

NOTE: This is a presentation outline by an IMO officer, however it should not be taken as representing IMO's official position.

# IMO'S ROLE

(IN THE REGULATORY JIGSAW)

- 1 International Shipping must be regulated at global level.
- 2 IMO is the appropriate forum to regulate international shipping (by setting the **highest practicable standards**), including maritime safety and security; crew training standards; and prevention of marine pollution from ships.
  - SOLAS
  - MARPOL
  - COLREG
  - STCW
  - .....
- 3 OTHERWISE .....

# ENVIRONMENTAL HAZARDS ASSOCIATED WITH SHIPPING

## 1 Operational discharges

(oil, oily mixtures, slops, dirty ballast water; noxious liquid substances; sewage; garbage; air pollution.....)

## 2 Accidental pollution

## 3 Harmful anti-fouling paints

## 4 Harmful aquatic organisms

## 5 Physical damage to marine habitats

.....

# IMO'S ENVIRONMENTAL CONVENTIONS

## AN OVERVIEW

- MARPOL (15/50%)  
(143 State Parties, 98% of tonnage)
  - ANNEX I (Oils)
  - ANNEX II (NLS in bulk)
  - ANNEX III (Harmful Substances in Packaged Form)
  - ANNEX IV (Sewage)
  - ANNEX V (Garbage)
  - ANNEX VI (Air Pollution)
- 1990 OPRC (15)
- 2000 OPRC-HNS (15)
- 2001 AFS (25/25%)
- 2004 BWM CONVENTION (30/35%)
- 2009 CONVENTION ON SHIP RECYCLING ?
- 1972 LC AND 1996 PROTOCOL TO LC
- CLC/FUND/HNS/BUNKERS/INTERVENTION

# MARPOL ANNEX VI

- ADOPTED IN SEPTEMBER 1997
- APPLIES TO ALL SHIPS (Survey & Certification: ships of 400 GRT and over )
- OZONE –DEPLETING SUBSTANCES- PROHIBITED
- NO<sub>x</sub> TECHNICAL CODE (FOR MARINE DIESEL ENGINES)
- SO<sub>x</sub> (FOR ANY FUEL OIL, SULPHUR CONTENT < 4.5%)
- SO<sub>x</sub> EMISSION CONTROL AREAS (SULPHUR CONTENT < 1.5%)
- VOLATILE ORGANIC COMPOUNDS (VOCs)

## MARPOL ANNEX VI

- Adopted in September 1997 (by consensus)
- 15/50%
- Entered into force on 19 May 2005
- After almost 8 years
- Why the delay?
- By the time in force, it is time to revise!
- So far, 47 Parties, 75% tonnage
- Some EU countries are still not Parties to Annex VI

## **THE NEED TO REVISE**

- IMO's monitoring shows the world average sulphur content in fuel oil is 2.7% over the last 5 years
- Experience in implementation
- Technological progress
- To further reduce air pollution from ships!

# TO REDUCE VOC EMISSIONS

**VOC** (Volatile Organic Compounds) are a mixture of light end components (methane to octane) in crude oil, which are emitted from the oil and oil products during production, processing, loading, transport, unloading and storage.

- Port State to regulate
- If so, inform IMO to notify other States
- Port to provide vapour control systems
- Tankers to provide vapour collection systems and shall use them during cargo loading

**The solution** to reduce VOC emissions is to redesign the loading system in order to prevent under pressure to occur and to establish a positive pressure in the loading arrangement.

# TO REDUCE NO<sub>x</sub> EMISSIONS

- The existing Regulation 13 applies to marine diesel engines with a power output of >130kW installed on ships constructed on or after 1/1/2000 (referred to as “new ships”)
- NO<sub>x</sub> Technical Code
- NO<sub>x</sub> emissions within limits:

17g/kW.h- less than 130rpm  
9.8g/kW.h- 2000rpm or more

(As compared with unregulated engines,  
a 6 to10% reduction)

(The operation of a marine diesel engine is also permitted when an “exhaust gas cleaning system” is installed.)

Leading engine manufacturers have confirmed that NO<sub>x</sub> emissions can be significantly reduced for engines made before 1/1/2000 through valve upgrades and other routine maintenance.



# TO REDUCE SO<sub>x</sub> EMISSIONS

- Only two ways :

One is to use low sulphur fuel oil; and  
the other is to remove the sulphur from the exhaust stream

- MEPC adopted “Guidelines for exhaust gas cleaning systems” or exhaust gas scrubbers. (Where will the waste streams from the scrubbers go?)
- MEPC is finalizing the washwater discharge criteria for such systems.

## **TO INCLUDE PM IN THE REVISION?**

- Particulate matter - a mixture of solid particles (soot in smoke)
- The impact of PM emissions is linked to harmful effects on human health
- Not in the current MARPOL Annex VI
- Will be addressed in proposed amendments to Annex VI

# **OUTCOME OF BLG 11 (April 2007)**

## **BLG 11 reached agreement on:**

- Introduction of VOC management plans for tankers
- A three tier approach on NOx limits for new engines
- Recording of handling of ozone depleting substances

## **BLG 11 to reach agreement on:**

- Reduction of SOx and PM emissions and related fuel issues
- NOx and PM limits for existing engines

## **Work remains on:**

- PM definitions and measurement methods
- Implementation and enforcement matters
- The NOx Technical Code and related Guidelines

**One hot issue:** To switch from residual fuel (heavy fuel oil - HFO) to distillates (marine diesel oil – MDO)?  
(what goes into the engine or what comes out if it?)

# **NO<sub>x</sub> limits for new engines**

## **A three tier approach on NO<sub>x</sub> limits for new engines**

- Tier I**            **Current limits in regulation 13**  
(17g/kW.h - less than 130 rpm  
9.8g/kW.h -2000 rpm or more)
- Tier II**            **Best available in-engine technology**  
Potential reductions of 15 to 25 %\*  
Tentative implementation date  
1 January 2011
- Tier III**           **Further engine development or the use of  
different after-treatment technologies**  
  
Potential reductions of 40 – 85 %\*  
Tentative implementation date 2015/2016

\* - calculated from Tier I

**Note:** A change in the quality of fuel used in engines will have a significant impact upon NO<sub>x</sub> emissions.

Fuel quality, together with other methodologies, could achieve cumulative reductions.

# OPTIONS TO ADDRESS SO<sub>x</sub> AND PM EMISSIONS (BLG 11)

## OPTION A STATUS QUO

No change from the current requirements of regulation 14

## OPTION B CHANGE TO SECA REQUIREMENTS

Keep the current structure of regulation 14 with:

- A Global Sulphur cap (unchanged)
- SECA Sulphur cap lowered in two tiers as follows:
  - 1.0% in [2010]
  - 0.5% in [2015]

## OPTION C CHANGE TO DISTILLATE FUELS

This is a fuel solution which would require:

- Use of distillate fuels for all ships as follows
- A Global Sulphur cap
  - 1.0% in [2012]\*
  - 0.5% in [2015]
- Include in MARPOL Annex VI the specification for the distillate fuel to be used by ships.

\* Members of the Working Group discussed the time required to ensure that adequate refining capacity is in place to supply distillate fuels as specified in Option C. Recognizing this debate, the dates of 2012 and 2015 will require further examination and discussion.

Note: **OPTION C2:** - Global caps as specified in Option C, but allows for alternative mechanisms (such as an exhaust gas cleaning system) in combination with residual fuel oil with a higher sulphur content (maximum 4.50% m/m or lower) to obtain an equivalent level of emission reduction as in C for SO<sub>x</sub> and PM.

# Scientific Group of Experts

## **To assess:**

The number of ships the amended Annex VI will apply (distributed by gross tonnage/installed power).

The volume of fuel being consumed by international shipping, showing the proportion of distillate and residual fuels.

The predicted fuel and emission trends leading to 2020, based on current MARPOL Annex VI regulations .

Any other relevant trends in the global fuel markets and the world fleet leading up to 2020.

The consequential impact on CO<sub>2</sub> emissions from ships and refineries.

The study will not aim at promoting any particular position; instead it will gather and present facts and data that will facilitate the MEPC's decision-making process.

The Group will focus on reviewing the impact on the environment, on human health and on the shipping and petroleum industries, of applying any of the options identified, starting with assessing a number of basic parameters and studying consequential impacts.

## **SCIENTIFIC GROUP OF EXPERTS**

The Study will evaluate the repercussions for the relevant industry sectors (shipping, petroleum, bunkering, engine and equipment manufacturers), resulting from application of those options requiring specific fuels, to ascertaining the feasibility and the global availability of the fuels in question; and the implications arising from various proposed implementation dates (e.g. 2012, 2015, 2018, etc.), taking into account commercial considerations for different trades and segments of the shipping industry.

The study is conducted by a group of selected experts, nominated by Member Governments and industry organizations.

The Group is working under a very tight time schedule and will deliver its report by mid December 2007 to avoid any delay, and so both BLG 12 and MEPC 57 can benefit from its work.

# THE REVISION PROCESS

- Annex VI entered into force on 19 May 2005
- MEPC 53 (July 2005) decided to revise and tasked the BLG Sub-Committee (target completion date of 2007)
- BLG 10(April 2006) started the work and established two intersessional CGs
- BLG-WGAP 1 (November 2006, Oslo)
- BLG 11 (April 2007) made progress
- MEPC 56 (July 2007 reviewed progress:
  - Extension by one year
  - SG's Scientific Group of Experts
- BLG-WGAP 2 (November 2007, Berlin)
- BLG 12 (February 2008) to finalize all amendments
- MEPC 57 (April 2008) to approve amendments
- MEPC 58 (October 2008) to adopt amendments
- MARPOL Article 16: Tacit acceptance procedure, 10+6 months, to enter into force on 1 February 2010.



# CLIMATE CHANGE

## UNFCCC:

- Adopted in 1992
- Entered into force in 1994 (189 Parties)
- Setting out a framework for actions

## Kyoto Protocol:

- Adopted in 1997
- Entered into force in 2005 (166 Parties)
- Annex I parties to reduce their overall emissions of six greenhouse gases by an average of 5.2% below the 1990 level between 2008-2012 (the first commitment period)
- **THE STARK REALITY!**

# **Reduction of GHG from Ships**

## **Resolution A.719(17) adopted in 1991**

Recognized the urgent necessity of establishing a policy on the prevention of air pollution from ships, leading to the adoption of MARPOL Annex VI

## **Air Pollution Conference in September 1997**

**Resolution 8 on “CO<sub>2</sub> emissions from ships” invites IMO to:**

- 1 co-operate with UNFCCC
- 2 undertake a study of GHG emissions
- 3 consider feasible GHG emissions reduction strategies

# IMO GHG study 2000

- MARINTEK, Norway;
- Carnegie Mellon University, United States;
- Det Norske Veritas, Norway; and
- ECON, Center for Economic Analysis, Norway.

The report of the Study was submitted to MEPC 45 (October 2000).

Financed by Denmark, the Netherlands, Norway, Sweden, United States, and the European Commission.

Shipping emitted 1.8% to the world total CO<sub>2</sub> emissions based on figures for 1996

The Study also stated that there was no other mode of transport with a better record than sea-transport. Nevertheless, it identified a number of areas in which there were considerable potential for reduction of CO<sub>2</sub> emissions.

# **IMO 2000 STUDY**

## **Summary of conclusions**

- **Significant potential for reduction from operational measures**
  - Implementation of some operational measures will require participation from others than shipowners
- **Technical measures easier to implement through regulations**
  - Implementing technical measures through new ships more feasible than retrofitting existing ships
  - Measures related to hull, engines and propeller are general measures for energy savings
- **Limited potential to prevent growth in the total emissions from ships if the increase in demand for sea-transport continues**
- **Shipping is a significant contributor in the development of environmental sustainable transport**

# Potential for CO<sub>2</sub> reduction from the world fleet

**Table- Results from case study**

<b>Estimated potential for reduction of emissions from world fleet</b>					
Reduction measures	Reduction of CO <sub>2</sub> emissions by implementation of measures on world fleet. <sup>1)</sup>				
	2010		2020		
M1. Efficiency rating ME, existing ships	2.3%		2.3%		
M2. Efficiency optimised ME, new ships	1.9%		3.2%		
M3. Stepwise switch from HFO to MDO.	1.6 %		3.0 %		
H1. Optimal hull shape, new ships	6.4%		11.6%		
H2. Propulsion system, new ships	3.1%		5.8%		
H3. Maintenance (hull/propeller), existing ships	2.3%		2.3%		
<b>Theoretical max. from technical measures</b>	<b>17.6%</b>		<b>28.2%</b>		
O1. Speed reduction of 10%	23.3%		23.3%		
O2. Weather routing	0.8%		0.8%		
<b>Estimated world fleet fuel consumption (no measures applied)</b>					
<b>Scenario 1 - No measures</b>			<b>Scenario 2 - No measures</b>		
<b>Annual growth of fleet 1.5%</b>			<b>Annual growth of fleet 3.0%</b>		
	2010	2020		2010	2020
Est. fuel cons. (ME)	165.8 Mt	192.5 Mt	Est. fuel cons. (ME)	203.1 Mt	256.62 Mt
Increase from 2000 <sup>2)</sup>	19%	38%	Increase from 2000 <sup>2)</sup>	36%	72%

<sup>1)</sup> Comparison with base line fleet development when no measures are applied.

<sup>2)</sup> Based on modelled growth of fuel consumption

Denomination M - machinery measure, H - Hull/propulsion measure, O - Operational measure

## To reduce CO<sub>2</sub> emissions by “optimizing the transport chain”:

1. Bigger ships
2. Deep-water ports
3. Cargo and ship owners to plan ahead to avoid port congestion
4. ....

## **IMO's Resolution A.963(23) adopted in 2003**

### **“IMO Policies and Practices Related to the Reduction of Greenhouse Gas Emissions from Ships”:**

- develop a work plan with timetable**
- establishment of GHG baseline**
- develop CO2 indexing methodology**
- consider technical, operational and market-based solutions**
- continue co-operation with UNFCCC and ICAO**

### **Shipping is part of the solution:**

1. Amount of CO2 emitted by ships, planes, trucks...
2. Amount of cargo moved, energy efficiency, cost-effectiveness, ...**in terms of CO2/tonne-mile of cargo carried**

### **Australia's example:**

- Road transport accounts for less than 40% of domestic cargo moved, but is responsible for over 80% of the emissions.
- In comparison, shipping accounts for 22% of the cargo moved, but only 4% of the emissions.

# MEPC IS WORKING

**MEPC 53** (July 2005) approved IMO's "Interim Guidelines for Voluntary Ship CO<sub>2</sub> Emission Indexing for Use in Trials" (MEPC/Circ.471)

**MEPC 55** (October 2006) approved a "Work plan to identify and develop the mechanisms needed to achieve the limitation or reduction of CO<sub>2</sub> emissions from international shipping", and agreed to update the 2000 IMO GHG Study

**The First Meeting** of the Contracting Parties to the 1996 Protocol to the 1972 London Convention adopted, on 2 November 2006, resolution LP 1(1) on "Amendments to include CO<sub>2</sub> sequestration in sub-seabed geological formation in Annex 1 to the London Protocol"

# **MEPC CONTINUES WORKING**

## **MEPC 56 (July 2007) agreed to a timeframe and ToR for the update of the 2000 IMO GHG Study:**

- The Study will be undertaken by an international consortium of renowned research institutes
- A Steering Committee will be established
- Contributions?
- Report to MEPC 59 (July 2009)

## **MEPC 56 established a CG to:**

- Compile and consider different approaches on technical, operational and market based measures
- Report to MEPC 57 for consideration in accordance with the GHG work plan.

**To use clean energy (bio-fuels; nuclear power; wind.....)?**



# LET'S WORK TOGETHER!

- IMO aims to establish global measures at MEPC 59 in July 2009 to reduce GHG emissions from ships before the end of the first commitment period of the Kyoto Protocol (2012)
- 
- IMO will continue to work and work hard.....
- 
- Let's work together!

