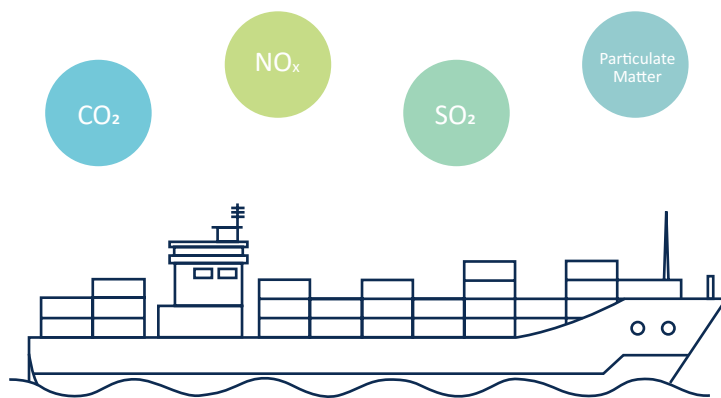




As many of us focus on reducing our carbon footprint on land via reduced energy consumption and use of cleaner energy, offshore on the open seas lurk some of the least understood and largest environmental polluters on the planet. It is estimated that the tens of thousands of ships that sail the world's oceans burn more than three million barrels of sludge-like, high-sulfur fuel every single day, making them a leading contributor of sulfur and particulates into the atmosphere.<sup>1</sup> But there is good news: The International Maritime Organization (IMO) is about to impose new emission standards on the shipping industry in an effort to make this extremely efficient way to transport goods much more environmentally responsible. In this report, we will discuss some of the implications of IMO 2020.

IMO, a United Nations body that sets rules for shipping safety, security and pollution, has mandated a reduction in the sulfur content limit of ships' fuel, which will go into effect on a global basis on January 1, 2020.<sup>2</sup> Previously set at 3.5% m/m (mass by mass), ships will now have to use fuel not exceeding 0.5% m/m sulfur in fuel oil.<sup>3</sup> As the deadline approaches, many oil refineries will need to adjust their product mix while many shipping companies will be challenged, at least initially, to cost-effectively source a compliant supply.



Source: <https://clearseas.org/en/air-pollution/>

It is important to note that the IMO itself does not have an enforcement mechanism, but rather relies on the individual governments of its member states to guarantee compliance by shipping companies domiciled in their countries and establish penalties for noncompliance in their waters. More than 170 countries, including the U.S., have signed on and agreed to enforce the new fuel regulations in their waters and ports by impounding ships that are found in violation.<sup>4</sup> The goal of this new limit (IMO 2020) is to improve shipping emissions and ultimately improve environmental health. Sulfur emissions impact air pollution, ocean ecosystems, agriculture and human health. Sulfur oxide (SO<sub>x</sub>) has been linked to acid rain, as well as cardiovascular disease, asthma, lung cancer and more. A 2016 study provided to the IMO's Marine

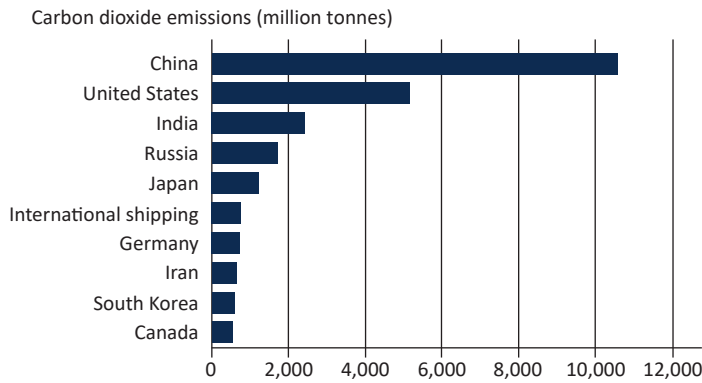
Environment Protection Committee (MEPC) claimed that failure to enact and enforce the 0.5% m/m limit would lead to over 570,000 additional premature deaths globally between 2020 and 2025.<sup>5</sup> The IMO predicts that this reduction in global SO<sub>x</sub> will be especially impactful in coastal and vulnerable areas and will ultimately lead to a cleaner environment. In order to comply with the 0.5% limit, all ships will need to use 1) a compliant fuel option, 2) non-compliant fuel combined with abatement technology (scrubbers) to eliminate sulfur emissions or 3) LNG (liquefied natural gas) fuel.

There are various options for compliant fuel with low sulfur content. However, experts project compliant fuel to be more expensive as refineries grapple with production and demand for both compliant and non-compliant fuel. There are also concerns about the safety of the compliant fuel option. In efforts to attain a 0.5% concentration limit, refineries are developing fuel blends that may not be compatible with current ship engines. According to Jack Jordan of S&P Global Platts, "The trouble will come when the products are mixed and some blends prove incompatible with one another: when a more aromatic 0.5% product comes into contact with a more paraffinic blend, the products are likely to separate and form sludge, blocking filters."<sup>6</sup> Testing and other precautions will need to be taken to make sure that the use of the new fuel does not pose any safety issues. Beyond possible issues with blended fuels, there is a lack of coordination across the industry. A compliant fuel provided by one refinery may have different characteristics than another. Engine operation depends not only on sulfur content but also factors such as viscosity and stability. A lack of consistency across refineries could potentially result in engine damage or failure, leaving the possibility that a ship's engines malfunction while at sea.<sup>7</sup>

Shipping companies may opt to maintain their use of bunker fuel (non-compliant oil that has historically been widely used) only if combined with abatement technology, also known as scrubbing technology. Scrubbers work by combining alkaline water with the ship's exhaust, effectively removing sulfur emissions. However, scrubbers require a relatively large initial investment, ranging from \$5 million to \$10 million per vessel.<sup>8</sup> There are also regulatory risks associated with this option, as some argue that scrubbing technology may still be materially harmful to the environment. Some countries, including China and Singapore, have already banned the use of open-loop scrubbers, a specific type of scrubber that pumps the water and sulfur waste that has been "scrubbed" out of the emissions right into the ocean.<sup>9</sup> What if a shipping company invests heavily in scrubbers, only to have their use banned globally in the future? What if there is a scarcity of supply of both scrubbers and bunker fuel?

Another option, although currently limited in global use, is LNG fuel. However, this seems to be a less likely option for shipping companies that have not already invested, as it requires ports to provide LNG bunkering infrastructure (currently not built on a global scale), ship retrofitting and costly storage tanks for the LNG fuel. This may become a more popular option over the long term, especially if efforts to reduce emissions continue.

## International shipping emissions compared to countries (2015)



Sources: International Council on Clean Transportation, Netherlands Environmental Assessment Agency

The impact of IMO 2020 on the refining industry may equal or exceed that on shippers, as refineries will need to meet the sharply higher demand for low-sulfur fuel. Complex refineries, which are built to convert high-sulfur oil to low-sulfur oil, could see increased margins, while simple refineries that have previously focused only on high-sulfur oil production could falter.<sup>10</sup> It will boil down to how much refineries are willing to invest in updated infrastructure and technology to supply low-sulfur oil.

Shipping companies that frequent ports in emission control areas (ECAs) may be better positioned during this disruption. ECAs, including much of North America and parts of Europe, already limit the sulfur content of fuel to 0.1% m/m.<sup>11</sup> Shipping companies may try to pass on the added cost of this new limit to consumers, decreasing shipping capacity and increasing freight rates.<sup>12</sup>

The consequences of IMO 2020 and the definitive direction that the refinery and shipping industries will take to comply is still uncertain,

even in the weeks before the deadline. Some shipping companies have diversified their fleet in preparation for this change, allocating some ships to use compliant oil and others to use scrubbing technology.<sup>13</sup> There remains no clear “best option” for either refineries or shipping companies, as the choice between compliant oil and non-compliant oil mixed with scrubbing technology will ultimately be dictated by supply and demand. “We are looking at a virtually overnight shift from 3.5% fuel sulfur content to 0.5%,” says Unni Einemo of the International Bunker Industry Association. “There is a real risk that the change would cause a period of severe product shortages and inflated prices.”<sup>14</sup>

IMO 2020 may have a significant impact on reducing air pollution worldwide. The IMO predicts that the regulation will result in a 77% drop (approximately 8.5 million metric tons annually) in overall SOx emissions from ships.<sup>3</sup> Considering that the shipping industry contributes about 12% of global SOx pollution annually, according to a 2014 IMO study, this regulation alone could help reduce global SOx pollution by more than 9%, annually.<sup>15</sup> In our view, for this new regulation to be as impactful as possible, all stakeholders will need to take an active role in encouraging pollution data transparency, global compliance, and effective governmental enforcement mechanisms.

As ESG focused credit investors, IMO 2020 discussions raise interesting ideas about the refining industry and its place in ESG investing. While refineries typically are not considered environmentally friendly businesses, we do note their contribution to lowering toxic emissions from the shipping industry. The production of low sulfur fuels would not be possible without the substantial capital investments refineries are incurring to produce those fuels. We view the passage and enforcement of IMO 2020 to be a significant positive for the environment, and a rare win in global coordination across countries and regulatory bodies – something we should celebrate. While refineries should be encouraged to make continued progress on reducing GHG emissions, we view IMO 2020 capex as a positive and a move in the right direction for the sector.

<sup>1</sup><https://www.cnbc.com/2019/07/15/oil-imo-2020-marks-the-biggest-change-in-oil-market-history.html>

<sup>2</sup><https://www.wsj.com/articles/maritime-regulator-says-shipping-environmental-efforts-set-to-go-11568368801>

<sup>3</sup><http://www.imo.org/en/MediaCentre/HofTopics/Pages/Sulphur-2020.aspx>

<sup>4</sup><https://www.cnbc.com/2019/10/30/imo-2020-the-winners-and-losers-of-a-global-shipping-revolution.html>

<sup>5</sup><http://www.imo.org/en/MediaCentre/HofTopics/Pages/Sulphur-2020.aspx>

<sup>6</sup><https://www.spglobal.com/platts/en/market-insights/special-reports/shipping/imo-2020-shipping-fuel-bills>

<sup>7</sup><https://www.bcg.com/publications/2019/disruptive-imo-2020.aspx>

<sup>8</sup><https://www.wsj.com/articles/ship-owners-multibillion-dollar-quandary-buy-cleaner-fuel-or-a-fuel-cleaner-1521538200>

<sup>9</sup><https://www.reuters.com/article/us-shipping-imo-scrubbers-analysis/ship-owners-worry-about-clean-fuel-bill-as-ports-ban-scrubbers-idUSKCN1R0162>

<sup>10</sup><https://www.bcg.com/publications/2019/disruptive-imo-2020.aspx>

<sup>11</sup><https://www.maritime-executive.com/article/imo-answers-questions-on-the-2020-sox-regulation>

<sup>12</sup><http://blog.capps.com/how-will-imo-2020-affect-ship-capacity-and-freight-rates>

<sup>13</sup><https://www.spglobal.com/en/research-insights/articles/as-imo-2020-deadline-nears-shipping-sector-makes-final-push-to-adapt>

<sup>14</sup><http://devstmaritimeneews.ubmemea.webfactional.com/news/europe/quotes-about-the-future-from-smm-2016/>

<sup>15</sup><http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Third%20Greenhouse%20Gas%20Study/GHG3%20Executive%20Summary.pdf>

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