



# Dealing with the 2020 sulphur cap

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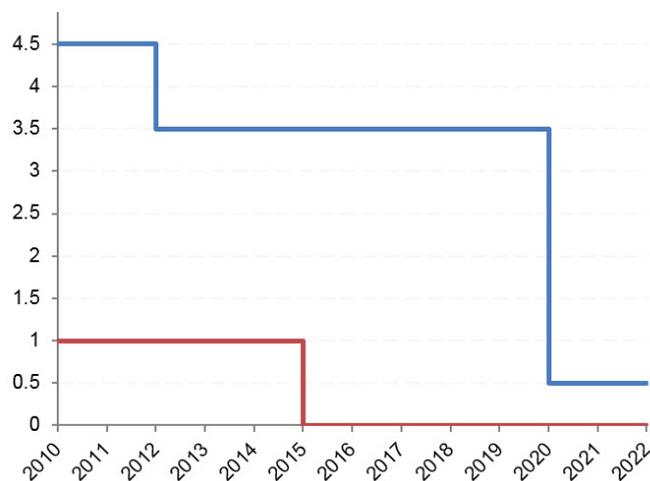
## Introduction

The International Maritime Organization (IMO) has put the shipping industry in a tight spot by introducing a 0.5% global sulphur cap within fuel oil. The decision was taken in response to hazardous health concerns concerning the increasingly harmful impact of the sulphur oxide emissions. With 1<sup>st</sup> January 2020 the confirmed date of enforcement, shipowners must decide what steps to take next to meet the new regulations and deal with the massive drop from 3.5%. The options are few; with high compliant fuel bills, huge scrubber technology investment, or compliance arbitrage the options. Despite the unavoidable costs on the shipping industry, the scientific evidence concerning the health benefits are compelling.

2020 is practically tomorrow. We believe the move from the IMO is overly optimistic, with the majority of parties involved preferring an implementation phase to the cap rather than a “hard” drop as seen in the figure above. The international bunker industry association has even predicted the change will create annual costs up to \$24 billion. With 90% of global trade carried out by sea, more confidence must be installed by the release of clearer regulations surrounding support and implementation.

This paper will explore the solutions at hand for shipowners, their implications on the related commodity markets, and overall effects on the wider economy. Moreover, the reasons for the uncertainty which shrouds the market will be investigated, in what is the biggest change to the shipping industry since the steer away from coal.

## IMO sulphur global cap limit



\*ECA: Baltic Sea Area, North Sea Area, North American Area, and US Caribbean Sea Area.

Source: IMO, Marex Spectron Research

The uncertainty this decision brings is attributed largely to the fact that there is no clear economically effective option. It remains a guessing game, with parties waiting for others to strike first before acting. This is particularly worrying, as in the world of huge capital investments,

## Tackling the cap

With a postponement highly unlikely, shipowners will have to eventually decide the most cost-effective route to take. An adjournment was initially being considered, but this was overturned after a study by CE Delft proved that there would be sufficient availability of low sulphur fuel oil (LSFO). A Baltic and International Maritime Council (BIMCO) study stated otherwise, adding to the general feeling of uneasiness which shrouds the future of the shipping industry. All solutions, despite demonstrating diverse strengths and weaknesses, share the common traits of uncertainty and higher costs.

The simplest and most widely shared solution is switching to LSFO or marine gasoil (MGO). Although the simplicity of this option is satisfying for shipowners, there are very high fuel premiums which accompany the switch. Two oil majors have backed this method, implying there will be a ready infrastructure in place come 2020. For shipowners who follow through with the switch, a decision must be made on whether to absorb the increase in voyage expenses or pass them on to consumers. With all the financial problems in the shipping industry in recent years, there may be a limit to how much can be passed on to consumers.

There are several other concerns surrounding LSFO. Experts have warned that mixing different blends of LSFO can lead to sludge formation in the engine of the vessel due to incompatibility issues. This is a problem as currently there are multiple ways of producing compliant fuel oil. This flexibility may be advantageous for refiners, but blended products could create a compatibility dilemma for vessels. Ships may have to organize routes depending on the availability of specific types of fuels. Whilst this should not be a problem in major bunkers such as Rotterdam, smaller ones may have a more limited range of supply.

The second solution involves the fitting of an exhaust gas cleaning system, commonly known as a “scrubber”. A scrubber allows the continued use of HFO as the sulphur oxide emissions are cleansed before entering the Earth’s atmosphere. There has recently been a rise in scrubber production in response to the cap, with many companies trying to take advantage of the new restraint. The main limiting factor behind the installation of a scrubber is its huge capital cost, with prices typically ranging from 3 to 8 million US dollars. The reason for this wide range is that the cost of a scrubber depends on various factors, such as category of the vessel, size of the vessel, emission target, pollutants to be treated, and reagent used to clean the gas. Thus a shipping company’s credit and access to finance is pivotal in determining whether a scrubber is a possibility. Despite the huge initial outlay, the installation of a scrubber can be economically effective in the long-term.

It is assumed throughout this paper that the type of scrubber being considered is a closed loop scrubber. The other type which is the open loop scrubber can be installed for around 800,000 dollars cheaper. However, this type of scrubber is unsustainable for future years as it simply eliminates the sulphur into the sea instead of the atmosphere. There will most likely be marine regulators trying to prevent their use, thus ships should beware of the potential risks.

Although the MGO/ULSFO and the scrubber remain the most realistic solutions, liquefied natural gas (LNG) is also being considered by a minority of ship owners. It is expected to be cheaper than other compliant fuels with hardly any sulphur oxide emissions. LNG would also conform to future regulations concerning carbon and even tighter sulphur caps. However, to use LNG, the vessel engine needs to be retrofitted at a high price. New builds are thus a more realistic target. For current vessels, this would represent a large commitment, especially as

LNG lacks global network and infrastructure. Although many oil and gas companies are promoting LNG and pushing for its implementation, it represents the distant rather than near future of the shipping industry.

Lastly, compliance arbitrage has gained press in recent weeks. Although it sounds unfeasible, the lack of clarity on inspection makes this a potential option. Some studies have even pointed out that the costs of fines could be more cost efficient than switching to high sulphur fuel oils. This is because the fines given are not set by the IMO themselves, but individual governments, which lead to variable charges. Furthermore, once ships are out at sea, there is little the IMO can do to verify compliance. This may be easier in less regulated areas outside the EU and US. If non-compliance occurs, the whole reasoning behind the cap is negated; the IMO must ensure this option remains out of the question. Although this may occur in early years of the cap, any cheating after clear regulations have been set could give certain shipping companies a scandalous reputation and is unlikely to occur.

## Market Impact (MGO/ULSFO)

The main issue regarding the switch to LSFO is the uncertainty of future prices. With a rise in demand predicted for these types of fuels nearer to 2020, a price spike is very probable. At the start of September 2018, one metric ton of ultra-low sulphur fuel oil (ULSFO) was about \$190 dollars more expensive than IFO380 high sulphur fuel oil (HSFO) in Rotterdam bunker. One metric ton of MGO on the other hand was about \$228 more expensive (basis ICE screen -70 for 0.1% FO and ICE screen-32 for DMA price). Although MGO is slightly higher in price, it is more widely available worldwide than ULSFO, which is located mainly in ECA areas.



Source: Bloomberg, Marex Spectron Research

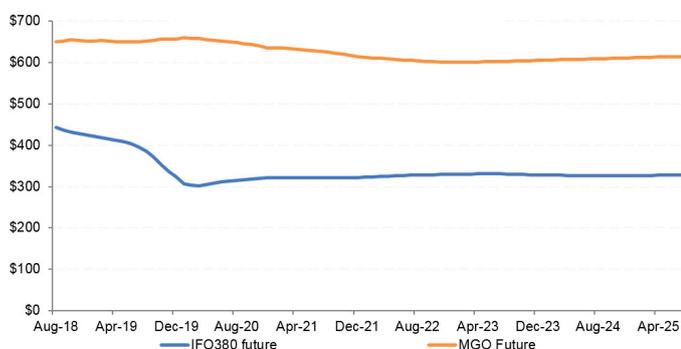
### MGO/ HSFO Spread



Source: Bloomberg, Marex Spectron Research

The spread between MGO and HSFO prices has been relatively stable over the past 3 years, with an upward trend emerging mid-2017. The latest movements thus imply that the premium is slowly starting to widen building up to the cap. With the price gap also likely to widen in the next two years, a situation exists where buyers are not committed to buy due to a lack of price guarantee and suppliers do not know when or how much to start producing in refiners. This is demonstrated by the following future contract forward curve.

### Forward Curve for MGO/ IFO 380

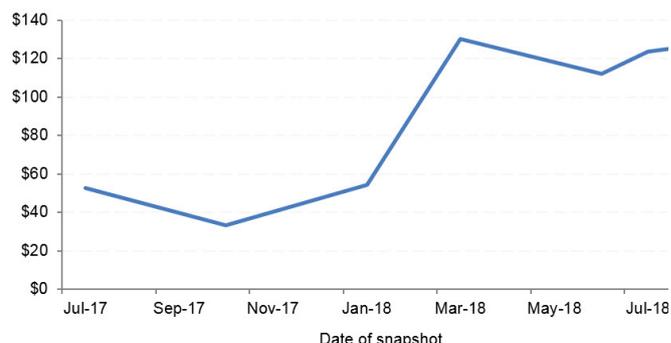


Source: Marex Spectron Research

The forward curve shows us future contract prices at the end of August 18 for MGO and IFO 380. The difference in price was \$207. The gap increases to 334\$ two years later, showing that the market currently predicts a wider price gap. This gap is clearly visible on the graph come August 2020. It is worth noting though that most of the gap comes from a drop in IFO 380 price, not necessarily a big increase in MGO price.

If we take future contract price spreads (Aug 2018 – Aug 2020) from several different snapshots over the past year, we can see the evolution of the market in terms of how it increasingly incorporates the widening price premium of MGO. This is demonstrated in the following graph.

### MGO premium over time (future contract price gap)



Source: Marex Spectron Research

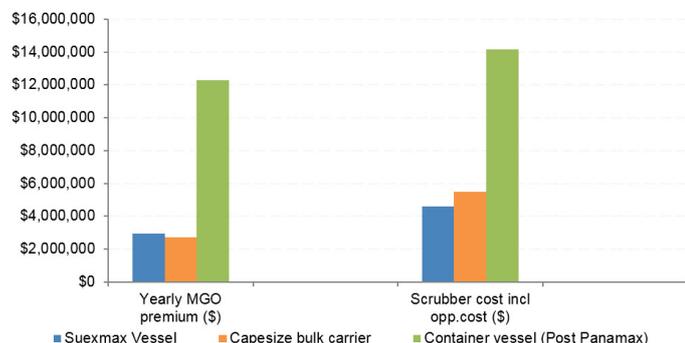
The graph shows a positive trend between the increasing price premium and build up to the sulphur cap. If this continues, the price premium will keep rising indefinitely as we get closer to the cap due to the futures market continually adjusting. This clearly depicts why there is so much uncertainty surrounding the use of LSFO. If it were not for the high price and uncertainty, LSFO would undoubtedly be the best option due to its simple and quick implementation.

## Scrubbers and IFO 380

The use of scrubbers has caused split opinions. A major energy firm has recently suggested that it is too late to fit fleets with scrubbers. On the other hand, several shipping companies have recently placed large scrubber orders, with some even investing in a scrubber manufacturing producer. When looking at current prices however, scrubbers seem to be an attractive proposition.

The added yearly expense of switching to MGO depends on several factors including the type of ship, speed, and days at sea. Nonetheless, there will be large increases in costs, especially for container vessels that burn a huge amount of fuel per day. The following diagram compares the cost of a scrubber (including opportunity cost) to the yearly MGO premium. Although the cost of a scrubber will be more expensive than the fuel premium, it does not excessively exceed it.

### Cost of scrubber installation vs. MGO price premium

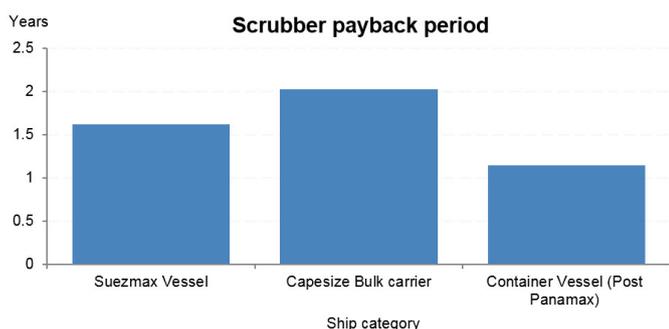


Source: Marex Spectron Research

The graph is based on average fuel consumption statistics, average monthly charter rates, and scrubber cost estimations for all three ship categories. It was assumed that ships operated at sea for 300 days a year. MGO is the fuel replacement used, and its price was recorded on 30th August 2018 for Rotterdam bunker. The opportunity cost of the scrubber installation must also be taken into account. The ship must remain in dry dock for roughly a month during the process, which will take away one month's revenue. The same assumptions apply to the following graph.

If we look at the payback period for the scrubber's initial cost to be offset by the fuel premium, these are relatively short periods:

### Scrubber payback period



Source: Marex Spectron Research

The longest payback period was the Capesize bulk carrier, which is around 2 years. The shortest was the Post Panamax container vessel, which was just over a year, likely due to the high amount of fuel it burns. When

looking at the bigger picture, these are relatively short time periods, and yearly savings after the initial payback period can be huge. For a Suezmax vessel, starting from year 3, there will be savings of roughly 2,850,000 US dollars per year. At the end of year 2, there will also be savings of 1.3 million US dollars. Therefore, if ship owners have the credit to afford the initial outlay and have the patience for installation, scrubbers provide a cost-effective solution in the long run, especially with the likely increase in MGO/ULSFO prices.

From another perspective, if we calculate the daily premium of using MGO and compare them to average daily charter rates, there is a large increase in additional costs in proportion to revenue. A Suezmax vessel, whose daily fuel premium is 9,849 US dollars has an average charter rate of 16,250 US dollars per day pro rata. The additional costs represent roughly 60% of the charter rate. This is a large amount to pass onto consumers. The Capesize encounters a similar situation, with additional costs representing 45% of a daily charter rate. Container vessels, which go by freight prices rather than charter rates, have too many variables to make a fair comparison, but estimates indicate that the additional costs will be under 10% of revenue. In this case, the extra costs can be passed on to consumers, but the short payback period and potential savings suggest that a scrubber is worthwhile in all cases due to high potential savings.

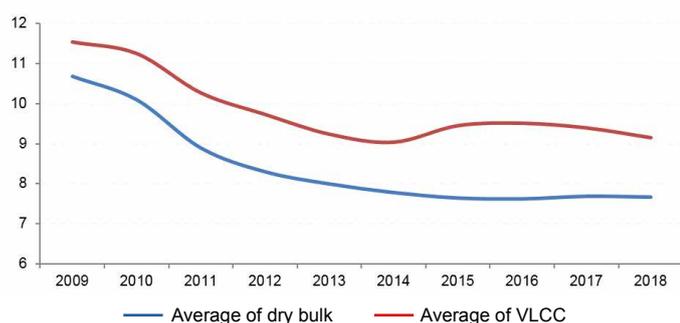
There could be a scenario where the price of HSFO drops due to a market shift towards LSFO. Ships installed with scrubbers could experience an even shorter payback period. In the same case though, suppliers may feel it is costly and unprofitable to keep HSFO in storage with much more expected demand for compliant fuels. Although refiners would most likely welcome a portion of guaranteed demand for HSFO, a shortage is still a possibility. In this case, HSFO could have a future as a power generating source, but must reach lower prices to compete with other alternatives such as coal. Likewise, HSFO can be burned to make electricity for desalination, with the same condition of reaching low enough prices.

The prices of future compliant fuel prices will ultimately determine whether scrubbers are a good idea, but as for vessels being currently built, the installation of a scrubber should not need a second opinion, as the price is much cheaper for new builds and there will be considerably less opportunity cost.

## Market impact on the shipping Industry

Shipowners have also expressed concerns over a potential supply shock due to a reduction in vessel availability, which could drive charter rates up. This could come from several sources. Old vessels which are economically inefficient could be scrapped as they tend to burn more fuel and lack the longevity for a scrubber investment. Vessels that also go through with the scrubber installation will be in dry dock for about a month. Collective slow steaming has also been suggested by shipowners to increase profitability and counter the higher fuel expenses. However, this would require a collective act from all ships. Considering the high level of competition amongst the shipping industry, collective slow steaming may be hard to implement without collusion. This is particularly emphasised during this period of fragility and uncertainty. Nonetheless, there is potential for a reduced supply, and coupled with much higher costs, the chance of an increase in freight prices should not be neglected.

### Fleet speed



Source: Bloomberg, Marex Spectron Research

Long haul voyages could also be affected by the cap. If imports are being delivered over a long distance, fuel expenses could exceed 200,000 US dollars just for one trip, with the consumer likely to feel some of the burden. Companies may start looking closer to home to reduce overall costs. With shipping being the main transport method for global trade, a distortion in voyage expenses could impact global import markets.

## Oil Market

Concerning crude oil, it is expected that sweet crude demand will increase in order to produce LSFO, as

desulphurization techniques in refiners are limited. This means that sweet crude grades will increase in price, whilst heavy grades will likely decrease. The premium between the two grades will therefore be large. This will again benefit complex refiners as they can continue to use heavier and cheaper grades whilst still producing compliant fuels. The transport costs of crude oil will also increase due to the higher fuel bills, which could be reflected by an increase in crude oil price.

However, the market has not yet incorporated this information. When we look at spread of future prices between heavy and light crude oil over several snapshots in the past two years there are marginal differences. This is demonstrated in the following graph, using 2018 and 2020 as the spread benchmarks.

### Heavy/Light crude oil spread (24th month contract)



Source: Bloomberg, Marex Spectron Research

Not only are the differences marginal, but the sour/heavy crude is leading in terms of price. This does not reflect our initial argument of an increase in sweet crude prices. There is a situation where the fuel oil market is perfectly reflected in terms of the large spreads between LSFO and HFO, but the crude oil market is unresponsive. This represents segmentation between the two markets. A possible reason for this is that the crude oil market has simply not responded yet and might incorporate this information once the amount of scrubbers installed is confirmed.

## Conclusions

Studies conflict on whether refiners will have sufficient capacity to meet the eventual increase in demand for LSFO. This is partly due to refiners being unsure on how much to produce due to a lack of clarity on future fuel prices and demand. In any case, they cannot afford to simply overlook the cap, with 2020 just around the corner. The situation is somewhat easier for complex refiners (found in major bunker ports) who have the ability and flexibility to switch to LSFO production. However, they cannot produce both types in full quantities due to refining capacity limits. Nonetheless, complex refiners are more equipped to deal with different future scenarios. Simple refiners, who primarily produce HSFO, must upgrade their configuration by installing more cokers in order to produce compliant fuel oil. However, with complete refinery modernisation costing up to 1 billion US dollars, simple refiners are unwilling to invest without clearer future market conditions.

The conundrum amongst the shipping industry is that refiners and ships are depending on each other. If refiners choose to commit to MGO production, ships installed with scrubbers will fear a potential supply shortage. However, if there turns out to be many scrubber installations, refiners will ponder how to sell the MGO surplus. Therefore, refiners are waiting to see what route shipowners take, whilst the latter are keen to see what actions the refiners will take. Future public announcements made by both parties will play a key role in clearing up this mismatch, leading to less transparency in the shipping industry.

## Closing remarks

The 2020 cap will not be smooth sailing for the shipping industry and will undoubtedly cause uncertainty and confusion for all related industries. This offers opportunities which should not be missed.

Whichever route shipowners take, there will be advantages and disadvantages which can only be justified based on future conditions. Ships committed to MGO and ULSFO might have to deal with last minute price spikes whilst ships with scrubbers installed might find refiners slowly shifting away from HSFO. There is no obvious solution and there will be plenty of observations amongst shipowners to see how others are dealing with the situation.

Logically, the first few years of the cap will be the period of most uncertainty. Markets may experience temporary volatility, with possibilities of local supply and demand shocks. Our research and execution teams will be there to guide our customers until the market forces work their way through volatility and re-establish the long-term price equilibrium.

## IMO 2018 meetings timeline:

September 24-28: Implementation on IMO instruments (unlikely to mention sulphur cap)

October 22-26: Marine Environment Protection Committee (extremely likely to mention sulphur cap)

November 5-9: Meeting of contracting parties (unlikely to mention sulphur cap)

November 19-23: IMO council (supervisors of the IMO may bring up decisions re-garding implementation of the sulphur cap)

December 3-7: Maritime Safety Committee (although more focused on piracy and ship security, sulphur cap may come up)

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