



**TAL  
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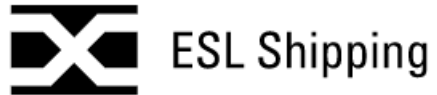
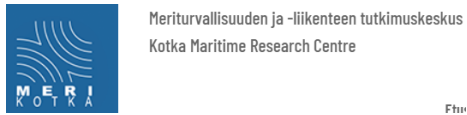
ESTONIAN MARITIME  
ACADEMY

# **FUTURE SHIPPING AND MARITIME DECARBONIZATION**

Tenured Associate Professor Ulla Tapaninen  
Estonian Maritime Academy  
Tallinn University of Technology

18.11.2022

# ULLA TAPANINEN



- She has experience in three different fields of expertise related to maritime field: **academic, business and public administration.**
- PhD from **Helsinki University of Technology** (later Aalto University) 1997
- Professor of maritime logistics in **University of Turku** 2005 -2012, Centre for Maritime studies. Adjunct Professor/Docent of maritime economics and logistics of University of Turku since 2010
- Key positions in two Finnish shipping companies: a development and environmental manager in **Finnlines** (1996-2005) and member of board in **ESL Shipping** (2012 - ).
- **City of Helsinki**, various positions related to transport, logistics, port operations (2012-2021).
- Tallinn University of Technology, **Estonian Maritime Academy**, tenured associate professor, maritime transport (2021-).
- She has carried out dozens of research projects in academic, business and public administration, published dozens of academic journal articles, written several text books, is keen writer of blogs and invited speaker in seminars.
- She is also particularly well connected to Finnish and European maritime field, European Union, academies and business sector.



# TALLINN UNIVERSITY OF TECHNOLOGY 2021

**10,024**  
students

**13.5%** International students  
from **99** different countries

**80** study programmes

**6** joint programmes

**31** international programmes

**1,897**  
employees

from **64** countries

**45.2** average age

**147** professors

**1,382**  
publications

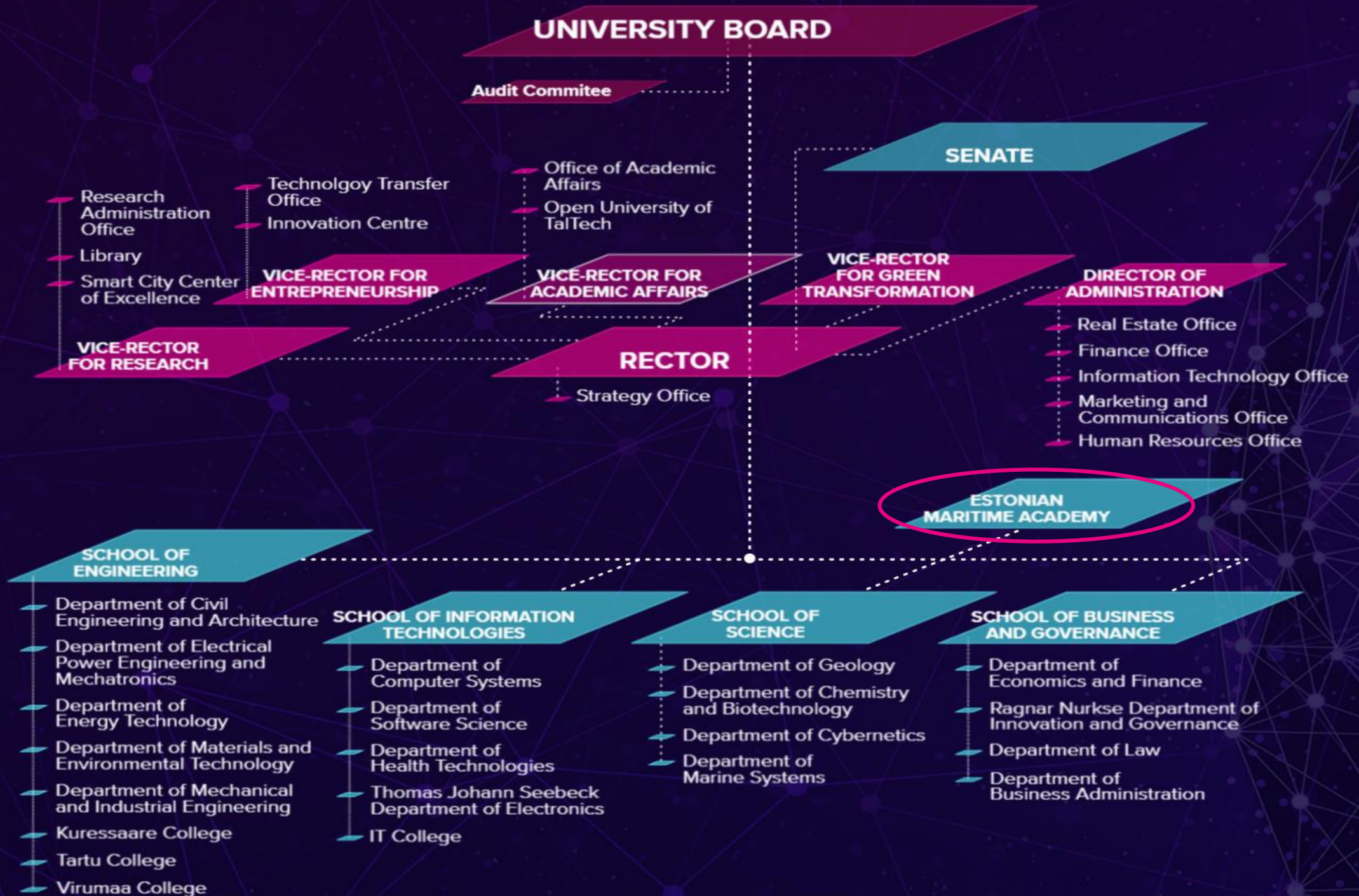
**55** PhD degrees awarded

**38.8%** international PhD students

**74,709**  
alumni

**3.3%** international alumni







# ESTONIAN MARITIME ACADEMY

## Research areas:

Maritime transport

Maritime cybersecurity

Blue economy and aquatic resources

Marine technology

Waterway safety management

Navigation safety and security



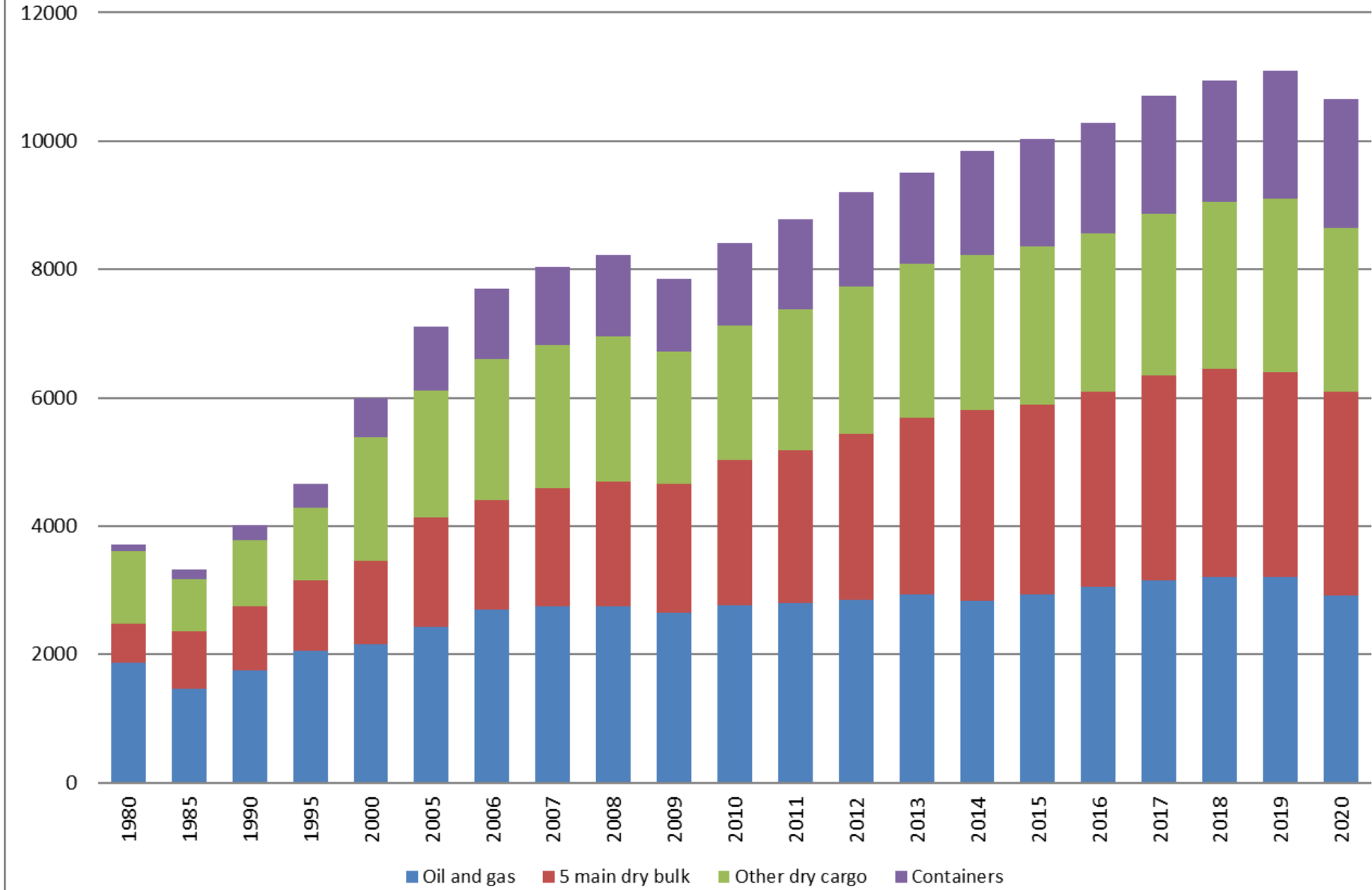
Main Speciality „Maritime“  
in Engineering PhD

Maritime Master Studies

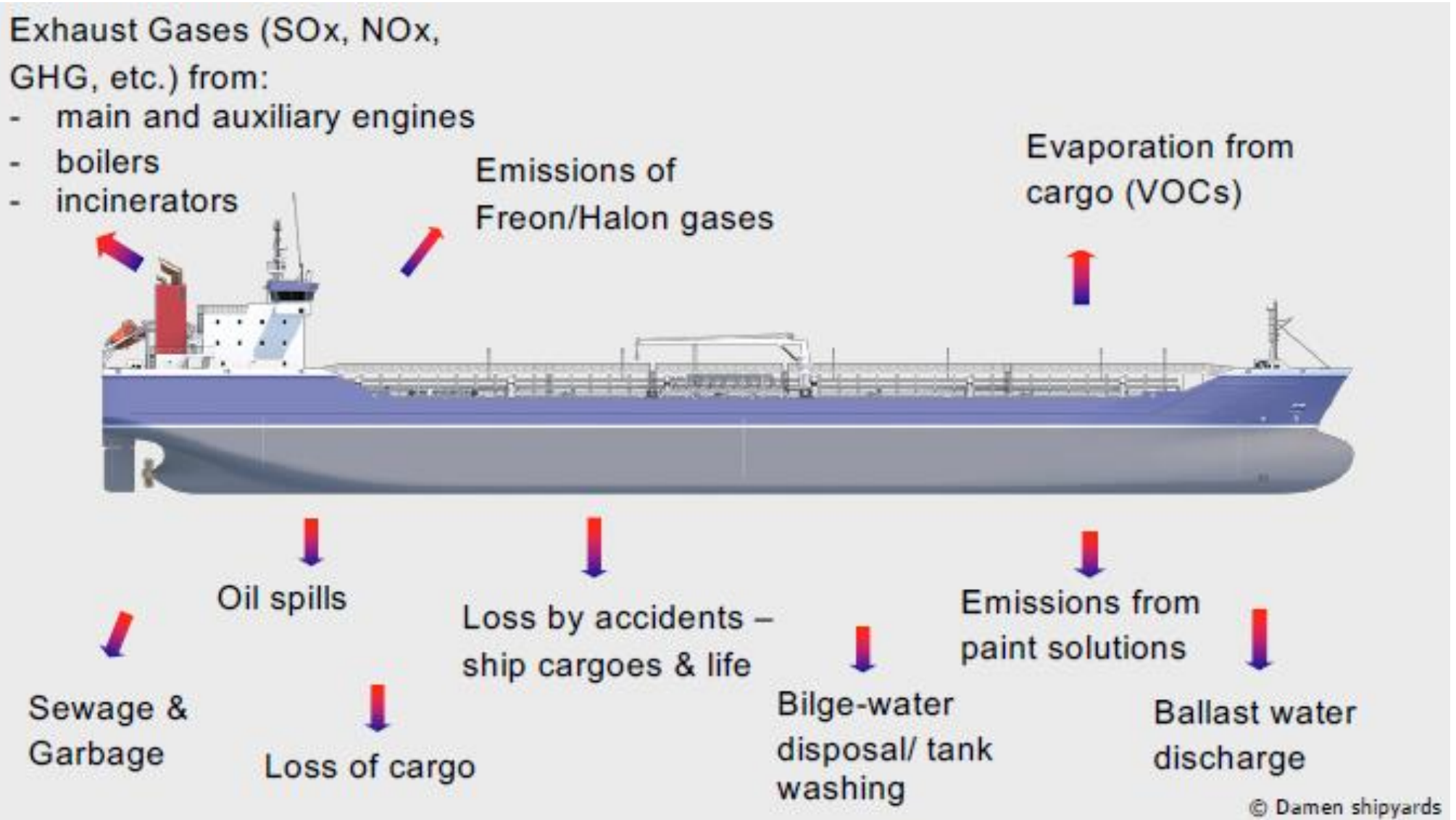
Navigation  
Ship Engineering  
Port and Shipping Management  
Waterway Safety Management



# International maritime trade (millions of tons)



# SOURCES OF POLLUTION FROM SHIPS



# WE HAVE A MISSION!

*“In the next 20 years the maritime industry must rebuild its cargo fleet. If this is done with the radical technologies now available, it will lead to the biggest change in ship design since steam replaced sail in the 19th century.”*

**TAL  
TECH**



Dr Martin Stopford |  
President Clarkson  
Research

Coronavirus, Climate Change & Smart Shipping

**THREE MARITIME SCENARIOS**

2020 – 2050





17 June 2021

# Further shipping GHG emission reduction measures adopted



# INITIAL IMO STRATEGY

- The initial GHG strategy envisages, in particular, a reduction in carbon intensity of international shipping
  - to reduce CO2 emissions per transport work, as an average across international shipping, by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008);
  - and that **total annual GHG emissions** from international shipping should be reduced by at least **50% by 2050 compared to 2008**.
- Until 2023 – operational measures
- 2023 – 2030 – market based measures
- 2030-2050 – alternative fuels



# European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions

## Page contents

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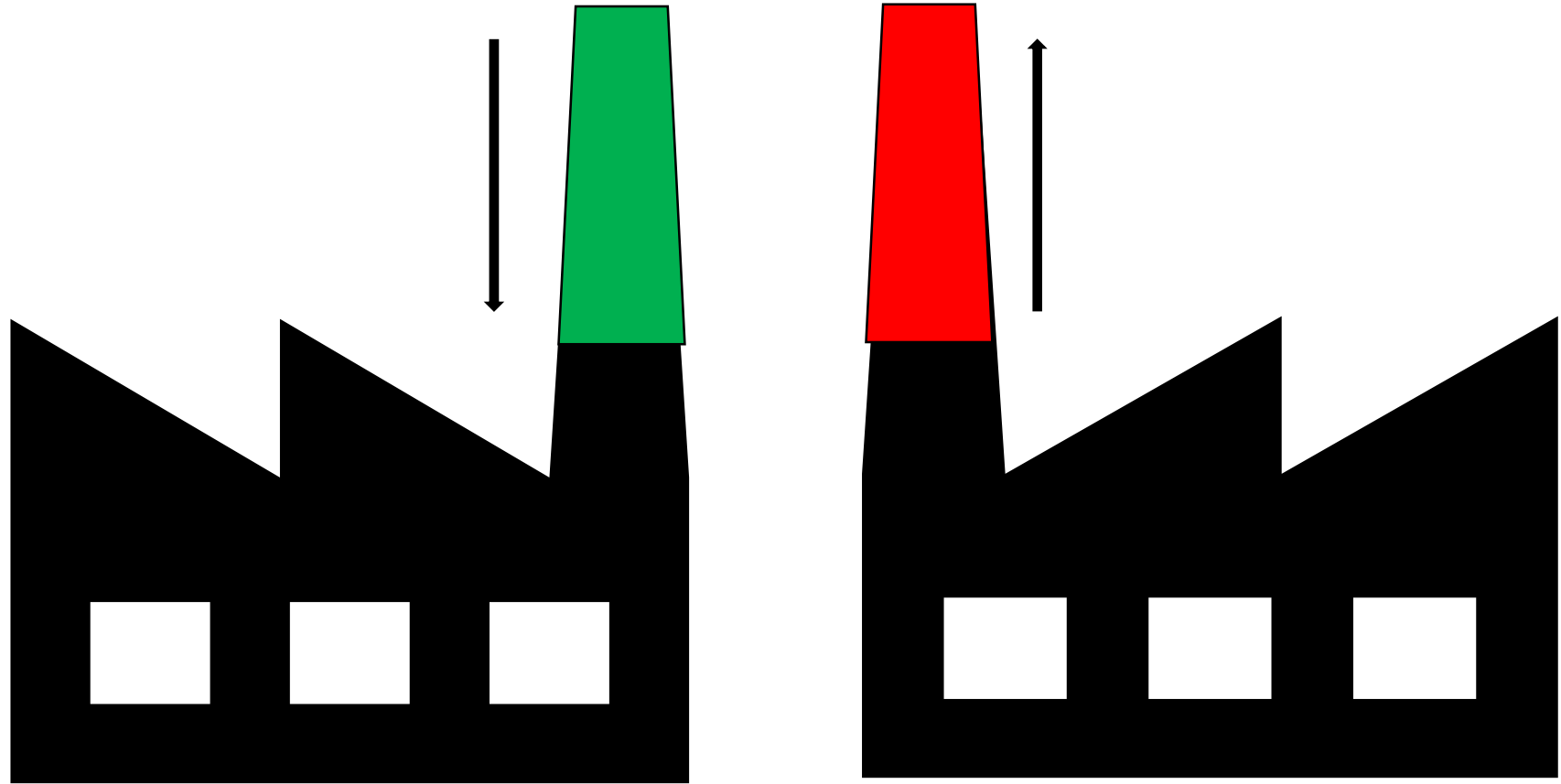
[Press contact](#)

Today, the European Commission adopted a package of proposals to make the EU's climate, energy, land use, transport and taxation **policies fit for reducing net greenhouse gas emissions by at least 55% by 2030**, compared to 1990 levels. Achieving these emission reductions in the next decade is crucial to Europe becoming the world's first climate-neutral continent by 2050 and making the [European Green Deal](#) a reality. With today's proposals, the Commission is presenting the legislative tools to **deliver on the targets agreed in the European Climate Law** and fundamentally transform our economy and society for a fair, green and prosperous future.

FuelEU Maritime	EU ETS	Energy Taxation Directive (ETD)	Alternative fuels infrastructure (AFI)
<p>Aims to incentivise uptake of renewable and low-carbon fuel (RLF) by setting increasingly strict limits on the GHG intensity of fuels used from 2025 onwards.</p>	<p>Ships of 5,000 GT and above to be included in the EU ETS from 2023. Applicable to all intra-EEA voyages and 50% of voyages to/from countries outside the EEA.</p>	<p>Remove tax exemption on bunker fuels sold within and for use within the EEA from 2023. Low rate compared to other sectors to prevent carbon leakage.</p>	<p>Sets requirements for adequate LNG bunkering infrastructure by 2025, and for minimum electric shoreside power supply by 2030.</p>



# SHIPPING AND THE EU ETS „EU EMISSION ALLOWANCES“





NEWS > PRESS RELEASES AND STATEMENTS

Press Release

# Shipping industry sets out bold plan to global regulator to deliver net zero by 2050

5 October 2021



Credit: Shutterstock

**London, 5th October 2021.** The International Chamber of Shipping has submitted plans to the industry's UN regulator, the International Maritime Organization (IMO), detailing urgent measures which governments must take to help the industry achieve net zero CO2 emissions by 2050.

## Downloads

Net zero submission paper  
⬇️ DOCX (144 KB)

## Related content



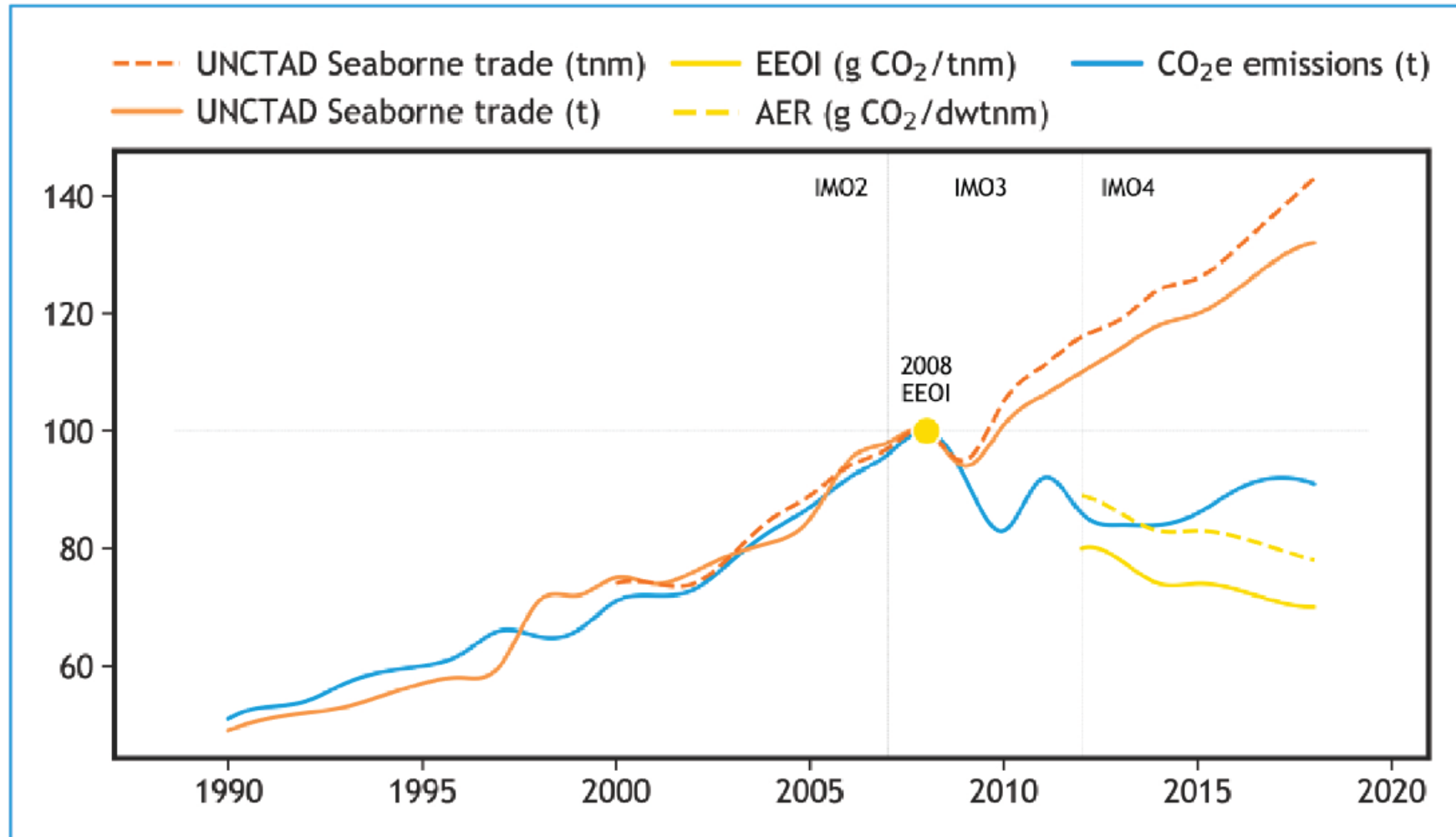
Press Release

**International Chamber of Shipping sets out plans for global carbon levy to expedite industry decarbonisation**





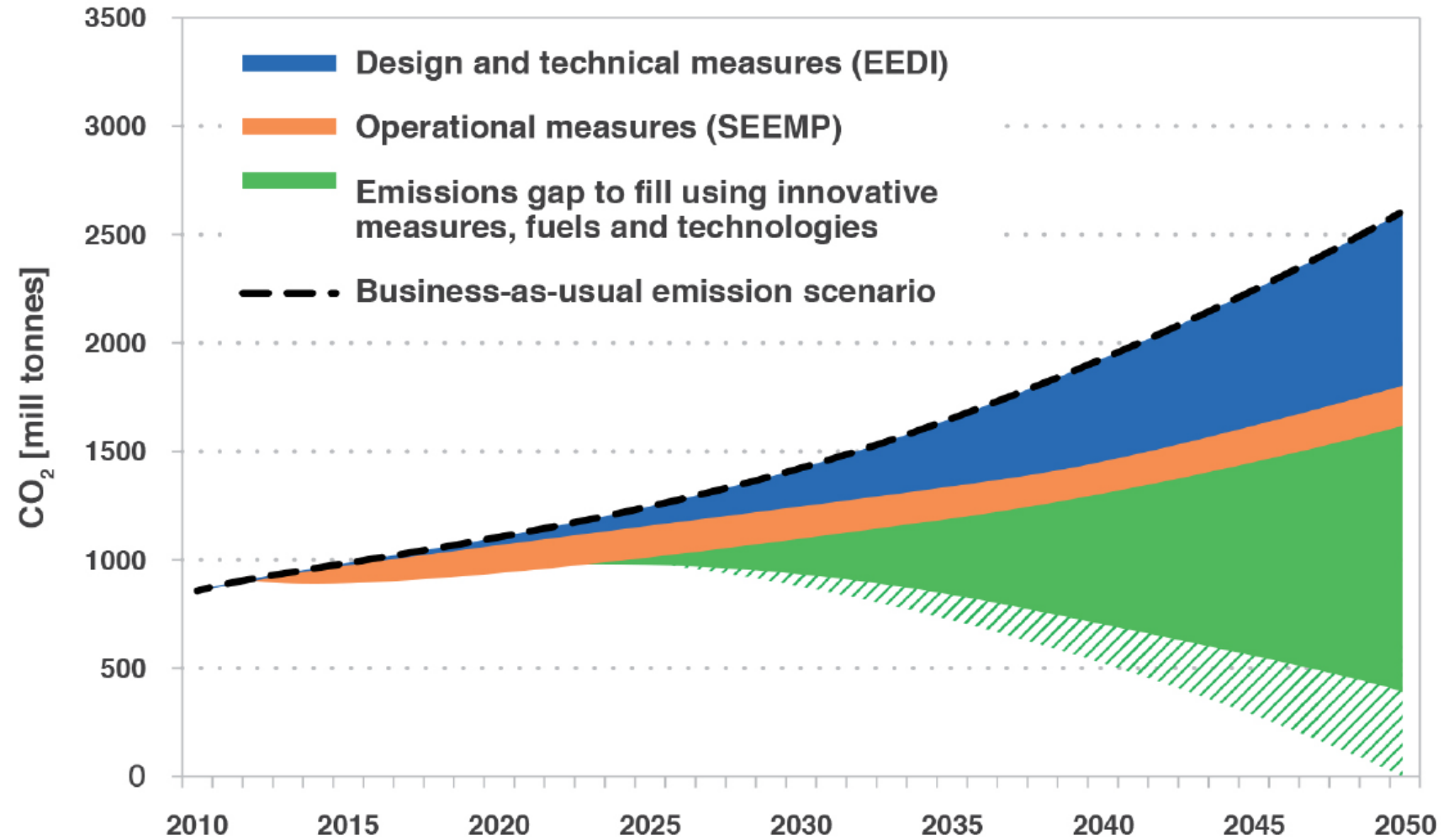
## Inventory of GHG Emissions from International Shipping 2012-2018



**Figure 2** – International shipping emissions and trade metrics, indexed in 2008, for the period 1990-2018, according to the voyage-based allocation<sup>1</sup> of international emissions<sup>2</sup>

Source: Fourth IMO GHG Study 2020

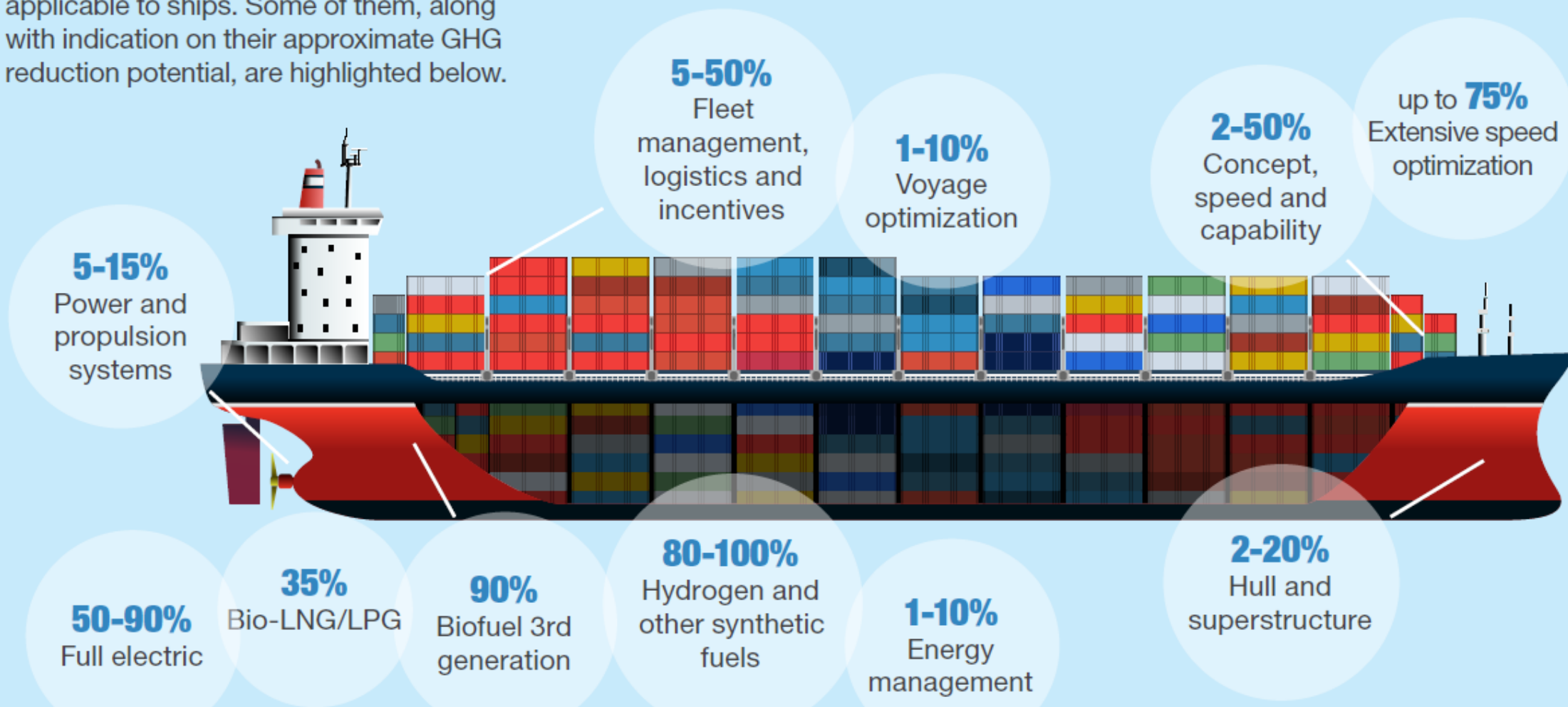
# GHG REDUCTION PATHWAY





# A wide variety of design, operational and economic solutions

Achieving the goals of the Initial IMO GHG Strategy will require a mix of technical, operational and innovative solutions applicable to ships. Some of them, along with indication on their approximate GHG reduction potential, are highlighted below.

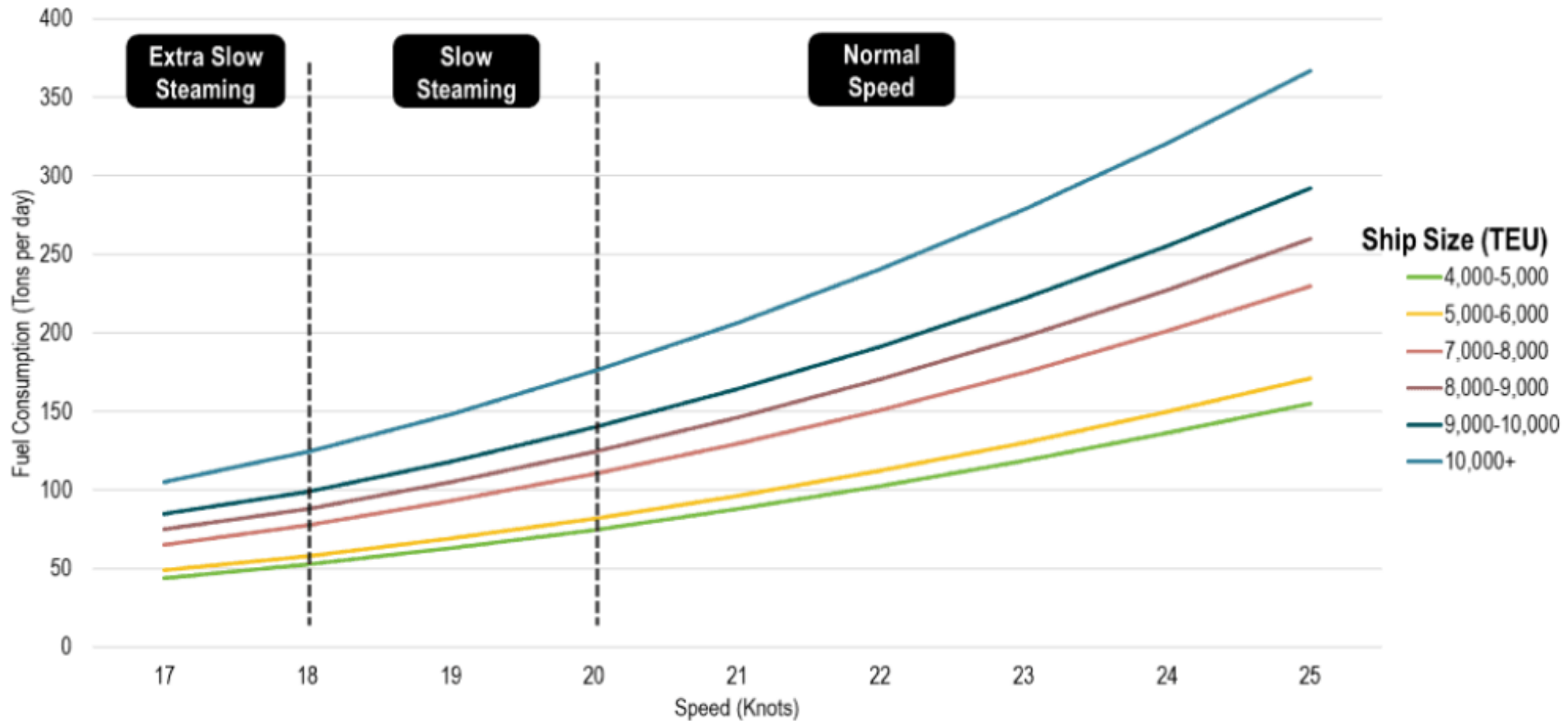


# SIX STEPS TO REACH CARBON FREE SHIPPING

1. Improve the energy efficiency in newbuildings.
2. Pilot various technical solutions to increase energy efficiency, e.g. rotor sails; smart IT- solutions to manage data for maintenance, bunker optimization and safety; air lubrication systems; use of batteries in ports and fairways; information for port arrivals, etc.
3. Reduce speed and improve port operations.
4. Be prepared for the new low or zero carbon fuels.
5. Shippers: evaluate alternative transport modes and operations.
6. Regulators: introduce rules and support mechanisms and carbon taxes to help shipping industry to move towards carbon-neutrality



# Fuel Consumption by Containership Size and Speed



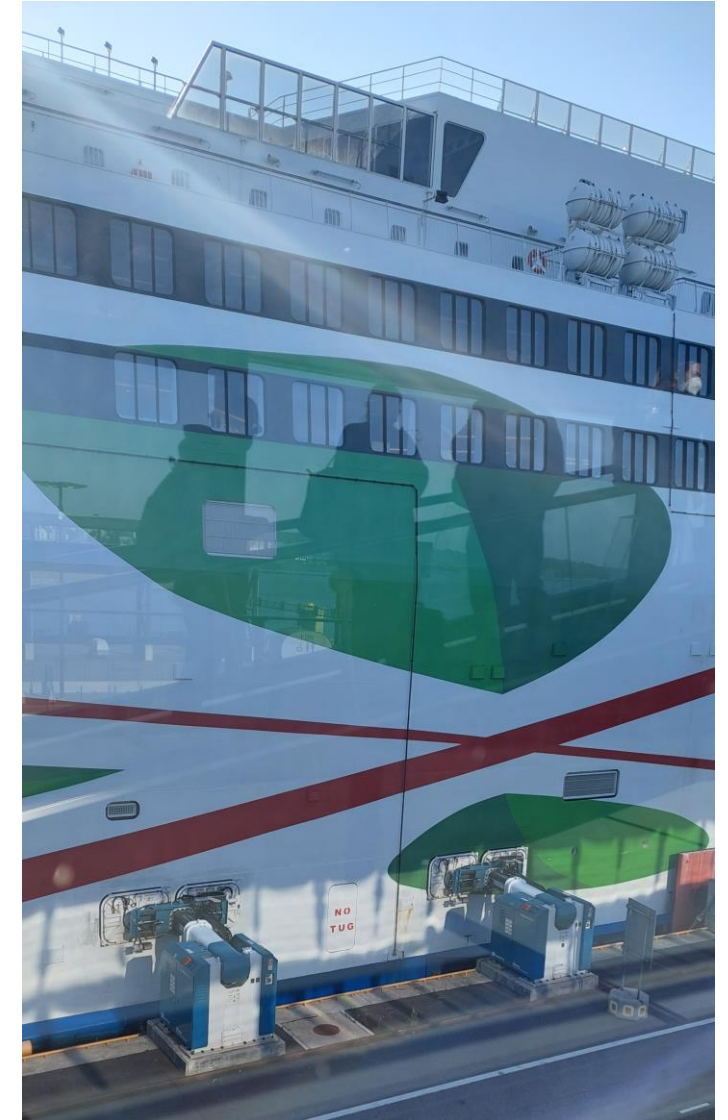
# AUTOMOORING SYSTEM IN HELSINKI AND TALLINN

## Tallinn's Old City Harbour to introduce automated mooring system

Port of Tallinn has signed contracts with maritime engineering companies Trelleborg and Cavotec for the instalment of automated mooring systems at quays 5, 12 and 13 of the Old City Harbour, which is used by passenger vessels serving the Tallinn-Helsinki route.

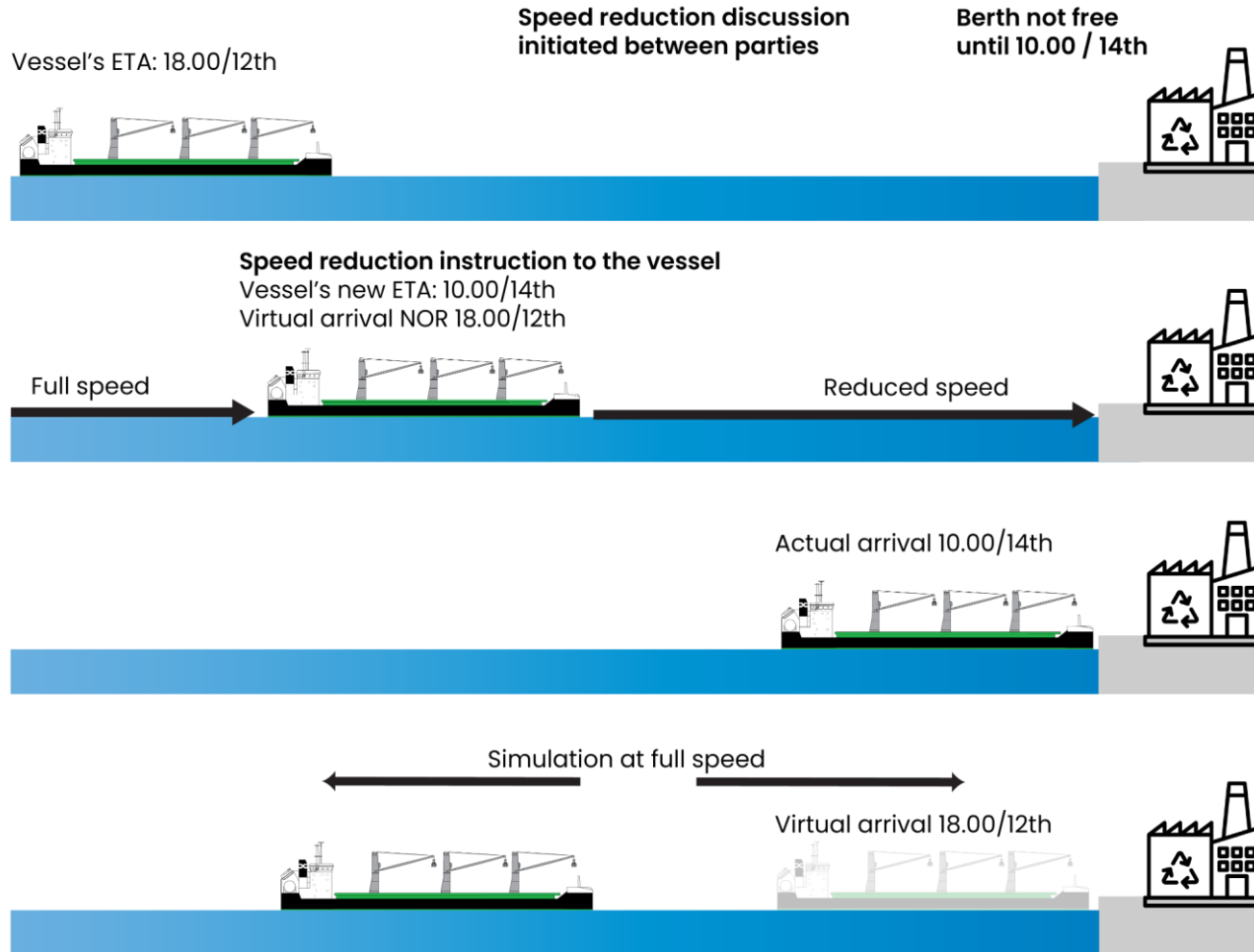
According to Peeter Nõgu, head of the infrastructure development division of Port of Tallinn, technological development has greatly contributed to the maritime sector, including the mooring processes of ships. "The new automated mooring equipment installed in the Old City Harbour will fasten our mooring operations while also requiring less man-hours and contributing to environmental sustainability. The new systems are primarily used by the ships sailing on our busiest route between Tallinn and Helsinki, where every extra minute saved either at sea or in port is highly valued."

The shipping industry uses either automated vacuum mooring or automated magnetic mooring systems. According to Peeter Nõgu, Port of Tallinn opted for a vacuum-pad based system, while the magnetic mooring systems are still at an early stage of development and usage. For this reason, the full impact of the electromagnetic waves on either a ship's electronics or the surrounding environment isn't yet fully known.





# VIRTUAL ARRIVAL



## Benefits of Virtual arrival

- reduced energy consumption
- reduced emissions
- less congestion in the port and anchorage area
- more reliable scheduling and line-up of vessels in port
- more efficient resource planning for port operators
- savings are shared between owners and charterer

**-24%**

**Average reduction of CO<sub>2</sub>-emissions**



05.11.2021 | Rahtiliikenne

## HansaLink to take environmental measures

### HansaLink to take environmental measures

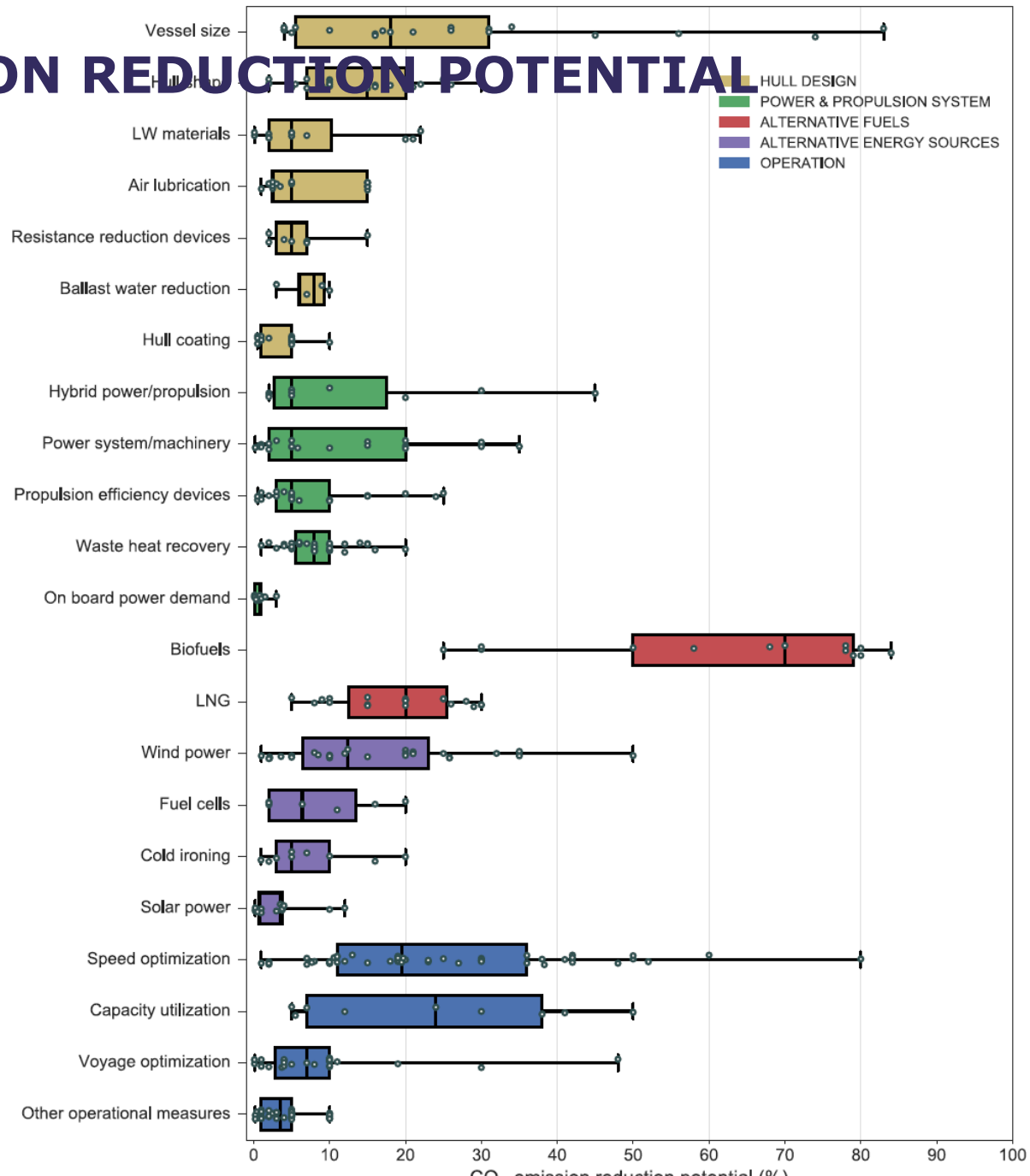
Grimaldi as a corporate group is determined to continue the fight against climate change. In this battle the environmental performance of the vessels is gaining more and more importance.

One of the effective measures shipping companies can do in order to contribute to actual climate crisis is to slow down the speed. Already a small adjustment helps us and our customers to decrease the CO2 emissions.

That in mind and trying keep our service level as unaffected as possible the schedule of the HansaLink Service will be altered as follows.

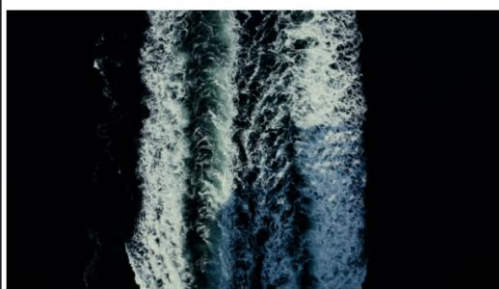


# CO2 EMISSION REDUCTION POTENTIAL



Source: Bouman, E. A., Lindstad, E., Riiland, A. I. and Strømman, A. H. (2017). State-of-the-art technologies, measures, and potential for reducing GHG emissions from shipping – A review. *Transportation Research Part D: Transport and Environment*. 52. pp. 408-421.

# Industry Leaders Collaborate to Develop Ammonia Shipping Fuel Guidance



PUBLISHED APR 17, 2021 3:05 PM BY THE MARITIME EXECUTIVE  
 This week, Lloyd's Register's Decarbonization Hub, A.P. Moller-Maersk, MAN Energy Solutions, Mitsubishi Heavy Industries, NYK Line, Total and the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping are joining forces in a new project with the purpose of guiding safe use of ammonia as a fuel for shipping.

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You are here: Home > Shipping News > World's First Liquid Hydrogen-Powered Ship Delivered

## World's First Liquid Hydrogen-Powered Ship Delivered

By M1 News Network | In: Shipping News | Last Updated on July 30, 2021

Engineering and design services provider LMG Marin has confirmed that HYDRA, the world's first liquid hydrogen-powered ship, has been delivered to Norway's ferry operator Norled.

Image Credit: LMG Marin

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## Norsepower will fit Vale's VLOC charter with rotor sails

MAY 28, 2021

Tuesday, September 14, 2021

**Splash** 847.com LET'S TACKLE DECARBONIZATION

Home / Sector / Operations / Bill Gates joins nuclear-powered shipping push

Bill Gates / Twitter

**Splash** 847.com MARITIME FORECAST

Home / Sector / Operations / Maersk orders up to twelve methanol-fuelled 16,000 teu ships at Hyundai Heavy

Sam Chambers / August 24, 2021

Copenhagen, 26 November 2020

## Partnership aims to develop hydrogen ferry for Oslo-Copenhagen

DFDS and its partners have applied for EU support for development of a ferry powered by electricity from a hydrogen fuel cell which only emits water.

VESSEL PERFORMANCE OPTIMISATION

## New concept design for ammonia-fuel ready LNG-fuelled ship

SHIP DESIGN SEPTEMBER 9, 2021

## Check out the Netherlands' first electric – and it's got swappable batteries

MARINE LEADER - Sep 09 2021 9:05 AM PT

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Bunkering Environment Europe Tech

## Norwegian duo set out to build ammonia bunkering terminals

Adis Ajdin / July 15, 2021

**Splash** 847.com LET'S TACKLE DECARBONIZATION

Home / Sector / Bunkering / World's first hydrogen cargo vessel set for Paris debut

Bunkering Environment Europe Operations

## World's first hydrogen cargo vessel set for Paris debut

Sam Chambers / April 7, 2021

The European innovation project Flagships will deploy the world's first commercial cargo transport operating on hydrogen later this year, plying the river Seine in Paris, gliding passed the Eiffel Tower.

**SHIPPAX** Getting access to our website

## Stena's pathway to decarbonise its shipping operations

STENA ELEKTRA © Stena Line

The scale of shipping's challenge to transition from fossil-based fuels to renewables must not be underestimated. We are a global industry, and ships must be able to serve all ports. There is still no easy answer on which technology to use and vessels built today could operate for up

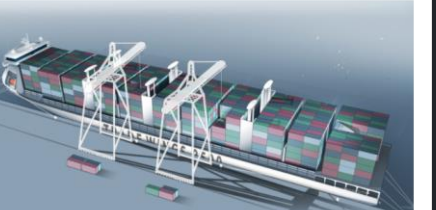
## Wind-assisted, LNG-electric containership Trade Wings 2,500 wins BV's AiP

BUSINESS DEVELOPMENTS & PROJECTS

May 17, 2021, by Fatima Bahtić

The 2,500 TEU vessel, which has been designed jointly by VPLP Design, Alwena Shipping, SDARI and AYRO, received an Approval in Principle (AiP) from the classification society Bureau Veritas.

With an overall length of 197 meters and a breadth of 32 meters, Trade Wings 2,500 features six Oceanwings wingsails installed on a vertical sliding mechanism so that they can be retracted partially while the vessel is in port, thus minimising the impact on cargo operations.



**Cruise&Ferry** INTRODUCING THE NEXT CLEANSEWAGE MEMBRANE

THE GLOBAL GUIDE TO PRECEDENT SHIPPING

## Ulstein develops new concept for zero-emission vessel

Ulstein Thor and Sif will be able to generate clean electricity using a Thorium Molten Salt Reactor

Ulstein has created a new zero-emission concept vessel, called Ulstein Thor, which will feature a Thorium Molten Salt Reactor (MSR) to generate clean electricity that can be used to power cruise ships.

Alice Chambers / 28 April 2022

# World's First Zero-Emission Wind and Hydrogen Power Cargo Ship



Concept design for the zero-emission barge (Egil Ulvan Rederi)  
 PUBLISHED MAR 26, 2021 7:44 PM BY THE MARITIME EXECUTIVE  
 A Norwegian partnership is moving forward with the development of what they are calling the world's first zero-emission cargo ship. After a six-month competition, with more than 31 ship owners bidding on the project, the contract for the construction has been awarded. The team expected to complete the design this year so that the vessel can enter service by 2024.





## 15 FINANCIAL INSTITUTIONS DISCLOSE THE CLIMATE ALIGNMENT OF THEIR SHIP FINANCE PORTFOLIOS

In a first-of-a-kind climate finance report, 15 Signatories of the Poseidon Principles disclose the climate alignment score of their ship finance portfolios. The Poseidon Principles Annual Disclosure Report 2020 shows that 3 banks' ship finance portfolios are aligned with UN decarbonization targets while 12 banks' portfolios are not. The climate assessment offers banks new insight into their lending decisions and provides opportunity to work with their shipping clients to meet society's goals.

International ship finance confirms its leadership role in global climate finance. Announced in June 2019, the Poseidon Principles became the first sector-specific climate alignment agreement for financial institutions. Today, Signatories deliver on their commitment and publish the Poseidon Principles Annual Disclosure Report 2020 – the first sector-specific climate alignment report of its kind. The Poseidon Principles establish a global framework to quantitatively assess and disclose whether financial institutions' lending portfolios are in line with climate goals set by UN maritime agency, the International Maritime Organization (IMO). The IMO's initial GHG strategy prescribes that international shipping must reduce its total annual greenhouse gas emissions by at least 50% of 2008 levels by 2050, whilst pursuing efforts towards phasing them out as soon as possible in this century.

*"This report marks a significant milestone for global ship finance and for climate finance reporting as a whole. I commend my fellow Signatories for their pioneering efforts to be transparent and accountable for their role in promoting responsible environmental behavior. I encourage other serious banks and export credit agencies to join us in supporting global seaborne trade in a sustainable manner,"* says Michael Parker, Chairman, Global Shipping, Logistics and Offshore, Citi, and Chair of the Poseidon Principles Association.

### Climate assessment will inform future decision-making

The Poseidon Principles Annual Disclosure Report 2020 includes climate alignment reporting from 15 financial institutions, most of which became Signatories in 2019, including ABN Amro, Amsterdam Trade Bank, BNP Paribas, Bpifrance Assurance Export, CIC, Citi, Credit Agricole Corporate and Investment Bank, Danish Ship Finance, Danske Bank, DNB, Eksportkreditt Norge, ING, Nordea, Sparbanken Vest, and Societe Generale. Financial institutions that joined the Poseidon Principles in 2020 are not required to report before 2021. The assessment by each Signatory includes emissions data collected from clients and the portfolio information from 2019, compared to a decarbonization trajectory for the same year. It shows that 3 financial institutions' ship finance portfolios are aligned with the IMO's initial GHG strategy while 12 banks' portfolios are not. More importantly, the report includes commentary from financial institutions on key takeaways from their climate assessment, and reflections on how it will inform their business activities and decision-making in the future.





Merenkulun logistiikka



Ulla Tapaninen



Logistiikka ja liikennejärjestelmät



Ulla Tapaninen

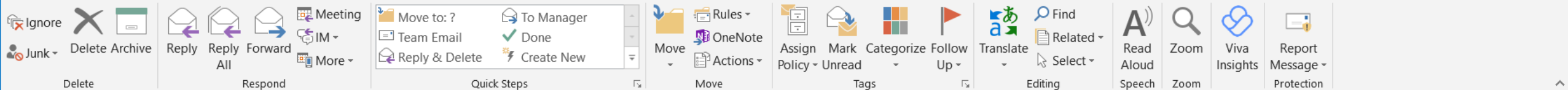


See also:

Twitter: @Utapaninen, LinkedIn

Blog: <https://ullatapaninen.net/>





Mon 14/11/2022 15:07



Lian Junhe

Aalto Seminar on Mechanical Engineering Sciences, Professor Ulla Tapaninen (TalTech)

To  staff-me-eng;  professors-me-eng;  doctoralcandidates-me-engCc  Tapaninen Ulla

i You forwarded this message on 17/11/2022 14:56.

**Aalto Seminar on Mechanical Engineering Sciences** on Wednesday, Nov 23, at Otakaari 4, K1, hall 326 at 10.15 – 11.00

**“Turbulent nature of maritime economics”**

**Professor Ulla Tapaninen, Tallinn University of Technology (TalTech)**

**Biography:** Professor Ulla Tapaninen, Associate Professor in Maritime Transport, has over 30 years of experience in logistics and maritime transport research and development work. She received her Ph.D. in logistics modeling at the Helsinki University of Technology in 1997. After her doctorate, she worked for ten years as a development manager and environmental manager in a large Finnish ro-ro shipping company Finnlines Plc. Between 2006 – 2012 she worked as a professor of maritime logistics at the University of Turku, specializing in maritime and port operations, IT, and maritime safety. Thereafter, she served as Senior Specialist and Head of Unit for the City of Helsinki in port and cross-border transport development projects. She started as an Associate Professor of Maritime Transport at the Estonian Maritime Academy in Tallinn University of Technology in 2021, focusing on sustainable shipping and maritime governance. Dr. Tapaninen has published dozens of scientific and professional publications, and she is a frequent speaker in seminars in the areas of maritime and cross-border transportation, logistics information handling, and maritime safety and environment. Ulla Tapaninen’s maritime economics can be read in her book Maritime Transport (Kogan Page 2018). She can also be followed on her blog: <https://ullatapaninen.net/>.

**Abstract:** Maritime markets are in turmoil. Just last year the prices of containers were time-time high, now we are seeing bulk-market making profits. At the same time cruise business is still recovering from pandemic. In this lecture we will shortly look at how maritime economics works, how can a shipping company make profit and survive in the turbulent market.

What makes the shipping business succesful, is the ability to order new ships or make long charters up to a few years before the boom period. When the rise then comes, the shipyards are full of order books and prices are cloudy, and no rental equipment is available for anything. Or, alternatively, you need to know how to sell or give up rental equipment even before the fall season. How can one do that? How can a shipping company be successful now and in the future?

***You are all welcome to join!***

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**TALLINN UNIVERSITY OF TECHNOLOGY  
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