Απανθρακοποίηση της ναυτιλίας: εξελίξεις στον Διεθνή Ναυτιλιακό Οργανισμό (IMO) και την Ευρωπαική Ενωση (ΕΕ)

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Καθηγητής

Τεχνικό Πανεπιστήμιο Δανίας

Purpose

- Take stock at recent developments to decarbonize shipping
- Try to assess prospects for the future
- NOTE: Treatment is surely not encyclopedic!

Reference

- Close to 50 years of maritime R&D (MIT, NTUA, DTU)
- ≈16 years involvement in the IMO process
- ≈16 years of R&D on shipping emissions (GHG and other)

Talk overview

- Some basics
- IMO action
- EU action
- Prospects

Basics

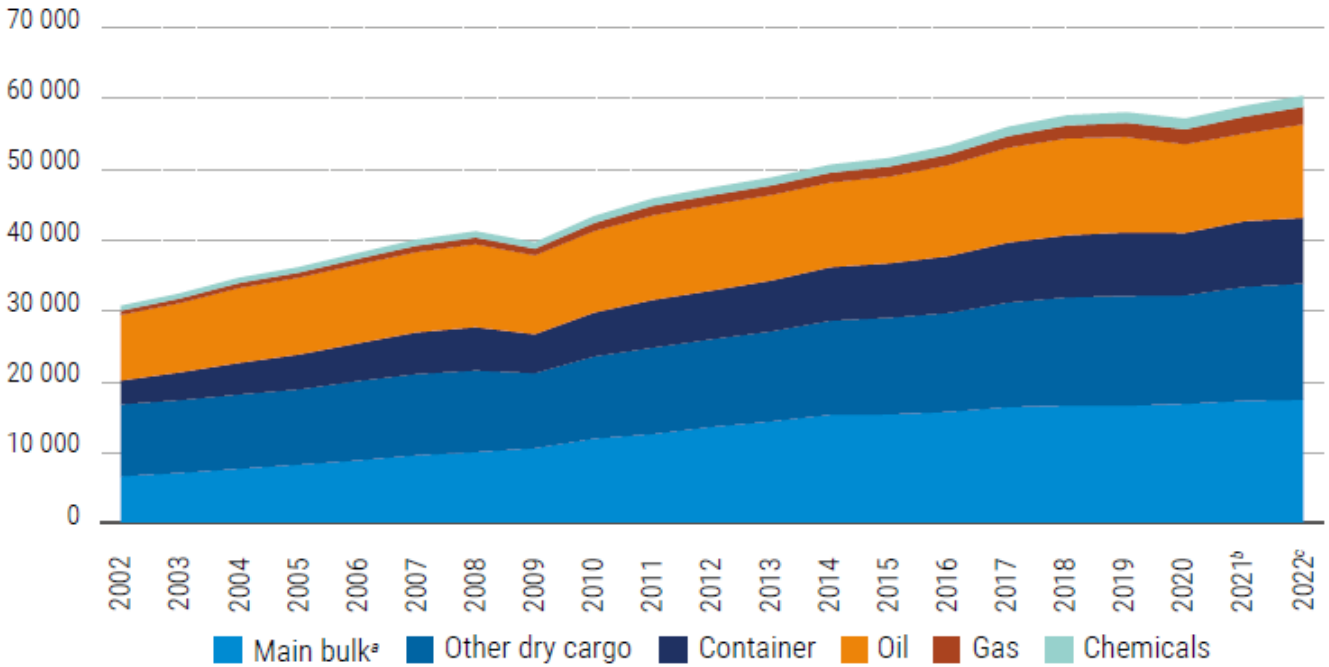
Shipping (maritime transport) carries

- ~90% of volume of world trade
- ~70% of value

Maritime trade

- Source: UNCTAD

Figure 1.2 International maritime trade, billions of cargo ton-miles, 2002–2022



Source: UNCTAD secretariat, based on estimates from Clarksons Research (Clarksons Research, 2022b).

[a] Includes iron ore, grain, coal, bauxite/alumina, and phosphate.

[b] Estimated.

[c] Forecast.

World fleet

Source: UNCTAD

Table 2.1 World fleet by principal vessel type, 2021–2022 (thousand dead-weight tons and percentage change)

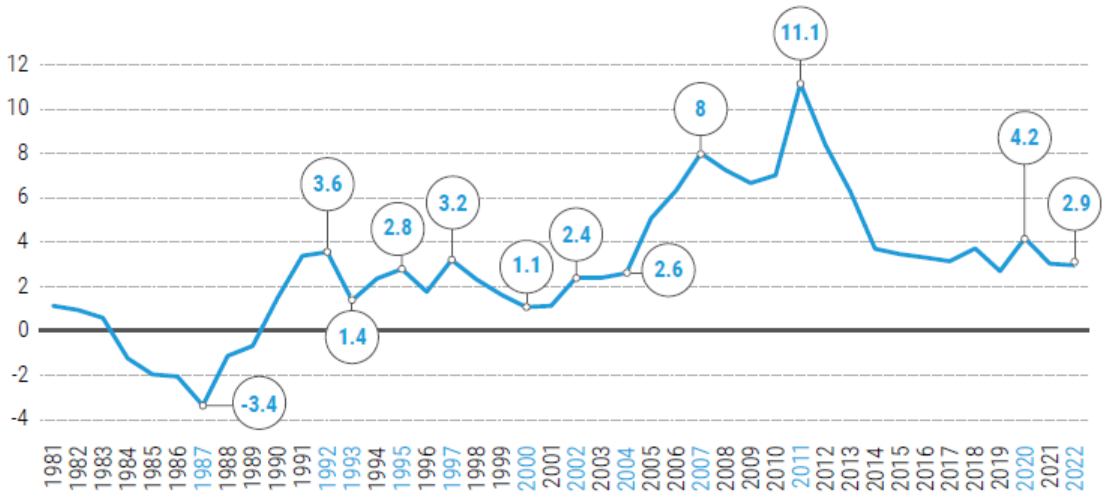
Principal types	2021	2022	Percentage change 2022 over 2021
Bulk carriers	913 175	946 135	3.61%
	42.75%	*43.02%*	
Oil tankers	619 331	629 014	1.56%
	28.99%	*28.60%*	
Container ships	281 825	293 398	4.11%
	13.19%	*13.34%*	
Other types of ships	243 949	251 742	3.19%
	11.42%	*11.45%*	
Offshore supply	83 805	84 281	0.57%
	3.92%	*3.83%*	
Liquefied gas carriers	77 458	83 770	8.15%
	3.63%	*3.81%*	
Chemical tankers	49 055	49 662	1.24%
	2.30%	*2.26%*	
Other/n.a.	25 443	25 690	0.97%
	1.19%	*1.17%*	
Ferries and passenger ships	8 188	8 340	1.85%
	0.38%	*0.38%*	
General cargo	77 910	78 819	1.17%
	3.65%	*3.58%*	
World total	**2 136 190**	**2 199 107**	**2.95%**

Source: UNCTAD calculations, based on data from Clarksons Research.

Notes: Propelled seagoing merchant vessels of 100 gross

- 2022: Total fleet of seagoing merchant vessels amounted to **102,899 ships** of 100 GT and above

Figure 2.1 Annual growth of the world fleet, 1981–2022 (percentage of dead-weight tonnage)



Source: UNCTAD calculations, based on data from Clarksons Research.

Greece: No. 1 in terms of ship ownership

Table 2.5 Ownership of the world fleet, ranked by carrying capacity in dead-weight tons, 2022, national- and foreign-flagged fleet

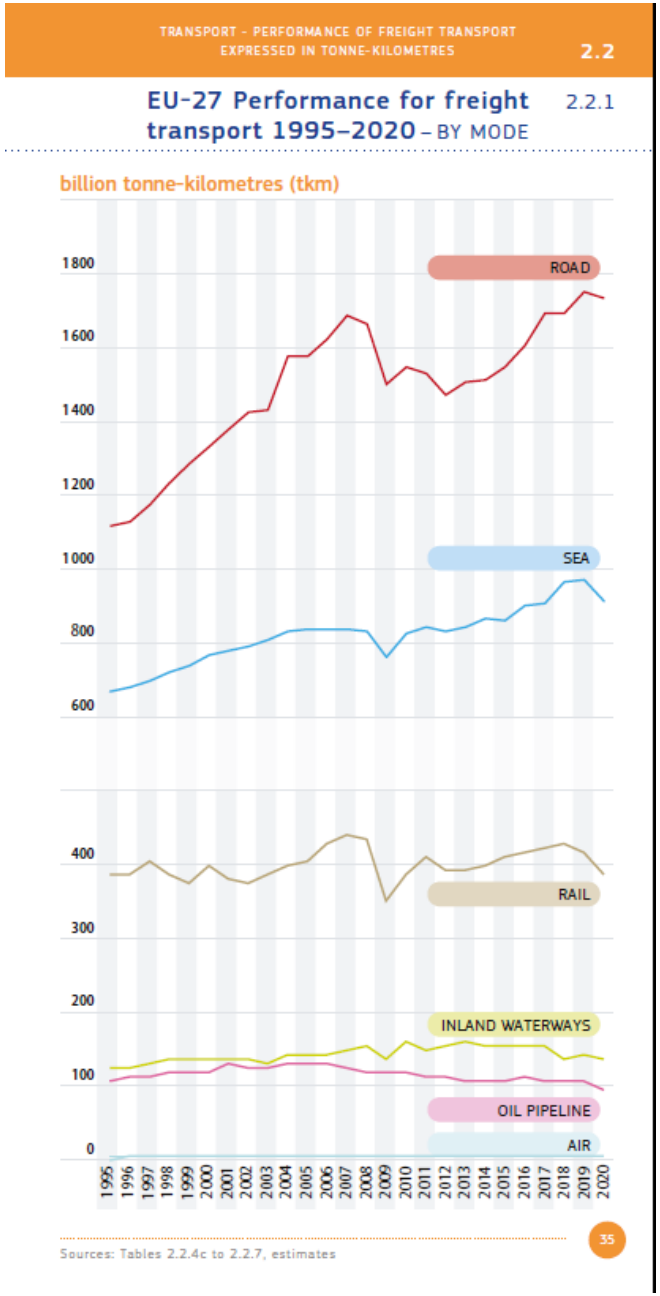
	Country or territory of ownership	Number of vessels			Deadweight tonnage				
		National flag	Foreign flag	Total	National flag	Foreign flag	Total	Foreign flag as a % of total	Total as a % of world
1	Greece	620	4 246	4 870	55 715 512	328 703 344	384 430 215	85.51	17.63
2	China	5 357	2 599	8 007	113 035 546	163 977 083	277 843 335	59.19	12.74
3	Japan	933	3 070	4 007	35 970 817	200 656 470	236 638 365	84.8	10.85
4	Singapore	1 371	1 400	2 799	67 869 137	68 312 248	136 243 709	50.16	6.25
5	Hong Kong, China	861	948	1 822	72 061 117	39 473 538	111 587 729	35.39	5.12
6	Republic of Korea	804	867	1 680	14 767 539	77 501 218	92 302 014	84	4.23
7	Germany	185	2 036	2 221	6 976 526	72 616 389	79 592 915	91.23	3.65
8	Bermuda	2	505	507	26 137	63 381 136	63 407 273	99.96	2.91
9	Norway including Svalbard and Jan Mayen Islands excluding Bouvet Island	982	1 002	1 987	18 980 244	40 945 002	59 931 039	68.33	2.75
10	United Kingdom of Great Britain and Northern Ireland including Channel Islands and Isle of Man	363	1 014	1 380	9 376 891	49 222 876	58 746 865	84	2.69
11	United States of America including Puerto Rico	774	1 001	1 783	10 193 014	44 123 048	55 113 272	81.23	2.53
12	China, Taiwan Province of	150	856	1 014	6 590 724	48 326 874	54 974 072	88	2.52
13	Denmark	414	430	844	20 484 167	20 152 955	40 637 122	49.59	1.86
14	Monaco	0	393	393	0	38 011 632	38 011 632	100	1.74
15	Switzerland	17	480	497	911 905	29 975 783	30 887 688	97.05	1.42
16	Türkiye	406	1 175	1 583	5 768 553	24 653 060	30 433 830	81.04	1.4
17	Belgium	99	244	343	9 141 427	20 304 520	29 445 947	68.96	1.35
18	Indonesia	2 283	121	2 411	24 763 544	4 050 071	29 065 796	14.06	1.33
19	United Arab Emirates	124	954	1 087	631 741	26 597 771	27 363 741	97.68	1.26
20	India	874	197	1 076	16 165 552	9 302 885	25 979 620	36.53	1.19

Source: UNCTAD

EU-27

MARITIME TRANSPORT

- ~90% of EU's external trade
- ~30% of EU's internal trade



Intra EU-27 freight by transport mode

Source: EU Statistical Pocketbook 2022

GROWTH 1995-2020

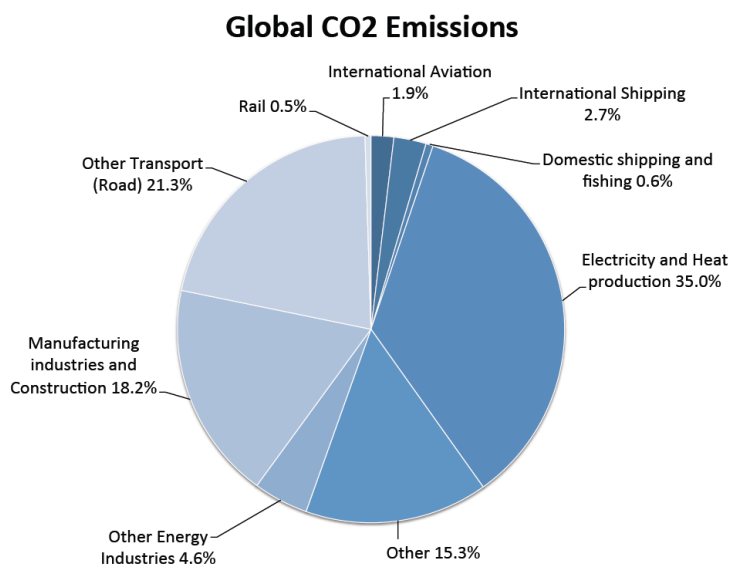
- AIR 45.4%
- ROAD 54.8%
- SEA 36.6%
- INLAND NAV. 14.6%
- RAIL 0.7%

GHG emissions from shipping

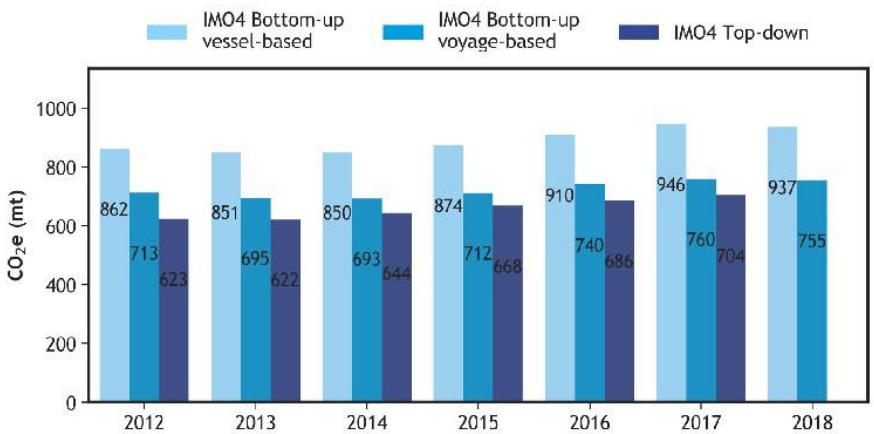
GHGs:

- CO_2
- CH_4
- N_2O

- ~3% (road: ~20%)

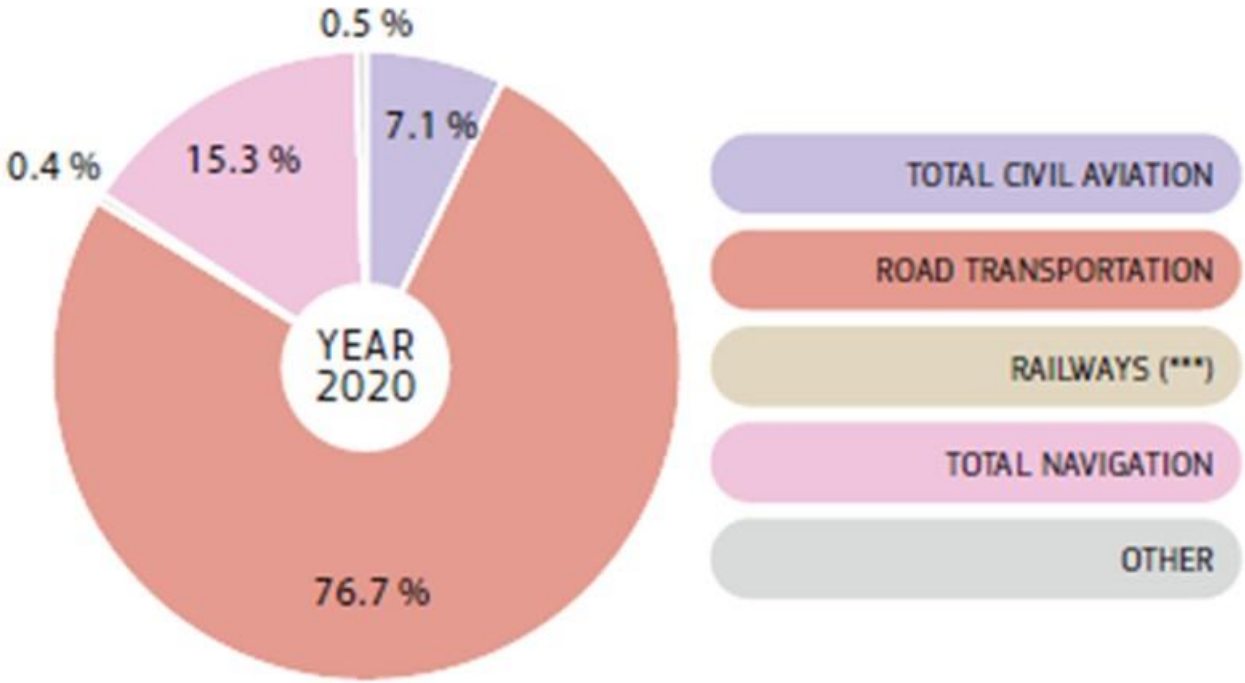


- ~ 1 billion tonnes a year



Source: various IMO GHG studies

EU 27- GHG emissions from transport



Source: EU Statistical Pocketbook 2022

What is the IMO?

International Maritime Organization

- A specialized UN agency, based in London, which is tasked to regulate shipping

- **Marine Environment Protection Committee (MEPC):** the IMO Committee tasked to regulate matters pertaining to the environmental performance of shipping

MEPC 80

- The 80th session of MEPC
- July 3-7, 2023 (last week!)

- Historic MEPC meeting, in terms of deciding how to proceed on GHGs

APRIL 2018

MEPC 73: Initial IMO strategy

CENTRAL AMBITION

- **Reduce annual GHG emissions by ≥ 50% by 2050** (vs 2008 levels)
- **Reduce annual CO2 emissions per transport work by ≥ 40% by 2030**, pursuing efforts towards **70%** by 2050 (vs 2008 levels)

Which countries opposed it?

Which countries opposed it?

MEPC 80 (last week) decided

- To reset the 2050 GHG target to **net zero**
- The process to reach the new target

Lloyd's List

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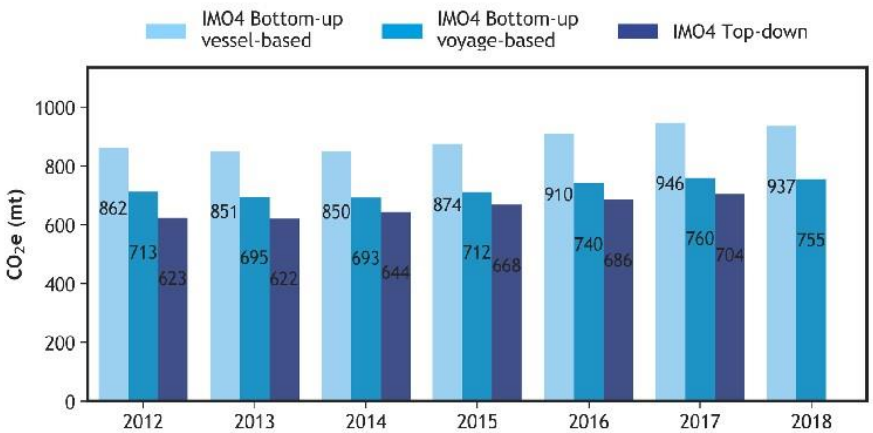
EMAIL

The IMO must show leadership on carbon emissions or face irrelevance

Another fudged consensus from MEPC80 is just not good enough. The unequivocal minimum yardstick must be net zero by 2050, with binding reductions by specified dates providing the necessary waymarkers

Disturbing GHG trend

4th IMO GHG study 2020



- CO_2 equivalent emissions **have increased** from 977 million tonnes in 2012 to 1,076 million tonnes in 2018 (a 9.6% increase).

QUESTIONS

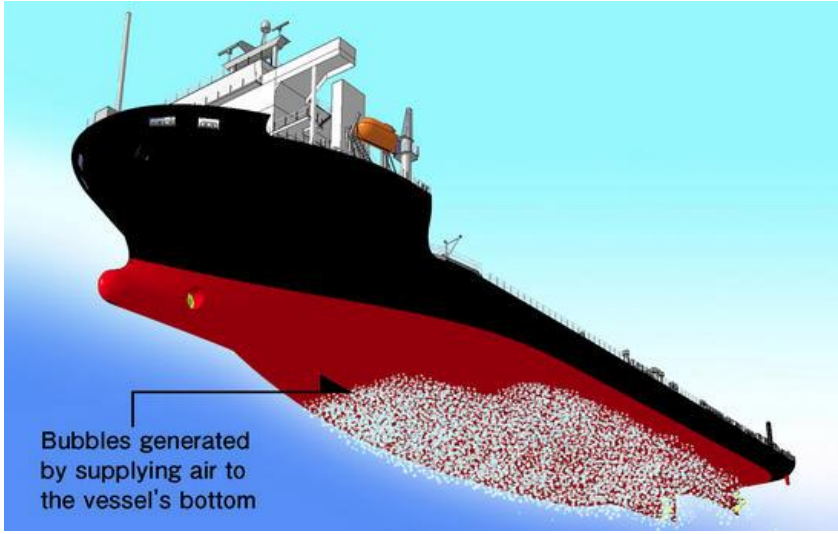
- What to do to reverse the trend?
- What to do to reach the 2050 50% reduction target? (let alone go all the way to zero)

Measures contemplated

- Technological
  - More efficient (energy-saving) engines
  - More efficient ship designs
  - More efficient propellers
  - Carbon capture and storage
  - Alternative low or zero carbon fuels
  - Energy recuperation devices
  - “Cold ironing” in ports

- Logistics-based
  - Speed reduction
  - Optimized routing
  - Several others

- Market-based
  - Emissions Trading System (ETS)
  - Carbon Tax/Levy on Fuel
  - Several others



- Alternative, low or zero carbon fuels
- Electric propulsion
- Etc

Market based measures (MBMs)

- Included under **medium term measures.**
- But only **OBLIQUELY:**

.3 new/innovative emission reduction mechanism(s), possibly including Market-based Measures (MBMs), to incentivize GHG emission reduction;

How does an MBM work?

- It applies the “polluter pays” principle by internalizing the external costs of GHG emissions
- It induces operators and investors to adopt measures that will reduce GHG emissions

- These measures can be
  - **Logistics-based** (short run) or
  - **Technological** (long run)

‘Logistics based’ MBM example

- Impose a Levy on fuel
- Induces ships to slow steam
- CO2 is a non-linear function of speed
- Slow steaming will reduce CO2 emissions

‘Technological’ MBM example

- An MBM will induce a ship owner to buy an energy efficient ship, or a ship that uses low or zero carbon fuels
- Better do this than pay the MBM
- MBM can bridge the fuel price gap and incentivize the use of alternative fuels

MBMs: not new at the IMO

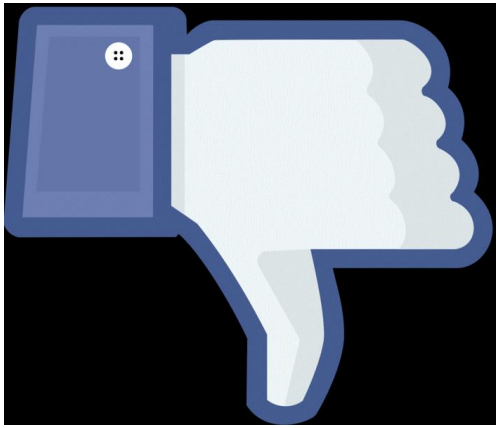
Prior IMO history (2010- 2013)

- 11 MBM proposals at MEPC 60 (March 2010)
- Expert Group formed by IMO Sec. General
- Feasibility study (300-page report)
- Work: May- August 2010
- Report presented at MEPC 61 (Sep. 2010)
- **NO PREFERENCE FOR AN MBM**
- Various discussions since then

And after many discussions…

- In 2013

- MBM discussion was suspended !



MBM discussion restarted

- MEPC 79 (December 2022)
- MEPC 80 (July 2023)

- Many delegations supported a levy
- EU-27+ EC: fuel standard + levy

For and against a levy

For a levy

- Pacific island states (Marshall Islands, Solomon Islands, Fiji, Tuvalu, Vanuatu, etc)
- EU-27
- Japan
- International Chamber of Shipping
- Other shipping associations

Against a levy

- China, India, Saudi Arabia, Russia, South Africa, Brazil, Argentina
- Other South American countries
- Norway (is for ETS)
- USA (not in favor of any economic measure)

NO CONSENSUS YET

Enter the EU!

- Upon taking office (summer 2019), the new European Commission President Ursula von der Leyen said that she wants shipping into the **EU ETS**

Enter the EU!

- Upon taking office (summer 2019), the new European Commission President Ursula von der Leyen said that she wants shipping into the **EU ETS**
- **This is the elephant in the IMO room**

- Sept. 2020

Parliament wants a 40% reduction in CO2 emissions from the shipping industry by 2030© Kara/Adobe Stock

To decarbonise maritime transport, Parliament voted to include CO2 emissions from the sector in the EU Emissions Trading System.

On Wednesday, Parliament adopted its position on the Commission's proposal to revise the EU system for monitoring, reporting and verifying CO2 emissions from maritime transport (the "EU MRV Regulation") with 520 votes to 94 and 77 abstentions.

July 2021: proposal for a Directive

- (581 pages)

EUROPEAN
COMMISSION

Brussels, 14.7.2021
COM(2021) 551 final

2021/0211 (COD)

Proposal for a

DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757

EU ETS for shipping

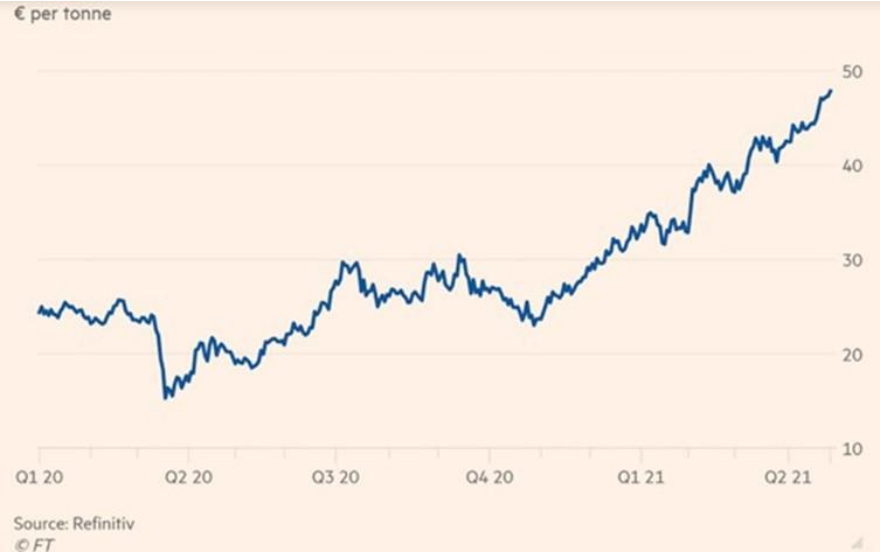
- The inclusion would involve:
  - 100% of CO2 emissions from all intra-EU trips
  - 100% of CO2 emissions in EU ports
  - 50% of CO2 emissions from trips between non-EU and EU ports

- CO2 emissions allowances would be purchased at EU carbon prices
- Phase-in period 2024-2026
- Extends to other GHGs as of 2026

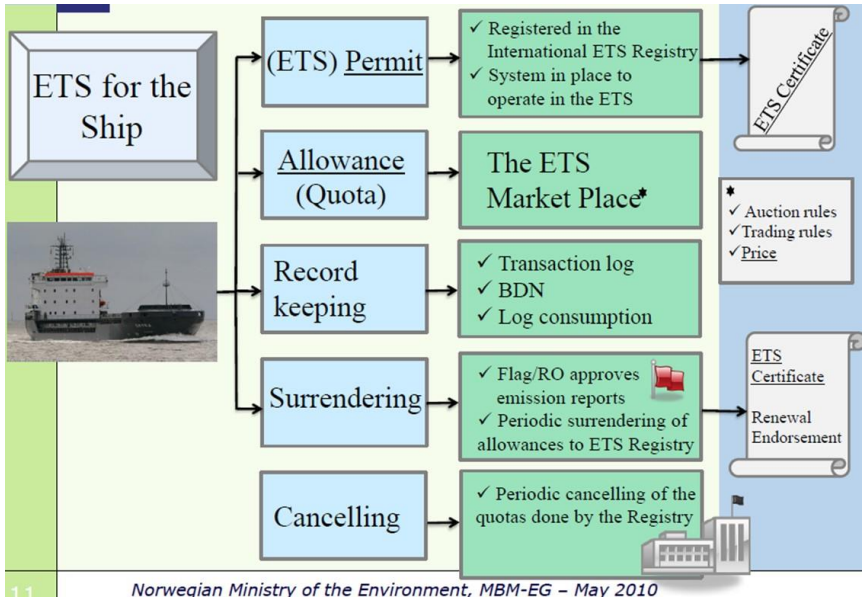
Main ETS challenges

Price uncertainty

- EU carbon price. Source: FT



Administrative burden



July 2021 ii: proposal for a Regulation

- (247 pages)

Enter FuelEU Maritime!

EUROPEAN COMMISSION

Brussels, 14.7.2021
COM(2021) 562 final

2021/0210 (COD)

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on the use of renewable and low-carbon fuels in maritime transport and amending Directive 2009/16/EC

(Text with EEA relevance)

{SEC(2021) 562 final} - {SWD(2021) 635 final} - {SWD(2021) 636 final}

FuelEU Maritime

- A parallel instrument to EU ETS

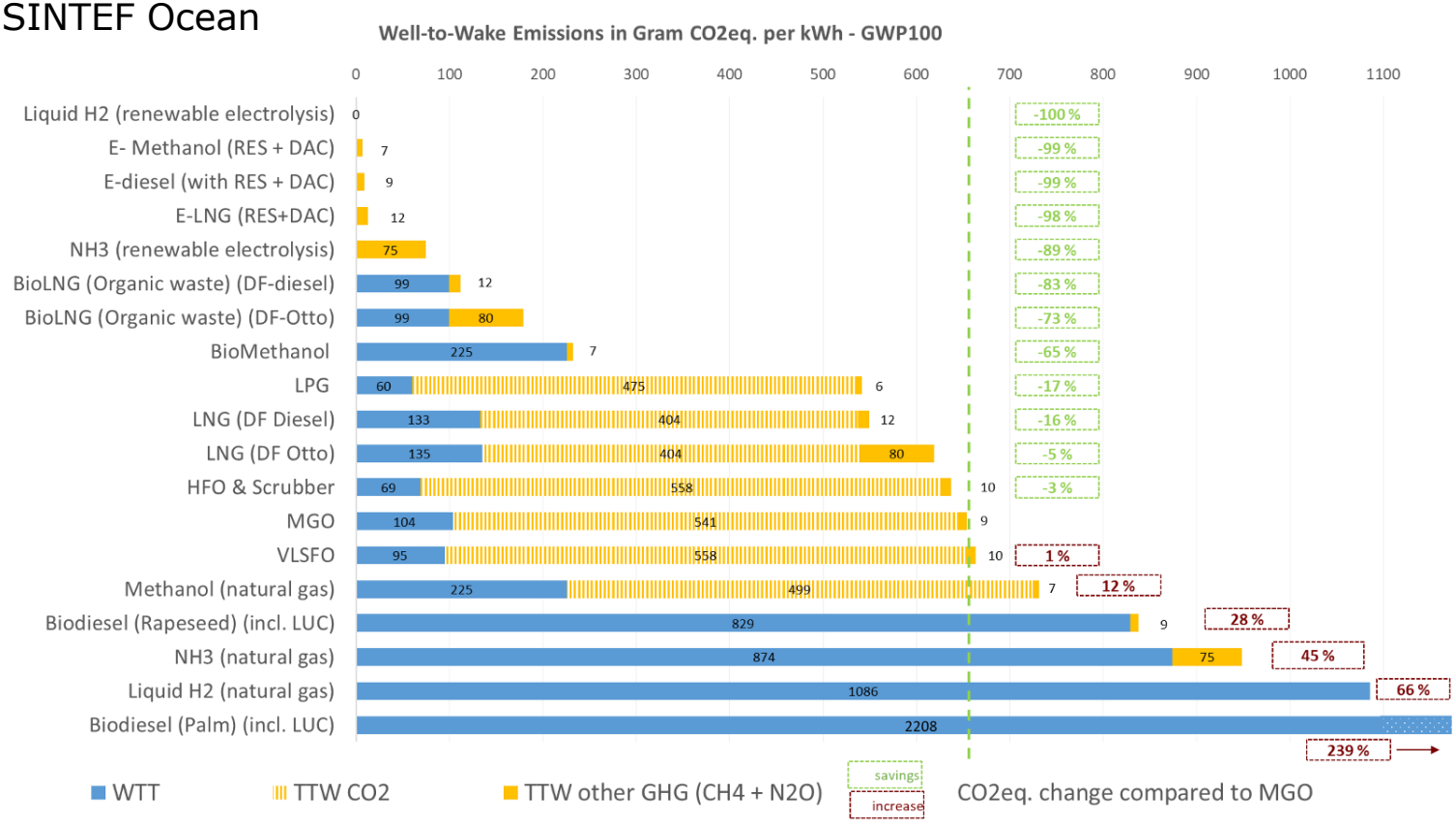
- Aims to increase the use of sustainable alternative fuels in European shipping and ports by addressing:
  - market barriers that hamper their use
  - uncertainty about which technical options are market-ready
- Is based on a **Well To Wake** approach
- Not limited to CO2, includes all GHGs

Upstream emissions

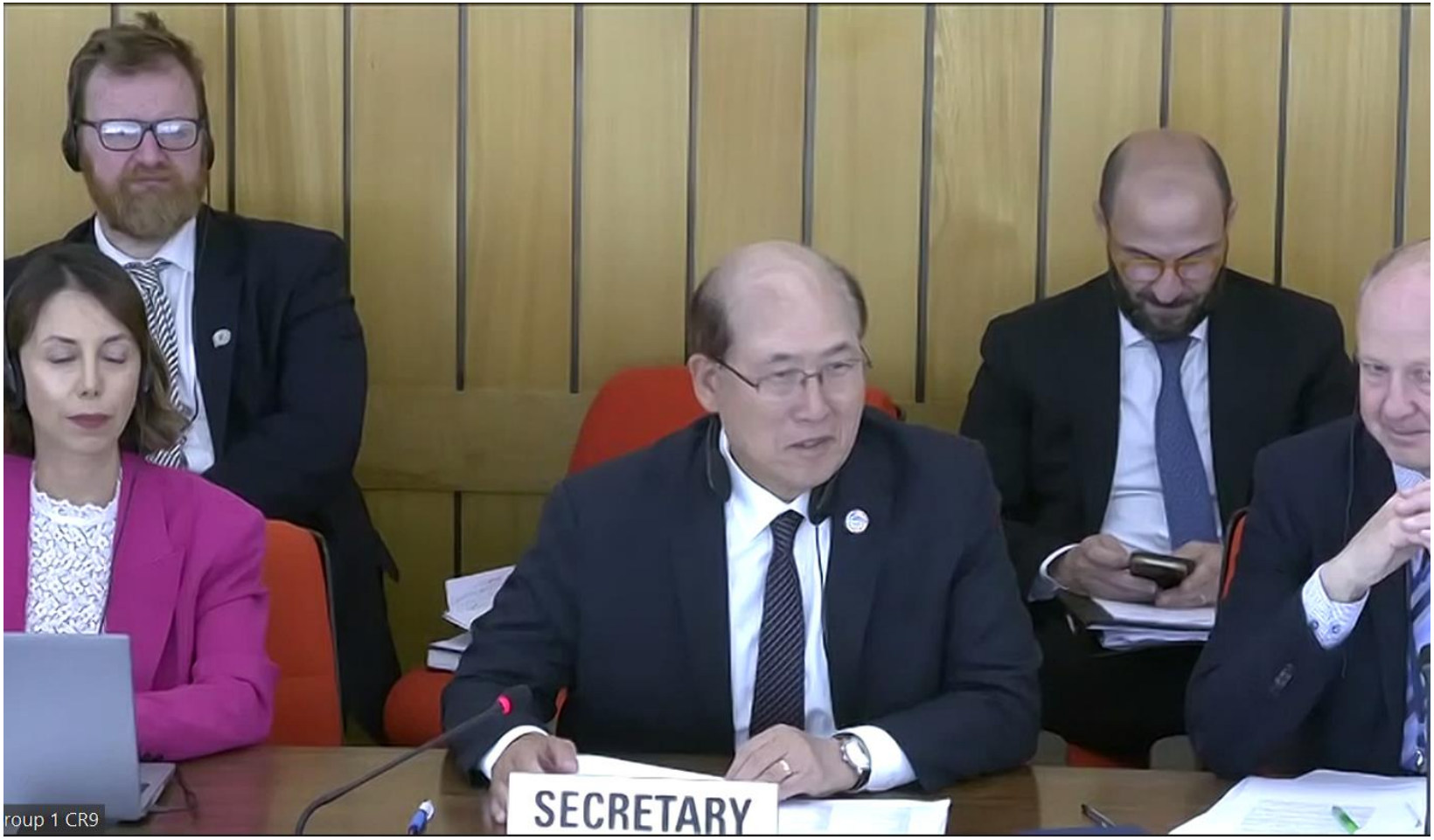
Operational emissions

Well to Tank vs Tank to Wake

- Source: SINTEF Ocean



MEPC 80 last week



Last week's headlines

- Tradewinds

IMO forges 'wish and a prayer' carbon deal as greens bemoan checkpoint targets

China, Brazil and Argentina push back against targets in line with Paris Agreement

Prospects

- Wide divergence of views
  - ❖ Many support a levy or variant
  - ❖ But some others disagree
- Interface IMO-EU: ????

- ALL IN ALL: Road to full decarbonization foreseen to be long

Our papers (sample)

- Bektas, T., Ehmke, J. F., Psaraftis, H.N., Puchinger, J., 2018, The role of operational research in green freight transportation, European Journal of Operational Research, doi.org/10.1016/j.ejor.2018.06.001.
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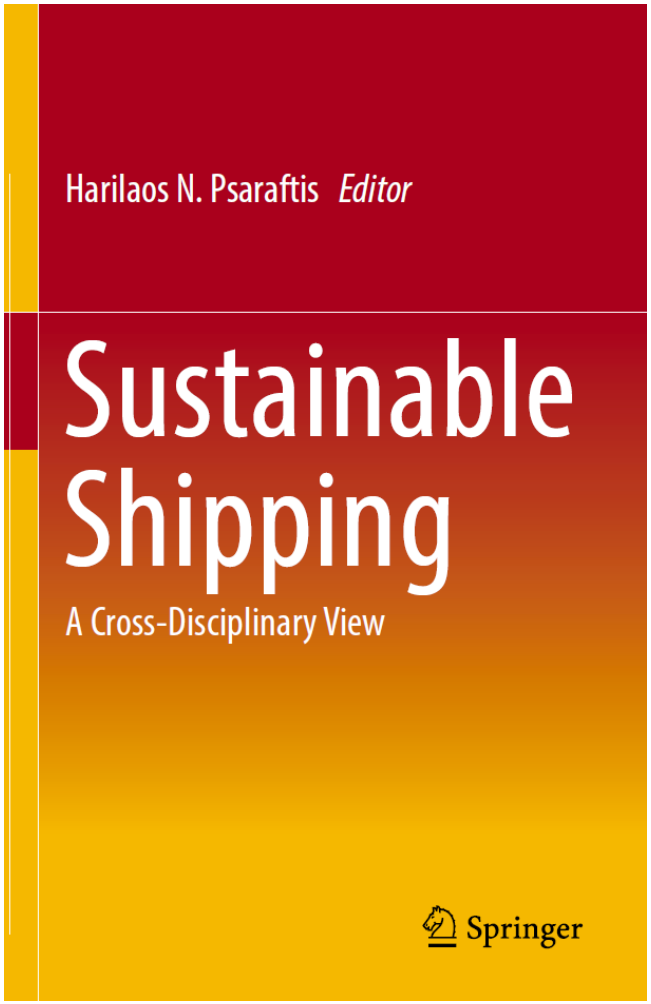
2019 book



THANK YOU

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