

Scrubbing Up: the impact of fitting a scrubber on charter rates and asset values

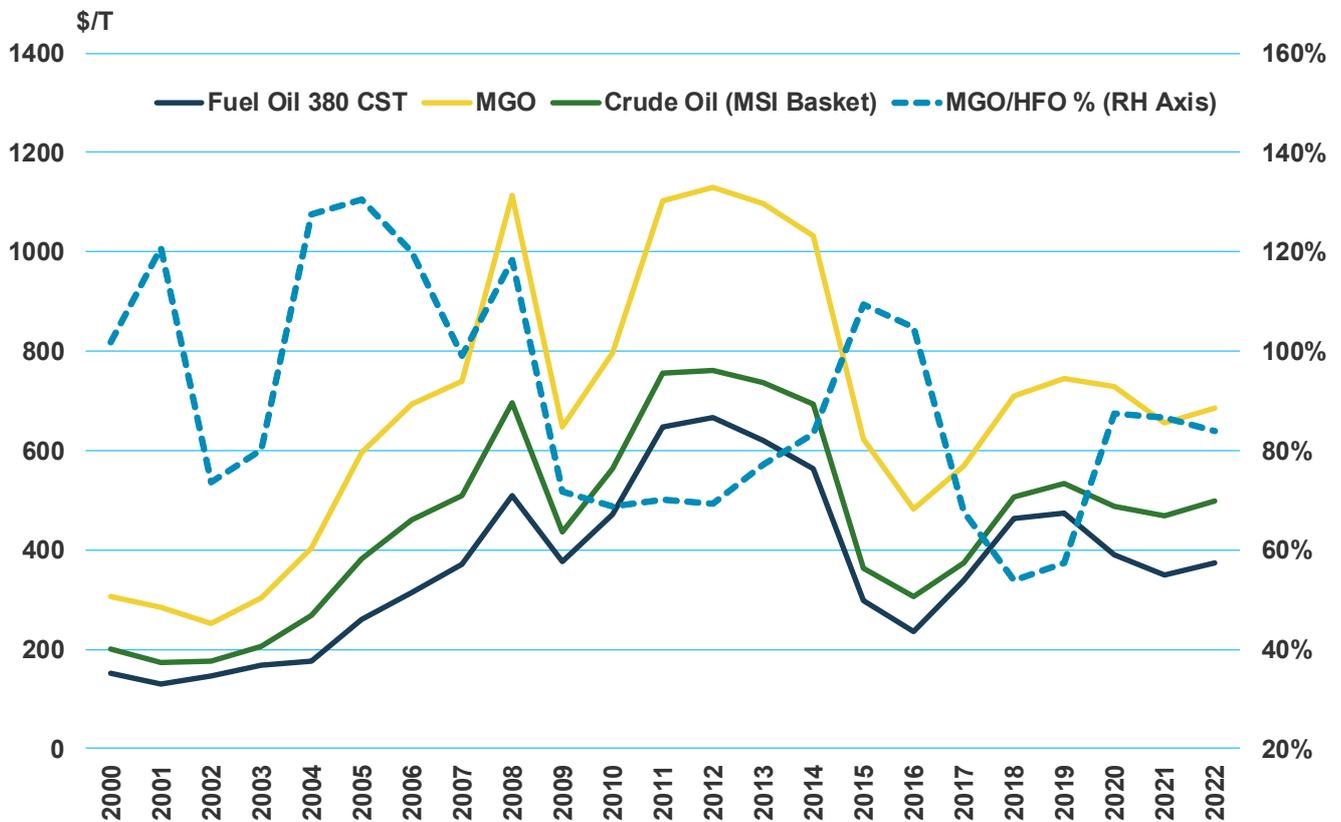
At face value, the economics of fitting a scrubber makes sense says Will Fray, Senior Dry Bulk Analyst at MSI, but the timing of *when* to fit will be crucial

The financial implications of IMO 2020 are stark. Consider the modern Panamax bulker benchmark vessel used by the Baltic Exchange in its calculation of the Baltic Panamax Index (BPI). This vessel consumes 32 tonnes of fuel per day: at today's prices, the fuel bill would be \$8.5 k/Day more burning low sulphur fuel (MGO) than standard HFO (IFO 380) when laden. This compares with the current timecharter-equivalent (TCE) spot rate for the vessel of \$12 k/Day, highlighting a huge difference between the potential value of chartering a vessel capable of consuming high sulphur fuel (i.e. fitted with a scrubber) against a standard vessel consuming low sulphur fuel following the introduction of the new low-sulphur emissions regulations in January 2020.

This highlights the potential for a major and immediate impact on voyage costs, of which a majority will be passed directly onto cargo interests through \$/T freight rates and/or bunker adjustment factors for liner companies.

From one perspective there are ramifications for the underlying consumption of goods and trading patterns, and in another this will also leverage the relative competitiveness of fuel-efficient modern tonnage whilst supporting slow steaming. However, in this article we are concerned only with outlining the impact of fitting a scrubber on vessel charter rates and values. In the interest of focusing the analysis, we concentrate on the dry bulk sector.

Figure 1: MSI Bunker Price Forecasts



There are many unknowns still at play, not least the availability and prices of compliant fuels post-2020. Many assume a low sulphur benchmark fuel will emerge (LSFO) as a new blend; more will be known when the ISO 8217 standards for marine bunkers are reviewed over the next 18 months.

In MSI's view, the price differential between LSFO (compliant blended fuel composed of fuel oil and low sulphur diesel) and HFO bunkers will remain significant beyond 2020, sitting at the top end of the historical premium range between HFO and MGO (this has ranged between c. 60-120% since 2000, see Figure 1 on the previous page). We would expect blended fuel and MGO prices to be comparable, given the ability of shipowners to use both as a compliant fuel.

There are essentially three routes to increasing production of low sulphur compliant fuel: a) increasing crude throughput, resulting in a higher volume of middle

distillates produced, but also additional (surplus) fuel oil, b) increasing the refined share of middle distillates; this requires potential 'yield switch' or investment in secondary refinery units, and c) investing in desulphurisation capacity to remove sulphur from fuel oil (expensive, and currently take up is low). The availability will differ by region, with Europe and SE Asia likely to be key distillate-short regions.

HFO / LSFO differential to widen in 2020

MSI sees compliant fuel blends beginning to be introduced in 2019. In 2020 we expect a dramatic drop in fuel oil consumption (Fig. 2). Increased MGO use, along with blended fuel, will fill the majority of the gap, with blended fuels taking a greater share beyond 2020. Fuel oil use will also rise as scrubber adoption gathers pace, and in the long-run, LNG use will increase, albeit from a low base, remaining a bit-player in the global bunker mix across our forecast horizon.

Figure 2: World Bunker Consumption Forecast by Fuel Type

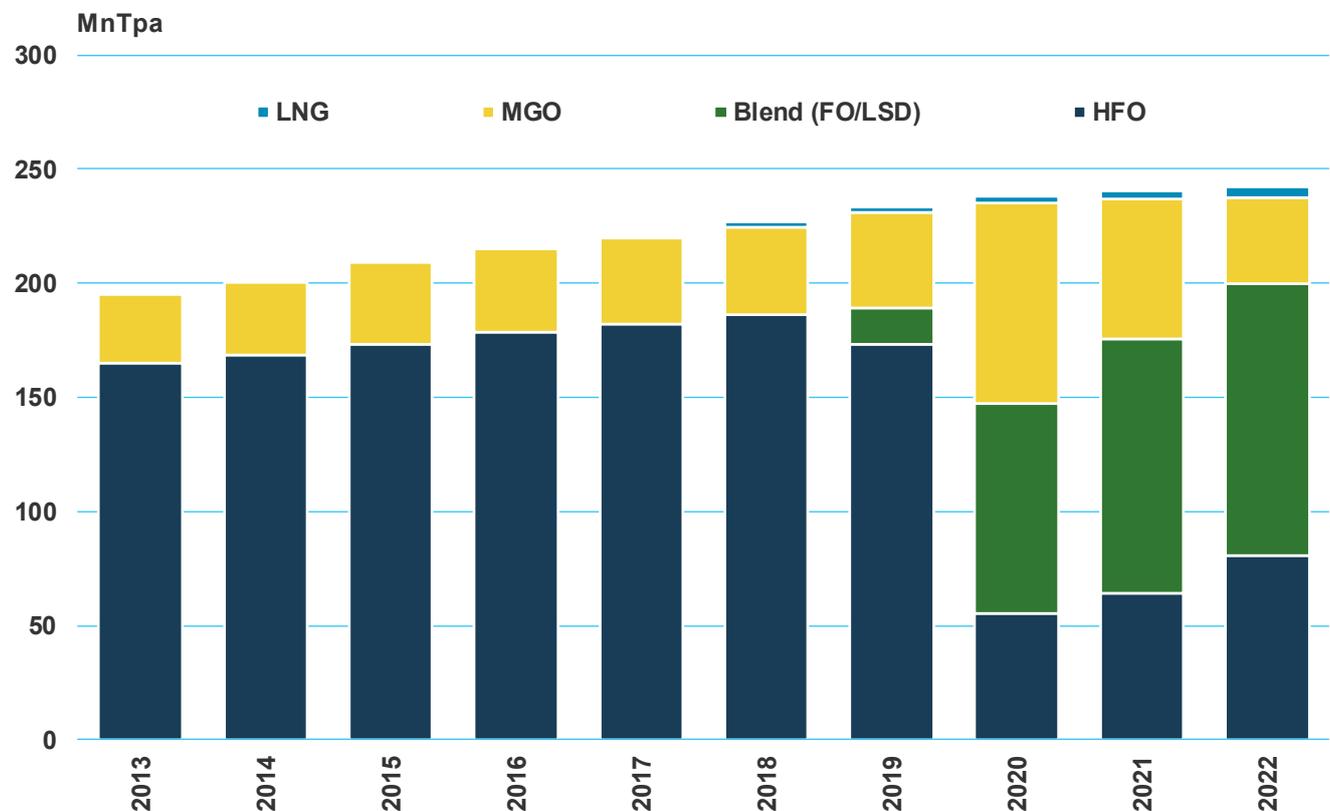


Figure 3: T/C Premiums, Value Premiums and Payback Periods for a Panamax Bulker

Variable	UNITS	MSI Base Case			Fuel Price Scenarios				
		2020	2021	2022	A	B	C	D	E
Scrubber Retrofit Cost (including lost opportunity cost)	\$ Mn	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Bunker Cost (HFO, \$/T)	\$/T	389	351	373	389	389	389	389	389
Bunker Cost (LSFO, \$/T)	\$/T	730	654	686	486	584	700	778	875
LSFO Premium	%	88%	87%	84%	25%	50%	80%	100%	125%
Fuel Cost Savings (net Running Costs)	\$ Mn pa	2.5	2.4	2.5	0.8	1.5	2.4	3.0	3.8
Finance plus operating costs of scrubber	\$ Mn pa	-0.6	-0.6	-0.5	-0.6	-0.6	-0.5	-0.6	-0.6
T/C Premium	\$ k/Day	7.1	6.8	7.0	2.2	4.4	7.0	8.7	10.9
NPV of Cash flows (discount rate 8.5% over 5 years)	\$ Mn	7.5	7.2	7.5	0.8	3.8	7.4	9.8	12.8
Value Premium	\$ Mn	2.0	2.0	2.0	0.8	2.0	2.0	2.0	2.0
Payback Period	Years				6.3	2.0	1.0	0.8	0.6

MSI's Base Case forecast for HFO and LSFO fuel prices provides a framework for understanding the implications of fitting a scrubber on timecharter rates, operating costs and vessel values (see Figure 3).

Timecharter rates up for negotiation

Starting with timecharter rates, all else being equal a charterer would pay a premium to charter a vessel fitted with a scrubber, theoretically up to a maximum of the expected fuel cost saving minus additional running costs. In practice, some discount will be applied due to operational risk associated with scrubbers, in case of equipment failure for instance.

Commercially, there is an incentive for both sides (owner and charterer) to negotiate a cost-savings sharing agreement for a vessel fitted with a scrubber, based on the undoubted difference in expectations for fuel costs between the parties. Conceptually, for long-term charters, the charterer may even offer to pay for the installation of a scrubber on a vessel in order to take advantage of fuel cost savings. In the VLCC market, Q3 18 has seen long-term charters for scrubber-fitted assets begin to define the market differential, for instance.

In an illustrative case, should an owner of a vessel with a scrubber expect LSFO vs HFO fuel price differentials to widen over the charter period, but the charterer expect fuel prices to narrow, then it is in the interest of both parties to maximise exposure to fuel price changes. Therefore, an agreement might be made to fix the vessel at a relatively low premium to a standard (non-scrubber-fitted) vessel, with an appropriate arrangement to share fuel savings over the period of the charter. The share of total fuel saved will be agreed depending on the relative difference in fuel price expectations between parties, net expected scrubber running costs.

T/C premiums will be significant, initially

A simple voyage cost model provides a framework to assess the value of chartering a scrubber-fitted vessel in terms of the premium over a standard vessel. This considers factors such as the time spent at sea vs. in port, in ballast vs. laden, fuel consumption characteristics and off-hire days, along with MSI's assumption for average fuel prices and the operational running cost of a scrubber (not including finance or maintenance costs, which will be on the owner's account).

By MSI's calculation, in 2020 the value of the timecharter premium for a Capesize benchmark vessel fitted with a scrubber will be \$12.1 k/Day, for a Panamax \$7.1 k/Day, Ultramax \$6.3 k/Day and Handysize \$5.1 k/Day. Considering the daily-equivalent cost of a financing, fitting and operating scrubber (outlined later) is a fraction of this, the financial incentive to fit a scrubber is strong.

Scrubber-fitted charter premium will fall

Now consider a scenario in which all vessels have scrubbers fitted. A premium for chartering a scrubber-fitted vessel no longer exists. But owners will have additional costs to cover, both operational and financial, and this will translate to timecharter rates. MSI's timecharter rate model neatly accounts for this through the impact of higher capital costs (and marginally higher opex) as inputs into the timecharter rate calculation.

Importantly the financial costs of installing a scrubber will not place a lower limit on the premium to charter a scrubber-fitted ship. As payback for early adopters is expected within 1-2 years after 2020, costs for these owners will become marginal after a short period of time (i.e. maintenance costs). In a market slump, owners with no scrubber finance outstanding will drive down charter rates close to opex, as is the dynamic in the pre-IMO 2020 world.

Value Premium

In summary, as long as significant fuel price differentials remain between HFO and LSFO, and MSI believes there will be in the long term, vessels with scrubbers installed will be most competitive. However, as more and more ships fit scrubbers, and over time as the finance is collectively repaid, the premiums will diminish to effectively zero. For some time, there will be a technology-led two-tier market for T/C rates, not far removed from the current technology-led two-tier market in the LNG sector (with regards to DFDE vs Steam Turbine engines). Importantly, early-adopters will have a significant advantage in this scenario, notwithstanding issues such as heavy corrosion being reported with immature technology.

Clearly, the strong cost savings potential of scrubbers will have a positive impact on values of vessels with scrubbers fitted as long as a T/C premium exists. Theoretically, the value of a scrubber being installed can be calculated as the net present value of all future cash flows of the scrubber, including:

- **Revenue:** effectively the timecharter premium over a non-scrubber fitted vessel.
- **Costs:** including financial and maintenance costs.
- **Terminal value:** effectively zero; scrubber life-expectancy is understood to be similar to vessel life-expectancy, but the costs to extract, recondition and install on another ship will be prohibitive for resale. At a weight of up to 30 T only, scrap value is immaterial.

The cost to install a scrubber is a key input to the above, and importantly also provides a cap to the value premium – MSI assumes adequate capacity to purchase and install scrubbers at short notice, which is itself an issue for debate. One important factor in this regard is the ability to perform at least part of the fitting process whilst the vessel is at sea, as seen in a recent announcement by Eagle Bulk.

Risks to scrubber installation costs

In our calculations we are assuming a prompt fit, and using reported prices for the scrubber installation. However, we are aware that the short-term risks to these assumptions sit on the upside. Given recent demand for scrubbers, and reports of lengthening waiting lists at scrubber manufacturers (e.g. Wartsila now report an 18-month wait time), there is likely to be upward pressure on both the price of scrubbers and the time it takes to install them, despite lower costs to produce scrubbers as the industry matures. This could potentially leverage the value of a vessel already fitted with a scrubber on Jan 1st 2020.

The cost estimates to fit a scrubber on a vessel vary widely according to a number of reports. The throughput capacity of the scrubber is the main driver of equipment price and depends on the engine output. Other factors are the type of technology used (closed, open, hybrid, dry) and manufacturer. Added to this is the installation cost, which will be higher for a retro-fit

on an existing vessel than installation on a newbuild vessel. Installation costs will comprise a higher proportion of the total cost to install a scrubber on a smaller vessel than a larger vessel.

Open-loop systems expected to prevail despite regulatory risks

MSI's estimates for retro-fit cost are derived from data published by Lloyd's Register, corroborated by data from ABS. We assume open loop scrubbers in our Base Case as this is the lowest cost required to conform to IMO 2020 regulations whilst using HFO bunkers, but we note risk from changes to regulations in future which may require a closed system (at a cost 25-50% higher than closed loop as a rule of thumb).

Finally, under MSI's bunker price forecasts it is evident that the cost to retrofit a scrubber will provide the ceiling to value premiums throughout the five-year horizon of this report. Taking the Panamax bulker example above, Figure 3 on page 3 shows the annual cost savings by year to 2022, plus a number of scenarios for a range of LSFO premiums over MSI's HFO forecast in 2020.

Clearly even at relatively low premiums for LSFO, the NPV of future cash flows (in this illustrative case, MSI assumes the T/C premium only exists for 5 years) cost saving through a scrubber exceeds the cost to install a scrubber by a significant magnitude. MSI also includes the associated payback period for reference – under scenarios where the LSFO premium exceeds 82%, this is less than a year.

MSI Foresight is a periodic series of articles on topical areas of interest across the commercial shipping spectrum. To find out more about MSI's analytical, consulting and vessel valuation services, please contact Robert Bewick at MSI on Tel: +44 (0)20 7940 7191 or email: robert.bewick@msiltd.com



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