Foresight

Regulation and market measures combine to reshape the shipping market

The IMO's short term GHG strategy, together with the Poseidon Principles will have an impact on the industry far beyond the reduction of emissions.

Whilst shipping markets continue to face the fallout from an unprecedented year, global regulation of the industry continues to gather momentum, with efforts to reduce the maritime industry's carbon footprint transitioning from simply recording emissions into concrete measures to reducing them.

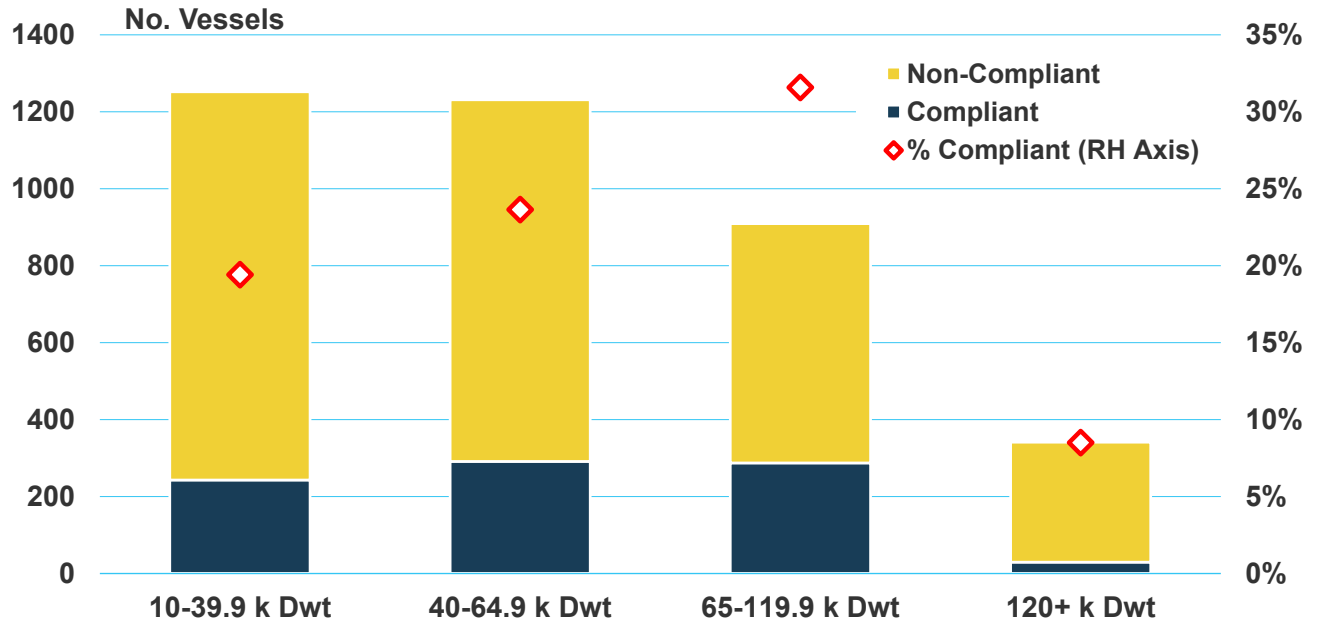
Central to these efforts is the International Maritime Organization's (IMO) initial greenhouse gas (GHG) reduction strategy. For anyone with even a passing familiarity of the shipping markets in recent years, this is well-trodden ground. However, it is worthwhile briefly recapping its stated aims.

As a pathway towards reduced CO2 emissions consistent with the Paris Agreement temperature goals, the initial GHG strategy envisages a reduction in the carbon intensity of transport work, across international shipping, of at least 40% by 2030 and pursuing efforts towards a reduction of 70% by 2050, compared to a 2008 benchmark. The strategy also aims to reduce total annual GHG emissions from internal shipping by at least 50% by 2050, again compared to 2008 levels.

The 76th session of the IMO's Marine Environment Protection Committee (MEPC) was held remotely in mid-June. Amongst other actions taken, the IMO adopted extensive new CO2 regulations applicable to existing ships. Foremost, amongst these were guidelines relating to the implementation of three key measures: (1) the Energy Efficiency Existing Ship Index EEXI; (2) the Carbon Intensity Indicator (CII); and (3) the enhanced Ship Energy Efficiency Management Plan or (SEEMP).

Despite the severe impact these measures will have on shipping, the market's understanding of their practical implications is limited at best. This is unsurprising given the evolving nature of the regulations, the underlying requirements and calculations. To shed some light on

Chart 1: Percentage of Dry Bulk Carriers Calling at EU Ports Estimated to be EEXI-Compliant (2019)



the impact the regulations will have on shipping, this article will combine the provisional guidance provided by the IMO with MSI's proprietary modelling framework to examine the alignment of the dry bulk carrier fleet with these three measures when they apply from 2023.

EEXI

To date, the greatest clarity exists round the EEXI. The EEXI is a one-time, technical measure based on the design of the ship, equivalent to the Energy Efficiency Design Index (EEDI), with some adaptations due to limited access to design data. It is an assessment of a vessel's theoretical efficiency, and shipowners will have to demonstrate that the vessel meets the prescribed levels of energy efficiency. It applies to all vessels above 400 GT falling under MARPOL Annex VI and will be applicable from the first annual, intermediate or renewal IAPP survey after 1st January 2023. Owners will have to show their vessels are in compliance with the EEXI standards – equivalent to EEDI phase 2 or 3 for newbuildings – or take action where required to bring the vessel into compliance.

Since a vessel's EEXI, or indeed its EEDI, is not publicly available data, it is impossible to precisely quantify the number of vessels which will not be compliant. However, it is possible to make an estimate of the proportion of the fleet which would need adjustments to bring them into compliance, based on 2019 data published under the EU's Monitoring, Reporting and Verification of CO2 Emissions (MRV) system.

Chart 1 shows the fleet of dry bulk carriers calling into EU ports during 2019, categorised by whether MSI estimates them to be compliant or not with the EEXI legislation. Because the EEXI value is broadly comparable to its EEDI, the estimations used in this chart are based on an assessment of whether the EEDI of individual vessels meet the standards applicable to the dry bulk carrier fleet as of 1st January 2023. While we have used the EEDI for vessels where known, many are not reported. In these instances, a vessel's EEDI has been estimated by using its Estimated Index Value (EIV), which is a simplified form of the EEDI. A paper published by TU Delft proposed that a suitable adjustment factor for the conversion of EIV to EEDI is 0.86; we have used this in our own calculations.
As Chart 1 shows, compliance for all dry bulk carrier segments below Capesize is between 19-32%, whilst less than 10% of Capesizes are estimated to be EEXI-compliant. Whilst this analysis is only applicable to dry bulk carriers trading to and from the EU, we have no reason to be that these levels of compliance are not representative of the global fleet. Ultimately, most dry bulk carrier owners will have to take some level of action to comply with the EEXI.

The two primary methods of compliance with EEXI requirements will be via engine power limitation (EPL) or the installation of energy efficiency technologies. It is believed that for many vessels the most cost-effective and efficient means of compliance will be to apply an EPL, which in turn would reduce the maximum speed of a vessel, although the EPL could be overridden for safety-related reasons.

From the market's point of view, the key question is the extent to which the widespread implementation of EPLs would impact actual vessel trading speeds. Chart 2 provides some insights into the scale of EPLs which would be needed to impact the actual average performance of the dry bulk fleet, by comparing the average design speed of the vessels (as recorded by IHS Fairplay) with the actual average and upper quartile sailing speeds recorded over 2020.

As the chart illustrates, most dry bulk carriers are already trading well below their design speed, and only a significant EPL in the order of a 30% reduction would start to bite into the actual trading performance of the fleet. In other words, our view of the impact of the EEXI on the trading speed of the overall fleet is not particularly significant. Similarly, the ramifications for overall vessel supply are not extreme, with all but the least efficient dry bulk carriers suffering only a marginal loss in competitiveness at most.

CII and SEEMP

This is not to say that these regulations as a whole are without bite. We believe that by targeting a vessel's actual operational CO2 emissions, rather than its theoretical, technical emissions, the CII is likely to

have significantly greater impact.

Essentially, the CII is a measurement of how efficiently a ship transports goods or passengers and is cited in terms of grams of CO2 emitted per cargo-carrying capacity and nautical mile. Taking effect from the start of 2023, all cargo, RoPax and cruise ships above 5 k GT will be assigned an 'attained' CII based on their annual performance.

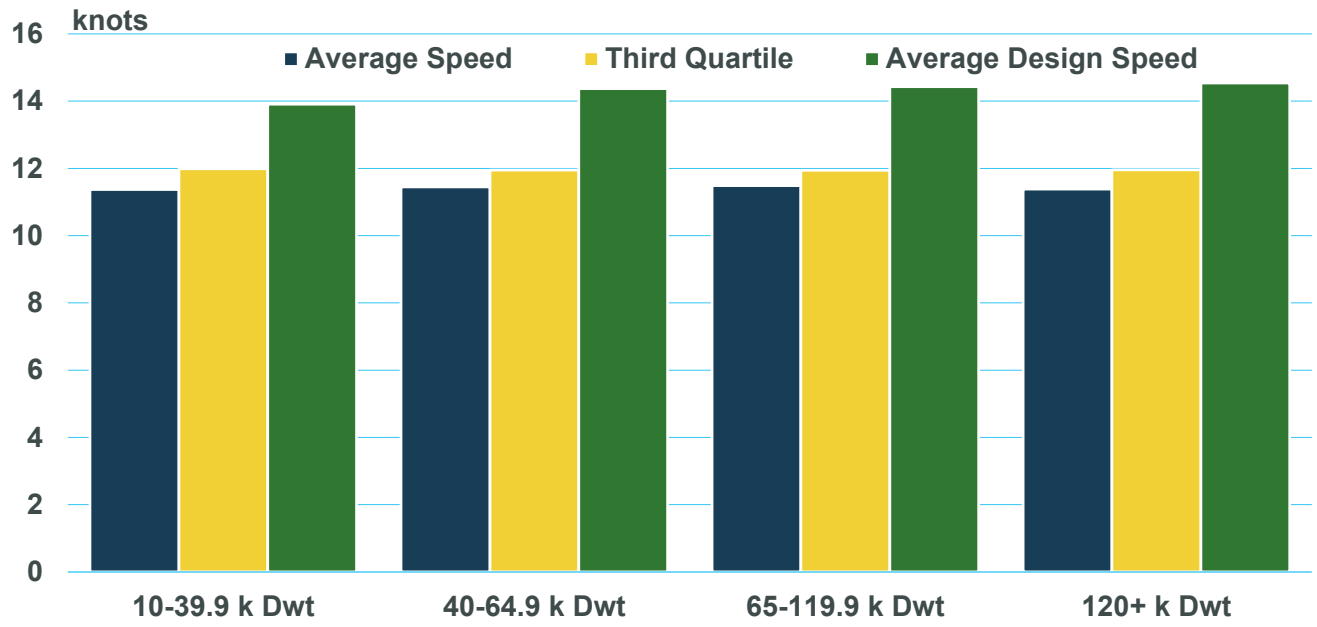
The annual attained CII will be calculated using data reported via the IMO's Data Collection System (DCS). This attained CII will then be measured against a benchmark level or 'required' CII. Ships will be given an operational carbon intensity rating from A to E according to how their attained CII compares to the required CII. A-C ratings indicate that a vessel has met its CII requirements. Ships that achieve a D rating for three consecutive years or an E rating in a single year will have to develop and have approved a corrective action plan as part of their enhanced SEEMP.

Crucially, the CII is a progressive measure, with vessels' required CII adjusted downwards each year, becoming increasingly stringent in line with the targeted global improvements in CO2 emissions. Using 2019 as the base year for the required CII reference lines, the reduction factors are set at 1% per year for 2020-2022 and 2% per year for 2023-2026. The reduction factors for 2027-2030 will be decided as part of the review to be concluded by 1st January 2026. It is widely believed that the reduction factors which will be imposed from 2027 onwards are likely to be of a greater scale than 2%.

For different ship types, the calculation underlying the attained and required CII is based on different ways of measuring the carbon footprint of the transport work. The first is the Annual Efficiency Ratio (AER), which uses the parameters of fuel consumption, distance travelled and cargo-carrying capacity. This is a measure of CO2 emissions per Dwt-Nm and is used for shipping sectors where the cargo is weight-critical. This includes all of the main ship types, such as tankers, dry bulk carriers, containerships, gas carriers and other commodity cargo ships. The second is capacity gross tonne distance (cgDist). This is a measure of CO2 emissions per GT-Nm and is used for volume-critical cargo, specifically cruise/passenger ferries, PCTCs and Ro-Ro passenger ships.

At the end of June, MSI began publishing an indicative AER for 2020 for over 21,000 ships currently in service across the major shipping markets via our

Chart 2: Dry Bulk Carrier Design and Actual Sailing Speeds



online HORIZON asset valuation platform. Our AER calculation follows a simplified methodology to the 'bottom-up' estimates created for the IMO's Greenhouse Gas Study. In summary, we have calculated an estimate for individual vessels' fuel consumption in 2020 from three sources: the main engine, auxiliary engines and boilers. Each of these corresponds to associated CO2 emissions. The total emissions are then divided by the relevant measure of transport work for the ship type under consideration, namely the multiple of the ship's cargo-carrying capacity and the distance it travelled in 2020.

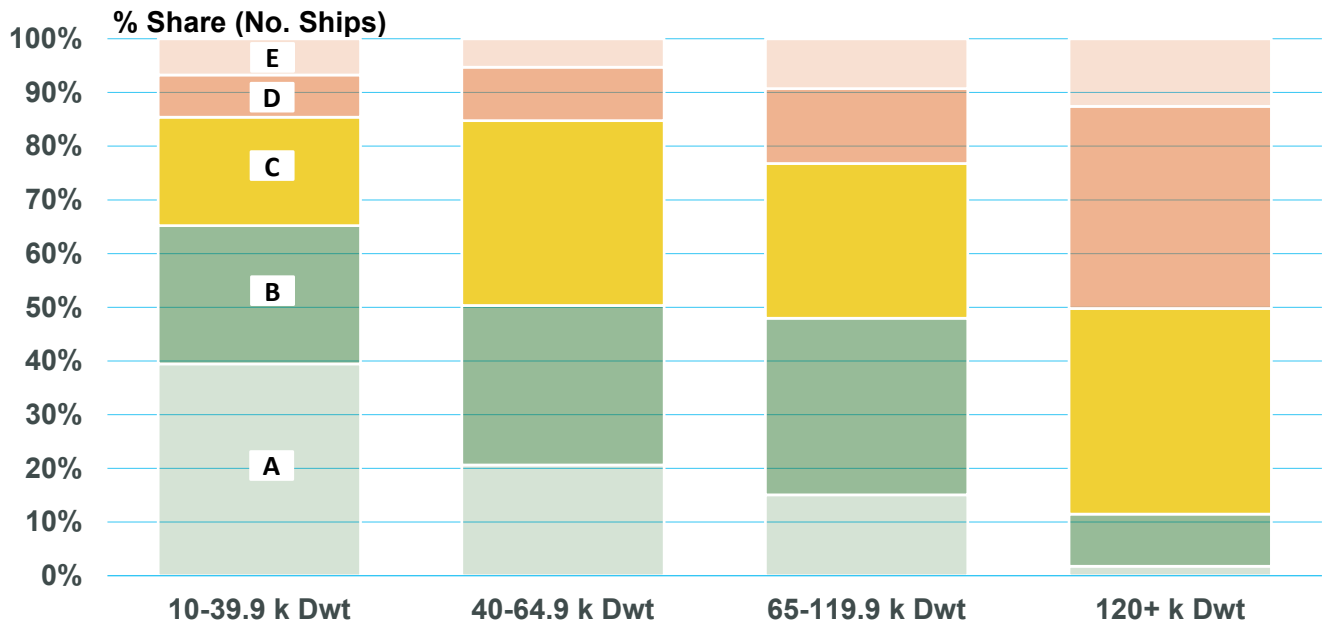
Whilst the main determinants of fuel consumption are taken into account in this approach, many lesser factors, such as vessel draught and weather conditions amongst others, are not. Bearing that in mind, for most ships under typical operations, MSI's AER estimate should provide an indicative position of the actual reported value.

Using these indicative AER figures for 2020 in conjunction with the technical guidelines on carbon intensity reduction adopted at MEPC 76, it is possible to assign a provisional attained CII to individual vessels based on their activity and performance in 2020. By comparing these against their required CII for 2023, when the regulation comes into force, we can gauge the readiness of the existing fleet under their current operational parameters at both the individual vessel and an aggregate level.

There are some notable caveats to our analysis. First is the indicative nature of the AER figures we are publishing as detailed above. Second, we are comparing attained CII figures from 2020 with required CII benchmarks for 2023. Finally, it is important to remember that the CII calculations will be further improved through correction factors in a separate guideline that will be developed next year. Nevertheless, for the time being, it is an instructive exercise in helping us to better understand the lay of the land.

The results of this provisional analysis for the existing dry bulk carrier fleet are outlined in Chart 3. Overall, it does not appear as if the regulations will be too onerous for dry bulk carrier owners when they initially come into force. Based on estimated 2020 AER figures and provisional attained CII based on the technical guidelines on carbon intensity reduction adopted by the IMO, 77% of the existing fleet attain a minimum CII rating of C or better; meaning that only 23% of the dry bulk carriers currently in service would require corrective action. Proportionally, the non-compliant

Chart 3: Estimated CII Ranking of the Dry Bulk Fleet (2020 Attained CII vs. 2023 Required CII)



vessels are heavily weighted towards the larger size ranges. Over 80% of all sub-Capesize dry bulk carriers would be rated C or better, whereas only 50% of Capesizes would be rated A to C.

These results support the criticism of some market participants and environmental organisations that the reduction targets are not ambitious enough. However, it is important to bear in mind that these targets will get progressively more stringent as the decade progresses, impacting an ever-increasing percentage of the ships currently in service.

If a vessel does need to take corrective action, there are several options open to the ship owner. The CII is based directly on a ship's fuel consumption, which is influenced by its technical efficiency and the fuel used in conjunction with operational parameters. Several options for technical and operational improvements are available.

As well as the earlier-mentioned limiting of engine loads, these include retrofitting vessels with energy-efficient technologies and switching to lower-carbon fuels. Both these routes to compliance involve additional CAPEX, with retrofitting an engine to burn LNG often being prohibitively expensive, particularly for older tonnage – although burning a percentage of biofuel as a 'drop in' fuel could be a more viable option. The most cost-effective means of compliance is likely through the optimisation of operational parameters. This will involve close cooperation between the ship owner and charterer, with this becoming a particular challenge when the vessel is on a timecharter. Indeed, for some sectors such as container shipping – where time charters are very much the norm – the application of a tightened version of CII requirements will likely require a rethink of chartering arrangements.

The very real downside risk for owners is that ships operating in the lowest CII ratings of D or E, or those that struggle to demonstrate improvement, could well be subject to chartering penalties or reduced employment levels, even if they are relatively young. This is likely to create an ever-growing pool of vessels that is at a commercial disadvantage.

While the implications for individual owners may be onerous, there is some upside, particularly at a macro level. The CII is likely to encourage the scrapping of less efficient tonnage, stimulating newbuilding demand. Similarly, if widespread slow steaming is adopted by the industry, it will have a significant impact on additional incremental vessel demand. Using MSI's proprietary models, we can calculate the impact if the dry bulk fleet slowed down, on average, by one knot to reduce its emissions and improve its CII rating. For the dry bulk carrier sector, this would imply a reduction of available supply of around 52 Mn Dwt, which equates to roughly 6% of the fleet.

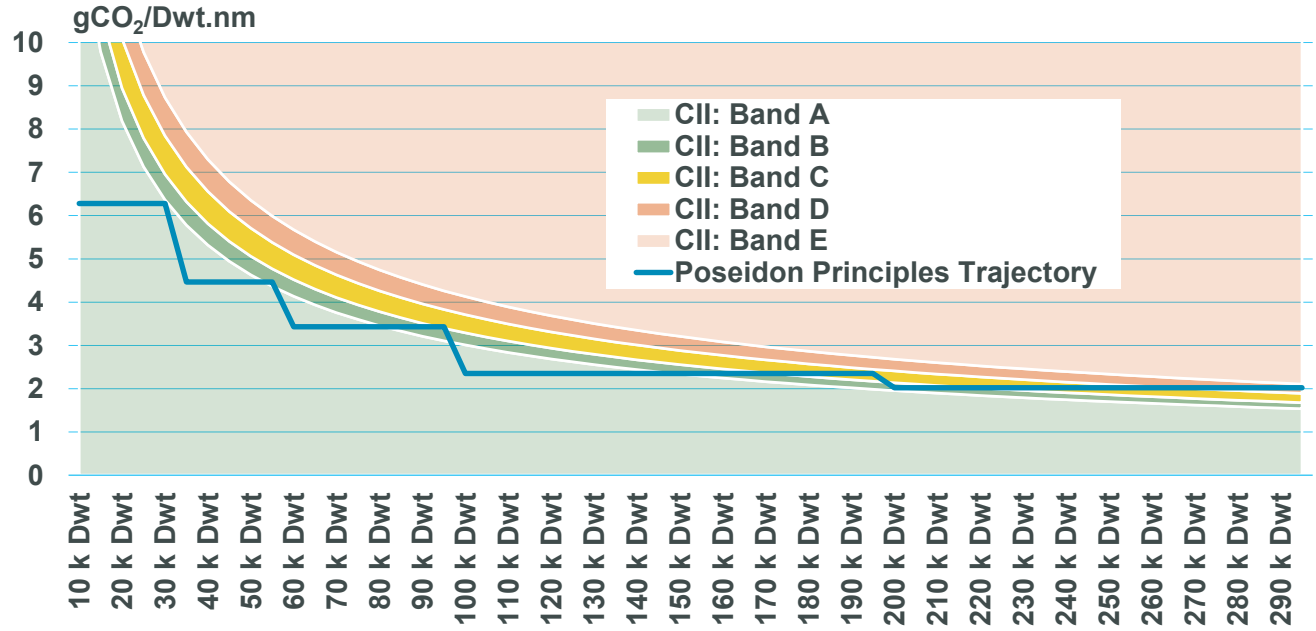
AER and Other Environmental Initiatives

The CII is not the only market measure that uses AER as its carbon intensity metric. The Poseidon Principles also employs the AER as a key part of its methodology in its efforts to assess and disclose the climate alignment of ship finance bank portfolios. While it does so in a manner that is consistent with the policies and ambitions of the IMO to reduce greenhouse gas emissions for shipping, there are notable differences in the decarbonisation trajectories it uses. The following graph outlines the AER banding of CII ratings in 2023 for dry bulk carriers and compares it with the latest 2023 decarbonisation trajectory for the Poseidon Principles (Version 4.0 published June 2021).

The decarbonisation targets of the Poseidon Principles, at least in the short-term, are considerably stricter than those of the CII. For most of the sub-Capesize fleet, compliance with the Poseidon Principles' decarbonisation trajectory in 2023 effectively equates to the highest CII rating of A. It is only for dry bulk carriers larger than 250 k Dwt that the requirements of the CII become comparable with those of the Poseidon Principles.

The considerably more lenient requirements of the CII are made readily apparent by comparing the estimated CII ranking of the existing dry bulk carrier fleet in 2023, as detailed earlier in this article, with how the same vessels compare to the Poseidon Principles decarbonisation trajectory in 2023. As previously stated, based on 2020 AER figures, 77% of the existing

Chart 4: 2023 Compliance Trajectory Values of the CII and Poseidon Principles (Version 4.0)



dry bulk carrier fleet in terms of the number of vessels, attain a minimum CII rating of C or better in 2023. However, again based on 2020 AER figures, under 20% of the fleet would be compliant with the Poseidon Principles' decarbonisation trajectory.

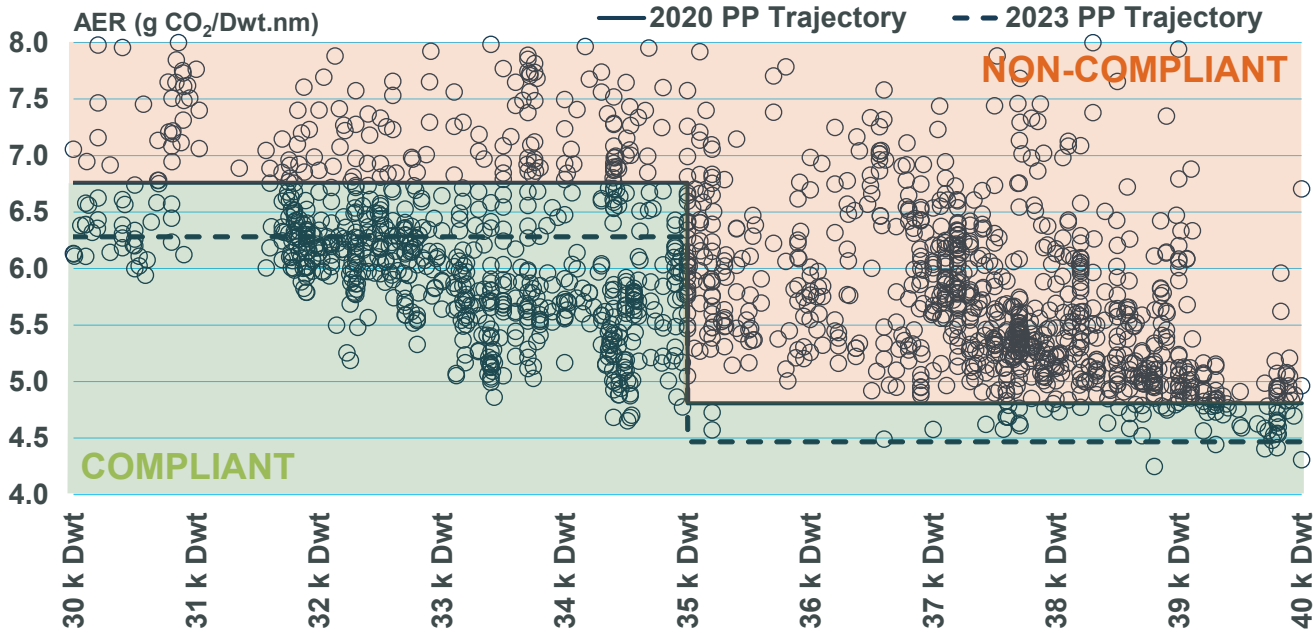
Whilst proponents of stricter regulations are more supportive of the Poseidon Principles' trajectory, it is not without its issues. The methodology for calculating an individual ship's required CII is based on its specific deadweight. However, the Poseidon Principles' trajectory methodology involves cohort ranges over a wide band of vessel sizes. The dry bulk carrier fleet is segmented into six size bands, with a specific trajectory value assigned to each. As a result, some more efficient designs are penalised by the current Poseidon Principles' trajectory methodology.

For example, in the Handysize dry bulk carrier segment, while new, fuel efficient designs of 38 k Dwt dry bulk carriers typically have lower estimated AER values than the older, less fuel-efficient 32 k Dwt vessels, trajectory values are based on different cohorts. A lower AER value for the larger 35-60 k Dwt band means that some fuel-efficient 38 k Dwt vessels fall foul of the trajectory. This is illustrated in Chart 5, which compares the AER of individual dry bulk carriers in the 30-39.9 k Dwt size range against the Poseidon Principles' trajectories for 2020 and 2023.

Ultimately, the regulations enacted to achieve the IMO's greenhouse gas reduction goals are going to significantly impact shipping in ways far beyond the reduction of emissions. Their impact will be felt across the industry, from the finance and operation of individual vessels to macro level supply/demand balances. At present, it is difficult to fully grasp the multi-dimensional implications of the initiatives currently underway.

Many of them, including both the CII and the Poseidon Principles, are very much work in progress and will evolve over time. MSI's inclusion of the vessel's AER on our online valuation system is one way in which we are supporting our clients to assess their environmental obligations, whilst also supporting wider ESG efforts. We will continue to monitor developments closely and provide our clients with the most up-to-date guidance on developments in green shipping and the move towards a decarbonised future.

Chart 5: Compliance of 30-40 k Dwt Dry Bulk with the Poseidon Principles Trajectory (Version 4.0)



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Maritime Strategies International Ltd.

24 Southwark Bridge Road
London SE1 9HF
UK

Tel: +44 (0)207 940 0070
Fax: +44 (0)207 940 0071
info@msiltd.com
www.msiltd.com