

Poten & Partners

IMO 2020 – Uncertainties & Opportunities



New York Energy Forum

February 12, 2019

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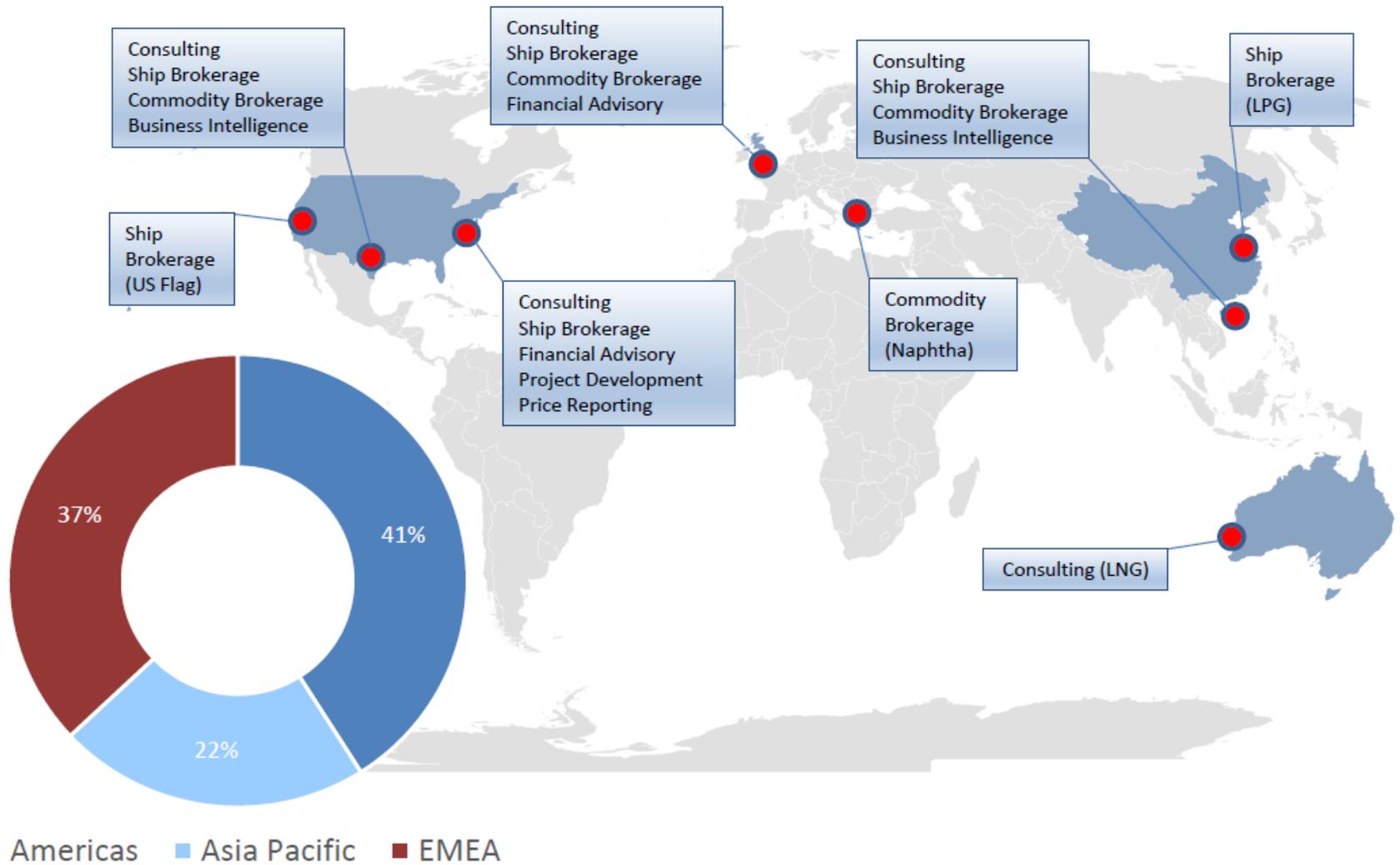
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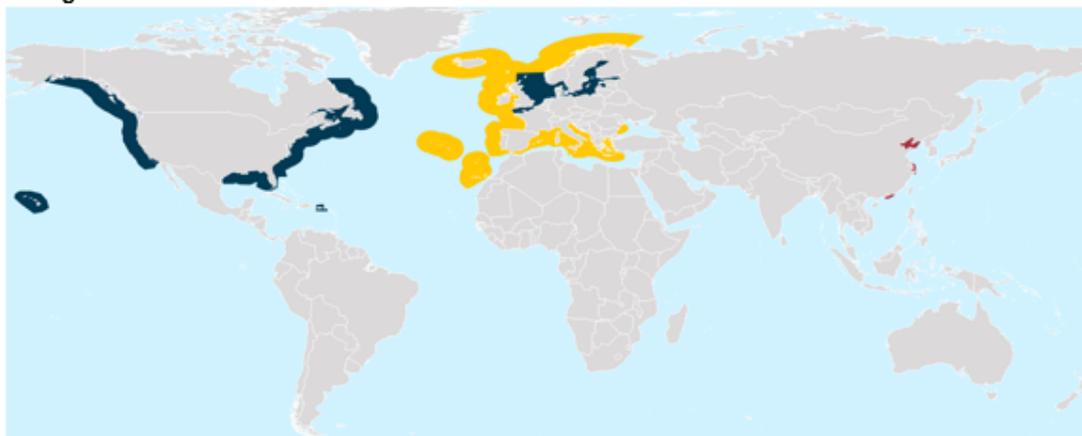
IMO 2020 Sulphur Emission Regulations: A Major Source Of Uncertainty

The IMO has been trying to reduce global sulphur limits for at least 20 years

Marpol Annex VI was adopted in 1997 and entered into force in 2005

For SO_x, the original limit of 4.5% set in 2005 was reduced to 3.5% in 2012 and 0.5% as of January 1, 2020

Designated marine sulfur limitation areas



■ International Marine Organization Emission Control Areas

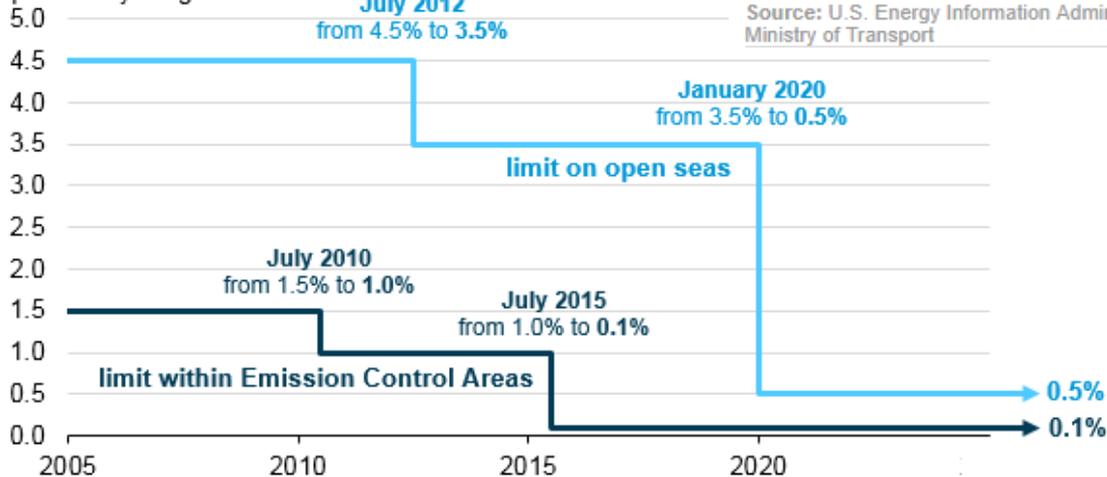
■ European Union Sulfur Directive

■ Chinese Emission Control Areas

Source: U.S. Energy Information Administration, based on International Marine Organization, European Union, and China's Ministry of Transport

Global marine fuel sulfur limits

percent by weight



Source: U.S. Energy Information Administration, based on International Maritime Organization (IMO)

Emission Control Areas (or ECA zones) were introduced in 2005. Sulphur limits were lowered in both 2010 and 2015

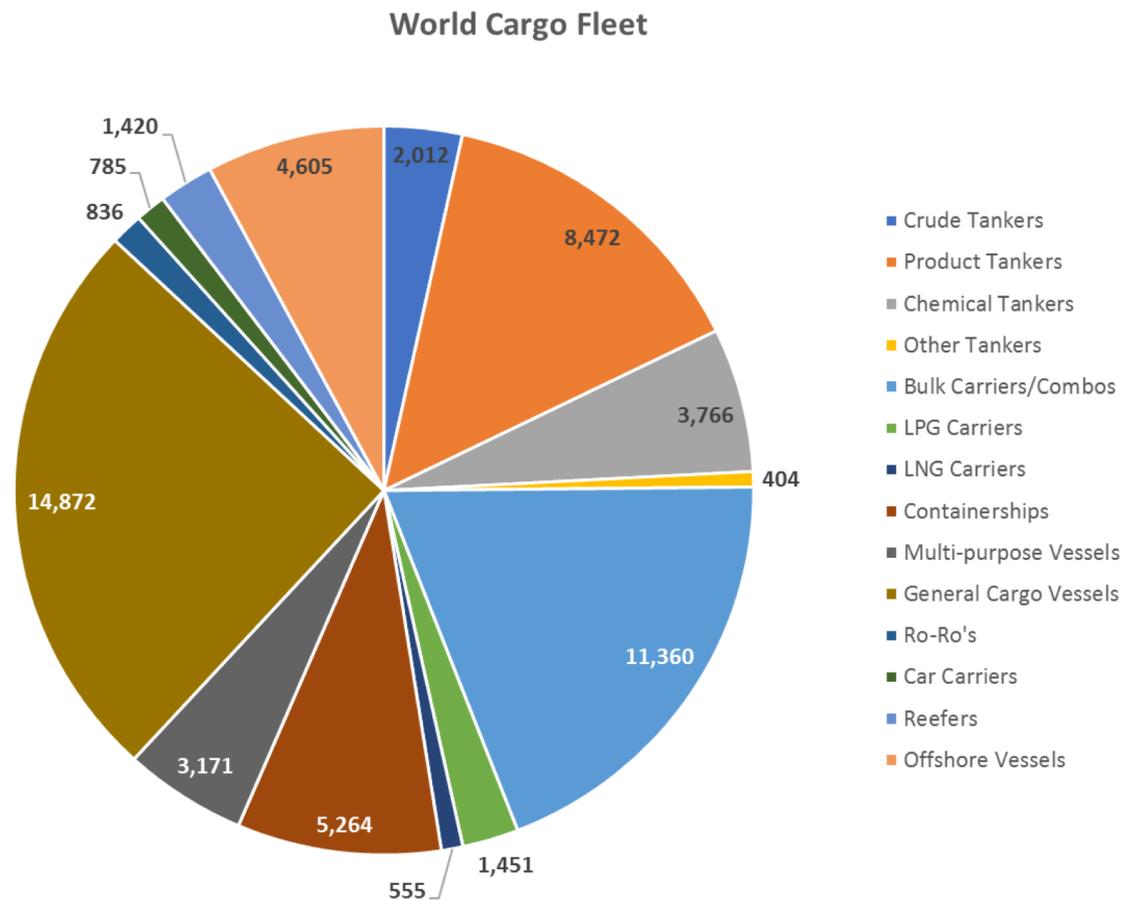
The EU has expanded the ECA zones beyond the North Sea and Baltic. It also includes parts of the Mediterranean

China has also introduced restrictions along parts of its coastline

IMO 2020: Unprecedented Change to Oil & Shipping Markets

Impact:

- 60,000 vessels carrying 90% of global trade
- 4 million barrels per day (4% of global oil demand)
- Worldwide implementation on 1 Jan 2020
- Expensive (\$ Billions)
- High level of uncertainty:
 - Fuel Availability
 - Fuel Price
 - Compliance



What Are The Compliance Options?

- Shipowners that need to comply with the new sulphur regulations have several options:
 - Use distillate fuels (around 80-90%)
 - Install exhaust scrubbers and continue to use high sulphur fuel oil (5-10%)
 - Use new low sulphur fuel oil
 - Use alternative fuels (LNG, LPG, Methane)

Each Compliance Option Has Pros And Cons

DISTILLATE FUEL



- Useable for most engine configurations



- Higher fuel cost
- May create operational issues due to low viscosity of the fuel

NEW COMPLIANT FUELS



- Useable for most engine configurations



- Unknown fuel cost
- No track record as per September 2018
- Uncertain availability
- May create operational issues due to off-spec fuel or incompatibility (ref. ECA hybrid fuels)

HSFO WITH SCRUBBER



- Can use conventional HSFO
- Possible for retrofit
- Reduces particulate matter as well as SO_x
- Attractive business case for certain ship types



- Initial investment (USD 2-10m)
- 3-5% fuel penalty
- Requires space for scrubber tower and supporting systems
- Requires chemicals (closed loop)
- Requires integration with ship's power management system
- Requires monitoring

LNG AS FUEL



- Has good environmental performance
- Can reach NO_x Tier III requirements
- Positive impact on EEDI



- High investment cost (USD 3-30m)
- Costly to retrofit
- Large regional variations in LNG price
- Methane slip in exhaust
- Requires space for tank
- Some engine types need additional systems to reach NO_x Tier III

The Case For (And Against) Scrubbers

- Scrubbers come in three varieties:
 - Open Loop – seawater is used to scrub and neutralize the Sox and no additional chemicals are needed. For the system to work satisfactorily, the seawater needs to have sufficient alkalinity.
 - Closed Loop – the closed loop system uses fresh water treated with chemicals. SOx is converted into Sodium Sulphate
 - Hybrid Systems – can be switched from open to closed loop as circumstances or regulations require
 - Open loop systems are the cheapest, but many shipowners like the flexibility that the hybrid system offers since open loop systems cannot be used everywhere
- Shipowners have been drawn to scrubbers for two reasons:
 - Is allows for the continued use of Heavy Fuel Oil, the fuel that the vessel's engine is built for and that the owner has experience with (low risk)
 - The economics are compelling:
 - Based on a price spread is \$250 - \$350 per ton between HSFO and LSFO, scrubbers have a payback period of between 1 and 5 years for the largest vessels
- Recent developments have created some doubt:
 - Will the price differentials be there?
 - Will the regulations change?

IMO 2020 – Questions And Risks

- LSFO bunker specs are not (yet) finalized and owners run risk of incompatible fuels from different suppliers
 - Risk of incompatible low Sulphur blends (Fuel oil + Distillates)
 - Different suppliers create their own low Sulphur fuel oil formulations (world wide availability or just local markets?) that might not be interchangeable
- How strict will countries enforce the IMO 2020 rules?
 - Many countries are potentially involved in the enforcement: Flag states, port states, states where bunker suppliers are located
 - Plans to regulate bunker suppliers so they can only provide HSFO to ships equipped with scrubbers
- Trade flow impact
 - Product trade: The IMO 2020 implementation may lead to local shortages of products which need to be shipped from surplus locations to bunker ports with shortages
 - Crude oil trade: Less sophisticated refineries will likely switch to sweeter crudes (such as Brent, WTI, Permian, Bonny light, Tapis) while more complex refineries will likely benefit from cheaper high Sulphur crudes (i.e. Maya, Saudi Heavy, Dubai)
- Higher fuel prices could lead to slow steaming in poor market conditions and accelerated scrapping of ships with poor fuel efficiency

IMO Sulfur Cap: Preliminary Conclusions

- The impact of the IMO Sulphur Regulations on the shipping markets is expected to be significant but also highly uncertain
 - Between the different compliance options and possible (temporary) waivers, we expect that the market will adjust and compliance will be high.
- For a long time most shipowners (and refiners) adopted a 'wait and see' attitude as investments are required for alternative strategies
 - Since mid-2018, more shipowners have opted for scrubbers but it remains a small minority. Recent decisions by certain ports in Asia, Europe and the Middle East to ban the use of open loop scrubbers has created uncertainty around the use viability of scrubbers
- Expectation is that there will be enough low sulphur fuel available worldwide, but some dislocations are possible – stimulating (product) tanker trade
- Increased demand for low sulphur fuels will increase the premium of sweet over sour crudes – potentially changing crude trade flows
- Storage is key for worldwide logistics to work – (temporary) floating storage could be required
- Scrubbers have the potential to be highly lucrative (but no guarantees), but the advantage may be temporary

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