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IMO 2020

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INTRODUCTION

Prior to COVID-19, maritime transport was responsible for shipping over 11 billion tons of cargo around the world each year. Because of the Coronavirus pandemic, this volume is expected to decrease by 5% or more in 2020, but once conditions return to normal, the United Nations projects steady growth of the industry over the next decade.

January 1, 2020 marked the beginning of a new era for many in the world of fuel and transport as the International Maritime Organization (IMO) marine fuel sulfur cap took effect. The future of maritime shipping has been murky in recent years, as ship owners and fuel suppliers prepared for the cap, and markets priced a new grade of marine fuel based on expected supply and demand. Expected, that is, before the Russia-Saudi Arabia oil price war spawned a crude oversupply, and the pandemic triggered a simultaneous collapse in demand for petroleum. Prices for petroleum products collapsed and plans for IMO 2020 compliance put into effect in late 2019 were rendered irrelevant by events that none of us could have predicted. The adage to “leave one’s options open” is, it seems, particularly appropriate in this instance.

WHAT IS IMO 2020?

In 2008, the IMO announced its plans to reduce air pollution by lowering the amount of sulfur allowed in a ship's fuel oil from a maximum of 3.5 percent to 0.5 percent. They gave the maritime world nearly 12 years to prepare for the upcoming changes that went into effect on January 1, 2020.

WHAT IS THE INTERNATIONAL MARITIME ORGANIZATION?

IMO, an agency of the United Nations, is responsible for setting standards for international shipping. The IMO maintains regulations for everyone involved in the shipping industry in order to improve maritime safety, security, and environmental sustainability. Since its founding in 1948, they have adopted more than 1,000 codes and recommendations that promote safety and control pollution.



THE PROBLEM WITH SULFUR

Humans have interacted with sulfur since ancient times—calling it “brimstone” in biblical days—and it is the tenth most abundant element in the universe. In 1777, it was officially named an element by famed French chemist Antoine Lavoisier. In its pure form, sulfur is a yellow, tasteless, odorless solid, naturally abundant in the earth’s crust.

In crude petroleum, sulfur is a naturally occurring contaminant, making up anywhere from 0.1 to 0.5 percent of crude oil by weight. Unless removed, the sulfur carries through the refining process and into products, such as gasoline, jet fuel, and marine fuel oil where it accounts for more than that initial 0.5 percent.



Before January 1, 2020, ships could operate on fuel oil containing 3.5 percent sulfur. At the time, the shipping industry burned five to seven percent of the world’s fuel but created half the world’s sulfur pollution. IMO 2020 decreases the sulfur limit to 0.5 percent, with ships in some areas operating on sulfur levels as low as 0.1 percent. According to the IMO, these new sulfur restrictions will eliminate 8.5 million tons of sulfur emissions from ships annually, resulting in a 77 percent reduction in sulfur pollution.

When marine fuel (also known as “bunker fuel”) is burned in a ship’s propulsion plant, the sulfur reacts with oxygen in the atmosphere to create

various sulfur oxides. Sulfur dioxide, in particular, is known to be harmful to both people and the environment. When inhaled by humans, sulfur dioxide irritates the respiratory system, including the nose, throat, and lungs, and is considered one of the leading causes of lung disease. By reducing the output of sulfur oxides, the IMO hopes to see a global reduction in pulmonary and cardiovascular diseases.

As for the environment, sulfur oxides exacerbate the problems of acid rain such as increasing air pollution that lead to respiratory conditions and the acidification of the oceans. They are also harmful to crops. Acid rain leaches aluminum, minerals, and nutrients from the soil that plants and trees need to grow. At high elevations, acidic fog and clouds might strip nutrients from foliage, leaving them with brown or dead leaves and needles. Limiting sulfur oxide emissions should help the land, sea, and the species in between, improving life on Earth for everyone.

MARITIME SOLUTIONS

Ship companies and refiners have been exploring solutions to reduce sulfur emissions to comply with IMO 2020:

1. Purchase IMO 2020-Compliant Fuel Oil

Purchasing fuel oil that meets the IMO 2020 sulfur limit, such as very low sulfur fuel oil (VLSFO, 0.5 percent sulfur) or ultra-low sulfur fuel oil (ULSFO, 0.1 percent sulfur), is perhaps the

most straightforward choice for ship owners, but it comes with its own share of complications. In 2019 and early 2020 VLSFO was in high demand as companies purged their inventory of high sulfur fuel oil (HSFO, 3.5 percent sulfur) from vessels and shore storage to comply with the new rules. To meet the increased demand for the new IMO 2020 compliant product, refiners pushed their plants to make more of it; consequently, prices increased significantly. For a while, VLSFO was trading at 200 USD per ton over HSFO. Because of the potential for VLSFO prices to remain high – or spike even higher – many ship owners were hesitant to commit to this option, and they sought out solutions with less financial risk.

To illustrate the magnitude of the problem, a hypothetical 8,000 TEU container ship cruising at 24 knots could burn approximately 225 tons of propulsion fuel each day. If this vessel was operating on VLSFO at December 2019 prices, it would be doing so at an incremental cost of 45,000 USD per day. On a typical voyage across the Pacific Ocean, the additional cost of burning VLSFO to comply with IMO 2020 could be one million USD or more.

2. Refit Vessel Propulsion Plants

Several carriers, such as Carnival Cruise Line and NYK Line have abandoned fuel oil altogether, choosing to run new or converted vessels on liquefied natural gas (LNG). LNG is both economical and naturally low in sulfur content, but bunkering ships with LNG requires special equipment. Although LNG bunkering facilities are being constructed, at present operating an LNG-fueled vessel is considerably more complex than operating one that runs on conventional fuel oil.

IMO 2020 has also inspired some out-of-the-box thinking, and by 2024 it might even be possible to run ships on ammonia, thanks to a new engine design from MAN Energy Solutions.

3. Add a Scrubber

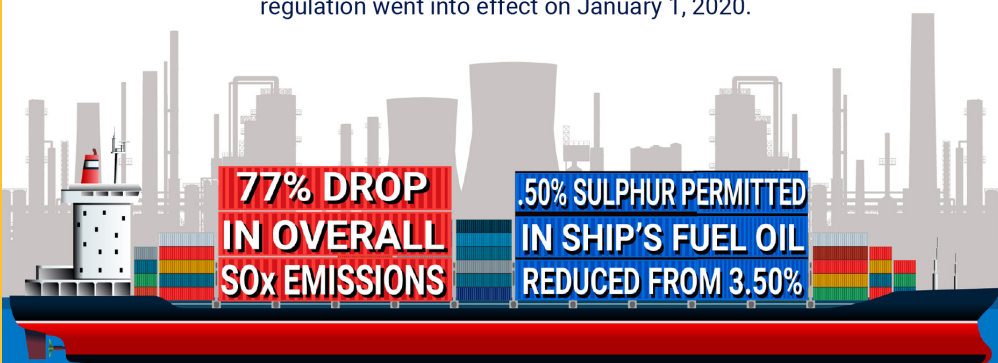
Installing an exhaust gas cleaning system (EGCS), or “scrubber” costs a lot—between \$2 million and \$4 million – but it allows ships to continue operating using the same HSFO as before, without the sulfur oxide emissions. The ECGS directs exhaust from the engine into the scrubber where it mixes with seawater. The seawater absorbs the harmful sulfur oxides and is then discharged over the side - back into the ocean where they are dispersed. Scrubber critics are concerned that pollutants are merely being moved from the air to the sea, but for now vessels with EGCS scrubbers meet all the requirements set by the IMO.

As the January 1, 2020 deadline for IMO 2020 loomed, ship owners had to decide whether they would install scrubbers, convert to LNG, or pay what appeared to be a substantial premium for VLSFO. None of us could have predicted the market conditions that led to today’s marine fuel prices. Prior to January, owners who installed scrubbers were very pleased with their economical choice. But as oil prices tanked over the winter and the price spread between HSFO and VLSFO narrowed to 50 USD per ton or less, they came to regret their decision. Similarly, shipowners who invested in LNG conversions have been delaying work on vessels in order to spread costs out as far as possible without breaching contracts. It appears that, despite years of careful planning, using VLSFO is, for now anyway, the economical course of action.

IMO 2020

What is IMO 2020?

With the goal to reduce the amount of sulfur emissions from ships, the IMO, International Maritime Organization, implemented a regulation limiting the amount of sulfur allowed in ship fuel to .5%. This regulation went into effect on January 1, 2020.



Every year, maritime transport is responsible for shipping upwards of



of freight around the world.

Maritime Solutions

Ship companies are using three main options when it comes to reducing sulfur emissions:

- Purchase IMO 2020 compliant fuel oil
- Refit vessel propulsion plants
- Add a scrubber



ENVIRONMENTAL BENEFITS

Sulfur oxides exacerbate the problems of acid rain and the acidification of the oceans. Limiting sulfur oxide emissions should help the land, sea, and the species in between, improving life on Earth for everyone.

HEALTH BENEFITS



By reducing the output of sulfur oxides, the IMO hopes to see a global reduction in pulmonary and cardiovascular diseases and lung cancer, and an improvement in overall health.

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REFINERY SOLUTIONS

Like shipowners, refineries have been working to adapt to the changing times for the past decade, and have settled on a few solutions:

1. Begin with Low-Sulfur Crude

By sourcing crude petroleum feedstock that already contains a low amount of sulfur, refineries can produce some grades of marine fuel oil that meet IMO 2020 requirements. Low sulfur, or “sweet” crude occurs naturally in but a few basins, such as the Permian in West Texas, and its supply is geographically limited, so betting entirely on this solution could be a risky choice for those in the refining industry.

2. Remove the Sulfur

Simply removing the sulfur from high sulfur, or “sour” crude might seem like an obvious solution, but few refineries are equipped to sufficiently remove sulfur from their crude petroleum slate to produce marine fuels that can meet IMO 2020. Due to the chemistry of the sulfur, during refining much of the crude’s sulfur remains in the heavy distillate products like marine fuel. Though this is the case, high sulfur distillate products can be further treated to remove sulfur, but many smaller refineries cannot support the additional throughput needed to meet demands for motor fuels such as ultra-low sulfur diesel (ULSD) in addition to bunker fuels such as VLSFO and ULSFO.

3. Continue to Produce Heavy Fuel Oil

For the few refineries unable to adjust to the new sulfur rule, producing HSFO remains an option; 8 IMO 2020

however, the product has limited use. HSFO can be used by carriers who have added scrubbers to their fleets, or when blended with ultra-low sulfur products to create an acceptably low sulfur fuel. Unfortunately, because the other global market outlets for HSFO are scant, continuing to produce only high sulfur bunker fuel merely to avoid investing in additional equipment is a temporary solution at best.

Shipowners, especially those who bought large quantities of VLSFO before prices cratered, are suffering unprecedented economic challenges. Refiners, similarly, have their own problems as they witness demand for many of their products drop to unimaginable lows. VLSFO, however, remains in demand because ships need fuel even if they are not underway. Because there is a market for marine fuels, refiners have diverted production streams – formerly directed to distillate products such as jet fuel and diesel fuel – to VLSFO production. Also, because more VLSFO is available than was expected, there is less incentive for laborious blending operations. Contrary to what everyone expected, VLSFO is both available and affordable. As for the future, when the pandemic ends and demand returns to a “new normal”, there is still a possibility that a heavy reliance on low-sulfur marine fuels could lead to spot shortages, provoking the inevitable consequences of supply and demand. Additionally, the IMO has made clear that they will make further changes to marine fuel requirements that would reduce carbon emissions in addition to sulfur.

PREPARE FOR THE FUTURE BY IMPROVING FLEXIBILITY

The bottom line? The IMO 2020 saga teaches the importance of flexibility; primarily in the maritime shipping industry, but also in the energy industry.

When investing in new facilities and equipment, fuel terminal operators should prioritize increasing their adaptability and enhancing their ability to change. Change is inevitable, so reliable, quality equipment coupled with a flexible design is vital to future success.

For example, instead of constructing more tanks to accommodate the diversity of fuel types, a terminal's existing tanks, product conveyance piping, and loading and bunkering equipment can be designed to reliably switch from one fuel to another without generating large volumes of product interface or causing contamination. Terminal equipment like Dixon's loading arms, rack monitors, swivel joints, and cam and groove fittings, have been engineered for decades to help our customers operate safe and efficient facilities, and they remain the best choice today.

Along with supplying some of the most reliable fuel loading equipment available, Dixon also provides terminal operators the ability to be resilient - to adjust to rapidly changing conditions. Whether a terminal is damaged due to severe weather, or must be reconfigured due to

changing needs, Dixon maintains large inventories of fuel loading equipment available for rapid deployment.

As the industry moves forward from IMO 2020 to new regulations in the future, remember this: remain flexible. Invest in reliable products that will increase your ability to adapt to new challenges in an ever-changing world.



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IMO 2020: Crisis or Y2K?

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