# IMO 2020 Scrubber Payout Extended by Narrow Sulfur Spreads

Compliance strategy at risk.

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**Data Sources for This Publication**
CME Group
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## Changing Economics

In a February report on the future of fuel oil after IMO 2020, S&P Global Platts suggested that May 2019 is the last chance for shipowners to order a scrubber device to clean exhaust emissions from burning less expensive high-sulfur bunker fuel, in time for their vessels to meet new International Maritime Organization standards in January 2020. The alternatives are to use more expensive IMO 2020-compliant fuel with sulfur content of 0.5% or convert the vessel to run on different fuel such as liquefied natural gas. Narrowing sulfur spreads this year have increased expected scrubber payback periods from one to three years. This note provides analysis of the changing economics of scrubber installation in the runup to IMO 2020.

## Shortage

As we detailed earlier this month (see Heavy Sour Crude Shortage Disrupts IMO 2020 Response), despite expectations to the contrary, the price premium for clean-burning 0.5% sulfur marine fuel oil over high-sulfur 380 CST bunker fuel at the U.S. Gulf Coast declined steadily from nearly $11/barrel in early January to less than $2/barrel during the first week of March and remained below $5/barrel on March 20, according to Platts data. Last year, the impending IMO regulation widened the spread between low- and higher-sulfur marine bunkers as traders bet that demand for high-sulfur fuels would evaporate in the runup to the new regulation. This year, fundamental and geopolitical circumstances have changed to increase the value of heavy high-sulfur crude grades versus light sweet alternatives. That reversal occurred because of a shortage of heavy crude that Gulf Coast refineries are configured to process due to OPEC production cuts and lower output from Venezuela and Iran.

## Regulations

The regulations coming into force in January 2020 are set to dramatically alter demand for high-sulfur fuel oil and in the process upset refinery economics around the globe. As we explained in a November 2016 note (see Marine Bunker Deadline to Benefit Refiners and Traders), the IMO regulation is the culmination of a series of standards set in motion in October 2008. The regulation leaves shippers facing higher fuel costs or installing expensive scrubber technology. Last June, we pointed to a bearish market view of heavy fuel oil prices after 2020 reflected in lower forward curve prices at that time (see Fuel Oil Sulfur Spreads Set to Widen Through 2020). The shortage of heavy crude this year has reversed that expectation, throwing a curveball at the economics of installing scrubber technology. Recent concerns about the open-loop waste disposal method that most scrubbers use have also increased fears that the technology could be subject to new regulation going forward.

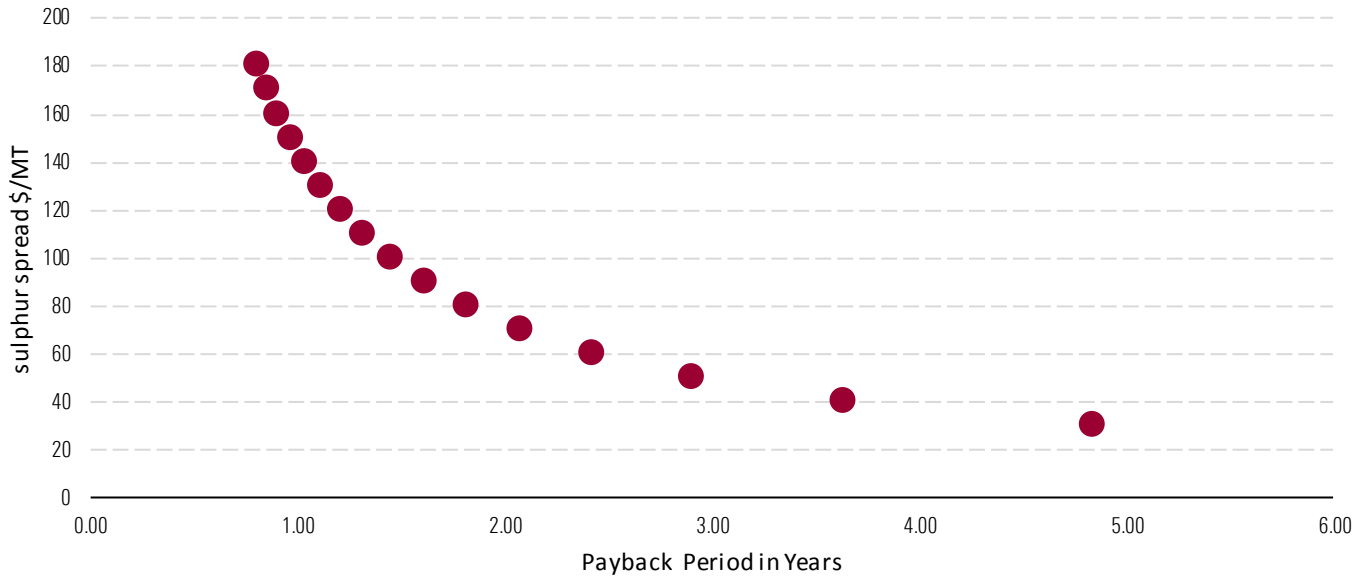
**Scrubber Payback**

A rapid return on investment for scrubber technology is based on the premise that the IMO 2020 regulation will destroy demand for high-sulfur marine bunkers as shipowners switch to compliant low-sulfur alternatives. The thinking was that prices for stranded high-sulfur fuel would tumble as costs soared for compliant fuels that require more processing and blending. So, while installing a scrubber requires an up-front investment by shipowners, this would be rapidly returned via fuel savings from continuing to use cheaper high-sulfur bunkers. That assumption of rapid payback has proved overly optimistic this year, considering reduced sulfur spreads. To confirm the impact of this change, we looked at scrubber investment payback sensitivity for the owner of a very large crude carrier, or VLCC.

Our analysis is based on several assumptions. First a typical scrubber installation for a 2 million-barrel capacity VLCC costs $2.5 million. Second, we need to estimate how much fuel a typical VLCC uses. This estimate is complicated by the age and efficiency of the vessel as well as the speed it travels. There are also different fuel rates for when the vessel is full (laden) or empty (ballast) and during loading and discharge. We assumed a new VLCC using 70 metric tonnes/day of bunker fuel at a regular speed of 15 knots when laden, 53 MT/day when in ballast, 20 MT/day when loading, 70 MT/day when discharging, and 10 MT/day when idle. Our assumptions are 45% of vessel time laden, 25% in ballast, 5% loading, 5% discharging, and 20% idle.

Based on these assumptions, we calculated average daily fuel consumption is 51 MT/day or 18,706 MT/year. We applied these consumption rates to a range of $/MT fuel savings that might arise from using a scrubber. The spread between U.S. Gulf 3.0% marine fuel oil and 0.5% very-low-sulfur marine bunkers averaged $43/MT between Jan. 2 and March 20. That average spread produces an annual saving using the scrubber of $43 x 18,706 MT, or $800,000/year. That scrubber saving translates to a payback period of $2,500,000/$800,000 or 3.1 years. Exhibit 1 shows a range of sulfur spreads from $30/MT to $180/MT and their equivalent payback periods. Earlier expectations last year were that sulfur spreads would increase to $140/MT (or higher), leading to scrubber investment payback in just under one year. Lower sulfur spreads this year have increased the payback period to three years.

**Exhibit 1** Scrubber Payout Curve for VLCC



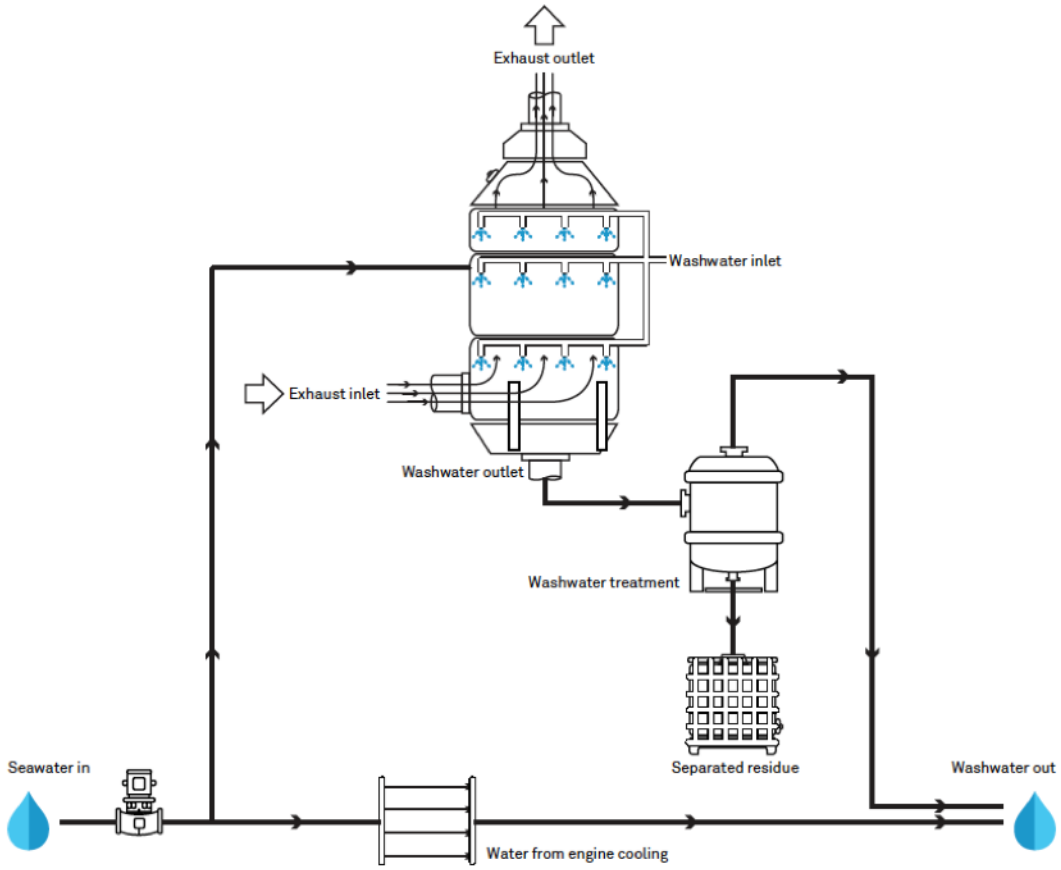

Source: Morningstar.

Our analysis is one example using a VLCC supertanker. There are many different vessel types and sizes with different fuel consumption rates. All of these would have different scrubber payback curves. We should also note that vessels can consume less fuel and save costs by slow sailing rather than installing scrubbers, but that reduces availability for charter earnings. Vessel owners also consider market time charter rates when determining profitability, meaning that fuel cost is not the only variable. However, every vessel is consuming fuel and must manage those costs regardless of market charter rates.

**Open-Loop Risk**

Another concern for shipowners considering installing scrubbers is whether these devices will be subject to further regulation in the future. Most ship scrubbers are open-loop designs that use water to extract sulfur and other emissions from exhaust gases and then return the water to the ocean (Exhibit 2). This practice has led several ports to ban open-loop scrubbers from discharging waste in their waters during the past year. These include the world's two largest bunker ports, Singapore and Fujairah in the United Arab Emirates, as well as ports in Norway, California, and China. Such restrictions reduce the operational flexibility of vessels with scrubbers and may require them to purchase and use low-sulfur fuels in ports that ban scrubbers, adding to operational expenses. These regulations also point to concerns that the IMO might impose restrictions on scrubber technology down the line that would further undermine the investment.

**Exhibit 2** Common Open-Loop Scrubber Design




Source: S&P Global Platts, Exhaust Gas Cleaning System Association.

Our analysis concludes that scrubbers have become a less viable alternative for shipowners today. This conclusion is based on a longer payback period resulting from narrower-than-expected sulfur spreads as well as the threat of further regulation reducing the life expectancy of scrubber technology. Current estimates indicate that at as many as 2,000 vessels fitted with scrubbers would use 500 thousand barrels/day of high-sulfur fuel—reducing the overall 3 million barrels/day requirement for low-sulfur bunkers by about 17% and providing a buffer market for fuel oil that cannot otherwise be converted by refiners. If fewer shipowners adopt scrubber technology the requirement for low-sulfur alternatives will be higher than expected next year. In that case, the burden of removing sulfur from the bunker fuel market falls back on refiners. We expect the result to be increased demand for low-sulfur crudes like U.S. shale. Refiners will also need to process more crude to increase output of low-sulfur distillates to blend with fuel oil to create IMO-compliant blends. We'll continue to monitor these developments during the runup to IMO 2020.

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