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The Oil and Gas Industry in the Dawn of IMO 2020

The oil and gas industry — already confronting a number of challenges related to the global push toward sustainability — is about to face one more.

On Jan. 1, 2020, the new fuel regulation of the International Maritime Organization (IMO) goes into effect. The IMO — a United Nations specialized agency responsible for the safety and security of shipping and the prevention of pollution by ships — is calling, via the new regulation, for stringent limits on sulfur content in marine bunker fuels.

But the implementation of IMO 2020 is complex. The regulation gives shippers multiple options, including noncompliance. As a result, its impact on the industry is difficult to predict. In all likelihood, big shipping companies will move quickly to comply and environmentally conscious regions like the U.S. and Europe will be quick to enforce. But other players and other regions are likely to lag.

In spite of the uncertainty, it's safe to say that some scenarios are more likely than others. And the likely ones demand immediate consideration. Jan. 1 is not far off, and the time to get ready for IMO 2020 is now.

IMO 2020: Background

The goal of the IMO 2020 maritime fuel regulation is to mitigate the environmental impact of the shipping industry by reducing the

sulfur content of marine bunker fuels. The regulation sharply limits sulfur content in bunker fuels used outside designated Emissions Control Areas — from 3.5% at present to 0.5% as of Jan. 1.

The regulation is one more element of a global regulatory push toward sustainability. Across the world, regulators are pushing the energy industry toward more environmentally friendly fuels. Some of these sustainability-related challenges have commanded a great deal of attention — for example, the implementation of biofuels and the worldwide shift toward electric vehicles. The new maritime regulation is part of that pattern.

But compared with those other developments, sustainability in the maritime sector has flown under the radar. The maritime sector is small and, therefore, easy to overlook. Other sectors, such as road transportation and petrochemicals, are a much larger part of global energy demand.

But the maritime sector is moderately growing, at a rate of 1.4% per year, thanks to global trade. And it is a major consumer of bunker fuels. Seventy-five percent of that consumption is heavy fuel oil (HFO), which is about to become noncompliant.

Given the maritime sector's growth rate and consumption pattern, IMO 2020 is likely to impact demand and pricing for HFO throughout the value chain.

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Uncertainty about IMO 2020 expected

The implementation of IMO 2020 seems bound to cause uncertainty. This is unsurprising given the multiple options for compliance and the multiple jurisdictions responsible for enforcement (see Figure 1).

Compliance: The regulation allows shipowners to respond in a variety of ways. They can:

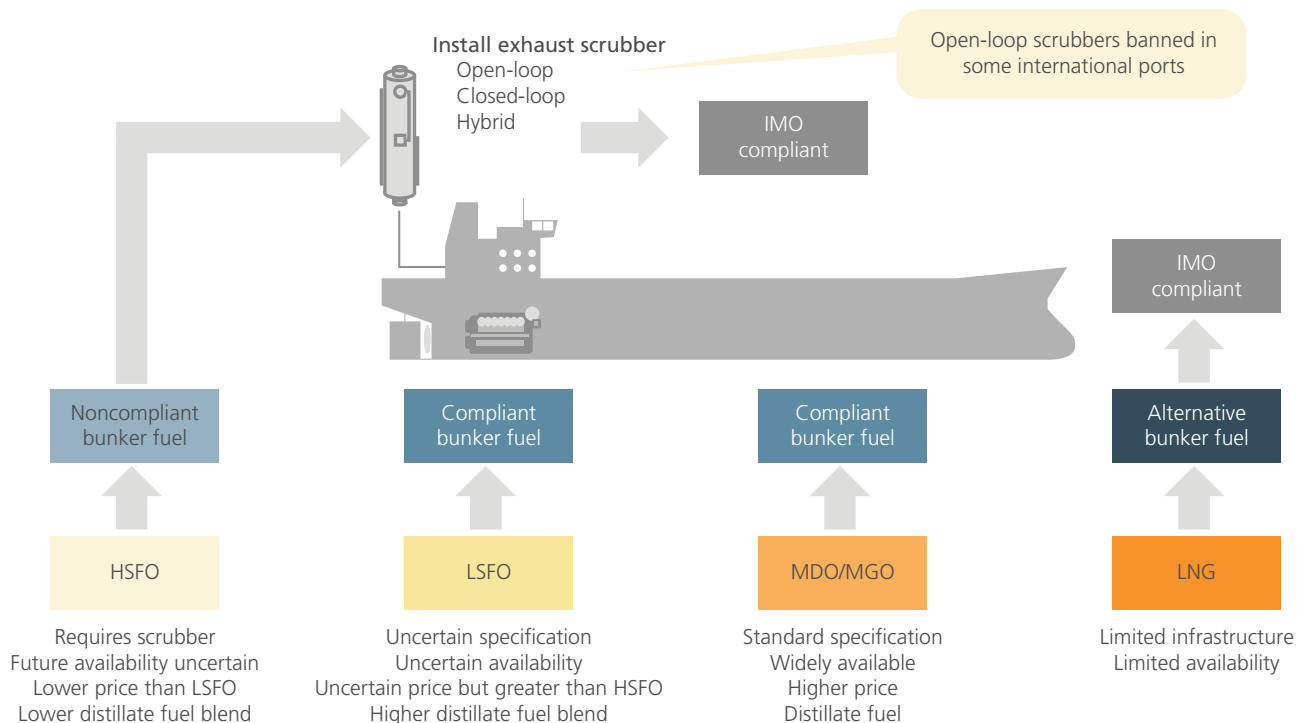
- **Switch to compliant fuels**, such as oil products with low-sulfur content
- **Install SOx scrubbers** (exhaust-gas cleaning systems)
- **Stop using heavy fuels** and switch to alternative fuels such as liquid natural gas
- **Fail to comply with the regulations altogether;** IMO 2020 gives shippers the option to opt out of compliance and pay a penalty instead

For shippers, there are advantages and disadvantages to each approach:

- A switch to compliant low-sulfur fuel oil (LSFO) confers immediate compliance, but there are uncertainties about specification, availability and price. Some of the more-available options, such as marine distillate oil/marine gasoil (MDO/MGO), are costly.
- The use of scrubbers lets shippers use cheaper high-sulfur fuel oil (HSFO). But there are technology challenges (one technology option, an open-loop scrubber, is banned in some ports). And there are uncertainties about the continuing availability of HSFO.
- Using liquefied natural gas (LNG) avoids all the problems of conventional heavy fuels, but availability is limited, as is the infrastructure needed for fueling.

Enforcement: The IMO has no enforcement power of its own; it depends on local governments for enforcement. Jurisdictions are likely to respond in a variety of ways, with the most stringent enforcement in the developed world, while others may impose lower penalties or put shippers under less scrutiny.

Figure 1
Shipping industry compliance pathways and main related risks/uncertainties



Source: U.S. Energy Information Administration (EIA); Ship & Bunker; L.E.K. analysis

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Given these significant near-term uncertainties, is prediction possible? We believe that it is.

A probable IMO 2020 adoption scenario

Despite the lack of clarity, it's possible, via a combination of market research and insight based on past trends, to predict adoption patterns. Our analysis of industry surveys and data suggests that out of the gate, approximately 50% of shippers will switch to LSFO and a third will opt for noncompliance (see Figure 2).

We expect that compliance will be highest in the U.S. and Europe, which together account for 25%-30% of maritime traffic.

Many shippers say they are not ready for the deadline and expect that their compliance will be late, costly or both (see Figure 3).

Shippers' responses will shape the bunker fuel market — in both the near and longer terms

To get a handle on the near-term shape of the market, industry players and investors should keep a close watch on how shippers respond and focus on these critical questions:

- **How effective is enforcement?** Compliant fuels will be more expensive, and that will drive more shippers into noncompliance.
- **At what pace will shippers install exhaust scrubbers to allow continued use of HSFO?** Given long lead times, it may take a year or more before enough shippers opt for scrubbers that the marine fuel market feels an impact.
- **At what pace will shippers transition to LNG or other alternative fuels?** The IMO plans to continue its push to reduce global greenhouse gas emissions by 50% between 2008 and 2050, and may issue additional regulations. This may drive shippers toward LNG, but the pace will also be determined by the availability of infrastructure.

While there are also questions about how refiners will manage capacity, in general they seem to be better prepared than other value-chain participants. The ultimate impact of IMO 2020 on refiners is yet to be determined — the answer will depend on how shippers' implementation strategies play out.

Figure 2
Strategic implications to shippers

		Assumed initial % adoption	Strategic implications
1	Switch to compliant fuels (low sulfur)	~50	<ul style="list-style-type: none"> • Compliant fuel demand will shift toward middle distillates; thus, low-sulfur fuel oil, gasoil and diesel prices will increase • 1.3 m/bpd incremental demand will be generated to meet the low-sulfur bunker requirement
2	Install SOx scrubbers	~10	<ul style="list-style-type: none"> • Ships must be dry docked for installation, and limited capable ports allow only 1,200 ships to be outfitted by 2020 (installation time estimate is between 12 and 18 months from when ship is docked) • Installations are expected to rise as dry dock capacity and installation capabilities rise moving forward
3	Retrofit to LNG-fueled	~10	<ul style="list-style-type: none"> • LNG retrofit requires significant capital expense, and shippers experience high levels of downtime (estimate is one to three years) • LNG bunkering infrastructure is lacking and slow to develop (e.g., in the U.S., infrastructure to dispatch LNG fuels is not expected to be developed until 2022-23)
4	Risk noncompliance	~30	<ul style="list-style-type: none"> • IMO has been ambiguous about enforcement, and fines will vary among countries, many of which have weak penalties • Countries with a higher likelihood of implementing IMO 2020 (or with stricter regulations, such as the U.S. and Northern European countries) control approximately 25%-30% of the maritime traffic

Source: EIA; Ship & Bunker; L.E.K. analysis

Figure 3
Market feedback on sulfur emissions regulation

Many shipping companies are not ready for the 2020 deadline	<p><i>"I do not know how I can make my fleet comply with these regulations by the end of 2019, since it takes years to source compliant fuels and retrofit vessels."</i></p> <p>Senior executive, global shipping company</p>
Compliance is eventually expected, but with delays	<p><i>"The market is scrambling to figure out how to comply with IMO low-sulfur regulations. There is not enough time to reduce emissions, since it can take over a year to make a vessel compliant."</i></p> <p>Former operations manager, leading maritime services player</p> <hr/> <p><i>"No major player is planning to risk huge fines and public backlash by skirting around these regulations."</i></p> <p>Tank barge operator, marine transportation and logistics services provider</p> <p><i>"Though I expect extensions to be granted, since there is simply not enough supply of scrubbers or alternative fuel sources to make all vessels compliant, all shipping companies are investing in technologies to reduce sulfur emissions."</i></p> <p>Senior executive, shipping and logistics services provider</p>
Compliance requires significant investment	<p><i>"No matter what technologies are adopted, companies are planning to increase spending by tens of millions of dollars per ship to reduce sulphur emissions."</i></p> <p>Former engineering officer, LNG carrier services provider</p> <p><i>"To overhaul fuel systems to meet low-sulphur regulations takes years and requires tens of millions of dollars in capital expenditures — it is a huge undertaking for the entire shipping industry."</i></p> <p>Technical superintendent, marine transportation and logistics services provider</p>

Source: L.E.K. research and analysis

But although these questions remain open, some key elements of demand, and therefore pricing, are becoming clear — and we can forecast the evolution of the market

While we acknowledge the uncertainties, we can nevertheless predict that:

- **Increased demand for LSFO and light oil will support a modest premium for higher-quality crudes.**
 - The global mix of sweet and sour crudes will likely not change much in 2020, since overall marine demand is low. But uncertainty about continued use of low-quality crudes will open wider price spreads vs. West Texas Intermediate and Brent markers. These price differentials will be highly volatile as the market adjusts to the "new normal."
 - After 2020, the mix may not change at all — the answer depends on the price differential. But most likely, high-sulfur crudes will trade at steeper price discounts from Brent, and very low-sulfur crudes, such as U.S. shale and tight oil, will see a slight increase in premiums.

- The impact on upstream drilling activity, while minimal, will be equivalent to the price differential trends for each crude segment.
- **Production from sour heavy crude oil regions will be impacted the most, but the impact won't be severe.**
 - Demand for heavier and sour products will decrease as more shippers move to LSFO, especially in the short term.
 - But in the longer term, the impact will be minimal since high-sulfur bunker fuels are a small part of total refining output.
 - High-quality areas — for example, the North Sea and most unconventional shale plays in the U.S. — won't see a major impact. Production and all related upstream activity will continue normally but with slight short-term benefit from slightly higher demand.
 - Production cuts in countries with lower-quality products — Venezuela Merey, Arab Heavy and Iran Heavy — will help minimize the impact of lower demand.

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- **The price differential of HSFO bunker fuels vs. Brent will likely widen in late 2019 and early 2020 due to the expected drop in demand.**

- Assuming a relatively successful IMO 2020 implementation, it's estimated that approximately 2 million barrels per day of high-sulfur vacuum residual will be displaced from the market, leading to HS residual and HSFO price drops in the first year.
- HSFO will eventually recover after the first half of 2020 as more ships are converted to exhaust scrubbers — and shippers therefore find use for noncompliant fuels.
 - HSFO and HS residual will also migrate to new uses in power generation — they are less expensive than coal and alternative fuels. Excess HS residual will also be used in internal consumption in complex refineries, but financial incentives may be needed in order to make the conversion attractive.
- Other refinery products with HS residual content, such as asphalt, will also drop in price over the next one to three years. That means additional margin pressure for refiners if no incremental market develops. But lower asphalt prices could drive up demand in road construction, though this is uncertain.

- **Low-sulfur diesel/gasoil will be the primary replacement for HS residual — and will benefit from its improved market position.**

- Marine operators may opt to burn straight diesel/gasoil to avoid fuel quality issues such as compatibility and stability. That will make diesel/gasoil the main marine fuel replacement for HS residual, especially in late 2019 and early 2020.
- Over time, they may move to blends as they gain experience with quality issues. Blend compositions will be primarily diesel/gasoil unless the residual has low-sulfur content (less than 1%).

- **Refiners will benefit from different strategies — depending on the complexity of each facility.**

- Most refiners will have a financial incentive to increase production of diesel, gasoil and other low-sulfur fuels.
- If the diesel vs. crude price differential is wide enough, refiners will be incentivized to divert low-sulfur feedstock to marine applications, reducing incremental demand for diesel/gasoil in the future.

- The impact on other refining distillates remains to be seen, but it will likely vary across geographic regions based on the relative complexity of the refining infrastructure.

- **Mineral lubricants will face differing challenges based on their American Petroleum Institute group classification, with less complex refineries showing higher vulnerability to margin losses.**

Who will succeed and who will struggle with IMO 2020 depends on strategy — but also on where each player is in the production chain

Industry participants need to know where they “sit” — and investors should take note of the impact on each value chain “node.” Implications for different players in the value chain will vary depending on how closely related they are to sourcing, production, use and distribution of fuels.

Who will have an advantage?	Who might be challenged?
<ul style="list-style-type: none"> • High-complexity refiners with coking and other heavy-oil processing capabilities — particularly in key heavy traffic ports such as those on the U.S. Gulf Coast • Light sweet crude oil producers (e.g., West Texas shale, the U.S. Gulf of Mexico, the North Sea and most Middle Eastern OPEC countries) • Small- and midscale LNG project developers (as adoption of LNG-fueled ships increases) • Scrubber manufacturers and marine engineering and construction companies • Infrastructure developers globally with asphalt and road-paving projects • Hydroprocessing and refining catalyst companies, sulfur-removal process licensors, and industrial gas companies • Exploration and production companies operating light sweet crude oil (e.g., U.S. shale plays) 	<ul style="list-style-type: none"> • Shipping companies that will most likely struggle with passing costs on to customers • Low-complexity refiners dependent on external sources of gasoils that may find them to be more expensive • Heavy crude oil producers in Canada, Latin America and, potentially, the Middle East • Existing bunkering infrastructure owners that may have to invest significant capital • Fuel consumers, as gasoline prices may increase with refineries trying to maximize diesel production • E&P companies producing medium and heavy crude oil with higher contents of sulfur and other contaminants

Source: ADI Analytics; L.E.K. analysis

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Watch this space

The first months after the implementation of IMO 2020 will bring more questions than answers. And the full impact of the new regulation will become clear only over time.

But while it's tempting for the industry to focus more on higher-profile sustainability challenges, such as the electrification

of road transportation and a continued push into biofuels, industry participants would be wise to keep a weather eye on the marine crude market. As we've seen, it's likely to have a disproportionate impact on the crude oil value chain. Our advice is, watch this space — and be ready to act as the IMO 2020 picture becomes clear.

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