

# The IMO Iceberg

*How marine fuel sulfur restrictions  
could risk catastrophe.*

BY PHILIP K. VERLEGER, JR.

**F**ew readers will have heard of the IMO—the International Maritime Organization. The public is likely completely ignorant of its existence. Rules issued by this organization, however, threaten to create an economic downturn in 2020 that might rival the Great Recession of 2008.

How could this happen? The answer is simple. The IMO has set tight restrictions on the sulfur content in marine fuel that take effect in 2020. The economic consequence of meeting the new standard could be catastrophic: gasoil prices may climb 100 percent, crude prices might hit \$200 per barrel, and global GDP could plummet 5 percent.

The IMO is a relatively obscure United Nations agency that regulates global shipping. It sets the rules by which all goods move across oceans from port to port. Most shippers abide by these rules because they would likely lose their vessel and cargo insurance if they did otherwise.

In short, the IMO is an essential cog in global trade. The problem is this: the agency's leaders come predominantly from the maritime industry. They are not economic policymakers. The IMO's current secretary-general, for example, is Kitack Lim, who majored in nautical science at the Korea Maritime and Ocean University and then served as a naval officer before moving to the civilian maritime sector. The U.S. ambassadors to the IMO are a Coast Guard rear admiral and the CEO of a marketing and communications firm. It is not extreme to assert that many if not most of the officials making the IMO rules are descendants in spirit and experience of Edward John Smith, the captain of the ill-fated RMS *Titanic*. These individuals know everything about seamanship—and nothing of economics.

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These same individuals have mandated a rule that threatens to cut world GDP in 2020 by as much as 5 percent. I repeat, this regulation could reduce global GDP 5 percent or more by 2020 from levels that might otherwise prevail. Indeed, if the IMO's "Titanic" mindset persists, I worry that global GDP in 2025 will be 10 percent lower than it would have been absent the agency's action on marine-fuel sulfur content.

How could these figurative progenies of Captain Smith inflict such a dire impact on the global economy? By doing the right thing in the wrong way. In the interest of removing noxious gases such as sulfur dioxide from our atmosphere, the agency has ordered the world's fleet of ocean-going ships, the vessels on which almost all world trade moves, to cut emissions more than 75 percent between December 31, 2019, and January 1, 2020. The reduction will be achieved primarily by shifting from fuels that now contain, on average, 2.2 percent sulfur to fuels with less than 0.5 percent.

Such a change would be simple if a small community or country demanded it. Compliance would be easy, for example, if the island of Tenerife demanded that ships coming within fifty miles of it burn low-sulfur



*The world's largest container ship as of 2017, the OOCL Hong Kong has a capacity of 21,413 twenty-foot equivalent units. Its Wartsila-Sulzer RTA96-C engine runs on bunker fuel.*

fuels. Indeed, Canada, the European Union, and the United States already impose such restrictions.

However, over 50 percent of the fuel used by ocean-going ships gets consumed outside of these areas. This fuel today amounts to four million barrels per day or 4 percent of the world's total oil use. Overnight conversion of 4 percent of the world's fuel use from the current 2.2 percent sulfur to 0.5 percent sulfur presents a problem, one that threatens global economic activity.

The 2020 deadline has been public knowledge for years, to be fair to the mariners who dominate the IMO's decision-making. The agency announced its program to reduce sulfur emissions in 2008. At that time, the IMO initiated efforts to reduce emissions near environmentally sensitive areas such as the European Union and the United States. At the same time, the IMO decided the world would need to move to ship fuels, called bunkers, containing less than 0.5 percent sulfur between 2020 and 2025. Today these fuels contain up to 3.5 percent sulfur. The decision as to when between 2020 and 2025 was left to be decided later based on the industry's preparations for the changeover.

The shipping industry also understood in 2008 that there were at least three ways to meet the standards. One option was to install scrubbers, which are devices that remove sulfur emissions from ship exhaust. Many power plants employ such units today, especially in the United States. A ship equipped with scrubbers could continue to burn high-sulfur fuel.

Shipowners could also comply with the rules by converting their engines to use liquefied natural gas.

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Many of large tankers moving LNG around the world, for example, already have such engines.

Last, shipowners could turn to the world's oil refiners who today supply the high-sulfur fuel and hope they can provide fuels containing less than 0.5 percent sulfur.

In 2016, the IMO concluded that the world's shipping industry would be ready by 2020. The evidence supporting this finding was flimsy at best. As reported by the *Wall Street Journal*, a study commissioned by the agency estimated that 4.7 percent of the world's sixty thousand ships would be equipped with scrubbers in 2020. A few ships would be converted to use LNG. However, the preferred compliance choice would be switching to low-sulfur fuel oil. Executives of Maersk, one of the world's largest shipping lines, told the *Journal* that "the onus should be on refineries, not shipowners, to deal with the fuel issue."

The problem for shippers and the world's consumers is that the maritime industry is not a high priority for the oil industry. The shipping business has traditionally consumed a form of "residual fuel oil" blended to specifications set by the shippers.

They call this product "residual fuel oil" for a reason. It is what is left over after refiners have processed crude to produce higher-value products such as diesel fuel, gasoline, jet fuel, and petrochemicals. Process engineers do whatever they can to minimize the production of residual fuel oil because it is a money loser. Refiner investments focus on producing the more lucrative products. Refiners produce residual fuels because they must do this to obtain the more-profitable products. In short, refiners tend not to invest specifically in manufacturing fuels for the maritime industry.

This practice makes the statement from Maersk about the onus being on refiners absurd. The IMO's arbitrary, capricious decision will likely create a chaotic situation in global oil markets, one characterized by very high prices and limited amounts of fuel for ships. The figurative descendants of Captain Smith are steering their industry and the global economy toward a very large iceberg.

**Table 1 Comparison of Arab Light Product Yields at Simple vs. Complex Refineries (Percent)**

	Simple	Complex
Light ends (Such as Gasoline)	11.7	59.0
Middle Distillates	32.8	28.0
Residual	45.0	6.0

Source: Energy Information Group.

The transition to low-sulfur marine fuel will distort all petroleum markets, probably as early as mid-2019. The first signs of this will be in distillate markets. The International Energy Agency warned in its *Oil 2018* report, issued in March, that distillate (diesel fuel) use must rise sharply in 2020 because distillate will replace

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the residual fuel previously used to make marine fuel. The IEA's conclusion is consistent with the findings of consultants advising the IMO.

The IEA also estimates that two million barrels per day of residual fuel oil that would have been used by ships will suddenly be surplus. Up to three-quarters of it will have no market unless blended with light, low-sulfur diesel fuel. An Exxon official explained that some of the residual fuel oil could be converted to compliant fuel by mixing 89 percent low-sulfur gasoil with 1 percent residual fuel oil. Such blending, though, would still leave substantial volumes of residual fuel oil without buyers.

The prospect of increased distillate demand and surplus residual fuel oil will have two obvious consequences. First, distillate prices will rise. Second, refineries that produce great amounts of residual fuel oil will close or seek the highest-quality crude to produce saleable fuels.

The IEA acknowledged the distillate issue, predicting a price increase of 30 percent to balance the market in 2020. This view seems conservative, as befits a quasi-government forecast. A more likely increase in distillate price would be on the order of 100 percent given a price elasticity of demand of -0.1, a relatively standard estimate for the short run.

The refiner response is a different matter. There are more than one thousand refineries in the world. Many, such as those found in the United States, are sophisticated units. And many are "less complex" facilities sometimes called "teapots."

Valero, the largest refiner in the United States, owns sixteen refineries, most of them sophisticated. Thus, as the company reported in its 2017 SEC filing, the firm processed crude oil into 48 percent gasoline and gasoline blendstocks and 38 percent distillates. Much of the crude oil input contained 4–5 percent sulfur, which was removed through processing.

Many simpler refiners cannot, however, do as Valero does. Table 1, produced by the Energy Intelligence Group, highlights the issue. It shows the yields of products produced by simple and highly complex refineries from one type of oil, Arab Light, the most common crude produced in the Middle East.

The sulfur content of residual fuel oil produced from the simple refinery would be around 3.3 percent because Arab Light has a sulfur content of around 1.5 percent. Today this fuel can be sold as bunker fuel. However, it would not be saleable after 2019.

The inability to market residual fuel oil will leave some refiners facing a hard choice. They could close. Alternatively, they could obtain crude oils containing almost no sulfur. Most will try the latter route, as they did in 2007. In doing so, they will benefit from the surge in U.S. oil production, much of it with very low sulfur content. For example, Eagle Ford shale, a crude that will be exported in increasing volumes from Corpus Christi in Texas, contains less than 0.15 percent sulfur. When refined, such crudes could produce a residual fuel oil that meets the new IMO standard.

The increase in projected distillate consumption combined with the requirement to remove sulfur from fuel oil will lead to massive bidding for light crudes by those who own the less-complex refineries. The IEA

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experts know, but did not explain in *Oil 2018*, that the distillate price rise will lead to a crude price rise.

History suggests that gasoline prices will rise less than gasoil prices. Instead, the difference between distillate and gasoline prices will widen because the IMO regulation will create one of the largest-ever increases in demand for distillate ever recorded. The previous peak occurred in 2007 and 2008. Then, as they will in 2020, refiners scrambled to acquire the low-sulfur crudes from which they could make diesel fuels with the minimal sulfur content environmental authorities would permit.

Diesel fuel prices relative to gasoline prices jumped to record levels in late 2007 and early 2008, though. The rise was explained by a combination of unique factors, including a rise in demand in China associated with the 2008 Olympics and a sharp drop in crude production in Nigeria, the key source of distillate-rich crudes.

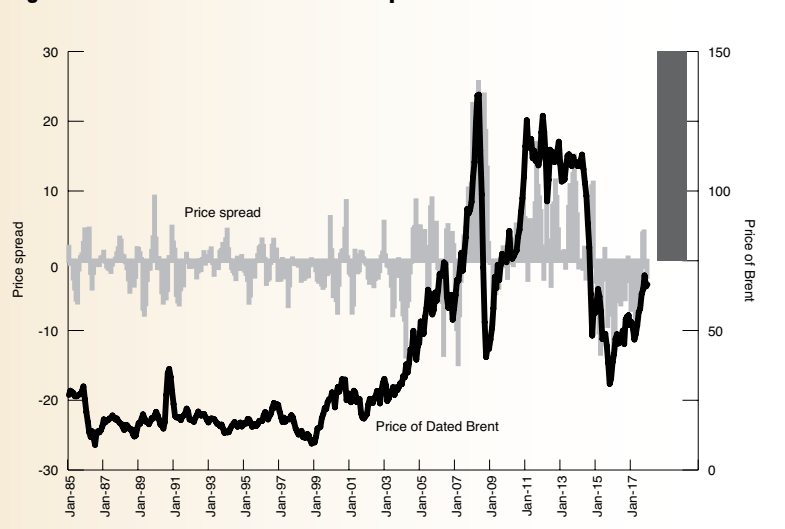
Figure 1 traces the history of the spread between gasoline and distillate spot prices from 1985 to 2018. The graph also tracks prices for Dated Brent, currently the accepted global crude benchmarks.

Note that the Brent price more than doubled in 2007 and 2008. Those who follow oil markets explained correctly at the time that light crude prices were pulled up by demand for low-sulfur distillate and a 25 percent decline in global production of light sweet crude, which is the key ingredient for low-sulfur gasoil. At the same time, cargos of high-sulfur Middle Eastern crudes could not be sold because most world refiners could not process them.

To the right, we show a block for the distillate-to-gasoline spread that fits our view that the IMO rules, if not changed, will lead to at least a

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**Figure 1 Premium of Gasoil to Gasoline Compared to the Price of Dated Brent**



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a 50 percent increase in the spread between distillate and gasoline prices. Such a rise will boost crude prices if past patterns hold. Based on the visual, we suggest crude prices could reach \$150 per barrel as refiners that can only produce residual fuel bid aggressively for low-sulfur crudes. A price over \$200 per barrel even seems plausible under these circumstances.

Oil-exporting countries such as Saudi Arabia are unlikely to do anything to bring prices down. In the past, their representatives have found ample excuses to avoid intervention. We should not expect them to behave differently this time. Indeed, they will probably jump at the opportunity to cash in because this could be their last real opportunity to profit from oil sales.

In truth, oil-exporting nations have a valid reason for staying on the sidelines. The incremental crude oils they might add to the market probably would not meet the needs of refiners desperately trying to make fuel that complies with global standards for all products.

The higher crude prices would feed back to prices of other petroleum products, particularly jet fuel and gasoline. Thanks to the IMO rules, the world's airline industry may confront high fuel prices and large losses, just as it did in 2007 and 2008. Some airlines could end up in bankruptcy again.

High diesel prices would affect the global transportation and agricultural industries. U.S. farmers especially would suffer higher fuel costs and lower prices. The greater expense of shipping products to foreign markets would force the price cuts; the higher fuel costs would cut margins.

Retail gasoline prices would rise as well. In the United States, politicians could easily be campaigning for reelection in November 2020 with unemployment on the rise and gasoline selling for \$6 or \$7 per gallon.

The economic impact of the higher prices combined with the very likely limited supply of fuel for commercial shipping will have a very significant impact on global

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growth. Consumer spending in the United States will decline because a larger share of disposable income must be spent on gasoline. Consumer spending on items other than gasoline could fall by 3 percent directly with the cumulative effect closer to 5 percent. Unemployment would increase sharply.

Employment would also decline in those countries that rely on exports. Shipping bottlenecks will lead to lower output in China, Germany, and China.

The prospect of another oil price shock resulting from regulations promulgated by an obscure UN organization should motivate key global economic policy organizations to act. To be blunt, the IMO requires adult supervision. Senior officials of the International Monetary Fund, the European Union, the United States, China, and Japan should immediately communicate their concerns to the IMO and propose that the agency phase in its sulfur-content restriction over three or four years rather than rushing ahead with an ill-considered program. If that effort fails, these senior officials should work to terminate the IMO's authority.

Sadly, one cannot expect the world oil industry to support such an effort. Instead, expect oil firms to work arduously to keep the IMO's January 2020 deadline. Also expect to hear company executives claim to have invested to produce the needed fuels, even though they have not. They will take this course because, over the last four decades, the oil industry has earned most of its profits during disruptions caused by the imposition of new regulations, unexpected increases in demand, or unplanned supply losses.

Senior policymakers must ignore the blandishments uttered by oil executives as well as statements from IMO officials that shippers and the oil industry had plenty of time to prepare. Yes, the industries did have plenty of time and they have wasted it. Still, if the IMO proceeds as planned, it will impose huge unnecessary costs on the global economy. Something must be done to prevent this. ◆