Directive 1999/32/EC MARPOL Annex VI Sulphur Inspections

Enforcement provisions of Sulphur Directive

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EMSA

Content

- SOx emissions
- MARPOL Annex VI
- Directive 1999/32/EC
- Sulphur Inspections

What are we talking about?

Sulphur dioxide (SO2), particulate matter (PM), nitrogen (NOx) from shipping

Why we care about emissions from ships

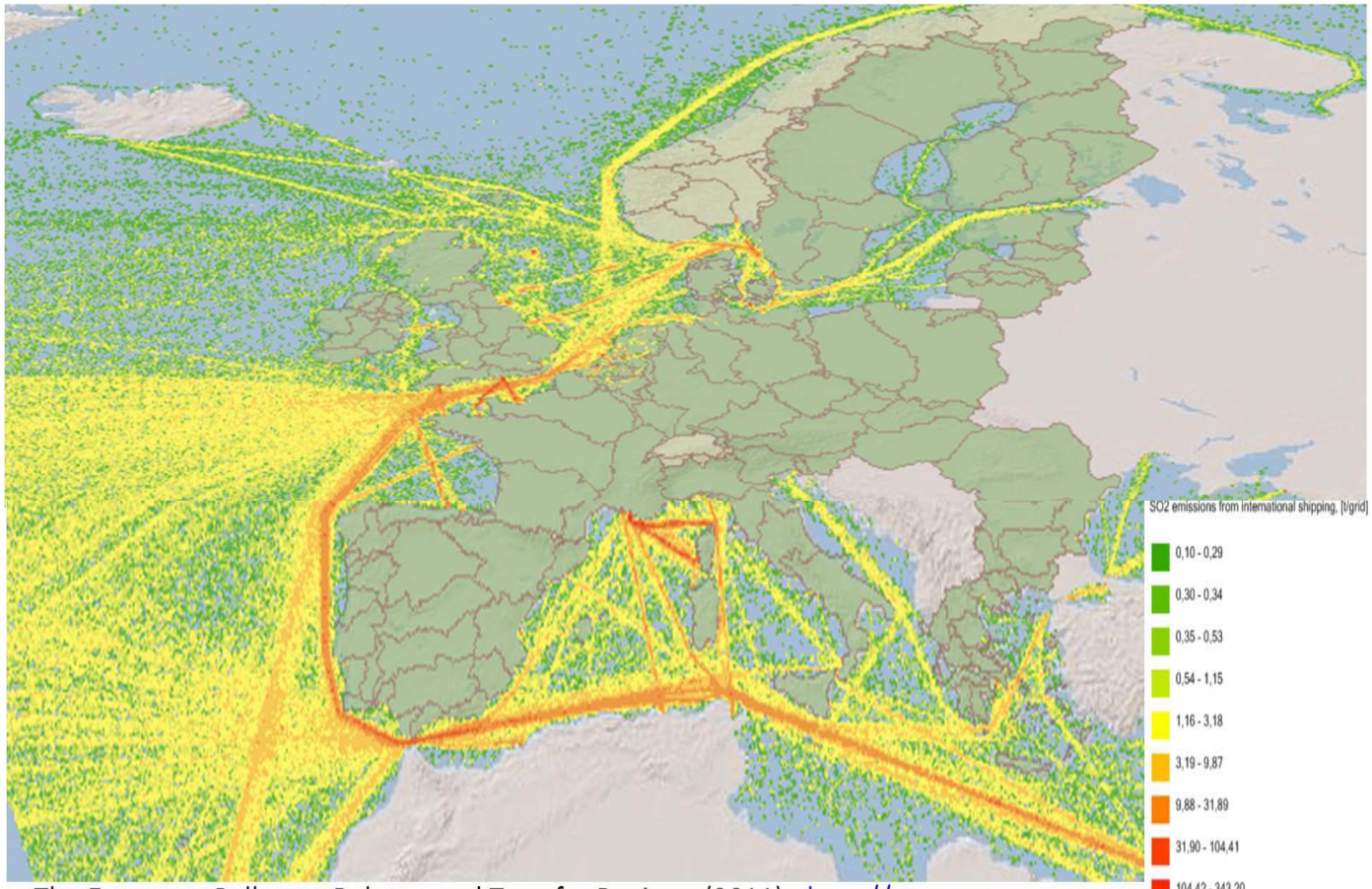
Ship emissions affect human health and cause acidification and eutrophication:

Acidification

Eutrophication

Why we care about emissions from ships

Proximity of emissions: 90% of ship emissions in the North Sea occur within 90 km of the shore

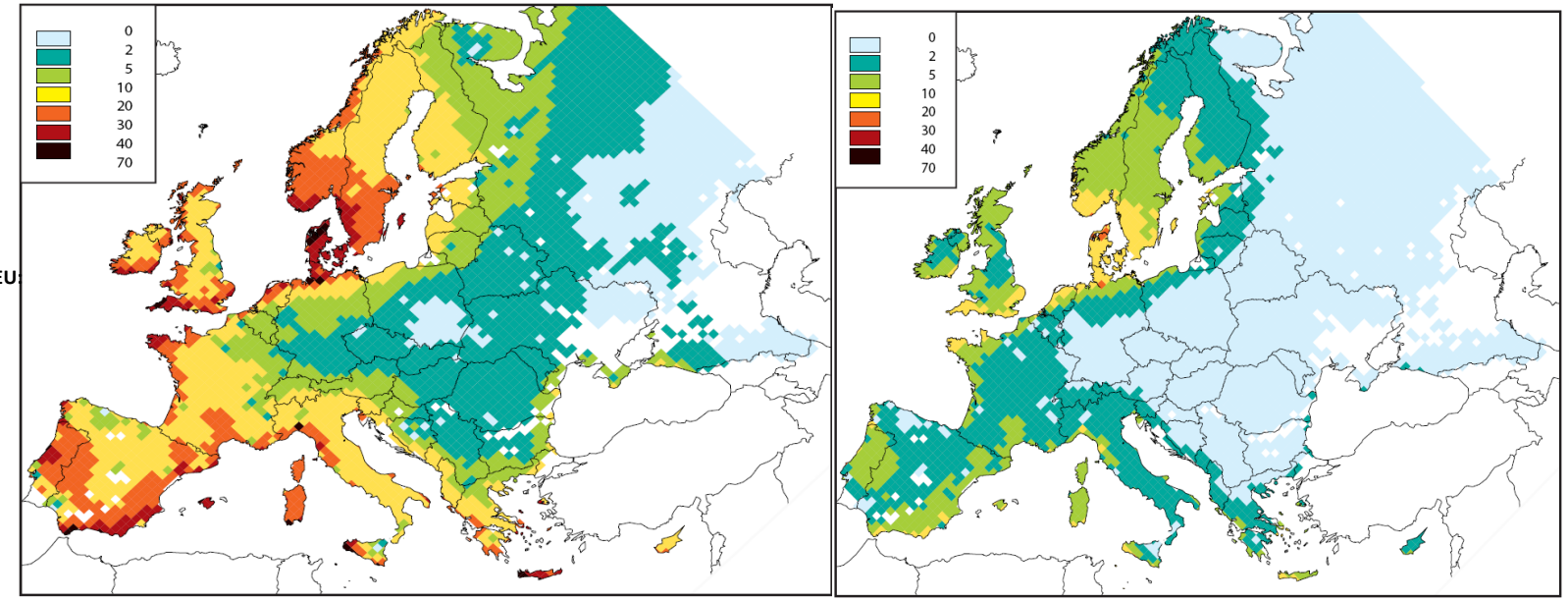


The European Pollutant Release and Transfer Register (2011) - http://prtr.ec.europa.eu

Why we care about emissions from ships

Emissions from ships are transported over considerable distances, affecting also inland air quality far beyond coastal areas

Contribution from shipping to SO2 concentration into EU



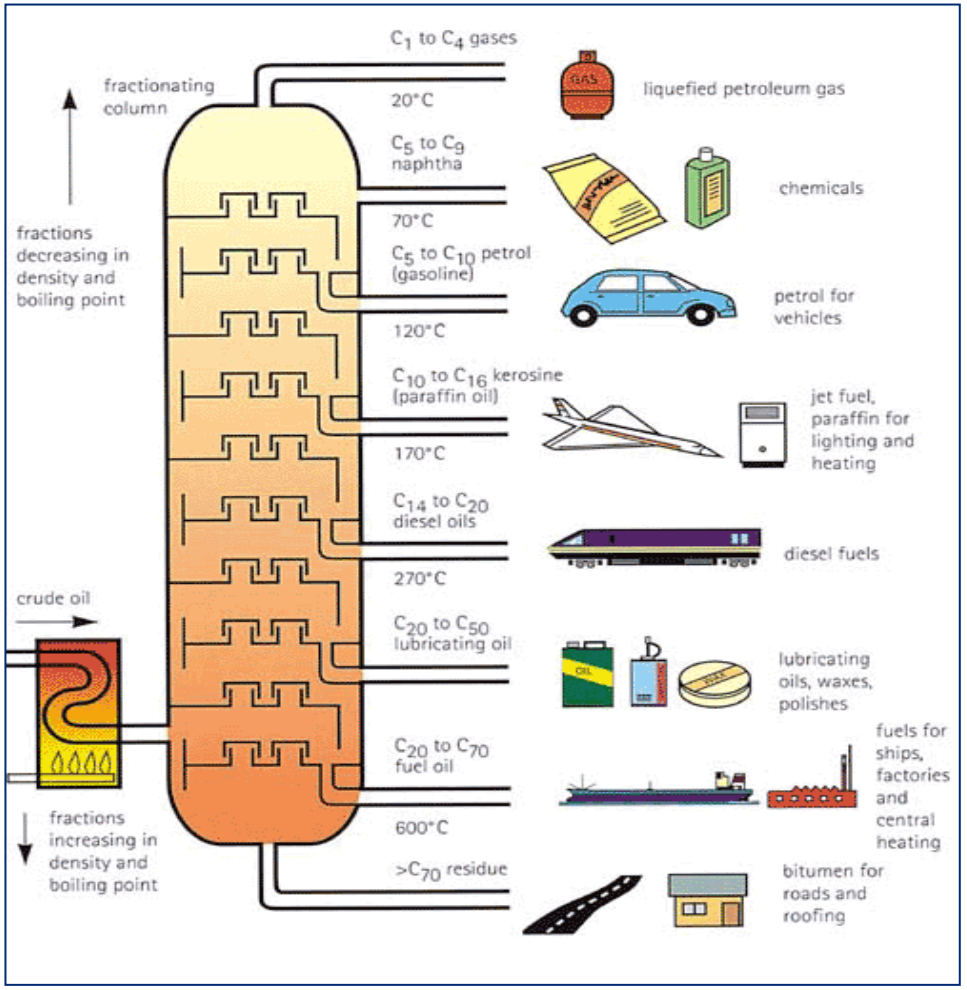
2000

2020: following new measures

Why we care about emissions from ships

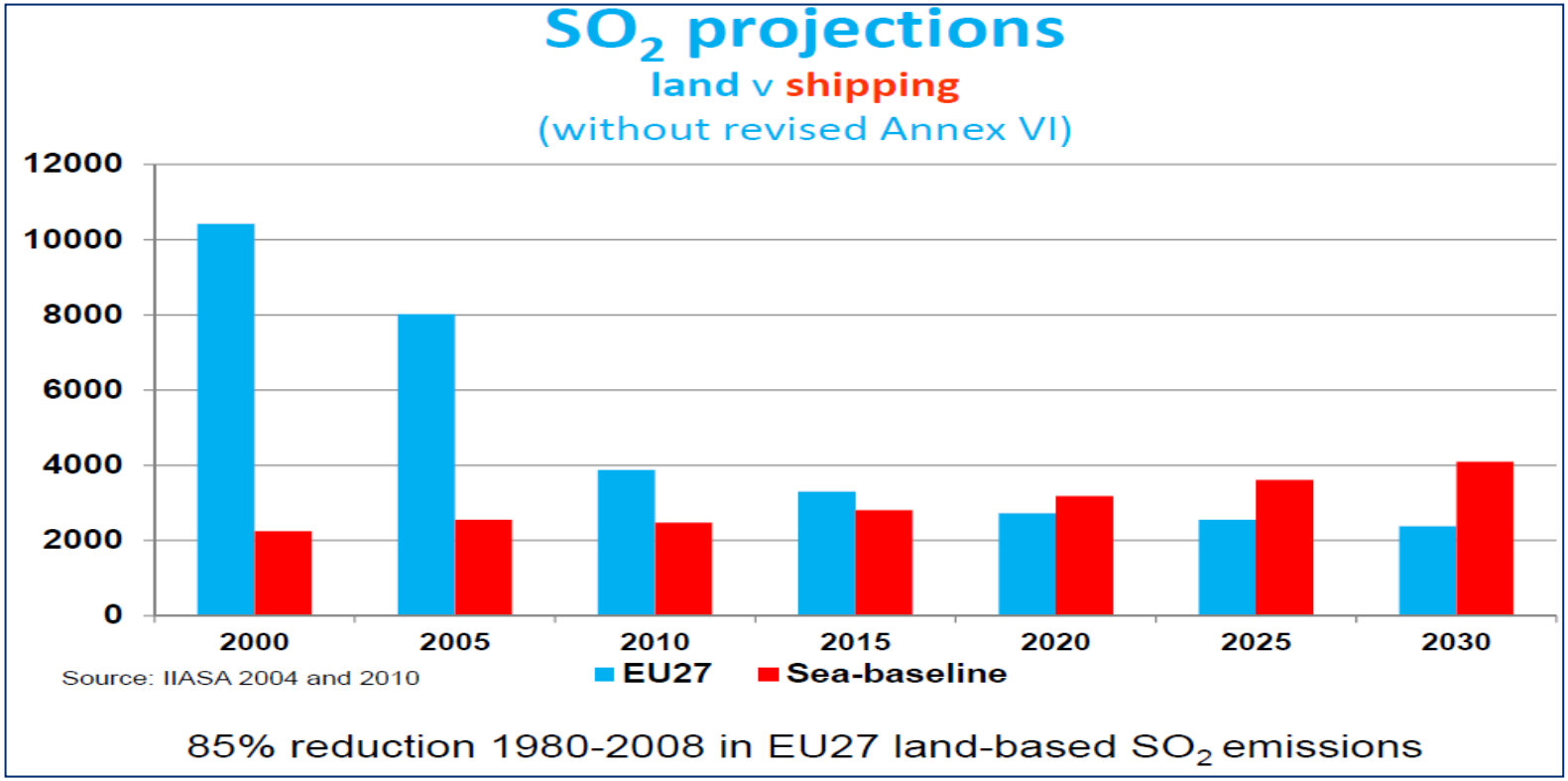
- **Fuel quality: intensity and emission factors**

- **Sulphur content in the EU for cars is 0,001%**



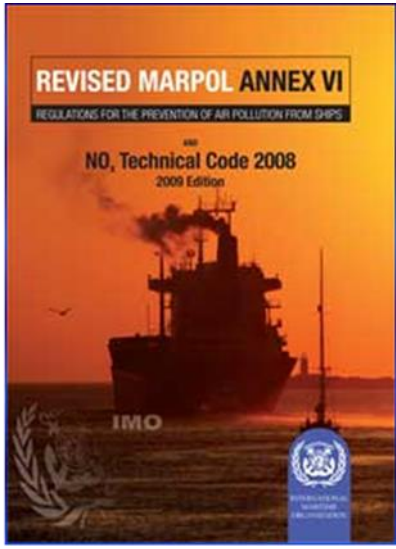
Why we care about emissions from ships

Emissions of SO2 (and Nox) from maritime transport were expected to exceed total emissions of these pollutants from all land-based sources in the EU by 2020



MARPOL Annex VI

MARPOL Annex VI - Introduction



- **Adopted in 1997, entry into force in 2005**
- **Aiming at minimizing airborne emissions from ships**
  (SOx, NOx, ODS, VOC, CO2)
- **Revised Annex VI in October 2008, entry into force in July 2010**
  (with significant tighter emissions limits)
- **77 IMO Parties have so far ratified Annex VI (incl. 24 EU MS)**
  (94.77% of world merchant shipping tonnage)
- **Regulation 4 “Equivalents” - use of alternative compliance methods**
  (at least as effective in terms of emission reductions as required)

MARPOL Annex VI – Regulation 14

- **The new global sulphur in fuel cap from 1/1/2012 is 3.50% and reduced progressively to 0.50 %, effective from 1 January 2020**

(or 2025 - depending on a IMO review of fuel availability: MEPC 66 established a Correspondence Group to look into the methodology for assessing availability)

- **Revised Annex VI also introduced 'emission control areas' (ECAs)**

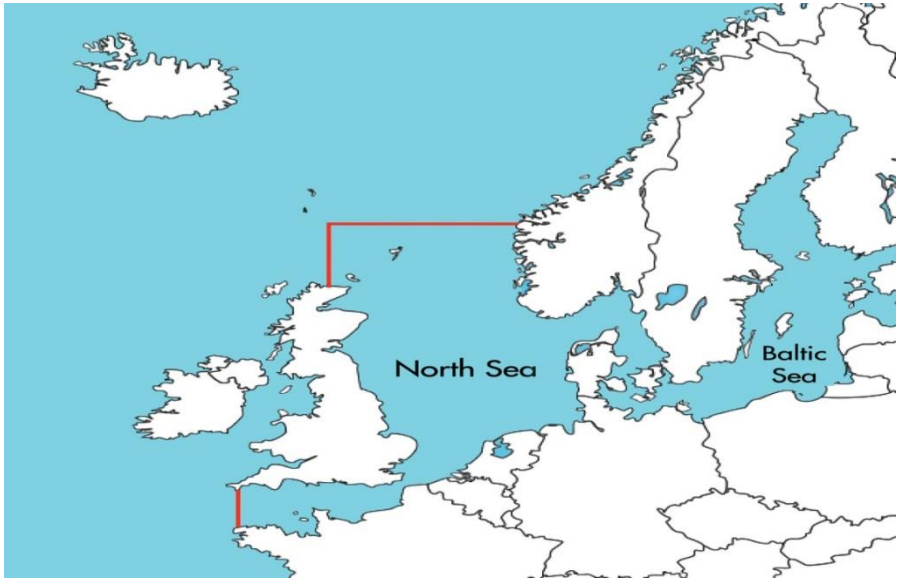
- **The limits of sulphur in fuel applicable in ECAs for SOx and particulate matter were reduced to 1.00% from 1 July 2010 + being further reduced to 0.10 %, effective from 1 January 2015.**

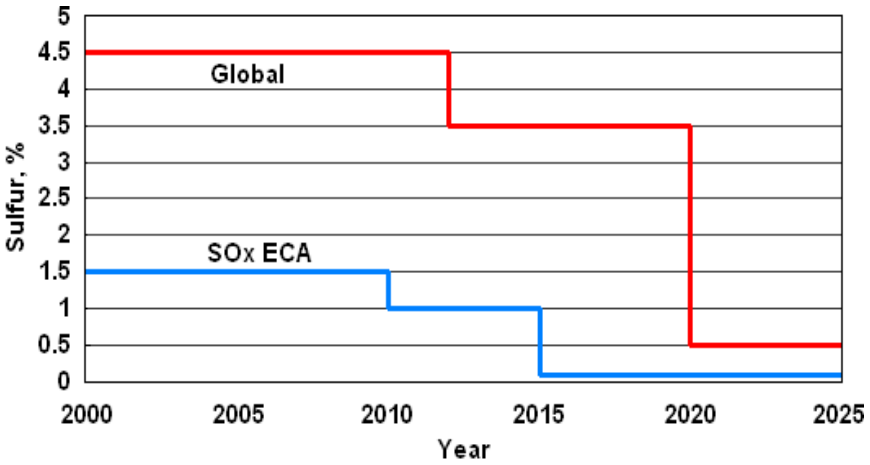
- **Alternatively, ships must fit an exhaust gas cleaning system or use any other technological method to limit SOx emissions.**

MARPOL Annex VI - ECAs

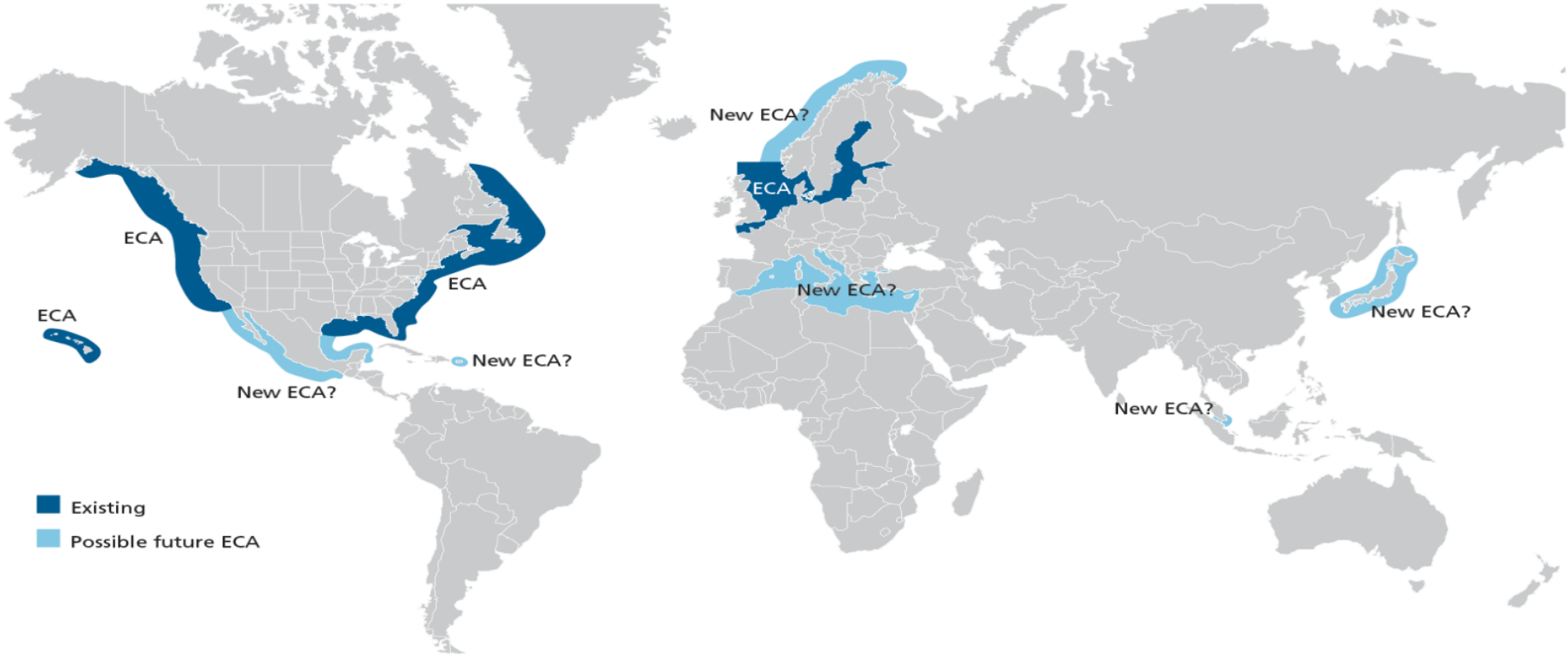
Currently there are 2 IMO Annex VI ECAs in Europe: the Baltic (2006) and North Sea ECA (including the Channel – 2007)

ECAs are designated by IMO following a proposal of the involved countries and through an amendment of Marpol Annex VI.





MARPOL Annex VI – Other possible ECAs



MARPOL Annex VI – Obligations for Parties

- **Reg. 18: Promote the availability of compliant fuel oil and inform IMO of the availability in its ports and terminals**

- **Reg. 17: Ensure provision of adequate reception facilities for (equipment containing) ODS and exhaust gas cleaning residues from cleaning system (e.g. scrubber sludge)**

- **Reg. 5 + 6: Issue survey, certificate (Int. Air Pollution Prevention Certification - IAPPC) for ships of 400 GT complying with engine and emission requirements.**

- **Reg. 10: Port state control on operational requirements (essential procedures relating to prevention of air pollution from ships), on-board bunker delivery notes + representative sample of the fuel oil (fuel sampling)**

Directive 1999/32/EC

EU Policy on Air Emissions

2005 Thematic Strategy on Air Pollution:
Air pollutant emissions of SO2 and NOx from ships are a **serious concern**, as they are expected to exceed those of all land-based sources in the EU by 2020. **Further action is therefore needed to improve human health and the environment.**

EU Maritime Transport Strategy 2009-2018:
European Commission, EU Member States and EU maritime industry should work together towards the long term objective of '**zero-waste, zero-emission'** maritime transport

EU 2011 White Paper:
The environmental record of shipping can and must be **improved** by both **technology** and **better fuels** and operations.

CLEANER air FOR ALL
Green Week 2013
Brussels 4-7 June

CLEAN AIR FOR ALL
EUROPEAN MOBILITY WEEK

EU 'Sulphur Directive' (1999/32/EC)

- **Sulphur content** in heavy fuels and gas oil regulated in the EU since 2000 (including marine gas and diesel oil)
- Directives **2005/33/EC & 2012/33/EU** brought EU legislation in line with MARPOL (1997 and 2008 changes)
- Integral part of **EU policy on Air Quality control**:
  - *reduce SOx (and PM) shipping emissions due to combustion of marine fuel with high sulphur content through cost-effective measures*
  - *prevent their contribution to air pollution -which harm human health and the environment becomes higher than the one from land-based sources*
- **Article 4c – Emission abatement methods**

The EU Sulphur Directive – Directive 2005/33

- Focused more specifically on sulphur emissions from shipping.
- Introduced SECAs in EU legislation (incl. 1,5% of sulphur content)

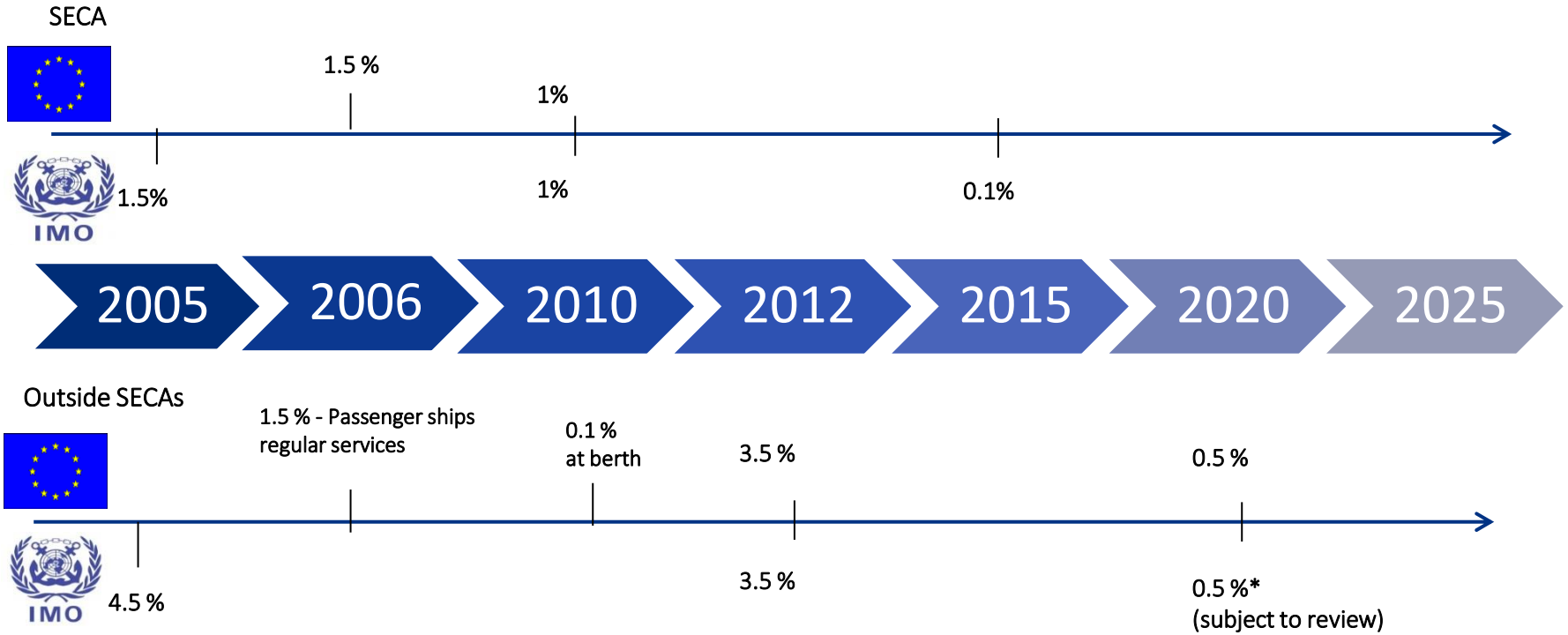
- It also introduced:

  - 0,1% sulphur in fuel requirement for **ships at berth** in EU ports
  - 1,5% sulphur in fuel requirement for **ALL passenger ships in EU waters**
  - Reference to alternative emission abatement technologies for ships
  - More focus on credible implementation by ships through effective sampling and dissuasive penalties
  - Coordination with enforcement based on international maritime law (Port State Control)
  - EMSA to assist in monitoring the implementation

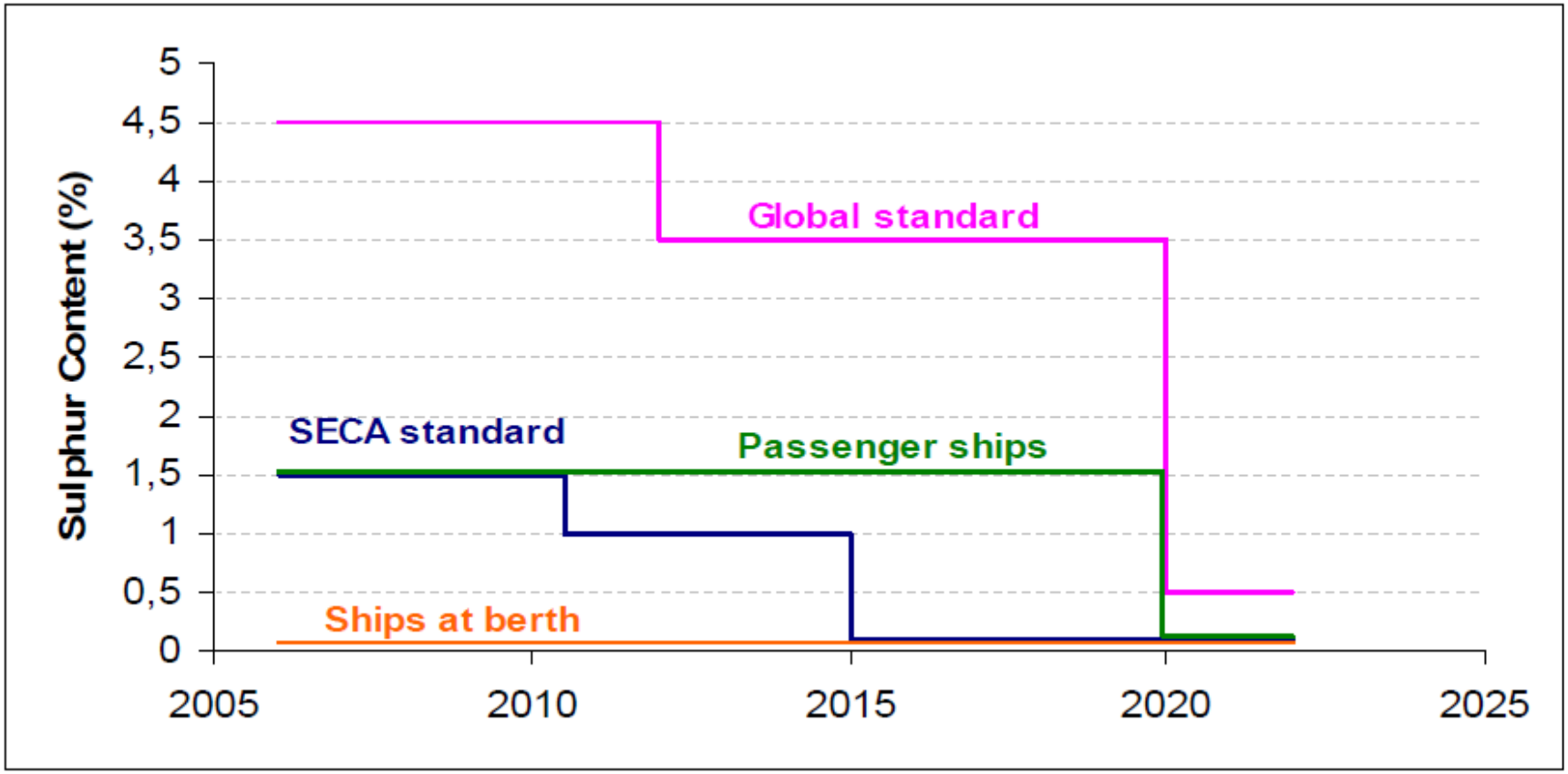
The EU Sulphur Directive – Directive 2012/33

- **Directive 2012/33/EC (amending Directive 1999/32/EC) adopted in Nov. 2012:**
- **Brings sulphur limits in line with MARPOL Annex VI 2008 amendments**
  - 1.00% until December 2014 and 0.10% as from January 2015 for **SECAs**
  - 3.5% as of June 2014 and 0,5% as of January 2020
- **0,1% sulphur content for ships at berth and 1.5% for passenger ships maintained**
- **MARPOL Annex VI non-availability assessment and possible postponement of 2020 limits were NOT included in the revised Directive: So 0,5% in all EU waters as of 2020!**
- **MS should endeavour to ensure the availability of marine fuel which comply with the Directive**
- **Commission shall consider the potential for reducing air pollution as part of its general air quality policy**

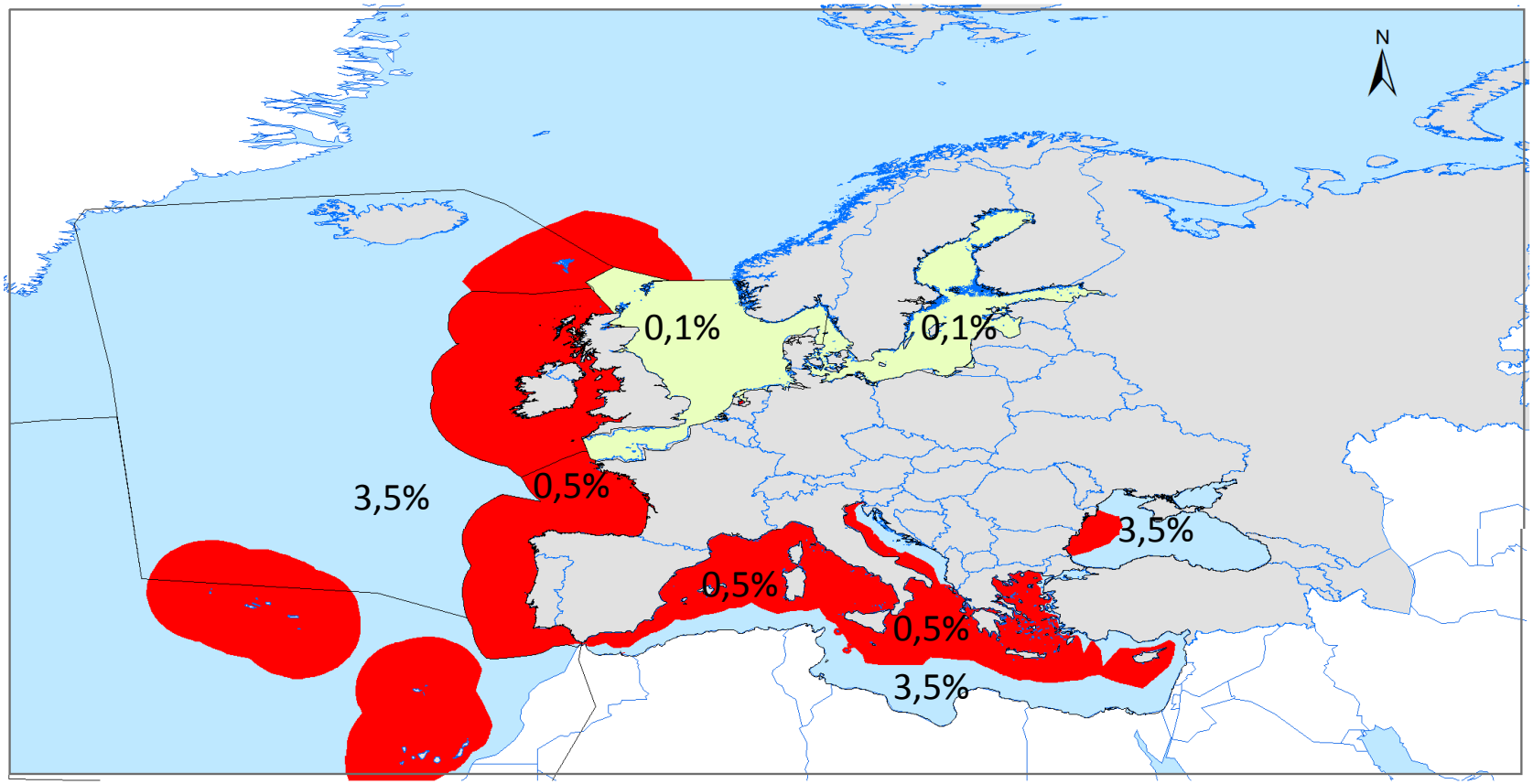
EU Sulphur Directive vs MARPOL



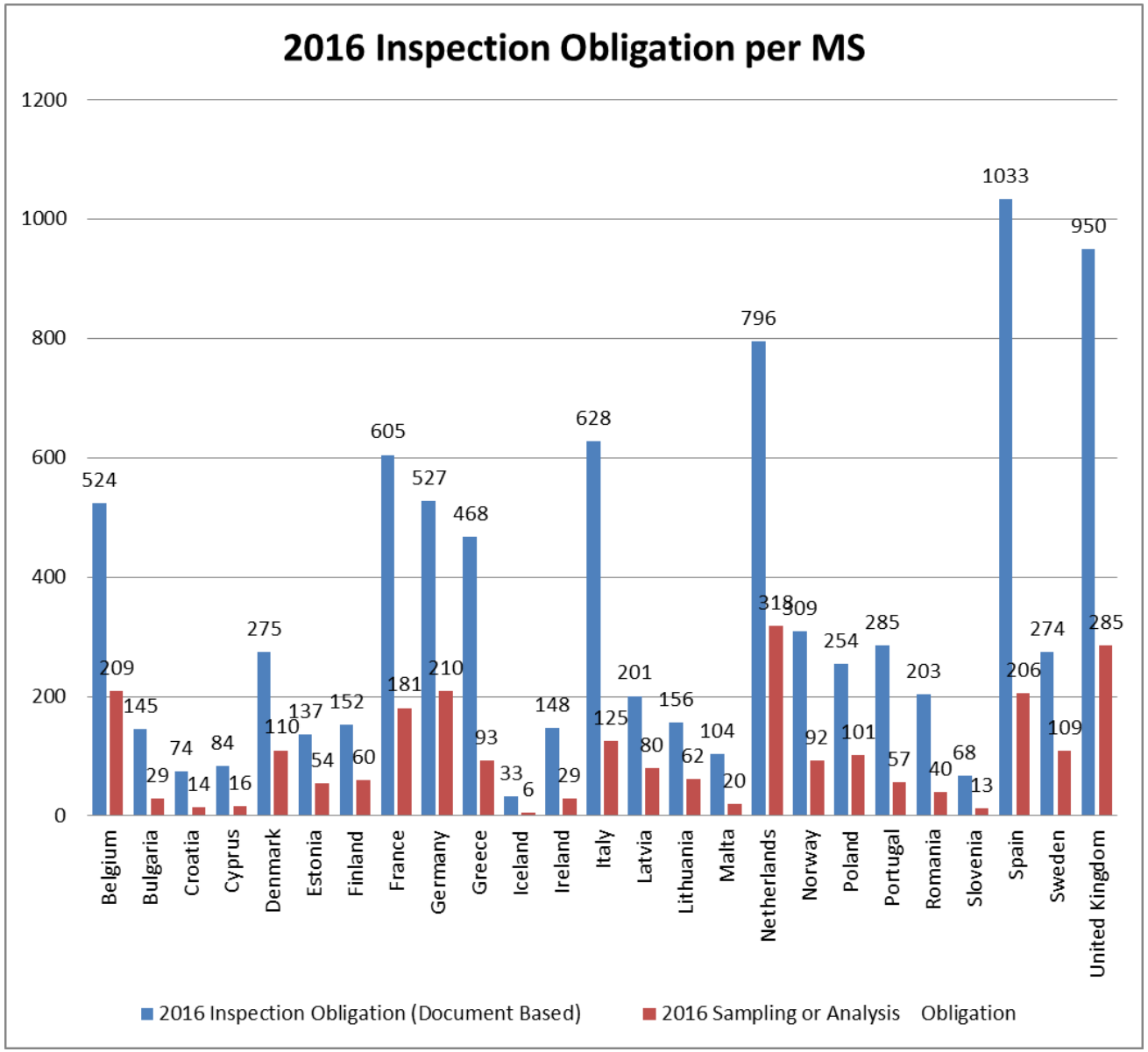
EU & Global Sulphur limits



Possible landscape after 2020



Commission Decision 2015/253

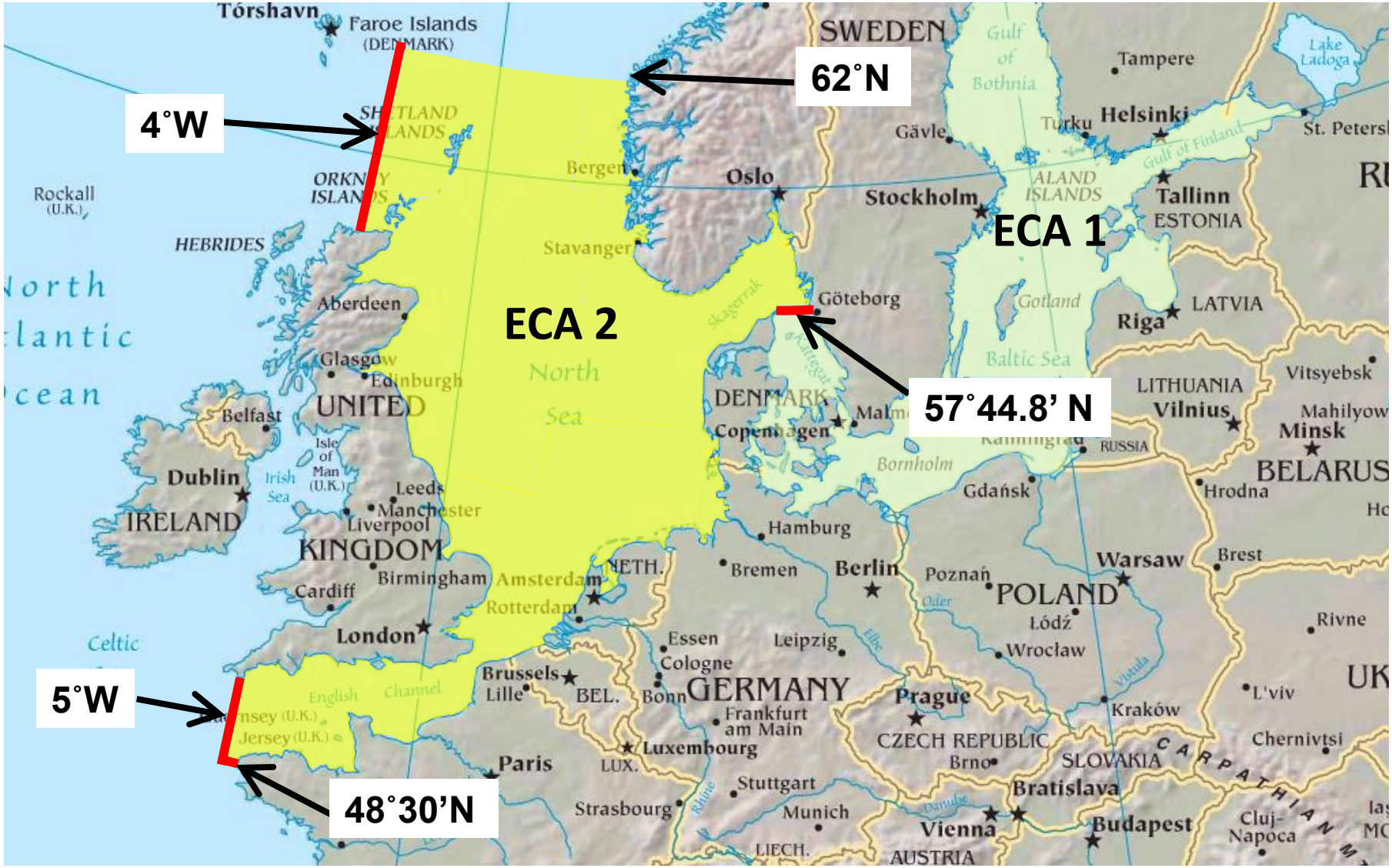


Sulphur Inspections

Scope of Application – Sulphur Limits

<table>
<tr><th></th><th>outside EU SECAs</th><th>inside EU SECAs</th><th>Exceptions</th></tr>
<tr><td>Ships at berth in EU ports
(includes at anchor)</td><td colspan="2">0.10%
(Not if timetable < 2 hrs or engines switch off and shore-side electricity)</td><td rowspan="3">Ships using Approved Emission Abatement Methods</td></tr>
<tr><td>Passenger ships
(on regular services to/from EU ports)</td><td rowspan="2">From 01-01-2020
0.50%</td><td rowspan="2">0.10%</td></tr>
<tr><td>Other ships/cases</td></tr>
</table>

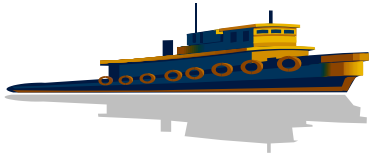
Scope of Application – EU SECAs



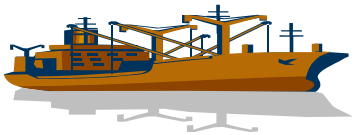
Scope of Application - Ships

The Sulphur Directive applies to all vessels of all flags, including vessels whose journey began outside the Union

(Art. 4a and 4b)

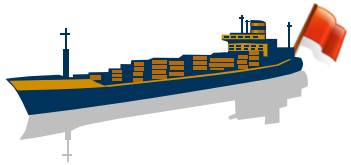


Domestic Shipping



International Trade

Flag State Ships

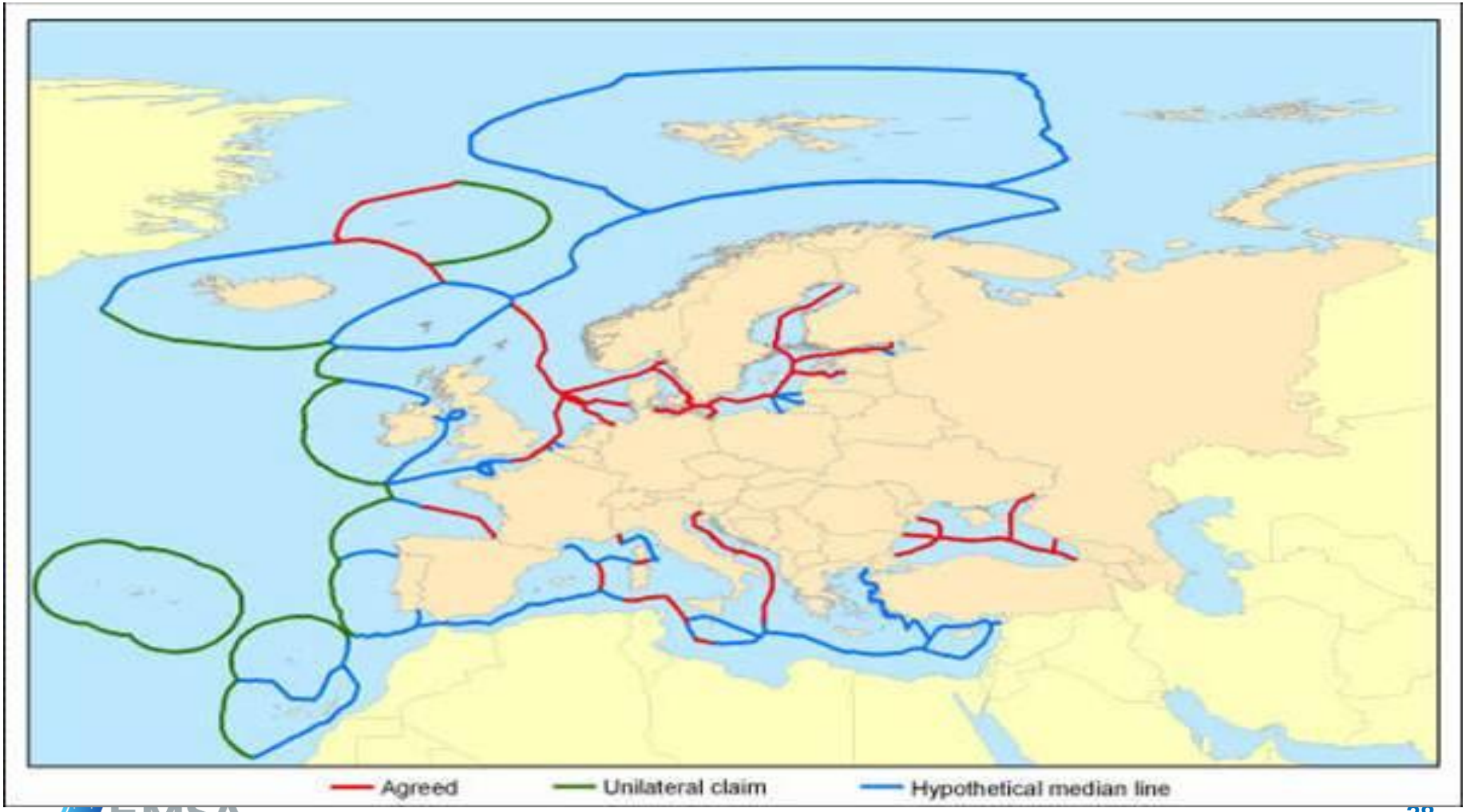


Foreign Flag Ships

Fishing Vessels

Scope of Application – Sea Areas

MSs shall take all necessary measures to ensure that marine fuels are not used in the areas of **their** territorial seas, exclusive economic zones and pollution control zones (Art. 4a)



Sulphur Inspection – MSs Obligations (Dir.)

- **MSs to ensure that marine fuels above sulphur content limits are not used** (Art. 4a&b)

  Also require the:

  - *correct completion of ships' logbooks, including changeover operations* (Art.4a Par.5), and
  - *recording of time of any changeover operation in the ship's logbooks* (Art.4b Par.1, at berth).

- **MSs shall check by sampling the sulphur content of marine fuels** (Art. 6)

  The means of sampling, analysis and inspection are (Art. 6 Par. 1a):

  (a) inspection of ships' log books and bunker delivery notes,

  and, as appropriate:

  (b) sampling of the marine fuel for on-board combustion while being delivered to ships , or

  (c) sampling/ analysis of the marine fuel for on-board combustion contained in tanks, where technically and economically feasible, and in sealed bunker samples on board ships.

Sulphur Inspection – MSs Obligations (IA)

- **MSs shall inspect ships' log books and bunker delivery notes in at least 10 % of individual ships calling per year** (Art. 3.2)

  From 1/01/2016, also sampling or analysis or both to be conducted on:

  - *40 % of inspected ships in MSs fully bordering the SECAs*
  - *30 % of inspected ships in MSs partly bordering SECAs*
  - *20 % of inspected ships in MSs not bordering SECAs*

- **MSs shall apply a staged approach to sampling and compliance verification** (Art. 5)

  (a) inspection of ships' log books and bunker delivery notes

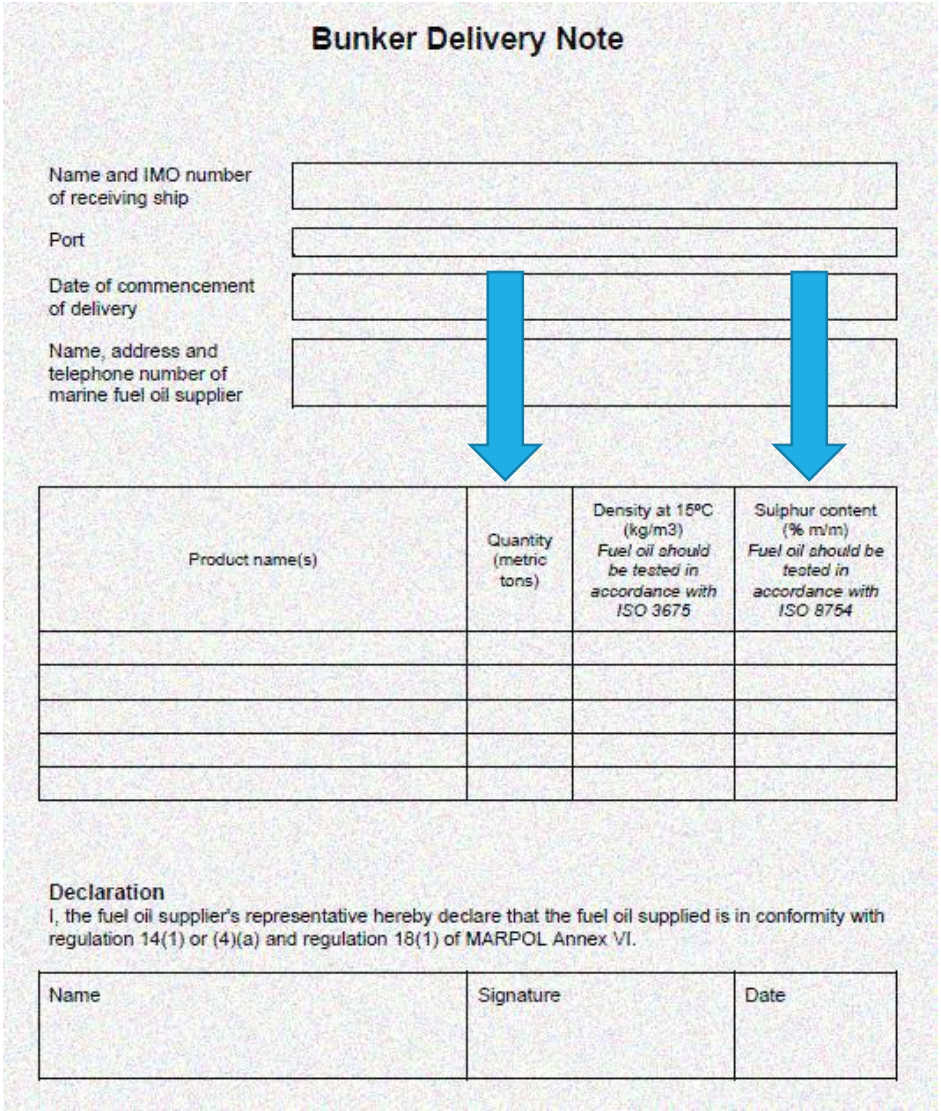
  (b) as appropriate, one or both of the following means of sampling and analysis:

  (i) analysis of the sealed bunker samples on-board ships accompanying the BDN,

  (ii) on-board spot sampling of marine fuels for on-board combustion followed by analysis

Documentation – Bunker Delivery Note

- Details of fuel oil for combustion purposes delivered to and used on board should be recorded by means of a bunker delivery note. The delivery note should be accompanied by a representative sample of the fuel oil delivered (MARPOL/AVI/R.18).
- The bunker delivery note shall be kept on board the ship in such a place as to be readily available for inspection at all reasonable times. It shall be retained for a period of three years after the fuel oil has been delivered on board.



Bunker Delivery Note

Name and IMO number of receiving ship	
Port	
Date of commencement of delivery	
Name, address and telephone number of marine fuel oil supplier	

Product name(s)	Quantity (metric tons)	Density at 15ºC (kg/m3) *Fuel oil should be tested in accordance with ISO 3675*	Sulphur content (% m/m) *Fuel oil should be tested in accordance with ISO 8754*

Declaration

I, the fuel oil supplier's representative hereby declare that the fuel oil supplied is in conformity with regulation 14(1) or (4)(a) and regulation 18(1) of MARPOL Annex VI.

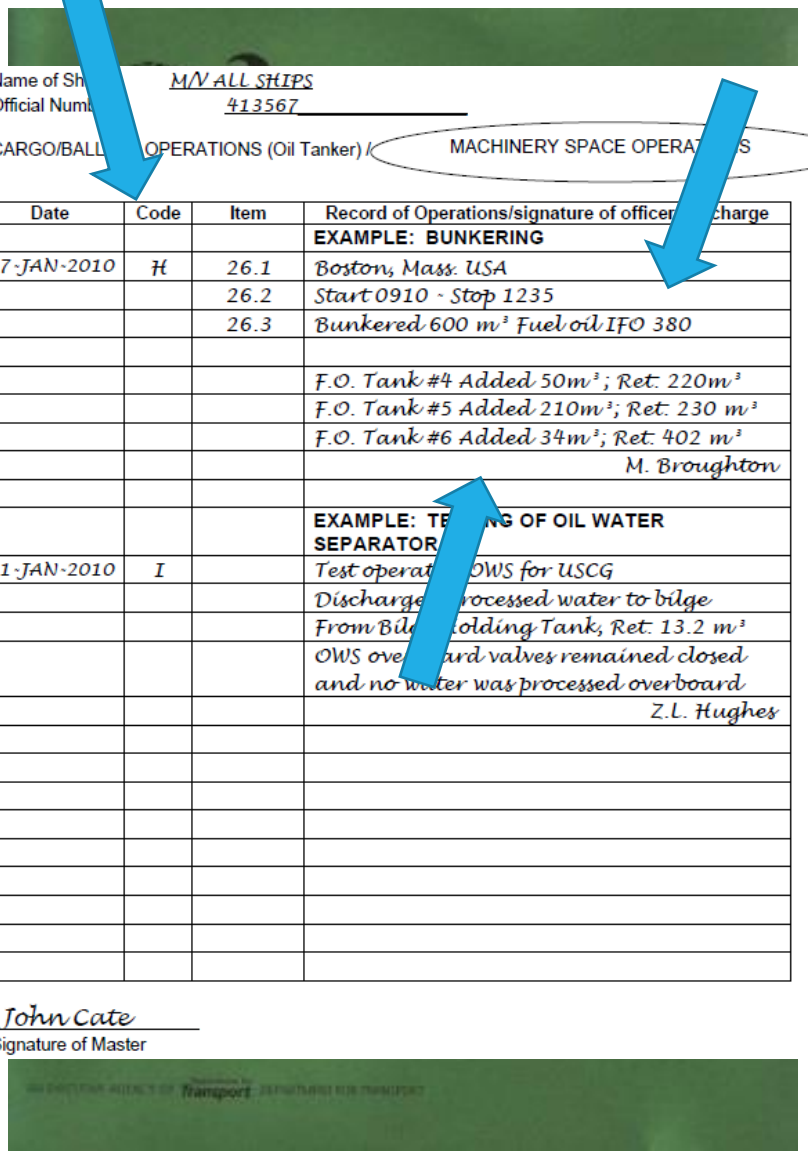
Name	Signature	Date

Documentation – Ships' Log Books

- Oil Record Book Part I
- Records of navigational activities
- Records of internal transfer of fuel
- Engine logbooks
- Tank sounding records
- Fuel change over records

Documentation– Oil Record Book P I

- Every ship of 400 gross tonnage and above and every Oil Tanker of 150 gross tonnage and above must be provided with an Oil Record Book - Part I Machinery space operations. Entries in the Oil Record Book should be drawn up at least in English or French or Spanish.
- Any machinery space operations related to bunkering of fuel or bulk lubricating oil must be recorded in the Oil Record Book Part I on each occasion (MARPOL/AI/R.17).
- The Oil Record Book shall be kept on board the ship in such a place as to be readi available for inspection. It shall be preserved for a period of three years after the la entry has been made. For compliance verification with the Directive, the Oil Recor Book is therefore an essential part of the Sulphur Inspection.



Name of Sh M/V ALL SHIPS
Official Numb 413567

CARGO/BALL OPERATIONS (Oil Tanker) / MACHINERY SPACE OPERATIONS

Date	Code	Item	Record of Operations/signature of officer in charge
			EXAMPLE: BUNKERING
17-JAN-2010	H	26.1	Boston, Mass. USA
		26.2	Start 0910 - Stop 1235
		26.3	Bunkered 600 m³ Fuel oil IFO 380
			F.O. Tank #4 Added 50m³; Ret: 220m³
			F.O. Tank #5 Added 210m³; Ret: 230 m³
			F.O. Tank #6 Added 34m³; Ret: 402 m³
			M. Broughton
			EXAMPLE: TE NG OF OIL WATER SEPARATOR
21-JAN-2010	I		Test operat OWS for USCG
			Discharge rocessed water to bilge
			From Bil olding Tank, Ret: 13.2 m³
			OWS ove rd valves remained closed and no water was processed overboard
			Z.L. Hughes

John Cate
Signature of Master

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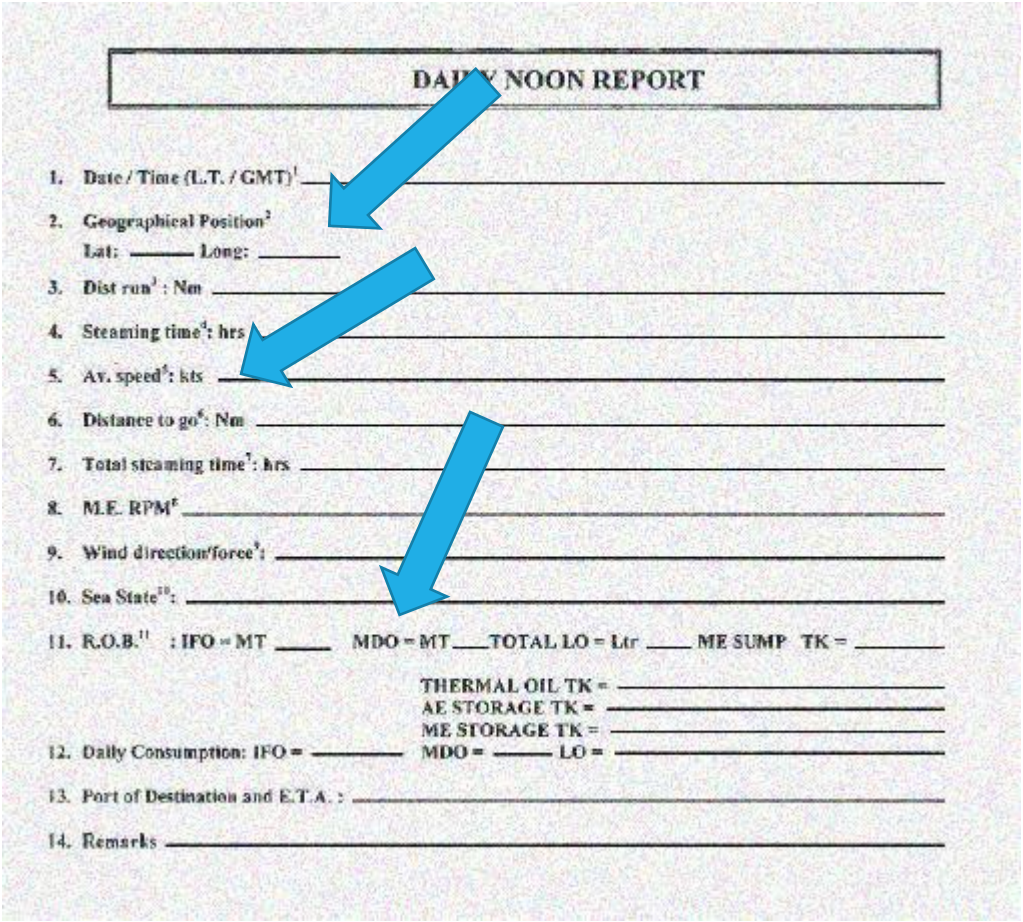
Documentation– Records Nav. Activities

- Records of navigational activities must be kept on board all ships of 150 gross tonnage and above engaged on international voyages and on all other ships of 500 gross tonnage and above (excluding fishing vessels) (SOLAS/CV/R.28).
- In addition, each ship of 500 gross tonnage and above, in the case where the voyage exceeds 48 hours, must submit a daily report to its company, which shall retain this and all subsequent daily reports for the duration of the voyage.



DAILY NOON REPORT

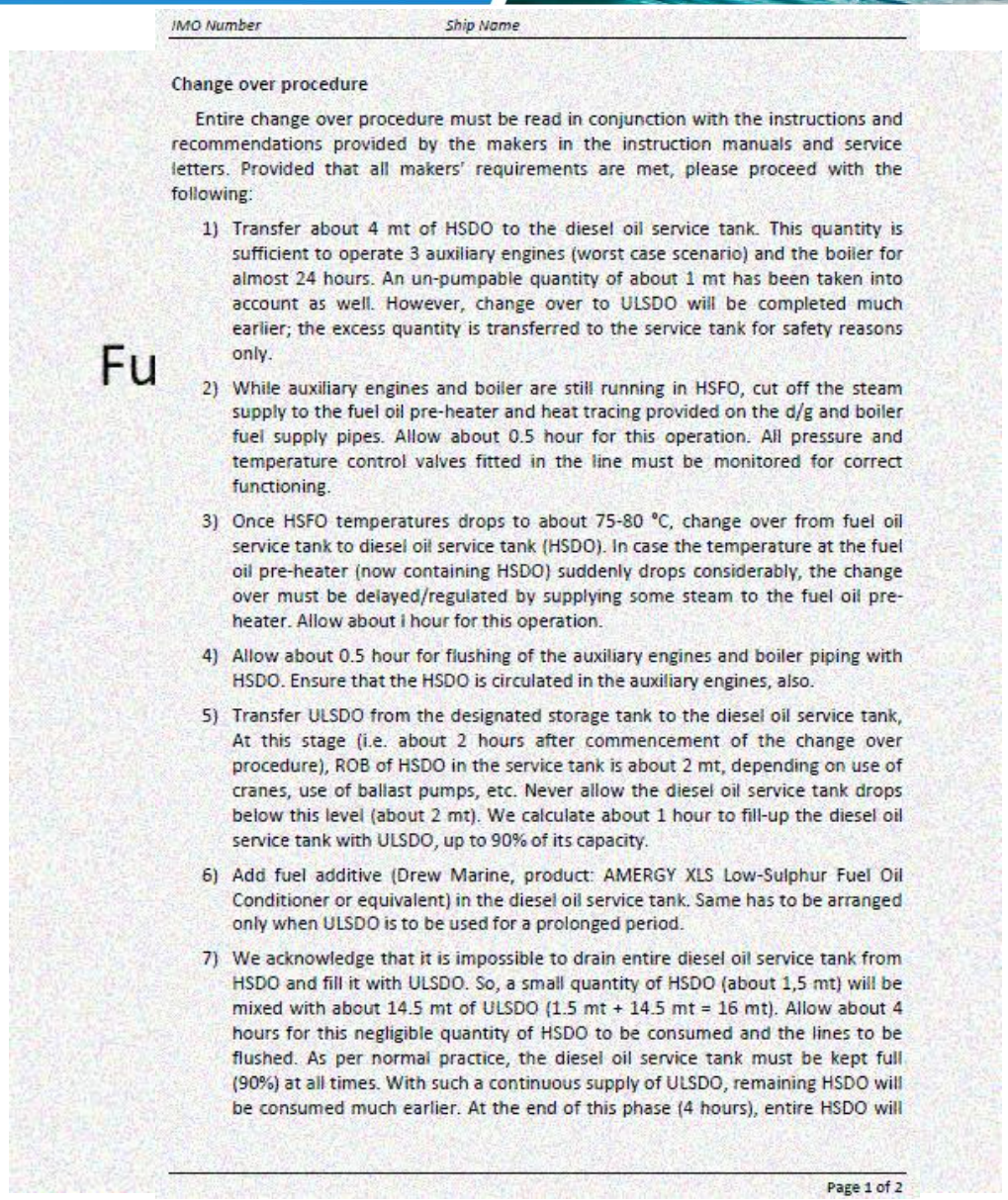
1. Date / Time (L.T. / GMT)[1] _____
2. Geographical Position[2]
   Lat: _____ Long: _____
3. Dist run[3] : Nm _____
4. Steaming time[4]: hrs _____
5. Av. speed[5]: kts _____
6. Distance to go[6]: Nm _____
7. Total steaming time[7]: hrs _____
8. M.E. RPM[8] _____
9. Wind direction/force[9]: _____
10. Sea State[10]: _____
11. R.O.B.[11] : IFO = MT _____ MDO = MT ____ TOTAL LO = Ltr ____ ME SUMP TK = _____
    THERMAL OIL TK = _____
    AE STORAGE TK = _____
    ME STORAGE TK = _____
12. Daily Consumption: IFO = _____ MDO = _____ LO = _____
13. Port of Destination and E.T.A. : _____
14. Remarks _____

[1] Insert date and time in local time and GMT
[2] Insert ship geographical position i.e. Latitude and Longitude.
[3] Miles run on last 24 hours.
[4] Hours run between 2 Noon reports.
[5] Vessel average speed on last 24 hours.
[6] Total remaining miles to final destination.
[7] Total hours at sea from ship departure.
[8] R.P.M. It is M.E. Revolution per Minute.
[9] According to Beaufort Scale.
[10] According to Douglas Scale.
[11] R.O.B. – Remaining on Board of total FO, DO and LO storage in vessel tanks.

Documentation – Change-over Written Procedure

- Ships using separate fuel oils to comply with the SOx emission requirements whilst entering or leaving a SECA, should carry a written procedure showing how the fuel oil change-over is to be achieved. To comply with the SOx emission requirements, the procedure should foresee allowing sufficient time for the fuel oil service system to be fully flushed of all fuel oils exceeding the new applicable sulphur content, prior to entry into a SECA, in order to avoid any contamination (MARPOL/AVI/R.14.6).

- In addition, **the volume of low sulphur fuel oils in each tank**, as well as **the date, time, and position of the ship when any fuel oil change-over operation has been completed prior to the entry into the SECA or commenced after exit from such an area, should be recorded in such log-book** as prescribed by the flag Administration of the ship.



IMO Number *Ship Name*

Change over procedure

Entire change over procedure must be read in conjunction with the instructions and recommendations provided by the makers in the instruction manuals and service letters. Provided that all makers' requirements are met, please proceed with the following:

1) Transfer about 4 mt of HSDO to the diesel oil service tank. This quantity is sufficient to operate 3 auxiliary engines (worst case scenario) and the boiler for almost 24 hours. An un-pumpable quantity of about 1 mt has been taken into account as well. However, change over to ULSDO will be completed much earlier; the excess quantity is transferred to the service tank for safety reasons only.

Fu

2) While auxiliary engines and boiler are still running in HSFO, cut off the steam supply to the fuel oil pre-heater and heat tracing provided on the d/g and boiler fuel supply pipes. Allow about 0.5 hour for this operation. All pressure and temperature control valves fitted in the line must be monitored for correct functioning.

3) Once HSFO temperatures drops to about 75-80 °C, change over from fuel oil service tank to diesel oil service tank (HSDO). In case the temperature at the fuel oil pre-heater (now containing HSDO) suddenly drops considerably, the change over must be delayed/regulated by supplying some steam to the fuel oil pre-heater. Allow about i hour for this operation.

4) Allow about 0.5 hour for flushing of the auxiliary engines and boiler piping with HSDO. Ensure that the HSDO is circulated in the auxiliary engines, also.

5) Transfer ULSDO from the designated storage tank to the diesel oil service tank, At this stage (i.e. about 2 hours after commencement of the change over procedure), ROB of HSDO in the service tank is about 2 mt, depending on use of cranes, use of ballast pumps, etc. Never allow the diesel oil service tank drops below this level (about 2 mt). We calculate about 1 hour to fill-up the diesel oil service tank with ULSDO, up to 90% of its capacity.

6) Add fuel additive (Drew Marine, product: AMERGY XLS Low-Sulphur Fuel Oil Conditioner or equivalent) in the diesel oil service tank. Same has to be arranged only when ULSDO is to be used for a prolonged period.

7) We acknowledge that it is impossible to drain entire diesel oil service tank from HSDO and fill it with ULSDO. So, a small quantity of HSDO (about 1,5 mt) will be mixed with about 14.5 mt of ULSDO (1.5 mt + 14.5 mt = 16 mt). Allow about 4 hours for this negligible quantity of HSDO to be consumed and the lines to be flushed. As per normal practice, the diesel oil service tank must be kept full (90%) at all times. With such a continuous supply of ULSDO, remaining HSDO will be consumed much earlier. At the end of this phase (4 hours), entire HSDO will

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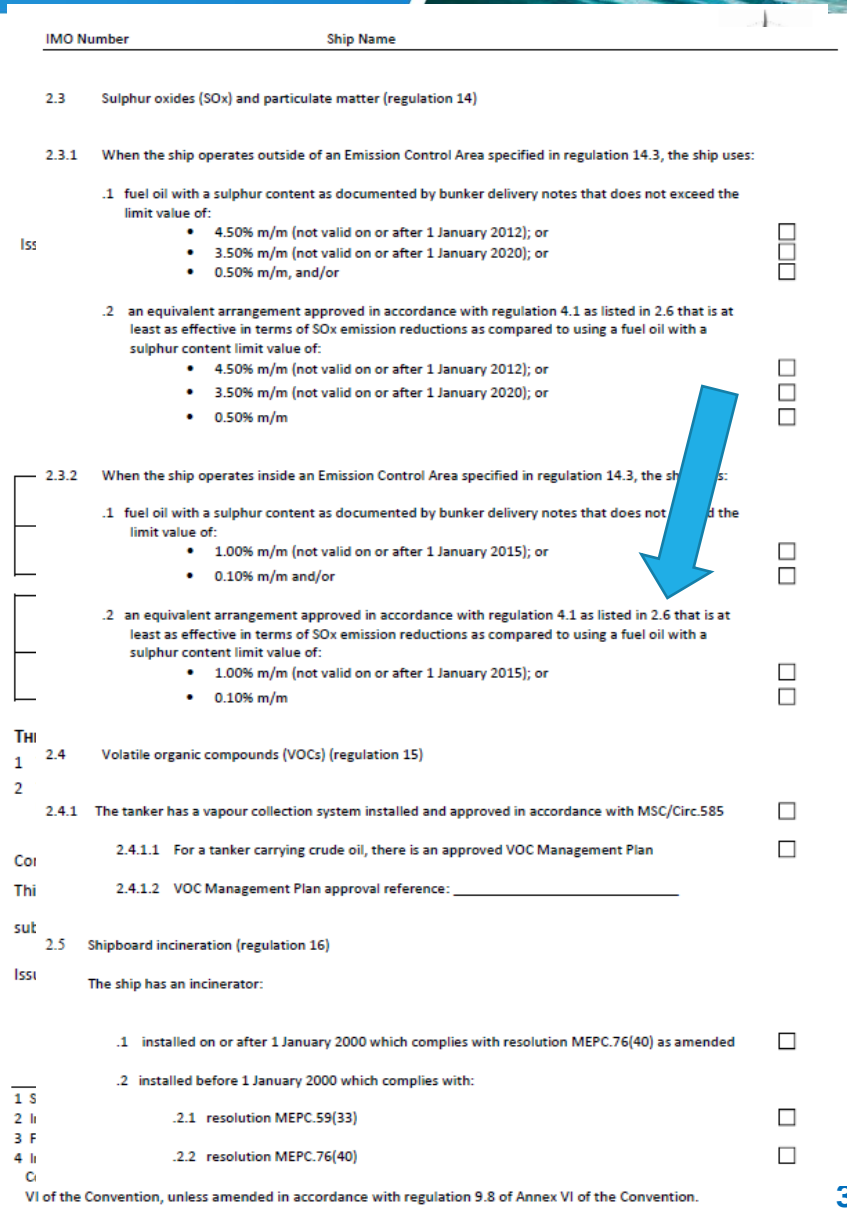
Documentation – IAPP

- Every ship of 400 gross tonnage must be issued with an International Air Pollution Prevention Certificate (IAPP Certificate). The Certificate should be valid for five years and must be drawn up at least in English, French or Spanish.
- The Supplement to the IAPP certificate details, in section 2, the way in which the control of emissions from the ship is achieved. Also, any “equivalent arrangements at least as effective in terms of SOx emission reductions”, or emission abatement methods, are specified in this document (section 2.6), if applicable.



IMO Number Ship Name

2.3 Sulphur oxides (SOx) and particulate matter (regulation 14)

2.3.1 When the ship operates outside of an Emission Control Area specified in regulation 14.3, the ship uses:

.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not exceed the limit value of:

- 4.50% m/m (not valid on or after 1 January 2012); or ☐
- 3.50% m/m (not valid on or after 1 January 2020); or ☐
- 0.50% m/m, and/or ☐

.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:

- 4.50% m/m (not valid on or after 1 January 2012); or ☐
- 3.50% m/m (not valid on or after 1 January 2020); or ☐
- 0.50% m/m ☐

2.3.2 When the ship operates inside an Emission Control Area specified in regulation 14.3, the sh s:

.1 fuel oil with a sulphur content as documented by bunker delivery notes that does not d the limit value of:

- 1.00% m/m (not valid on or after 1 January 2015); or ☐
- 0.10% m/m and/or ☐

.2 an equivalent arrangement approved in accordance with regulation 4.1 as listed in 2.6 that is at least as effective in terms of SOx emission reductions as compared to using a fuel oil with a sulphur content limit value of:

- 1.00% m/m (not valid on or after 1 January 2015); or ☐
- 0.10% m/m ☐

2.4 Volatile organic compounds (VOCs) (regulation 15)

2.4.1 The tanker has a vapour collection system installed and approved in accordance with MSC/Circ.585 ☐

2.4.1.1 For a tanker carrying crude oil, there is an approved VOC Management Plan ☐

2.4.1.2 VOC Management Plan approval reference: _____

2.5 Shipboard incineration (regulation 16)

The ship has an incinerator:

.1 installed on or after 1 January 2000 which complies with resolution MEPC.76(40) as amended ☐

.2 installed before 1 January 2000 which complies with:

.2.1 resolution MEPC.59(33) ☐

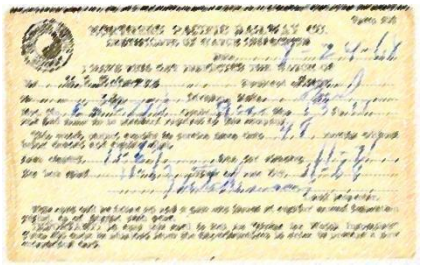
.2.2 resolution MEPC.76(40) ☐

VI of the Convention, unless amended in accordance with regulation 9.8 of Annex VI of the Convention.

Documentation – Tank Plans

- The capacity plan, tank sounding tables book or the stability information book may provide useful information during an inspection
- These plans help in identifying the fuel tanks on board and their capacities. Piping diagrams might also help to understand whether the fuel changeover has been undertaken properly, if the need arises to verify this.

National Preliminary Arrangements

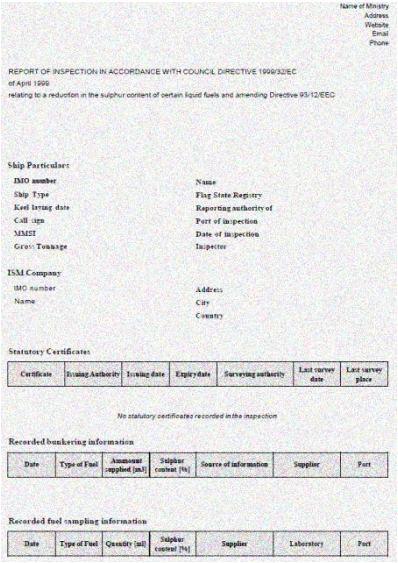


Sulphur Inspector Authorization
(IA Art.2)

ISO 17025 Accredited laboratory

Sampling Equipment
(IA Art.6.4)

Inspection Form
(Art.5.2)



REPORT OF INSPECTION IN ACCORDANCE WITH COUNCIL DIRECTIVE 1999/32/EC
of April 1999
relating to a reduction in the sulphur content of certain liquid fuels and amending Directive 93/12/EEC

Ship Particulars

IMO number	Name
Ship Type	Flag State Registry
Keel laying date	Reporting authority of
Call sign	Port of inspection
MMSI	Date of inspection
Gross Tonnage	Inspector

ISM Company

IMO number	Address
Name	City
	Country

Statutory Certificates

Certificate	Issuing Authority	Issuing date	Expiry date	Surveying authority	Last survey date	Last survey place

No statutory certificates recorded in the inspection

Recorded bunkering information

Date	Type of Fuel	Ammount supplied [m3]	Sulphur content [%]	Source of information	Supplier	Port

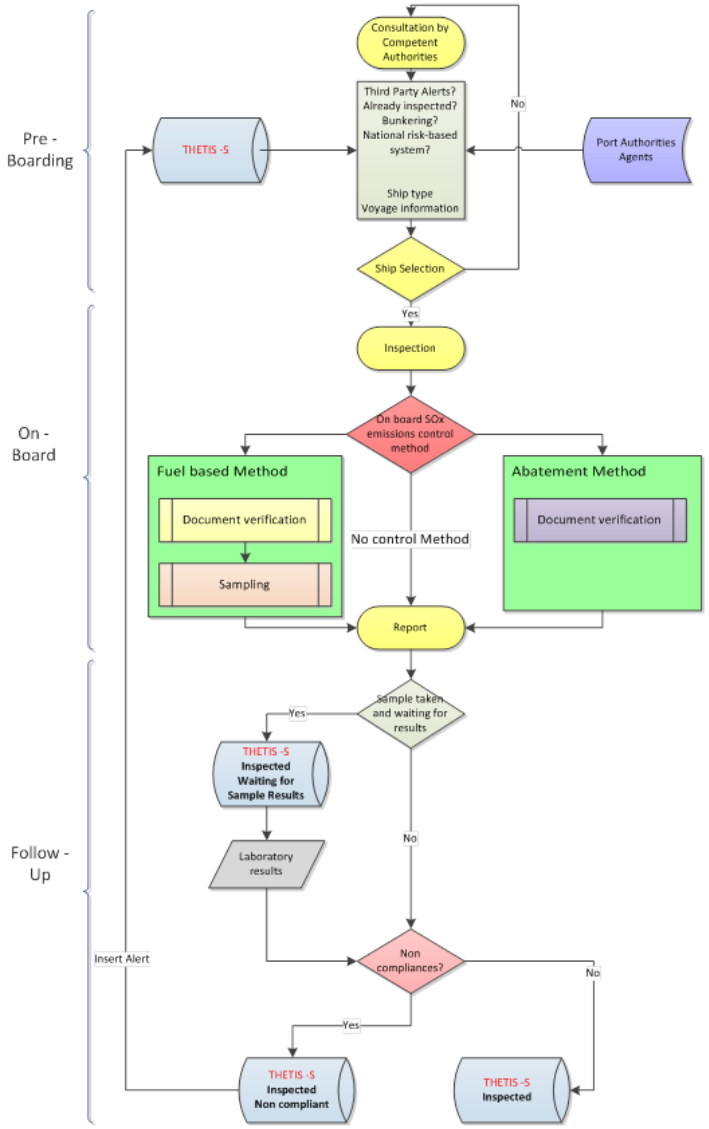
Recorded fuel sampling information

Date	Type of Fuel	Quantity [ml]	Sulphur content [%]	Supplier	Laboratory	Port

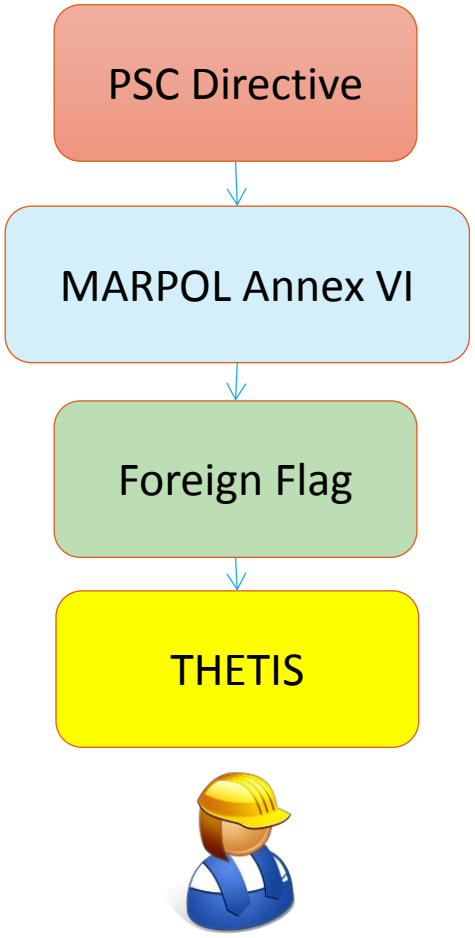
EMSA

Sulphur Inspection – Sequence

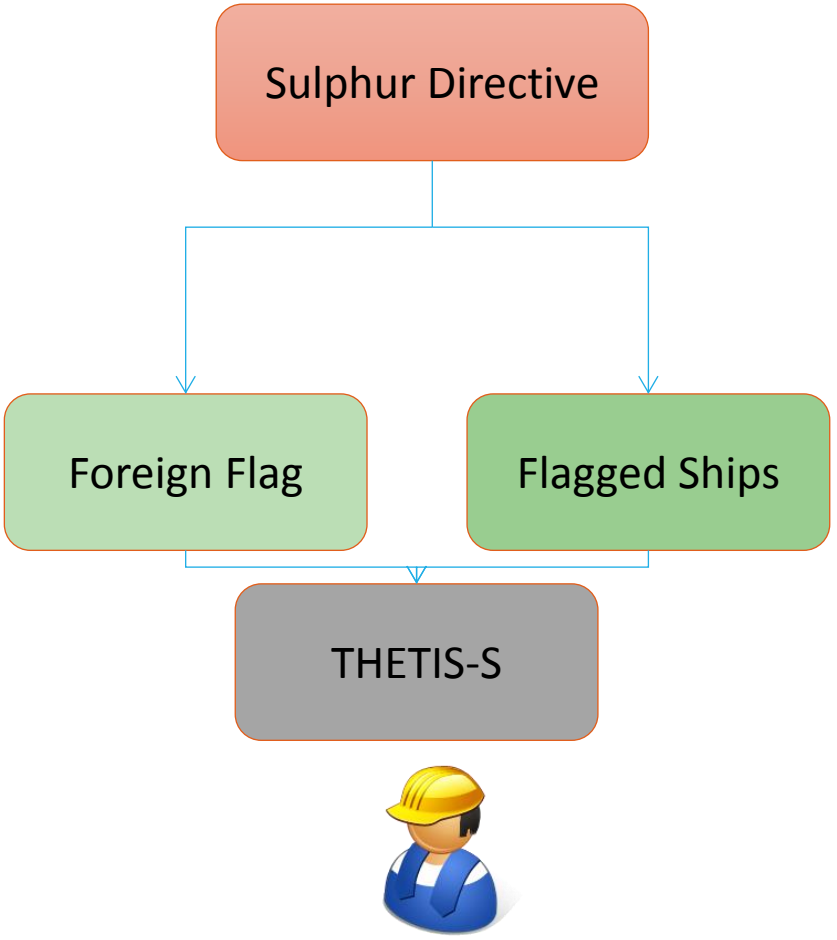
- **Pre-boarding**
  - Ship information
  - Ship selection
- **On board**
  - Preliminary verifications
  - Inspection of a ship using a fuel based compliance method
  - Inspection of a ship using an abatement method
  - Sample collection and analysis
- **Follow-up**
  - Non-compliances with the Directive
  - Reporting the findings of the Sulphur Inspection



Sulphur Inspection vs Port State Control



PSC Officer



Sulphur Inspector

Thank you!

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