



## Understanding IMO 2020

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In 2020, the International Maritime Organization (IMO) required bunker fuel used by the global shipping industry to lower sulfur content from 3.5% to 0.5%. As a result, fuels will require blending with low sulfur products like diesel. Followed by radical changes and significant costs to all players. We experienced the IMO 2020 sulfur regulations significantly increased pricing for global transportation fuels broadly. This stands to benefit those who can most efficiently produce low sulfur refined products (complex refiners) while potentially creating inflationary costs for global transportation and consumers.

IMO Marpol Annex VI sulphur limits timeline

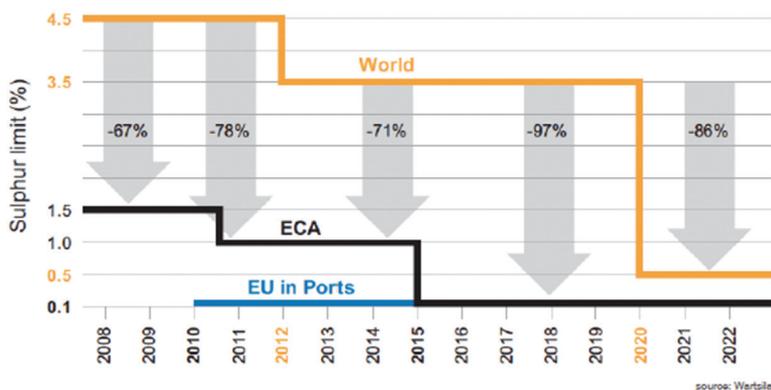


Figure 1. IMO Marpol Annex VI sulphur limits timeline

Emission standards rules were first discussed in 1973 during the International Convention for the Prevention of Pollution from Ships (MARPOL), and since 1997, these standards have become progressively more stringent, on a country-by-country basis, focusing on reducing greenhouse gas emissions (GHG).

Efforts have focused on regulating the sulfur levels in fuels used while ships are operating in defined coastal areas defined as Emission Control Areas (ECAs). These are generally located in high traffic coastal regions adjacent to Europe and North America (dark blue areas in the map below) and sulfur thresholds in these areas have systematically been



**Figure 2.** Current and future Emission Control Areas (ECA)

reduced until the latest update in 2015 which reduced this limit to 0.1% sulfur.

While the sulfur limits for bunker fuel usage in the ECA's are tight (tight enough that they can only effectively be met by using marine diesel), their impacts have not been substantial because total usage in these areas is quite small. A much bigger impact is expected when the new standards for "openwater" transit come into effect ("Global cap" in the chart below). In 2008 the International Maritime Organization (IMO) voted to reduce the global cap on sulfur emissions for international shipping to 0.5% (from the 3.5% which has been in effect since 2012) starting from 1 January 2020. In October 2016, the IMO reiterated the 2020 deadline, reducing the odds of a last-minute deferral. The latest figures provided by the IMO showed that the yearly average sulfur content of the residual fuel oils tested in 2015 was 2.45%. As a comparison, the worldwide average sulfur content for distillate fuel is 0.11%.

The change will have dramatic consequences on the refining industry and both crude oil and product prices. Normally, refineries don't make bunker fuel but instead they produce fuel oil

(mostly vacuum tower bottoms and other related streams). Bunker fuel is primarily produced by blending terminals which purchase fuel oil from refineries along with distillates to produce a variety of bunker grades. Industry consultants have indicated that this market structure has the potential to constitute another source of problem for the industry in the 2020 transition.

Global fuel oil production was ~8mmb/d in 2016, of which ~4mmb/d (~38%) was used as bunker fuel, which represents the main application. Fuel oil is also used for electricity generation (a key area of potential future demand growth), heating and a variety of industrial purposes. The global oil product bunker market is dominated by residual fuel oil, accounting for ~80% of the market (with the rest being marine gasoil).

#### Forecasted Product Portfolio Post 2020

This to provide a perspective on the bunker industry as it is today/currently, and a view of what the industry could look like after 2020 is in full implementation mode.

### Prior to 2020

Simple product selection – in reality ship owners have two considerations to make: Do I need fuel that complies with Emission Control Area (ECA) specifications (0.1%) or do I need a fuel that is for international waters HSFO 3.5%. Of course some ship owners also have the option to go for higher viscosity fuels like RMK 500, 700, etc. or even less viscosity, e.g. RMG 180. However, there is not too much complexity around the fuel choices. We also operate in a market where from a supply perspective, the market is quite balanced.

Supplier / Customer relationship heavily relies on pricing – competitive pricing or cheapest price will win the deal 10 out of 10 times!

Credit is very liquid - partly as there are too many suppliers in the market and each bring a portion of credit to the market!

Connected to the credit point, is the fact that barriers to entry for new suppliers/bunker traders are not very hard to overcome. Therefore, we have a very crowded competitor landscape (too many suppliers!).

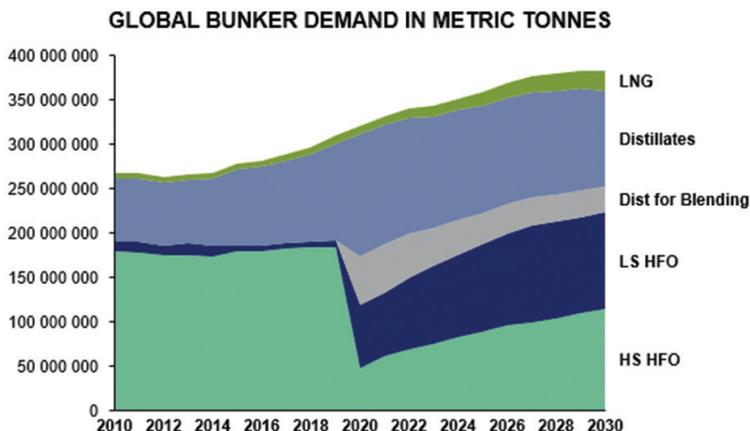
### Post 2020

There will be a very wide range on price differentials (spreads). Buyers must realize that poor bunker planning may result in having to buy the most expensive fuel option to comply with the new regulations. "Fuel Oil Not Available Report" (FONAR) can not help when MGO is available at a port and the preferred fuel choice for the ship owner is VLSFO and VLSFO is not available at the port. Under this situation, they will have to buy the compliant fuel that is available, pricing is not one of the criteria to use a FONAR.

Having to deal or plan for multiple fuel options will be more relevant and as mentioned on the price differentials, this will have a very serious impact to customers if they have to buy the most expensive fuel due to poor planning.

With the introduction of VLSFO 0.5%, and the fact that the majority of the VLSFO fuels will be blended, understanding quality specifications will be critical in minimizing the potential challenges around compatibility and stability, among others like a wide range of viscosity.

As we mentioned, the supply



*Figure 3. Global Bunker Demand in Metric Tonnes.*

availability will be more complex. We are not predicting that there will be massive supply disruptions. However, buyers should anticipate that there could be times that their preferred fuel is not available and will end up having to wait for the next avails or having to buy the most expensive fuel.

We see the relationship moving from pricing (transactional) to a relationship based more on trust and how reliable your supplier is (emotional).

Credit liquidity will be challenged, and in a way it could be very similar to what we are projecting for fuel supply.

### Pricing-Spread Analysis

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## QUALITY IMPACT

### From the supply side:

Challenge of handling multiple grades: MGO, VLSFO, HSFO but in addition the different specifications within the VLSFO blended fuels, different viscosity and other characteristics.

### From the demand side:

Very similar to the supplier, prepare and be ready for procuring and handling multiple grades: MGO, VLSO, HSFO and how important it will be in the future to properly for bunkers. Poor planning can lead to having to buy the most expensive compliant fuel available and additional operations on board the vessel to handle the fuel switch over.

### Advises to Shipowners and Academicians;

**Blending and feedstock strategies.** The best short-run source of low-sulfur fuel for shippers in marine gasoil (or a combination of marine gasoil and fuel oil), and, in our view, this will be the compliance strategy of choice for most of the shipping companies, at least in the early years. From a technical perspective, shipping companies are saying that technically it should be relatively easy to switch to a combination fuel (even if switching to pure gasoil may present challenges in some cases), with only minimal operational changes and no significant capital expense or time out of service. The two fuels combined could see an incremental demand of 1.2-1.5 MBD. Gasoil blending is the option of choice for Maersk. The largest benefit of this short-run option is flexibility, or capability to adjust to market dynamics. The largest negative could be lack of viscosity that impairs tanker engine performance with long duration untested fuel options.

**Non-compliance / cheating.** The IMO has no authority to monitor or enforce its own regulations, but rather has relegated compliance to the member states. Currently, both direct and indirect methods are used to monitor compliance in ECAs. These include in-port verification of bunker fuel paperwork and the monitoring of vessel smokestack emissions at sea using aeroplanes and, more recently, drones. There are also large differences between the penalties imposed on non-compliant vessels in ECAs. The penalties imposed in North America are more severe than elsewhere. See Table 1 for this.

**Scrubbers.** Shipping companies can decide to equip vessels with exhaust gas cleaning systems (ie. scrubbers) which spray alkaline water into a vessel's exhaust, causing the removal of sulfur dioxide. The advantage of this approach is that it allows burning high sulfur fuel oil (set to become increasingly cheaper from 2020). The disadvantages is the high upfront investment requirement (\$2-10m) per vessel (including the lost income during the installation phase), it is less proven on 2- stroke and 4-stroke engines (used in large shipping vessels), and increases opex by ~\$400k per vessel per year (e.g. requires specialized personnel). There are also several uncertainties associated with this solution: firstly, if MARPOL legislation proceeds along the same lines as has legislation regulating the emissions from terrestrial motor vehicles, then future legislation can be expected to impose limits on pollutants such as nitrous oxide (NOx) and particulate matter that are not filtered by scrubbers. It also raises the issue of waste water disposal. Industry estimates suggest that only 300-400 KBD of the 2.5MBD high sulfur bunker fuel consumption can be absorbed by scrubbers in 2020. Further, while spreads may incentivise scrubbers as an option, the available dry dock capacity

**Table 1.** Penalties for non-compliance to sulfur regulations in selected countries

Country	Maximum financial penalty
Belgium	Eur 6 million
Canada	CAD 25,000
Denmark	No maximum
Finland	Eur 800,000
France	Eur 200,000
Germany	Eur 22,000
Latvia	Eur 2,900
Lithuania	Eur 14,481
Netherlands	Eur 81,000 + gains
Norway	No maximum
Sweden	SEK 10 million
UK	GBP 3 million
USA	USD 25,000/d

**Source:** Trident Alliance

to change over the fleet may be a limiting factor. In long term HSFO usage will increase due to newbuild vessels (see the graphic; Global Bunker Demand in Metric Tones)

**LNG / Methanol.** LNG- or methanol-fuelled vessels should be cheaper than 0.5% sulfur bunker fuels, generate lower emissions and protect vessel owners from future changes in emission standards (carbon dioxide, NO<sub>x</sub>, particulate matter). The disadvantages of these technologies are the high upfront capex requirements (LNG is best suited for new builds), and the lack of high capacity supply location. From an environmental perspective, a key risk is the emission of unburnt methane in the combustion process (known as the “methane slip”), which can substantially limit the greenhouse gas reduction from using LNG. Recent studies suggest that this issue has been practically eliminated in the most recent LNG engines. However, a recent environmental impact study promoted by the European Commission continues to rank methane slip as a key issue “requiring further investigation”. LNG is certainly an important long-term driver, but we

won't see a widespread adoption of this technology in the shipping industry in the very near term. However it can be research topic especially for academicians in long term with source handicap.



### **Ada Ezgi Başer**

Born and raised in Istanbul with Turkish and French roots with a long term interest in the maritime industry. This interest led her to persue and receive her Bachelor degree from the Department of Maritime Transportation and Management Engineering at Istanbul University.

After graduating, she worked on VLCC tankers on Swedish company where through hard work, perseverance and diligence she rose to the rank of chief officer. This led her to a career which was often challenging but always rewarding where she was fortunate enough to travel and work globally and helped to foster an interest other culturest and perspectives.

Her quest for a new challenge has led her to bunker industry which affords new opportunities to work and learn globally. Currently she is working for Danish owned company named as Dan-Bunkering at Dubai office since Feb/2019. Beside her native languages Turkish and French she speak also English and Spanish fluently which she feel are essential languages for the trading of bunkers, dealing with internal and eternal stakeholders and developing new business. Friends and family are very important for her and in her spare time she enjoy their company. She is also a professional rhythmic gymnast since the age of four and also enjoy snowboarding, running, swimming and travelling.