

Options to be IMO 2020 compliant

	VLSFO	MGO	Scrubbers	LNG
Explanation	Very Low Sulphur Fuel Oil 0.5% S	Marine Gasoil 0.1 % S	New / Retrofit	Liquefied Natural Gas
Benefits	<ul style="list-style-type: none"> - does not require large investments - seen as a short-term option to be IMO 2020 compliant 	<ul style="list-style-type: none"> - operational experiences - widely available on a global level - does not require large investments 	<ul style="list-style-type: none"> - high attractiveness in the market - relatively cheap - seen as a mid-term option 	<ul style="list-style-type: none"> - proven technology for large vessels - cost advantage to MGO - viable long-term option
Risks	<ul style="list-style-type: none"> - uncertainty about compatibility and stability - possible quality and availability problems 	<ul style="list-style-type: none"> - high costs 	<ul style="list-style-type: none"> - limited operating experiences - reduce space on vessels - risk on future regulations on carbon emissions 	<ul style="list-style-type: none"> - tanks occupy huge space on the vessels - infrastructure for refueling - requires long-term planning



IMO 2020

exact impact is still uncertain

What we know...

- Ocean freight rates will increase in Q4 2019, because the shipping lines either need to invest (Scrubber / LNG) or buy more expensive fuels to be IMO 2020 compliant

What we see...

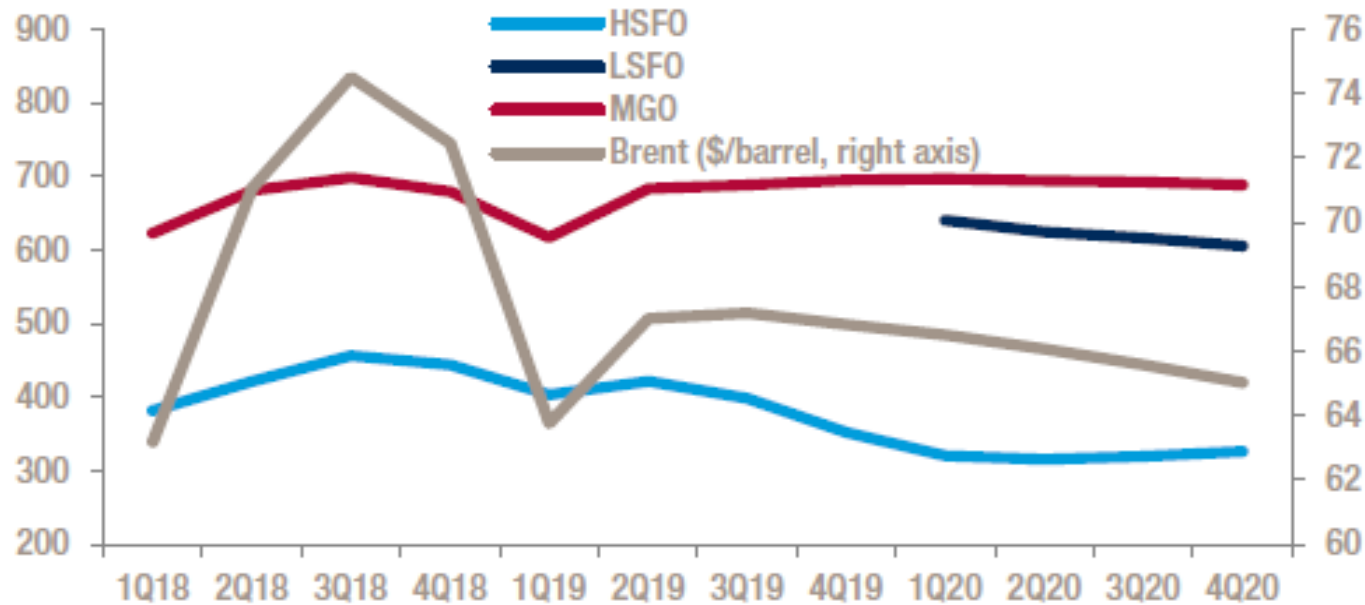
- The analysts from Drewry saying that global freight rates are predicted to increase by 6.5% in 2019 and by 8.3% in 2020, others are publishing figures between 15-20%
- Drewry counted 161 vessels (1.44Mio TEU) which will get scrubbers installed until end of 2019. This will effect mainly the Asia WB trade. The schedule is showing in total 255 vessels (9% of global container fleet).
- Installing scrubbers and preparing vessels for VLSFO will disrupt the sailing schedules, possibly also on short notice
- The market is uncertain about a sufficient supply of VLSFO, so that carriers may need to use the even more expensive MGO
- There might be a compatibility issue for VLSFO, because it is a new blend, so different provider could provide different quality, which could lead to engine failures



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Forecast Bunker Prices (USD/mt)



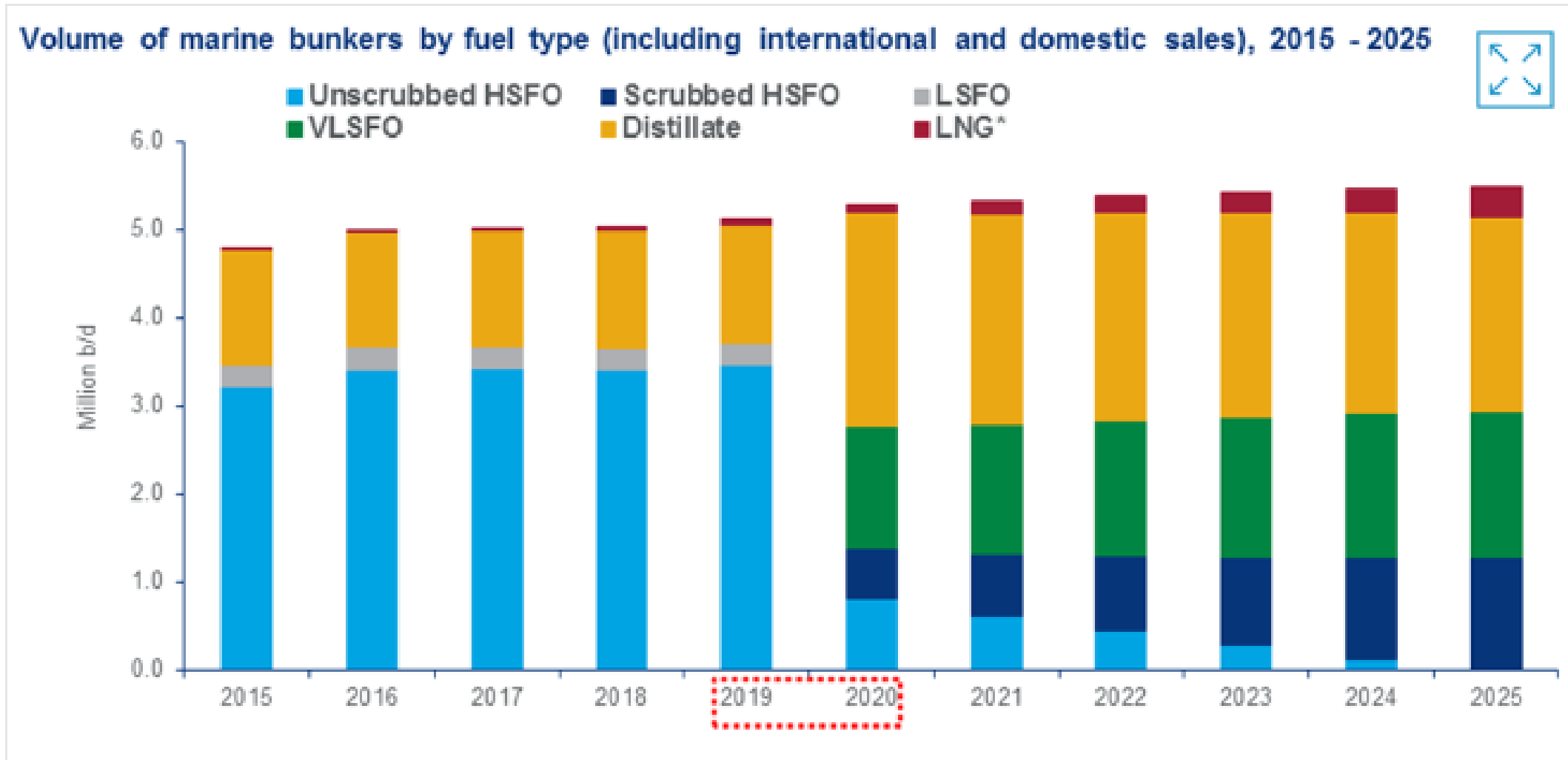
Note: Bunker prices shown are based on an average across 8 representative ports

Source: Drewry Maritime Research

- Price wise the VLSFO is seen in the area of MGO, because the refiners also facing investments themselves. If they cannot achieve a similar price level, it would be more beneficiary for refiners to use the 0.5% fuel to produce diesel or gasoline.
- A reliable index is not established yet, so far ahead of IMO2020 the data quality is not good enough.



Impact of IMO 2020 on marine fuels demand



Source: Wood Mackenzie