

Ship scrubber washwater: How much, what's in it, and where it's dumped

A rapidly growing number of ships are being fitted with exhaust gas cleaning systems, or “scrubbers,” as a way to comply with the International Maritime Organization’s (IMO) 2020 global fuel sulfur limit. Scrubbers remove sulfur from ship exhaust by spraying a buffer solution (usually seawater) over it and then discharging the washwater overboard, often without treatment. The washwater is more acidic than the surrounding seawater and contains polycyclic aromatic hydrocarbons (PAHs), particulate matter, nitrates, nitrites, and heavy metals including nickel, lead, copper, and mercury.

A new ICCT report is the first global assessment of the mass of washwater discharges expected from ships using scrubbers. The study is based on 2019 ship traffic, as a pre-COVID-19 baseline, and considers approximately 3,600 ships that had or were expected to have scrubbers installed by the end of 2020.¹

Results show that these ships alone can be expected to emit at least 10 gigatonnes (Gt) of scrubber washwater in a typical year of business-as-usual operations for global shipping. For context, the entire shipping sector carries about 11 Gt of cargo each year. Figure 1 illustrates the percentage contributions by ship type.

Scrubbers allow ships to continue to burn inexpensive heavy fuel oil that has high sulfur content because the scrubber removes a portion of the sulfur from the exhaust before it's emitted into the air. However, an earlier ICCT study found that while scrubbers are effective at reducing air emissions of sulfur dioxide, emissions of carbon dioxide, particulate matter, and black carbon were higher with scrubbers compared with substituting lower-sulfur marine gas oil for heavy fuel oil.²

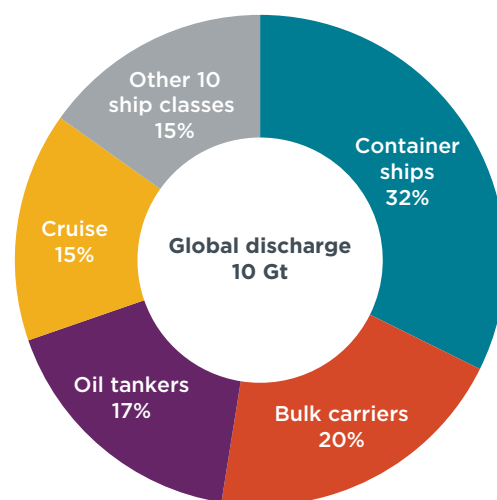


Figure 1. Scrubber washwater discharges by ship type

¹ This is based on Clarksons Research Portal, World Fleet Register, when referenced in June 2020. See <https://www.clarksons.net/portal>. Since the analysis was performed in June 2020, additional ships with scrubbers were added to the database, and the international shipping fleet fitted with scrubbers has increased to more than 4,300 ships.

² Bryan Comer, Elise Georgeff, Liudmila Osipova, *Air emissions and water pollution discharges from ships with scrubbers*, (ICCT: Washington, D.C., 2020), <https://theicct.org/publications/air-water-pollution-scrubbers-2020>

WHAT'S THE CONCERN?

PAHs and heavy metals have been linked to cancers and reproductive dysfunction in marine mammals.³ Coral reefs are already bleaching and dying off as a consequence of rising ocean temperatures and ocean acidification, and scrubbers emit washwater that is warmer and more acidic than ambient seawater. IMO's scrubber discharge limits, initially developed in 2008, were based on data from just three ships operating with scrubbers, two of which were prototypes. The discharge criteria lack rigorous scientific justification and have not been strengthened since, despite reviews of these guidelines in 2009, 2015, and 2020.

WHERE ARE WASHWATER DISCHARGES OCCURRING?

The new report estimates that 80% of scrubber discharges occur within 200 nautical miles of shore, and there are spatial hot spots in heavily trafficked regions including the seas surrounding Europe, the Strait of Malacca, and the Caribbean Sea (Figure 2). The 5 countries with the largest mass of washwater discharge in their territorial seas and internal waters are the United States (147 million tonnes [Mt]), the United Kingdom (125 Mt), Italy (102 Mt), Greece (95 Mt) and Japan (76 Mt).

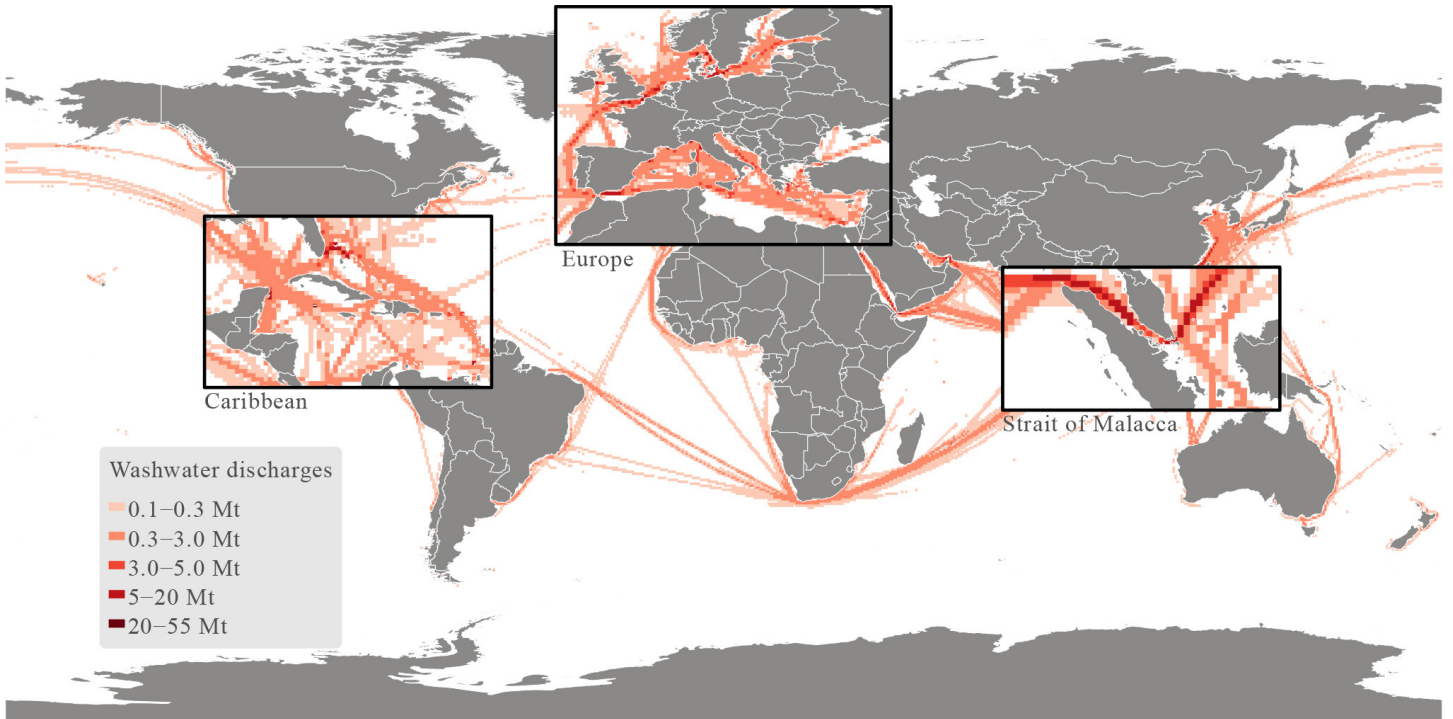


Figure 2. Global scrubber washwater discharges distribution and the sites with the largest washwater hot spots

Scrubber discharges also occur along major shipping routes, some of which pass through IMO-designated Particularly Sensitive Sea Areas (PSSAs). One of these is the Great Barrier Reef, where about 32 Mt of scrubber washwater is expected to be discharged, mainly from ships serving coal terminals in northeast Australia. But that represents only 5% of the 665 Mt expected to be discharged in PSSAs around the world each year. The Baltic Sea PSSA, for example, is projected to receive 295 Mt of discharges.

³ Elise Georgeff, Xiaoli Mao, Bryan Comer, *A Whale of a problem? Heavy fuel oil, exhaust gas cleaning systems, and British Columbia's resident killer whales*, (ICCT: Washington, D.C., 2019), <https://theicct.org/publications/hfo-killer-whale-habitat>

IMPLICATIONS FOR SCRUBBER POLICY

Although several governments have taken preventative measures and banned the use of scrubbers in their ports, internal waters, and territorial seas, many have not. Understanding how much washwater is expected to be discharged and where could improve policymaking—especially for the most affected territorial seas, ports, and vulnerable PSSAs. An online, interactive map showing the distribution of scrubber washwater discharges is available at <https://theicct.org/publications/global-scrubber-discharges-Apr2021>. Additionally, a spreadsheet summarizing the amount of scrubber washwater discharges within each country's Exclusive Economic Zone, territorial seas, internal waters, major ports, and from ships that fly each country's flag, is accessible at the same link.

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