IMO Sulphur Cap

*Abhishek Deshpande, Joel Hancock

Oil Analyst at Natixis Global Markets Research, Natixis Cannon Bridge House, 25 Dowgate Hill London, UK

Introduction

The global shipping industry is a major source of emissions, with exhaust gases from ships in 2012 contributing 2.2% of global CO₂, 30% of NOx and 9% SOx. The International Maritime Organisation (IMO) announced in October 2016 a limit on the maximum sulphur content in marine fuels of 0.5% from 2020, down from the current 3.5% previously, for oceanic zones outside of current emission control areas (ECAs - Baltic Sea, North Sea, North American Coast and the United States Caribbean Sea) due to concerns regarding the effect of sulphur oxides on human health and the environment. 3.5% sulphur fuel oil (HSFO) dominates the marine fuel market at present, with a 75% market share, equivalent to ~3mn b/d, which is 42% of global fuel oil demand. With a high volume of non-compliant HSFO needing to be replaced, there are worries in the market regarding the availability and affordability of compliant fuels by 2020

Compliance

We expect compliance to the new regulations to initially vary regionally, with particularly high compliance in existing ECAs due to an already strong regulatory regime. In any given ECA, the current limit on sulphur in fuel oil is 0.1%. We expect particularly high compliance in North America due to the availability of compliant fuels due to the high level of complexity of US Gulf coast refineries. Limited fuel options and less stringent regulation could result in lower penetration in the developing world, however most analysts see full compliance by 2025, increasing as a system of penalties, inspections is put into place to deal with noncompliance and compliant fuels increase in availability and affordability globally.

Alternate Fuel Options for Shippers

Scrubbed High Sulphur Fuel Oil (HSFO)

The industry has identified three main alternatives to unconstrained use of HSFO, for now. The first option is to continue using HSFO, and install scrubbers to existing ships to remove pollutants. Scrubber systems are a diverse group of air pollution control devices that can be used to remove some particulates from exhausts at source. The benefit of this option is that users will be able to take advantage of a likely decline in price of HSFO due to lower demand post-2020. Retrofitting older vessels with scrubber technology can cost between $4-6 million. The payback period will be dependent on the pricing differential between HSFO and more expensive, alternate fuel options, but industry participants have estimated this would average ~5 years. The length of the payback time would make it economically unfeasible for any end of life vessel <5 years of remaining operational life to undergo retrofitting.

Post 2020, HSFO suitable for consumption in the marine sector are likely to become more of a niche product if refineries produce less to deal with lower demand and crack the HSFO into lighter products. This may lead to a fuel shortage which reduces the availability of fuel for ships utilising scrubber technology, and may result in higher prices beyond 2025 when full compliance is reached globally.

Ultra-low Sulphur Fuel Oil (ULSFO)

ULSFO is a fuel oil that has been treated and blended to remove excess sulphur, and typically contains...
~0.1% maximum sulphur content. There is a growing ULSFO market in Europe following the implementation of MARPOL legislation to enforce a lower 0.1% sulphur cap in 2015. Amsterdam-Antwerp-Rotterdam total supply is ~7,000 b/d, with plans for additional expansions. Although there are no expensive initial outlays associated with a switch to ULSFO as is the case with installing scrubbers, pricing, availability and the standardisation of low sulphur fuels are issues that could prevent large uptake. ULSFO is attractive to shippers at a premium of $2/barrel compared to HSFO, however the price in 2020 is likely to be higher than this, and future supply is uncertain; de-sulphurising can be a prohibitively expensive process (as sulphur does not blend linearly, it costs far more to take down sulphur levels by 0.1% from 0.6% to 0.5% than 1% to 0.9%). Wood Mackenzie estimate the total demand for global ULSFO will be 900,000b/d by 2020 with most of this increase in one year between 2019 and 2020. Supply shortages and ULSFO price rises would encourage refiners to produce more low sulphur fuel, but as the price rises in line with demand this option will become less attractive to shippers. There is currently no unified blend of ULSFO with different refineries producing blends to slightly different specifications, which has created worries regarding compatibilities at regional and global bunkering hubs.

**Marine Gasoil (MGO)**

MGO is a cleaner, lower sulphur fuel and is a middle distillate. This fuel type already currently constitutes 1.2mn b/d of global shipping fuel demand (~15%) and is priced at a premium to HSFO. As a cleaner alternative, MGO a likely candidate to soak up displaced HSFO demand near term, primarily due to the relative availability of marine gasoil compared to ULSFO. We estimate that marine fuels will represent 9% of global distillate demand by 2020, up from 4% in 2017. Increased demand for middle distillates from the shipping sector will likely have ramifications across the barrel. (Fig 1)

Refineries will produce more gasoil to meet demand; however the increasing supply of gasoil will also cause increased production of products across the middle distillates spectrum, including gasoline as these products are produced via the same process. This could result in a global surplus of gasoline, which would result in lower gasoline prices and pressure on gasoline cracks and potentially strengthen gasoil cracks due to the increased marine gasoil demand in the overall gasoil complex.

Moving into the distillate market will lower ship owner’s influence from a pricing perspective. As the main consumer of HSFO, price fluctuations have been relatively easy to forecast based on supply and demand constraints of the shipping sector. With marine demand only likely to constitute only ~10% of global distillate demand by 2020, ship owners may see prices fluctuate for reasons beyond their immediate control, such as the prevailing weather conditions at demand centres or stronger than expected economic growth in emerging economies. This adds a level of risk to the shipping industry that was not previously present, and could see shipping operators extensively hedging their gasoil supply.

The move towards cleaner, more expensive fuels in the near term will add to the costs of shippers, with compliant fuels trading at large premiums to HSFO. This could encourage non-compliance in non-ECA areas in 2020, especially when enforcement structures are either not in place or under-developed. (Fig 2)
**Liquefied Natural Gas (LNG)**

LNG is seen as a less conventional yet also far less polluting option. LNG has seen some uptake as a marine fuel in areas where cleaner fuels are preferred, such as cruise ships and ferries. The standardisation of LNG means there are no compatibility issues as with ULSFO, and LNG is generally cheaper than ULSFO. However, a lack of suitable infrastructure for LNG bunkering will severely limit LNG’s penetration into the shipping sector. Infrastructure is starting to develop however, with a growing number of European ports offering bunkering services. LNG is a significantly cleaner fuel than 3.5% HSFO, with NOx emissions reduced 80%, and SOx by almost 100%. However, studies have highlighted the risk of ‘methane slip’ from LNG vessels; with methane emissions are higher than conventional marine fuels - methane has 84 times the global warming perspective of CO2 over a 20 year timescale. As the energy density of LNG is lower, ships need bigger tanks which reduce the room available for cargo. Retrofitting a vessel to run off LNG could cost between $5-20 million, which would be relatively expensive for most ship owners when compared to scrubber. We therefore see the most penetration from new builds. On average, an LNG vessel will cost $5-10 million more than a ship running conventional fuel of a similar size. We do not think LNG will be a main player in the fuel mix in 2020, however going forwards we should see more uptake of LNG vessels. The growing global trade in LNG has seen the sanctioning and development of multiple megaprojects which will increase the likelihood of a global supply chain of bunkering, regasification and reliquification of LNG which will encourage ship owners to invest in new build LNG vessels. There is also a rising pressure on customers using ships to transport or receive their goods to reduce their own global carbon footprints; requesting the ship owner to deliver their required goods by a LNG tanker would further expedite the transition.

**Sweet-Sour Spread**

The regulation change will favour sweeter crudes which yield lower sulphur products and require less processing to produce compliant low sulphur fuel. Simple hydroskimming refineries will be unable to use sour crudes to produce fuel with a low enough sulphur content, which will lead to a pricing premium for sweeter crudes as demand from these refineries increases. The sweetening of the average crude slate will eat into margins for refiners, with the sweet-sour spread likely to widen post 2020. Crudes which could see pressure due to their high sulphur contents are focussed in the Middle East, with Iraq’s Basrah Light (2.92%) and Kirkuk (2%), Qatar’s Al Shaheen (2.5%) and Iran’s Iranian Heavy (1.8%) all classified as sour and at risk from falling prices.

**Impact on Refiners**

There is potential for regional disparity in the volumes of ULSFO being produced globally due to a lack of hydrotreaters and sulphur recovery units in the legacy refining fleet, which are required to desulphurise sour crudes. This could open up potentially lucrative arbitrage opportunities if demand is focussed away from supply centres, which have seen complex Greenfield additions to the refinery fleet over the last decade. The main beneficiaries of the regulation changes in our view will be complex refineries which will be able to run sour crude and still produce compliant low sulphur fuels. Deep conversion refineries located on the US gulf coast as well as Chinese independents (forced in the past to utilise heavy fuel oil as a feedstock due to import quotas) which are able to use HSFO as a feedstock will benefit the most from the changes in our view, as HSFO comes down in price in the near-term due to the collapse in demand from the shipping sector. Less complex hydro skimming refineries could struggle as the premium paid for sweet crudes eats into their margins and demand for heavy fuel oil falls. Regional availability of sweet vs sour crude will once again become very important. US refiners will benefit from their natural advantage of both refinery complexity and ability to access US sweet shale supply. There is a likelihood of WTI selling at premium to Brent especially if the high sulphur Buzzard field continues to increase its share of the Forties blend, one of the five blends that constitute the Brent benchmark, and further widening of spreads between North American Sweet and Middle East Sour grade crudes.