



MARITIME

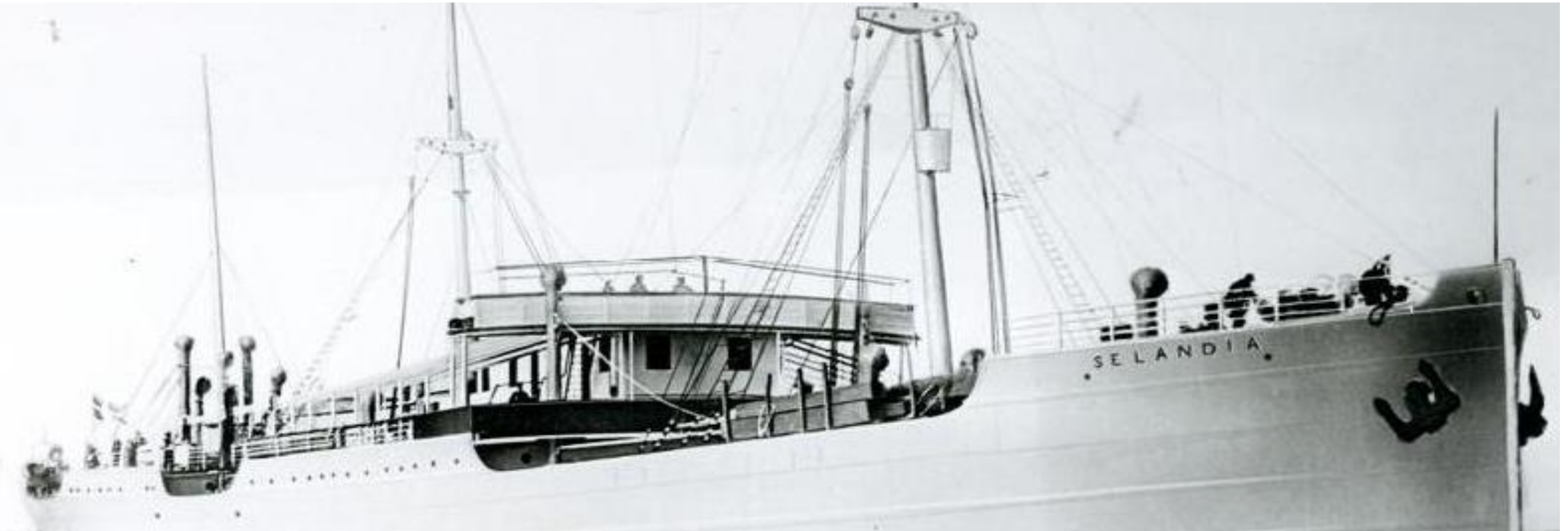
Global Sulphur Cap 2020

Compliance options: challenges and opportunities

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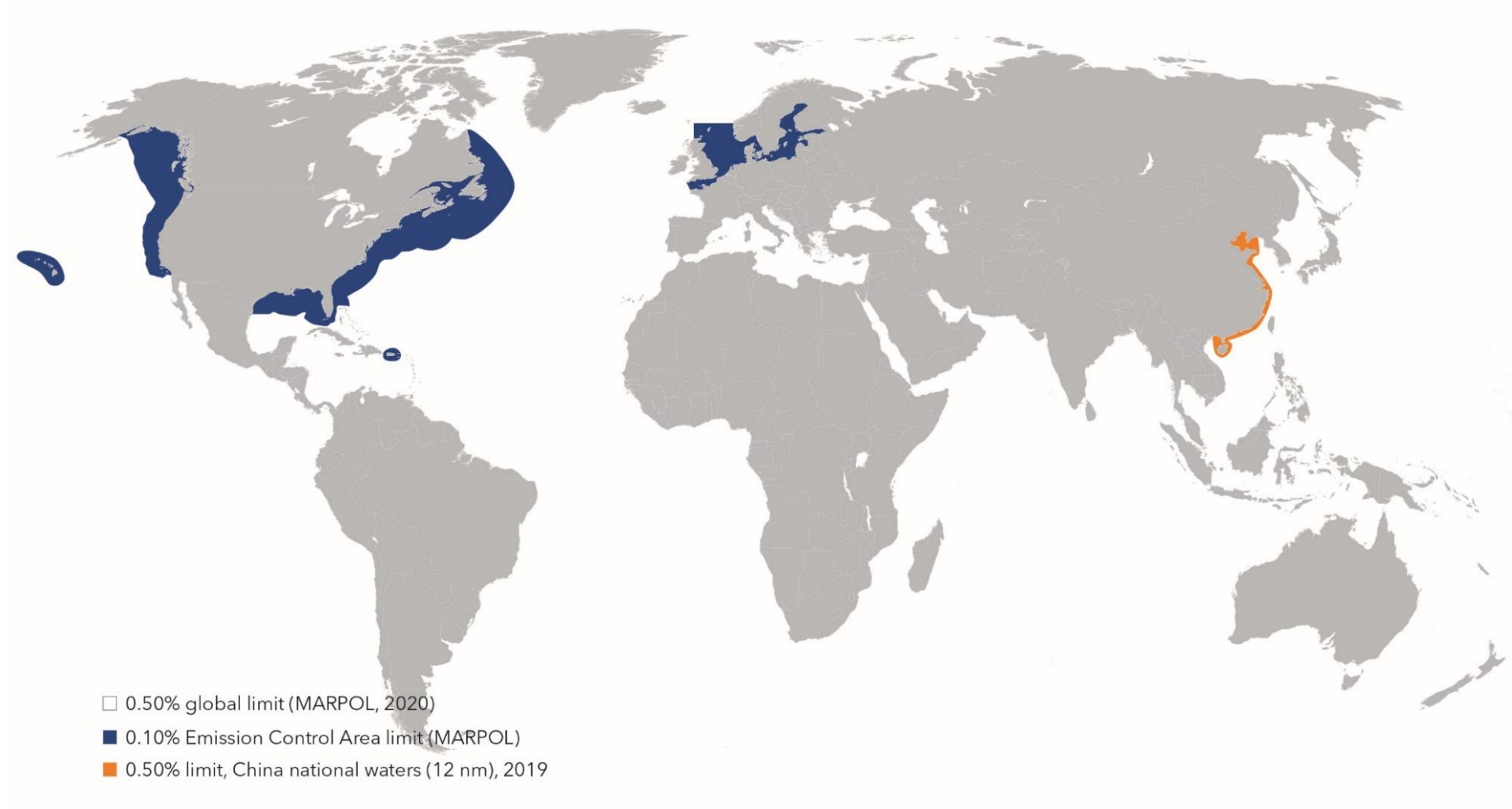
26 October 2018

1911: One of the first ocean-going, diesel-powered vessels



The transition from coal to oil took more than 50 years. Now, we are facing a new shift in fuel that will go a lot faster, with implications for the whole industry.

Global sulphur cap 2020 overview



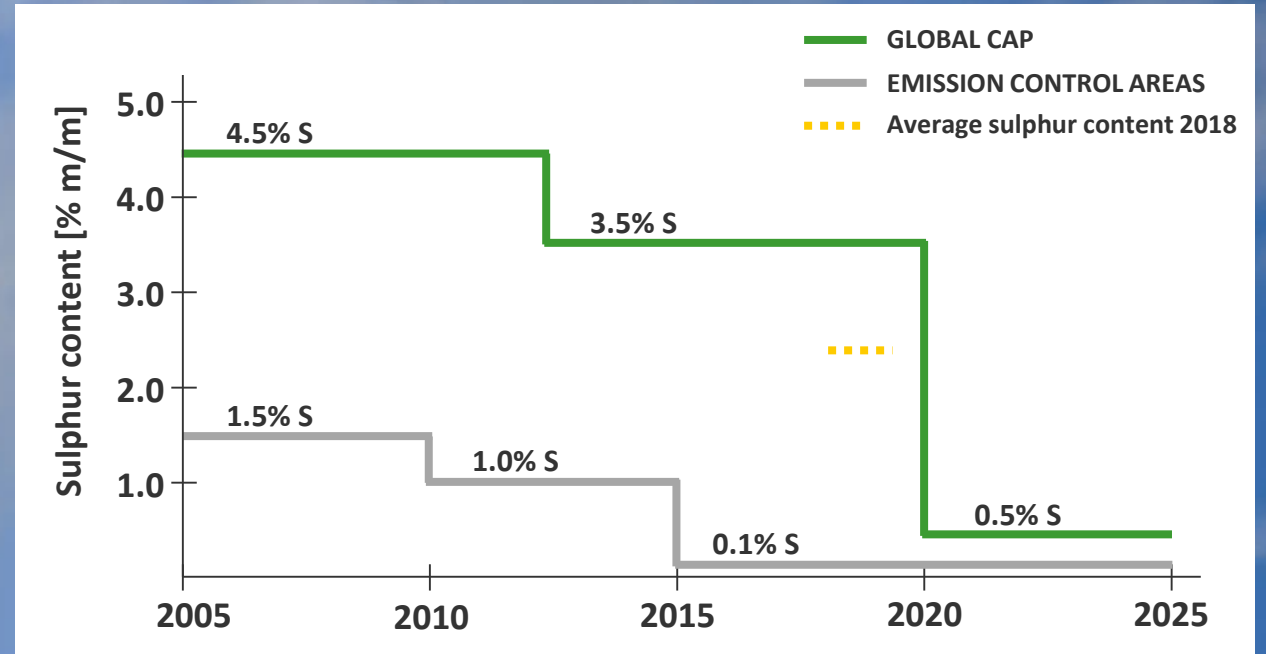
Today: Environmental regulations enforce strict limits to the sulphur emissions

Already in force:

- Sulphur emissions are strictly regulated in areas in North America and North Europe.
- China has already applied the 0.50% cap for some ports, with possible expansion to all coastal waters from January 2019.

New from 2020:

- IMO sets a global limit for sulphur in fuel oil used on board ships of 0.50%.



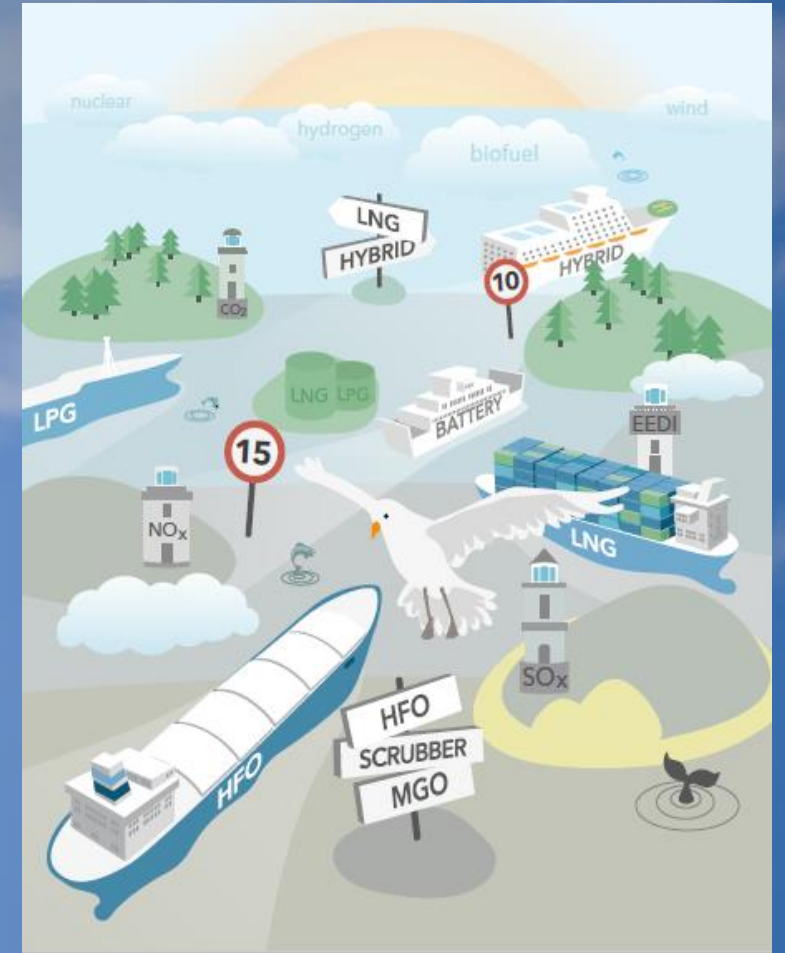
The average sulphur content today is ~2.5%, the Global Sulphur Cap 2020 represents a true challenge for the industry.

To comply with the Global Sulphur Cap, there is no solution that fits all owners

Compliance options:

- 1 Switch to distillate fuels (0.10% S)
- 2 Switch to low-sulphur fuel blends (0.50% S)
- 3 Install exhaust gas cleaning systems (scrubbers)
- 4 Retrofit the vessel to use alternative fuels, e.g. LNG, LPG, methanol

To prepare for 2020, owners are now evaluating options and strategies to have the best competitive edge in the market.



1

Switch to distillate fuels (0.10% S) **Expensive solution, but works for all**

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- Useable for most engine configurations
- Well known and available fuel

-

- Significantly higher fuel cost
- May create operational issues due to low viscosity of the fuel
- Need for appropriate lubrication



2

Switch to low-sulphur fuel blends (0.50% S)

Likely to work for all, but still have some risk and uncertainty related to it

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- Useable for most engine configurations
- Lower cost than distillate fuels

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- Blends are not on the market yet, and hence no track record
- May create operational issues due to fuel stability or incompatibility
- Unknown fuel cost, but higher cost than today
- Uncertain availability of fuel



3

Install exhaust gas cleaning systems (scrubbers)

High investment cost, but enables continued use of today's heavy fuel oil

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- Continue use of cheap heavy fuel oil
- Possible to retrofit on existing ships
- Reduces particulate matter, as well as SOx

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- High initial investment (USD 2-10M)
- Increased fuel consumption by 2-3%
- Requires space for scrubber tower and supporting systems
- May require chemicals and sludge handling
- Limited capacity with scrubber manufacturers before deadline in 2020

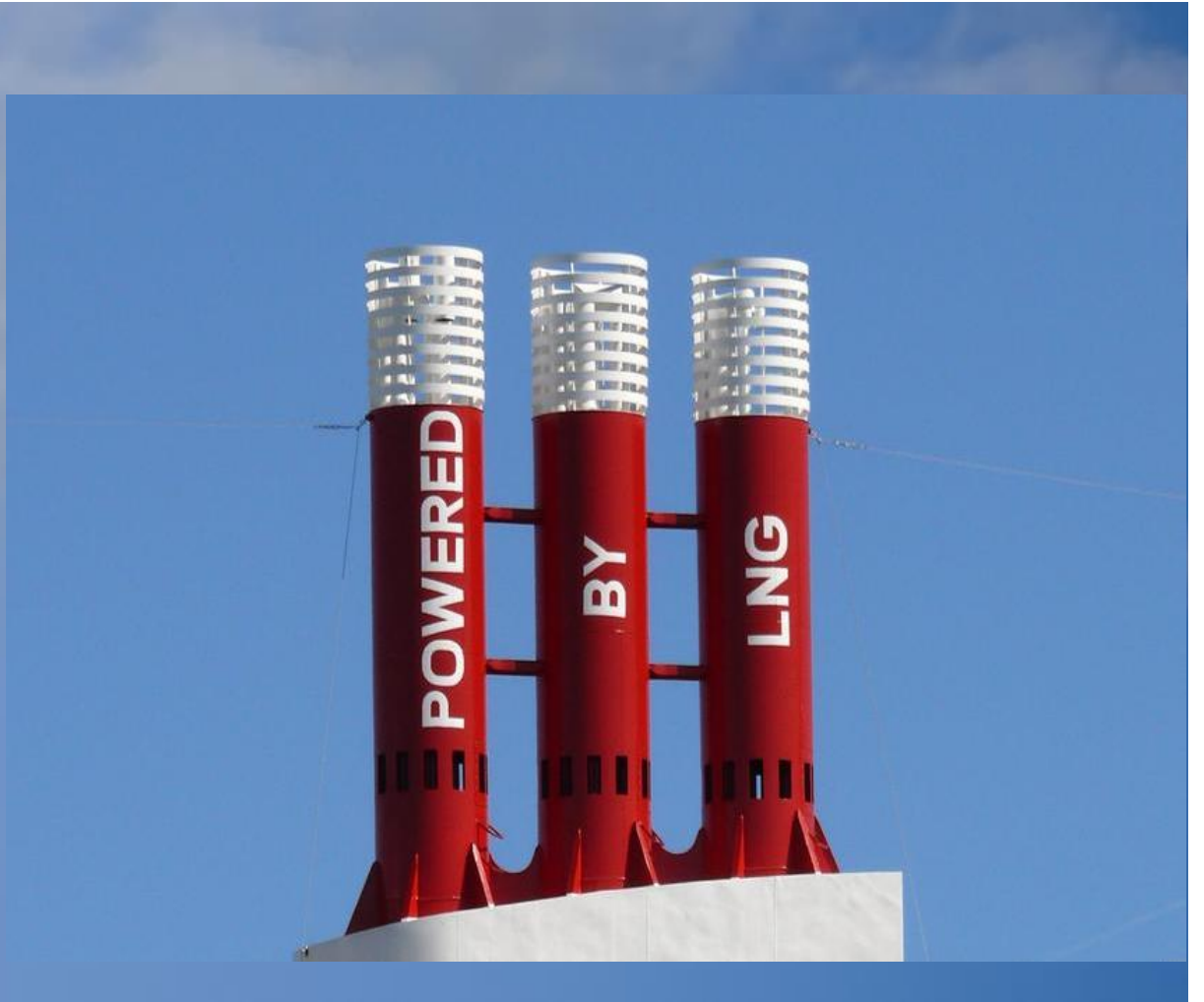




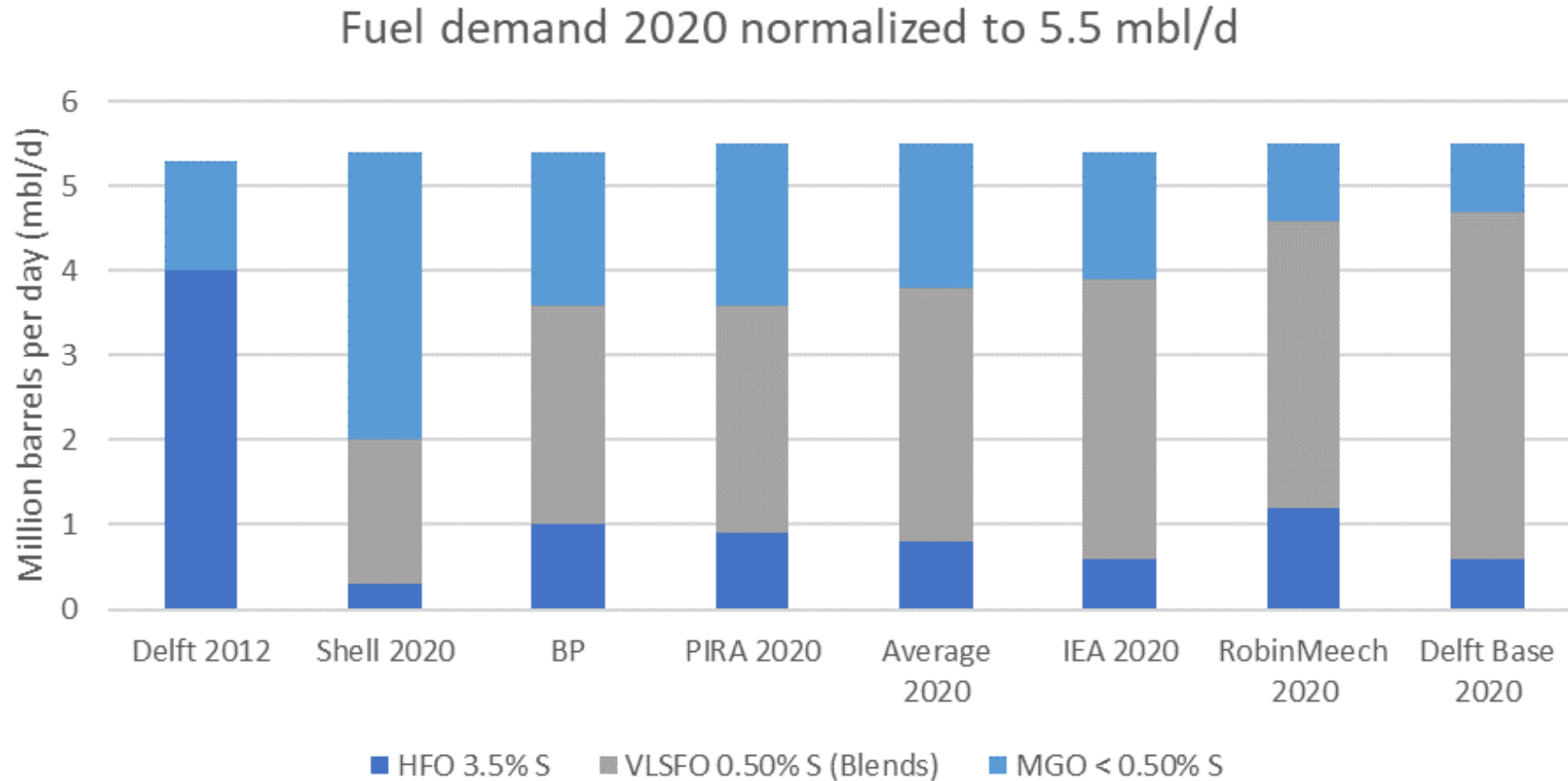
- Good environmental performance
- May reach Tier III performance on NOx
- Positive impact on Energy Efficiency Design Index (EEDI)



- High investment cost (USD 3-30M)
- Costly to retrofit
- Large regional variations in LNG price
- Methane slip in exhaust for some engine technologies
- Requires space for tank



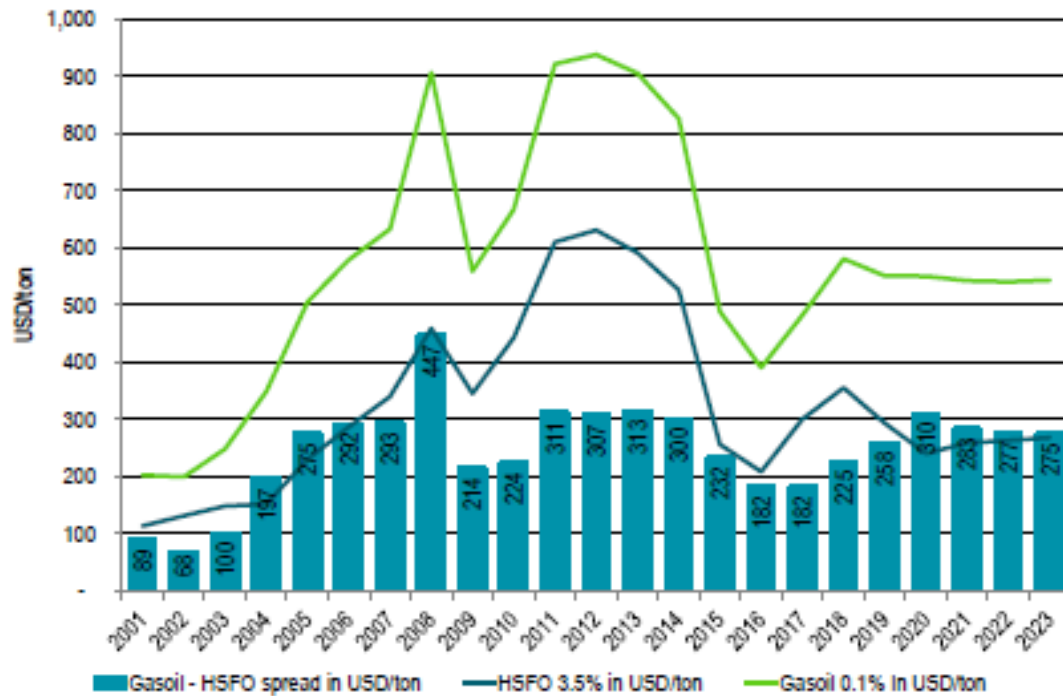
Projected fuel demand



Source: SEB, March 2018

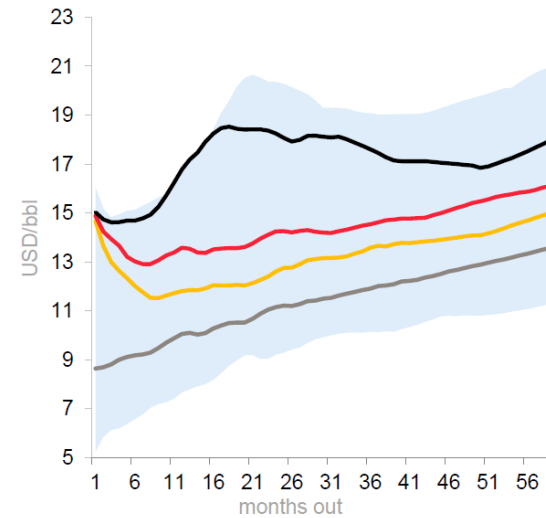
Gasoil vs. HSFO spread – historic and projections

Yearly averages for Gasoil 0.1%, HSFO 3.5% and the spread in USD/ton



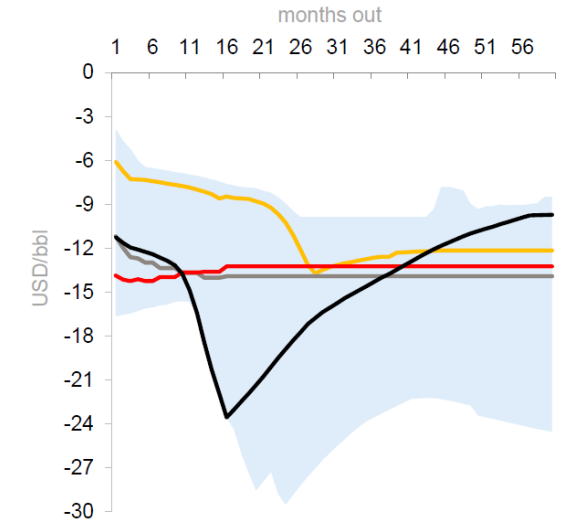
Source: SEB, Bloomberg

NWE Gasoil crack forward curve



Source: Bloomberg, ADIA analysis

3.5%* Fuel oil crack forward curve



* Refers to Sulphur content

Range 1 year ago 2 years ago 3 years ago Current

Key assumption: oil price \approx 70-80 USD/bl

The Global Sulphur Cap has implications for the entire shipping industry



So, what should the owner do?

Evaluate and decide on compliance strategy

- 1 Switch to distillate fuel (0.10% Sulphur)
- 2 Switch to low-sulphur fuel (0.50% Sulphur)
- 3 Install exhaust gas cleaning systems (scrubbers)
- 4 Retrofit the vessel to use alternative fuels

Prepare a ship specific implementation plan (IMO recommendation)

The plan should include:

- Risk assessment
- Fuel oil capacity and segregation capability
- Necessary hardware modifications to fuel storage and handling
- Tank cleaning
- Procurement of compliant fuel oil
- Fuel oil changeover plan

Assess legal & commercial aspects of charter party obligations

Considerations to be taken:

- Voyage Charter vs. Time Charter (T/C normally responsible for bunker)
- Availability of compliant or compatible fuel
- Fuel price differences in the transition towards January 2020
- Costs of cleaning / de-bunkering
- Disposal of high sulphur bunker

How can DNV GL support?



Thank you!

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