

# POLICY UPDATE

JUNE 2023

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## Global update on scrubber bans and restrictions

As exhaust gas cleaning systems, or scrubbers, are being used more and more on ships, many countries and ports are restricting their use because of the water pollution they produce. This paper updates a review of countries and ports that have implemented measures restricting the use of scrubbers that was first done as part of our global assessment of scrubber washwater discharges in 2021.<sup>1</sup> This review includes measures announced up to February 2023 and differentiates between those that are applied as bans and those that are more limited restrictions; we also indicate where and how the rules apply. The analysis is divided into five regions: the European Union plus the United Kingdom and Norway; Asia; the Americas; Oceania; and Africa and the Middle East. We are also publishing a supplementary spreadsheet on our website that contains detailed descriptions of the bans and restrictions, and it includes links to official documents, where available.

### BACKGROUND

Scrubbers were first introduced as a way to comply with the sulfur limits on ship air exhaust that were imposed by the International Maritime Organization (IMO). Sulfur oxides (SO<sub>x</sub>) emissions were first regulated by the IMO in 1997 in the Protocol to the International Convention for the Prevention of Pollution from Ships (MARPOL) and the regulation was reviewed in the following years in Annex VI, Regulation 14. The targets set by the protocol are shown in Table 1.

**Table 1.** SO<sub>x</sub> limits inside and outside Emission Control Areas (ECAs), according to MARPOL, Annex VI, Regulation 14

Inside ECAs	Outside ECAs
1.50% m/m prior to 1 July 2010	4.50% m/m prior to 1 January 2012
1.00% m/m after 1 July 2010	3.50% m/m after 1 January 2012
0.10% m/m after 1 January 2015	0.50% m/m after 1 January 2020

Compliance with these targets can be achieved either with low-sulfur fuels or with equivalent methods, as long as the latter is proven to be as effective at reducing emissions. Regulation 4 of Annex VI establishes scrubbers as equivalents for this purpose and the amendment to the protocol in 2008 set the first and only discharge

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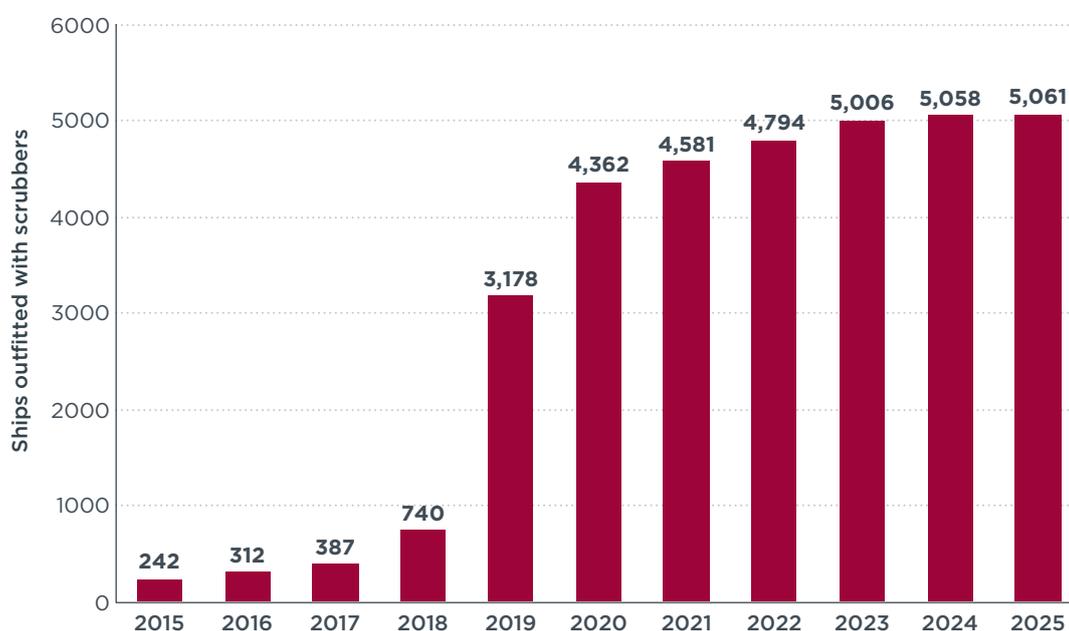
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<sup>1</sup> Liudmila Osipova, Elise Georgeff, and Bryan Comer, "Global Scrubber Washwater Discharges under IMO's 2020 Fuel Sulfur Limit," (ICCT: Washington, D.C., 2021), <https://theicct.org/publication/global-scrubber-washwater-discharges-under-imos-2020-fuel-sulfur-limit/>.

criteria for scrubbers. Despite the revisions of the Annex that followed, the limit on scrubber discharges was never revised to be more stringent.

Because scrubbers reduce sulfur air pollution from the exhaust, they allow ships to use heavy fuel oil instead of more expensive low-sulfur fuels. Still, ICCT research has found that the carbon dioxide, particulate matter, and black carbon emissions from ships using scrubbers are higher than those using marine gas oil.<sup>2</sup> Additionally, the washwater discharged by open-loop and hybrid scrubbers and the bleed-off water generated by close-loop scrubbers can be contaminated with polycyclic aromatic hydrocarbons, particulate matter, nitrates, nitrites, and heavy metals, and it is more acidic than the water into which it is often dumped. These pollutants have been linked to cancer and reproductive dysfunction in marine mammals.<sup>3</sup>

According to DNV data, scrubber installations ramped up considerably in 2019, in preparation for the IMO's 2020 global fuel sulfur regulation (Figure 1).<sup>4</sup> Between 2020 and 2023, 644 additional scrubbers were installed, and DNV projections are that the scrubber fleet is going to increase to at least 5,061 scrubbers by 2025.



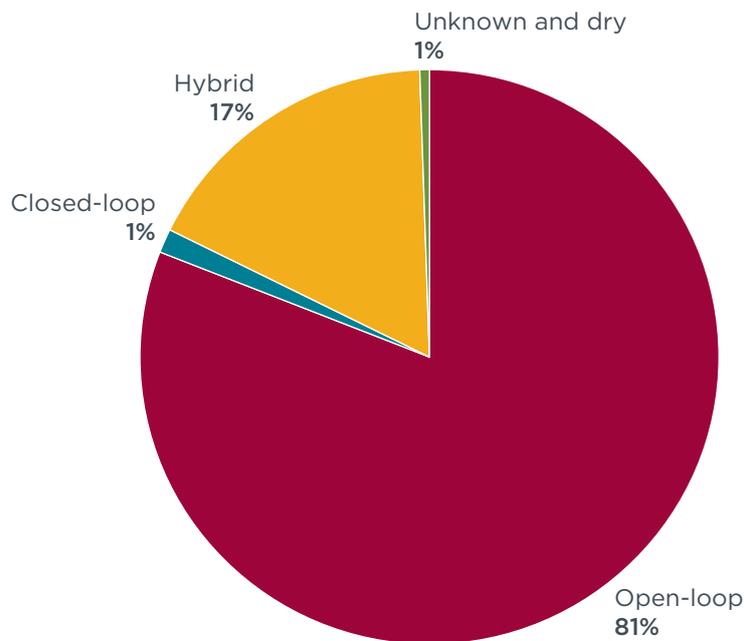
**Figure 1.** DNV data of the number of ships outfitted with scrubbers and projected to be outfitted with scrubbers.

As shown in Figure 2, the 5,061 scrubbers that are expected to be installed by 2025 are projected to be 81% open-loop (4,097), about 17% hybrid (869), and approximately 1% closed-loop, (68). The remaining 1% includes 23 scrubbers that are not identified and four dry scrubbers that use a dry media instead of a liquid to remove contaminants.

2 Bryan Comer, Elise Georgeff, and Liudmila Osipova, "Air Emissions and Water Pollution Discharges from Ships with Scrubbers," (ICCT: Washington, D.C., 2020), <https://theicct.org/publication/air-emissions-and-water-pollution-discharges-from-ships-with-scrubbers/>.

3 Elise Georgeff, Xiaoli Mao, and 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/publication/a-whale-of-a-problem-heavy-fuel-oil-exhaust-gas-cleaning-systems-and-british-columbias-resident-killer-whales/>.

4 "Alternative Fuels Insight (AFI)," Veracity by DNV, 2023, <https://store.veracity.com/da10a663-a409-4764-be66-e7a55401275a>.



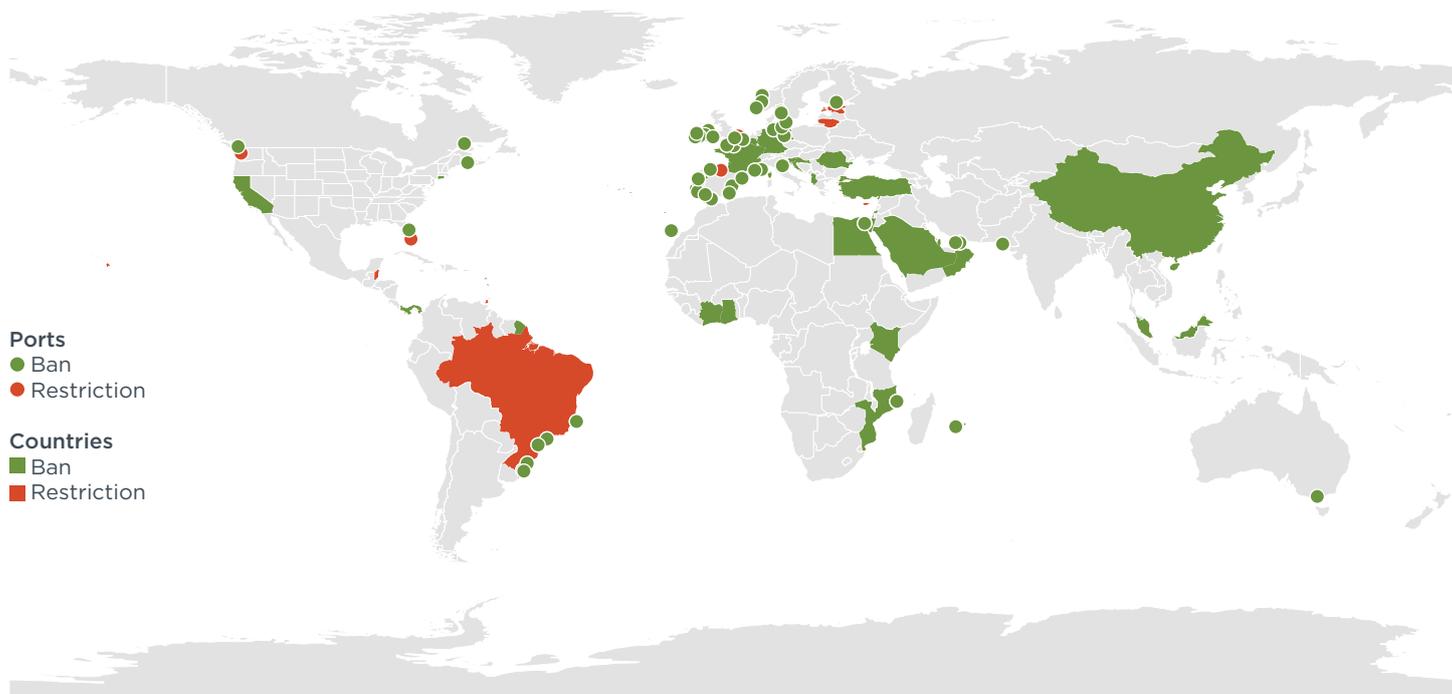
**Figure 2.** DNV data of scrubbers projected to be in the global shipping fleet in 2025 by type.

## CURRENT BANS AND RESTRICTIONS AGAINST SCRUBBERS

Measures that regulate scrubbers are described here as either “bans” or “restrictions.” With “bans,” we mean a prohibition on any washwater discharges or bleed-off water from scrubbers. By “restrictions,” we mean that scrubber use and discharge are allowed as long as certain criteria are met. The analysis was done using data from NorthStandard, Britannia P&I, International Chamber of Shipping, and the Exhaust Gas Cleaning System Association (EGCSA).<sup>5</sup>

In Osipova et al. (2021), when scrubber washwater was regulated under the scope of an existing law, the ban was not counted. Here we review all measures implemented by private ports, port authorities, and countries, and we consider every type of action made by governments or local authorities to regulate scrubbers. We found that 93 measures have been implemented in 45 countries (Figure 3). Where not specified, we assumed that measures using the term “washwater” are meant to apply to both washwater from open-loop scrubbers and bleed-off water from closed-loop scrubbers.

<sup>5</sup> “No Scrubs: More Ports Declare Ban on EGCS Discharges,” NorthStandard, accessed March 1, 2023, <https://www.nepia.com/industry-news/no-scrubs-more-ports-declare-ban-on-egcs-discharges-update/>; “List of Jurisdictions Restricting or Banning Scrubber Washwater Discharges,” Britannia, last modified November 29 2022, <https://britanniapandi.com/wp-content/uploads/2022/12/Britannia-Loss-Prevention-Guidance-List-of-Jurisdictions-restricting-or-banning-scrubber-wash-discharges-updated-29-11-2022.pdf>; “Regulations & Guidelines,” Exhaust Gas Cleaning System Association, accessed March 1, 2023, <https://www.egcsa.com/regulatory/>.



**Figure 3.** Bans and restrictions on scrubbers by countries and ports.

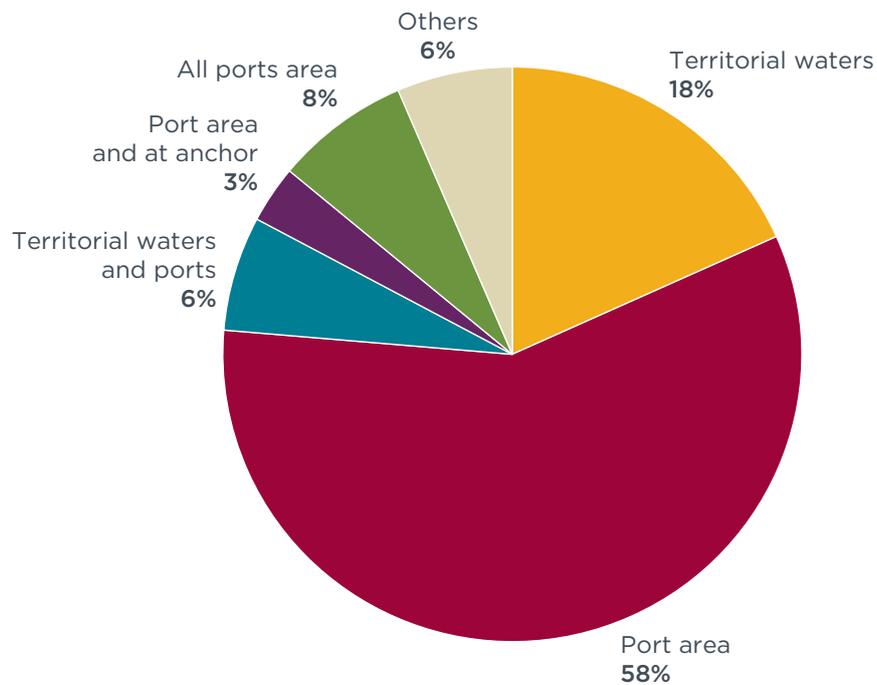
*\*This map is presented without prejudice as to the status of or sovereignty over any territory, the delimitation of international frontiers and boundaries, and the name of any territory, city, or area.*

Eighty-six percent of the measures are bans rather than more limited restrictions. In the 14% of measures where a restriction is applied, the limitations vary. For example, in Bahrain, vessels have to demonstrate that the scrubber works in conformity with IMO guidelines and that its discharges bring no harm to the environment. In Brazil, vessels must have approved scrubber equipment and a SO<sub>x</sub> compliance plan.

Most bans are focused on open-loop scrubbers or washwater discharges from open-loop scrubbers; these are 64% of the measures. Oman is one example, and there is a recommendation to either switch to closed-loop mode or to use compliant fuel. In 29% of the bans, the measure is applied to “washwater,” and we assume this applies to every scrubber type and thus includes bleed-off water from closed-loop scrubbers and washwater from open-loop scrubbers; Turkey is one example. Finally, a small percentage, 8%, ban the release of contaminated water and wastewater, which implicitly includes water dumped overboard from scrubbers (e.g., Port of Ravenna, Italy).

Unsurprisingly, given that almost half of the bans and restrictions are implemented by a port, port areas are the most common geographical scope, 58% (Figure 4). In the case of the Vancouver Fraser Port Authority, discharges from open-loop scrubbers and bleed-off water from closed-loop scrubbers are not allowed at anchorage or at berth.<sup>6</sup> Eighteen percent of bans and restrictions are applied on territorial waters, usually when the measures are national. In other cases, they are implemented in both territorial waters and ports (e.g., the restriction in Estonia), in all ports (e.g., the ban on open-loop scrubbers in Kenya), or in port areas and at anchor (e.g., the ban on washwater discharges from open-loop scrubbers in Israel).

<sup>6</sup> Vancouver Fraser Port Authority, “Notice of Amendment: Port Information Guide,” November 24, 2021, <https://www.portvancouver.com/wp-content/uploads/2021/11/2021-11-24-Notice-of-Amendment-Port-Information-Guide.pdf>



**Figure 4.** Geographical scope of bans and restrictions globally.

## EUROPEAN UNION, UNITED KINGDOM, AND NORWAY

There is some kind of restriction or ban on scrubbers in seventeen EU countries, the United Kingdom, and Norway (Figure 5). Eight of these countries ban or restrict scrubbers in their territorial waters and/or port areas, and four countries have bans in their territorial waters and have further measures implemented by local ports with stricter targets (e.g., France and Norway in the fjord area). In the case of Germany, inland waterways are regulated by the Strasburg Waste Convention (CDNI) which classifies scrubber washwater discharges as “hazardous substances.”<sup>7</sup> According to another regulation, the SeeUmwVerhV, this classification also applies to the maritime sector and the ban would therefore also apply to seas and oceans.<sup>8</sup> Thus, vessels in Germany are only allowed to use closed-loop scrubbers and washwater discharges are prohibited. In the remaining seven countries, the bans are implemented at the port level. One example is the Port of Gothenburg in Sweden; in its regulation, updated in 2022, the port prohibits washwater discharges and only allows the use of closed-loop mode in the port area.<sup>9</sup>

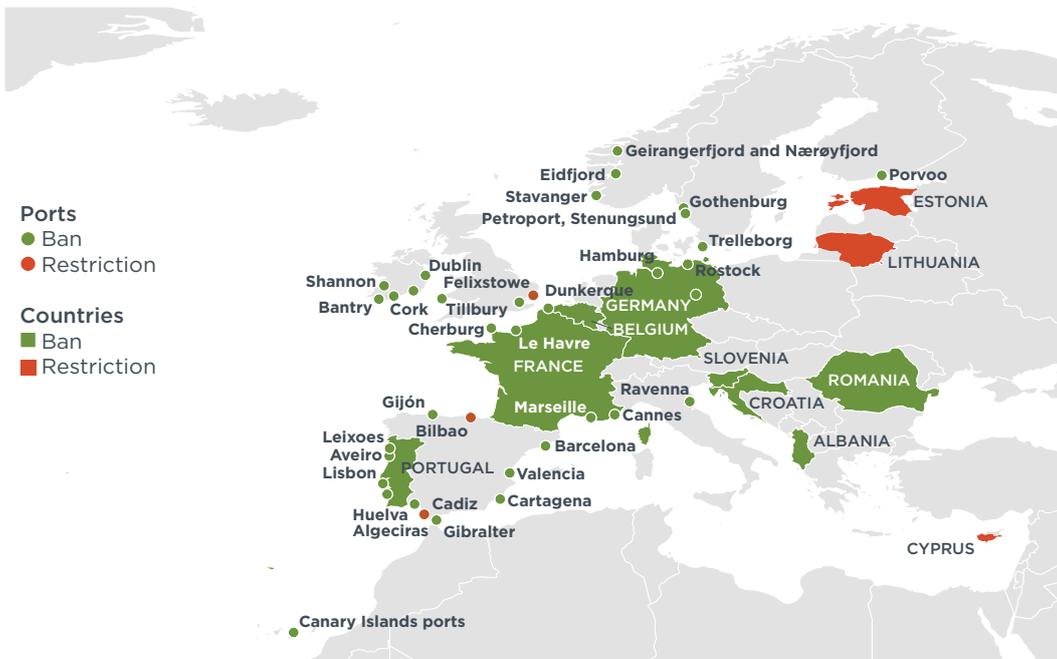
In the case of restrictions in this region, these usually require that vessels get authorization before entering the port or the territorial area (e.g., Estonia and Port of Bilbao), require the use of closed-loop scrubbers only (e.g., Port of Felixstowe), or require proof that the discharged water will not harm the environment and that the pH of the discharged water be below 8.0 (e.g., Lithuania).<sup>10</sup>

7 CDNI, “The CDNI Convention - Convention on the Collection, Deposit and Reception of Waste Generated during Navigation on the Rhine and Other Inland Waterways,” 2018, <https://www.cdni-iwt.org/the-cdni-convention/?lang=en>.

8 Federal Ministry of Transport and Digital Infrastructure and the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety in agreement with the Federal Ministry of Finance, “SeeUmwVerhV - Verordnung Über Das Umweltgerechte Verhalten in Der Seeschifffahrt,” accessed March 30, 2023, <https://www.gesetze-im-internet.de/seeumwverhv/BJNR137110014.html>.

9 “Permits and Regulations,” Port of Gothenburg, 2022, accessed March 10, 2023, <https://www.portofgothenburg.com/maritime/permits-and-regulations/>.

10 “Shipmasters Information and Emergency Procedure Guide,” Port of Felixstowe, July 2020, [https://www.portoffelixstowe.co.uk/files/8015/9351/1985/Shipmasters\\_information\\_booklet\\_July\\_2020.pdf](https://www.portoffelixstowe.co.uk/files/8015/9351/1985/Shipmasters_information_booklet_July_2020.pdf).



**Figure 5.** Bans and restrictions on scrubbers in Europe.

*\*This map is presented without prejudice as to the status of or sovereignty over any territory, the delimitation of international frontiers and boundaries, and the name of any territory, city, or area.*

## ASIA

Bans against open-loop washwater discharges have been adopted in China, Malaysia, and Singapore (Figure 6). In Malaysia, the ban applies to territorial waters and in Singapore, the ban was published by the Port Authority of Singapore and applies only to the port area.

Since 2019, China’s Maritime Safety Administration has prohibited washwater discharges from open-loop scrubbers in inland river ECAs, waters of the ports in coastal ECAs, and in the Bohai water area. Before entering these areas, ships are to switch to low-sulfur fuels and record information about the fuels used before and after the switch, as well as the time it took to make the switch. In Hong Kong, there is a restriction on scrubber use and authorities need to be “satisfied” with the effectiveness of the sulfur abatement technologies in use on the vessel before they grant access to territorial waters.



**Figure 6.** Countries and ports that have a ban or restriction on scrubbers in Asia.

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## AMERICAS

In the United States, measures against scrubbers are applied in five states (Figure 7). California bans scrubbers within 24 nm of its coast.<sup>11</sup> According to the Vessel General Permit for Discharges Incidental to the Normal Operation of Vessels (VGP), in Connecticut, the washwater from any vessel included is prohibited.<sup>12</sup> In Hawaii, discharging is allowed if ship owners obtained an official license or permit when entering territorial waters. In Florida and Washington State, port-level measures are in place. The Port of Seattle in Washington does not allow washwater discharges from cruise ships and the Port of Canaveral in Florida prohibits washwater discharges.<sup>13</sup>

In Canada, the Vancouver Fraser Port Authority amended its port information guide in 2021 to promote safer and more efficient navigation in its area.<sup>14</sup> One of the amendments states that discharges from fuel combustion machinery into the environment are not permitted while a vessel is at anchorage or at berth, and this applies to water from both open-loop and closed-loop scrubbers. Also, ships fitted with hybrid scrubbers should switch as soon as possible to closed-loop mode and operate the scrubber in zero-discharge mode. Bleed-off water from closed-loop scrubbers is prohibited and should be disposed of in an adequate facility; if not, vessels must switch to compliant fuel or shore power. Lastly, vessels outfitted with scrubbers are required to submit a pre-arrival declaration to the port.

There are limits on the use of scrubbers in five countries in Central and South America (Figure 7). (Argentina previously had a ban on washwater in its territorial waters and

11 "Ocean-Going Vessel Fuel Regulation," California Air Resources Board, accessed March 29, 2023, <https://ww2.arb.ca.gov/our-work/programs/ocean-going-vessel-fuel-regulation>.

12 U.S. Environmental Protection Agency, "Vessel General Permit for Discharges Incidental to the Normal Operation of Vessels (VGP)," 2013, [https://www3.epa.gov/npdes/pubs/vgp\\_permit2013.pdf](https://www3.epa.gov/npdes/pubs/vgp_permit2013.pdf).

13 Port of Seattle, "Terminal Tariff No. 5: Rates, Charges, Rules and Regulations for Services Performed by and at the Port of Seattle and at Terminals of Participants," effective January 1, 2023, <https://www.portseattle.org/sites/default/files/2022-12/Terminals%20Tariff%205%2001.01.23.pdf>; Canaveral Port Authority, "Tariff No. 16: Governing Rates, Rules & Regulations of Marine and Port Services Provided by the Canaveral Port Authority," effective October 1, 2020, [https://www.portcanaveral.com/Cargo/Port-Tariff/CPA-Tariff-16-FY21-FINAL-\(1\).aspx](https://www.portcanaveral.com/Cargo/Port-Tariff/CPA-Tariff-16-FY21-FINAL-(1).aspx).

14 Vancouver Fraser Port Authority, "Notice of Amendment: Port Information Guide."

ports, but it was suspended due to COVID-19, and thus is not counted). Bermuda bans washwater and residues from scrubbers in its territorial waters and Panama bans them at the Panama Canal. Trinidad & Tobago allows the discharge of washwater, but only with prior approval. In Belize, washwater cannot be discharged into territorial waters and or at ports. A national regulation in Brazil requires that scrubbers have an approved compliance plan and documentation, and additional measures against washwater discharges from scrubbers are taken at the port level. For example, at Vale S.A. ports, within 24 nm of the coastline ships should use only low-sulfur fuel and not discharge any washwater into the ocean. Also, the ports of Rio Grande, Pelotas, and Porto Alegre ban any discharges or bleed-off water, from both open-loop and closed-loop scrubbers, within the polygon of the Ports of Rio Grande do Sol, Lake Guaíba, and Lagoa dos Patos waterway.



**Figure 7.** Bans and restrictions on scrubbers in the Americas.

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## OCEANIA

The Port of Hastings in Australia is the only place in Oceania that applies any measure on scrubbers (Figure 8). It prohibits the discharge of any offensive and contaminated liquid or waste matter from every vessel type in its port area.<sup>15</sup> This would include discharges from scrubbers.

In 2021, New Zealand’s Ministry of Environment released guidelines for the use of scrubbers in territorial waters and they are “discouraged.” Ships outfitted with scrubbers should avoid discharges when possible and carry compliant fuels onboard.

<sup>15</sup> Port of Hastings, “Port Operating Book,” 2017, [https://static1.squarespace.com/static/592f5720f5e2317ce97cec2c/t/59559f78d1758e3b9a29aa6d/1498783617943/POH-OPR-PRO-001+Port+of+Hastings+Operating+Handbook\\_Rev0.pdf](https://static1.squarespace.com/static/592f5720f5e2317ce97cec2c/t/59559f78d1758e3b9a29aa6d/1498783617943/POH-OPR-PRO-001+Port+of+Hastings+Operating+Handbook_Rev0.pdf).

Furthermore, they are encouraged to use closed-loop scrubbers in zero-discharge mode and retain the sludge until it can be disposed of in a port facility. Because this is not a formal ban or restriction, it was not counted in our study.



**Figure 8.** Bans and restrictions on scrubbers in Oceania.

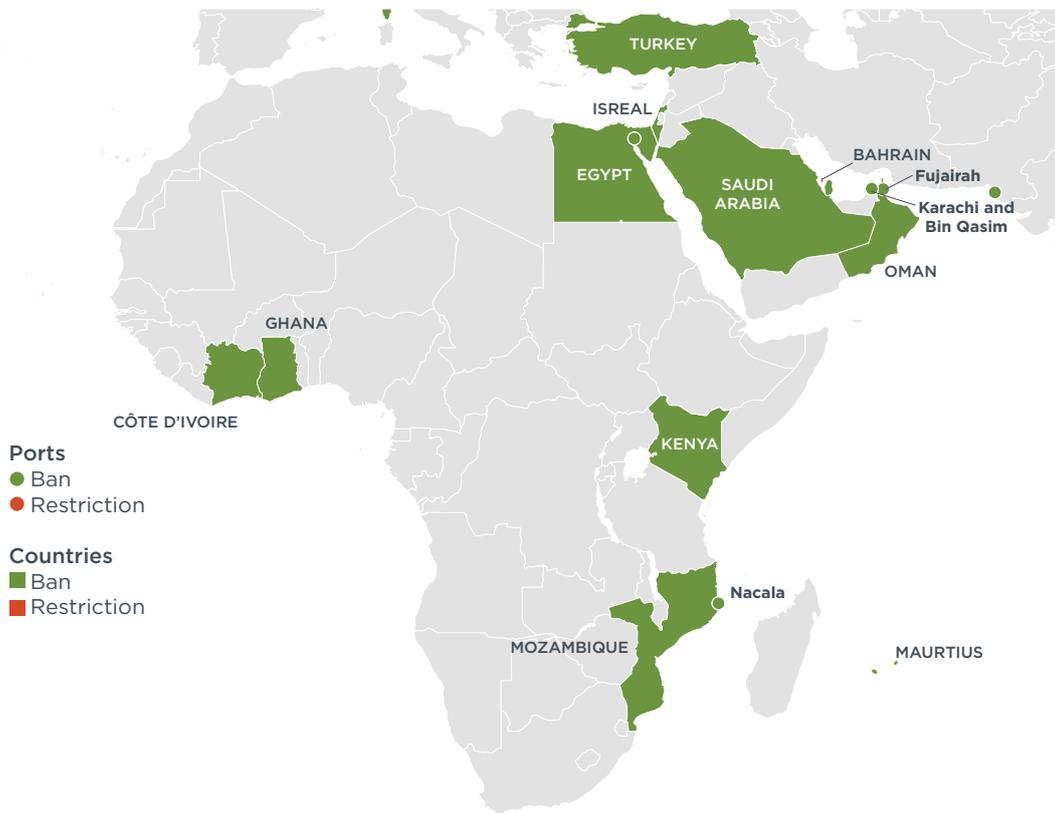
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## AFRICA AND THE MIDDLE EAST

There are bans on open-loop scrubber operations in four African countries (Figure 9). Egypt bans all scrubber types in its territorial waters and ports, and the Suez Canal bans them in the port area. Kenya applies the ban to open-loop scrubbers in all ports and the port of Mombasa in Kenya applies further rules and requires that ships switch to compliant fuels or use closed-loop mode for hybrid scrubbers.

Mozambique allows open-loop scrubbers in its territorial waters if they work properly and follow the regulations; ships must use compliant fuels instead of open-loop scrubbers within ports, bays, and estuaries. Additionally, open-loop scrubbers are banned in all port areas in Mozambique. The Port of Nacala is the only port in Mozambique that has further requirements, and it bans all scrubber discharges in its area.

In the Middle East, Bahrain has a Marine Notice that encourages the use of closed-loop scrubbers in its territorial waters and exclusive economic zone and allows discharges from open-loop scrubbers only if vessel operators can prove that the discharges will not bring any harm to the marine ecosystem. Additionally, open-loop discharges are prohibited in the port of Bahrain and at anchor. In six other countries, ports ban the discharge of washwater from open-loop scrubbers and instead recommend the use of closed-loop scrubbers or compliant fuels. In the ports under the jurisdiction of the Ports, Customs and Free Zone Corporation in the United Arab Emirates, all scrubber use is banned in territorial waters and in Oman, scrubber use is banned in territorial waters only.



**Figure 9.** Bans and restrictions on scrubbers in Africa and the Middle East.

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## SUMMARY

The number of vessels outfitted with scrubbers is increasing, and we found 93 bans and restrictions in place against scrubbers and associated discharges as of February 2023. We considered measures implemented at the national, sub-national, and port levels. Most bans apply to open-loop scrubbers only and leave room for the use of closed-loop and hybrid scrubbers. In some cases, there are general bans on “contaminated waters” and/or “wastewater.” Because of the levels of contaminants in scrubber washwater and bleed-off water, we considered such bans to implicitly apply to scrubbers. Nevertheless, more precise rules could leave less space for ship operators’ interpretation.

That many of the measures are being implemented by ports shows the potential to go beyond IMO and national regulations. Indeed, in Europe, most of the bans and restrictions have been introduced at the port level. In the Americas, bans and restrictions are almost evenly split between national/sub-national and port-level measures, and in Africa, the Middle East, and Asia, the measures are mostly implemented on a national level. Future work could include calculating the geographical area covered by these measures and the prevented washwater discharges thanks to the bans and restrictions.