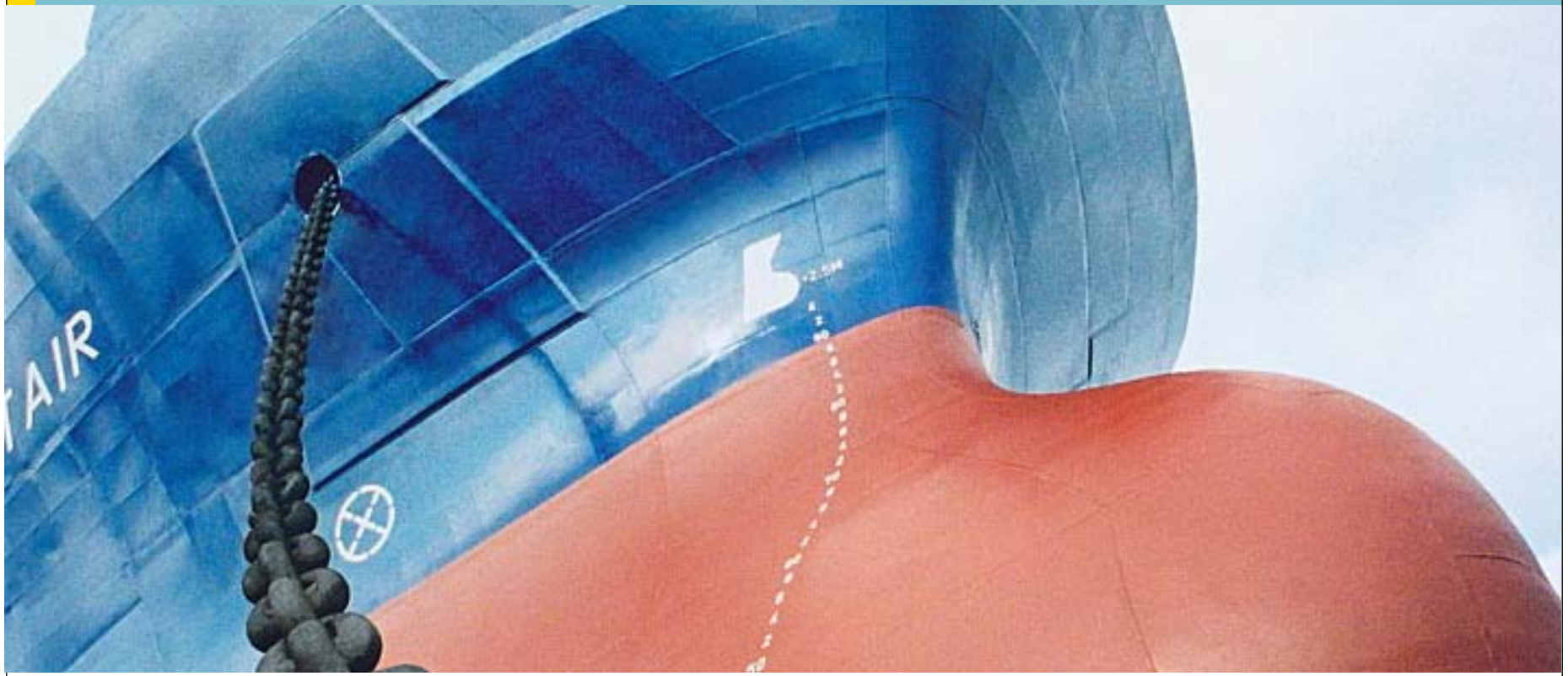
NABU Fachgespräch Maritime Abgasrunde „ECA compliance – erste Erfahrungen “

13.03.2015



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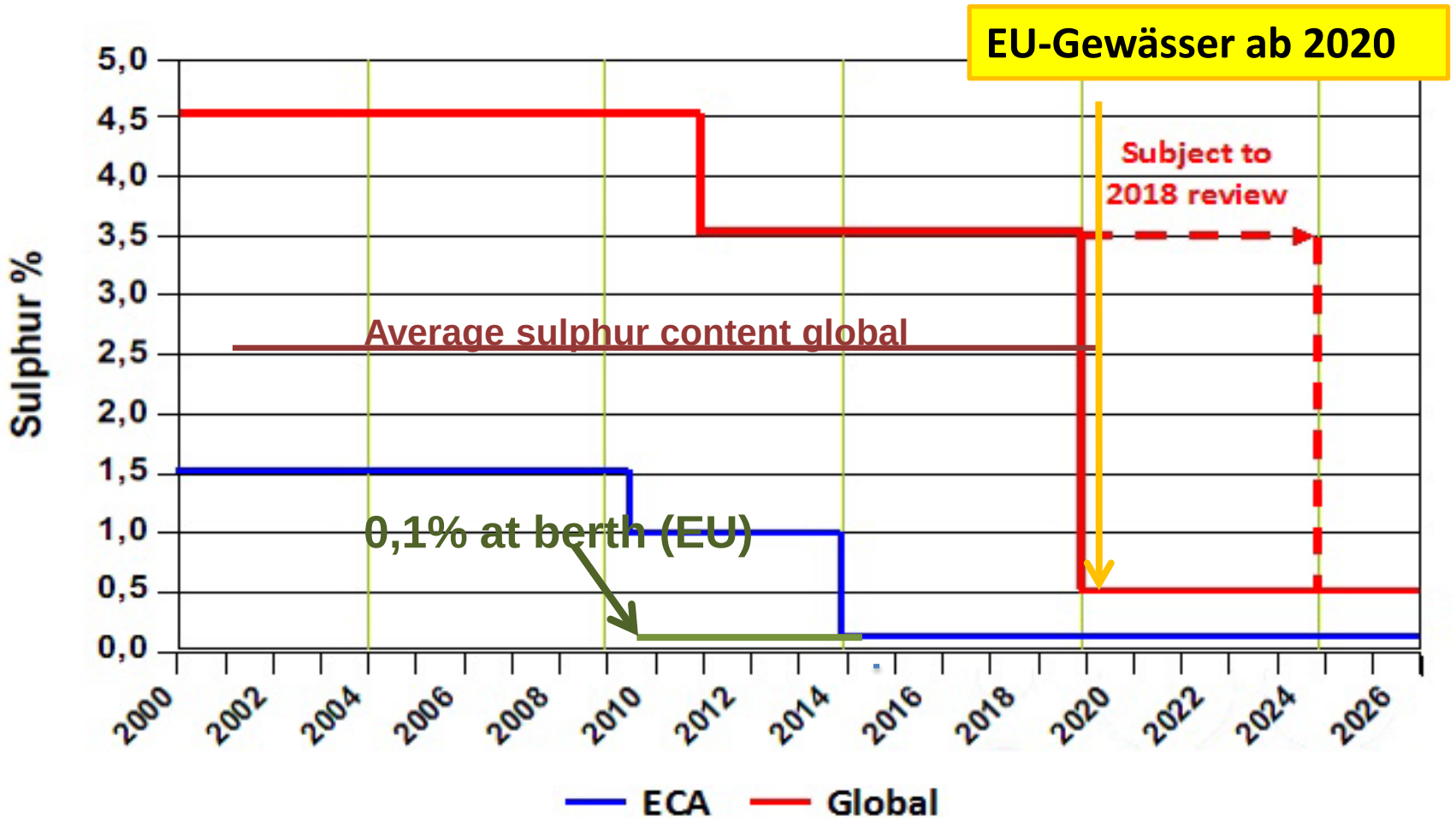
German Shipowners' Association

Gliederung

I. **Brennstoffumstellung – erste Erfahrungen**

II. **Sulphur Emission Control Areas and scrubbers**

Schwefelgehalt in Schiffsbrennstoffen



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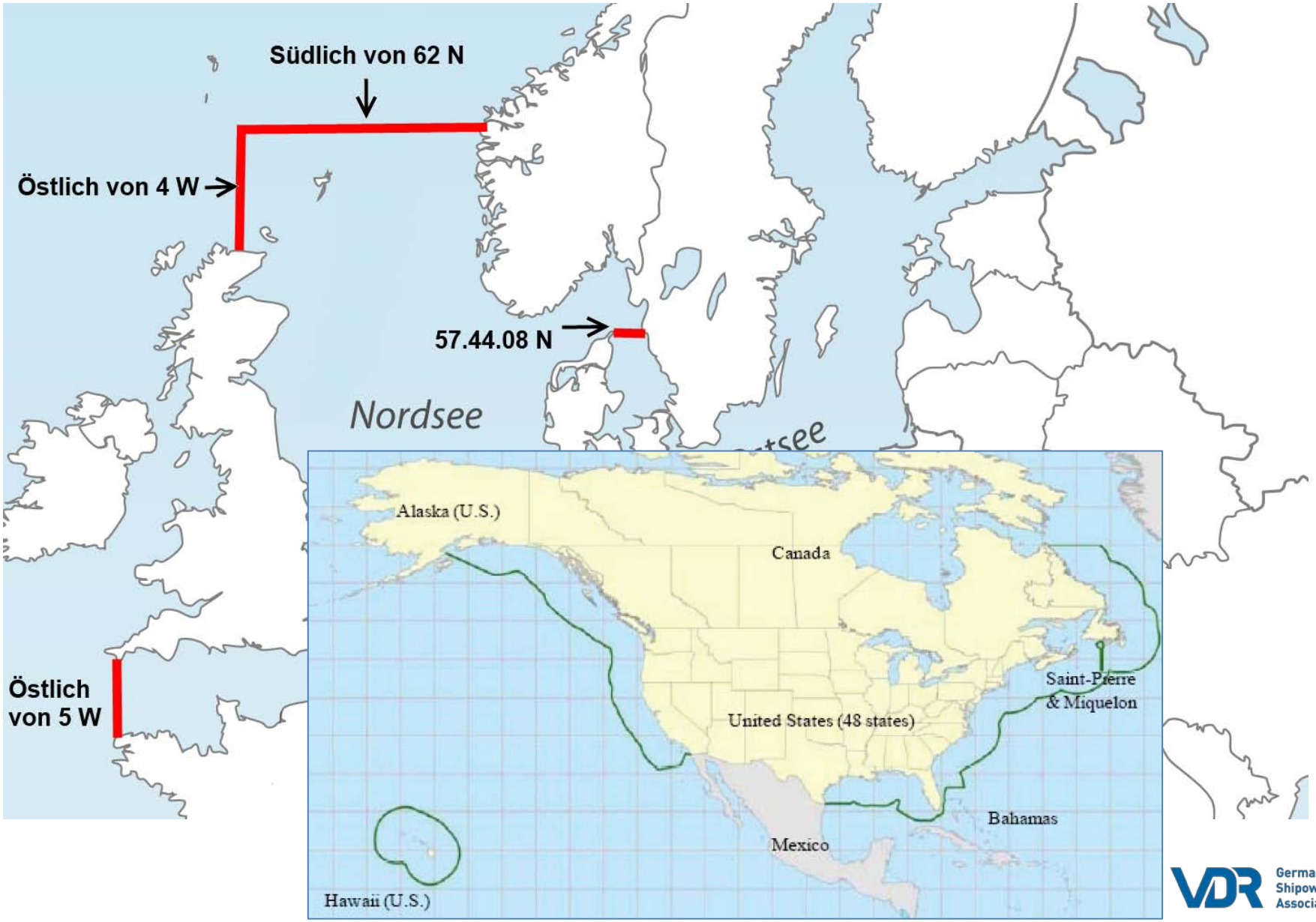
ECA in Europa (SOx) und USA (SOx und NOx)



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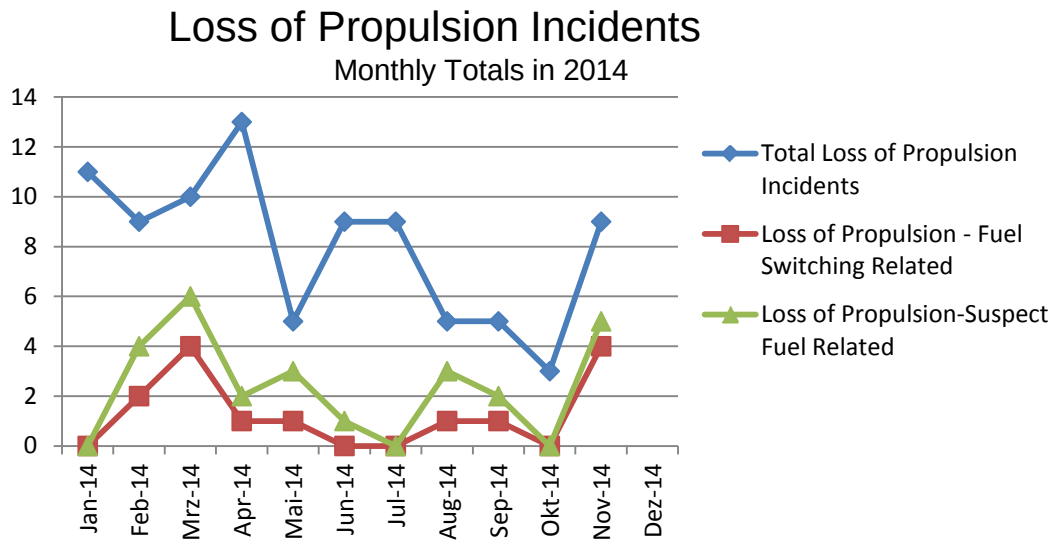
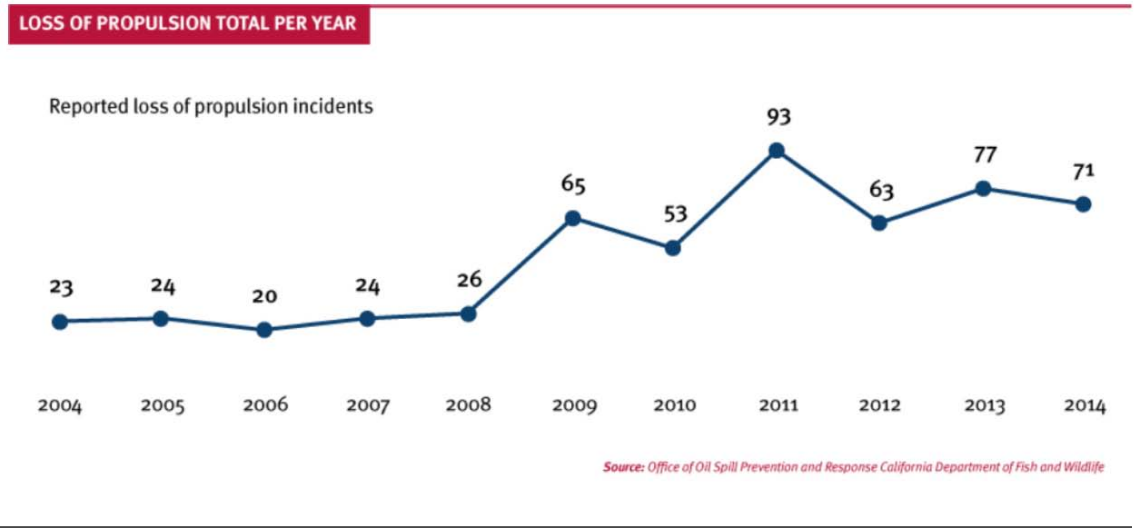
ECA 2015: Ausgangslage

- Vermeidung von technischen Problemen und Black outs
- Bsp: CA (seit 2014 0,10% DMA)





Quelle: CA Department of Fish and Wildlife

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Brennstoffumstellung

Risiken

- keine Erfahrungsmöglichkeiten im change over (CA: 1 LoP alle 3-5 Tage)
- Viskositätsunterschiede HFO vs MGO (Verschleiß, Zündfähigkeit, LoP)
- Verminderte Schmierfähigkeit von MGO- weitere Schmierölversorgung
- Brennstofffilter (LoP)
- Risiko von Lecks
- Umstellungszeit HFO-MGO (non-compl)
- Kontamination von MGO
- zudem: neue Brennstoffe (ULSHFO)
- Dokumentation an Bord

October 2014

VDR German Shipowners' Association

Industry Guidance on Compliance with the Sulphur ECA Requirements

Assistance to ship owners, operators and crew

This Industry Guidance shall give assistance to ship owners, operators and crew to prepare for the changes in fuel characteristics and compliance with the new sulphur limits for ships fuel used in in Sulphur Emission Control Areas (SECA) as of January 1, 2015. The main emphasis of this paper lies on the process of switch over from HFO to LSF.

Introduction

As of January 1, 2015, 0:00h, the sulphur content of fuel oil used on board ships within SECAs shall not exceed 0.10% m/m. This is required both by the European Directive n°2012/33/EU of 21st November 2012 as well as Annex VI of the international MARPOL Convention. In most cases, compliance will require the use of Low Sulphur Fuel, LSF (MDO or MGO) by the ship or of the recently offered compliant fuels such as HDME50 with higher pour points and viscosities that require heating. Prior to entry into a SECA, it is therefore required to have fully switched over from any high sulphur fuel in use to the SECA compliant marine fuel. Alternative compliance can be achieved by using fuels with higher sulphur content if exhaust gas cleaning systems are used, the so-called scrubbers.

Current SECAs are the designated areas within 200 nautical miles offshore the coast-line of the USA and Canada, the US Caribbean ECA (waters around Puerto Rico and the U.S. Virgin Islands), as well as the Baltic Sea and North Sea/English Channel in Europe. This paper mainly concentrates on implications of the European SECAs.

Generally speaking, the western boundary of the North Sea SECA is the longitude extending from Brest (France) to Falmouth (U.K.) and further northwards from Strathy Point east of the Orkney Islands (U.K). The northern boundary of the North Sea SECA is the latitude extending from Vågsøy (Norway) to Thorshavn (Faroes). Further, the area is bound by the latitude extending from Skaw to Gothenborg (i.e. entry to the Baltic SECA).

Legal Background

With regard to sulphur oxide emissions the relevant regulation (MARPOL ANNEX VI, Regulation 14.4.3) states:

While ships are operating within an Emission Control Area, the sulphur content of fuel oil used on board ships shall not exceed [...] 0.10% m/m on and after 1 January 2015.

The international MARPOL Regulations is transferred to European law by Directive 2012/33/EU regarding sulphur content of marine fuels. It regulates inter alia the sulphur content of fuels used by maritime transport in the Baltic Sea, North Sea and English Channel. It states in the relevant regulations:

- Member States shall take all necessary measures to ensure that marine fuels are not used [...] within SOx Emission Control Areas if the sulphur content of those fuels by mass exceeds [...] 0,10 % as from 1 January 2015.
  If a ship is found by a Member State not to be in compliance [...] with this Directive, the competent authority of the Member State is entitled to require the ship to:
  - ☐ present a record of the actions taken to attempt to achieve compliance; and
  - ☐ provide evidence that it attempted to purchase marine fuel which complies with this Directive in accordance with its voyage plan [...] and [...] no such marine fuel was made available for purchase.
- The ship shall not be required to deviate from its intended voyage or to delay unduly the voyage in order to achieve compliance.

Properties and compatibilities of fuels

Energy content per Volume

Between High Sulphur Fuel Oil (HFO) and distillates lies a difference in density of approximately 8%. As the fuel pumps deliver a defined volume of fuel to the engine, this may result in a reduction of available energy for combustion and a potential reduction of maximum power that is not compensated by the higher net calorific value of distillates (~ + 2%). In normal operation of a vessel this will usually not be a problem, but might have a negative impact in extreme circumstances.

Compatibility

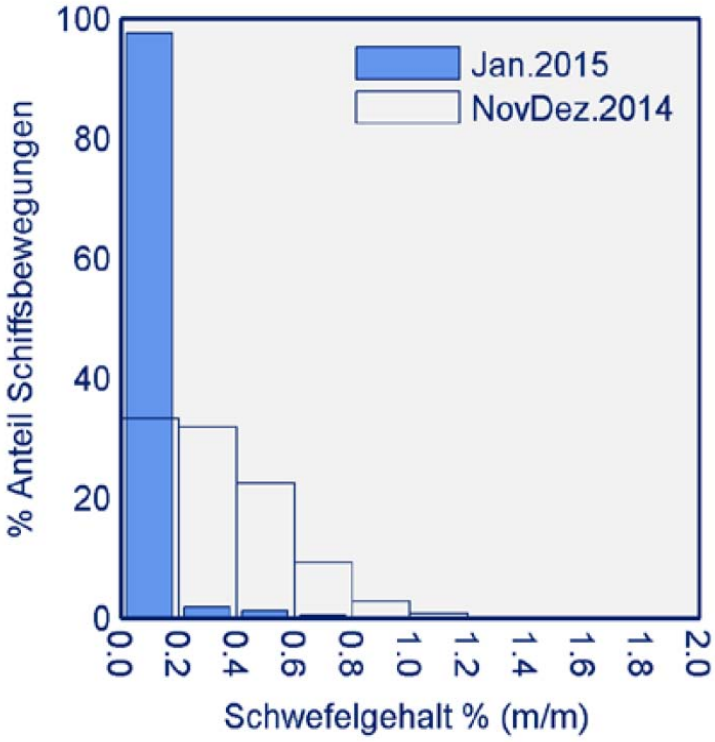
Reports further show that modifications in the refinery processes have led to considerable changes in fuel properties. In a report by Chevron (Chevron, July 2007) it is evidenced that the

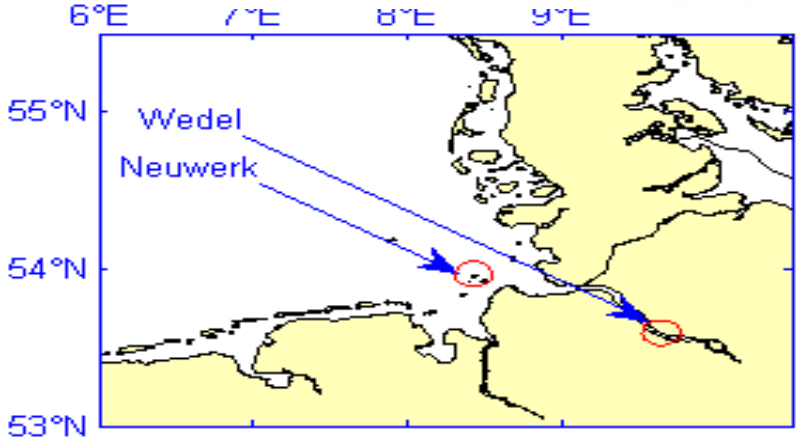
Erste Erfahrungen

Erste BSH-Analysen

- 600 Schiffsbewegungen (Elbe) seit 3 Monate
- Messungen der Abgas-zusammensetzung / Rückschlüsse auf Brennstoffqualität
- Messstationen auf Neuwerk und Wedel (hier: nur Wedel)
- Ergebnis: 95 % regelkonform

- problemlos?





Erste Erfahrungen

- umfassende Vorbereitung sichert Umstellung
  - change-over-procedures; Crew briefings
  - technische Vorbereitung der Schiffe
- technische Probleme
  - z.B. Probleme mit Einspritzpumpen
  - Einspritzventilen, Ventilsitzen
- keine black-out-Berichte
- Brennstoffkosten und Verfügbarkeit (EU und US/CAN-ECA)
- Dokumentenchecks
  - change-over-procedures ex HFO->HFO vs. HFO->MGO
  - BDN – Angabe präziser Werte (nicht „max. 0,1%“ o.ä.)

EU ECA - Konformitätskontrollen

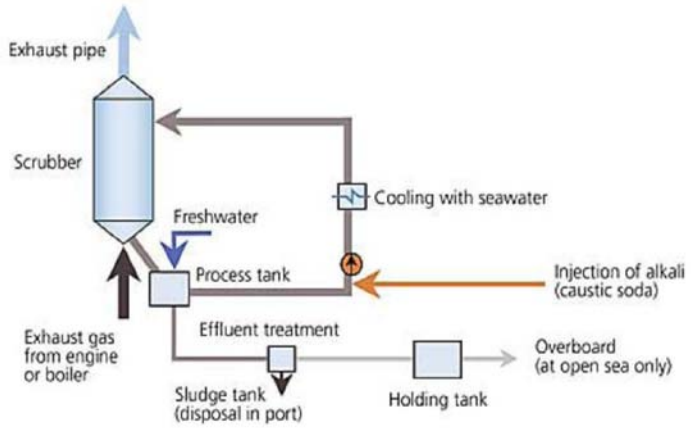
- Harmonisierte Brennstoffkontrollen
  - Durchführungsbeschluß (EU 2015/253) vom 16.Feb 2015
  - ab 2015: Dokumentenkontrolle von min 10% anlaufender Schiffe
  - ab 2016: Brennstoffbeprobung von min 40% der 10% als ECA-Staat, 30 % und 20% bei tlw. ECA-Grenze bzw. keine ECA
- Leitlinien für Brennstoffkontrollen in Abstimmung
- Aufbau einer EU-Datenbank (Thetis-S)
- Brennstoffproben aktuell unterschiedlich
  - SWE: 200 samples 2014
- Auswertung der MARPOL VI/ EU-SchwefelRL maßgebend für 2020

Gliederung

I. **Brennstoffumstellung – erste Erfahrungen**

II. **Sulphur Emission Control Areas and scrubbers**

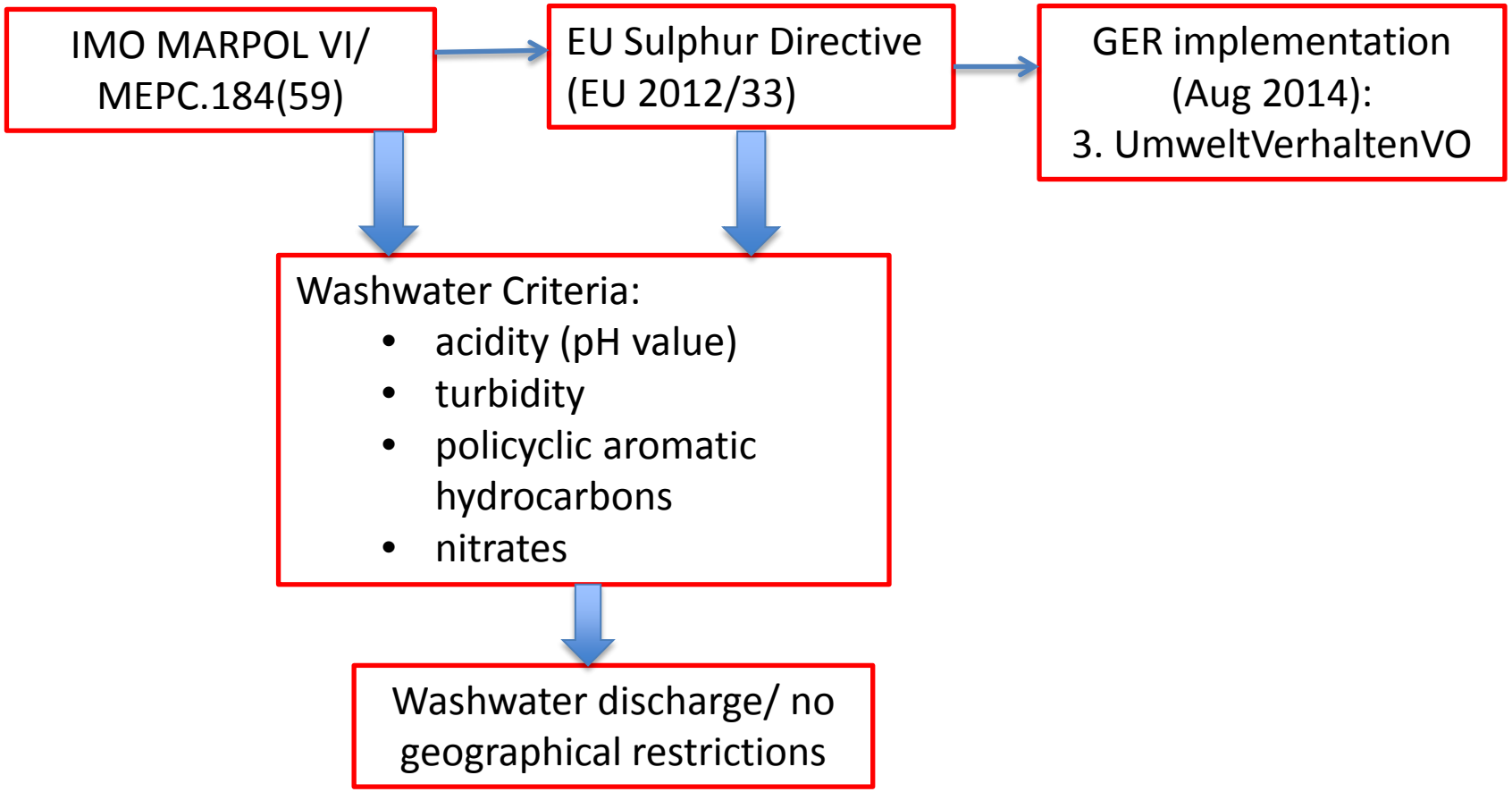
EGCS developments



- Dry + wet systems, majority wet installations
- EGCS uptake: 62+ in 2013
- currently 160 systems installed or on order,
- figures tend to 200+ by 2020
- more orders to be expected towards 2020 when 0,5% sulphur content in EU waters enters into force (MARPOL?)

Regulatory framework

- **Regulation wet scrubber**



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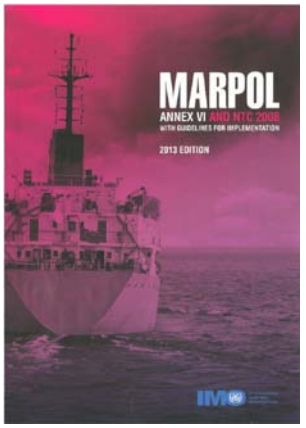
Regulatory framework

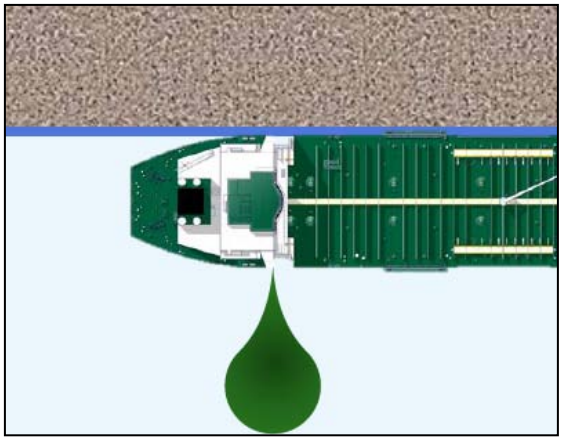
- <u>Regulation wet scrubber</u>

IMO MARPOL VI/ MEPC.184(59)

Verification during commissioning phase



- Verification of pH value – model calculation needed
  - […] the discharged washwater plume should be measured externally from the ship (<u>at rest in harbour</u>) and the discharge pH […] will be recorded when the plume at 4 metres from the discharge point equals or is above pH 6.5



- Way out: mathematical calculation needed
- Revision process of IMO Guideline 184 necessary MEPC-PPR-MEPC-publication

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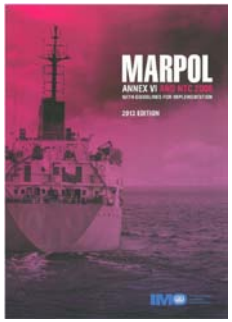
Regulatory framework

- **Regulation wet scrubber**



IMO MARPOL VI/
MEPC.184(59)

EU Sulphur Directive
(EU 2012/33)

yes

Washwater
discharge in EU waters ?

no

EU Marine
Framework
Directive

EU Water
Framework
Directive

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Regulatory framework

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR MOBILITY AND TRANSPORT

Directorate D - Logistics, maritime & land transport and passenger rights
D.1 - Maritime transport & logistics

European Sustainable Shipping Forum (ESSF)

Directive 1999/32/EC (as amended) - as regards to sulphur content of ma				
Sulphur Emission Control Area (SECA) EU Member States - Position on EGCS washwa				
Countries	*National/Local Regulations?*	*EGCS washwater discharge allowed?*	*If allowed, are there any exemptions?*	Additional information/comments provided
Finland	No	Yes	No exemptions so far	Ports can set rules for themselves but haven't done yet.
Sweden	No	Yes	No exemptions so far	Ports can set rules for themselves, but haven't done yet.
Norway	No	Yes	No exemptions so far	Ports can set rules for themselves, but haven't done yet.
Estonia	No	Yes	No exemptions so far	Ports can set rules for themselves, but haven`t done yet. This topic is under discussion.

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Regulatory framework

- ESSF Subgroup Scrubber meeting (05/01/2015), EMSA update slide:

Apart from **Germany** and **Belgium**, **four** (**4**) other countries foresee additional restrictions:

- **Finland** (Minister of Environment)- Operators should be able to demonstrate lower impact from the discharge water.
- **Sweden** (Swedish Environmental Protection Agency) - Position from the Swedish Agency for Marine and Water Management: no open-loop scrubbers should be allowed and closed-loop could as long as there is no discharge.
- **Estonia** (Ministry of Environment) - Water Act states that discharging pollutants from ship into sea is prohibited.
- **Latvia** (The Ministry of Environmental Protection and Regional Development) - Further discussions are needed. Regulations on washwater are foreseen in the future.

➢ **Note:** Lithuania, Netherlands, Norway (as SECA MS) still under consultation

Regulatory framework

Possible future restrictions

- MEPC.184(59):
  - 10.3. wash water data recording

- Appendix III
  - grant waiver for existing installations to possible future stricter washwater discharge standards

Regulatory framework

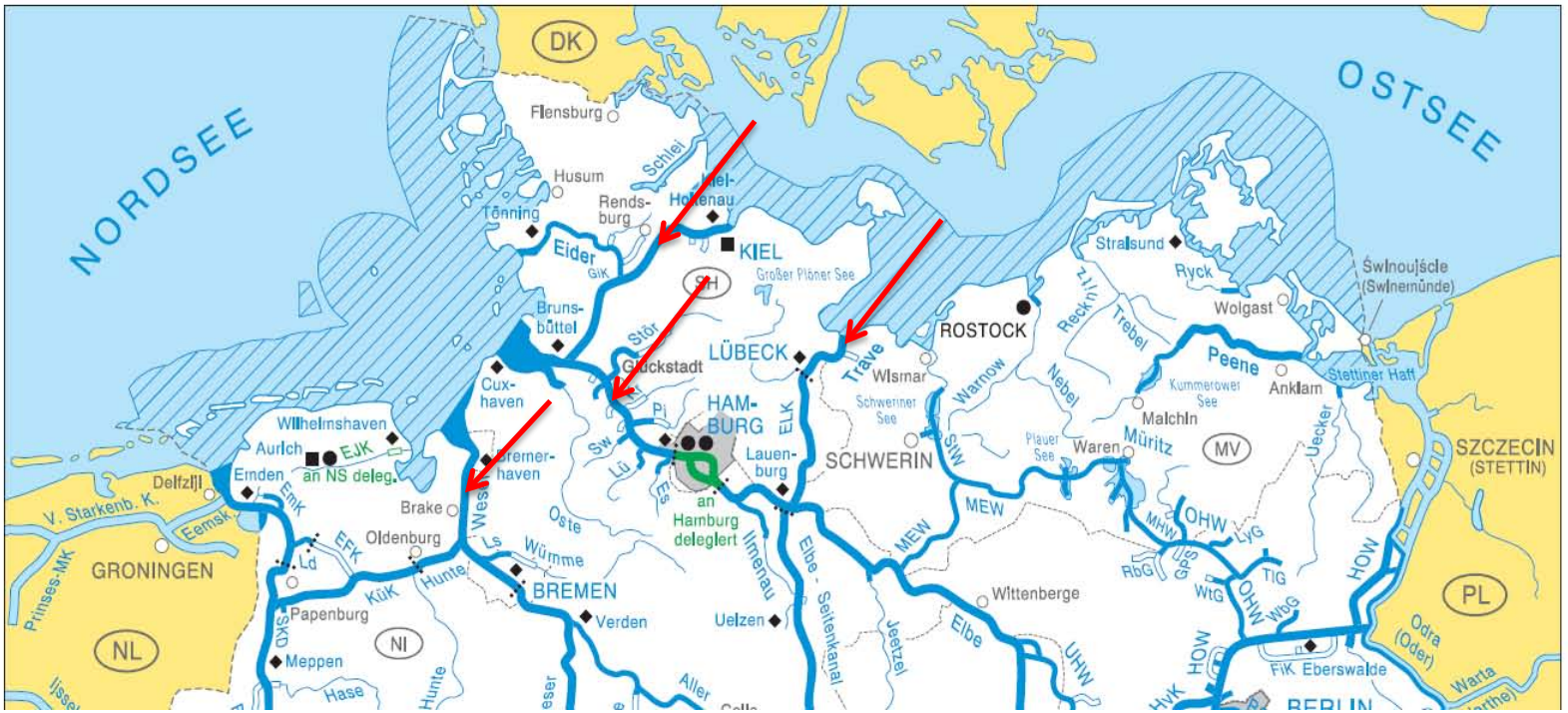
- discharging in EEZ etc prohibited unless installation certified according to IMO-Guideline MEPC.184(59) / no discharge into inland watersways used as seawaterways

FEDERAL WATERWAYS

- Federal Waterways and Shipping Agency

WSV.de

Bundesministerium für Verkehr und digitale Infrastruktur



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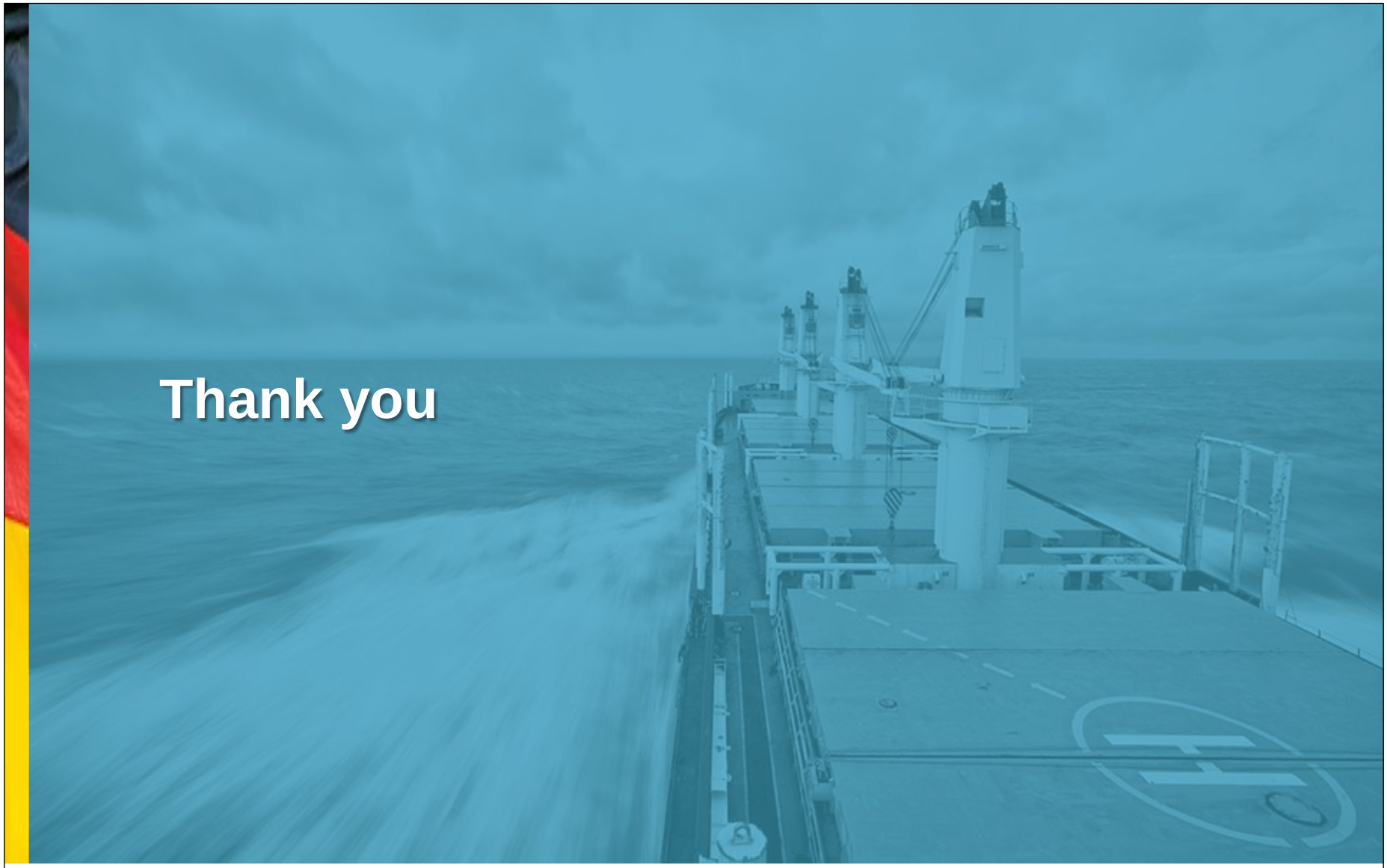

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Back up

- BACK UP

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The chemistry behind …

- Engine Exhaust Gas:
  - $S + O_2 \rightarrow SO_2$ (~95%)
  - $SO_2 + 1/2\ O_2 \rightarrow SO_3$ (~5%)
- Scrubber chemistry:
  - $SO_2 + H_2O \rightarrow H_2SO_3$ (Sulphurous Acid)
  - $SO_3 + H_2O \rightarrow H_2SO_4$ (Sulphuric Acid)
- Scrubber Reactions:
  - $CaCO_3 + H_2SO_3 \rightarrow CaSO_3 + H_2O + CO_2$
  - $2CaSO_3 + O_2 \rightarrow 2CaSO_4$ (Calciumsulphate)
  - $Ca(OH)_2 + SO_2 + ½\ O_2 \rightarrow CaSO_4 + H_2O$
  - $Ca(OH)_2 + SO_3 + H_2O \rightarrow CaSO_4$ (Calciumsulphate) + $2\ H_2O$