MARINE BOARD

of the

TRANSPORTATION RESEARCH BOARD

Focus Session: Paths Towards Zero Emissions Shipping Operations

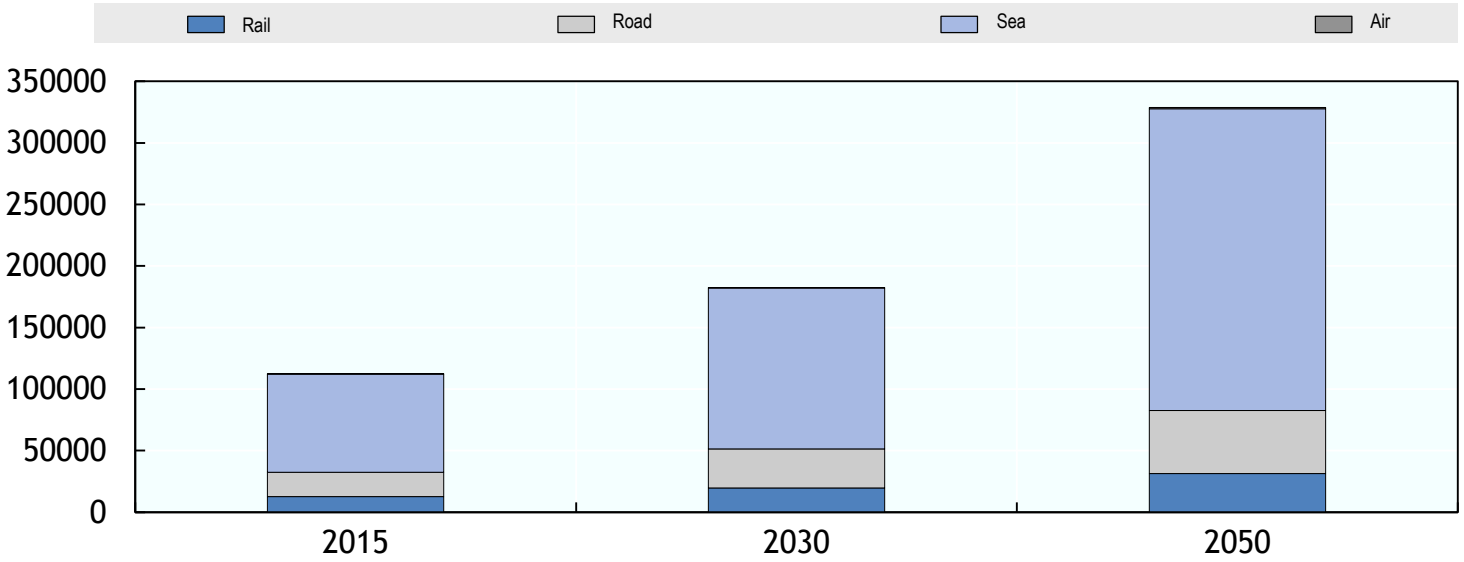
November 8, 2018

Carbon Emissions from Shipping (2011)

Bulk ships		
Small tanker (844 tonnes)	20	DEFRA
Large tanker (18,371 tonnes)	5	DEFRA
Deep-sea tanker (120,000 tonnes)	5	NTM
Small (solid) bulk vessel (1,720 tonnes)	11	DEFRA
Large (solid) bulk vessel (14,201 tonnes)	7	DEFRA
Container vessels		
Small container vessel (2,500 tonnes)	13.5	DEFRA
Larger container vessel (20000 tonnes)	11.5	DEFRA
Average deep-sea container vessel	8.4	BSR/Clean Cargo
(assuming mean 11 tonne load per TEU)		
All maritime	**14**	**TRENDS**

https://www.ecta.com/resources/Documents/Best%20Practices%20Guidelines/guideline_for_measuring_and_managing_co2.pdf

ITF Projections on Emissions Sources



Source: ITF Outlook 2017, Figure 2.7

- Global transport growth will be the greatest for shipping
- Other propulsion fuels do not deliver the cost and energy efficiency of Heavy Fuel Oil
- Regulators capping sulfur emissions to 0.5% by 2020; industry responding with scrubbers because adequate supply of LSHFO (low sulfur HFO) in doubt; scrubbers increase ocean acidification.

Fuel Options Available Do not Get Us As Far As They Need To

Fuel Option for Propulsion	CO2 Reductions
Advanced biofuels	25-100%
LNG	0-20%
Hydrogen	0-100%
Ammonia	0-100%
Fuel cells	2-20%
Electricity	0-100%
Wind	1-32%
Solar	0-12%
Nuclear	0-100%

LNG is the Bridge to 'Zero Emissions' Shipping

Barry Parker, Contributor
Barry Parker, bdp1 Consulting Ltd provides strategic and tactical support...

Source: ITF (2018). Decarbonizing maritime transport, Table 4.

Media Suggests Issues But There Are Industry Champions

Maritime CEOs rally behind IMO efforts to de-carbonise world shipping

THE maritime industry is being urged to speed up both technological and business model innovation, further improve operational and technical energy efficiency, and switch to zero-carbon fuels and new propulsion systems in an effort to achieve de-carbonisation.

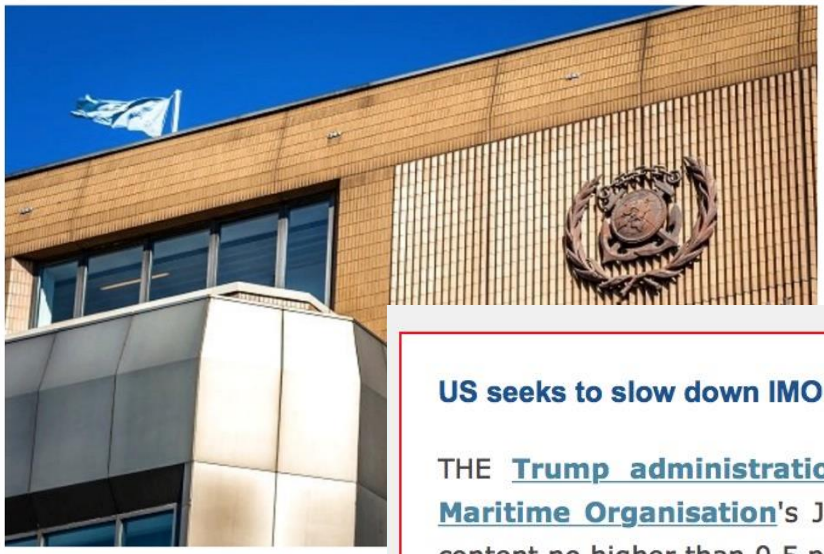
The message came as 34 CEOs and industry leaders worldwide gathered at the **Global Maritime Forum**, where they signed a call for action aimed at steering the industry towards de-carbonisation, reported London's Tanker Operator.

… but there are significant concerns about cheating, and enforcement …

U.S. Responses & Opportunities

US to Win Big from IMO 2020

11 Oct 2018 09.06am



The US is set to be the big win Maritime Organisation's upcor emission, according to comm group.

Are there outstanding research needs?

What can the Marine Board do?

US seeks to slow down IMO 2020 sulphur rule, annoying refiners

THE **Trump administration** is seeking to slow the implementation of the **International Maritime Organisation**'s January 2020 rule that ships switch to maritime fuel with a sulphur content no higher than 0.5 per cent.

The stricter sulphur cap rules are expected to push up the cost of moving everything from soybeans to Apple iPhones, with some of that cost potentially being passed on to consumers.

The move risks alienating an industry that supported US President Donald Trump, and which stands to gain from the increase in demand for cleaner-burning diesel fuel. US refineries are more sophisticated than many competitors in other parts of the world, and American companies have

Paths Towards Zero Emissions Shipping Operations

Framing Questions

- What are the current challenges you see with the implementation of a firm deadline set by the IMO for reduced SOx emissions? Will there be enough supply of low sulfur fuels, and at what cost, in the short-term (before 2020)?
- What alternate technologies or fuels will be available to move the marine industry towards a much lower or 'zero emissions' state by 2050? What are the advantages, disadvantages, and unintended consequences of the various technologies and, in your experience, what is realistic to expect (in terms of standards)?
- What is the economic impact of a 'zero criteria pollutants emissions' target in the short (before 2020), medium (before 2030) and longer term (before 2050)? What are measures you can see for reducing the negative impacts of this target?
- What do you believe will be the path forward? What is the refining industry doing to help the marine industry meet the IMO 2020 limits and ultimately move to a 'zero emissions' future? What more can be done?
- What are the key challenges faced by U.S. regulators?

Paths Towards Zero Emissions Shipping Operations

Regulator Perspective
Michael Samulski, Director, Large Marine and Aviation Center, Environmental Protection Agency (EPA)

Refiner Perspective
Bill Hutchins, Project Manager LNG Marine fuels - Americas, Shell

Domestic Operator Perspective
Ned Moran, Senior Vice President of Moran Towing Corporation

Deep Sea International Operator Perspective
John Butler, CEO, World Shipping Council