

New ships: Design efficiency since 2009

Extensive over-compliance and falling average fleet design efficiency

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Summary

This latest update study, incorporating 2016 data, confirms that a considerable number of ships in different ship categories and sizes continue to comply and over-comply with phase 2 and even phase 3 EEDI requirements – providing further evidence that the requirements need strengthening. The results, however, also suggest that recent improvements in ship design efficiency stalled in 2016, with the average design efficiency of new build bulk carriers, tankers and gas carriers being worse in 2016 than in 2015.

1. Context

All ships built after 1 January 2013 need to have an Energy Efficiency Design Index (EEDI) score. This measure of design fuel efficiency needs to be better than a reference value, which depends on the ship type and size. The reference value reflects the average fuel efficiency of ships that have entered the fleet between 1999 and 2008.

The required EEDI of new ships becomes more stringent over time. From 2015, ships have to be 10% more efficient than the reference value, and every five years the stringency increases by another 10% until 2025. These targets are subject to mid-term reviews. The review of Phase 2 and 3, requiring ships from 2020 and 2025 to be 20% and 30% more efficient than the reference value, is ongoing.

In 2015 CE Delft carried out a study for Transport & Environment and Seas at Risk, which analysed how the design efficiency of new ships has changed based on a simplified version of the IMO's EEDI ship design formula - called the Estimated Index Value (EIV). The EIV was used by the IMO to set the reference line values. Once calculated, the EIV of individual ships were then correlated to their *estimated EEDI* (eEEDI) using the empirical relation that the EEDI is about 10% lower than the EIV. The study included ships built between 2009 and mid-2014. An update of that study with data from the second half of 2014 and 2015 was undertaken in 2016. The current study is a further update with data on ships that entered the fleet during 2016.

2. New ships over-comply with design efficiency standard, but 2016 efficiency appears to tail off

This study finds that based on an analysis of EIVs, the average design efficiency of new ships has improved in recent years. However, this improvement trend seems to have stalled in 2016.

An analysis of the estimated EEDI (eEEDI) of new ships, shows that of the ships that entered the fleet in 2016, 14% of bulk carriers, 52% of containerships, 23% of tankers, 21% of gas carriers and 55% of general cargo ships, had an eEEDI at least 30% below the reference line. In other words, many 2016 ships are already over-complying with the 2025 Phase 3 targets almost 10 years ahead of time.

At the same time, analysis shows that despite this over-compliance, the average design efficiency of new bulk carriers, tankers and gas carriers was worse in 2016 than in 2015. Moreover, the share of ships with eEEDI's below the reference line (i.e., are more efficient than the reference value) and the share of ships meeting or exceeding the Phase 1, Phase 2 or Phase 3 required EEDI values decreased in 2016 compared to

2015. The design efficiency of containerships and general cargo carriers as measured by their eEEDI was more or less at the same level in 2016 as in 2015.

While recognizing that there are uncertainties, there appear to be quite substantial differences in achieved efficiencies. This trend does not appear to be limited to specific ship types or sizes. This suggests that there is a large variation in the design efficiency that is not determined by ship type-specific requirements. In other words, ships of the same type and of similar size and cargo capacity have considerable differences in their design fuel/CO2 efficiencies. This rather points at substantial efficiency opportunities that are yet to be tapped by all ships.

3. Comments and conclusions

In October 2016 during the scheduled review, the IMO passed up the opportunity to strengthen the EEDI by advancing the Phase III target from 2025 to 2022 and adopting a new Phase IV target. Despite all the evidence, a small number of states and industry representatives argued at the time that the strengthening of the IMO's only climate measure should be delayed until 2018. The results of this latest study back up the earlier evidence of significant over-compliance many years in advance by new ships – not only with the Phase II but also the Phase III requirements. The evidence is clear: at present the EEDI regulation is not driving improvements to the efficiency of new ships and, in addition to a strengthened Phase III, ambitious new future phases are needed.

As part of the IMO's comprehensive GHG strategy, a more fundamental review of the EEDI is now needed. It should include the setting of a new phase IV and phase V to ensure that innovative ship design makes a positive contribution to the decarbonisation of the sector. The long life of ships means this work is not something that can be left to a later stage. Moreover, the urgency of the task of the shipping sector to respond to the requirements of the Paris Agreement demands immediate action. Improved design efficiency of newly built ships is an obvious low-hanging fruit and will drive the uptake of energy efficient technologies. Failing to require ships built in the 2020s to be more efficient than business as usual will, on the other hand, make it much harder for the sector to meet any long-term GHG emission reduction commitments.

Further information

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