REFINERS, SHIPPERS, LUBRICANTS FACE UNCHARTED WATERS OF LOW-SULPHUR 2020 RULE BY IMO

By Vicky Ellis
A wave is about to break over the marine world that will sweep over refiners, lubricant makers, the international shipping community and major equipment manufacturers.

New rules kick in on 1 January 2020 drastically slashing the amount of sulphur content in bunker fuels, from around 3-4% in the open seas to a maximum 0.5%.

With little more than a year to go, shipping leaders have said they are still testing, or yet to test, new technologies or fuels that are not widely available.

The deadline cannot be pushed back. And questions remain about who will enforce this, with regions and individual ports potentially being lined up to do this, rather than the International Maritime Organisation (IMO), which established the rules.

From the shipowners, ports and engine makers, to the refiners, lubricant manufacturers and additive makers, each link in the marine and fuels supply chain faces unique, though inextricably linked challenges.

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technology, which strip high sulphur fuels of their sulphur content, or from purchasing new types of low sulphur fuel expected on the market.

Then there is the logistical pressure of where to load new fuel and the appropriate new lubricants to match.

Time is another challenge. All this preparation comes on a relatively short time scale for a business used to long lead times, with operators trialling options at what seems to be the last minute.

What possibly adds to the clouded situation from the shippers’ point of view, especially smaller operators or traders perhaps without as many direct links to the big oil companies, is that refineries have not been too public about what their plans are.

There is a sense, on the ground, when you talk to shipping contacts, about a lack of information.

The latter option was the preferred one as most of the investments over the last decade were to increase diesel yields.

Fast-forward to the summer of 2018, refiners’ plans were not out in the open for obvious competition law restriction.

“We won’t have an answer to who will produce what, the quantity, or what quality,” said Valdenaire.

“We only know it’s going to be a different fuel, different process, different properties. As a result one of the key elements of [the post-2020 landscape] will be the risk of compatibility issue between different fuels.”

At a lab in Rotterdam, Concawe is testing anonymised samples of what could be the 0.5% marine fuels from refiners.

Its researchers hope to provide some guidance on compatibility between the different fuels and expect initial results in September, together with their research partners the International Standards Organisation (ISO) and the International Council on Combustion Engines (CIMAC).

As of November the lab tests were still ongoing, and the partners hope to issue guidance between Q1 and Q2 2019.

**GASOIL DEMAND COULD ROCKET**

Looking past the oil majors’ guarded positions, refineries will be forced to change their output, according to Elia Farah, petrochemical and energy analyst at ICIS.

“We predict a major shift in demand to distillates from high sulphur fuel oil (HSFO) leading up to 1 January 2020,” he said.

Residual fuel oil is currently the most widely used fuel in ships, Farah added, who has been working on an ICIS white paper forecasting the impact of IMO rules. (See chart on Oil-based bunker fuel demand for an overview of this white paper research).

“After 2020, we’ll see a substitution with distillates. Over time, after 2020, we’ll start to see the employment of scrubbers become more commonplace, and a reversal of this substitution,” he added.

“We expect to see demand from gasoil as a bunker fuel increase by 120%. It is not widely used within shipping at the moment but it will grow to have the biggest market share globally, for a period of time after the upcoming regulations come into play,” he said.
“Fuel oil demand overall within shipping will decrease by 40% in 2020. Although it is significant, it does not seem as major as the change in gasoil, because there are existing volumes of low-sulphur fuel oil mitigating this decline.”

This is where classic supply and demand drivers, and hence pricing, will come into play.

According to Farah, the price of high-sulphur fuel oil is expected to drop, so scrubbers will start to be employed in new ships.

“We do not anticipate much retrofitting to take place, with a very small percent of existing ships carrying out such investments, given the high associated costs,” he said, adding that newly-built ships will use the “abundance” of HSFO.

“Which will be a lot cheaper. Over time, we’ll start to see demand for HSFO increase, offsetting distillate demand growth in the long term.”

These competing dynamics will further complicate the situation with early movers likely to see the bigger returns over the long term.”

Bringing our view back to the present, new fuel types will affect what lubricants are best suited for different vessels – something that will be addressed in the second part of this article.

This means some hard thinking and preparation for shipowners.

UNCHARTERED WATERS
Shipping lines face choppy waters, besides this impending emissions deadline. 2018 has thrown up political tensions between world superpowers the US and China, with President Trump’s rhetoric tainted by anti-dumping duties thrown up on both sides, not to mention warning shots taking place in the EU, Iran and, of course, Mexico.

Within the new sulphur rules, there are several routes to compliance as well as costs associated for shipping.

“Stricter limits on sulphur in fuel from 2020 onwards will pose a major challenge for the shipping industry, as we will have to simultaneously use new technologies and fuels which are currently only being trialled or are not sufficiently available,” said the CEO of shipping major Hapag-Lloyd AG, Rolf Habben Jansen, at the firm’s second-quarter financial results press conference in July.

Shipping lines have three options, according to Jansen – switch to low-sulphur fuel, convert to emission control systems (EGCS), known as “scrubbers”, or use liquefied natural gas (LNG).

“We will probably need a combination of the three solutions mentioned and [we] are currently evaluating all options with a view to a future strategy for shipping fuel,” he said.

Hapag-Lloyd AG is using three pilot projects in 2019 trying out different technologies to find the “right mix” for its fleet set.

Other options on the table for shippers include distillate fuels, methanol, or another option pointed at by several speakers interviewed for this article: to simply not comply. While it is not advisable, it could be being considered, but this would mean shippers risk breaking the rules in the hope they will not be caught.

Major costs associated with equipment for the new low sulphur regime run into the millions. This would be a massive gamble for players to take, given the current lack of clarity over the policing of new rules.
ENGINE MAKERS GEAR UP SCRUBBERS

Shipping sources have expressed concerns about the cost effectiveness of new options, their practicalities, and whether they are getting enough information yet from governing bodies and fuel suppliers.

Having said this, preparations are under way from some big original equipment manufacturers (OEMs).

Engine maker Wartsila sealed a €170m order from a major European container shipping company for hybrid exhaust gas cleaning equipment and a retrofit service, it said in July.

The group, which is listed on Finland’s stock exchange, reported “high demand” for scrubber solutions and “activity increasing” in both the new build and retrofit markets.

Scrubbers are proving controversial in some camps, including that of the CEO of Odfjell, a major Norwegian tanker chartering and operations group which deals with bulk liquid cargoes, including chemicals.

The company’s CEO, Kristian Morch, told trade magazine Ship & Bunker in August 2018: “I think fundamentally we have difficulty in seeing why an industry with 60,000 ships should try and solve a problem that actually should be solved ashore. The people that supply in the bunker market will have to adapt to whatever regulation goes on in that market.”

A scrubber solution “intuitively doesn’t make sense”, he went on to say, but there are still scenarios where it “could be quite an attractive” investment, including where the spread between HSFO bunkers and compliant fuel is wide.

“But it would be a $90m to $100m decision by Odfjell and we’re not convinced that that spread will stay as wide as it is,” he said.

Other challenges include how easily available low-sulphur fuels will be, whether they will be interchangeable (something that research from Concawe’s may help show), and how rules will be enforced on the open seas.

“The EU, the European Commission [the EU’s executive arm], the Port States Control authorities know how to control, prosecute, and to make sure the law is being applied. In Europe, we know the level of compliance will be very high. Controls, checks so on,” said Concawe’s Valdenaire.

Some see a risk in regions like Latin America and some African countries which have not got the same experience as Europe and North America, as both regions have already introduced in 2015 zones of the sea limiting sulphur emissions to 0.1%.

The areas are known as Emission Control Areas (ECAs) and are located in the Baltic and North Seas, parts of the North American East and West coastlines and...
the US Caribbean (see map by Transportstyrelsen via ResearchGate).

Valdenaire added: “We don’t want to be isolated. The level of enforcement may vary between region and we think it’s a risk for competitiveness and global enforcement.”

Efforts have been made to spread and share information, as far as can be done.

Fuels Europe, the advocacy division of the European Petroleum Refiners Association (Concawe is the scientific division), has launched a marine fuels platform, a working group, and invited other refiners’ trade groups from America, Canada and West Africa (WAF) to communicate on this. A website has also been launched to promote information (https://www.marinefuels2020.com/)

For a “historically conservative” sector like marine, this regulatory pressure is new, according to marine lubricant players, and marks a contrast with the automotive market which has more regular and less dramatic tweaks to fuel and lube specifications.

The next year – and beyond - will be crucial. It is a complex time, where the rule change will affect the price and availability of currently used bunker fuels, as well as newly made ones.

Choices made by shipping companies – to use new low sulphur fuel, or to install scrubbers that can use “dirty fuel” – will be driven by their attitude to costs and ease of use.

These choices will have consequences for refineries’ output, and vice versa. And these choices will dictate whether the marine sector emerges relatively damage-free after the wave washes over them, and how much money it will have cost them.

CLOCK TICKING FOR MARINE LUBES

Sailing on the high seas, the last thing a captain wants is an engine malfunction. High risk environments demand attention to detail, right down to the oils used to lubricate engine machinery. This is one reason why the marine industry is a very conservative place.

And as the clock ticks towards the new era in marine fuels and lubricants, the conservative market is having to move at a quicker pace towards change.

“I have a countdown timer on my phone, 510 days until 1 Jan 2020,” said Ian Thurloway, the brand and marketing manager for Chevron Marine Lubricants in August.

New IMO low sulphur rules could prompt both an immediate splash and a long-term shift, says Dick Wolpert, Chevron Oronite’s marine product line specialist. Unlike in the automotive sector, “the fact there is [a global] external regulatory deadline, that is new to the marine game.”

A low sulphur cap under the MARPOL rule has applied to pockets of the sea known as Emission Control Areas (ECAs) in North America, the Baltic, and North seas. This new 0.5% limit is global.
The future is uncertain: large quantities of low sulphur fuel are not yet available; refiners’ offerings are not widely known; lubricant approvals from original equipment manufacturers (OEMs) are not yet declared; nor has every vessel operator announced their plans.

ICIS analysts have predicted high-sulphur fuel oil (HSFO) use will initially drop, as Elia Farah, analyst for the petrochemicals information provider, explained earlier. A major shift in demand to distillates is predicted because a lack of sufficient LSFO in 2020 in the ICIS whitepaper.

So what is the impact on the lubricants, that crucial piece of the puzzle for well-run engines? Significant change for some in the market; for others, little or none.

START YOUR ENGINES WITH NEW FUELS

Engineers will be well versed in how engines work, but others may be less familiar with why lubricants are so important to the beating heart of a ship.

Ship engines are different to those in cars – and not just size-wise, with some vessel engines twice as big as a double decker bus.

In a common engine for a vessel, a two-stroke engine running on a heavy fuel, one major lubricant use is for the cylinder piston which pumps up and down. Unlike in cars, which need oil topping up much less frequently, this cylinder oil is a lost product that gets burned with the fuel.

This means lubricants are taken on board ships with fuel much more often – and it also means that any change in fuel, like the one on the cards for 2020, will have an impact on the type of marine lubricants needed.

Lubricants are made with base oils, historically marine has been based on Group I, which is still a key feature of the European base oils market despite the wave of rationalisation that hit around 2015, losing around 1.5m tonnes’ capacity.

As Group I base oils supply shrinks and Group II become more prevalent, it’s possible that in future, pressure may shift onto the marine sector. However at least one hurdle to this, beyond practicalities, is that OEMs don’t allow approvals for a lubricant formulation in their engines to be traded across from Group I to Group II.

MATCHMAKING MACHINE LUBES TO FUELS

In the shipping environment, several applications on board a vessel need lubrication, explains Joseph Star, ExxonMobil’s global field marketing advisor for marine fuels and lubricants.

Vessel operators carry a range of lubricants and greases, from cylinder oils for two-stroke engines to hydraulic or circulating oils, gear oils, compressor oils, refrigeration oil and greases. Out of all these marine lubes, the IMO 2020 regulation is only likely to affect engine oils, says Star, “in particular those lubricants designed for two and four-stroke applications. The oils for these applications will vary depending upon the customer’s route to compliance – scrubbers or compliant fuel – and engine design.” Engine manufacturers set most of the specifications for their equipment.

“We have a good idea of what the fuel blends are likely to be,” Thurloway said. “There’s still going to be high sulphur product that will be used in scrubber-equipped vessels, as well as blended with low sulphur products while maintaining the 0.5% level. There’s going to be a lot of permutations of what that blend could contain... The larger issue may be... whether the right products are available in the right places.”

The base number or BN of a lubricant must be paired with the sulphur of a fuel and the operating conditions. Switching between fuels can create a mismatch, with consequences for performance.

Acid is created when high sulphur fuel is burned. Picking the right machine lube is a balancing act between getting the right BN to neutralise that acid, and detergency (to keep engine parts clean).

While 70 or 100 BN is a common pairing with bunker fuels used today in containers, crude oil or bulk carriers, 25-40BN is expected to dominate for lower sulphur fuels.

It will be a “major task” for bunker suppliers to source compliant fuels and “prepare supply infrastructure to accommodate the new regime”, according to Unni Einemo, of the International Bunker Industry Association (IBIA), considering they will need to replace most of their current HSFO supply volumes with fuels meeting the 0.50% sulphur limit.
The IBIA believes HSFO “used legally will account for less than 5% of total marine fuels demand in 2020, compared to 75% or more today.” From 2020, a single low BN cylinder oil should be able to cope with both the maximum 0.10% fuels and fuels with up to 0.50% sulphur, she suggests.

**NEW PRODUCTS PREDICTED FOR NEW IMO REGIME**

The cylinder oil landscape could “change quite substantially during 2019” as suppliers amend their market offerings to meet changing demands, according to Star.

“There is no ‘one lubricant fits all’ approach for two-stroke cylinder oils given the variety of compliant options and fuels that could enter the market in 2020. ExxonMobil therefore expects the cylinder oil landscape to change quite substantially during 2019 as suppliers amend their market offer to meet the changing demands,” he said.

Lubricant producers and additive companies are developing new products; picking a few examples from rival suppliers, there is clearly a mantra of “be prepared”.

Additive makers such as Oronite, Infineum or Lubrizol are likely to revise their formulations.

However there is still uncertainty and that is why flexibility and a number of outcomes are being readied.

As Wolpert said in the summer: “We don’t know which way it will go. We’re preparing lubricant solutions for the whole range of potential fuels. If a shipowner has a scrubber [on a vessel with a two-stroke engine] and wants to use 3.5% sulphur fuel, they can use a 70BN or 100BN [machine lubricant] for which we already offer additives today. If they buy 0.5% sulphur fuel, we have products we’re developing in the 25-40BN range, with lower acid neutralisation but improved detergency.”

Oronite offers around five or six additives on the general market under the OLOA brand, or Oronite Lube Oil Additive. It is developing products for future fuels, though has not released names of new products.

Meanwhile ExxonMobil’s marine lubes business is “working closely with OEMs and assessing multiple lubricant formulations” in its test engine, Star said: “We have also recently revamped and substantially upgraded our scrapedown analysis service to provide operators with additional insight into their two-stroke engine operations. We are also looking at our supply chain, product and location offer.”

ExxonMobil plans to “simplify” its offering, so its cylinder oil for compliant fuels can be used “continuously within ECAs, minimising complexity and storage considerations for operators”, says Star. Changes may be “less substantial” for medium-speed engines, with only a slight amendment in BN levels. “If vessel operators choose LNG [liquefied natural gas] as their compliant fuel option, then a bespoke engine oil will be required.”

Chevron Marine Lubricants announced a new range of cylinder lubricants, with five products from 25BN to 140BN, in September 2018 under the TARO ULTRA brand. They will have approval by early 2019 for the main two-stroke OEMs, says Thurloway. “We’ve got a new line of products that will be introduced throughout 2019 ready for 2020… we’re very ready.”

Major two-stroke OEMs include big names like Wartsila and MAN.

A Shell spokesperson said it has designed lubricants for low sulphur fuels, for two-stroke, crosshead diesel engines and for four-stroke trunk piston engines.

IBIA’s Einemo was confident the lubes sector “is prepared for this change” when speaking in the summer, because “most” of the major manufacturers have been busy developing products that “work well with low sulphur fuels”.

She added: “This work already began prior to 2015 when the ECA sulphur limit fell from 1.00% to 0.10% and it was clear that traditional high BN cylinder oils would not be suitable for longer periods of operation on 0.10% sulphur fuels.”

**CHARTING A COURSE INTO THE UNKNOWN**

There are concerns, on whether fuels complying with the 0.50% sulphur limit will be widely available in 2020, Einemo concedes, and whether ships will comply. “This is, ultimately, a question of money and willingness to comply, combined with an expectation of effective enforcement.”

Preparing for compliant fuels being in “short supply and that they may be unavailable in some locations initially” is a reality, suggests Einemo.

Meanwhile, Star believes shippers should “immediately contact” their current fuel and lubricant suppliers about detailed fuel requirements, expected locations and compliance options, if they have “not already done so”.

Flexibility is a key trend in uncertain times. With shipowners like Hapag-Lloyd trialling different technologies, new lubricants are emerging. This is a sea change for fuels in shipping which could have some immediate, some long-lasting, consequences for selected lubricant uses. The short-term horizon is dotted with new lubricants, news of new approvals and new fuels.