

IMO 2020

THE IMPACT OF CHANGING BUNKER FUEL SPECIFICATIONS

#IMO2020 #TRADING #REFINING #OIL #MARINE #SHIPPING



In November of 2016, the International Maritime Organization (IMO) announced that the newest step in the evolution of MARPOL Annex VI will come into effect January 1, 2020. The hard start date ushers in a new international law with the objective of reducing the sulfur content of marine fuel (bunker fuel) worldwide. Bunker fuel accounts for only about 4% of global oil demand; however, its use accounts for about 40% of the world's sulfur emissions.

The Current State of Marine Fuel

As it currently stands, there is 3.5% sulfur content limit on marine fuels worldwide, and a 0.1% limit on marine fuels consumed in emission controlled zones (ECAs).

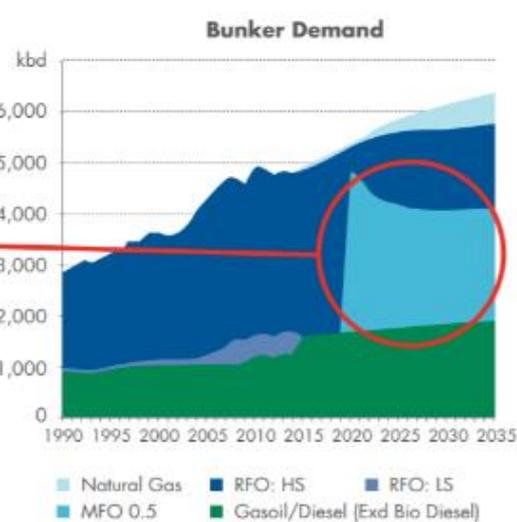
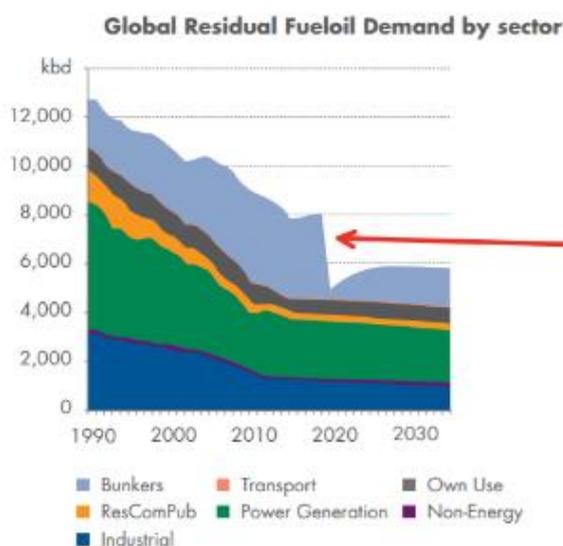


Source: Thor Marine Trading¹

Starting in 2020, the global sulfur cap on all marine vessels operating outside of ECA zones will drop to 0.5%. This is a significant reduction in sulfur content of bunker fuels which will have a dramatic effect on producers, refiners, traders, and ship owners. This article will focus on the impact that the 2020 rule will have on these entities leading up to, and after January 1, 2020.

Bunker fuel only accounts for about 4% of global oil demand; why is it even that important? Marine transportation accounts for around 80% of the world's physical trade². A stirring in the bunker market will have a far reaching ripple effect on global trade, particularly in the energy market. More importantly, the marine industry has been an important consumer of undesirable refinery by-products, residual fuel oils, or RFOs (a major component of bunker fuel).

Residual fuel oil is one of the left over products that remains after crude oil is refined to make higher value products such as gasoline, diesel and other distillates. It's highly viscous and contains numerous contaminants such as heavy metals, nitrogen, and of course sulfur. Marine engines are made to handle HFO. They use high alkalinity lubricants that curtail the harmful effects of the aforementioned contaminants in terms of wear and tear on the engines. This in turn, made the seaborne transport industry a beneficial outlet for refiners to get rid of their unwanted fuel oil and it gave ship



Source: Shell³

¹ Thor Marine Trading
<https://www.thormarinetrading.com/bunker-trading/seca-eca/Protoco>

² IEA - Market Report Series 2017

³ Shell: IMO 2020 - A Clear Vision Into 2020 with Our Suite of Fuel Solutions

owners a cheap, reliable source of fuel for their vessels. In addition to marine fuels, residual fuel oils are used as feedstock for power generation, industrial processes, and heating in non-OECD countries. Due to increasing environmental regulations, the demand for residual fuel has been, and is expected to continue to decline.

MARINE FUEL PARAMETERS

Fuel Types	ISO Category	Viscosity (cSt) (at 50°C for Residual and 40°C for Distillate Fuels)		Sulfur Content (%)
		Minimum	Maximum	
Heavy Fuel Oil (HFO)	Residual (RMA – RMK)*	10	700	1.0 – 3.5
Marine Diesel Oil (MDO)	Distillate (DMB)	2	11	0.10 – 1.5
Marine Gas Oil (MGO, Low Sulfur Distillate Fuel)	Distillate (DMA and DMZ)	2	4	0.10 – 1.0
0.10% Heavy Fuel Oil (HFO, ECA Fuel)	Not standardized	9	67	0.10
0.50% Heavy Fuel Oil (HFO, Global Fuel)	Not standardized	No requirements defined	No requirements defined	0.50

*RMA-RMK: RMA, RMB, RMD, RME, RMG and RMK

Source: ABS Marine Fuel Advisory 2018⁴

Refining

Bunker fuel accounts for about 4.2 mb/d of the world’s demand. Around 3.4 mb/d of that demand is for HFO while the remaining 800 kb/d is for MGO². Starting January 1, 2020, 3.4 mb/d of HFO will need to become IMO compliant. In order to keep pace with continuously developing worldwide emissions regulations, refiners have and will likely continue to take some combination of the following steps:

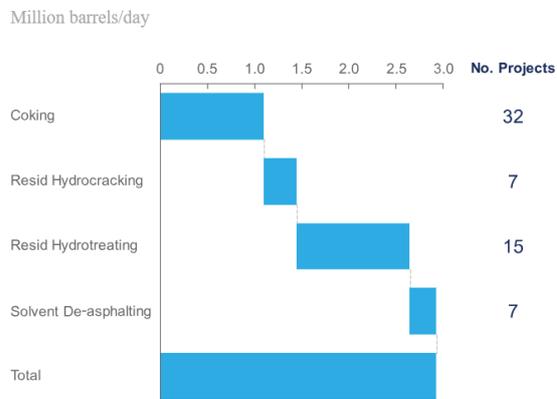
- Invest in residual processing capacity
- Restructure the portfolio of feedstocks used in their refineries

Refinery projects are capital intensive and take a long time to build. A residual hydrocracker can cost over \$1 billion and can take around 4 years to build depending on the size and complexity of the project. The projects pictured below have been planned or under development for a few years at the least. These were not necessarily developed as a direct result of the new MARPOL Annex VI regulations, but as a result of increasing regulations

⁴ ABS: Marine Fuel Advisory 2018
<https://ww2.eagle.org/content/dam/eagle/advisories-and-debriefs/marine-fuel-oil-advisory.pdf>

on sulfur limits and other emissions regulations overall. With that said, the following investments are the types of projects that will help refiners reduce the sulfur content of their end products.

RESIDUAL PROCESSING PROJECTS



¹ Includes all firm and probable projects with completion between 2017 and 2023
 Source: Energy Insights, McKinsey refinery project database

Source: McKinsey⁵

While the processes above can aid in the removal of sulfur, choosing a crude input with low sulfur content to begin with greatly reduces the percentage of sulfur left over once the refining process is complete. As a general rule, the sulfur content on a percentage basis will double or triple throughout the refining process as some of the crude is converted to residual fuel oil.

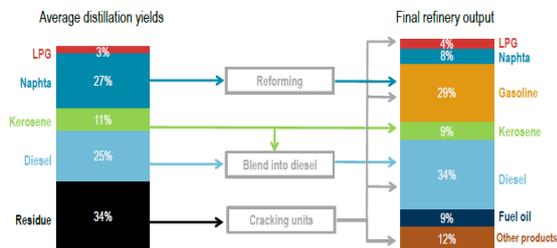
As regulations continue to evolve, particularly in sulfur reduction, refiners are expected to change the slate of current crudes used in their refineries. Refineries will alter their current portfolio of crude inputs and gradually shift from sour to sweeter crudes. The increased demand for sweeter crudes come 2020 will widen the current premium between low and high sulfur crudes.

As previously stated, refinery upgrades are capital intensive and take years to develop. The window for building upgrades prior to 2020 passed 3-5 years ago depending on the size and complexity of the project. Complex refineries (especially those with significant coking capacity) that were made to process (and re-process) heavy crudes, equipped

⁵ McKinsey: MARPOL uncertainty not stopping some refiners from acting
<https://www.mckinsey.com/industries/oil-and-gas/our-insights/petroleum-blog/marpol-uncertainty-not-stopping-some-refiners-from-acting?cid=other-eml-alt-mip-mck-oth-1805&hlkid=eb651df15f2145fc99edadef7620d90f&hctky=1169950&hdpid=b9b70692-1fc5-4d2a-bac3-268aaf90fb69>

with various upgrades to optimize the production of heavy sour crudes into desirable products, will most likely experience a bump in refining margins over competitors as they take advantage of reduced sour crude prices.

RESIDUAL PROCESSING PROCEDURE



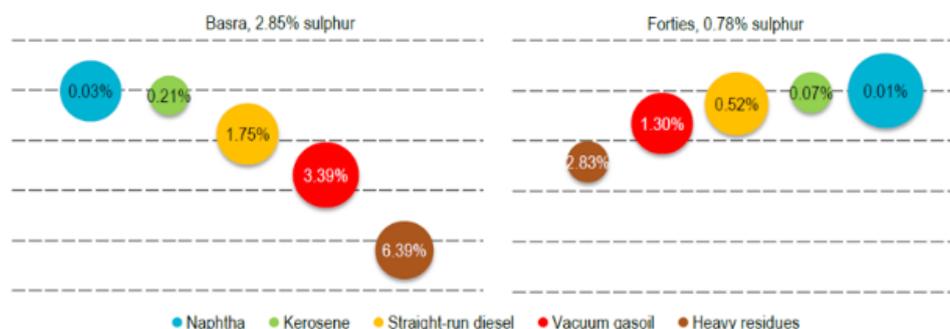
Source: IEA - Market Report Series 2017²

In addition to changing the feedstocks of refineries, refiners will also need more crude in order to keep up with global middle distillate demand. Lighter sweeter crudes have less sulfur and are less costly to process in to the desired end products; however, their yield is lower than that of sour crudes. Beyond the expected annual increases in demand for crude due to general global economic growth, crude runs will increase due to a reduced yield per barrel refined. Refinery runs are expected to increase by 3.9 mb/d overall by 2020, with approximately 2.5 mb/d dedicated to producing additional distillates⁶. Even with increased throughput; refiners are not expected to completely cover all of the 3.4 mb/d of bunker fuel required by ships with on-spec 0.5% sulfur marine fuel by 2020.

One third of the 80% of global physical trade carried out on marine vessels is attributed to the energy industry⁷. IMO 2020 will undoubtedly cause volatility in energy markets worldwide as traders and refiners move from conventional feedstock sources and trades routes in an attempt to find the most efficient and profitable way to supply the demand of 0.5% bunker fuel necessitated by the marine industry from 2020.

As previously mentioned, one of the principal outcomes of IMO 2020 will be the increased demand of low sulfur crudes. Demand for crude overall will continue to grow as the globe's population increases and the economy continues to grow. Global oil demand is expected to increase by 2mb/d to a 102 mb/d in 2020. The total growth of crude demand isn't widely contested give or take a few hundred thousand barrels, nor is it the most important aspect of crude demand growth to consider. The focal point from a crude demand standpoint leading up to 2020 will be the magnitude of the shift from sour to sweet crudes. Sweet crudes, already in relative high demand, will see further increases in demand from 2020 onwards relative to sour grades, thus widening the spread between them.

Sulphur Content in Straight-Run Products



Note: bubble size reflects the product yield.

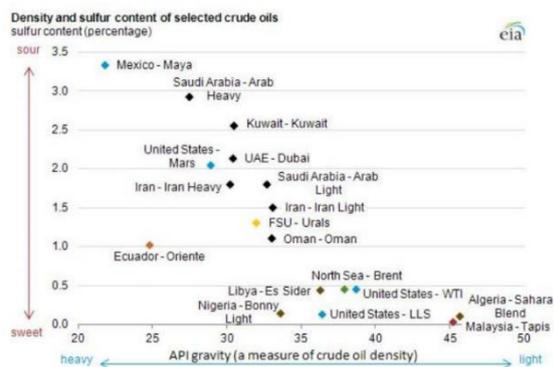
Source: product yields and sulphur content are based on BP crude assays from www.bp.com.

BP Crude Assays⁷

⁶ Reuters: Refiners, traders brace for fuel-market volatility ahead of sulfur caps

⁷ BP Crude Assays
<https://www.bp.com/en/global/trading/crude-oil-and-refined-products/crudes.html>

The increased spread between sweet and sour crudes will incentivize refiners with complex refineries outfitted with numerous upgrades to take advantage of the cheap sour crude available. The extra cost associated with processing sour crudes will be offset by the rising premium placed on sweet crudes. Complex refineries have the capability to reduce the sulfur of their end products with cokers, hydrocrackers, hydrotreaters, and de-asphalting units; giving them a distinct input cost advantage over simple refineries, particularly for 2020 and the following few years.



Source: U.S. Energy Information Administration ⁸

Europe will source light crudes out West Africa, the US, and other economically viable geographies.

Even as sweeter crudes become more desirable and more prevalent from 2020 onwards, residual fuel oil will remain an unwanted by-product. The residual fuel that was once used to make 2.5%-3.0% bunker fuel will no longer be capable of making 0.5% bunkers without considerable refining or blending. Residual fuel won't leave the marine market all together, but some of it will be diverted to power generation in countries with less stringent environmental policies as they take advantage of heavy residual fuel oil discounts in 2020. The sour residual fuel oil left over in places without advanced refining capacity, like Singapore for example, will likely send RFO to China, Japan, and South Korea for further processing. These countries, will in turn take the excess LSFO that they produce and export it to Singapore (largest bunkering hub in the world). Along with Fujairah, Houston, and Rotterdam, Singapore is one of the four main bunker hubs in the world.

Trading

Modifying crudes slates in favor of sweeter crudes, particularly in simple refineries, will significantly alter current crude trading routes. The United States is in a particularly strong position heading into 2020 because it has a strong supply of light sweet crude and the advanced refinery capabilities required to take advantage of the ensuing sweet over sour premium in 2020. Local demand will take up a large portion of the sweet crude available in the United States, but crude exports from the US Gulf are expected to rise significantly in 2020. Europe, Singapore, and even South America are expected to draw from the US Gulf. Meanwhile, US refiners will continue to refine discounted sour crudes from Mexico, South America, and the Middle East. Asian countries with the refining complexity to process high sulfur crudes like China, South Korea, and Japan are expected to take advantage of discounted sour crude as well. Refineries in Asia with capability to do so will continue to take in sour crudes from the Middle East while Singapore and

⁸ EIA: Changing quality mix is affecting crude oil price differentials and refining decisions
<https://www.eia.gov/todayinenergy/detail.php?id=33012#>

Table 1. Rotterdam Fuel Oil Price Forecasts versus Brent

(\$/bbl)	Sept 2018	Dec 2018	June 2019	Dec 2019	June 2020	Dec 2020	Dec 2021
Brent	77.29	76.55	74.58	72.42	70.51	68.49	65.88
Rotterdam 1% LSFO	69.25	67.42	64.44	63.25	65.31	66.48	64.48
Rotterdam 3.5% HSFO	67.18	65.23	61.26	47.64	47.44	49.21	49.93
Brent vs Rotterdam 3.5% differential	10.11	11.32	13.32	24.78	23.07	19.28	15.95
Rotterdam 1% vs 3.5% differential	2.07	2.19	3.18	15.61	17.87	18.27	14.55

Sources: Intercontinental Exchange, CME Group

Table 3. Brent vs ARA Gasoil and Singapore Low Sulfur Gasoil

(\$/bbl)	Sept 2018	Dec 2018	June 2019	Dec 2019	June 2020	Dec 2020	Dec 2021
Brent	77.29	76.55	74.58	72.42	70.51	68.49	65.88
ARA Gasoil	89.74	89.41	88.63	89.41	88.23	85.98	82.92
Singapore Gasoil	89.22	88.73	87.87	88.87	87.91	85.58	-
Brent vs ARA Gasoil differential	12.45	12.86	14.05	16.99	17.72	17.49	17.04
Brent vs Singapore Gasoil differential	11.93	12.18	13.29	16.45	17.40	17.09	-

Sources: Intercontinental Exchange, CME Group

Source: Shipandbunker.com⁹

As the flow of crude and residual fuel oil changes, a shift in these hubs will likely occur. Singapore will remain a major bunkering hub due to its geographic location, but it will lose the current competitive advantage that has over China, S Korea, and Japan. Singapore just doesn't have the low sulfur refining units or capacity to meet the 0.5% bunker fuel spec at the levels in which it currently supplies the maritime industry in the region. Singapore will remain the central bunkering hub in Asia due to its geographic location, the existing bunker supply infrastructure, and storage space that it has, but it will see some of its bunker demand diminish.

Outside of crude and residual fuel, gasoil (diesel) demand is expected to increase significantly due to the 2020 sulfur cap. Gasoil and other middle distillates will be in high demand as refiners and bunker suppliers look to meet the new bunker fuel standards through blending. Gasoil is the main blending complement used to lower the sulfur content of residual fuel oil in order to convert the mixture to acceptable marine fuel standards. It's expected that there will be about an 85/15 gasoil to residual fuel oil blend used to make ECA compliant

0.5% sulfur bunker fuel. The trade flows of gasoil are expected follow similar developments as residual fuel oil in the advent of IMO 2020. Singapore will likely increase imports of distillates from the Far East and South Asia. Europe, which is already short on diesel, will increase its imports from the United States. The increased competition for low sulfur gasoil and middle distillates will drive the price of diesel upwards through 2020.

⁹ Shipandbunker.com – Expected Pricing and Economic Impacts of the IMO 2020 Rule

<https://shipandbunker.com/news/world/215771-expected-pricing-and-economic-impacts-of-the-imo-2020-rule>

Shipping

IMO 2020 will have a significant impact on shipping; particularly in the tanker industry.

Although the IMO 2020 rule was ruled upon in November of 2016, there was still active debate as to whether or not the sulfur cap should be delayed until 2025, through 2017. Despite being an integral part of world trade, the marine transportation industry has not enjoyed the same commercial success as other sectors of the economy since the recession. The buildup of the world's fleet through 2010 led to a severely oversupplied commercial fleet for demand no longer existed. The combination of the surplus of available freight and lack of demand led to negative earnings, bankruptcies, and a drawn out recovery process for an industry that still has yet to fully recover.

Despite the industry's recent hardships, the IMO decided to go through with the initial 2020 sulfur cap regulation. At this point, ship owners have two options for complying with IMO 2020 regulations:

1. Use IMO 2020 compliant 0.5% (or less) sulfur bunker fuel, or
2. Outfit their ships with exhaust gas cleaning systems ("ECGS" or "scrubbers")

Exhaust gas cleaning systems are components which remove sulfur from the engine's exhaust. The installation of a scrubber system would allow a ship to continue burning cheaper 3.5% sulfur fuel oil while remaining IMO compliant.

Prior to making their decision, ship owners have a number of factors to consider, including:

- Cost of a scrubber (between \$1,000,000 and \$6,000,000 depending on the size and type of the ship, and the complexity of the system installed)
- The fuel efficiency of the vessel
- The expected spread between high sulfur fuel oil vs. 0.5% fuel oil over the scrubber's lifetime
- The availability of IMO 2020 compliant bunker fuel (and HFO in the future)
- The age of the vessel
- The vessel's trading range

- Global compliance

To start the year, ship owners were largely opposed to the new ECGS technology. Owners have since softened their stance. At present, most ship owners are taking a wait and see approach regarding the installation of scrubbers, but sentiment seems to be trending in favor of ECGSs as an increasing number of newbuild vessels on order are "scrubber ready", i.e. owners have the option of installing scrubbers as the vessel is built should they choose to do so. It's expected that about 1,000-2,000 vessels will be outfitted with scrubbers by 2020, but the vast majority of the 52,500 vessels which comprise the global commercial fleet will rely on 0.5% sulfur fuel.

From a financial standpoint, most models seem to indicate that scrubber systems will return an owner's investment within two to four years depending on the models' inputs and parameters including: size, age of the ship, vessel class, and the future spreads between HFO and 0.5% bunker fuel. The cost of marine fuel will increase significantly in 2020. The spread between HFO and MGO on October 1, 2018 is about \$250/MT based on the Global 4 Ports Average via shipandbunker.com. That figure could very well double leading into 2020. HFO will drop drastically as it will no longer be a viable standalone marine fuel option, while marine ECA fuel will skyrocket.

Although ECA Fuel will be very expensive, and exceedingly compliant at 0.1%, vessels without scrubbers are expected to run their vessels on it in the last quarter of 2019 and during the early days of IMO 2020 implementation. ECA Fuel is a known product which owners are comfortable with and it's already widely available. 0.5% sulfur fuel oil will be available at the time of enactment, but the quality, quantity, and location of it is uncertain. One of the major concerns owners have with the new regulation is the uncertain characteristics that come along with new fuel blends: What are its specifications? How will it interact with the fuel already on board? How will it affect the ship's engines? Refiners have rigorous testing and quality control, but the introduction of new products on a mass scale does have potential liabilities. Owners that opt not to install scrubber systems are putting a lot of trust in refiners and traders to make all of the changes necessary for IMO 2020 in a relatively short period of time.

Over the long term, ship owners maximize their earnings by effectively constructing an optimum portfolio of vessels through: shrewd vessel management in the spot market, accurately timing the purchases of newbuildings, the purchase or selling of secondhand vessels, the placement of vessels on time charter (or chartering them out), or scrapping their ships. IMO 2020 adds another layer to owners' decision making by adding scrubber installation to the mix: which vessels should or should not be outfitted with scrubbers?

While there are differing opinions over which vessels should be outfitted with scrubbers, there is an industry wide consensus for vessels which should not be outfitted with scrubbers - old vessels. Old vessels have a limited remaining trade life and are far less fuel efficient relative to the younger ships in the fleet. Many owners are currently losing money on their modern ships due to the conditions of the worldwide freight market; their losses are exacerbated by the older vessels in the fleet because of the extra fuel costs and because they often receive discounted freight rates as charterers will choose the best and newest ships available when choosing a vessel for a spot voyage. The 2020 increase in bunker fuel will render some older vessels obsolete. Oil tankers are already being scrapped at the highest rate in years. 110 VLCCs have already been scrapped in the first half of 2018; more than twice the number of ships scrapped all of last year¹⁰. The scrapping rate is expected to increase further once the new bunker specs come into play. In the long run, the increase in vessel scrapping may be a blessing in disguise. The industry has been plagued by oversupply for years due to overbuilding as ship owners compete for market share. As long as newbuildings remain in check, shipping rates should increase.

At the most basic level, there are three strategies ship owners have or will implement in regards to scrubber installation:

1. Install scrubbers on newbuildings
2. Install scrubbers on young/middle aged ships
3. Don't install ECGSs
 1. If an owner believes that the large spread between HFO and global fuel will remain for a long time, installing scrubbers on newbuildings could

yield the best return on investment. New build vessels are the cream of the crop in an owner's portfolio. They are the most technologically advanced, most fuel efficient, and have the longest potential trade life. In addition, newbuildings are the most desirable to charterers. It's possible that these ships could drive a higher premium relative to other vessels; especially in a tight a market or if compliant fuel within a specific regions becomes scarce during a particular load period. Finally, newbuilds will have been custom built ahead of time to optimize performance with a scrubber installed onboard; unlike a vessel which has been retrofitted with an ECGS system. Trafigura has employed this strategy as they have 32 ECGS tankers of various classes on order for 2020 delivery. Recently, The MR (product tanker) market has seen an increase in "scrubber ready" ship orders as owners attempt to take advantage of the fuel price differential in ECA trades between the US and Europe. Overall, appetite for scrubbers has been increasing in recent months. The capacity for scrubber installations to be completed prior to January 1, 2020 is shrinking as the available slots at shipyards are getting filled.

2. Another option that is being pursued by ship owners is retrofitting young-middle aged vessels. The youngest vessels within a fleet are very fuel efficient. Because of this, the marginal fuel savings generated by these vessels would not be as great as their older counterparts; every extra metric ton of HFO burned instead of 0.5% sulfur fuel could result in significant savings. In addition, the newest vessels in the fleet could remain scrubber free in the event that the availability of HFO fall over time after the implantation of IMO 2020, or if the spread between HFO and global fuel diminishes quickly. This strategy will allow the owner's newbuildings to lift a great amount of cargo per voyage and enjoy greater fuel efficiency throughout the vessel's lifespan. Frontline has opted to retrofit some of the middle aged tankers. Not only has the company ordered 14 ECGS systems (with an option to buy 22 more) from Feen Marine Scrubbers Inc., Frontline has also taken a 20% stake in the ECGS manufacturer¹¹.

3. The final option is to use IMO 2020 compliant fuel. Some owners have vehemently opposed scrubber installation throughout 2017, though some of these owners have since softened their

¹⁰ Businessmirror.com
<https://businessmirror.com.ph/oil-tanker-owners-scrap-the-most-ships-in-decades/>

¹¹ Worldmaritimenews.com
<https://worldmaritimenews.com/archives/255817/frontline-takes-20-pct-stake-in-feen-marine-scrubbers/>

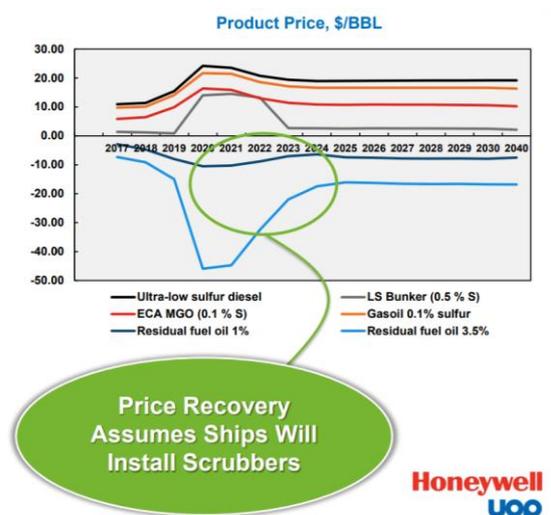
initial opposition to ECGS systems. In order to combat the forthcoming rise in bunker fuels prices, some owners, such as Maersk, have formed strategic alliances with bunker suppliers and storage companies. Owners with pessimistic views on ECGSs believe that refiners will be able to produce lower sulfur content fuel more quickly and efficiently than the market seems to indicate at the moment. They also may not see the need to rush to be first to market with ECGS systems and are simply waiting to see how the implementation of 2020 plays out.

In addition to a vessel's age, other factors a ship owner will consider while contemplating the scrubber conundrum are size and trading range. The marginal fuel savings from an ECGS system are greater on a larger ship than a small one due to the amount of fuel they consume per voyage. Large vessels frequently employed on long haul voyages will enjoy greater fuel savings than smaller ones.

Current legislation dictates that vessels sailing in ECA zones must burn ECA fuel while they remain within the zone. However, if a vessel has an ECGS installed it would be able to burn HFO in ECA zones until 2020 in which case it would be able to burn global fuel. Vessels which regularly trade in ECA zones would see an additional fuels savings boost over other ships trading within ECA zones.

While exhaust gas cleaning systems have their benefits, they are not without their faults. Exhaust gas cleaning systems are an expensive upfront cost and a relatively new technology to the marine industry. Ship owners are reluctant to retrofit exhaust gas cleaning systems on trading ships because of the cost, downtime associated with installation (for retrofitted vessels), the increased OPEX, and the training necessary to prepare the crew of the ship for the handling of the scrubber system. In addition, scrubbers weigh a lot and take up potential cargo space on vessel. The added weight reduces the tankers fuel efficiency and reduces the amount of cargo that it can carry. While the fuel savings are still beneficial to an owner with the added weight on a per voyage basis, the charterer of a voyage may select a vessel without a scrubber because it will be able to carry more product at the same cost than the vessel with scrubber technology.

Although industry players have been skeptical of the widespread availability of 0.5% fuel oil come 2020, there may be shortages of HSFO in the years that follow the implementation of IMO 2020. If producers and refiners are able to switch to sweet crudes efficiently over the next few years, the amount of high sulfur residual fuel oil will drop significantly as lower sulfur fuel oil becomes more prevalent. Over time, the spread between HSFO and 0.5% FO will shrink; therefore diminishing the fuel cost advantage that scrubber vessels will have over non-scrubber ships. The timing and magnitude of the change in spreads remains to be seen, but it is conceivable that, due to lack of physical supply in areas with low sulfur RFO and blending components, the cost associated with installing scrubbers will not be worth the discount for HSFO. As regulations continue to develop and technology improves, the supply of sour products could diminish to the point where sour products are no longer attractively marketable.



Honeywell
UOP

Honeywell¹²

Finally, some market participants are questioning the administration of the law itself. There is no enforcement arm, and therefore no real prosecution available from the IMO for the rules that the organization imposes. Any punishment for non-compliant vessels would be imposed by the flag under which the ship is registered (which are often flags of convenience) or the port of call, which has no legal obligation to punish vessels that do not comply with the new regulations. While these concerns are understandable, the consensus is that the vast majority of vessels will comply with IMO

¹² Honeywell <https://www.uop.com/wp-content/uploads/2018/04/Maximizing-Profitability-with-High-Residue-Conversion-Uniflex-Technology.pdf>

2020 standards. The compliance won't be driven by flag states or ports of call, but by charterers and ship owners themselves. Charterers and ship owners both have an incentive to comply with the new legislation. Ship owners are competitive and charterers will choose to charter vessels which are IMO compliant over vessels which are not. There are potential legal ramifications for insurance purposes and fines incurred for non-compliance. Also, there is the potential for public backlash in response to news of ship owners or charterers disobeying environmental regulations which could hurt the associated companies' public images and share prices.

Beyond IMO 2020

Looking into the future, the next monumental shift in shipping is most likely the conversion from oil to gas as the predominant marine fuel. There are already a number of LNG vessels in operation. LNG has the capability to be applied on much larger scale than is currently being utilized. LNG is clean burning and the marine sector is growing at about 20% per year. The order book is almost as large as the current fleet itself. Expect the LNG fleet to continue to grow as infrastructure for marine LNG supply improves.

From a regulatory standpoint, the next big issue is the implementation of ballast water management systems in 2024 across the entire commercial fleet. Beyond that, there are a number of proposed new ECA zones that include the Mediterranean Sea, Mexico, Norway, and Puerto Rico. It may take some time for these ECA zones to come into effect, but the trend is heading in that direction.

The Impact

- **Ships will begin to run MGO and ECA Fuel through their tanks in preparation for lower sulfur fuel standards.**
- **Refinery runs will increase on the back of rising demand for refined products.**
- **Large spreads will develop between sweet and sour crudes and residual fuel oil.**
- **The trade of all petroleum products (except HFO and its derivatives) will see a temporary hike due to increased volatility and transport.**

- **Gasoil demand increases will lead to a dramatic price spike in diesel and increased clean product tanker demand.**

- **Vessels will begin slow steaming in order to gain greater fuel efficiency.**

- **Demand for scrubber systems installations will increase leading into, and through 2020.**

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