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Six tricks to support sustainable cruise shipbuilding

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Photographs by Timo Mäkipää.

Abstract

This report explores the current state of sustainable industrial transformation in the maritime industry by mirroring the increasing number of respective policies, strategies and regulations with the views of the industry representatives. The report is divided into two parts; the first one looks into the policies, regulations and incentives that drive green transformation in the maritime industry. The second part builds on empirical data collected among maritime industry firms and industry association representatives, highlighting the opportunities and challenges currently experienced within the business field concerning green transition. Building on the findings in both parts, the report concludes with recommendations for policymakers—the six tricks—to better pursue and guide sustainability transformation in the maritime industry in general and in cruise shipbuilding in particular.

Key words: Sustainability, green transition, shipbuilding, maritime sector, policy, business

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1. INTRODUCTION

People and nations globally are faced with the same challenge of how to slow down climate change. The situation is severe and is considered a major global concern. However, the world has belatedly understood the current state of nature, so urgent actions are needed to combat this problem. Climate agreements and new proposals for how to fight global warming are increasingly being negotiated and initiated. Some of the agreements and new actions are global and thus concern the entire world or at least the majority of the countries, while some are regional or continental by nature; thus, certain specific actions only address the challenges and opportunities of individual industries. How are industries prepared and able to respond to these rapidly tightening yet unsurprising demands?

The maritime industry, among others, is facing great pressure to advance its environmental performance. This industry is a broad field encompassing actors operating in shipbuilding, port operators and shipping companies, working alongside their vast business networks in different related fields. Due to the complexity of ships and the actor networks related to all phases of their life cycle, advancing sustainability in this sector is a highly complex process, calling for systemic change in many respects. For some, current environmental regulations pave the way for acquiring competitive advantage, whereas for others, it may simply come across as confusing, challenging and bureaucratic.

This report presents the current state of sustainable industrial transformation in the maritime industry by mirroring the respective policies, strategies and regulations with the voices of the industry actors. We first look at the public actions, regulations and strategies that drive green transformation in the maritime industry, including the key global agreements to which most of the world's countries have committed themselves; the measures defined within the European Union (EU); and the regulations and directives concerning the maritime sector in particular. While this is not a systematic review of all global, regional and sectoral regulations and directives, we summarise the recently adapted climate policies that especially apply for maritime industry enterprises. Thereafter, we discuss the perspective of shipbuilding business in the face of environmental demands. First, we look at the interview findings from shipbuilding companies, then we examine the findings from discussions with maritime industry association representatives. This part builds on empirical data with a particular emphasis on shipbuilding, wherein future innovations for sustainable shipping are generated. To conclude, we summarise recommendations for policymakers in terms of how to best acknowledge the business actors' views and support their concerns when pushing and guiding green transformation. Hence, this report serves as a brief summary for anyone interested in the current climate policies and, particularly for policymakers, as a nutshell full of varying views from broad shipbuilding industry networks.

The report is based on research conducted for project MUUTOS – Megatrends transforming the maritime industry in Finland ('Megatrendit uudistamassa meriteollisuutta Suomessa'), which is funded by the Foundation for Economic Education (Liikesivistysrahasto) in 2023–2025. The project seeks to explore the effects of various megatrends on the maritime industry, with particular emphasis on the international business of Finnish maritime industry firms. The MUUTOS project aims to deepen our understanding of the preconditions for collective agency in the industry to meet the grand environmental sustainability challenge, and one way to achieve this is to explore the perspectives of the respective actors at different levels. This report combines recent policy developments with reflections from the industry, uncovering the needs that remain unmet within the business actors.

2. CLIMATE POLICIES IN THE EUROPEAN MARITIME INDUSTRY

2.1 Global level: The Paris Agreement and the UN's sustainable development goals

In terms of global-level actions, perhaps the most well-known is the Paris Agreement, an international treaty in which 196 countries committed to in Paris, France, in December 2015, with the joint goal of slowing down climate change (United Nations Climate Change, 2023). The Agreement, which came into effect on 4 November 2016, is legally binding for the involved countries (ibid.). The objective of the agreement is to maintain 'the increase in the global average temperature to well below 2°C above pre-industrial levels' while also limiting 'the temperature increase to 1.5°C above pre-industrial levels' (United Nations Climate Change, 2023). Just recently, a report by the World Meteorological

Organization (2023) warned that global warming is likely to temporarily exceed the limit of 1.5°C in the coming years (see the report and McGrath, 2023). According to their estimates, exceeding the limit is likely to recur, although not on a permanent basis (McGrath, 2023). Thus, countries all around the world must react before it is too late. Although the Paris Agreement remains valid despite the possible exceeding of the limit, should global warming be at 1.5 °C or the limit be exceeded 20 times in a row, then it could be stated that the goal of the Paris Agreement failed (McGrath, 2023).

Another key initiative with global significance is the sustainable agenda set by the United Nations (UN). The UN included sustainable development in its 2030 agenda as a guideline for states, taking into consideration certain 'economic, social and environmental' perspectives (United Nations, 2015, p. 6). The agenda presents the different perspectives with a wide scope, comprising 17 sustainable development goals (SDGs) and 169 targets (United Nations, 2015). The scope is wide addressing various global challenges, including poverty, hunger, people's health and well-being, gender equality, quality education, right to access pure water and sustainable energy, durable infrastructure, sustainable consumption, sustained economic growth and employment, boosting of innovation, peace and justice and environmental issues, such as the fight against climate change and conservation of waters and land ecosystems, to mention a few (United Nations, 2015). The agenda has guided countries towards a 15-year roadmap of sustainable development starting in January 2016, and the monitoring and assessments have been carried out by governments with the help of specific indicators (United Nations, 2015). Several global and regional climate strategies are linked to the UN's SDGs and the Paris Agreement. One of them, and perhaps the one with the most impact on the green transition in the European business environment, is the European Green Deal.

2.2 Regional level: The European Green Deal

Along with, or influenced by, current global treaties and climate goals, in 2019, the European Commission launched the European Green Deal, which is a broad proposal or roadmap for how EU members can tackle climate change and become greener and more sustainable (European Commission, 2021a; 2019). The first aim of the proposal is to cut greenhouse gas (GHG) emissions by 55% by the year 2030, with a baseline in 1990 (European Commission, 2021a). In addition, the region reaches out even further by aiming at making Europe climate neutral by 2050, which means that EU countries must jointly achieve their goal of 'net zero greenhouse gas emissions' (European Commission, 2023a). The proposal contains various political initiatives, taking into account different spheres of nature and economic society, as listed by the European Council and Council of the European Union (2023a), including 'the climate, the environment, energy, transport, industry, agriculture and sustainable finance'.

The European Green Deal addresses several essential measures for tackling climate challenges and reaching climate neutrality. One of these is the European Climate Law, which is a groundbreaking measure for the rest of the initiatives. In 2021, an European Climate Law was approved, including the abovementioned first-step objective of cutting net GHG emissions by 55% by 2030, which can help achieve the ultimate objective of climate neutrality by 2050 (European Commission, 2023a). The fact that this objective has been written into law means that climate neutrality has become a binding obligation for the region (ibid.). In practice, this also means that the region's progress is assessed within five-year periods in accordance with the Paris Agreement (European Commission, 2023a). Notably, the European Climate Law also involves other goals and upcoming commitments, such as the launch of a climate target for 2040, although the details will be announced at a later phase (European Commission, 2023a). Other initiatives of the European Green Deal include themes that concern both individual citizens and/or industries, such as circular economy actions, energy usage, strategies related to chemicals, biodiversity and forests and a package called 'Fit for 55' (European Council and Council of the European Union, 2023a). In particular, Fit for 55 represents an extensive package containing legislative proposals that have implications for several industries. This initiative deals closely with the maritime industry and will be presented in more detail in the next section.

Some of the policies and initiatives had already been initiated prior to the the European Green Deal. For instance, the vision of climate neutrality was first presented in 2018 (see European Commission, 2018; 2019). Another previously initiated climate action is the EU Emissions Trading System, which is a carbon market that is currently being amended and broadened as part of the Fit for 55 package. The European Commission's (2019, p. 4) publication introducing the Green Deal mentions that EU actions back in 2019 would only have led to 60% reductions in GHG emissions by 2050. Given that newer actions are necessary, together with new policies, several initiatives have been and are now being expanded, with more advanced goals in line with the European Green Deal.

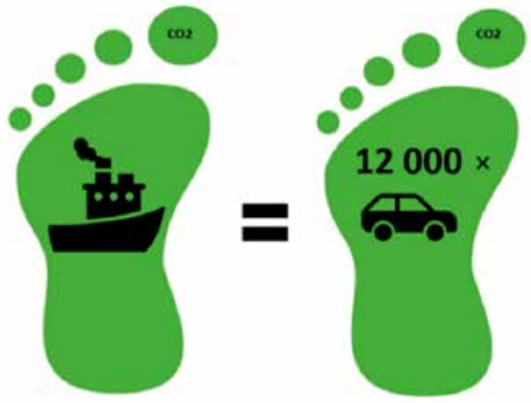
Before going deeper into the new legislative proposals for the maritime industry, one revised directive is still worth mentioning, as it deals with companies in different fields. In the spirit of the European Green Deal, a Corporate Sustainability Reporting Directive (CSRD) was published in the Official Journal of the European Union in December 2022 (Directive (EU) 2022/2464). The CSRD is based on an existing Non-Financial Reporting Directive (NFRD) and is related to the EU's sustainable finance actions (European Commission 2021b; 2021c). The overall goal is to standardise the sustainability reporting of companies for the use of interested parties (European Commission, 2021b). The CSRD also aims to provide information on the 'risks that sustainability issues present for companies, and the impacts of companies themselves on people and the environment' (European Commission, 2021c, p. 3). As the directive became effective on 5 January 2023, the largest companies are now required to adopt the new reporting system starting from the financial year 2024, which means that this will be visible in the reports by 2025 (European Commission, 2023b). Companies need to act promptly to comply with the new rules. However, for many of them, the timeline is quite fast, especially considering that there is only one year between the launch of the directive and the start of the new reporting system. Nevertheless, only large companies and listed companies (also listed small and medium-sized enterprises), with a few exceptions, need to apply the rules of the new directive (European Commission, 2023b), but in order to compile their carbon footprint data as required, these large companies must somehow initiate their respective reporting systems in their supply chains.

2.3 Industry-specific actions with a focus on the maritime industry

The share of maritime transport corresponds to 3%–4% of the total amount of CO2 emissions in the EU (European Commission, 2021d, p. 5). To be more precise, over 124 million tonnes of CO2 emissions were measured from MRV[1] monitored ships sailing to and from the ports of the European Economic Area in 2021, according to the European Commission (2023d, pp. 9, 19). As regards vessels carrying passengers/cruise ships, they emitted a total of 14.6 million tonnes of CO2 emissions in 2021 according to the reported emissions of RoPax and passenger ships (European Commission, 2023d, p. 22).

To understand the magnitude of such emissions, the overall carbon footprint of a cruise ship can be compared to that of approximately 12,000 cars (Lloret et al, 2021; University of Exeter, 2021), as illustrated in Figure 1. Furthermore, while contemplating the effect of a ship's carbon footprint regionally, the Baltic Sea region (BSR) is a good example in this respect. The BSR is a distinctive economic region that is also known for the high volume of ships sailing on the Baltic Sea. According to HELCOM (2023), around 2000 ships of different types pass between the ports 'at any given time'. Furthermore, a large number of cruise ships ply the same route. Thus, the impact of emissions and other adverse effects on the region is significant.

Figure 1: Carbon footprint of a cruise ship



Source: Data based on Lloret et al (2021) and University of Exeter (2021).

These figures highlight the importance of launching new directives and regulations for waterborne transport. The International Maritime Organization (IMO) is an international body that has traditionally played the role of regulating the shipping sector. However, the European Commission considers its actions too slow to respond to the urgent need to reduce GHG gas emissions

1 *The Monitoring, Reporting and Verification (MRV) Regulation requires large ship owners and operators to report their carbon dioxide emissions, among others (European Commission, 2023e).*

(see, e.g., Finska and Ringbom, 2022, p. 23). Nevertheless, at present, both the IMO and the EU have increasingly monitored the current state of the industry and have set new climate targets.

2.3.1 Fit for 55 package

The Fit for 55 package, published in 2021, functions as a legislative framework that addresses several fields and economic sectors, thereby proposing new legislation and amendments to existing ones to better respond to the new EU climate targets (European Commission, 2021a; European Council and Council of the European Union, 2023a). While Fit for 55 considers, among others, different sectors' energy efficiency targets, emission reductions and uptake of renewable energy, the proposal also initiates a social climate fund and a carbon border adjustment mechanism (CBAM) (European Commission, 2021a; European Council and Council of the European Union, 2023c). Several initiatives in the package involve significant implications for maritime actors and five of them are described in more detail in the following subsections. The EU has already decided on the provision of regulations and directives for the majority of the initiatives, although some are being negotiated or finalised at the time of writing this article.

The following three legislative acts, namely, the EU Emissions Trading System, the FuelEU Maritime initiative and the Energy Taxation Directive (European Council and Council of the European Union, 2023c), are especially relevant for shipping companies (see also Finska and Ringbom, 2022) and they define precise rules, even at the level of an individual operator. However, the industry is also embedded in the Alternative Fuels Infrastructure Regulation, with special implications for ports, and the Renewable Energy Directive (European Council and Council of the European Union, 2023c). Moreover, as far as domestic maritime transport is concerned, or domestic navigation as mentioned in an EU regulation, the policy measures for this sector are especially covered in a revised regulation commonly called 'Effort Sharing Regulation', which includes a GHG emission reduction target for specific sectors in EU member states (European Council and Council of the European Union, 2023c; Regulation (EU) 2023/857, pp. 2, 3). In practice, the member states have their own national targets for sectors included in this regulation, but the states work towards a joint EU-level reduction target, which is 40% by 2030 from the 2005 baseline (European Commission, 2023m). However, in this report, we focus in more detail on the five first-mentioned maritime-related directives/regulations, as shown in Figure 2.

Figure 2: Five new EU directives and regulations for the maritime industry

The EU Emissions Trading System

The EU Emissions Trading System (EU ETS), founded in 2005, is a system created for reducing emissions from specific industries in the EU, such as power generation and other energy-intensive industries (European Council and Council of the European Union, 2023c). In the midst of the Fit for 55 initiative, the EU amended existing systems to further reduce emissions in the region. As mentioned earlier, and in line

with the goal of climate neutrality, there was a need to propose changes for this trading system as well, adding the maritime transport industry to the system, among other changes (ibid.). Let it be mentioned that alongside the first EU ETS, the EU is initiating another system for emissions trading for buildings, road transport and some additional industries, according to the European Council and Council of the European Union (2023c). There are many different rules related to the EU ETS, after all, it is one of the most essential climate actions of the EU. The main rules relevant to the maritime sector are presented here. To start with, according to the directive concerning the emissions trading system, the new joint objective of the EU ETS is related to the fact that the emissions of the sectors belonging to the system must be cut by 62% by the year 2030 compared to those of the year 2005 (Directive (EU) 2023/959, p. 142). The inclusion of the maritime industry means that large vessels (with the limit set at 5000 gross tonnage) have to pay for allowances when they emit CO2 emissions, which can be done by buying and using 'allowances for each tonne of reported CO2 (or CO2 equivalent) emissions' (European Commission, 2023e). Offshore ships are to be included in the system later, and adding smaller vessels to the system will be investigated (Art. 3gg and 9 in Directive (EU) 2023/959). As far as the emission allowances are concerned, they can be acquired through auctions and companies will also be able to trade allowances in secondary markets (European Commission, 2023l). According to the European Commission (2023e), the EU ETS includes a limit or 'cap', which determines the maximum amount of emissions that can be released and which will be decreased in time. In practice, this cap is 'expressed in emission allowances' (European Commission, 2023l).

Some special rules are related to maritime companies, for example, the EU ETS covers 50% or 100% of the maritime emissions depending on the situation, guided by the following rule: '50% of emissions from voyages starting or ending outside of the EU' and '100% of emissions that occur between two EU ports and when ships are within EU ports' (European Commission, 2023e). The EU ETS should be an efficient system for cutting GHG emissions generated by the industry. Moreover, according to the European Commission (ibid.), the system will initially include only CO2 emissions, but from 2026, other emissions will be included in the system, that is, methane and nitrous oxide. This decision should further speed up the ability of the region to reach its climate goals. At the beginning, new maritime entrants in the system are to be given mitigations because during a changeover phase, shipping companies are allowed to use allowances for a limited amount of emissions only, but only until emissions are reported for year 2026, which would mark the first time when allowances must be used for 100% of emissions (European Commission, 2023e; Art. 3gb. in Directive (EU) 2023/959). In addition, the directive includes several exemptions, for example, as far as specific ice-class ships are concerned, companies are to be given mitigations due to the winter conditions meaning that they are allowed to use 5 % less allowances than the reported emissions and this rule will apply until 31 December 2030 (Directive (EU) 2023/959). The EU also intends to follow-up possible actions set by the IMO for international shipping, such as global market-based measures (Art. 3gg. in Directive (EU) 2023/959). The new rules for the maritime industry came into effect on 5 June 2023. However, the year 2025 is the first year when maritime enterprises must use allowances for 40% of emissions marked during the 2024 operating year (European Commission, 2023e; Art. 3gb. in Directive (EU) 2023/959). Meanwhile, the related amendments of the EU ETS have implications for another existing regulation, namely the Monitoring, Reporting and Verification (MRV) regulation (European Commission, 2023e).

The FuelEU Maritime initiative

The FuelEU Maritime initiative is also part of the Fit for 55 package. In July 2023, the Council of the European Union approved a new regulation that strives to raise 'the demand for and consistent use of **renewable and low-carbon fuels'** and contribute to decreasing levels of GHG emissions (European Council and Council of the European Union, 2023b). The regulation (EU) 2023/1805) includes several important steps to a more environmentally friendly shipping industry, and the most important ones are summarised here. One of the rules relates to the need for large ships to reduce the GHG intensity in the fuel that they use (European Council and Council of the European Union, 2023b). This initiative also involves a provision of 'reliefs' to companies during the first years of complying with the rules. In particular, a gradual reduction is permitted, which means that the share of reductions grows over time: the reductions should be 2% starting from 2025 and gradually increase to 80% from 2050 onward (Art. 4 in Regulation (EU) 2023/1805; European Council and Council of the European Union, 2023b). The regulation covers 50% of the energy used when a ship departs from a port in EU or arrives to a port in EU while the port in the other end is outside the EU, whereas the regulation applies to 100% of the energy when the ship is within an EU port or sailing from an EU port to another EU port (Regulation (EU) 2023/1805, p. 50). Another rule relates to the use of onshore power while the use of carbon-intensive

energy sources is being decreased. Concerning port stays at large ports in the EU, container ships and passenger ships have to utilise onshore power from 2030 and this rule applies to port stays of at least two hours (Art. 6 in Regulation (EU) 2023/1805; European Council and Council of the European Union, 2023b). However, this rule requires that the infrastructure is available, an issue that is defined in the Alternative Fuels Infrastructure Regulation, which functions as a matching pair of FuelEU Maritime initiative and is presented later. Moreover, this scope will be expanded from the year 2035 to include also other ports that have required onshore power supply in place (Art. 6 in Regulation (EU) 2023/1805).

The regulation mentions the usage of new types of fuels, the so called renewable fuels of non-biological origin (RFNBO), launching 'a special incentive regime' to promote their use (European Council and Council of the European Union, 2023b). Since these fuels are new in the maritime industry, incentivising their use is relevant and may positively contribute to their faster uptake. Additionally, according to European Council and Council of the European Union (2023b), 'an exclusion of **fossil fuels** from the regulation's certification process' is taken into account. This regulation also presents a number of exemptions, for example, similar to the directive concerning the EU ETS, companies operating ice-classed ships are given mitigations due to the special circumstances they operate in (Regulation (EU) 2023/1805, p. 52). The majority of the new rules will come into effect from January 2025, with a few exceptions (European Council and Council of the European Union, 2023b). To conclude, the FuelEU Maritime initiative deals with an extensive regulation that should positively contribute to the uptake and usage of renewable fuels and low-carbon fuels within the maritime industry.

The Alternative Fuels Infrastructure Regulation

As far as the maritime industry is concerned, the Alternative Fuels Infrastructure Regulation (AFIR), in turn, ensures that a minimum number of infrastructure for electricity supply is installed for the use of ships in ports situated at seaside and inland, along with refuelling possibilities of liquefied methane at appointed Trans-European Transport Network (TEN-T) maritime ports (Arts. 9-11 in Regulation (EU) 2023/1804), among others. As mentioned earlier, such infrastructure is essential for more environmentally sustainable ship operations; without proper infrastructure, the mandated actions cannot be done. The directive takes into account different ship traffic volumes of the ports as well as different ship types in order to reach an optimal capacity (see Arts. 9-11 in Regulation (EU) 2023/1804 and p. 10). In practice, this regulation guarantees that infrastructure is in place in main ports and, thus it has implications mainly for TEN-T ports. Additionally, a need for standards regarding the uptake of alternative fuels and their recharging/bunkering is mentioned in the regulation (Regulation (EU) 2023/1804, p. 13). Alternative fuels and their infrastructure are also discussed in article 14 (Regulation (EU) 2023/1804) as regards EU states' national policy frameworks, as the states need to report on their development and uptake.

The Energy Taxation Directive

Fit for 55 takes a new stand on fuel taxation and tax reliefs in the maritime sector. The Energy Taxation Directive (ETD) has been in place since 2003 (European Commission, 2021e). At present, there are ongoing negotiations being made regarding its revision, and the inclusion of maritime industry is among the agenda. The reform of the directive includes major changes in how energy is taxed, namely it will be based on energy content and environmental performance, instead of being taxed according to volume (Baert, 2023), and with the new directive, the most harmful fuels to the environment (i.e. the most highly polluting fuels) will be subject to the highest taxes (European Commission, 2021e). Moreover, the revision of the directive would have a major impact on the maritime industry as one of the changes is related to tax exemptions. The maritime transport has been in a privileged position, enjoying tax-free fossil fuel usage (e.g. European Commission, 2021e). However, these types of 'carrots', also provided for using polluting fuels, are no longer in line with current environmental policies. Incentives should be retained, but as a result of environmentally sustainable actions. Thus, the new ETD would mark the end of such tax reliefs in shipping, as ships' fuel consumption should no longer be exempt from taxes within the EU borders as regards fossil fuels (ibid.). According to data from 2021, there would be a gradual increase in the minimum tax rates for heavy fuels in the maritime industry, whereas 'a minimum rate of zero' would be applied for sustainable fuels during a ten-year period (European Commission, 2021e). This would encourage maritime actors to adopt more sustainable fuels. The ETD has been negotiated for the longest time alongside other Fit for 55 measures in the EU, and it remains to be seen when a final agreement will be reached.

The Renewable Energy Directive

The Renewable Energy Directive (RED) is being updated, which also has an impact on the maritime industry. Earlier, the EU had set a goal according to which 32% of the total amount of energy used must originate from renewable energy by 2030, but a revision of the directive was proposed as part of the climate actions (European Commission, 2021a; 2021f, p. 1). With the updated directive, this amount should add up to a minimum of 42.5% by the same year 2030; however, the region attempts to reach the limit of 45% (European Commission, 2023j; 2023k). Moreover, this change will especially address those sectors that are lagging behind in their development, including the transport sector (European Commission, 2023e). Therefore, the revision of the directive includes a specific target for transport. The implications for the transport sector are as follows: '14.5% greenhouse gas intensity reduction or 29% share of renewable energy in final energy consumption', as well as 'a combined sub-target of 5.5% for advanced biofuels and renewable fuels of non-biological origin, including a minimum level of 1% for renewable fuels of non-biological origin' (European Commission, 2023j). Having said that, these targets concerning the transport sector are related to other maritime transport-related initiatives, such as the use of renewable fuels of non-biological origin and the reduction of GHG emissions that fall under the FuelEU Maritime initiative. The directive also includes targets for the industry, for example, the industry needs to raise its renewable energy usage by 1.6% each year and the share of RFNBO in terms of the hydrogen used should follow specific rules set in the directive (European Council and Council of the European Union, 2023d). The directive was adopted in October 2023 (European Council and Council of the European Union, 2023d).

In addition to the summarised regulations/directives, other EU strategies, plans and regulatory packages influence the maritime transport and/or shipbuilding industries, including their large supply chains. The new and revised EU directives and regulations are essential developments that help drive the change needed for decarbonising the maritime industry. They also have major implications for the ship designs built and updated within the shipbuilding industry. However, some aspects of the initiatives, for example, as regards the FuelEU Maritime and AFIR, have also been criticized for not including ambitious enough targets for the maritime industry (see e.g. Transport & Environment, 2023).

2.3.2 The revised IMO strategy

Aside from the variety of actions under the Fit for 55 package, the maritime industry actors must comply with industry-specific policies, given that the IMO has fought against emissions by setting targets for reducing pollution generated by ships. The International Convention for the Prevention of Pollution from Ships (MARPOL) is an international agreement finalised under the IMO (2023a). This convention includes a variety of rules for both ship construction and international shipping regarding pollution from ships. The Annex VI specifically takes into account the energy efficiency of vessels and their emissions released into the air: for example, the Energy Efficiency Design Index (EEDI), the Ship Energy Efficiency Management Plan (SEEMP), the Energy Efficiency Index for Existing Ships (EEXI), the Carbon Intensity Indicator (CII) and the IMO Data Collection System (DCS) (cf. Finska and Ringbom, 2022) all fall under the MARPOL Annex VI (IMO, 2023b).

Similar to the EU, the IMO has recently informed stakeholders about changes in its industry strategies. The most recent changes under the new '2023 IMO Strategy on Reduction of GHG Emissions from Ships' were decided upon in July 2023 in the 80th meeting of Marine Environment Protection Committee (IMO MEPC 80, 2023). This strategy comprises several important issues regarding the reduction targets of GHG emissions in the fight against climate change.

First, the aim is to continue focusing further on the requirements regarding the energy-efficient design of vessels (IMO MEPC 80, 2023, p. 6). A second element relates to the carbon intensity of shipping companies, which should be reduced; to be more precise, the aim is to decrease 'CO2 emissions per transport work, as an average across international shipping, by at least 40% by 2030, compared to 2008' (IMO MEPC 80, 2023, p. 6). The third additional feature is that the shipping sector must introduce 'technologies, fuels and/or energy sources' that emit zero GHG emissions or represent emission levels close to zero, and that their share should be 5%, aiming at 10%, of the energy used by the sector by 2030 (IMO MEPC 80, 2023, p. 6). Last but not least, the IMO has set a target similar to the climate neutrality of the EU. According to the IMO strategy from 2018 the shipping sector must reduce by half its GHG emissions by 2050 from the 2008 baseline and strive to eliminate GHG emissions completely during this century (IMO, 2018). However, with new changes

taking place, this target was revised in July 2023, and a higher target was set by rushing the timing. The current target is to 'reach net-zero GHG emissions by or around, i.e. close to, 2050' (IMO MEPC 80, 2023, p. 6).

The new strategy has been updated to better meet goals of the Paris Agreement and the SDG of United Nations concerning the fight against climate change (IMO MEPC 80, 2023). However, the revision of the IMO strategy from 2018 is a logical step towards aligning itself with other climate policies as well, such as the EU climate neutrality target, even if they describe strategies at different regional and sectoral levels. In particular, raising the target is important in terms of improving the state of nature. This revision also involves two intermediary milestones at two levels, a minimum required level and a higher level: GHG emissions must be reduced by a minimum of 20% (preferably 30%) by 2030 and by 70% (preferably 80%) by 2040, compared with the 2008 baseline (European Commission 2023c; IMO MEPC 80, 2023, p. 6). The new IMO strategy is an effective and much-needed strategy for the maritime industry, one that complements earlier initiatives and regulations.

2.4 EU funding for climate actions

Apart from the multitude of old and new regulations and directives that aim to respond to the climate crisis, there are also incentives available for businesses. Hence, 'carrots' are combined with the 'sticks'; for example, funding is offered for businesses so that they can partly finance their green transition. The EU supports enterprises transitioning to more sustainable business activities through various financing instruments, such as loans and guarantees, which are provided via financial intermediaries (European Commission, 2023f). Furthermore, in accordance with the original European Green Deal proposal and goals, the EU promotes research, development and innovation through several EU funding programmes, such as the Horizon Europe Programme (European Commission, 2019) and the LIFE Programme for 2021–2027 (European Commission, 2023g), as well as investments in infrastructure through the Connecting Europe Facility (European Commission, 2023h). A temporary recovery instrument, NextGenerationEU, helps, among others, solve challenges and create opportunities for the post-COVID era, in which green values and digitalisation have become increasingly important (European Commission, 2023f). Moreover, part of the revenues that originate from particular directives or regulations are transfered to funds that respond to current climate challenges, for example, some EU ETS revenues are allocated to the Innovation Fund, among others (European Commission, 2023i). In other words, money generated from the trading system is allocated to this fund to boost, for example, technologies and processes that reduce GHG. As a new stepping stone to greener maritime-related innovations, part of the fund will now be assigned to the use of stakeholders within the maritime industry (Ovcina Mandra, 2023).

Some 'carrots' are further dedicated to specific regions within the EU. With respect to the BSR, the funding provided by the Interreg Baltic Sea Region Programme is especially addressed to the challenges and opportunities emerging in this region. Several needs and solutions mentioned in the Programme correspond to the European Green Deal targets, such as those identified under programme objective Blue Economy, which also covers the shipping sector (see SFC2021 INTERREG Programme).

In addition to these funds, the Energy Taxation Directive, under negotiation and presented earlier, represents a kind of reward for maritime enterprises (i.e. 'the less heavy emissions you produce, the less you pay in taxes'). At the same time, the EU ETS also encourages switching to alternative fuels and clean technologies because emissions have to be paid for. Whether it is a stick or a carrot depends on the interpretation of the situation; however, once the enterprises have made their initial investments in new sustainable fuels and in low- or zero-carbon technologies, they no longer have to pay such large sums for emission allowances.

Given the details of the regulations and policies mentioned above, several essential questions may arise. How do businesses within the maritime industry manage the complex and ever-tightening regulatory environment? Furthermore, how many businesses know about these incentives and funding possibilities and maximise such opportunities? Is the funding provided sufficient for the green transformation? Our next section examines the subject from the perspective of maritime industry businesses.

3. THE SHIPBUILDING INDUSTRY'S PERSPECTIVES REGARDING ENVIRONMENTAL DEMANDS

3.1 Perspectives of shipbuilding firms

The empirical research data on shipbuilding companies were collected through 25 interviews conducted in 2021–2022, which aimed to explore the views on the green transformation of stakeholders in the maritime industry. The interviews were conducted with the representatives of firms operating as part of a long-established European cruise shipbuilding network. These firms represent different types of firms in the network, varying from large shipbuilding companies to their international engine suppliers and small interior-outfitting suppliers. To understand their views on sustainability advancement and the ensuing demands to combat climate change, we discussed both the related opportunities and challenges.

All the interviewed companies acknowledged the tightening environmental regulation in the industry. This regulation was seen as an inevitable step forward in sustainability advancement, yet at the same time, it is considered an ambiguously evolving and bureaucratic burden that is possibly difficult to meet. The latter view results from the uncertainties of how the foreseen regulations will be implemented in practice and what will emerge in the future. Indeed, some firms are actually waiting for further regulations before proceeding with their green innovation activities to avoid developing something that will not be supported, favoured or standardised in the future. Another perspective that emerged from the interviews is that the regulatory environment seems to be thightening rapidly, solidifying the competitive advantage of those firms that have proactively started to develop the right things; someone needs to offer the solutions that can become new standards. For example, the CSRD on the EU reporting of sustainability is expected to provide a real push for firms, as it required network-level reporting, although many smaller and even larger firms do not have capabilities and systems in place to meet these rapid and still somewhat ambiguous reporting demands. Nevertheless, the rapidly approaching reporting deadline motivates firms to meet their reporting responsibility, take leadership in their networks, and initiate systemic changes in their respective supply chains.

Leadership and demand, indeed, emerge as central issues. While sustainability advancement is increasingly driven by growing customer interest but most urgently by regulatory demands, there is no paying customer awaiting new reporting system outputs or greener solutions. This leads to a chicken-and-egg problem, in which firms turn to each other asking for leadership and instructions. For example, a shipbuilding company asks its suppliers to deliver their best zero-carbon innovations, while suppliers expect the shipbuilding company to determine what they should develop and for what return. Such a feasibility issue is a true challenge for smaller firms that do not know how actively or how soon they should start reducing their carbon footprints, for example, or use recycled or recyclable materials. Such development activities come with considerable R&D costs that, amidst inflation and other forms of market turbulence, may be beyond the reach of many firms, not to mention the issue of whether they will have returns on those investments. For example, the interviewees report that an American cruise passenger is not currently likely to pay extra for an ecological cruise, which means that the R&D activities required for meeting the policy objectives may not be economically feasible. However, there is no option to leave them undone, either.

Consequently, in a game of 'push-and-pull', there are plenty of pushing 'sticks', while more pulling 'carrots' would also be highly needed. Public funding is quite openly available for environmental R&D activities, and many of the interviewees are familiar with such opportunities and ongoing projects. In fact, some of them are already taking part in such projects. However, individual inter-firm R&D projects often suffer from the inadequate activities of the partners, unoptimal information exchange, and the inability to extend the partner involvement to broader surrounding networks. Thus, to spread the positive effects of the existing green incentives as widely as possible, the interviewees from the representative firms mentioned that they would appreciate more information about the support systems for sustainability advancement.

3.2 Perspectives of maritime industry associations

Association-level data were collected via interviews and a workshop among five key maritime industry association representatives in Europe. This part of the data collection process took place in the spring of 2023. These organisations represent the industry's perspectives regarding policymaking at the EU and the IMO, and the interviewees are well aware of the developments in both arenas.

The association representatives are highly familiar with the upcoming regulations. They relay information about such news to the industry firms and, in turn, bring the businesses' concerns to the policymakers through various board memberships, events and other connections. These interviewees feel that ambitious regulations are a necessary driver of sustainable advancement as they push hesitating firms forward. In accordance with the firm representatives, the association members also voiced their sincere concerns about the urgent need to mitigate climate change.

However, the association interviewees also acknowledged the practical challenges that hinder the effective implementation of the regulations and policies at different levels. For example, similar to the shipbuilding industry firms, they are worried about how to trigger innovative investments that would truly have an environmental impact, how to find paying customers for those innovations and, most urgently, how to find experts that can deliver such innovations. Indeed, for the association representatives, the lack of human resources was even a more pressing issue than financial resources, as they already perceive that financial support for eco-innovation is quite widely available. The increasing scarcity of highly educated industry experts and the workforce in general is a continuously worsening problem in many Western economies with smaller young generations. Furthermore, international competition to attract the brightest minds and highly skilled talents has been tough. In addition, given the global nature of this business, competition is also an important concern whereby European firms and networks must compete with the emerging lower-priced shipbuilding industries, particularly in China, without the bureaucratic and financial burdens set by tightening international regulations. For example, if an American cruise liner is not willing to pay extra for more ecological vessels, what is the competitive advantage of green innovations over lower-cost Chinese vessels? Moreover, the state support for green innovations for example in China, and particularly in the US as a result of the Inflation Reduction Act (IRA), has currently reached completely different spheres than the EU can offer, thus indicating a clear challenge to the business competitiveness and green forerunner position of European industries.

To overcome these challenges, the association representatives first call for the creation of international pools of experts in the region. We need clever minds more than ever. The demand for niche sustainability experts can be highly occasional, yet their presence could be secured with combined actions, projects and permanent development organisations that can be utilised by all members of the network. In addition, the interviewees highlight the importance of increasing and developing relevant education and training programmes to heighten the availability and flexibility of the workforce. In the future, it is also of great importance to invest in attracting and keeping international students in the region.

Regarding their plans for their businesses, the association interviewees recognise that green transformation starts from the commitment and vision of key actors who operate as system integrators in their respective networks. Moreover, it is not enough to simply optimise some parts when the whole system requires change. By identifying their networks, setting and communicating their sustainability actions and forwarding practical development goals in their networks, the wider business field can fully commit to green transition. Regarding policymaking and the associations themselves, the interviewees all agree that further rewards must be developed and the existing ones must be made visible. Furthermore, the interviewees suggest better tax support for green investments and continuous engagement in the design of future EU programmes to facilitate green transition, among others. To help more businesses benefit from EU innovation funds, support opportunities must be better communicated by policymakers and associations. Such funds should also be more easily accessible to different kinds of firms in the region. Last but not least, the interviewees emphasise that all actors related to the maritime industry must continue working for increased awareness within the region and among local maritime networks. In this way, international investors and other potential partners can find us and join the green transition.

In summary, the maritime industry representatives largely share the same concerns, viewed from different angles based on their respective positions in the industry. Overall, the views are still positive, and everyone involved perceives the European maritime industry businesses as forerunners in global green transformation. Nevertheless, their ideas concerning what kinds of policy actions are required to make this position sustainable allow us to provide practical recommendations for the future.

4. CONCLUSIONS

This report synthesises the current policy environment that has implications for the European shipbuilding industry and sheds light on the perspectives of focal businesses and associations that are influenced by and influence the development of the policy environment. The number of green-oriented policies may seem overwhelming at first. Do all these climate policies and strategies relate to one another? Regardless of whether they are global, regional or sectoral, all of them are interlinked.

First on the list is the Paris Agreement to which many countries are legally committed. The European Green Deal, including the European Climate Law, is a regional effort of the EU that aims to contribute to the objectives of the Paris Agreement (e.g. European Council and Council of the European Union, 2023a). The IMO strategy is only related to the international shipping sector. Having said that, it is similarly paired with the effort of the Paris Agreement and UN's SDG concerning the climate change (IMO MEPC 80, 2023). Furthermore, also the European Green Deal is connected to the United Nation's 2030 Agenda and SDGs (European Commission, 2019, p. 3). Therefore, all these policies share a common goal: to make a change in the state of nature and the welfare of people and nations by decreasing the amount of GHG emissions or achieving climate neutrality to help mitigate global warming.

While the daily business of maritime industry companies focuses on competitiveness and economic sustainability, it is clear that environmental considerations have entered the realm of daily work as well. Given the increasing complexities involved in the international business environment, relevant regulations and other policy tools should be further developed for maximum impact while simultaneously providing a competitive boost for the European maritime sector. On this basis, we present the following recommendations for policymakers, namely, the 'six tricks' to support sustainable shipbuilding.

1. Understand the reality of SMEs in achieving sustainability advancement

While policymakers at different levels look at the industry more generally, it would be highly useful to obtain on-the-ground information regarding developments in the industry, not only through associations that easily advertise forerunners. Convincing all stakeholders of the importance of sustainability development means developing 'sticks' and even more 'carrots' that provide incentives to encourage resource-constrained smaller firms to invest in the development of greener solutions. The development of effective support actions depends on a realistic understanding of the status and challenges of those actors who are most in need of support.

2. Provide easy access to real-time policy information

Information on the current policies, regulatory frameworks and support systems is embedded in heavy, jargon-filled documents that are scattered in different depositories. When compiling this report, we noticed that it can be quite tricky identifying the key points of such long regulatory papers, let alone understanding whether the website contains the latest information and guidelines. For maritime industry business representatives, it can be highly challenging to keep up with the tightening demands and their practical implications, even with the help of the authorities and industry associations. Thus,

improving business policy communication would be helpful, along with providing an easy access to up-to-date guidelines delineating where the industry should be going and how.

3. Organise free events focused on sustainability advancement

Information on sustainability-supporting policies is widely available, and numerous events are organised around these themes. However, there cannot be too many of these. While the forerunners in green transition are often present in such events, it is also important to spread the message of the policy objectives, means and support systems for the wider industry audience. In this way, those who are not yet active in this sphere would be armed with better information to make sense of what and how they could act upon the green transition. Freely and easily accessible events, held virtually and face-to-face, were the most preferred means cited by the interviewed business representatives. In addition, it would be useful to arrange events that facilitate the collaborative generation of ideas pertaining to sustainability in different maritime industry settings and the shared understanding of such ideas.

4. Create a pool of sustainability experts

Given that the association representatives pointed to the lack of sustainability experts in the maritime industry, it would be highly useful to pool such expertise and support its easy availability for various firms. For instance, not every small or medium-sized firm must employ its own sustainability specialist; instead, it could seek advice on how to integrate sustainability development practices into all of its processes. Given that obtaining such services from consultants can be out of reach for some firms, creating an international pool of experts could be a useful source of advice. In addition, strong investments and developments should be targeted at the (international) re-education and training services of people within and outside the maritime sector, thus allowing for an increasingly flexible international labour pool.

5. Design more 'carrots' instead of 'sticks'

The European shipbuilding industry environment would benefit greatly from advanced financial incentives, such as those currently generously offered in the US market. As demonstrated in the previous sections, the EU proceeds with its green transition objective with a more regulatory approach. Although it is seemingly successful in pushing firms to develop more environmentally friendly solutions, it can also be damaging for those who are in global price competition against counterparts that are not required to invest in complying with such regulatory burdens. While the European resources for generous incentives are different from those in the US, it would still be important to improve this aspect (e.g. through further R&D funding and tax reliefs) for the sake of market-driven development motivation and business sustainability in economic terms. Moreover, such incentives should be easily accessible to firms of all sizes.

6. Push the green transition forward globally

As the EU can influence the development and direction of its internal market, it is important to continue its active pursuit of its goals and values globally. This power to influence others derives largely from its economic power, which is why the top priority should be to keep the EU economy strong and healthy. In foreign interactions, all means to promote green transition must be employed, thereby increasing the demand for European green solutions, such as in the maritime sector. This legitimises all the efforts required from businesses to advance the generation of eco-innovations and materialises the anticipated forerunner advantages in the standardisation of green solutions in global competition.

In conclusion, the regulatory environment provides the necessary 'sticks' to advance the green transformation in the maritime industry in Europe. However, taking into account the global business networks and competition in which the related businesses are involved, the increased generation of incentivising 'carrots' is also necessary. The aforementioned six tricks may sound tricky, but they are actually rather simple suggestions that lay down the groundwork for more practical and innovative policy ideas. Through positive and supportive actions, firms are not only pushed forward, but increasingly encouraged to find their own paths and innovate their own roles in sustainability advancement, thereby strengthening the competitiveness of the entire region.

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