Tightening environmental rules change maritime traffic

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Introduction

The International Maritime Organization (IMO) has decided on strict measures to reduce the carbon intensity of shipping (IMO, 2023). The revised IMO GHG Strategy includes an enhanced common ambition to reach net-zero GHG emissions from international shipping close to 2050, a commitment to ensure an uptake of alternative zero and near-zero GHG fuels by 2030, as well as indicative check-points for 2030 and 2040. Furthermore, the European Commission has presented the Fit for 55 package (EU Parliament, 2022), which includes proposals for the inclusion of shipping in the carbon trading, the carbon content of fuels, the abolition of duty-free treatment for bunkers, and the distribution infrastructure for alternative fuels.

The shipping industry is already preparing itself to the IMO and EU GHG regulations. Emissions from shipping can be reduced in three different ways. Ship fuel solutions, ship design and technological advancements, and operational solutions, i.e. ship type selection, and ship speed choices. In addition, the development of a carbon-neutral maritime business model requires the involvement of the entire industry, from shippers to ship technology.

The methods to reduce CO2 emissions are multiple and can also be utilized to bring a reduction in CO2 emissions in addition to the use of alternative fuels (Lindstad et al., 2021). Some of methods are slow steaming practices, which can lead 16% to 19% energy savings (Barreiro et al., 2022; Corbett et al., 2009; Degiuli et al., 2021); main engine derating practices which involves optimizing the current load point to align with the design load point (Nielsen et al., 2018); waste heat recovery systems, which is one of the solution to decrease CO2 emissions by recovering the waste heat from operations (Barreiro et al., 2022; Degiuli et al., 2021); finally alterations of operational patterns which involves service frequency, scheduling, speed reduction activities (Corbett et al., 2009)

Materials and methods

Within this study literature was reviewed, and case studies were analyzed.

Results

The maritime research group in Estonian Maritime Academy has studied the effects of tightening environmental regulations to the shipping industry. There is several case studies under work, about passenger car-ferry traffic (Tapaninen & Palu, 2022) and on coastal ferry traffic (Laasma et al., 2022). In addition, calculations on emissions in ports (Kotta et al., 2023) has been carried out.

There has been and are on-going also several research projects to study the effects of environmental regulations to shipping (Taltech, 2023):

- Sustainable Flow, EU Central Baltic Programme, 3/2023 – 2/2026.
- AIRSHIP, EU Horizon GA 101096487, 11/2022 – 10/2026.
- The Competitiveness of Ports and the Role of the Public Sector in Supporting this Competitiveness in Ports in Estonia, Latvia, Finland and Sweden, Estonian Ministry of Economic Affairs and Communications, 2022

- Methodology for shipping operations environmental effects. 2022, Ministry of Environment, Estonian Research Council, Estonian Ministry of Economic Affairs and Communications.
- Capitalization of the GIS Assessment Portal (PlanWise4Blue) developed under the Adrienne project.
- Analysis of small islands transport connections.

Implications on sustainable maritime operation

In summary there are significant changes coming to all aspects of maritime transport due to tightening environmental regulations. In the Maritime Research Group in Estonian Maritime Academy at Tallin University of Technology, we have grouped the requirements to six important steps how the maritime sector can prepare itself for the carbon-free future (Tapaninen, 2021). First four actions are for shipping companies, one for shippers, and one for regulators.

First, shipping companies are improving the energy efficiency in their newbuildings. Second, shipping companies are piloting various technical solutions to increase their energy efficiency, e.g. rotor sails; smart IT- solutions for bunker optimization and safety. Third, shipping companies are reducing their speed at sea and port companies improve their operations. Fourth, new low or zero carbon fuels are being developed. Fifth, shippers are reorganizing their transport chains. Finally, authorities and regulators are introducing rules and support mechanisms and carbon taxes to help shipping industry to move towards carbon-neutrality. Even more, investors are supporting the change of the maritime business.

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