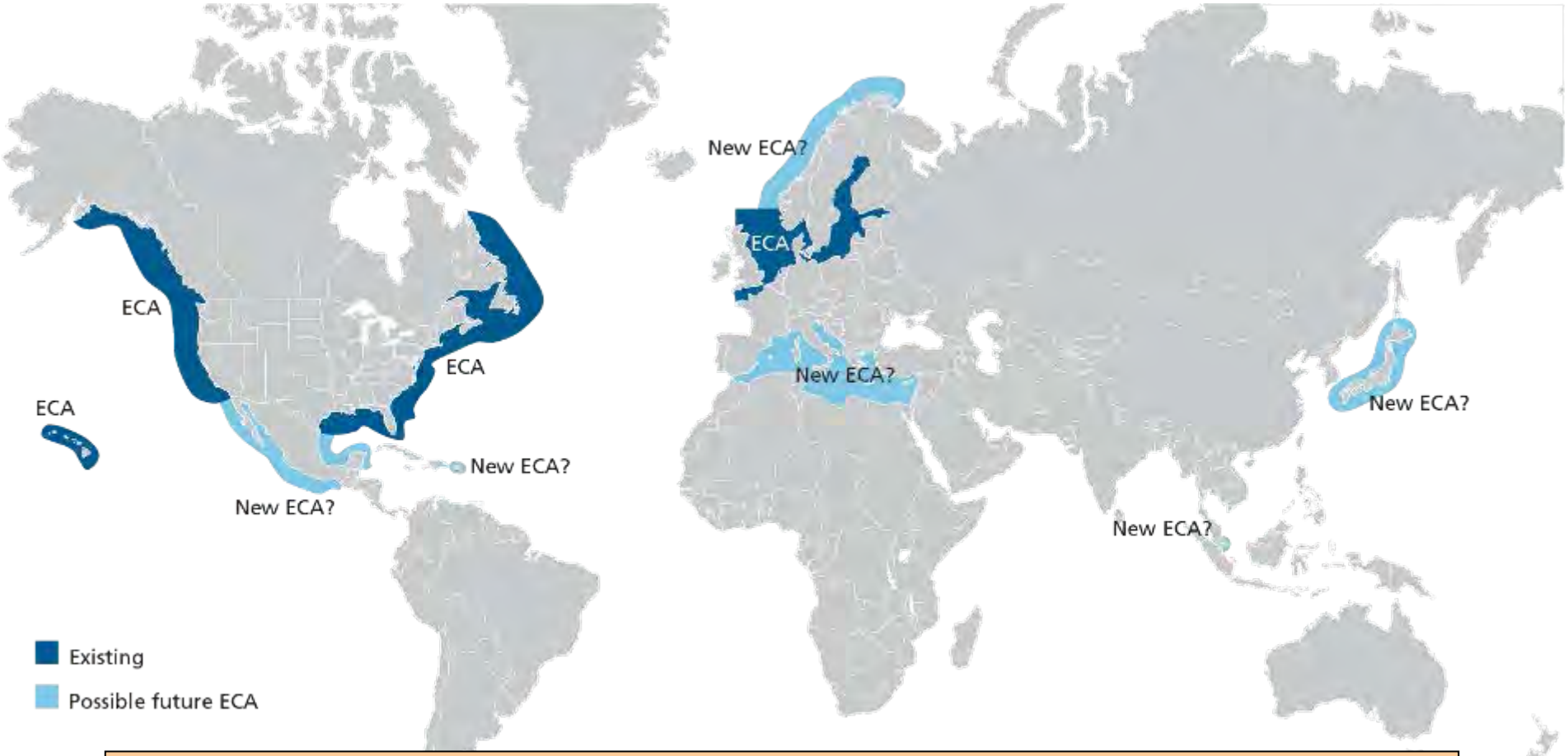
Noncompliance fee schedule

California Port Visits	Amended Per-Port Visit Fee*	Fee Prior to Amendments
1st Port Visited	$45,500	$45,500
2nd Port Visited	$45,500	$91,000
3rd Port Visited	$91,000	$136,500
4th Port Visited	$136,500	$182,000
5th or more Visits	$182,000	$227,500

* Fee halved for vessels that purchase and use compliant fuel during port visit.

CARB regulation will be superseded by MARPOL Annex VI in 2015

Future ECAs? Potential impact??



What is the right compliance strategy?

Basically 3 options on the table

1 LNG as fuel

2 Scrubbers for exhaust gas cleaning

3 Low sulphur fuel

…or fleet redeployment,
i.e. give up trading in ECAs…

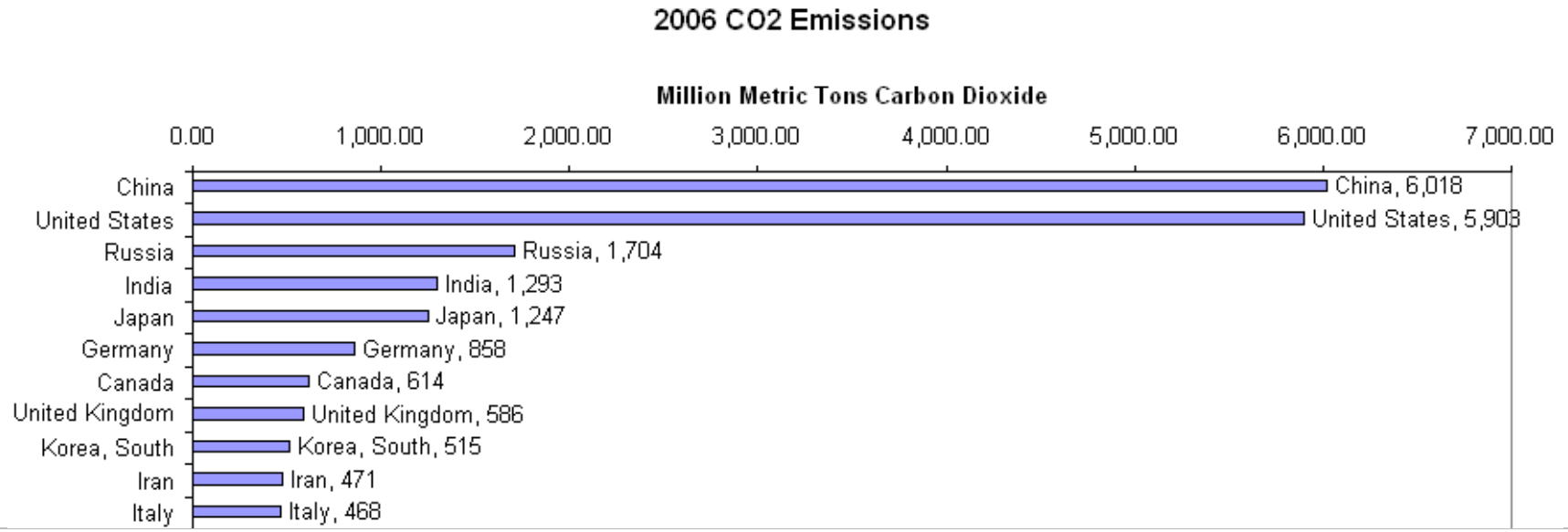
Not all issues are equally important – but the decision space is complex, and cost implications significant

- There is a lot of money at stake
  - Major investments or increased operating costs
  - Vessel second-hand value
  - Non-compliance consequences
- Different strategies have different capital needs
- Different trading patterns requires different solutions
  - Time in ECA
- Fleet characteristics/age profiles will impact decisions & solutions
  - Is selling or scrapping a viable option?
  - Repositioning?
- Contractual framework
  - Who pays for the fuel?
  - Increased fuel cost – less chance of charter?
- Fleet flexibility
  - It costs, is it worth it?
- Technology risk
  - Who wants to go first? Using what?

Air emissions
CO_2

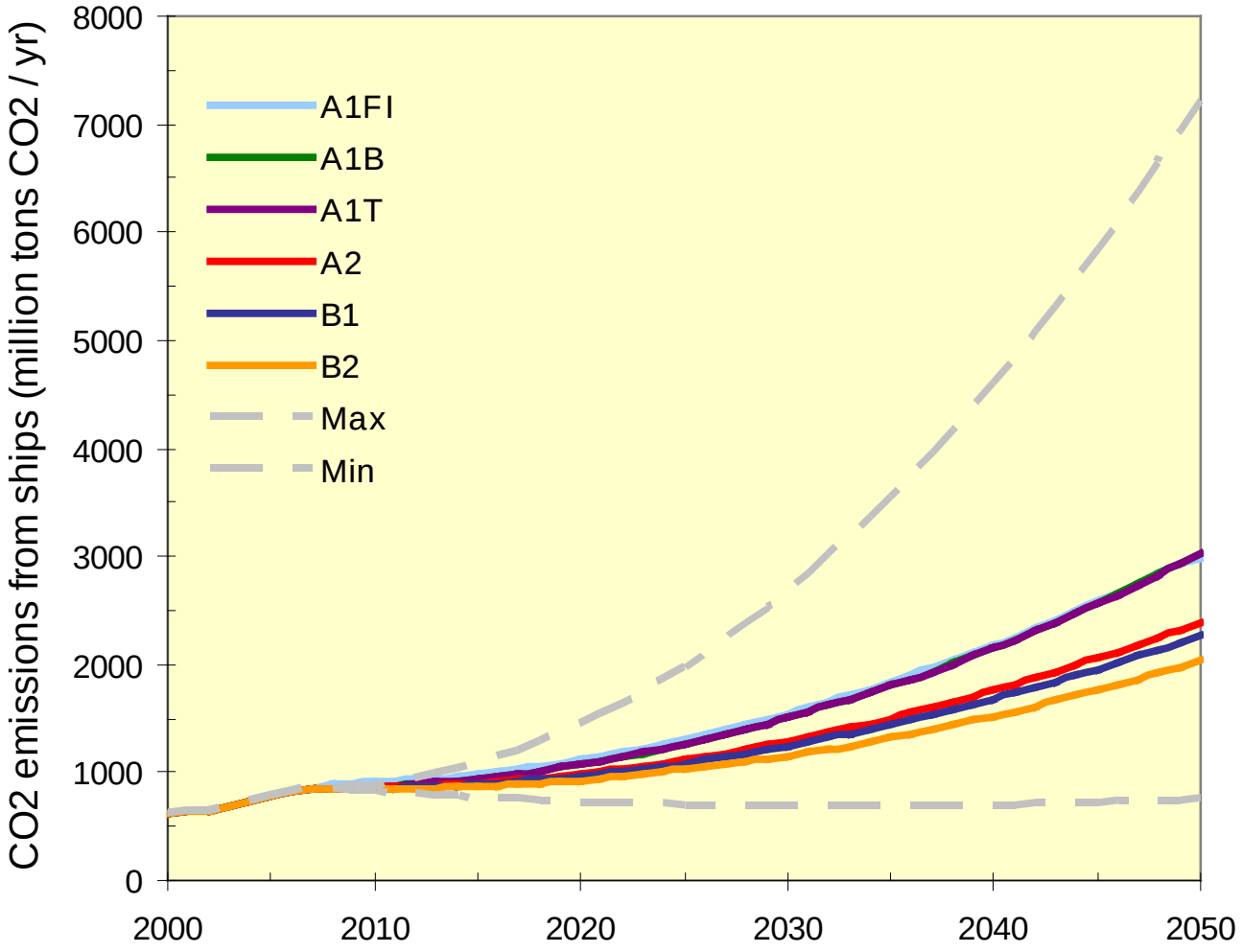
Shipping CO_2 emissions – why the world cares

- Shipping burns approx. **335 million tonnes fuel** per year… while transporting 85% of the worlds goods
- The associated emission of CO_2 is around **1 billion tonnes of CO_2** per year



Future outlook

- Economic growth **drives increased trade** and transportation
- BAU improvements in fleet efficiency expected to be **more than offset by growth**
- Emission **doubling or trebling by 2050** likely consequence
- **Unacceptable** to policymakers



Source; Second IMO GHG Study 2009; MEPC59/INF.10

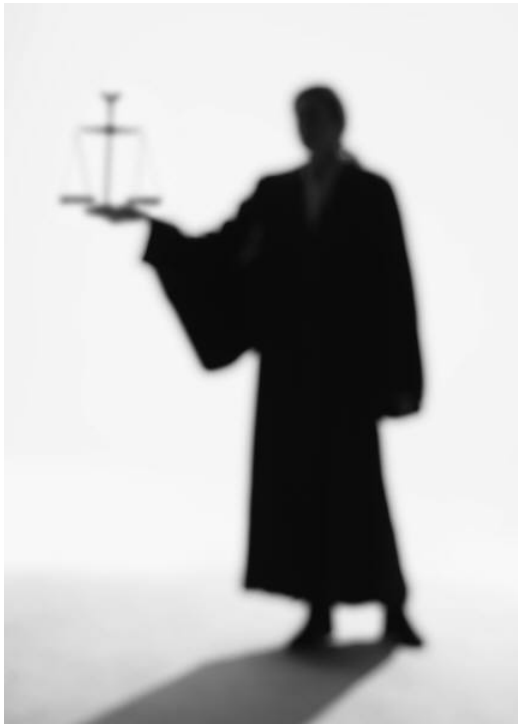
Political bodies shape global efforts to reduce shipping GHG

- **UNFCCC**. Arena for international climate negotiations. Considers shipping key source of climate change mitigation and adaptation **funding**

- **IMO**. Working to reach **industry wide, global agreements** reducing the amount of CO2 emissions from international shipping.

- **EU**. Proposes to cut shipping CO2 by **40% by 2050** when compared with 2005 levels. Working on regional regulations.

Regulatory options for shipping



- **Technical / operational measures**
  - EEDI
  - SEEMP
  - EEOI
- **Market Based Measures (MBM)**
  - cap and trade system
  - levy system
  - other approaches (several on the table)

Speed limits seeing renewed interest

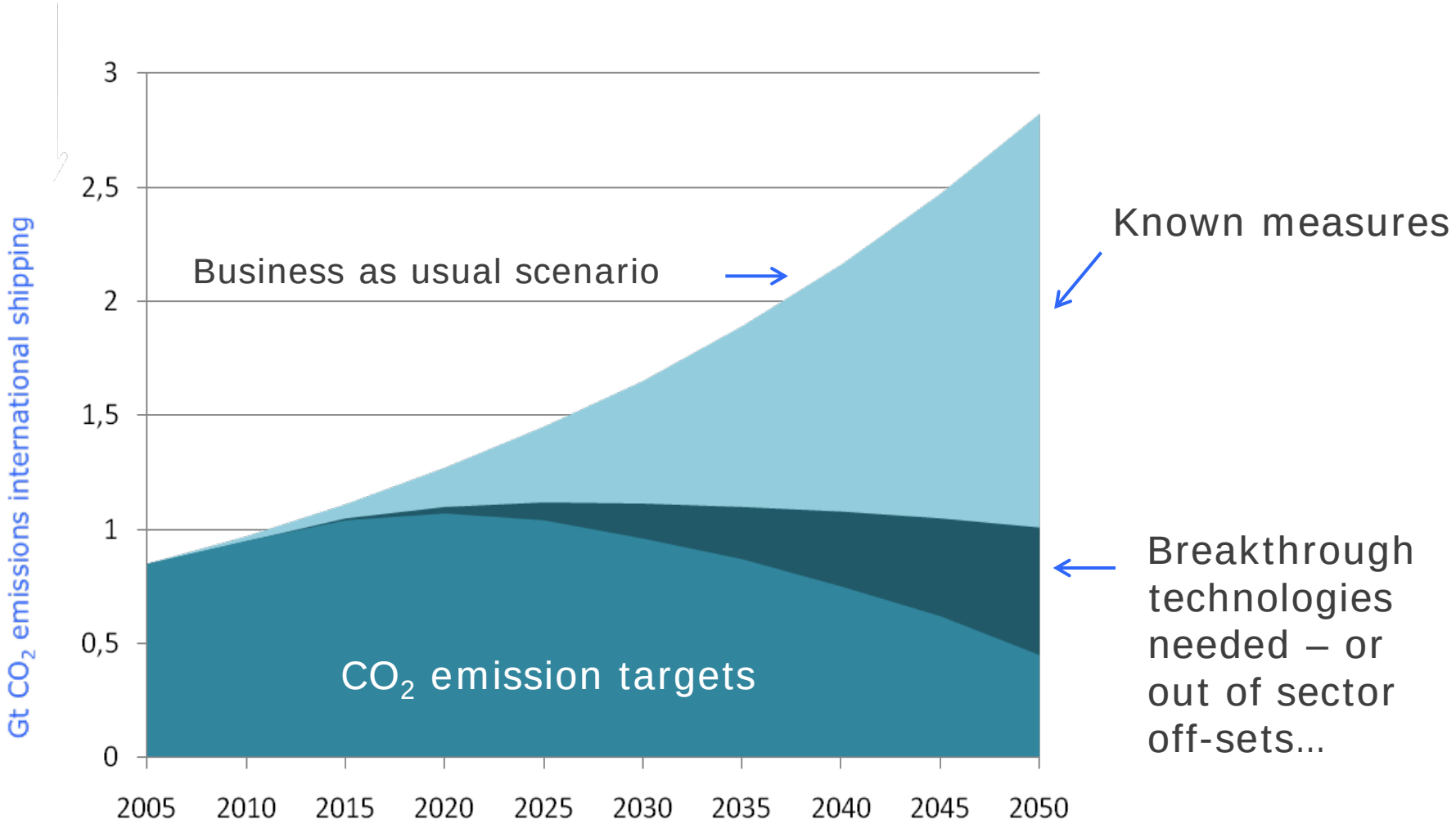
Regulations aside, what can shipping actually do?

- **More efficient operations**, e.g. weather routing, control of energy consumers onboard, speed optimising and trim
- The introduction of **more efficient technology** – both for ships in operation and for newbuildings
- **Fuel shift** from residual fuel oils, marine gasoil and diesel oil to use of natural gas; possibly other green fuels
- **Improved infrastructure**, including port turn-around times, port capacity / -logistics and size of ships
- **Improved cooperation** between players including owners/charterers, contractual issues, port integration

It's not just technology, it's also about people and their organisations

CO_2 reduction – What does it all add up to?

What is the maximum reduction achievable?



Key words for the decade