

Zero carbon – what, when, where?

The long and winding road towards decarbonised shipping

OneOcean

The global maritime sector is under increasing pressure to reduce the environmental impact of its operations. With new regulations emerging in 2023, all industry players will have to react to new requirements and considerations. In this article, we will give a whirlwind tour of the next environment regulations coming into force and what to expect on when and how they will be implemented based on comparable past initiatives.

Meeting the targets set by the International Maritime Organization (IMO) for reducing shipping's carbon footprint will not be easy. The IMO's decarbonisation target is to reduce carbon intensity by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008 levels. Total annual greenhouse gas (GHG) emissions should be reduced by at least 50% from 2008 levels by 2050. To make these goals a reality, planning and effective strategic preparation on the part of vessel owners will be essential.

A new generation of regulations

In support of these targets, the IMO has adopted a new generation of mandatory regulations. These include the Energy Efficiency Design Index (EEDI), which is mandatory for new ships, and the Ship Energy Efficiency Management Plan (SEEMP) for all ships. In 2016, the IMO also adopted as mandatory the Data Collection System (DCS). This requires owners of vessels of more than 5,000 gross tonnage (GT) to collect and report fuel oil consumption data.

In 2021, the IMO adopted short-term measures to reduce the carbon intensity of all ships by 40% from 2008 levels by 2030. Entering into force in 2023 will be the Energy Efficiency Existing Ship Index (EEXI), which applies to ships of 400 GT and above.

Also taking effect in 2023 will be the Carbon Intensity Indicator (CII) regulation. CII is a measure of how efficiently a ship transports goods or passengers and is given in grams of CO₂ emitted per cargo-carrying capacity and nautical miles. It applies to all cargo, RoPax, and cruise ships above 5,000 GT, and is intended to determine the annual reduction factor within a specific rating level. [For more information about these regulations, see p22.]

In order to determine the carbon intensity rating, the actual attained annual operational CII will need to be documented and verified against the required annual operational CII. The rating will be scaled from A (major superior) to E (inferior performance) levels. The performance level must be recorded in the ship's SEEMP. A rating of D for three consecutive years, or E, will require a corrective action plan to be submitted. Administrations and port authorities may be encouraged to provide incentives to ships with an A or B rating.

At the regional level, the European Union's 'Fit for 55' plan aims at reducing GHG emissions by 55% by 2030. The package was proposed in July 2021 by the European Commission and could become law during 2022.

Future regulatory scenarios

Implementing changes to the way the maritime industry operates is a process that takes considerable time. The past could give a good indication as to what may occur with this latest round of regulations.

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For example, by looking at the IMO regulations limiting sulphur levels in fuel and nitrogen oxide (NOx) emissions, we can get an understanding of the time needed for implementation. The protocol setting limits on sulphur content in fuel and NOx emissions was adopted in 1997 as part of the International Convention on the Prevention of Pollution from Ships, (MARPOL). However, it required acceptance by 15 states with not less than 50% of the world's merchant shipping tonnage and could only become effective 12 months after that. The required acceptance was finalised in 2004 and the regulation became effective in 2005. Three years of examination followed before the revised protocol was adopted in 2008, and two more years before it had legal force and effect in 2010.

Furthermore, whereas the global limit for sulphur content in fuel was originally set at 4.5% mass by mass (m/m), it was reduced to 3.5% m/m, and from January 2020 to 0.50% m/m. Within emission control areas (ECAs), the limit on sulphur content has been lowered to 0.10% m/m. Limits for particulate matter emissions have also been lowered.

Similarly, the global Tier I NOx limit of 17.0 g/kWh set in 2000, was reduced with Tier II in 2011 to 14.4 g/kWh. In ECAs, the limit is as low as 3.4 g/kWh. These examples illustrate the potential for lengthy implementation of regulations. Not only did the protocol take 13 years before it entered into force, but the milestone limits have continued to be adjusted since.

Using these examples, we can expect the new generation of regulations and restrictions will have bold deadlines which will likely be subject to change over time. Already the IMO is looking at possible exclusions and corrections to the calculation of CII ratings and, as the practicalities of meeting these deadlines becomes a reality, further corrections may very well come to the fore.

Current trends towards compliance

Currently, the focus for compliance is on technological improvements that deliver greater fuel efficiency and reduce emissions. Zero-carbon marine fuels, such as methanol, ammonia, and hydrogen which are slowly emerging as options.

For EEXI, the currently most favoured options to achieve compliance appear to be engine power limitations (EPL) and shaft power limitations (ShaPoLi) – although, as previously highlighted by The Nautical Institute, care must be taken to ensure that these limitations do not pose safety issues. Other potential solutions include batteries, waste heat recovery systems, air lubrication technology and wind-assisted propulsion.

Nevertheless, hardware alone is not sufficient, as software is necessary to deliver the data needed to connect operations and emissions, to track results and to support proper decision making. Most importantly, planning and engaging with the requirements by auditing current practices and developing strategies for meeting the objectives will be essential.

The process of determining and outlining the strategic steps necessary for compliance is hindered by the disconnect between vessel owners and managers. While ship owners carry responsibility for their vessels' compliance with CII and SEEMP regulations, many employ ship management companies who control the operational budget and make the actual onboard operational decisions. Further, the owner's responsibilities may compete with the charterer's commercial intentions. Complete transparency between the ship and all shoreside stakeholders can help alleviate this situation by allowing for a higher level of shared and consolidated planning before and during voyages.

The latest IT solutions and software platforms to enable real-time communication between ship and shore are, therefore, essential to efficient emissions reduction. Collaboration between all stakeholders will be needed if both compliance and commercial interests are to be met.

The key to compliance lies in adopting a holistic and proactive approach to improving fleet-wide environmental performance. Knowing and realistically assessing the company's current efficiencies and deficiencies over the short and longer term will be an important starting point.

Urgent action is needed

Maintaining a complete understanding of all the relevant regulatory details is challenging, to say the least. To be aware and keep track of all the regulations in force during the voyage, while at the same time being fully occupied with routine operational duties, can easily lead to human error. Again, software-provided data will be essential.

The industry needs to act quickly and effectively if the GHG reduction targets are to be met. Failure to be adequately prepared and positioned for compliance could be extremely costly and could lead to the loss of any competitive edge. Although difficult, full compliance will involve aligning traditional operational habits with actions necessary under the new regulations.

Developing a market behaviour model based on historical experiences will be a major focus area as efforts to decarbonise operations are implemented.

Further insight into this subject will be available from a OneOcean white paper to be published in the coming months.
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