

Argus White Paper: IMO, IMO it's off to sea we go....

In 2008, the International Maritime Organisation (IMO) outlined a reduction in the global maximum limit of sulphur content for any fuel oil used by a shipping vessel, reducing it to 0.5pc from 3.5pc. The restriction was to be imposed in either 2020 or 2025, depending on a review of the availability of required fuel oil. This review was discussed in October at the 70th session of the Marine Environment Protection Committee in London, where the 87 parties present decided to impose the global cap in 2020.

The IMO's decision is based on the conclusion of the Assessment of Fuel Oil Availability, carried out on its behalf by environmental consultancy CE Delft. This report concludes that "in all scenarios the refinery sector has the capability to supply sufficient quantities of marine fuels with a sulphur content of 0.50% m/m or less and with a sulphur content of 0.10% m/m or less to meet demand for these products". The expectation is that the bulk of the task in meeting the new sulphur cap will be shouldered by the refining sector and made possible by the amount and type of refining capacity already in place or in the process of being added.

Our view is somewhat different. We expect there to be a significant dislocation in terms of bunker fuel use and pricing with the introduction of the new sulphur cap in 2020. For some refiners the new environment will offer a significant opportunity, for others it will mean an even fiercer struggle for survival. In addition, we expect the bulk of the requirement for investment to fall not on the refiner but on the shipowner.

Here we address some key questions about the new regulation and the implications it may have.

How significant an issue is it?

The issue of sulphur emissions from vessels out at sea may seem remote to most, but this has the potential to hit hard and wide. A global 0.5pc cap means that shippers currently using high-sulphur fuel oil (HSFO) will have to find an alternative or invest in compliance measures in 2020. On the basis of our forecasts, this could affect the consumption of as much as 185mn t/yr of fuel oil, which is almost half the entire global production of the product. So this is a big deal both for the refiners which produce fuel for marine bunkers and for the estimated 45,000 vessels that currently consume HSFO.

What are the options to address this problem?

There are various:

- 1. Switch to marine gasoil (MGO).** At the moment the shipping industry only uses MGO for 10-15pc of its bunker fuel requirements, a market share that has increased since 2015 with the obligation to use maximum 1pc sulphur fuel in the designated Emission Control Areas (ECAs). A straight substitution of MGO for HSFO is possible without any technical modification being necessary, although following the 2015 ECA move it has become evident that some operators have encountered problems when switching at sea between MGO and HSFO. But the higher price of MGO makes this a high-cost option for ship operators.
- 2. Switch to compliant 0.5pc low-sulphur fuel oil.** Unfortunately, 0.5pc fuel oil availability is limited. Production of fuel oil this low in sulphur depends either on the refiner processing low-sulphur crude, or on it desulphurising the higher sulphur fuel oil already being produced. Supply of the former is limited — <0.5pc sulphur crude accounts for less than 10pc of global production — while the global refining system has little residual desulphurisation (RDS) capacity. What little RDS capacity that exists is mainly aimed at supplying low-sulphur feedstock to refinery upgrading units. Refiners will find ways to blend some volumes using available fuel oil, vacuum gasoil and gasoil streams, but this will not meet the scale of the problem. In the end it is questionable how willing refiners will be to divert material away from producing high-value transport fuels to produce lower value bunker fuel instead — unless of course the bunker fuel is priced at a much higher value than in the past.
- 3. On-board scrubbing technology.** Shipowners could install scrubbers that capture the sulphur emissions when the fuel is burned, which would allow them to continue to use HSFO. Retrofitting scrubbers is a relatively straightforward exercise, which can be undertaken for instance during a regular dry-docking. It is also relatively low-cost, at \$2mn-3mn including installation, depending on engine size and type of system.
- 4. Consumption of LNG.** LNG contains almost no sulphur and in recent years a nascent bunkering capability has developed in northwest Europe, the US and a few other places. So far, investment in both vessels and bunkering facilities

has been limited and there is no realistic possibility of LNG making anything other than a cursory contribution to global bunker needs by 2020. Longer term, the prospect of gas maintaining a significant price advantage over oil products means that LNG could make inroads into the bunker market.

5. **Consumption of methanol.** Introduction of the 0.1pc sulphur cap in the ECAs in 2015 has increased interest in the possible use of methanol as a marine fuel. A number of engine manufacturers have developed technologies that use methanol and one company has ordered a number of new-build chemical tankers that will be fuelled by methanol. To date this option has been mainly considered as an alternative to MGO or LNG. Methanol can be used in diesel engines with minimal modification and can use similar infrastructure as oil products. Both factors make methanol potentially a more viable option than LNG. The cost of converting a vessel to run on methanol reportedly is similar to the cost of retrofitting scrubbing equipment. But methanol has half the energy content of MGO or HSO.
6. **Non-compliance.** For the less scrupulous, simply ignoring the mandate could be the solution. In the European ECA, where the sulphur limit dropped from 1pc to 0.1pc in 2015, a European Commission study found that non-compliance amounted to about 5pc. This figure is likely to increase significantly for global shipping, where monitoring in the open seas will be considerably more difficult. Globally, the enforcement and punishment for non-compliance will be up to the individual countries where the ship is registered, and there is no set or established sanction for violation of the cap.

So MGO is the answer ?

Probably not. It is true that refiners have already made significant investments in upgrading capacity designed to produce gasoil/diesel, leading to a 1mn b/d increase in traded volumes from four key exporters over the last five years. And more is on its way, with a total of 3mn b/d of coking and hydrocracking capacity due on stream in the next five years or so. It is also true that the pace of growth in global diesel demand has slowed as China's economic growth has eased and consumers in many parts of the world start to turn their backs on diesel as a road fuel. Production of gasoil/diesel between 2015 and 2020 is likely to increase by 105mn t, but demand will increase by only 70mn t, resulting in a sizeable surplus of gasoil/diesel in 2020. At around 35mn t, this excess supply looks like being far from what might be required by ship operators should they try to go down the MGO route.

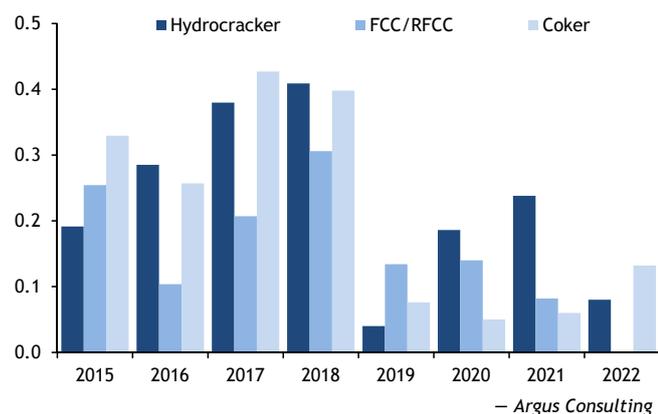
So refiners need to invest to produce 0.5pc fuel?

On the face of it, yes. There is likely to be a strong price signal for them to do so. If the availability of MGO really will be as constrained as we suspect, gasoil/diesel and consequently jet fuel prices will balloon. Meanwhile, fuel oil prices will drop sharply since there will suddenly be a surplus of fuel oil in the market as ship operators switch to using MGO. We forecast that the price spread between low-sulphur gasoil/diesel and high-sulphur fuel oil will be around \$45/bl in the immediate aftermath of the specification change, compared with \$25-30/bl at present. This will significantly increase the incentive for refiners to invest in coking and hydrocracking capacity, to upgrade the unwanted fuel oil into low-sulphur gasoil/diesel, or build RDS capacity. But in the latter case, refiners will only sell 0.5pc product into the bunker pool if the price they obtain is close to the price of MGO, otherwise it would make more sense to use the 0.5pc product as upgrader feedstock to produce gasoline and diesel.

Will shipowners react?

The problem is that the same price signal will also incentivise the shipowner to install on-board scrubbing equipment. Data from the Exhaust Gas Cleaning Systems Association in 2015 indicated that there were about 300 scrubbing systems in use or due to be installed, which represents just 0.6pc of the 45,000 vessels worldwide that are likely to need to find a way of meeting the specification change in 2020. In reality, only a minority of these vessels accounts for the bulk of the bunker fuel actually consumed. Given the dire financial situation in the shipping industry, owners will not be in any hurry to make this investment and if history is indicative of shipowners'

Global upgrading additions - firm projects mn b/d



behaviour, most will wait until 2019 to gauge the availability of 0.5pc sulphur bunker blend before deciding if and what kind of investments they can afford to make. But a \$300-350/t price spread between HSFO and more expensive low-sulphur MGO after 2020 will give shipowners every incentive to add scrubbing equipment, since they will be able to recoup a \$2mn-3mn investment in quicker time. In the end, if enough shipowners invest in scrubbing, they will re-establish the market for HSFO and destroy the original price signal established by the initial switch from HSFO to MGO.

So the window for refining investments could be a short one?

Looks like it. How long it is depends on how long it takes for the shipping industry to invest in scrubbing. Starting with the estimated 45,000 vessels that would be potential candidates for retrofitting with scrubbing technology, around 19,000 are 15 years old or more and therefore might not be considered for the investment. This leaves 26,000 vessels. According to industry sources there is capacity to retrofit 2,000-3,000 vessels per year, so it could take ten years to convert the global fleet completely. Since the minority that consume the most bunker fuel would probably be the first to convert, it may be closer to 5 years until sufficient retrofitting has taken place to return gasoil/diesel and fuel oil prices back to pre-IMO levels. If by around 2025 the prices of gasoil/diesel and fuel oil will have returned to pre-IMO levels, any new investment in refinery upgrading is likely to be in trouble. Even assuming that such investments were in place ready to take advantage of the initial price dislocation, which is unlikely to say the least, refiners would almost certainly fail to make a satisfactory return on their multi-billion dollar investments.

Is there any good news for refiners?

Depends on what kind of refinery they have. For coking refineries with hydrocrackers that are operating in 2020, things look rather promising. Supported by low fuel oil and high gasoil/diesel prices, these refiners will enjoy strong margins for a while. Unfortunately hydroskimming and fluid catalytic cracking refiners are going to struggle. This will favour regions with a high degree of upgrading complexity such as parts of Asia-Pacific and the Middle East over Europe, for instance.

Does this mean another golden age of refining?

Only for as long as it takes for prices to return to pre-0.5pc cap levels. It is hard to see any renewed golden age of refining running much beyond the 2025 timeframe. And it is worth reiterating that while it may be a golden age for coking/hydrocracking, it will be quite the reverse for operators of more simple configurations.

What happens to the unwanted fuel oil?

This may be the elephant in the room. Outside of relatively few countries, marine bunkers are the only market of any note for fuel oil. In most regions, fuel oil use has been and will continue to be declining. As the world becomes more and more environmentally conscious, is it realistic to expect electricity generators to suddenly take advantage of the availability of cheap fuel oil to displace power generation from coal or natural gas? Will they be allowed to by governments? Or will the independent Chinese refiners mop it up as refinery feedstock? Unless a home for this material can be found, refinery runs would need to be reduced to prevent the fuel oil being produced in the first place – which of course would cut supply of transport fuels. There will be incentive for refiners to try and blend fuel oil down to the 0.5pc sulphur limit, but this will require a lot of gasoil to use as blendstock. For quality reasons, severely hydrotreated gasoil is not suitable for blending with fuel oil to make marine bunker fuel.

So there is no single solution to the IMO issue?

There are different ways that the specification change can be met, involving different timeframes and different players, so it is difficult to see a definitive way forward. MGO, on-board scrubbing, 0.5pc fuels and LNG are all likely to play a role to some extent or other. The only certainty appears to be that from the point of view of investment, the three years leading up to 2020 will not be long enough to allow either the shipping or refining sectors to prepare for the specification change. Inevitably it will be switching to MGO that provides the main route to compliance with the new regulations in the short term, but ultimately it will be investment in scrubbing technology that provides the solution, to the detriment of any investment in refinery upgrading capacity.

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