



European Maritime Safety Agency

# **SAFEMED III Seminar on MARPOL Annex VI**

*Lisboa, 29-30 April 2014*

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## **GHG/Relevant Substances Efficiency & Emissions**

### **Part I (Requirements for New and Existing Ships)**

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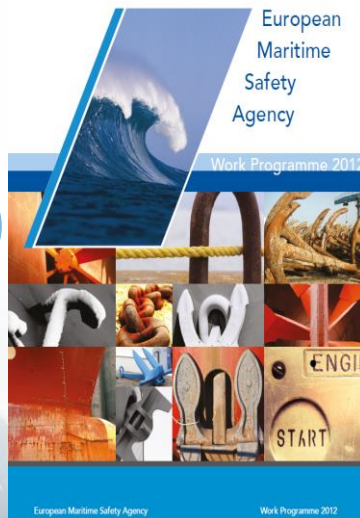
European Maritime Safety Agency

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- **EMSA - Environmental Protection**
- **Introducing GHG and other Relevant Substances**
- **International and Regional (EU) Regulations/Legislation**
- **Relevant Outcomes from IMO - MEPC 66**

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## EMSA - Environmental Protection



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## Prevention of Pollution caused by Ships

### EMSA's actions address:

1. Port Reception Facilities
2. Sanctions for ship source pollution
- 3. Air pollution (sulphur)**
- 4. Greenhouse gases & climate change**
5. Ballast Water and invasive species
6. Ship Recycling



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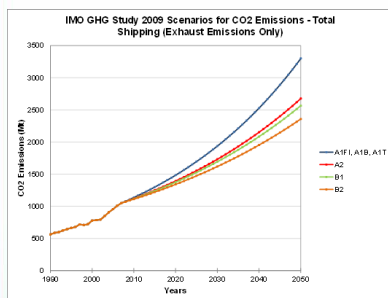
## Q: What are Ship Emissions?

### A: GHG and other Relevant Substances

- **GHG (Greenhouse Gases)** - **CO<sub>2</sub>** (Carbon Dioxide), **CH<sub>4</sub>** (Methane), N<sub>2</sub>O (Nitrous Oxide), HFCs (Hydro Fluorocarbons), PFCs (Perfluorocarbons) and SF<sub>6</sub> (Sulphur Hexafluoride)
- **Other Relevant Substances** - **NO<sub>x</sub>** (Nitrogen Oxides), **SO<sub>x</sub>** (Sulphur Oxides), NMVOC (Non-Methane Volatile Organic Compounds), CO (Carbon Monoxide) and **PM** (Particulate Matter, including Black Carbon).
- **Main difference**
  - **Greenhouse Gases** have a global effect (global warming, sea level rise, climate change)
  - **Relevant substances** (or air pollution) have a local effect on the direct surroundings (human health & environment)

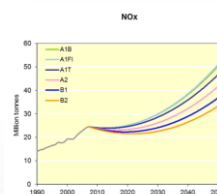
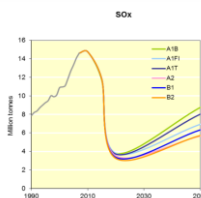
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## Modelling Total Shipping Scenarios



**Business as Usual**  
(different economic trends)

2009 - 1118 MT  
2020 - 1300 MT  
2050 - 3600 MT



**Emission Scenarios**  
2008 revised Marpol Annex VI rules  
(2<sup>nd</sup> IMO GHG study 2009)

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## EU reaction on emission scenarios

### The EU has to cooperate globally

"In maritime, there is a need for a **global level playing field**. The EU should strive – **in cooperation with IMO** – for the universal application and enforcement of **high standards of safety, security, environmental protection** and working conditions, and for eliminating piracy."

(2011, EU Transport White Paper)



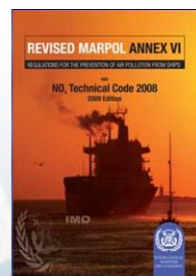
VP COM Kallas IMO SG Sekimizu

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## MARPOL Annex VI International regulations addressing 'other relevant substances'

### Stricter international requirements: revised MARPOL Annex VI

- Objective: Further minimizing the environmental and health risks of air pollution from ships: NO<sub>x</sub>, SO<sub>x</sub> and PM
- Adopted in October 2008
- Entered into force on 1 July 2010
- 72 of IMO's 170 MS have ratified
- **24 EU MS have ratified** (+ TR, ME)



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## MARPOL Annex VI

### International regulations addressing 'other relevant substances'

- **Revised MARPOL ANNEX VI - Resolution MEPC.175 (58), 2008**

- Main changes - Progressive reduction globally in emissions of SO<sub>x</sub>, NO<sub>x</sub> and PM and the introduction of emission control areas (ECAs) to reduce emissions of those air pollutants further in designated sea areas.
- Revisions to the regulations for ozone-depleting substances (ODS), volatile organic compounds (VOC), shipboard incineration, reception facilities, and fuel oil quality have been made. Also, it was added regulations on fuel oil availability.

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## MARPOL Annex VI

### International regulations addressing 'other relevant substances'

- **Revised MARPOL ANNEX VI - Resolution MEPC.175 (58), 2008**

- Regulation 4, *on equivalency* - allows the use of alternative compliance methods at least as effective in terms of emission reductions as required
- Regulation 13, *Nitrogen Oxides (NO<sub>x</sub>)*
- Regulation 14, *Sulphur Oxides (SO<sub>x</sub>) and Particulate Matter (PM)*
- Regulation 18, *Fuel oil availability and quality*

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- **NO<sub>x</sub> Technical Code 2008 - Resolution MEPC.177(58), 2008**

- Certification, Testing and Measurement Procedures

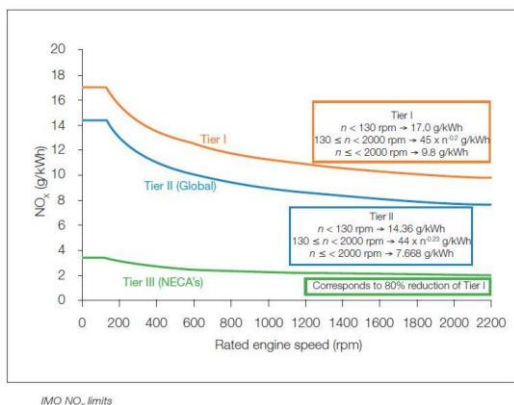
- **Other Relevant Guidelines**

- Resolution MEPC.184(59), 2009 - Exhaust Gas Cleaning Systems

## MARPOL Annex VI

### International regulations addressing 'other relevant substances'

- Regulation 13, Nitrogen Oxides ( $\text{NO}_x$ )



#### Effective Dates

**Tier I - 1<sup>st</sup> Jan 2000**

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**Tier II - 1<sup>st</sup> Jan 2011**

**Tier III - 1<sup>st</sup> Jan 2016**

Note: Tier III apply only to the specified ships while operating in NECA + subject to technical review

Source: Wärtsilä (?) - Internet

## MARPOL Annex VI

### International regulations addressing 'other relevant substances'

- Regulation 14, Sulphur Oxides ( $\text{SO}_x$ ) and Particulate Matter (PM)

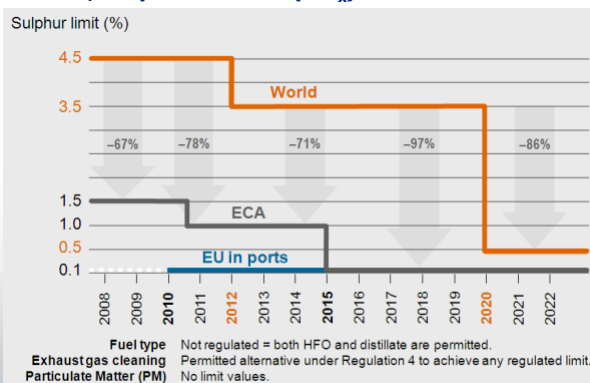
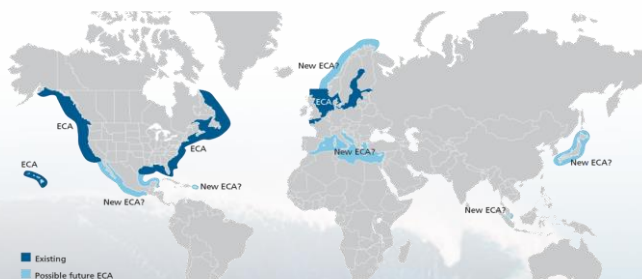


Figure 2. IMO sulphur limits for years 2008-2020 (% mass).

Source: Wärtsilä



- Designated (after a request from the coastal states) **Emission Control Areas (ECAs)**: North American + Caribbean + Baltic and North Sea
- Introduced stricter **sulphur** content in fuel requirements for all ships:
  - From **3.50% to 0,50%** on 1/1/2020 in all waters (subject to a fuel availability assessment)
  - From **1.00% to 0.10%** on 1/1/2015 in **ECA's**
- Sets engine requirements for new builds on NOx emissions (Tiers)



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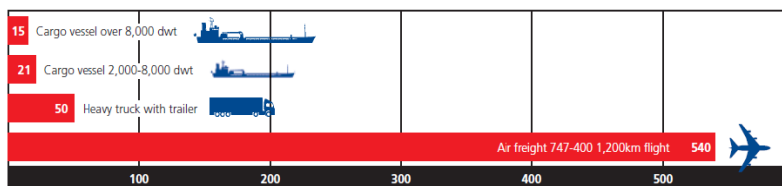
Source: DNVGL

### Shipping is one of the most energy efficient and environmentally friendly modes of transport (around 3% of the total CO<sub>2</sub> emissions)

- Moving a tonne of cargo by air produces up to 100 times as much CO<sub>2</sub> as moving it the same distance by sea
- Modern ships emit as little as 5 grams of CO<sub>2</sub> per tonne-kilometer compared to about 50 grams per tonne-kilometer for heavy trucks

#### COMPARISON OF CO<sub>2</sub> EMISSIONS BETWEEN MODES OF TRANSPORT

Grams per tonne-km



Source: NTM, Sweden

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## MARPOL Annex VI

### International rules addressing GHG

- **The Kyoto Protocol (adopted in Japan December 1997)** is an international agreement linked to the *United Nations Framework Convention on Climate Change (UNFCCC)*, which **commits** its Parties by setting internationally binding emission reduction targets.
- Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of *common but differentiated responsibilities (CBDR)*.

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**Shipping** - bunker fuels falls out of the Kyoto scope

## So, what to do?

- It is proven that significant potential reduction of GHG can be achieved either through **technical** and **operational** measures. Merged, these measures would represent an increase in ships' energy efficiency and subsequently reduce emissions by **25% to 75%** below the actual levels (2<sup>nd</sup> IMO GHG Study 2009).
- The **Energy Efficiency Design Index (EEDI)** and the **Ship Energy Efficiency Management Plan (SEEMP)** requirements are part of first package of technical and operational measures (respectively) developed by the **IMO**, as part as **MARPOL Annex VI** amendments, to enhance ships' energy efficiency and thereby control and reduce their CO<sub>2</sub> emissions. Like other IMO Conventions, the principles of the "no more favourable treatment" are used.

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## International Regulations & Guidance addressing GHG - IMO

- **Revised MARPOL ANNEX VI - Resolution MEPC.203 (62), adopted in July 2011 - Chapter IV**

- Inclusion of regulations on Energy Efficiency for Ships, CO<sub>2</sub>
- Related Guidelines on the EEDI/SEEMP, adopted in 2012:

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*Resolution MEPC.212 (63) - Method of Calculation of the Attained EEDI*

*Resolution MEPC.213 (63) - Development of SEEMP*

*Resolution MEPC.214 (63) - Survey and Certification of the EEDI*

*Resolution MEPC.215 (63) - Calculation of Reference Lines for the EEDI*

- **MEPC.1/Circ.684, 2009** - Voluntary Guidelines for the EEOI

## Relevant Outcomes from MEPC 66

- **Marine Environment Protection Committee - MEPC 66**  
held at IMO headquarters from 31 March to 4 April 2014

- Agenda Items: WBM, Recycling, Air Pollution (including EE)

*Significant progress was made particularly w.r.t. GHG (Energy Efficiency). However, as foreseen, the NOx related discussions dominated the debate, ending in difficult compromise for new NECA.*

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- **2009 Guidelines for EGCS (SOx):** MEPC 66/INF.31 (IMarEST) study by UCL on theoretical/mathematical pH recovery model, in relation to washwater discharge, forwarded to PPR 2 for further consideration.
- **MARPOL Annex VI (NOx):** Tier III requirements vs NECA dates.
- **Energy Efficiency (GHG/CO<sub>2</sub>):** EEDI regulatory framework (guidelines method calculation/survey and certification of the EEDI). Further technical and operational measures for enhancing EE. Update 2<sup>nd</sup> IMO GHG Study. Agreement to establishment the EEDI database.

## Relevant Outcomes from MEPC 66

- **Amendments to MARPOL Annex VI (Reg. 13 - NO<sub>x</sub>)**

➤ Following extensive discussions, the Committee agreed to the following modifications:

- to retain the effective date of 1 January 2016 for the existing emission control areas for NO<sub>x</sub> as listed in paragraphs 6.1 and 6.2 of regulation 13 of MARPOL Annex VI; and
- to place an exception of a five-year delay for large yachts (greater than 24 m in length and of less than 500 GT).

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The Committee also agreed to the need to further improve the text of regulation 13 of MARPOL Annex VI, with a view to clarifying the effective dates of NO<sub>x</sub> Tier III emission standards for any future emission control areas for NO<sub>x</sub>.

## Relevant Outcomes from MEPC 66

- **Amendments to MARPOL Annex VI (Reg. 13 - NO<sub>x</sub>)**

➤ After lengthy discussions, an agreement was proposed by the Chairman as follows (still in square brackets):

[.3alt that ship is operating in an emission control area designated for Tier III NO<sub>x</sub> control under paragraph 6 of this regulation, other than an emission control area described in paragraph 5.1.2, and is constructed on or after the date of adoption of such an emission control area, or a later date as may be specified in the amendment designating the NO<sub>x</sub> Tier III emission control area, whichever is later.].

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*Several interpretations may be given - further discussions needed!*

**Ireland** and **Spain** put forward reservations on this agreement.

## Relevant Outcomes from MEPC 66

- **Further Technical and Operational Measures for enhancing Energy Efficiency of International Shipping (GHG - CO<sub>2</sub>)**
  - Recognising the progress made during the discussions, namely on the development of a data collection system of ships (MR) and the identification of its core elements, as well as on the most suitable metrics to address Energy Efficiency for the existing ships, the Committee:
    - encouraged interested delegations to voluntarily submit data resulting from any monitoring programs and metrics testing;
    - Agreed to further consider the impact on any future measures (in the context of the Kyoto Protocol Principle CBDR) under the already established technical cooperation and capacity-building program;
    - Agreed to establish an intersessional correspondence group (GC).

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**THANK YOU FOR  
YOUR ATTENTION**

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