

MARITIME

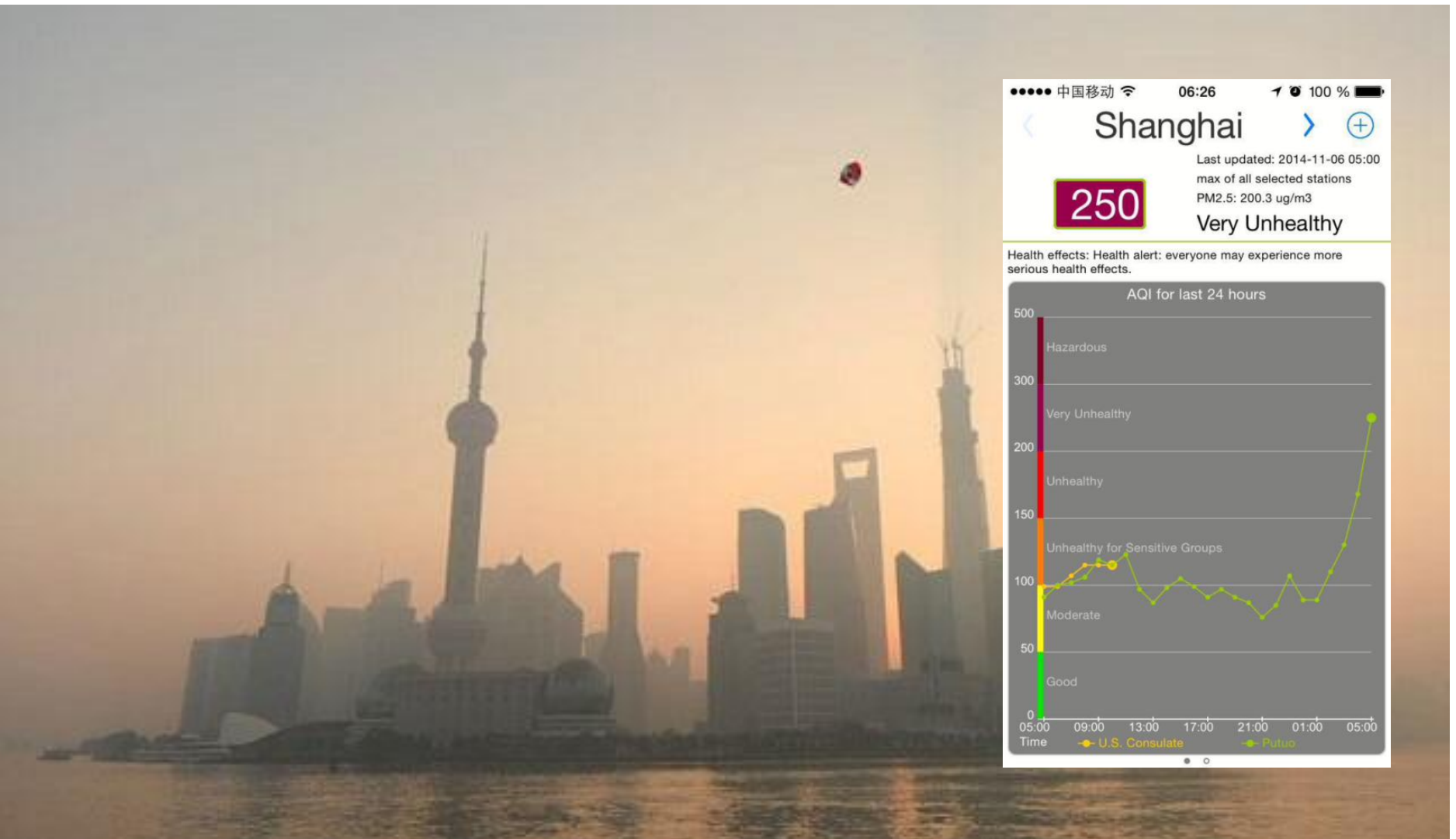
Choosing your compliance strategy towards 2020

The class perspective

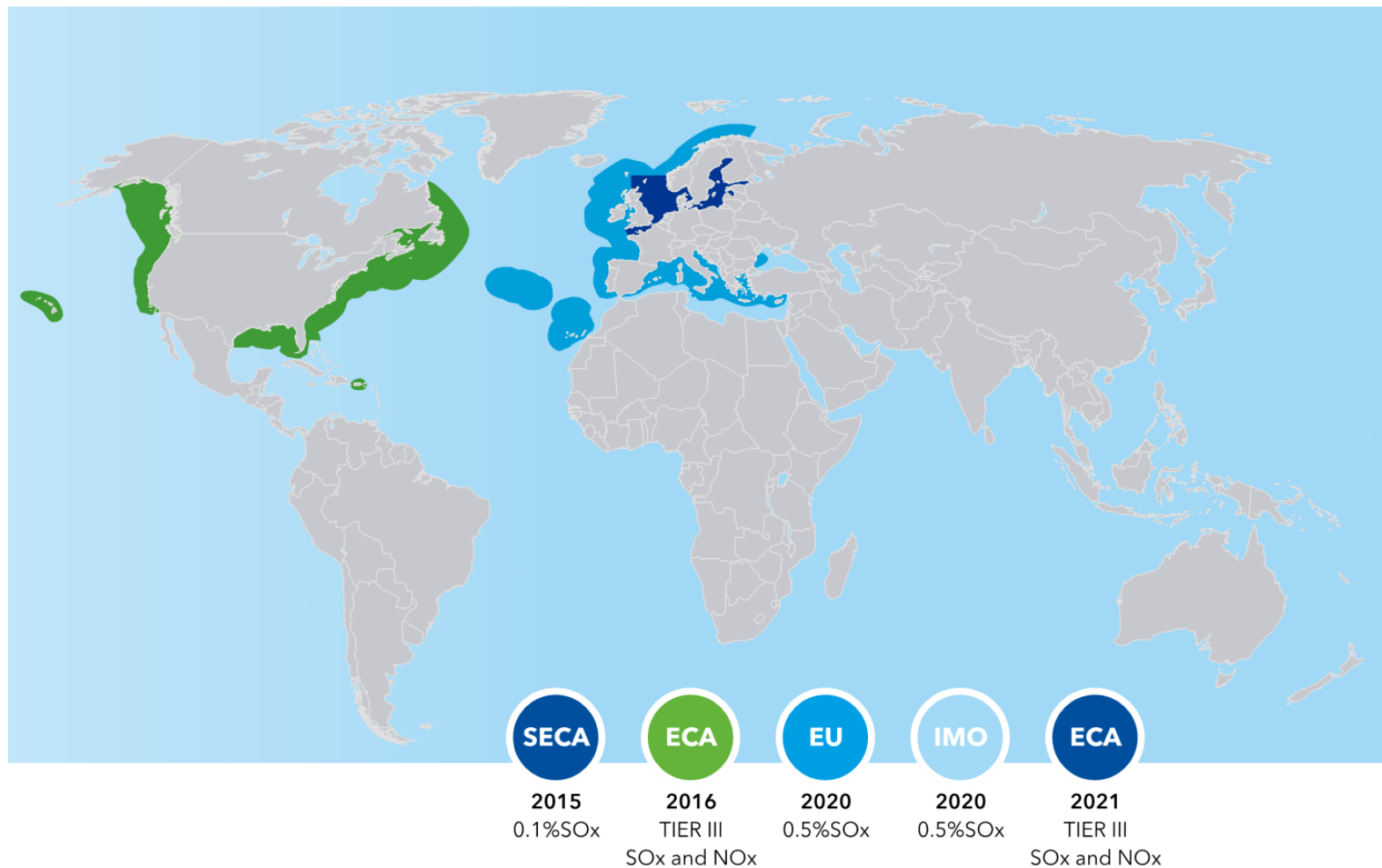
Stine Mundal

30 June 2017

Safe and sustainable future



Emission to Air



Regional „(D)ECA“ in China: Currently only SO_x



Decisions, decisions...

**External
factors**

**Ship
factor**

**Different
choices
Different
challenges**

**ling
ern**

**Other;
Investment
Off-hire
Etc.**

What are the options?

2020-01-01

3.5% S



0.5% S

Compliance options:

HFO
+Scrubber

MGO/MDO

Alternative
Fuels
(LNG, Methanol, etc)

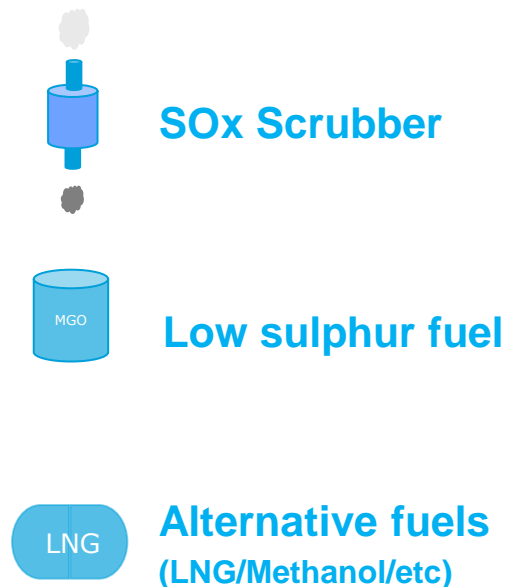
New Compliant
Fuels? (0.5%S)

To prepare for 2020, options should be evaluated and strategies put in place to order to have the best competitive edge in the market

Choosing a compliance strategy

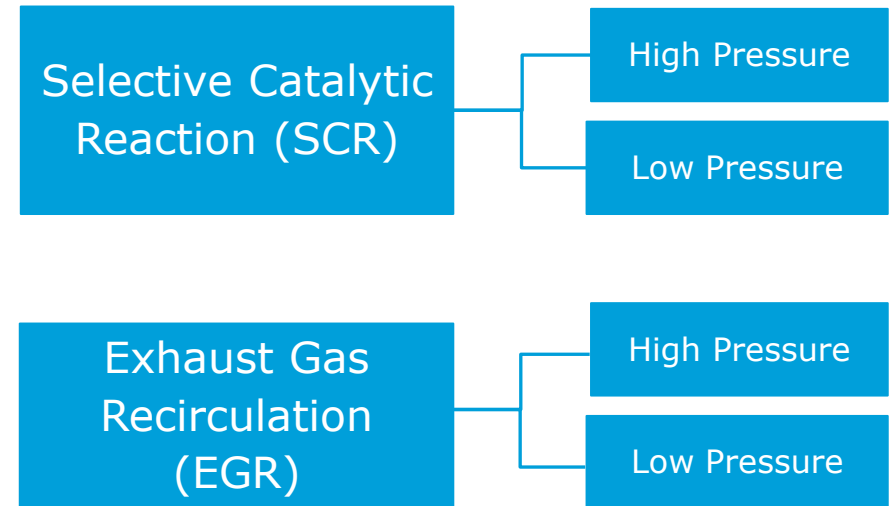
Present and possible future NOx-ECAs are also subject to the 0.1% Sulphur cap. Hence it is important to consider a total compliance strategy when choosing technology solutions.

SOx compliance strategy



NOx compliance strategy

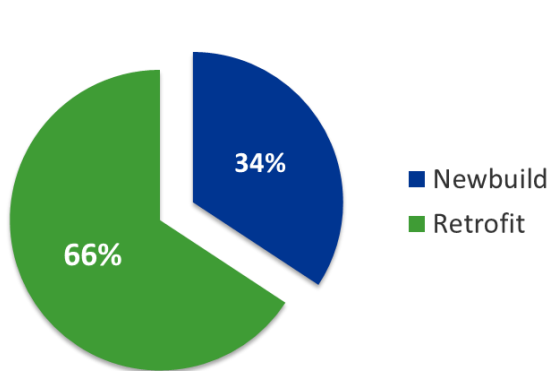
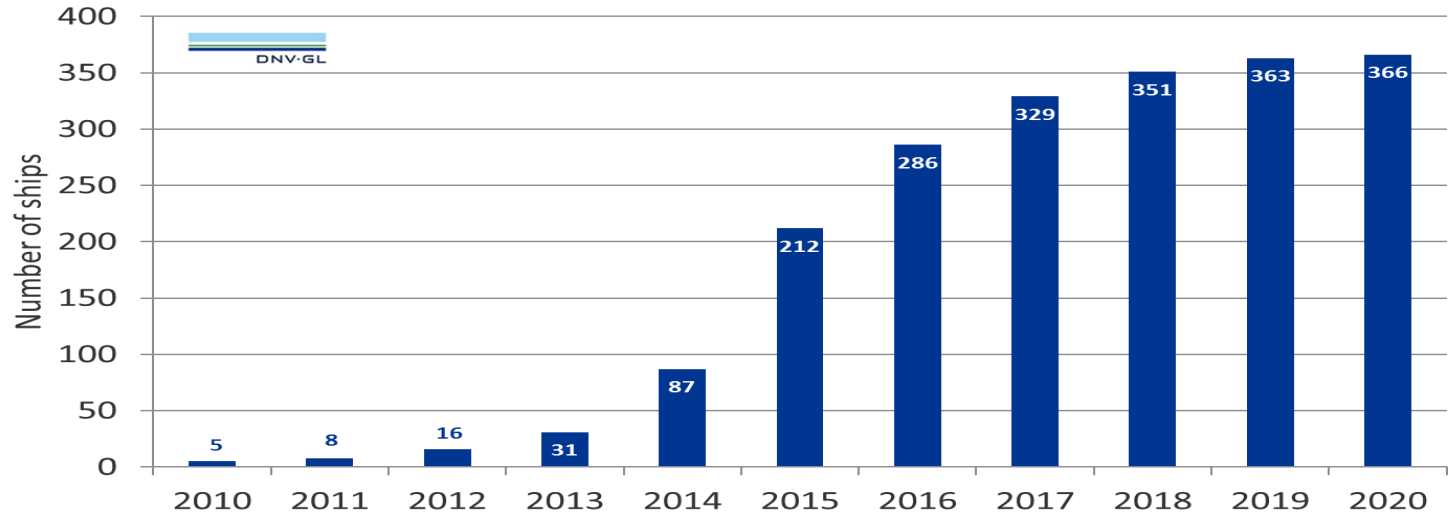
Main technology alternatives



SOx Scrubbers: Statistics

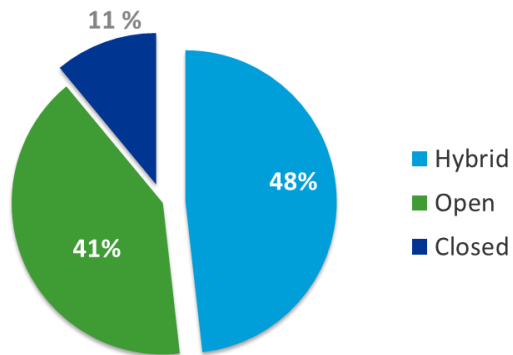


Number of ships with installed scrubber - cumulative



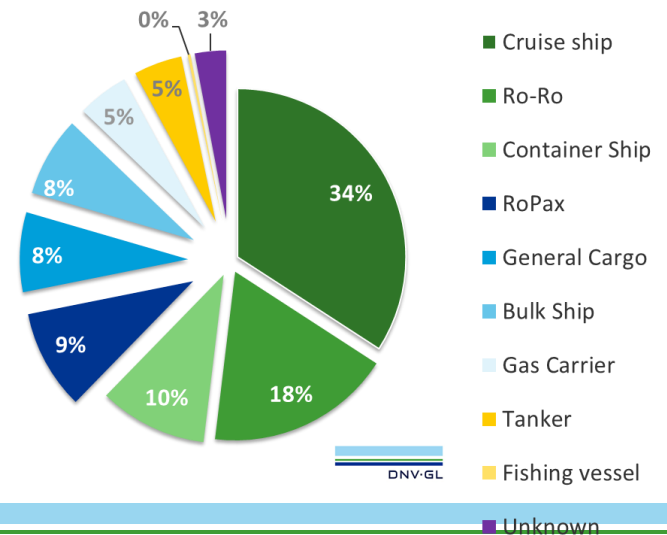
■ Newbuild
■ Retrofit

DNV-GL



■ Hybrid
■ Open
■ Closed

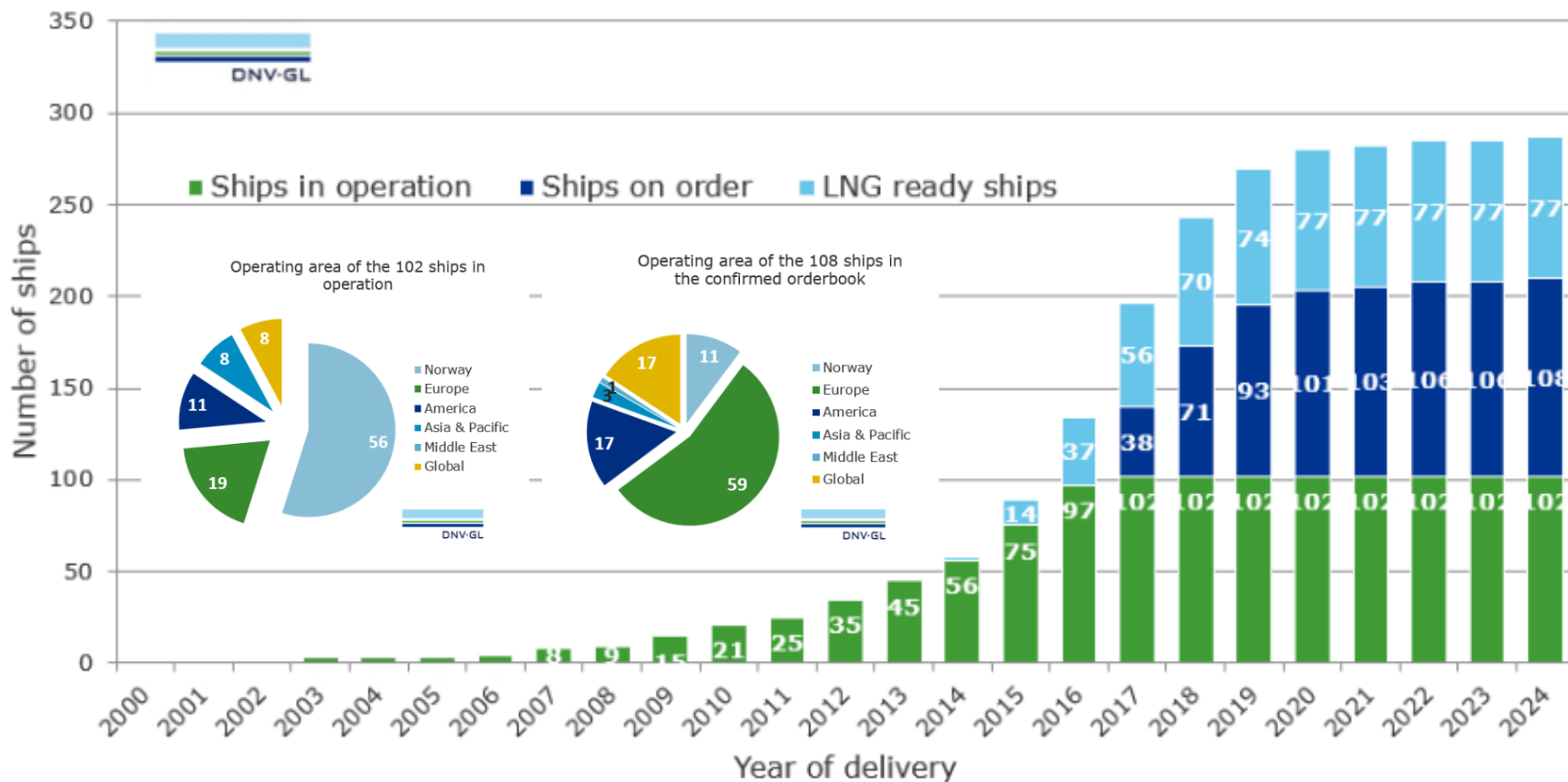
DNV-GL



■ Cruise ship
■ Ro-Ro
■ Container Ship
■ RoPax
■ General Cargo
■ Bulk Ship
■ Gas Carrier
■ Tanker
■ Fishing vessel
■ Unknown

DNV-GL

LNG as fuel: Ships



Low Sulphur Fuels

■ Consideration of alternative fuels

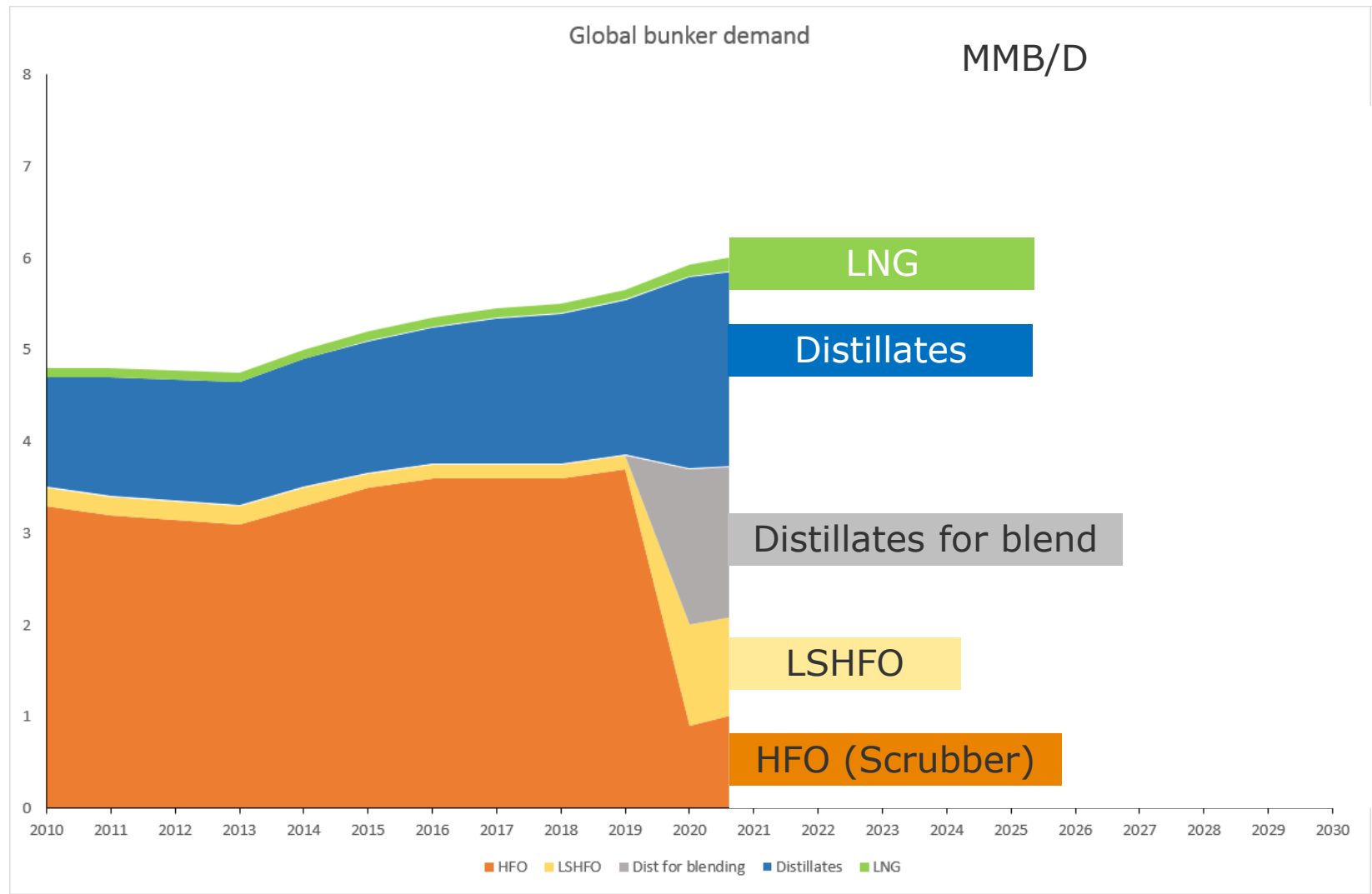
- availability
- safety
- cost

■ Need for Low Sulphur Fuels

- In the ECAs
(**30-50 Mt/year** today)
- Globally after 2020
(**≈ 300 Mt/year**)

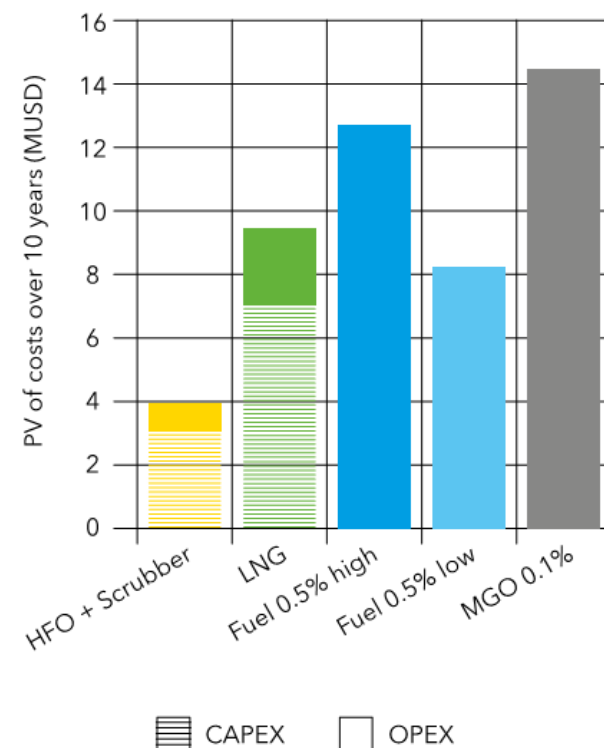
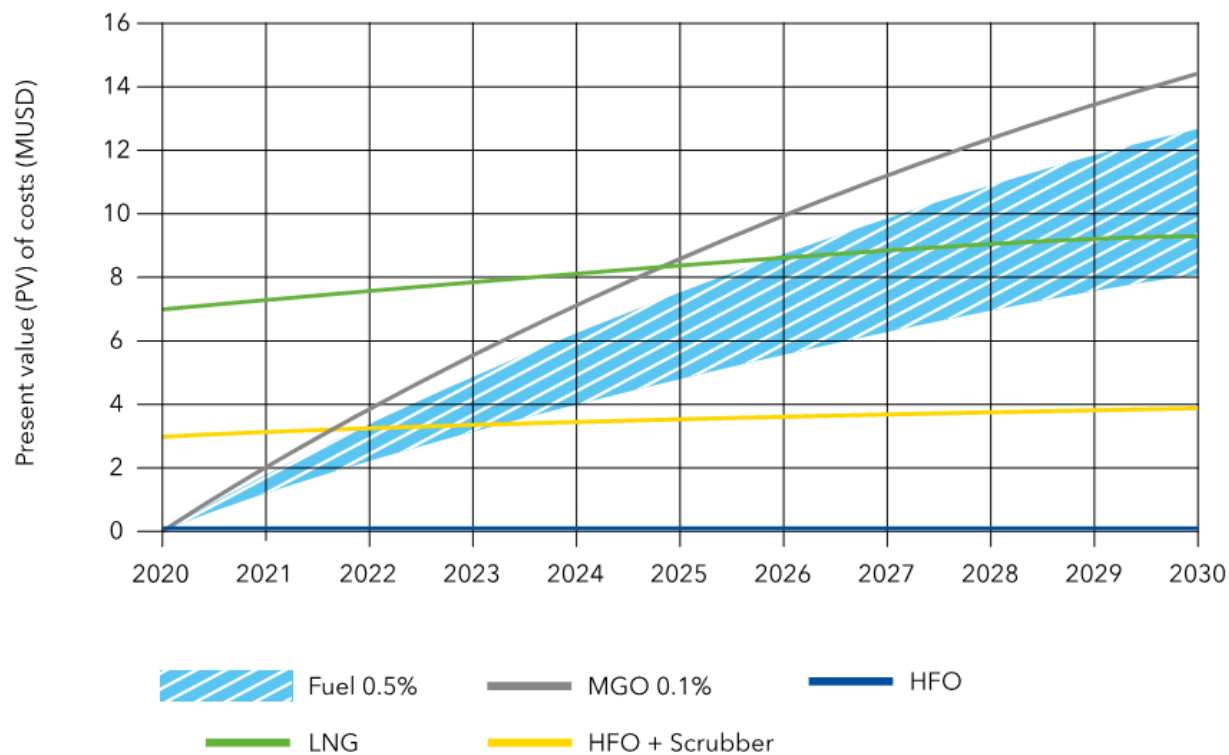


Global bunker demand



CAPEX & OPEX

Accumulated cost compared to HFO baseline



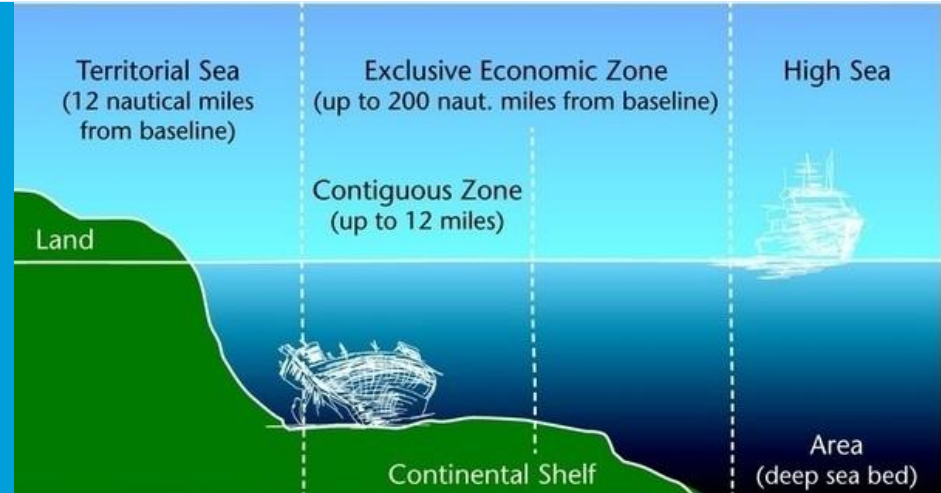
Cost comparison example for a **NB Handimax Bulk carrier**



What is the legal basis for enforcement?

UNCLOS forms legal basis for jurisdiction

- Coastal states have full jurisdiction in internal waters, jurisdiction in EEZ limited to environmental protection
- High seas belong to no state



Flag states have jurisdiction over ships flying its flag



Port states exercise port state control based on domestic law

Enforcement during the transition

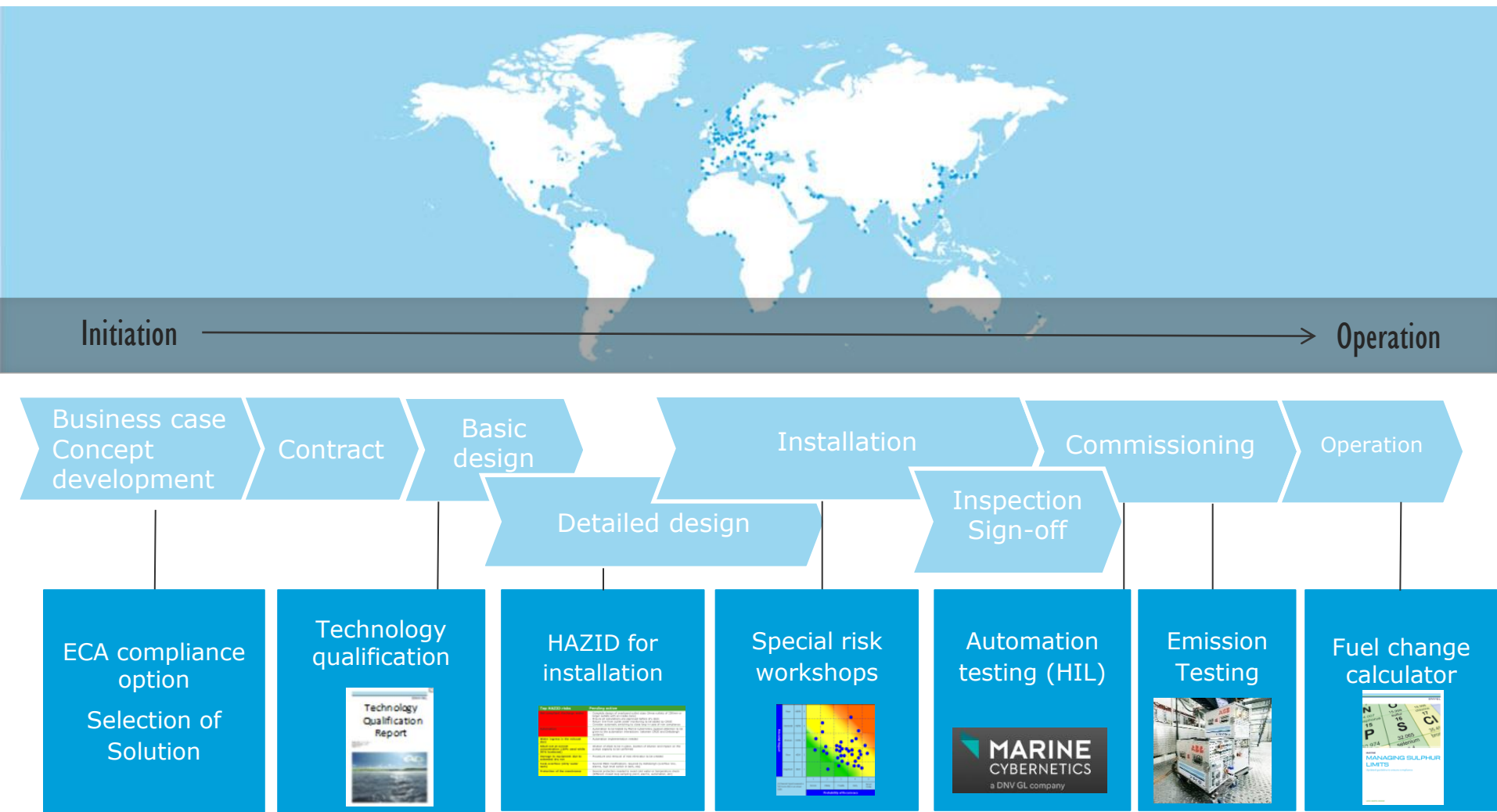


- We believe the rush to source compliant fuel will start late in 2019. Accordingly we expect to see;
- Some bunkering facilities unable to provide compliant fuels
- Some bunkering facilities will not have cleaned tanks prior to taking LS fuels
- A large number of ships with $> 0.50\%$ fuel remaining on board, causing a serious disposal issue
- Ship fuel tanks/piping contaminated with $> 0.50\%$ fuel, causing inadvertent non-compliance

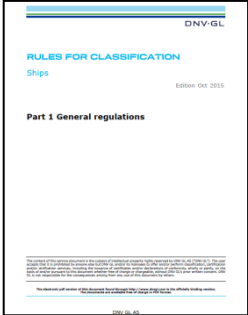
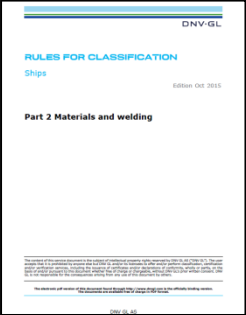
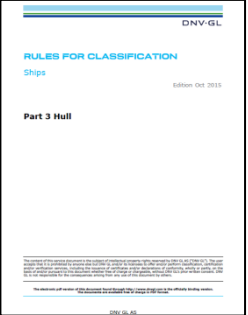
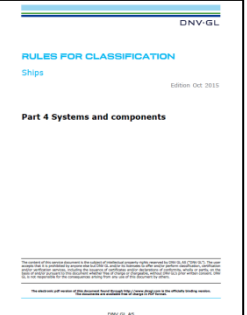
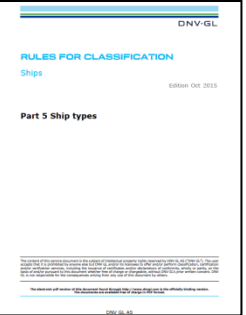
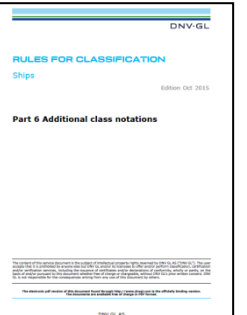
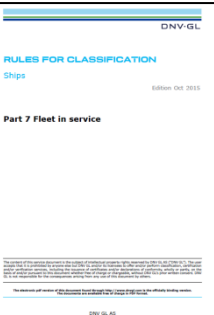


Significant non-compliance is expected during the first months of the transition. How enforcement and penalty levels will be managed remains an open question.

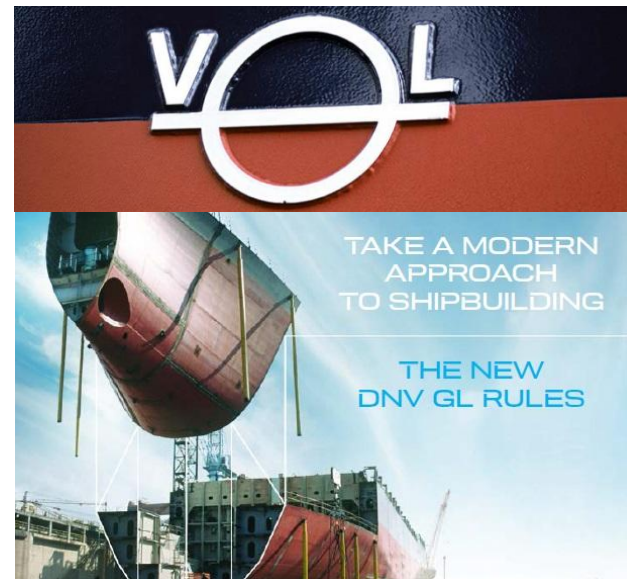
How to get ready?



DNV GL Classification - Supporting the low Sulphur future

Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7
						
General regulations	Materials and welding	Hull	System and components	Ship types	Additional class notations	Fleet in Service

- **DNV GL Rules and Class Notations for**
 - CLEAN and CLEAN DESIGN Notation
 - LNG READY Notation
 - SCRUBBER READY Notation
 - Exhaust Gas Cleaning systems (Scrubbers)
 - ...



Find more information in our DNV GL Brochures



DNV GL offering the broader view on Sulphur Compliance

Stine Mundal

stine.mundal@dnvgl.com

+49 170 7851 363

www.dnvgl.com

SAFER, SMARTER, GREENER