

KR Technical Seminar

Air Pollution from Ships

Convention & Legislation Service Team
Korean Register

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Emission Control Area

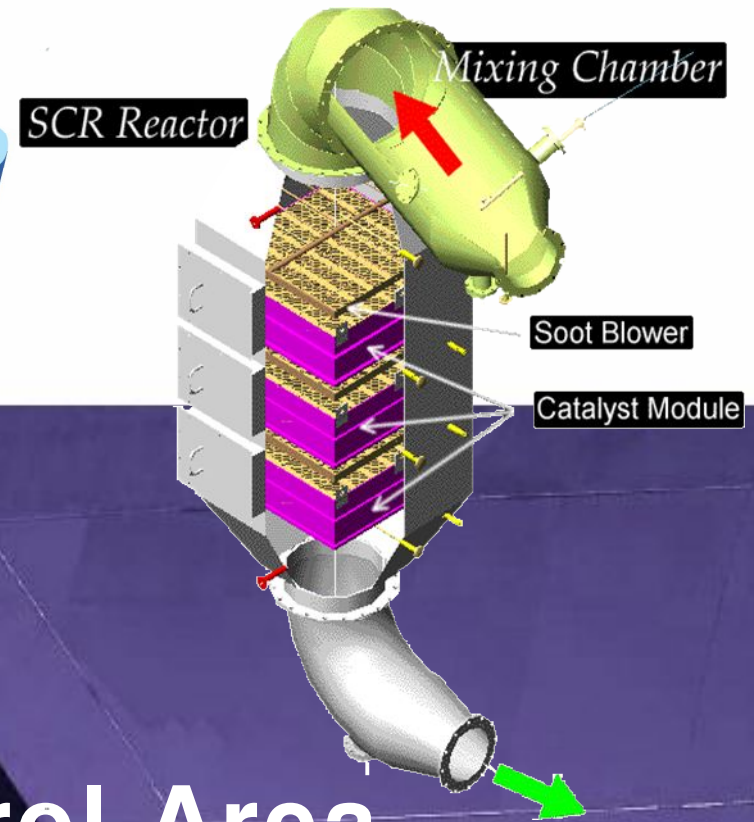
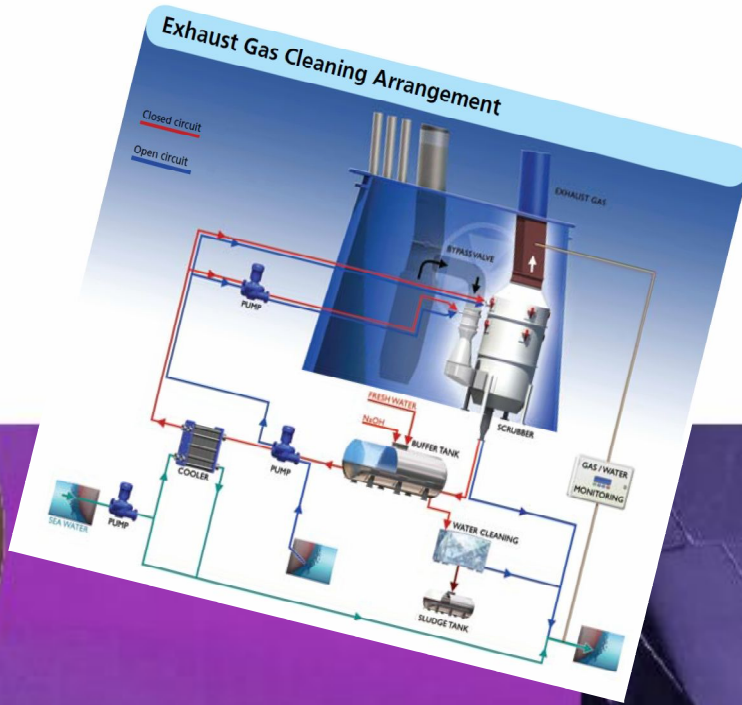
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1. Emission Control Area



1. Emission Control Area



● Sulphur Oxides Emission Control Area (North Sea and Baltic Sea)



● The requirements within North and Baltic Sea on sulphur contents

Sulphur content	Effective Date
1.5 % m/m	Date < 1 Jul. 2010
1.0 % m/m	1 Jul. 2010 ≤ Date < 1 Jan. 2015
0.1 % m/m	1 Jan. 2015 ≤ Date

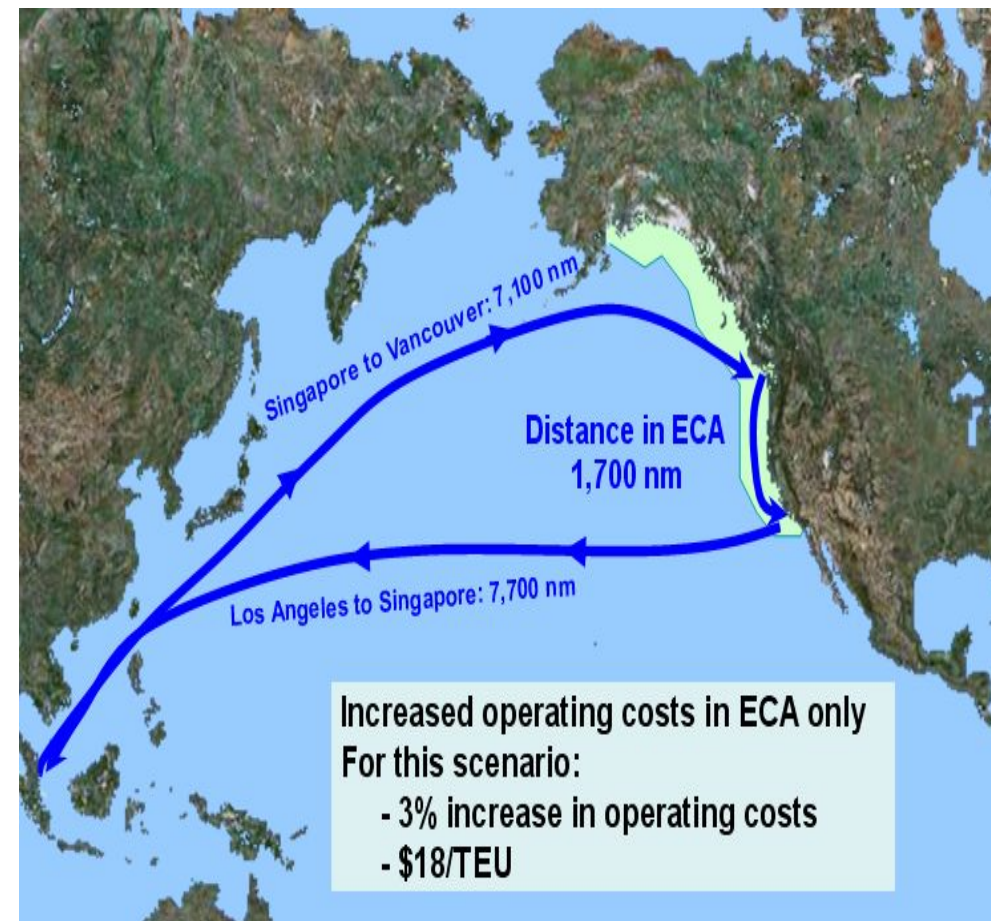
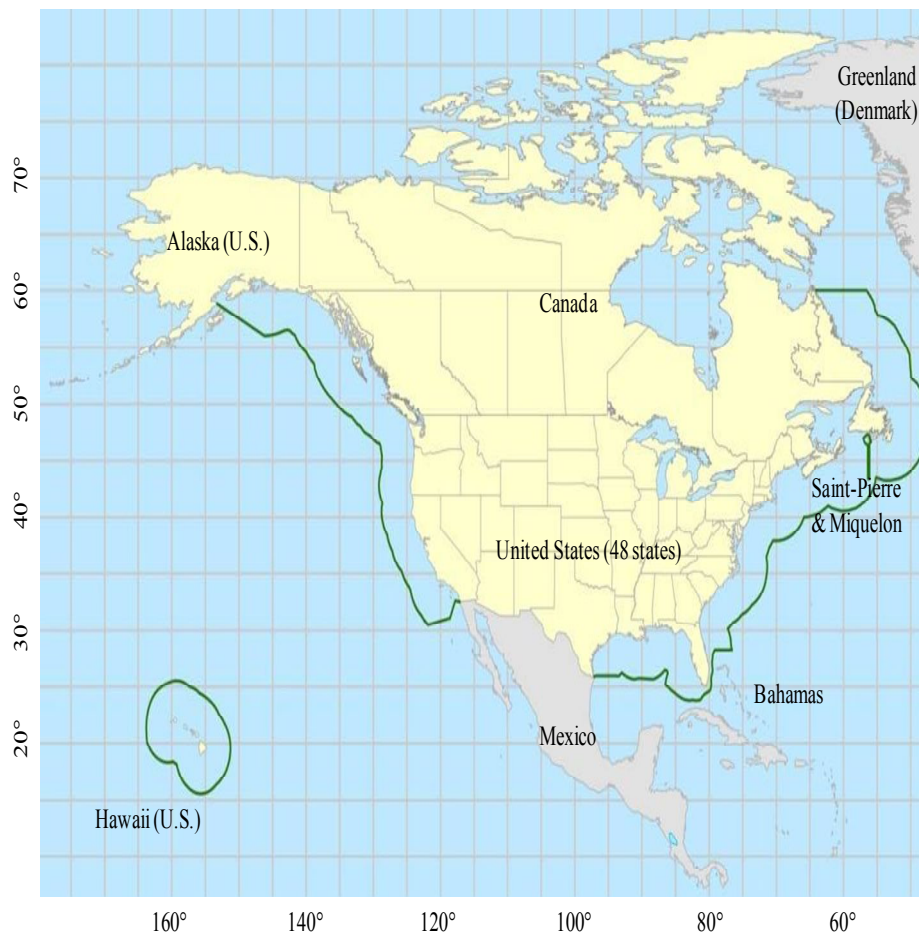
1. Emission Control Area



- **Nitrogen and Sulphur Oxides Emission Control Area (North American)** – adopted by Res.MEPC.190(60) : effective from **1 August 2011**

- **Amendments to Reg.13 and Reg.14 of MARPOL Annex VI**

- **Ripple effect throughout the ships economy**



1. Emission Control Area



● Adopted by Res.MEPC.190(60) – Effective from 1 August 2011

● Reg.14 (SOx) amended by Res.MEPC.190(60)

(enter into force on 1 August 2011)

North American area (before 1 Aug. 2012)

Sulphur content	Effective Date
4.5 % m/m	Date < 1 Jan. 2012
3.5 % m/m	1 Jan. 2012 ≤ Date < 1 Aug. 2012

North American emission control area (on or after 1 Aug. 2012)

Sulphur content	Effective Date
1.0 % m/m	1 Aug. 2012 ≤ Date < 1 Jan. 2015
0.1 % m/m	1 Jan. 2015 ≤ Date

Amendments by Res.MEPC.190(60) are effective from 1 August 2011. However, in accordance with paragraph 7 of this requirement, during the first 12 months following an amendment designating a specific Emission Control Area, ships operating in that Emission Control Area are exempt from the requirements.

1. Emission Control Area



● Revised MARPOL Annex VI text adopted

Res.MEPC.202(62) - Effective: 1 January 2013

USA additional Emission Control Area proposal adopted

The MEPC 62 adopted a proposal to designate certain waters **adjacent to coasts of Puerto Rico (United States) and the Virgin Islands (United States) as an ECA** for the control of emissions of nitrogen oxide (NO_x), sulphur oxide (SO_x), and particulate matter under MARPOL Annex VI Regulations for the prevention of air pollution from ships

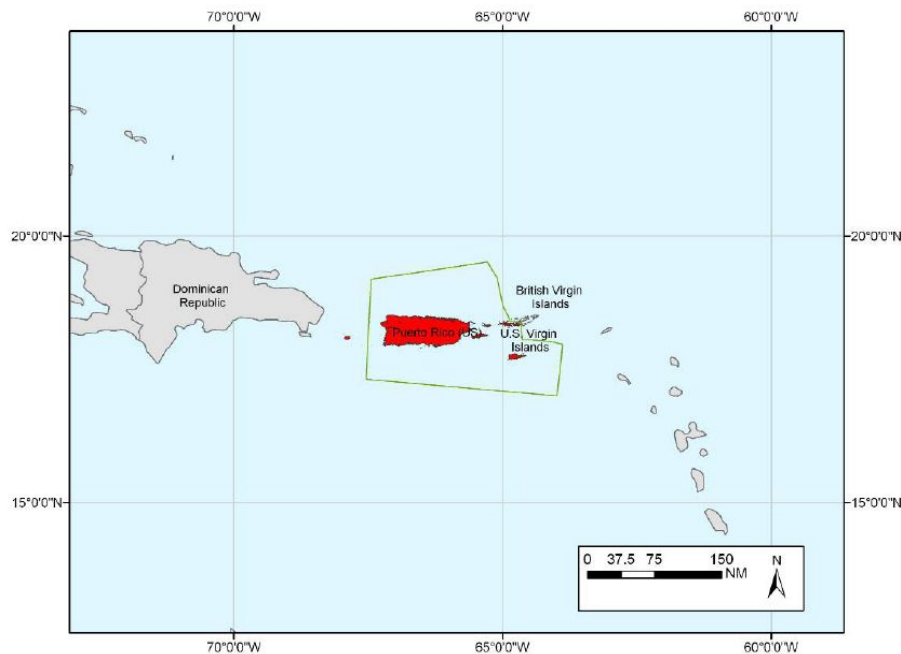


Figure 2-1: Area Proposed for ECA Designation

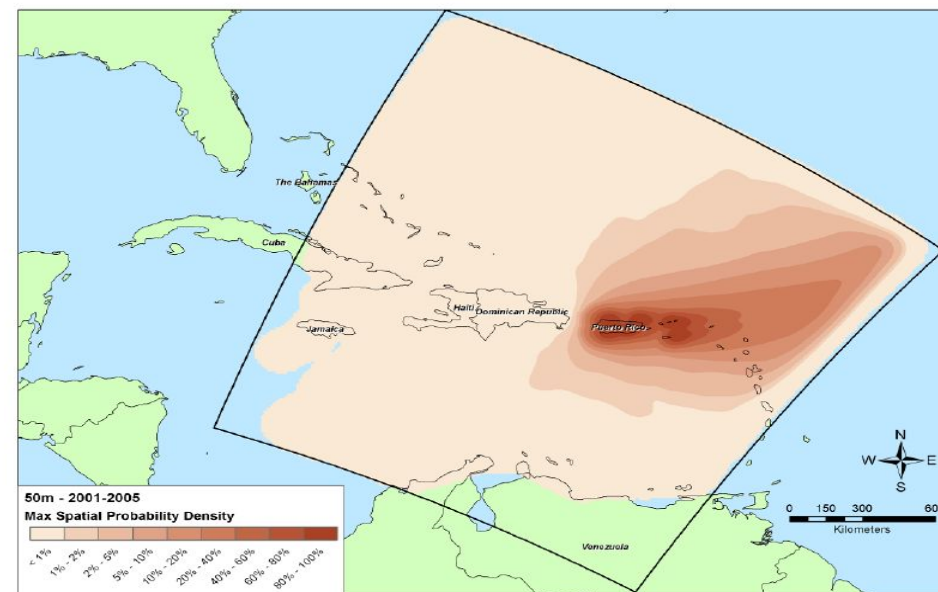


Figure 5-1: Probability that Emissions from Offshore have an Impact on Selected Onshore Sites

1. Emission Control Area



● Adopted by Res.MEPC.202(62) – Effective from 1 January 2013

● Reg.14 (SOx) amended by Res.MEPC.202(62)

(enter into force on 1 January 2013)

U.S Puerto Rico and Virgin Islands (before 1 January 2014)

Sulphur content	Effective Date
4.5 % m/m	Date < 1 Jan. 2012
3.5 % m/m	1 Jan. 2012 ≤ Date < 1 Jan. 2014

U.S Puerto Rico and Virgin Islands (on or after 1 January 2014)

Sulphur content	Effective Date
1.0 % m/m	1 Jan. 2014 ≤ Date < 1 Jan. 2015
0.1 % m/m	1 Jan. 2015 ≤ Date

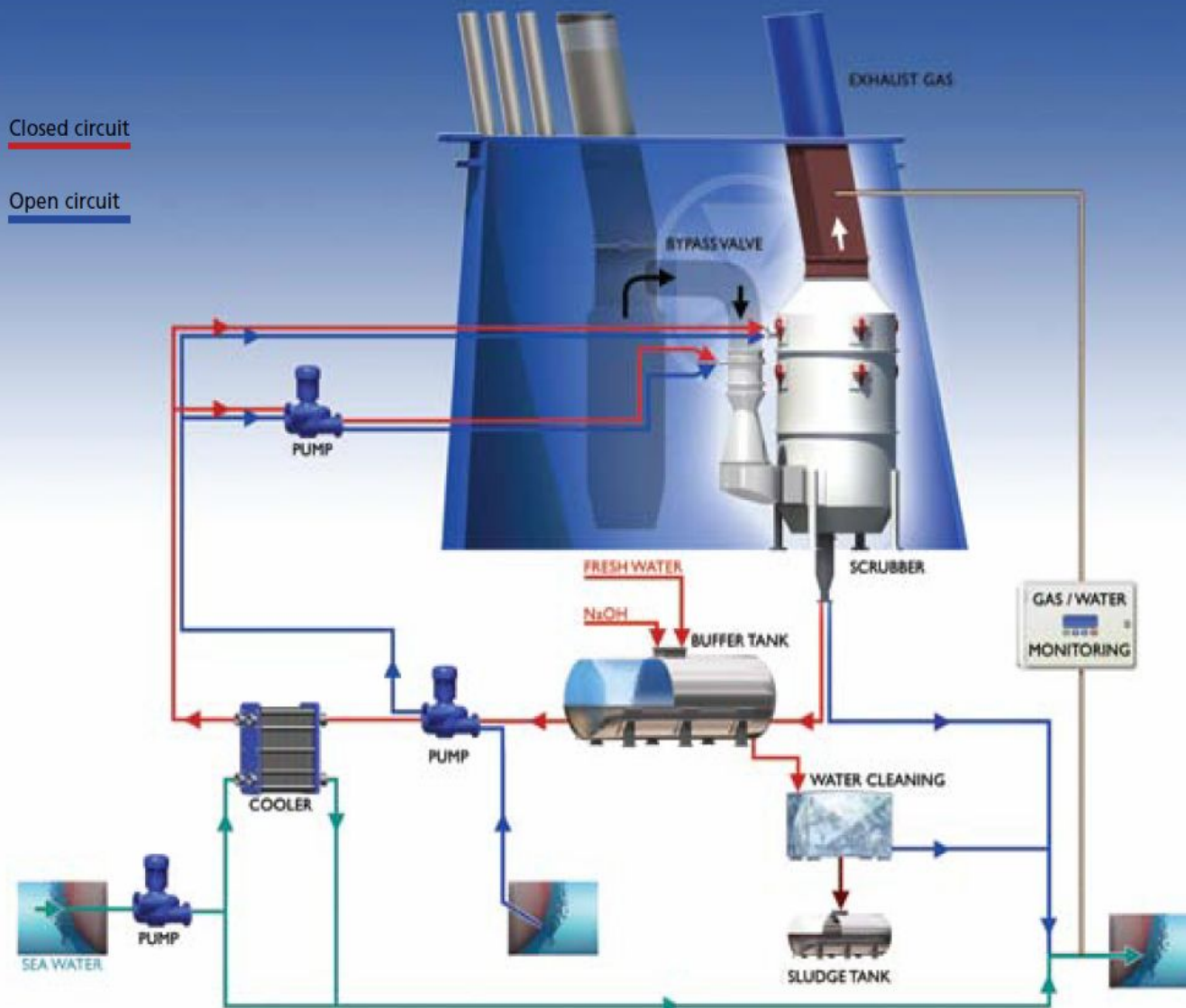
Amendments by Res.MEPC.190(60) are effective from 1 August 2011. However, in accordance with paragraph 7 of this requirement, during the first 12 months following an amendment designating a specific Emission Control Area, ships operating in that Emission Control Area are exempt from the requirements.

1. Emission Control Area



Considerations for Exhaust Gas Cleaning System

Exhaust Gas Cleaning Arrangement



MEPC 59 had adopted the Res.MEPC.184(59) prescribing the rules for certification, verification and documentation of scrubbers and regulations for monitoring and discharge of wash water.

1. Sulphur regulations apply to the all ships regardless of age or keel laying.
2. Fuel Type is not regulated, only sulphur contents, which means that both heavy fuel oil (HFO) and distillate are permitted.
3. Exhaust gas cleaning is an allowed alternative under Regulation 4 of MARPOL Annex VI equivalents.

Source : PureSOx Manufactured by Alfa-Laval

1. Emission Control Area



Nox emission requirements within Emission Control Area

NO_x emission limit

RPM (n = Rated engine speed)	Tier I (Para.3)	Tier II (Para.4)	Tier III (Para.5.1.1)
	1 Jan. 2000 ≤ K/L < 1 Jan. 2011	2011.1.1 ≤ K/L < 1 Jan. 2016	1 Jan. 2016 ≤ K/L
n < 130 rpm	17.0 g/kWh	14.4 g/kWh	3.4 g/kWh
130 rpm ≤ n < 2000 rpm	45.0 * n ^(-0.2) g/kWh	44.0 * n ^(-0.23) g/kWh	9 * n ^(-0.2) g/kWh
2000 rpm ≤ n	9.8 g/kWh	7.7 g/kWh	2.0 g/kWh

20% ↑

80% ↑

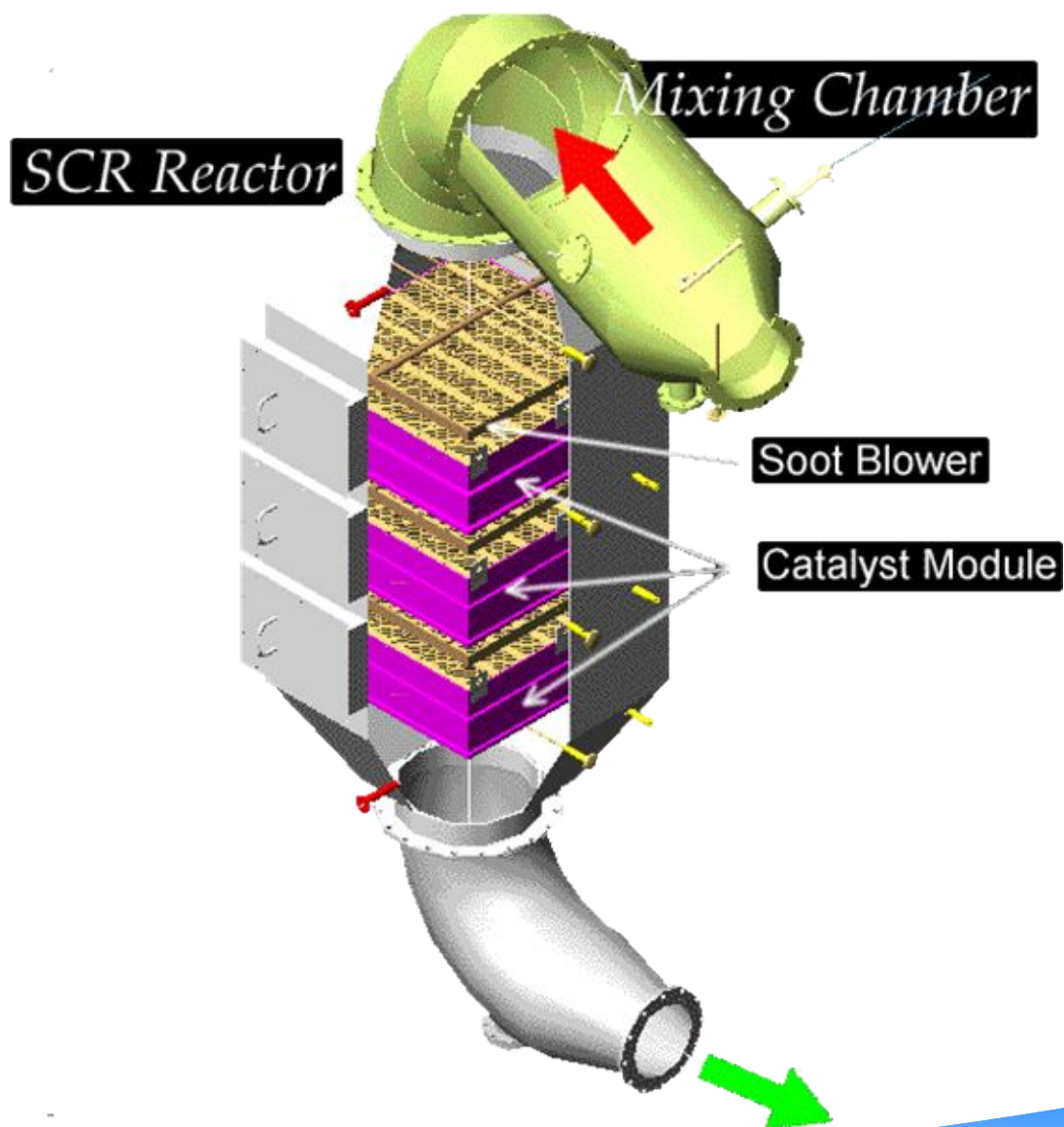
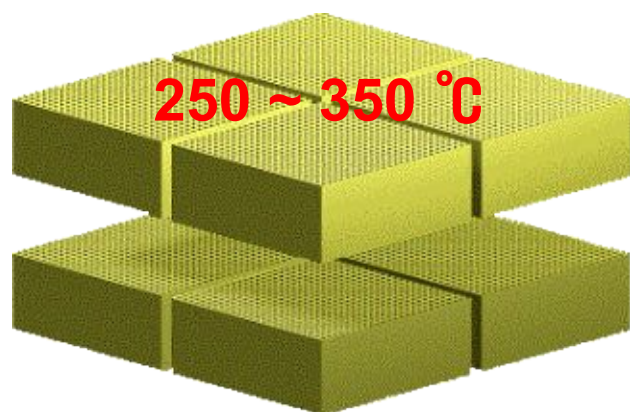
Tier III

- When the ship is operating **in** an Emission Control Area, **Tier III** standards will be applied
- When the ship is operating **outside of** an Emission Control Area, **Tier II** standards will be applied

1. Emission Control Area



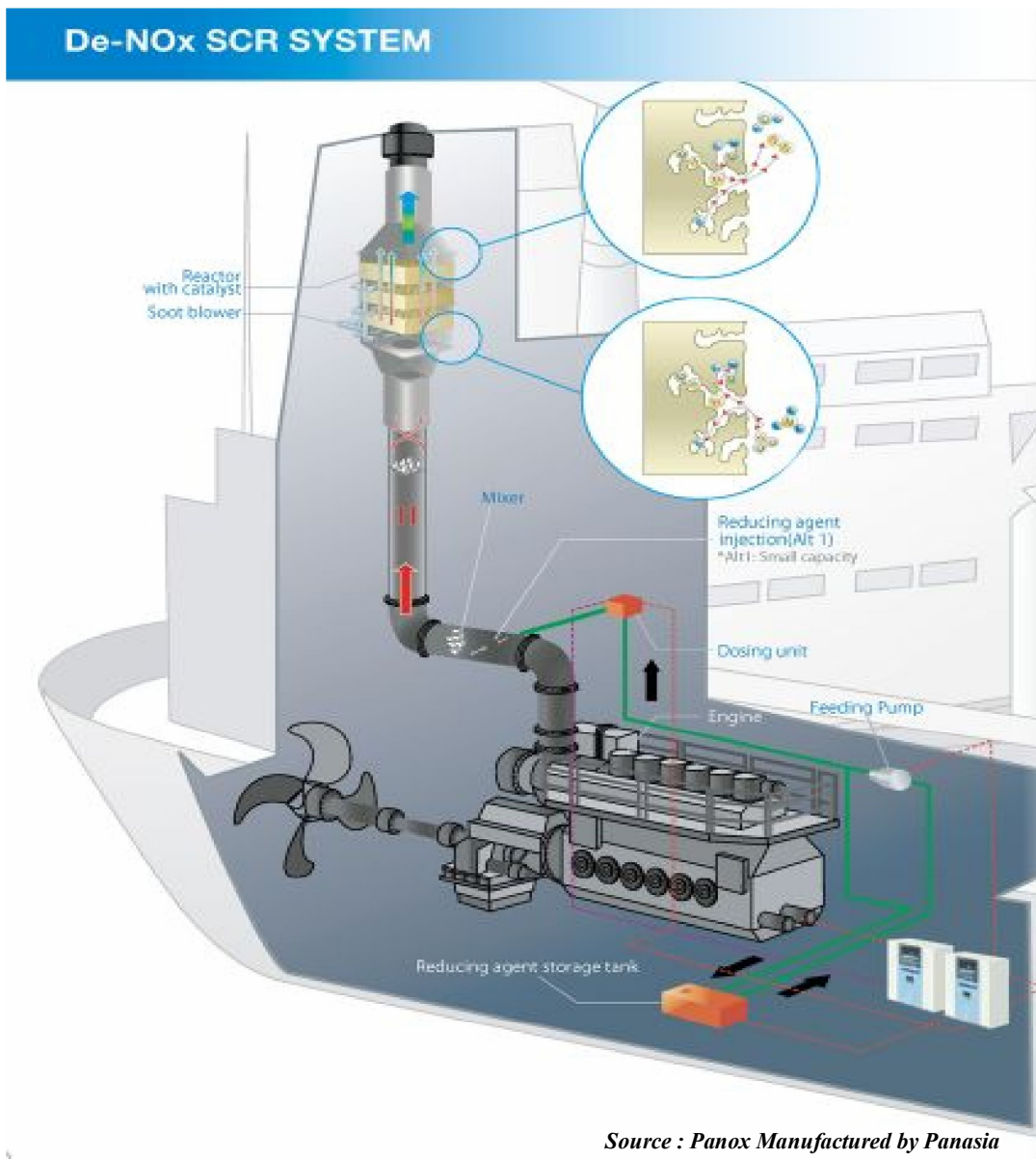
● Considerations for the SCR (Selective Catalytic Reduction)



1. Emission Control Area



Considerations for the SCR (Selective Catalytic Reduction)



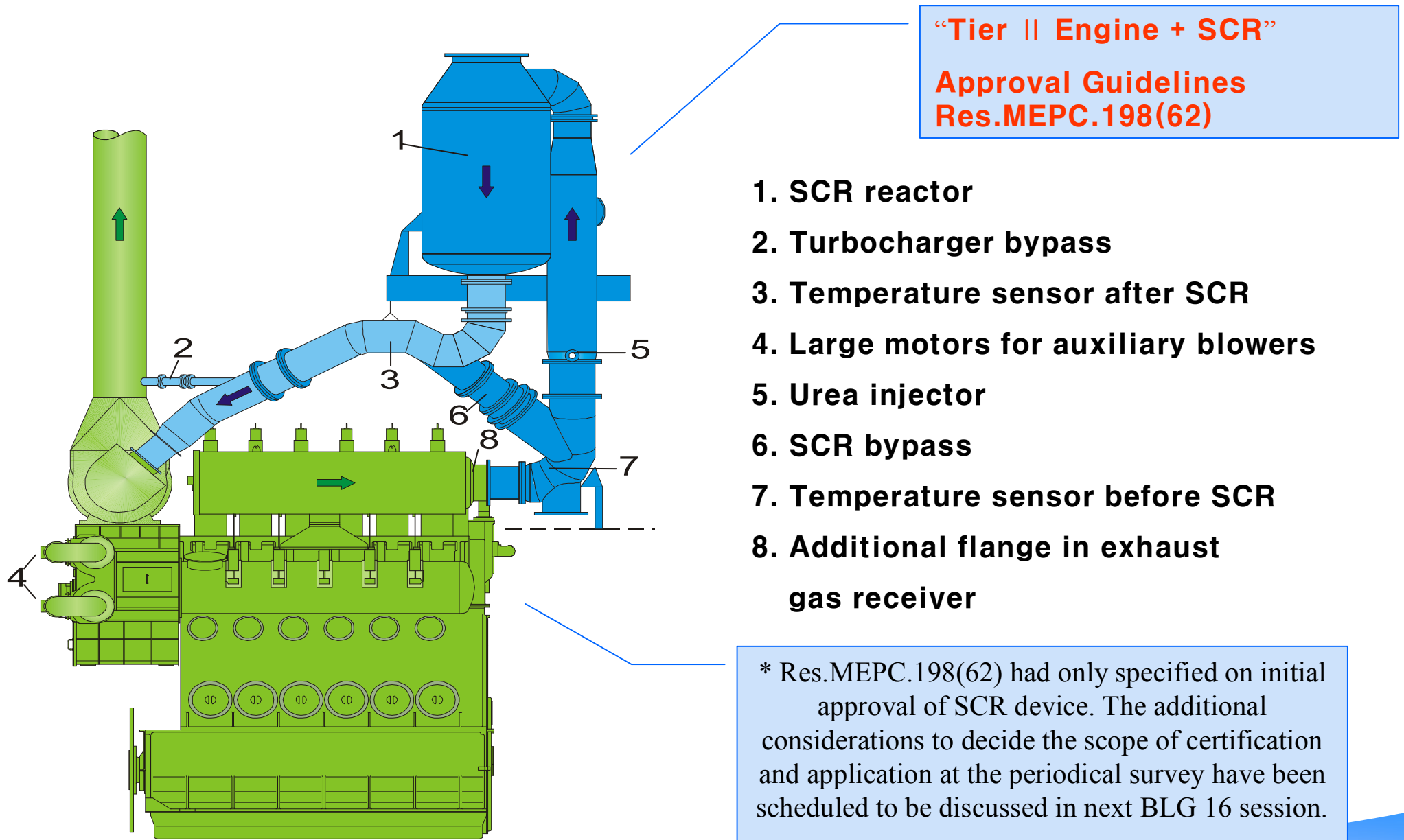
MEPC 62 had adopted the Res.MEPC.198(62) prescribing the additional aspects of the Nox Technical Code 2008 with regard to particular requirements related to marine diesel engines (SCR approval guidelines)

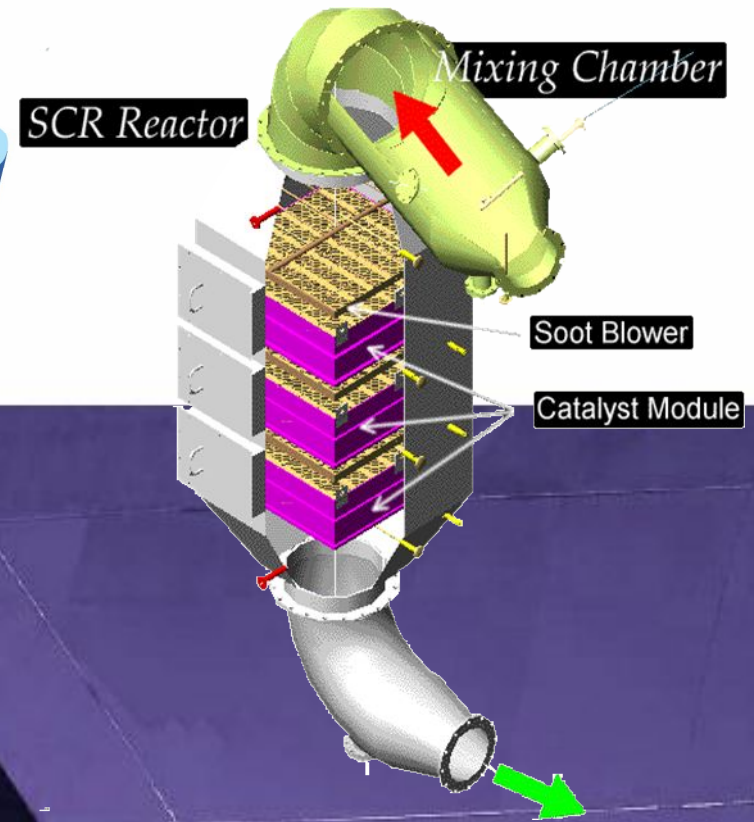
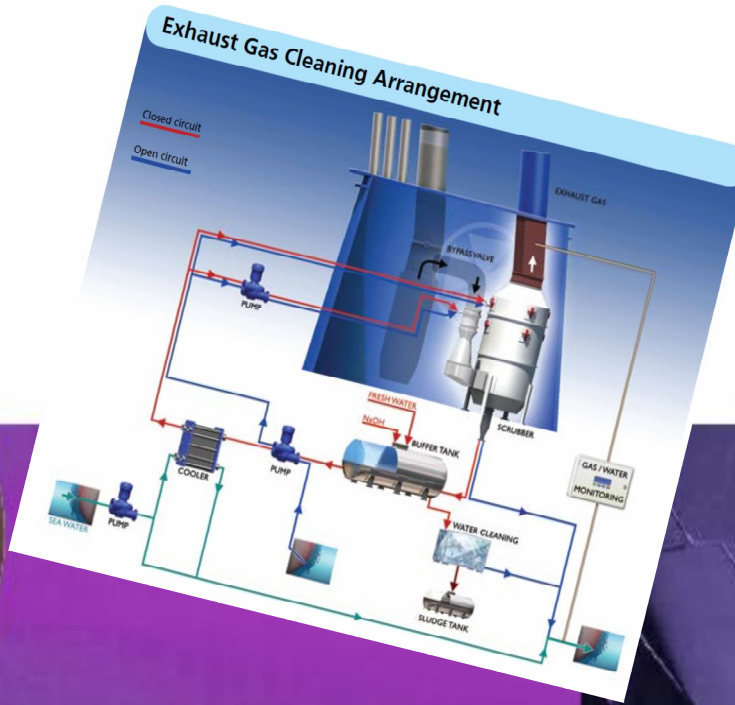
1. Currently available technology relating to the SCR devices consist of some layer of catalyst modules with a number of cells under specified design temperature.
2. The SCR devices shall be designed and installed on board ships in order not to generate the back pressure caused by exhaust gas from diesel engines.
3. Generally, the size of SCR has been assumed to comprise one-third or one-quarter of total engine's size.

1. Emission Control Area



● Considerations for the SCR (Selective Catalytic Reduction)





2. Local Regulation regarding SOx



EU SOx Control – EU Directive 2005/33/EC

Applicable date	Relevant Regulation	Applicable Region	Emission limits and others
2010. 01. 01 ~	2005/33/EC	Ships at berth in EU ports / Inland waterway vessel	<p>Maximum allowable sulphur content of fuel oil used by ships at berth and inland waterway vessel will be 0.10% m/m</p> <ol style="list-style-type: none"> 1. The time of any fuel-changeover operation to be recorded in ship's logbooks 2. A sealed sample of signed by the representative of the receiving ship and keeping on board 3. "At Berth" covers ships at anchorage, on buoys or alongside. Whether or not they are working cargo 4. This covers all grades of fuel oil and all types of combustion machinery including boilers 5. Exemption <ul style="list-style-type: none"> - This shall not apply to ships in operation but ships at berth - This shall not apply to any use of fuels for the purpose of securing the safety of a ship or saving life at sea - This shall not apply to ships which are timetabled to be at berth for less than two hours and to ships which switch off all engines and use shoreside electricity while at berth in ports

2. Local Regulation regarding SOx



California Sulphur limit requirements

Applicable Region	Application year and SOx limit	
24nm ZONE	NOW 2009.07.01 ~	- MGO not greater than 1.5 % m/m - MDO not greater than 0.5 % m/m
	2012.01.01 ~	- MGO not greater than 0.1 % m/m - MDO not greater than 0.1% m/m

* HFO (Heavy Fuel Oil) can not be used within the applicable region

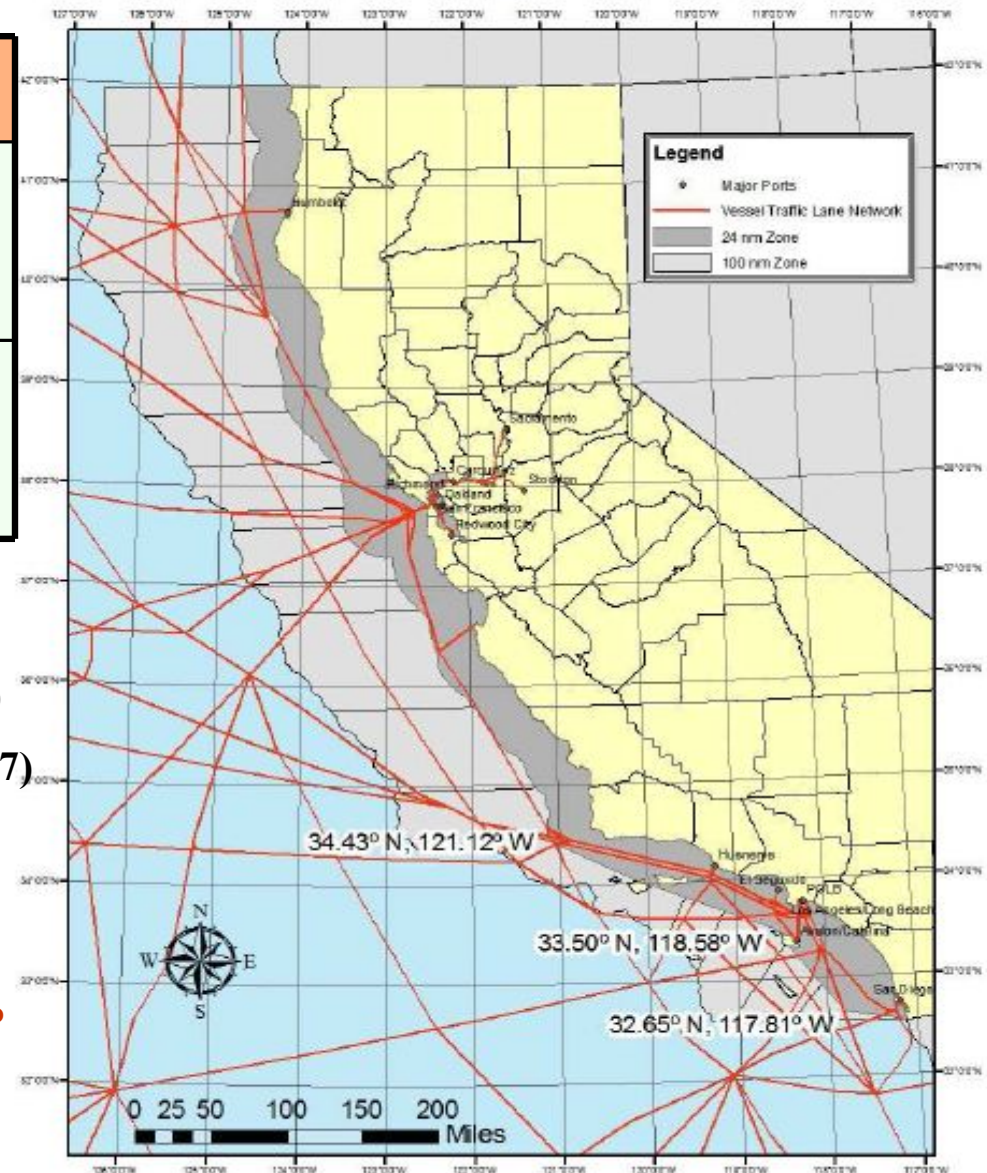
MGO: (Marine Gas Oil, DMA according to the ISO 8217)

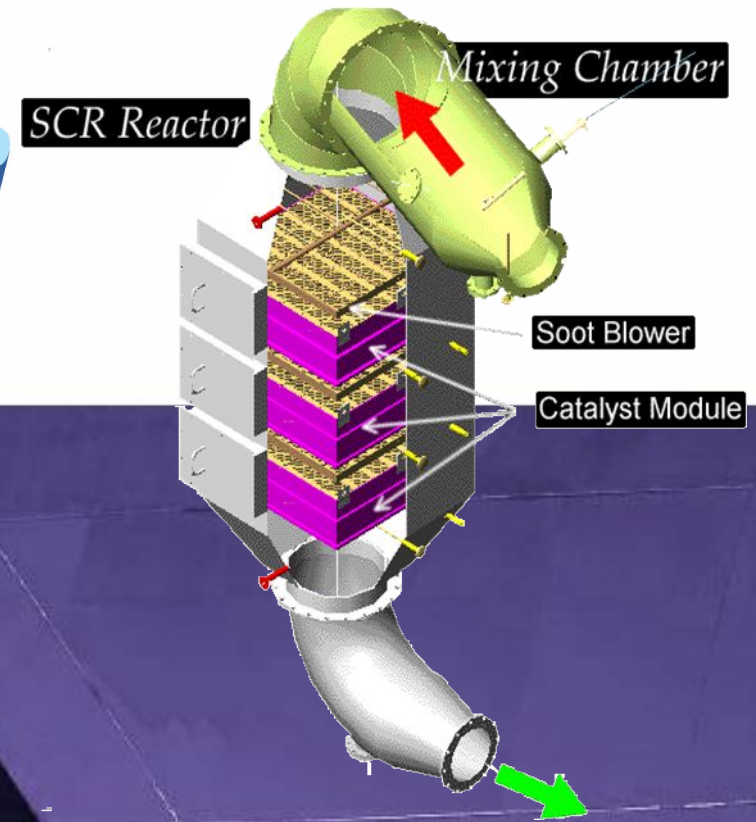
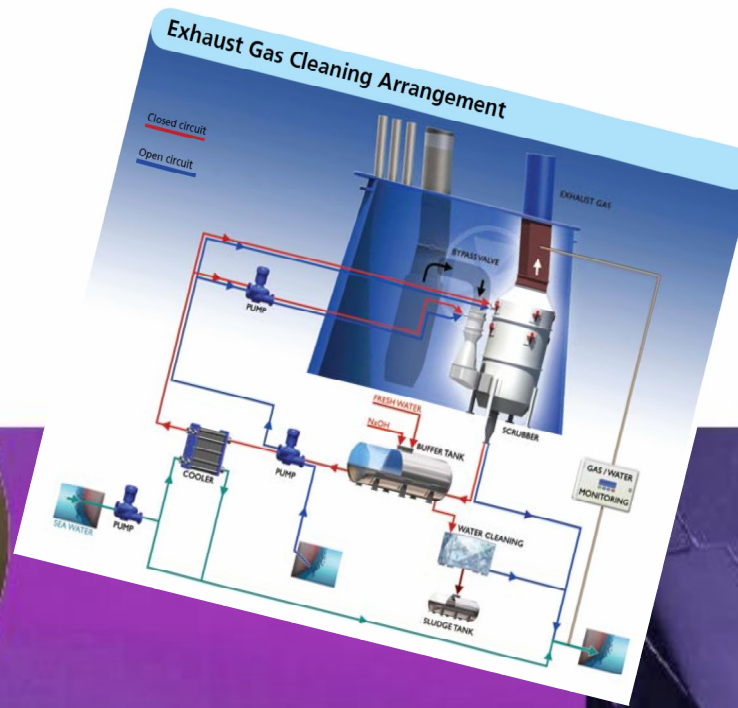
MDO: (Marine Diesel Oil, DMB according to the ISO 8217)

** Amendments to the California Sulphur Limits

- The implementation of proposed sulphur requirements which will be effective from 1 January 2012 (MGO not greater than 0.1% m/m and MDO not greater than 0.1% m/m) have been postponed by 1 January 2014 according to the “Fuel Sulphur and other operational requirements for ocean-going vessels within California waters and 24 nautical miles of the California Baseline”

Regulated California Waters(24nm Zone)





3. Sulphur Contents in Fuel Oil



3. Sulphur Contents in Fuel Oil



● Sulphur limits requirements the outside of emission control area

Sulphur content	Effective Date
4.5 % m/m	Date < 1 Jan. 2012
3.5 % m/m	1 Jan. 2012 ≤ Date < 1 Jan. 2020
0.5 % m/m	1 Jan. 2020 ≤ Date Review by 2018 and if not reasonably applicable by that time then become effective from 2025

- According to the Reg.14.1 of MARPOL Annex VI, the sulphur limits of fuel oil used onboard ships operating the outside of emission control area will be stringent from 4.5% m/m to 3.5% m/m on or ar after 1 January 2012.
- As all of the fuel oil systems on board ships shall be filled with the fuel oil not greater than 3.5% m/m sulphur limits from the effective date, these requirements shall be applied to the ships not the supplying time but the using time of fuel oil.

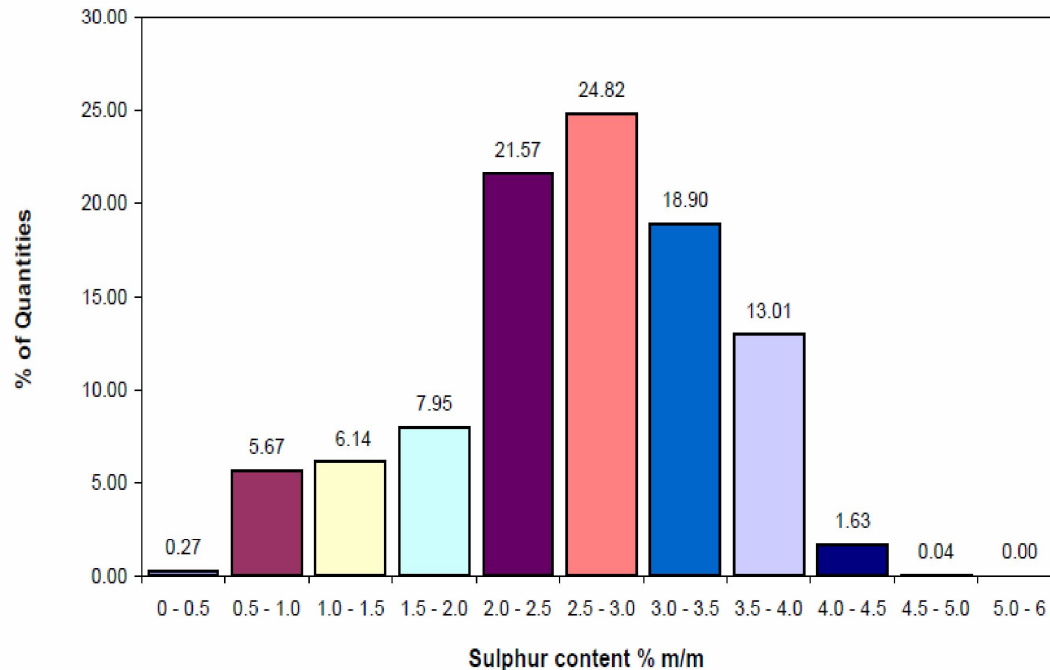
3. Sulphur Contents in Fuel Oil



Sulphur monitoring for 2010 proposed by IMO Secretariat

Sulphur Distribution for Residual Fuel

Average Sulphur Content 2.61% m/m



1. As shown in the paragraph, the average sulphur content of the tested residual fuels has increased since 2009 by 2010 percentage points from 2.60% to 2.61%.

2. The distribution of samples shows that 5.94% of the samples are below 1.0% m/m sulphur content in contrast to last year's 3.7% as the 1.00% m/m sulphur limit within Emission Control Area became effective on or after 1 July 2010.

Sulphur monitoring programme 2009 – 2010

Year	Document reference	Corresponding quantity of residual fuel oil (tonnes)	Number of samples tested	Tonnes per bunkering	Average sulphur content
2009	MEPC 61/4	94,323,860 tonnes	106,503	886	2.60%
2010	MEPC 62/4	91,554,245 tonnes	101,894	899	2.61%

● Black Carbon and Particular Matter

1. Initial discussion on Particular Matter, especially, Black Carbon affecting Arctic region has been proposed by Norway at MEPC 60 session
2. There was no definition of Black Carbon and no future work frame to formalize the discussion on the reduction of Particular Matter from international shipping industry

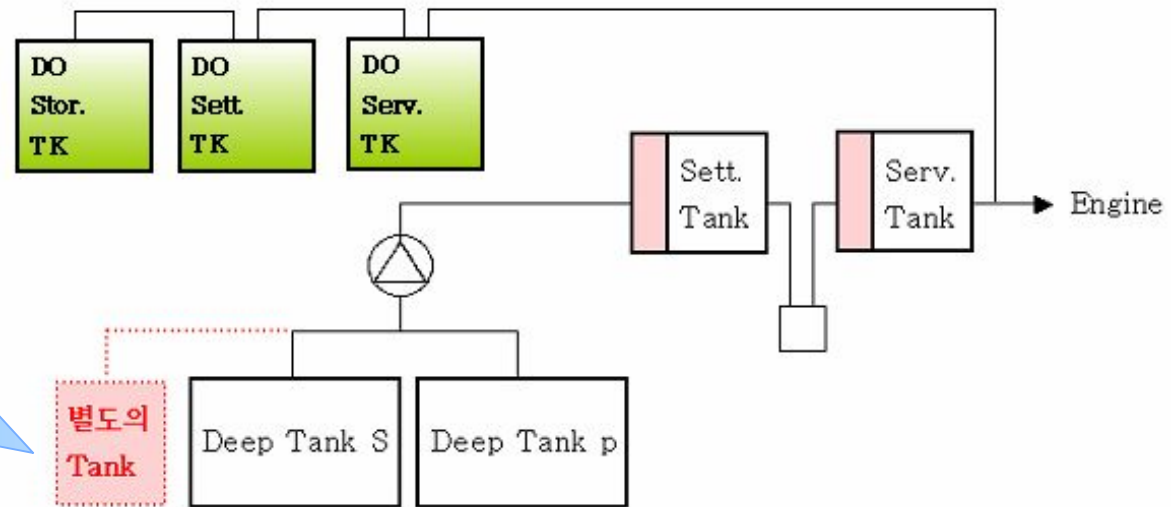
1. develop a definition for Black Carbon emissions from international shipping industry
2. consider measurement methods for Black Carbon and identify the most appropriate method for measuring Black Carbon emissions from international shipping
3. investigate appropriate control measures to reduce Black Carbon emission from international shipping
4. develop a draft IMO framework for reduction of emissions of Black Carbon, and especially consider the possible scope and implications for enforcement of such a framework
5. submit a final report to MEPC 65, detailed discussion will be held in BLG 16th

3. Sulphur Contents in Fuel Oil



● Considerations for the use of Low Sulphur Fuel Oil (LSFO)

Ex)
A case of the using of Marine Gas Oil
→ The application of Cooling Solution shall be considered



1. Viscosity : fuel oil cooler might be installed in the supply system to achieve the required viscosity for fuel injection

2. Fuel Oil Tank and Piping System : tank capacity and arrangement for each fuel oil (HFO, MDO, MGO) shall be considered. Especially, Low sulphur fuel oil tanks should not be located directly adjacent to hot HFO tank walls and fuel return lines have to be considered to avoid possible contamination of low sulphur fuel by other fuels

Thank You !



**Is there any question if you want to later,
Please contact to below e-mail address
Kr-clt@krs.co.kr**