



Regulations that enforce reduction of marine- and air pollution from ships



Maritime Competence and Innovation Skagerrak & Kattegat

FOCUS ON GREENER SHIPPING

Simultaneously with the growth of maritime transport, awareness of the influence of such maritime transport on the environment has increased, resulting in the creation of international regulatory framework to govern shipping's influence on the environment.

This pamphlet describes a number of the areas where such regulations enforce reduction of marine- and air pollution from Ships. The main idea is, that the fulfilment of the regulations will require new ideas, new products, new services, new cooperations etc. - and herein lies uncountable possibilities for the maritime service industry, whether main supplier with extensive R&D activities or smaller service provider.

PREVENTION OF AIR POLLUTION- MARPOL ANNEX VI

IMO's adoption of MARPOL Annex VI, limits the main air pollutants contained in ships exhaust gas, including sulphur oxides (SOx) and nitrous oxides (NOx), and prohibits deliberate emissions of ozone depleting substances.

A progressive reduction in emissions of SOx, NOx and particulate matter is introduced and so are emission control areas (ECAs) where the emission of NOx as well as SOx and particulate matter is further restricted.

MARPOL Annex VI sets limits on NOx and SOx emissions from ship exhausts, and prohibits deliberate emissions of ozone depleting substances.

	2011 Jan apr jul sep	2012 Jan apr jul sep	2013 Jan apr jul sep	2014 Jan apr jul sep	2015 Jan apr jul sep	2016 Jan apr jul sep	2017 Jan apr jul sep
MARPOL Convention							
Annex VI: Prevention of air pollution from ships		Revised Annex VI entered into force July 2010					
New ECA-SOx			North America ECA/SOx August 1. 2012				
				Caribbean ECA-SOx December 2013			
Controls inside ECA-SOx	Max. Sulphur content limit reduced 1.0 % m/m (july 1, 2010)					Max. Sulphur content limit reduced 0.1 % m/m January 1. 2015	
Controls outside ECA-SOx			Max. Sulphur content limit reduced 3.5 % m/m (july 1. 2012)				
Alternative equivalent Soc controls	Exhaust gas cleaning system approved inside and outside ECA-SOx (July 1. 2010)						
NOx controls-new construction	Tier II controls January 2011					Tier II controls January 2016	
ECA-NOx						North America ECA-NOx 2016	
Nox controls-ships constructed january 1, 1990-December 31, 1999	Approved method available Okt. 2010						
Ozone Depleting Substances (ODS) Record Book	ODS record book July 2010						
Volatile Organic Compounds (VOC) Management Plan	VOC record book July 2010						

EMISSION CONTROL AREAS

Two sets of emission and fuel quality requirements are defined by Annex VI: (1) global requirements, and (2) more stringent requirements applicable to ships in Emission Control Areas (ECA).

Existing Emission Control Areas include:

1. Baltic Sea (SO_x, adopted: 1997 / entered into force: 2005). Figure 1.
2. North Sea (SO_x, 2005/2006). Figure 1.
3. North American ECA, including most of US and Canadian coast (NO_x & SO_x, 2010/2012). (Figure 2).
4. United States Caribbean ECA. According to an amendment dating of July 2011, MARPOL Annex VI will include waters adjacent to Puerto Rico and Virgin Islands (Figure 3).

Figure 1
SO_x Emission Corntol Areas

Top:

The existing North Sea-Baltic Sea ECA.

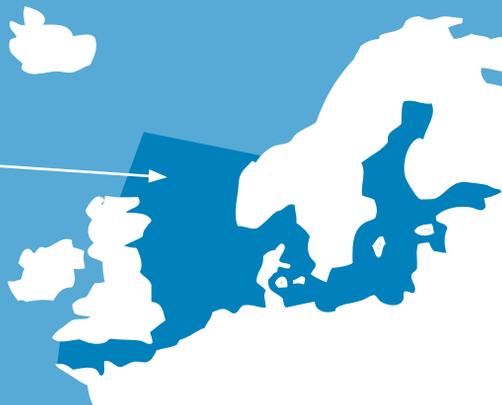
Bottom:

*The North American ECA
(200 nautical miles from coast),
not already in place.*

Source: Rydbergh (2010).

North Sea-Baltic Sea

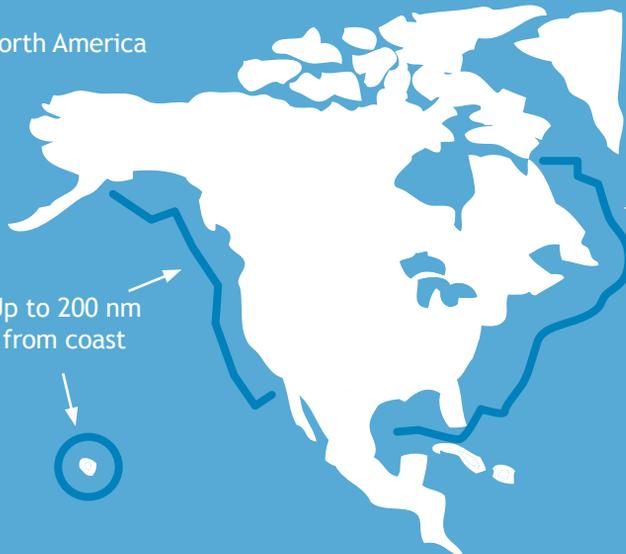
The new SECA zone
marked by
dark blue area



North America

Up to 200 nm
from coast

Up to 200 nm
from coast

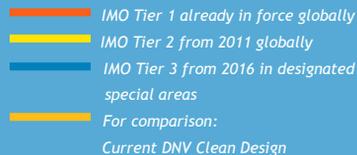


NOX EMISSION STANDARDS

NOx emission limits are set for diesel engines depending on the engine maximum operating speed (n, rpm), as shown in Table 1.

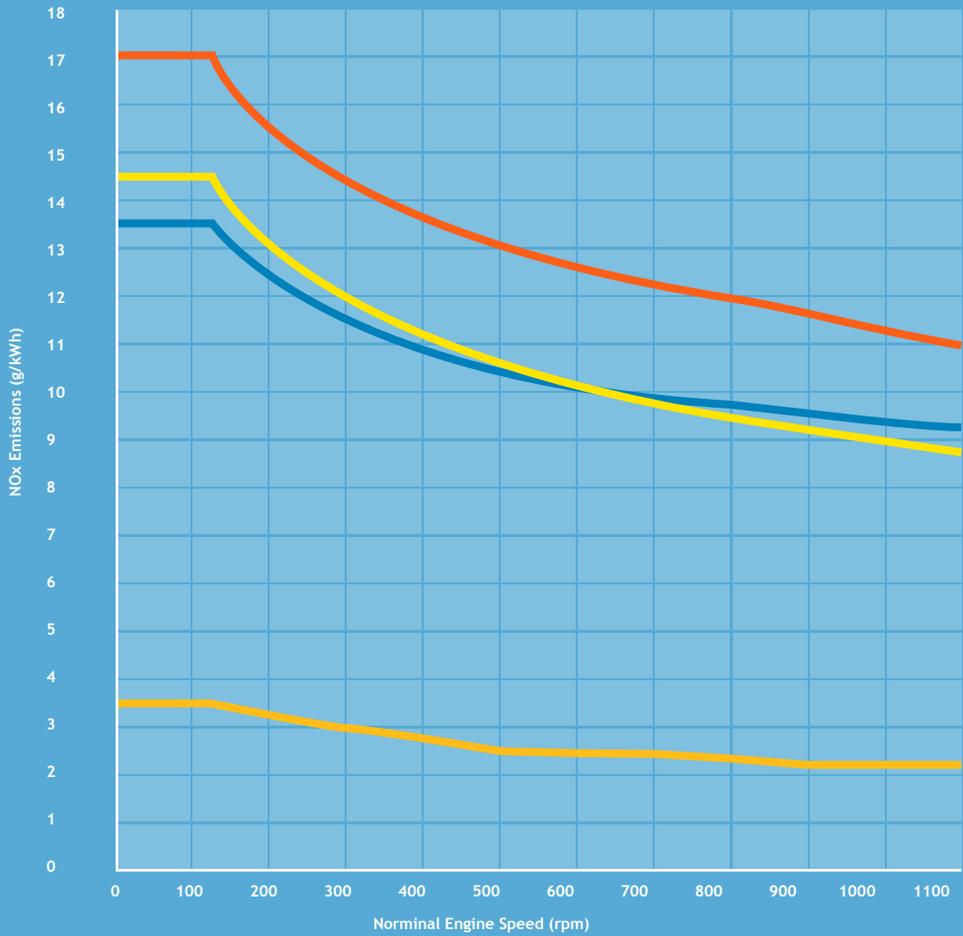
Tier I and Tier II limits are global, while the Tier III standards apply only in NOx Emission Control Areas.

Table 1
Marine Engine NOx regulations



Source: Environment and Transport Canada January 2009.

http://www.ecy.wa.gov/programs/air/Doug/AndrewGreen_NAmericaEmissionsControlArea.pdf



SULFUR CONTENT OF FUEL

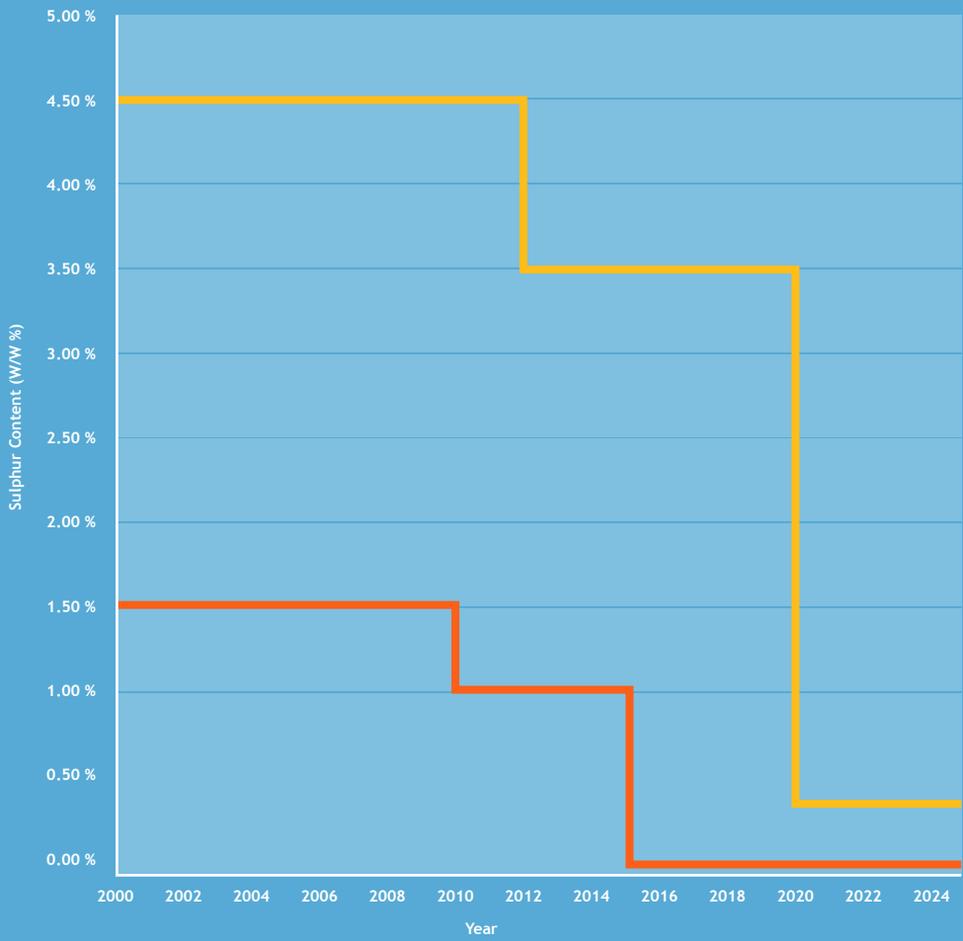
Caps on sulfur content of fuel oil as a measure to control SO_x emissions and, indirectly, PM (Particulate Matters) emissions (there are no explicit PM emission limits).

Special fuel quality provisions exist for SO_x Emission Control Areas (SO_x ECA or SECA). The sulfur limits and implementation dates are listed in Table 2.

Table 2
Sulphur content regulation timelines

 Marine Global
 ECA

Source: Environment and Transport Canada January 2009.
http://www.ec.gc.ca/programs/air/Doug/AndrewGreen_NAmericaEmissionsControlArea.pdf



THE CONTROL OF GREENHOUSE GAS EMISSIONS

IMO recognizes the increasing importance and urgency to control greenhouse gas (GHG) emissions worldwide.

Carbon dioxide is the most important GHG emitted by ships, both in terms of quantity and of global warming potential.

Regulations are adopted on energy efficiency for ships to make mandatory the Energy Efficiency Design Index (EEDI), for new ships, and the Ship Energy Efficiency Management Plan (SEEMP) for all ships by Parties to MARPOL Annex VI, representing the first ever mandatory global greenhouse gas reduction regime for an international industry sector.

CONTROL OF HARMFUL ANTI-FOULING SYSTEMS

Ships' hulls need to be kept smooth from marine growth to ensure maximum performance and full efficiency. In the past, many of the coatings used were themselves harmful to the marine environment.

The IMO's International Convention on the Control of Harmful Anti-fouling Systems on Ships, which entered into force in September 2008, prohibits the use of harmful organotins in antifouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.



BALLAST WATER MANAGEMENT EMISSIONS

All ships need to carry ballast water to keep them stable in the water. The taking-up of ballast water from one part of the world and discharging it else-where can introduce aquatic nuisance species. In 2004, IMO adopted the International Convention for the Control and Management of Ships' Ballast Water and Sediments, which, when in force, will require all ships to carry out ballast water management procedures to a given standard.

30 countries have now signed and the next are expected in 2012, whereby the required 35% of the world tonnage is covered and the convention will be mandatory for different ship types, building year and ballast water treatment or exchange method over the period 2012-2016.

HANDLING AND CONTROLLING GARBAGE PRODUCED ON A SHIP'S VOYAGE

The enforcement of when and where to dispose of all types of wastes produced on a ship's voyage has become better regulated through MARPOL Annex V (Gar-bage). Perhaps the most important feature of the Annex is the complete ban imposed on the dumping into the sea of all forms of plastic.

However, although the Annex obliges Governments to ensure adequate provision of facilities at all ports and terminals for the reception of garbage, more work needs to be done to ensure availability of adequate garbage reception facilities in every port. Hence, IMO has instigated an "Action Plan on tackling the inadequacy of port reception facilities".

Despite actions taken nationally and internationally, the situation with regard to marine litter is continuously getting worse according to the [United Nations Environment Programme \(UNEP\)](#).



SHIP RECYCLING

When ships reach the end of their working lives, recycling is undoubtedly the most environmentally friendly way to dispose of them. Many of the components and much of the steel is re-used. However, there are concerns about environmental and working conditions in ship recycling yards and in view of this, IMO took action to develop a realistic and effective solution to some of these concerns.

The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (the Hong Kong Convention) is aimed at ensuring that ships, when being recycled after reaching the end of their operational lives, do not pose any unnecessary risk to human health and safety or to the environment.

CONCLUSION

To meet the regulations described above, and to meet further global and local restrictions, there are numerous ways, methods and technologies. This is a huge challenge for the shipping industry and at the same time it is a sea of opportunities for the marine industry. Products, rebuilding, retrofitting, consultancy, design, test and approval etc. etc.



Maritime Competence and Innovation Skagerrak & Kattegat

MARKIS is a maritime competence and innovation collaboration project in the Skagerrak & Kattegat region.

Over a three-year period businesses, research and education institutions and public authorities will work together to make the Skagerrak and Kattegat region a global frontrunner in the conversion to sustainable shipping.

The vision is to create a region with zero harmful emissions to air and water from shipping and a globally competitive maritime cluster.

Read more about MARKIS at:
www.markis.eu

Markis project is fonded by:



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