MARAN GAS MARITIME INC.

MARPOL

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ISALOS Summer courses

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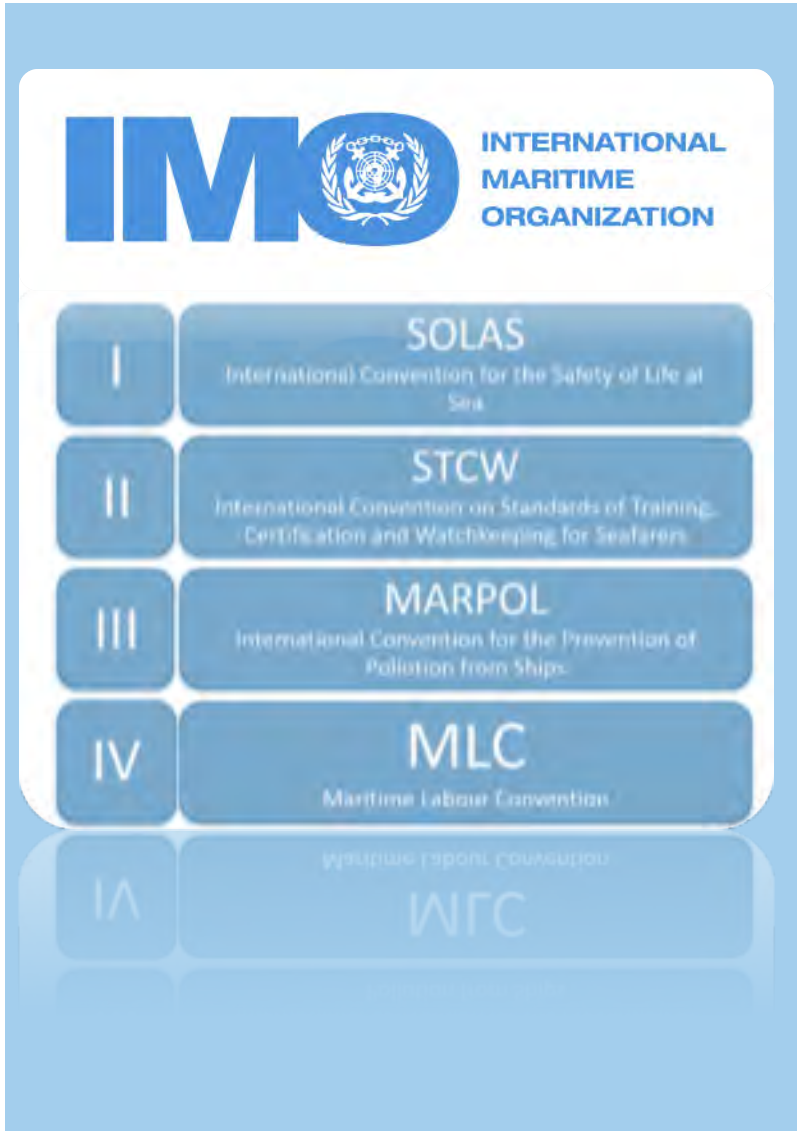
Objectives of the presentation

- Placing MARPOL in the wider context of International regulations,
- Understanding How and Why MARPOL was created,
- Presenting the basic elements, (ANNEXES).

The Four Pillars

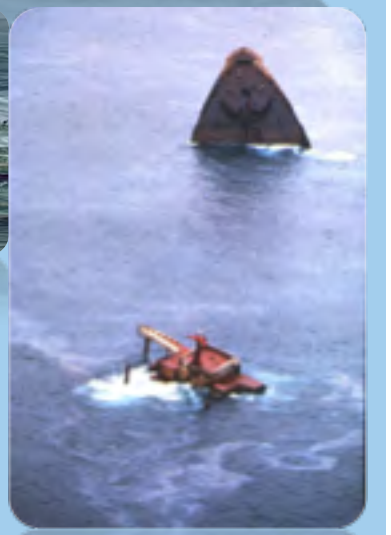


The shipping industry aims to achieve the highest standards of health, safety and environment protection by implementing four international maritime law regulations set by the IMO:

- The 'International Convention for the Safety Of Life At Sea' (SOLAS);
- The 1978 International Convention on 'Standards of Training, Certification and Watch-keeping' (STCW);
- **The 'International Convention for the Prevention of Pollution from Ships' (MARPOL) ;**
- And the 'Maritime Labour Convention' (MLC).

To this end, these Conventions are characterized as *the four 'pillars of the international regulatory regime for quality shipping'*.

MARPOL Intro: Looking back in History



Torrey Canyon | 1967

- 1959 US built, 60,000 dwt, Liberian-flagged
- Jumboized to 120,000 dwt
- Cargo 120,000 ts of BP oil for Milford Haven
- **Navigational error** (shortcut near Seven Stones reef off the coast of Cornwall) caused grounding and ripped open **6 tanks**
- 31,000,000 gallons of oil leaked
- Oil spread all between England & France

Amoco Cadiz | 1978

- 1974 built Amoco Cadiz carrying 227,000 tonnes of crude oil
- **Steering gear failure** caused grounding off the coast of Brittany, France
- The whole cargo spilled out as the breakers spilt the vessel in two, progressively polluting 360 km of shoreline
- At the time this was the largest oil spill by tanker ever registered.

Introduction of MARPOL

Because of such accidents, the Convention for the Prevention of Marine Pollution was introduced.

- The MARPOL convention is the main international convention covering the prevention of pollution of the marine environment by ships from **operational** or **accidental** causes (by oil & other harmful substances).
- It is a combination of **two treaties** in 1973 and 1978 respectively and updated by amendments through the years.

Features:

- **Six technical Annexes**
- **Special areas** with strict(er) controls on operational discharges are included in most Annexes – *based on oceanographical and ecological condition and to their sea traffic.*

MARPOL 73/78 ANNEXES

- **ANNEX I:** Prevention of Pollution by **Oil** (October 1983)
- **ANNEX II:** Control of Pollution by **Noxious Liquid Substances** in Bulk (April 1987)
- **ANNEX III:** Prevention of Pollution by **Harmful Substances** Carried by Sea in **Packaged** Form (July 1992)
- **ANNEX IV:** Prevention of Pollution by **Sewage** from Ships (September 2003)
- **ANNEX V:** Prevention of Pollution by **Garbage** from Ships (December 1998)
- **ANNEX VI:** Prevention of **Air Pollution** from Ships (May 2005)

Annex I – Oil

EXXON VALDEZ (1989) – Grounding, 11 million gallons at sea, (triggered OPA, SOPEP)

ERIKA (1999)- broke in two during a severe storm close to Brittany, 20,000 tn oil spill, (accelerated single hull phase out)

Prestige (2002) –sunk -20 million gallons spill

- The annex covers the prevention of pollution by oil from operational measures as well as from accidental discharges.
- 39 regulations in 7 chapter to regulate oil pollution from ships:
  - Ship design intended to minimize oil discharge into the ocean during operation and in case of emergency,
  - Ship operation
- In 1992 amendments it was made mandatory for new oil tankers to have double hulls and brought in a **phase-in schedule for existing tankers to fit double hulls** (revised also in 2001 and 2003).

Why is it important ???

An example:

An escape of only 1,000 tons of crude oil at sea would:

- Create a spill of 10 km^2,
- Oil will emulsify to reach a quantity of 2,800 tons,
- If this quantity comes ashore it could generate up to 10,000 – 30,000 tons of oily waste!!!!

Annex II – Noxious Liquid Substances in Bulk

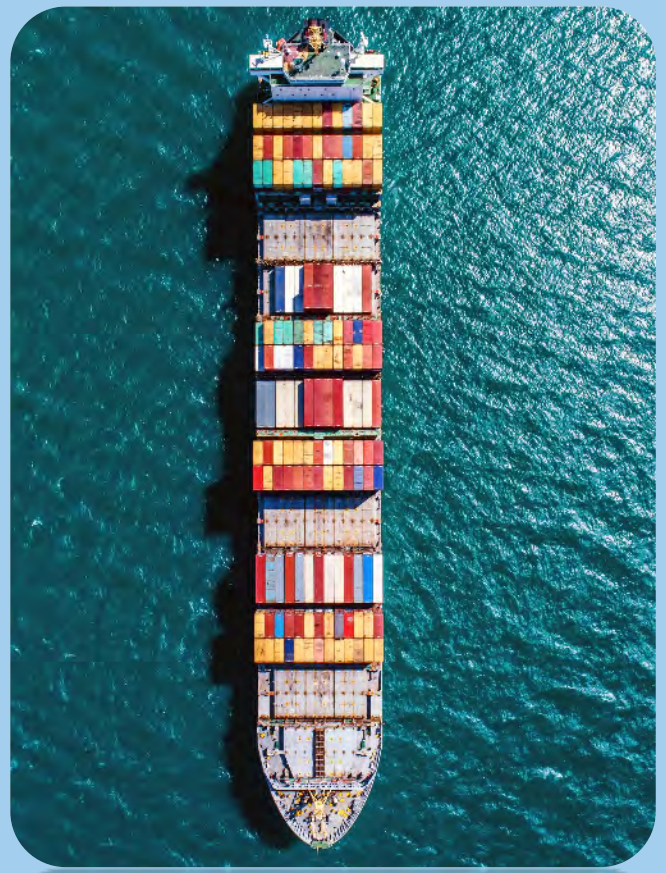
A substance other than oil which, if introduced into the marine environment is likely to create hazards to human health, to harm living resources and marine life.

- The annex sets provisions for the design and construction, the equipment and the operation of chemical tankers, and contributes towards the environmentally sound transportation of noxious liquid substances in bulk.

- Basic principles of MARPOL annex II are:
  - Safe containment of the noxious liquid substances,
  - dilution of discharges and
  - limitation of discharges into the sea.

The **International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code**) works as a supplement to MARPOL annex II.

Annex III – Harmful Substances carried by sea in Packaged Form

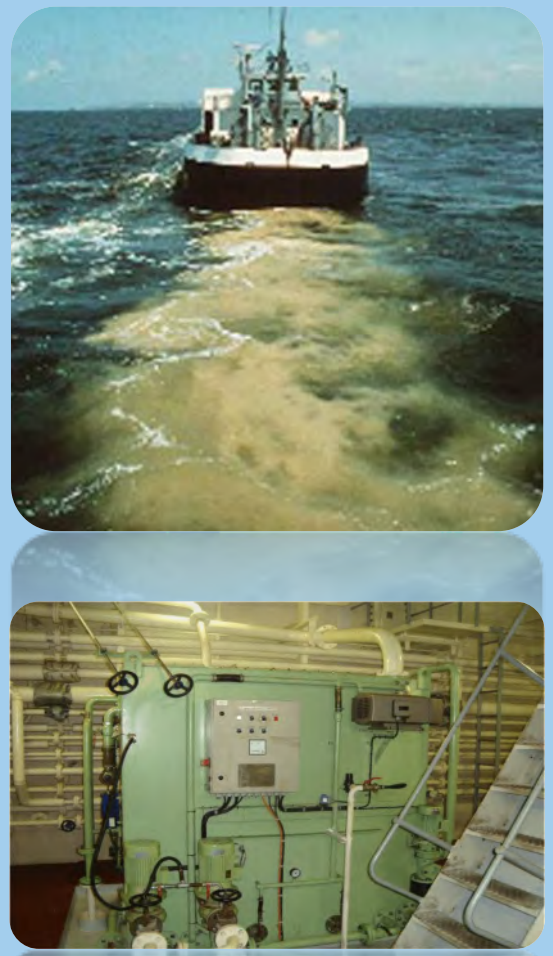


- The annex contains regulations which include requirements for the standards on packing, marking, labeling, documentation, stowage, quantity limitations, exceptions and notifications for preventing pollution by noxious substances

- It aims to prevent or minimize pollution of the marine environment by harmful substances in packaged forms or in freight containers, portable tanks or road and rail tank wagons, or other forms of containment specified in the schedule for harmful substances in the International Maritime Dangerous Goods (IMDG) Code.

- There may be following sources of pollution (on containerships):
  a. Pollution from hold bilges (contaminated with cargo / oil seepage)
  b. Pollution from loss overboard of harmful packaged goods (Marine Pollutant as in IMDG Code)

Annex IV – Sewage from ships



Sewage treatment plant on board a ship.

Drainage and other wastes from any form of toilets, medical premises and from spaces containing living animals.

- Annex IV contains a set of regulations regarding the discharge of sewage into the sea from ships, including regulations regarding the ships' equipment and systems for the control of sewage discharge, the provision of port reception facilities for sewage, and requirements for survey and certification.

- It is generally considered that on the high seas, the oceans are capable of assimilating and dealing with raw sewage through natural bacterial action. Therefore, the regulations in Annex IV of MARPOL prohibit the discharge of sewage into the **sea within a specified distance from the nearest land**, unless otherwise provided.

- Governments are required to ensure the provision of adequate **reception facilities at ports and terminals** for the reception of sewage, without causing delay to ships.

Annex V – Garbage

- Annex V aims to eliminate the amount of garbage being discharged into the sea from ships, and is applicable to all types of vessels.
- **GARBAGE** refers to all kinds of food, domestic and operational waste, all plastics, cargo residues, incinerator ashes, cooking oil, fishing gear, animal carcasses and **e-waste** generated during the normal operation of the ship and liable to be disposed of continuously or periodically.
- Annex V requires procedures for minimizing, collecting, storing, processing and disposing of garbage, including the use of the equipment on board
- The effectiveness of ships to comply with the discharge requirements depends largely upon the availability of adequate port reception facilities, especially within special areas.

Why is it important ???

Annex V – Garbage

Garbage type[1]	All ships except platforms[4]		Offshore platforms located more than 12 nm from nearest land and ships when alongside or within 500 metres of such platforms[4] Regulation 5
	Outside Special Areas and Arctic waters Regulation 4 (Distances are from the nearest land)	Within Special Areas and Arctic waters Regulation 6 (Distances are from nearest land, nearest ice-shelf or nearest fast ice)	
Food waste comminuted or ground[2]	≥ 3 nm, en route and as far as practicable	≥ 12 nm, en route and as far as practicable[3]	Discharge permitted
Food waste ***not*** comminuted or ground	≥ 12 nm, en route and as far as practicable	Discharge prohibited	Discharge prohibited
Cargo residues[5,6] not contained in washwater	≥ 12 nm, en route and as far as practicable	Discharge prohibited	Discharge prohibited
Cargo residues[5,6] contained in washwater		≥ 12 nm, en route and as far as practicable (subject to conditions in regulation 6.1.2 and paragraph 5.2.1.5 of part II-A of the Polar Code)	
Cleaning agents and additives[6] contained in cargo hold washwater	Discharge permitted	≥ 12 nm, en route and as far as practicable (subject to conditions in regulation 6.1.2 and paragraph 5.2.1.5 of part II-A of the Polar Code)	Discharge prohibited
Cleaning agents and additives[6] in deck and external surfaces washwater		Discharge permitted	
Animal Carcasses (should be split or otherwise treated to ensure the carcasses will sink immediately)	Must be en route and as far from the nearest land as possible. Should be >100 nm and maximum water depth	Discharge prohibited	Discharge prohibited
All other garbage including plastics, synthetic ropes, fishing gear, plastic garbage bags, incinerator ashes, clinkers, cooking oil, floating dunnage, lining and packing materials, paper, rags, glass, metal, bottles, crockery and similar refuse	Discharge prohibited	Discharge prohibited	Discharge prohibited

Annex VI – Air pollution

The international air pollution requirements of Annex VI establish limits on:

- **CO_2** emissions from ships;
- **Nitrogen oxide(NOx)** emissions from diesel engines;
- **Sulphur oxide (SOx)** emissions from ships;
- Emissions from **ozone depleting substances** from refrigerating plants and fire fighting equipment;
- **Volatile organic compounds** emissions from cargo oil tanks of oil tankers;
- Emissions from **shipboard incinerators**;
- **Fuel oil quality**.

Why is it important ???

AIR EMISSIONS

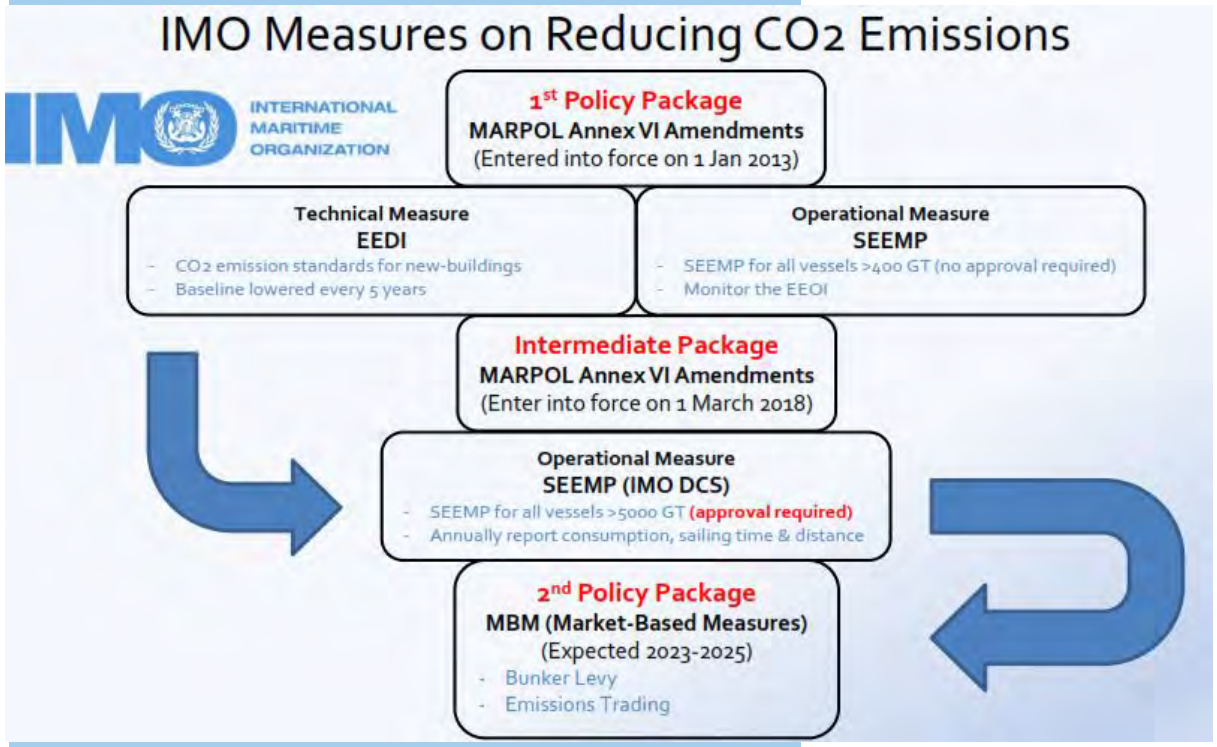
Air emissions by shipping, such as carbon dioxide (CO2), sulphur dioxide (SOx), nitrogen oxide (NOx), particulates and non-methane hydrocarbons, are known to contribute to **global warming, acid rain, eutrophication, rising levels of ground level ozone, affecting ecosystems and human health**.

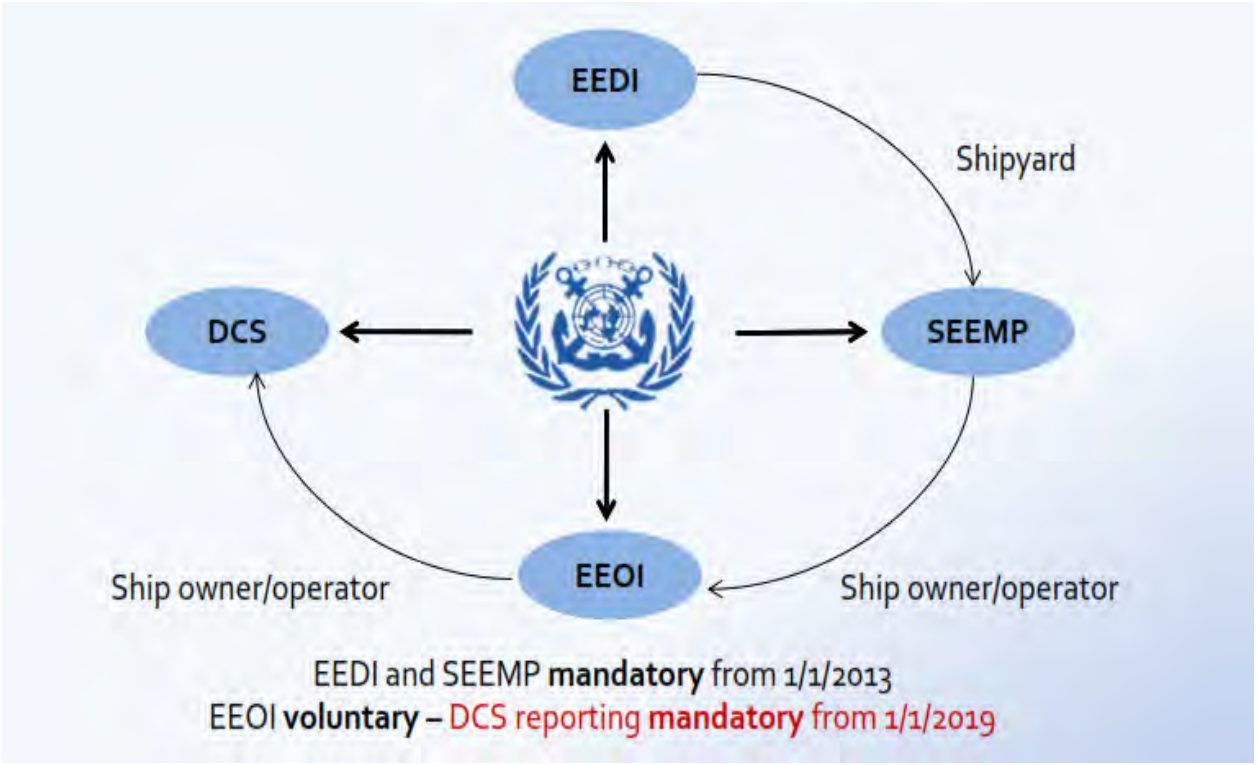
It is estimated that shipping accounts for:

- 3 % of CO2 emissions;
- 7 % of SOx emissions; and
- 10-15 % of NOx emissions
- *while carrying 90% of international goods*.

New Regulations – CO2 emissions

IMO measures on reducing CO2 emissions





EU MRV & IMO DCS

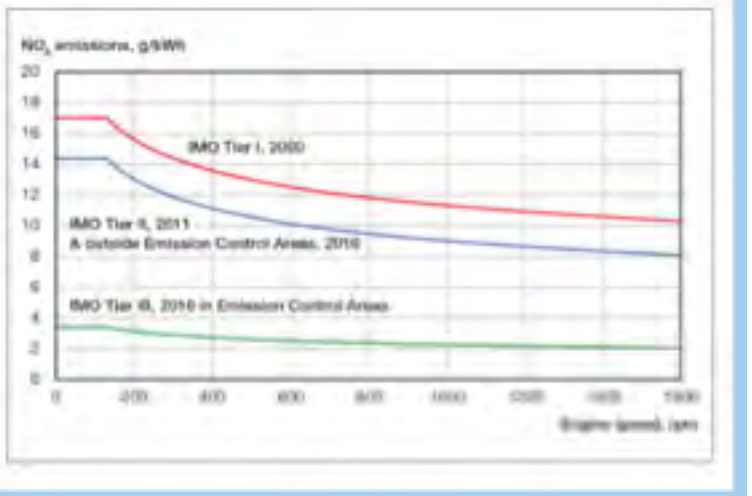
EU MRV (monitoring, reporting and verification of CO2 emissions)

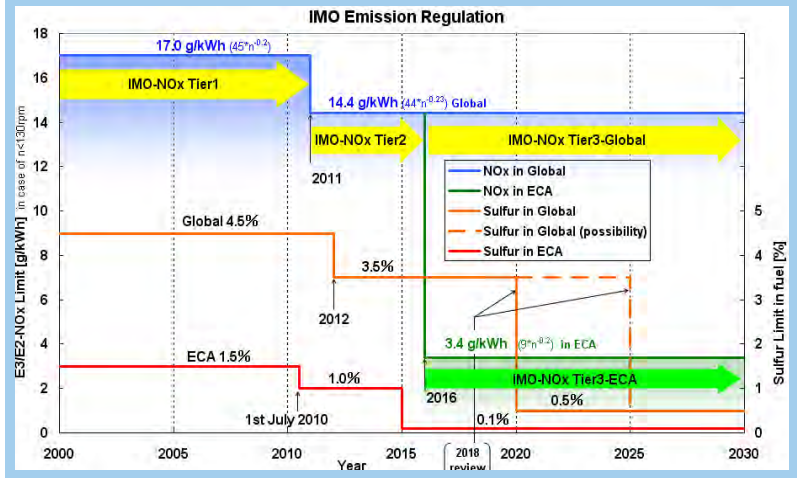
- EU-wide system for the monitoring, reporting and verification (MRV) of CO2 emissions from large ships. (July 2015)
- CO2 emissions monitored per voyage and on annual basis for any voyage including a EU port. (January 2018)
- Company to submit annual emission report to EU and Flag State. (From 2019)

IMO DCS (Data collection system)

- "IMO Data Collection System (DCS)" (Marpol Annex VI Amendments), (March 2018:
- SEEMP to include methodology to collect the fuel consumption. Confirmation of compliance by Administration (Flag or Class) (Dec 2018)
- Annual emission report submitted to verifier; (Data Collection from Jan. 2019).

NOx & SOx Emissions





NOx

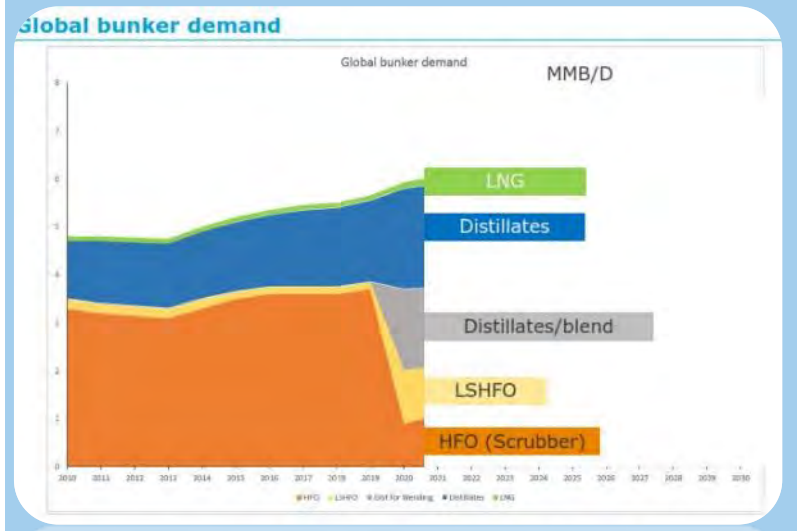
- NOx gases are formed during the **combustion process from diesel engines**,
- MARPOL Annex VI has adopted NOx exhaust emissions standards; **IMO Tier I, Tier II** (engines installed in ships constructed after Jan 2011) and **Tier III** (after 2016).

SOx

- Sulphur Oxides – SOx – stems from the sulphur content in the **fuel oil**, sulphur is not incinerated by the combustion process.

IMO 2020 0.5% Sulphur Cap

The Challenge !!!



Limits on Sulphur Regulations:

- Current Global Limit : **3.5%** m/m
- From 1 Jan. 2020: **0.5%** Sulphur or approved equivalent
- ECA Limit will remain 0.1% m/m

What are the options for compliance?

- 0.5% "VLSFO": (Not available yet)
- HFO + Scrubber
- LNG (or other alternative fuel)

What about fuel availability?

- Marine Fuel demand vs Refineries distillation

Thank you!

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