Navigating the IMO's 2025 Net-Zero Framework: Compliance, Fuel Choices and Costs

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Introduction

In April 2025, the International Maritime Organization (IMO) adopted its new net-zero framework (NZF) through deliberations in its Marine Environment Protection Committee (MEPC). This framework mandates a transition to low-carbon fuels and sets enforceable greenhouse gas (GHG) reduction targets for ocean-going ships with over 5,000 gross tonnage (GT), subject to ratification by member states in October 2025 and compliance for fleets starting early 2028.

The NZF, effective January 2028, introduces performance-based, technology-neutral measures focusing on well-to-wake (WtW) GHG intensity of marine shipping fuels, alongside a global carbon pricing scheme [1and 2]. For the maritime sector, this represents a significant shift: compliance is no longer optional, and inaction can carry escalating financial consequences. This paper provides the fleet owners, operators, and fuel suppliers with guidance on technology adoption, route and fleet optimization, and cost-benefit planning. The NZF sets mandatory reduction targets in GHG fuel intensity compared with a 2008 baseline. Detailed reduction factors and methodologies are discussed later, but key reductions of ~21% by 2030, increasing to 43% by 2035 has set the stage for commercial shipping operations to take notice [2].

The IMO has set forth sweeping regulatory changes to mercantile ship emissions for ships exceeding a GT of 5,000, a category that accounts for over 85% of the global commercial maritime traffic [1]. A quick overview of the major types of ships in the global mercantile trade, the total number of registered ships in each category, and the cumulative GT of each category is listed in Table 1, using data retrieved from the public domain [3]. An average ship of the entire global fleet has

a GT of ~14800. However, bulk carriers and container ships comprise ships with some of the highest GTs currently. A hypothetical, combined group of these two types of ships has a fleet average of ~42900 GT. It is vital to note that this combined group makes up about 57% of the cumulative GT transported while forming only 19% of the entire global fleet.

For fleet owners as well as regulatory bodies, accelerating changes in these categories could serve to have the biggest impact on the world stage in tackling emissions from commercial maritime traffic.

Table 1 Estimation of average tonnage in merchant ship fleets

Ship type	Number of ships	Cumulative GT (1000s)	Average GT (rounded) by type
Bulk carriers	14,137	573,635	~40,600
Container ships	6,791	324,911	~47,800
Oil tankers	12,636	367,578	~29,100
General cargo	21,125	70,129	~3,300
Others	57,806	330,376	~5,700
World mercantile fleet	**112,495**	**1,666,629**	**~14,800**
Bulk carriers + containers as a combined group *	20,928 (19%)	898546 (54%)	~42,900

Data compiled June 16, 2025.
GT = Gross tonnage.
*Assumption: This is a hypothetical category formed to illustrate the scale of the mercantile tonnage captured in these two ship categories.
Source: [3].

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