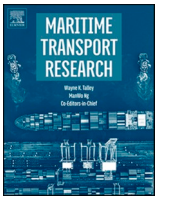
Maritime Transport Research 3 (2022) 100068

Contents lists available at ScienceDirect

Maritime Transport Research

journal homepage: www.sciencedirect.com/journal/maritime-transport-research



Shipping decarbonization and green ports

The "Initial IMO Strategy" was adopted in the 72nd session of the Marine Environment Protection Committee (MEPC 72) of the International Maritime Organization (IMO) in April 2018. It has set, among other things, ambitious targets to reduce greenhouse gas (GHG) emissions from ships, and purports to express a strong political will to phase them out as soon as possible. The most ambitious of these targets is to reduce GHG emissions by 2050 at least 50% vis-à-vis 2008 levels, and there is also an intermediate target to reduce CO_2 emissions per transport work by 2030 at least 40%, again vis-à-vis 2008 levels (IMO, 2018). In the period after MEPC 72, the focus of the IMO discussion has been on the formulation and eventual adoption of the short-term measures, that is, measures that are to be agreed upon and implemented by 2023. In fact, MEPC 76, held in June 2021, and after a rather difficult discussion, adopted such a short-term measure. MEPC 77 (November 2021) saw the initiation of the discussion on mid-term and long-term measures, which include, among others, market based measures (MBMs) and alternative fuels. The discussion continued at MEPC 78 (June 2022) and is expected to continue at future meetings of MEPC.

In parallel, and in the context of the European Green Deal that was adopted in 2019, in July 2021 the European Commission (EC) unveiled its long-awaited "Fit for 55" scheme, a package of proposals to make the EU's climate, energy, land use, transport and taxation policies fit for reducing net GHG emissions by at least 55% by 2030, compared to 1990 levels. For shipping, this package stipulates the inclusion of shipping into the EU Emissions Trading System (ETS) (EU, 2021a), and includes the FuelEU Maritime initiative, that aims to stimulate the uptake of sustainable maritime fuels and zero-emission technologies (EU, 2021b).

Ports can play a critical role in the decarbonization process, both in terms of reducing in-port GHG emissions (on shore power supply), and in terms of contributing to the reduction of at-sea GHG emissions, by making wider use of practices such as virtual arrival. Further, ports can help reduce GHG emissions in other modes if they contribute to shifting traffic from road to sea. Ports are getting more engaged in the IMO process and this is expected to be continued in the future.

In this MARTRA special issue on shipping decarbonization and green ports, seven papers have been accepted after a peer-review process. These papers look at the subject of the special issue from various perspectives and examine specific topics connected to this subject.

The first paper (Foretich et al., 2022), aims to aid stakeholders involved in decision making and research related to the transition to alternative fuels. To do so, a scoping study was conducted with the goal of outlining the barriers, uncertainties, and possibilities in the short and long term for the transition. Increasingly stringent environmental standards and heightened regulatory focus on maritime decarbonization are driving infrastructural and technical development for alternative fuels and mixtures, engine concepts, and operating practices. However, the transition to alternative fuels is found highly complex and requires both a global outlook that spans diverse stakeholder demographics and coordination with multiple actors across the value chain.

The second paper (Tseng and Pilchner, 2022) investigates the carbon reduction potential of the Kra canal, a potential future canal across the Kra isthmus in Thailand which would reduce sailing distances between Far East and Europe. The paper finds that not only will the canal not reduce emissions, but construction of the canal and of hub ports and their activities (potentially including oil refining) will adversely impact pollutant emissions as well. However, the authors argue that when technology becomes far greener, and countries work together with a focus on decarbonization, then the canal does indeed offer significant potential for decarbonizing the shipping industry.

The third paper (Ashrafi et al., 2022) develops a comprehensive and integrated set of sustainability criteria that are relevant for evaluating alternative marine fuels. An overview of different alternative marine fuel pathways is provided, and the current challenges associated with adopting alternative marine fuels are assessed. As many as 18 sustainability criteria are developed, and are identified through the academic and trade literature and validated through a multi-stakeholder participatory approach (based on the input from

https://doi.org/10.1016/j.martra.2022.100068

Available online 3 August 2022

70 maritime experts), for a systematic and consistent evaluation of marine fuels. The paper evaluates maritime stakeholder perspectives on the importance of sustainability criteria and provides a discussion of key policy implications and areas for future studies.

The fourth paper (Hessevik, 2022) is a qualitative multiple case study of three Norwegian offshore shipping companies and analyzes the drivers that shape the companies' strategies to reduce GHG emissions, with particular focus on how the strategies are impacted by membership in green shipping networks. The paper finds that the main drivers have been initiatives by internal key persons, participation in voluntary programs, mandatory regulations, and customer demand. The analysis shows no major shifts in strategy after joining a green shipping network; however, it does show that network membership may impact the way shipping companies work with emissions reduction.

The fifth paper (Lindstad et al., 2022) focuses on potential energy reductions through building more slender bulk vessels in combination with wind assisted propulsion (WASP). The results indicate that fuel consumption and hence GHG emissions can be reduced by up to 40% on an operational basis (Energy Efficiency Operational Indicator- EEOI) and 30% when shipbuilding is included (lifecycle assessment- LCA), when operated at an average speed of 10 knots with sail routing, i.e., the vessel operates in ocean areas with good wind conditions and the voyage route is optimized to get the most out of the wind.

The sixth paper (Lagouvardou and Psaraftis, 2022) studies the impacts of the inclusion of the maritime sector in the EU Emissions Trading System (ETS). The paper investigates the risk of container lines replacing transshipment hubs in the European Economic Area (EEA) with nearby non-EEA competitors, with Piraeus vs Izmir and Algeciras vs Tanger Med as case studies. The results show that a non-EEA hub can become attractive for carbon prices well below 25 EUR per metric ton of CO_2. Further, in all cases, the hub switch results in a rise in overall carbon emissions which amplifies the risk of carbon leakage.

Last but not least, the seventh paper (Cammin et al., 2022) reviews the emissions reporting of the top 49 container ports in the world, and observes that less than half of their sample ports provide public information on their emissions. The authors then propose a classification scheme with different assessment criteria, and interestingly make connections between report availability and the press freedom index of the associated country hosting the port. The proposed classification scheme can be a useful tool when comparing different ports among their peers, and their willingness to share information on their environmental performance.

We hope that the reader of this special issue will find the above papers of interest. Perhaps more important, we hope that the shipping industry will make progress and take the necessary bold moves to steer the industry in a clear path towards reaching the targets that have been set.

Declaration of Competing Interest

We declare no conflict of interest in publishing this article.

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